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11th WORLD GLAUCOMA CONGRESS

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ABSTRACT BOOK

11th WORLD GLAUCOMA CONGRESS

June 25 - 28, 2025

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RAPID FIRE

P-RP-001

PYRUVATE AND RELATED ENERGETIC METABOLITES MODULATE RESILIENCE AGAINST HIGH GENETIC RISK FOR GLAUCOMA

K Li[1], N Tolman[2], A Segrè[3,4], K Stuart[56], O Zeleznik[3], N Vallabh[7,8], K Hu[5,6], N Zebardast[3], A Hanyuda[9,10], Y Raita[11], C Montgomery[2], C Zhang[2], P Hysi[12,13], R Do[14], A Khawaja[5,6], J Wiggs[3,4], J Kang[15], S John[2,16], L Pasquale[1]

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Background

Glaucoma polygenic risk scores (PRS) can identify disease risk, yet some individuals with high PRS remain unaffected. Factors contributing to this resilience remain unknown. We explored whether plasma metabolites alter glaucoma risk prediction and whether a metabolomic signature of resilience to genetic susceptibility existed.

Methods

Plasma measurements of 168 metabolites were profiled using nuclear magnetic resonance spectroscopy in 4,658 glaucoma cases and 113,040 controls from the UK Biobank. Multivariable logistic regression models incorporated metabolites into PRS-based glaucoma risk assessments, applying multiple comparison corrections. Interactions between metabolic risk scores (MRS) and PRS were assessed for their combined effects on glaucoma risk. A two-sided unpaired t-test, adjusted for age, sex, and covariates, identified a metabolic resilience signature in high PRS individuals without glaucoma. Experimental validation of a nominated resilience biomarker was conducted in a human-relevant murine glaucoma model.

Results

Plasma metabolites alone were weak predictors of glaucoma (Area Under the Curve=0.579) and offered only modest improvement in PRS-based risk models (p=0.004). Nonetheless, individuals in the highest PRS and MRS category had 25-fold higher odds of glaucoma (95% Confidence Interval [CI]=18.8–34.1) compared to those in the lowest category ($P_{interaction}$=0.019). In the top PRS decile, elevated lactate (P=8.8E-12), pyruvate (P=1.9E-10), and citrate (P=0.02) levels were associated with glaucoma resilience. Resilience metabolite levels significantly modified the relationship between PRS and glaucoma risk ($P_{interaction}$=0.0011), with higher total resilience metabolite levels linked to reduced glaucoma risk (Odds Ratio=0.71, 95%CI=0.64–0.80) in the highest PRS quartile. Dietary pyruvate reduced intraocular pressure (IOP) (P=0.002) and optic nerve damage (P<0.0003) in *Lmx1b*^{V265D} mice, supporting its therapeutic potential.

Conclusions

Plasma metabolites modestly enhance PRS-based glaucoma risk models but helped to identify resilience biomarkers to glaucoma despite a high genetic predisposition. Among these, pyruvate demonstrated a role in producing resilience against a high genetic predisposition to glaucoma. These findings suggest potential therapeutic strategies of pyruvate and its metabolites in mitigating glaucoma risk in genetically predisposed individuals.

P-RP-002

A STEP CHANGE IN GLAUCOMA POLYGENIC RISK SCORE PERFORMANCE IMPROVES DISEASE PREDICTION IN ALL MAJOR POPULATIONS AND PROVIDES ENHANCED CLINICAL UTILITY

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Background
Glaucoma is one of the most heritable complex diseases and is the leading cause of irreversible blindness. Glaucoma is characterised by progressive vision loss, with the disease largely preventable through timely treatment. However, early detection is difficult and 50% of patients remain undiagnosed. There is an urgent need to develop better risk assessment tools to personalise screening and improve treatment strategies.

Methods
In collaboration with 23andMe, Inc., we collated genome-wide association study data on 296,757 open angle glaucoma (OAG) cases and 6,240,939 controls, drawn from several major ancestry groups. We supplemented these with glaucoma related traits (eye pressure, optic disc parameters, ocular hypertension; N=320,296) and applied a multitrait model, enabling construction of a glaucoma polygenic risk score (PRS). We evaluated PRS performance for glaucoma risk in independent case-control samples from each ancestry group. We then evaluated the ability of the PRS to predict a range of clinical outcomes.

Results
Our novel PRS showed marked improvements in OAG risk prediction performance in held out testing sets. In the Australian ANZRAG European ancestry data those in the top 10% PRS had 10 fold increased risk (OR=10.0) relative to the remainder (compared to 4.2 for our previously published PRS). Similar performance was seen in the US NEIGHBOR data (OR=9.5 for top 10% versus remainder in European ancestry individuals; OR 6.5 in Latinos). In other ancestry groups, the novel PRS had similar performance to that seen in Europeans using our previous PRS (OR =5.1 and OR=3.8 for top 10% versus the remainder in South Asians in UK Biobank and African Americans in the POAAGG study, respectively). Our PRS effectively stratified an Australian cohort for age at onset with those in the top 10% PRS developing glaucoma 25 years earlier than those in the bottom 10%. The PRS also improved upon our previous PRS in predicting the need for treatment initiation or escalation within 3 years in Australian glaucoma suspects. Finally the PRS predicted need for incisional surgery in advanced glaucoma cases in ANZRAG.

Conclusions
Our novel PRS efficiently identifies individuals at very high-risk of developing glaucoma as well as accelerated disease progression and requirement for trabeculectomy. Risk profiling with the enhanced PRS will enable earlier screening and timely treatment of high-risk individuals, with reduced screening and monitoring costs in those at low risk.

P-RP-003

UNTANGLING THE COMPLEX GENETIC RELATIONSHIP BETWEEN MYOPIA AND OPEN-ANGLE GLAUCOMA

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Background
The increased risk for open-angle glaucoma (OAG) in (high) myopes is well known, however the underlying mechanism remains unclear. We aim to untangle this complex relationship through one-sample Mendelian Randomization analyses for OAG- and myopia-related traits.

Methods
We performed a meta-analysis of 3 population-based cohorts: the EPIC-Norfolk Eye Study, the Busselton Healthy Aging Study, the Rotterdam Study, and a high-myopia case-control study: the Dutch Myopia Study. High myopia was defined as an axial length ≥ 26.0 mm, or a spherical equivalent of ≤ -6.0 diopters if axial length was unknown (excluding participants who had a history of lens or refractive surgery). We tested the association of a myopia genetic risk score (GRS) on OAG and intraocular pressure (IOP), and an OAG GRS on myopia and axial length, using linear and logistic regression models corrected for age and sex. The GRS were calculated using estimates from the latest meta-GWAS for myopia and OAG, respectively. Results were meta-analyzed using generic inverse variance weighted models with random effects.

Results
A total of 20,185 participants were included in the analyses, of whom 1,247 had high-myopia, and 580 had POAG. In the meta-analyses, one standard deviation increase in the myopia GRS was associated with an OR (95% CI) of 1.19 (1.09, 1.30) for OAG, and an OR (95% CI) of 1.29 (1.00, 1.67) for OAG in an 1:4 axial-length matched subset (or spherical equivalent matched if axial length was not available). The OR (95% CI) for OAG in the highest quartile of the myopia GRS compared to the lowest quartile was 1.71 (0.80, 3.66). One standard deviation increase in the OAG GRS was also significantly associated with longer average (95% CI) axial length of 0.08 (0.01, 0.14) mm. There was no significant association between the OAG GRS and high-myopia, although there was a similar upward trend, with an OR (95% CI) of 1.10 (0.91, 1.32). In the Rotterdam Study, high myopics had an average (95% CI) 0.68 (0.42, 0.95) mmHg higher IOP, but the myopia GRS was not associated with IOP (p = 0.103).

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Conclusions

There is evidence of a genetic bidirectional causal association for myopia and OAG. Myopia associated variants increase OAG risk independent of lengthening of the ocular axis, which suggests myopia related genes might affect OAG risk through changes in the cornea, anterior chamber, lens, or optic nerve head structure. Future research should explore alternative biological pathways.

P-RP-004

SINGLE-CELL TRANSCRIPTOMIC PROFILING IDENTIFIES PATHOLOGICAL MECHANISMS OF OPTN (E50K) MICE DURING NTG DEVELOPMENT

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Background

Glaucoma is characterised by progressive degeneration of retinal ganglion cells (RGCs). Many studies have reported retinal glial cells also play an important role in neurons degeneration, whose underlying mechanisms are not well defined. A systematic analysis at the single cell level is crucial for better understanding of the molecular alterations and interactions between RGCs and glial cells during disease progression.

Methods

We performed single-cell RNA sequencing (ScRNA-seq) on different aged OPTN E50K mutant mice, the normal tension glaucoma (NTG) *in vivo* model, to obtain a complete gene expression profile for analysis and verified by pathological methods.

Results

In this study, we used scRNA-seq to map the transcriptome of 210,754 retinal single cell at different stages of NTG disease for the first time, and define the cellular characteristics of RGCs, microglia, Müller cells and astrocytes. RGCs showed significant transcriptional heterogeneity, affecting pathways related to energy metabolism and the alterations of cellular communication with neuroglias at early stage of NTG. E50K mutation initially triggered microglia activation as aging and lead to retinal degeneration through the strengthened cellular interaction of CD74-MIF between disease-associated microglia and RGC. Subsequently müller cells, the main neuroglias in the retina, became gliosis with the increase of age and interacted with microglia through Notch1-TNF pathway, contributing to retinal neuroinflammation in NTG.

Conclusions

Our study is the first to describe transcriptomic and biochemical pathway alterations in RGC and glial cells depending on NTG progression. Microglia activation advanced neuroinflammation corresponding with RGC degeneration and aggravated age-related gliosis of muller cell, suggesting new targets for diagnostic and therapeutic strategies.

P-RP-005

A METABOLOME-WIDE STUDY OF OPEN-ANGLE GLAUCOMA REVEALS UPREGULATED LIPID METABOLISM PATHWAYS

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Background

Metabolomics offers a promising approach to gain insights into underlying mechanisms and uncover potential biomarkers for various diseases. By analyzing metabolic profiles, we aim to identify early metabolic alterations indicative of open-angle glaucoma (OAG) and discover novel targets for therapeutic intervention.

Methods

We used data from two cohorts of the population-based Rotterdam Study (N=2559, mean ± standard deviation age 80 ± 9 years, 57.3% female). A total of 65 (2.5%) participants had OAG. Intraocular pressure (IOP) was adjusted for IOP-lowering medication or surgery. We quantified the thickness of macular retinal layers on OCT using an in-house deep learning algorithm (EyeNED). Genetic risk scores (GRS) for OAG and IOP were calculated from the latest published meta-GWAS. Plasma levels of 940 metabolites were measured by Metabolon Inc. on fasting blood samples. Metabolite set enrichment analysis was performed to identify significant metabolic pathways. Cross-sectional associations with metabolic pathways and individual metabolites were determined using logistic and linear regression models. All analyses were adjusted for age, sex, BMI, and sub-cohort.

Results

The lipid super pathway (LSP) was enriched in participants with a higher IOP (normalized enrichment score [NES]: 2.34), a thinner retinal nerve fiber layer (RNFL; NES: -1.41), a higher OAG GRS (NES: 1.39), and a higher IOP GRS (NES: 1.24). Within the LSP, androgenic steroids, endocannabinoids, dicarboxylate, long-chain monounsaturated fatty acids (FAs), long-chain polyunsaturated FAs, long-chain saturated FAs, medium-chain FAs, phosphatidylethanolamine, pregnenolone steroids, and sphingomyelins were associated with OAG-related parameters. Specifically, 1-palmitoyl-2-docosahexaenoyl-GPE and 1-stearoyl-2-docosahexaenoyl-GPE were significantly associated with increased OAG prevalence, thinner RNFL and thinner inner plexiform layer. A higher IOP GRS was associated with the upregulation of 14 LSP-metabolites; 9 were also associated with a higher IOP. (2 or 3)-decenoate, dodecadienoate, 3-hydroxylaurate, tetradecadienoate, and 3-hydroxydecanoate mediated the association between IOP GRS and IOP by 1.2-1.7% (95%CI: 0.1-3.8%).

Conclusions

Lipid metabolic pathways were found to be significantly associated with OAG-related parameters. These findings suggest that metabolites could serve as potential biomarkers and therapeutic targets, which warrants further investigation.

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P-RP-006

SIX-YEAR RATE OF VISUAL FIELD PROGRESSION IN THE LASER IN GLAUCOMA AND OCULAR HYPERTENSION (LIGHT) TRIAL

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Background

The only recognized modifiable risk factor for glaucoma progression is the intraocular pressure (IOP). However, patients can progress at different rates even when treated to the same target IOP at three years. In this work, we analyse the 6-year rate of visual field (VF) progression in the Laser in Glaucoma and ocular HyperTension (LiGHT) trial, comparing Selective Laser Trabeculoplasty (SLT) and medications (drops) as first-line treatment.

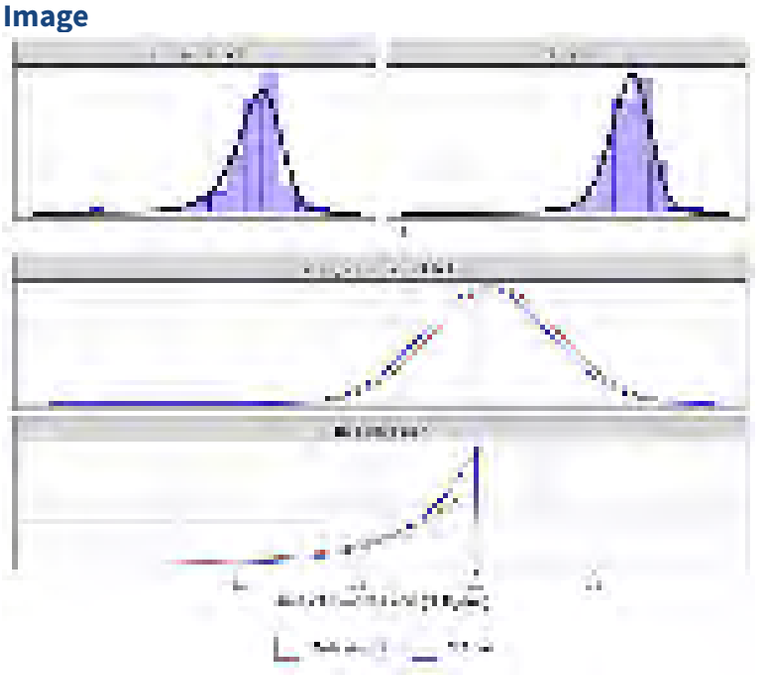
Methods

The LiGHT trial recruited 718 patients newly diagnosed with either open angle glaucoma (OAG) or ocular hypertension, randomised to SLT or drops as first treatment[2]. Treatment escalation was guided by an IOP target, set according to the Canadian Target IOP Workshop[3]. The better eligible eye (more positive Mean Deviation, MD) of each participant with at least 3 reliable 24-2 SITA-Standard VFs (false positive errors < 15%) over at least 6 months were included. A published Bayesian hierarchical model[4] was used to compare the mean rate of MD progression between the two arms. The model allows the separate estimation of the distribution of true rates, assumed to be a negative exponential, from the effect of learning and noise, assumed to be Gaussian[4]. The exponential component also allows direct estimation of the proportion of patients progressing faster than specific rates in the two arms.

Results

Data from 710 eyes (354 SLT-1st) were analyzed. Baseline MD was -2.15 ± 2.69 (Mean ± Standard Deviation) in the SLT-1st arm and -2.13 ± 2.84 in the drops-1st arm (p = 0.723). The true MD rate was -0.26 [-0.31, -0.21] dB/year (Mean [95%-Credible Intervals]) for the SLT-1st arm and -0.37 [-0.43, -0.31] for the drops-1st arm (29% reduction, p = 0.006). The estimated proportion of very fast progressors (true rate < -1 dB/year) was 2.1 [0.8, 4.1]% in the SLT-1st arm and 6.5 [4.0, 9.7]% in the drops-1st arm (Odds Ratio = 3.80 [1.39, 9.06]). The estimated proportion of fast progressors (true rate < -0.5 dB/year) was 14.4 [9.1, 20.2]% in the SLT-1st arm and 25.4 [20.0, 31.1]% in the drops-1st arm (Odds Ratio = 2.15 [1.22, 3.65]).

Image



Conclusions

In the better eligible eye, SLT as a first-line treatment significantly reduced the true rate of progression by 29% compared to drops first, despite both arms having been treated to the same target IOP following pre-determined protocols. One explanation for this effect might lie in the mechanism of action of SLT compared to drops, the effect of which is less related to gaps in dosing and patients' compliance.

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P-RP-007

RETINAL NERVE FIBER LAYER OPTICAL TEXTURE ANALYSIS: THE ASSOCIATION BETWEEN AREA AND ANGLE WITH VISUAL FIELD PROGRESSION

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Background

Glaucoma, a leading cause of irreversible blindness, involves progressive damage to retinal ganglion cells and their axons, leading to structural and functional vision loss.[1] Early detection of glaucoma progression is critical, as timely intervention can significantly slow disease progression and preserve vision.[2] Optical coherence tomography (OCT) is widely used for monitoring glaucoma due to its detailed imaging of the retinal nerve fiber layer (RNFL).[3,4] Emerging techniques, such as RNFL optical texture analysis (ROTA), enhance detection by analyzing subtle texture changes in RNFL, providing insights beyond traditional thickness measurements. This method detects optical texture loss in the RNFL, providing insights into glaucomatous damage that may not be apparent using OCT-based RNFL thickness analysis or red-free RNFL photography.[5,6,7] The purpose of this study was to investigate the association between baseline RNFL bundle defects, measured using ROTA, and visual field progression in glaucoma.

Methods

All eyes underwent 24-2 visual field (VF) testing and a baseline wide-field (12 × 9 mm^2) optical coherence tomography scan for ROTA. The borders of RNFL defects were delineated from ROTA, and the area and angle were calculated for each eye. For eyes with multiple RNFL defects, the total defect area and angle were calculated by summing individual defects. VF progression events were assessed using Guided Progression Analysis. Mixed-effect logistic regression models and survival analysis were performed to evaluate whether baseline RNFL defect area and angle were associated with VF progression.

Results

A total of 219 eyes (including 127 primary open angle glaucoma and 92 glaucoma suspect) from 142 patients were included. 41 eyes (22.8%) showed VF progression during a mean (95% CI) VF follow-up of 5.8 (5.6 to 6.0) years. Eyes with VF progression had significantly larger baseline ROTA RNFL defect areas (25.8 mm^2 vs. 9.3 mm^2, P<0.001) and angles (71.3° vs. 31.3°, P<0.001) compared to non-progressing eyes. In multivariable mixed-effect logistic regression models, larger baseline ROTA RNFL defect area was associated with VF progression (OR 1.18, 95% CI 1.10 to 1.26, per 1 mm^2 larger, P<0.001). Similarly, larger baseline ROTA RNFL defect angle was associated with VF progression (OR 1.11, 95% CI 1.11 to 1.24, per 1° increase, P=0.040). Survival analysis confirmed these results, demonstrating shorter progression-free survival for eyes with larger baseline ROTA RNFL defect areas and angles.

Image

Table 1. Demographic and Clinical Characteristics of the Study Population by Guided Progression Analysis

Variables	Total (n =142, 219 eyes)	Progression (n =41, 50 eyes)	No progression (n =127,169 eyes)	P value
Patient Characteristics				
Age (years)	68.7 (67.0, 70.4)	68.2 (64.8, 71.6)	68.5 (66.7, 70.4)	0.827
Sex (% Female)	78 (54.9%)	23 (56.1%)	70 (55.1%)	1.000
Race (% African American)	31 (21.8%)	7 (17.1 %)	29 (22.8%)	0.516
Eye Characteristics				
Diagnosis (n, %)				
POAG	127 (58.0%)	35 (70.0%)	92 (54.4%)	0.053
Glaucoma suspect	92 (42.0%)	15 (30.0%)	77 (45.6%)	
Axial length (mm)	24.4 (24.2, 24.5)	24.6 (24.2, 24.9)	24.3 (24.1, 24.5)	0.216
Mean IOP during follow-up (mmHg)	15.1 (14.5, 15.6)	15.6 (14.6, 16.6)	14.9 (14.3, 15.6)	0.341
Baseline 24-2 visual field MD (dB)	-3.0 (-3.5, -2.4)	-3.3 (-4.4, -2.2)	-2.8 (-3.4, -2.2)	0.436
Follow-up for VF, years	5.8 (5.6, 6.0)	6.1 (5.6, 6.5)	5.7 (5.5, 6.0)	0.143
Baseline ROTA RNFL defect area (mm^2)	13.0 (11.1, 15.0)	25.8 (20.9, 30.7)	9.3 (7.6, 10.9)	**<0.001**
Baseline ROTA RNFL defect angle (degree)	40.5 (33.4, 47.6)	71.3 (51.2, 91.3)	31.3 (24.8, 37.9)	**<0.001**

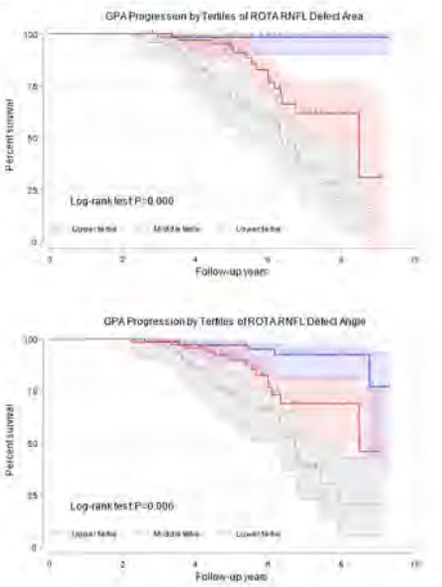
CCT = central corneal thickness; IOP = intraocular pressure; MD = mean deviation; POAG = primary open angle glaucoma; RNFL = retinal nerve fiber layer; ROTA = RNFL optical texture analysis. Values are shown in mean (95% confidence interval), unless otherwise indicated. Statistically significant P values are shown in bold.

Table 2. Factors Contributing to the Visual Field Progression by Univariable and Multivariable Mixed Effect Logistic Regression Analysis

Variables	Univariable Model		Multivariable Model 1 Area		Multivariable Model 2 Angle	
	OR, 95 % CI	P value	OR, 95 % CI	P value	OR, 95 % CI	P value
Age, per 10 years older	1.01 (0.75, 1.35)	0.966	1.28 (0.86, 1.91)	0.228	1.16 (0.82, 1.65)	0.394
Sex: Female	1.10 (0.56, 2.18)	0.781				
Race: African American	0.58 (0.24, 1.39)	0.221				
Axial length, per 1mm longer	1.20 (0.90, 1.61)	0.218	0.79 (0.50, 1.23)	0.296	1.16 (0.83, 1.63)	0.388
Mean IOP during follow-up, per 1 mmHg higher	1.05 (0.95, 1.15)	0.340	1.18 (1.03, 1.35)	**0.017**	1.08 (0.97, 1.21)	0.180
Baseline 24-2 visual field MD, per 1 dB worse	1.03 (0.95, 1.12)	0.422	0.71 (0.54, 0.93)	**0.011**	1.00 (0.88, 1.14)	0.986
Follow-up period, per 1 year longer	1.15 (0.95, 1.39)	0.144				
Baseline ROTA RNFL defect area, per 1 mm^2 larger	1.08 (1.05, 1.11)	**<0.001**	1.18 (1.10, 1.26)	**<0.001**		
Baseline ROTA RNFL defect angle, per 1 degree increase	1.14 (1.04, 1.25)	**0.007**			1.11 (1.01, 1.24)	**0.040**

CCT = central corneal thickness; IOP = intraocular pressure; MD = mean deviation; OCT = optical coherence tomography; RNFL = retinal nerve fiber layer; SQ = scan quality; SSI = signal strength index; VF = visual field. Values are shown in β coefficient (95% confidence interval). Statistically significant P values are shown in bold.

Figure1. GPA progression by tertiles of ROTA



Conclusions

Baseline RNFL bundle defect area and angle, as measured using ROTA, are associated with VF progression in glaucoma. These findings suggest that ROTA-based RNFL metrics may serve as a prognostic marker for identifying eyes at higher risk of progression.

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P-RP-008

OUTCOMES OF ARTIFICIAL INTELLIGENCE (AI)-ENABLED MELBOURNE RAPID FIELDS (MRF) ONLINE PERIMETER IN HOME MONITORING FOR GLAUCOMA

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Background

We assess the reliability of home-based visual field (VF) testing using AI-enabled MRF Online Perimeter compared to clinic-based testing with the Humphrey Field Analyzer (HFA). Previous studies from our group demonstrated that the visual field (VF) can be tested unsupervised at home using MRF with standard iPads (1). This study performed VF tests using patients' home computers with a calibration step to allow for any screen size (>= 9.7 inches).

Methods

52 glaucoma patients (99 eyes) were tasked with performing VF testing at home using MRF Online. Written and verbal instructions were provided to participants. The results were compared to previous outcomes on Humphrey Field Analyzer (HFA) SITA-Faster performed in the clinic. AI-enabled webcam analysis ensured optimal testing conditions (viewing distance, background lighting) and gaze stability.

Results

Patient age ranged from 34 to 87 (average 64.61, SD 12.74). High concordance with HFA was found for Mean Deviation (MD) and Pattern Deviation (PD) with intraclass correlation coefficients (ICC) of 0.88, and 0.78 respectively. Individual MRF Online results were slightly less reliable than HFA [(False-positive% 10.18% vs 7.59%, p=0.05, Fixation loss% 21.01% vs 15.65%, p<0.016)] and had 20% longer testing time (4.19min vs 3.41 min, p<0.001). Bland-Altman analysis returned a bias of -0.69 dB for MD and 95% Limits of Agreement (LoA) of -7.51 dB to 6.12 dB. The PD found a bias of -0.40 dB and 95% LoA of -5.27 dB to 4.48 dB. Test-retest analysis found a high concordance between repeated MRF tests with an ICC range of 0.88 to 0.95 for MD.

Conclusions

The AI-enabled MRF Online perimetry software enables patients to conduct reliable, longitudinal visual field testing from home using their personal computers, delivering outcomes comparable to standard Humphrey Field Analyzer (HFA) testing conducted in the clinic.

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P-RP-009

ACUTE BIOMECHANICAL RESPONSE OF OPTIC NERVE HEAD IN NORMAL TENSION AND HIGH TENSION GLAUCOMA

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Background
To evaluate the morphological changes in the optic nerve head in normal tension glaucoma (NTG) and high tension glaucoma (HTG) following acute intraocular pressure (IOP) elevation

Methods
One eye from each of 307 glaucoma subjects (154 with NTG and 153 with HTG) was randomly selected and imaged using optical coherence tomography (Spectralis, Heidelberg Engineering, Germany). Imaging was conducted under primary gaze and during acute IOP elevation (to approximately 35 mmHg), achieved using an ophthalmodynamometer. Morphological parameters, including lamina cribrosa depth (LCD), prelamina depth (PLD), prelamina thickness (PLT), minimum rim width (MRW), Bruch's membrane opening area (BMO area), and choroidal thickness (ChT), were automatically extracted using Reflectivity software (Abyss Processing Pte Ltd, Singapore).

Results
The majority of subjects were male (193 out of 307, 62.9%) with a mean age of 68.52±6.05 years. Baseline IOP was significantly higher in HTG than in NTG (16.08±4 vs 14.83±3.56, P=0.004), but there was no significant difference in IOP at acute elevation between HTG and NTG (33.86±6.91 vs 35.07±6.77, P=0.121). At baseline, PLT was thicker in HTG than in NTG (174.09±104.25 vs 147.98±84.49, P=0.017), while mean deviation and MRW were lower in HTG compared to NTG (all P<0.05). Upon acute IOP elevation, both PLT and MRW were reduced in both groups (all P<0.05) from their baseline values. However, LCD and PLD increased significantly in HTG, whereas only PLD increased in NTG (all P<0.05) following acute IOP elevation.

Conclusions
Neural tissue thickness decreased following acute IOP elevation in both groups, while connective tissue, such as lamina cribrosa, was deformed only in HTG subjects. This suggests that the two glaucoma subgroups may exhibit inherently different biomechanical properties.

P-RP-010

TIME AND FREQUENCY TO DETECT GLAUCOMA PROGRESSION USING COMBINED PERIPAPILLARY OCT ANGIOGRAPHY VESSEL DENSITY AND RNFL THICKNESS

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Background

Testing strategies in glaucoma management must balance patient burden, progression accuracy, and healthcare costs. Prior studies have found that, with similar testing frequency, optical coherence tomography angiography (OCTA) detects progression slightly earlier than OCT but that both imaging modalities are complementary in their ability to detecting glaucoma. The aim of current study is to evaluate the time and frequency to detect glaucoma progression using combination of circumpapillary retinal nerve fiber layer (cpRNFL) with OCT and circumpapillary capillary density (cpCD) with OCTA in glaucoma.

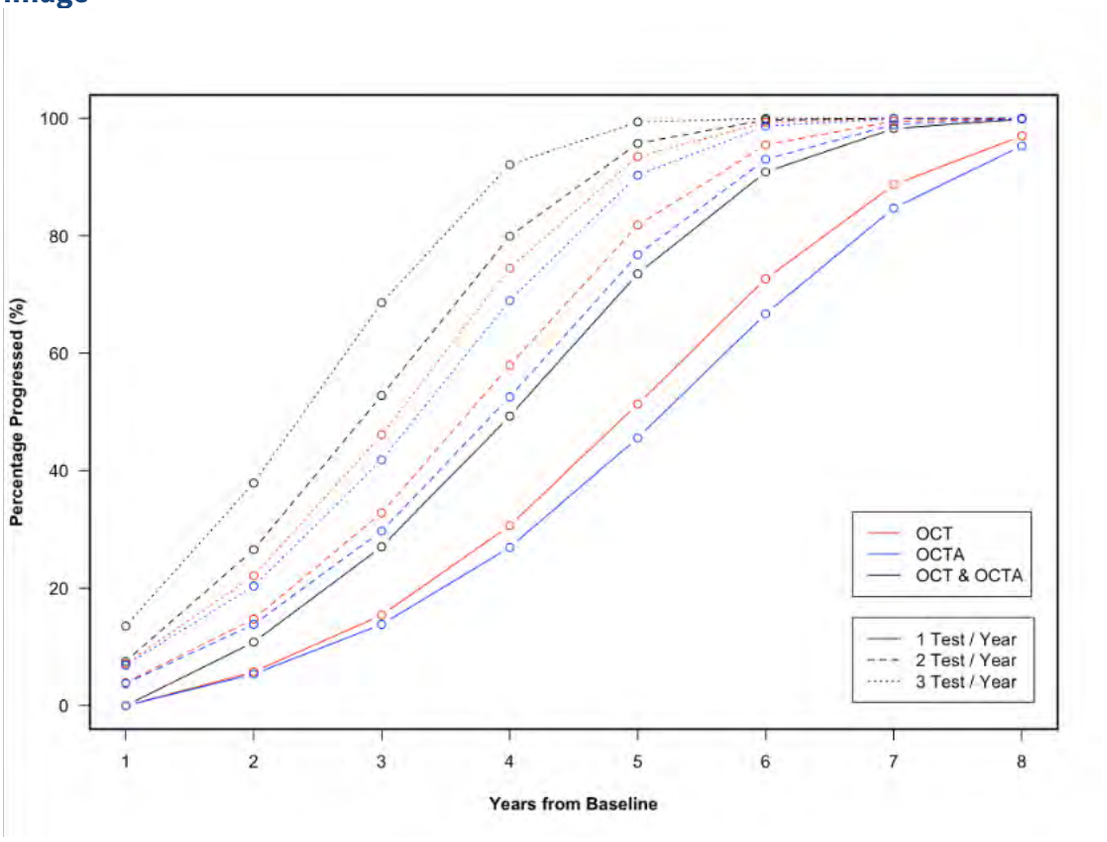
Methods

156 eyes of 98 patients with glaucoma were followed up over an average of 3.5 years with ≥2 years/4 visits enrolled. We created a computer simulation to evaluate the time required to detect progression by cpRNFL, cpCD or a combination of cpRNFL and cpCD. Linear mixed-effects models were utilized to predict cpRNFL and cpCD across follow-up time. Measurements of bilateral eyes were nested within subject to account for inter-eye correlation structures. Using computer simulation, the time required to detect progression at different testing frequencies was evaluated. A significant rate of change of -0.75%/year for VD and -1µm/y for cpRNFL were chosen as the average rates of VD loss and cpRNFL thinning in glaucoma patients based on the report of prior studies.

Results

On average for eyes with cpRNFL rate of thinning faster than or ≤−1µm/y, progression was detected after 5.4, 3.9, and 3.3 years when testing was performed one, two, and three times per year, respectively. For eyes with a cpCD loss faster than or ≤ −0.75 %/year, progression was detected after 5.6, 4.1, and 3.4 years, for similar testing frequency. After addition of OCTA to OCT, progression by either OCT or OCTA was detected sooner which was after 4.5, 3.1, and 2.6 years for similar testing frequency (Figure1). The proportion of progressed eyes at 2 and 5 years was greater when cpRNFL and cpCD testing were used in tandem. With 2 tests per year, the proportion of progressed eyes with cpRNFL thinning of −1.0 µm/year was 14.76% at 2 years and 81.81% at 5 years; the progression of progressed eyes with cpCD thinning of -0.75%/year was 13.84% at 2 years and 76.81% at 5 years. Using OCT and OCTA in tandem, the power to detect progression was higher than either alone, with detection of 26.57% at 2 years and 95.74% at 5 years. This differential remained significant across other testing frequencies.

Image



Conclusions

This study suggests that cpRNFL and cpCD are similarly effective in detecting progression, but that using them together improves our ability to detect glaucoma progression. Increasing the number of tests from two to three per year does not significantly reduce the time required to detect progression, suggesting that two visits per year are sufficient for detecting glaucoma using both cpRNFL and cpCD.

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P-RP-011

RETINAL NERVE FIBER LAYER OPTICAL TEXTURE ANALYSIS: DIAGNOSTIC ACCURACY IN DETECTING ABNORMAL 10-2 VISUAL FIELD DEFECTS

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Background

To evaluate the diagnostic performance of papillary RNFL bundle defects identified using ROTA in detecting abnormal 10-2 visual field (VF) defects.

Methods

In this cross-sectional study, all eyes underwent 10-2 VF testing and wide-field optical coherence tomography for ROTA. Sectoral RNFL defects were classified into six categories: superior arcuate, superior papillomacular, superior papillofoveal, inferior papillofoveal, inferior papillomacular, and inferior arcuate. For the 10-2 VFs, the superior and inferior hemifields were classified as abnormal if a cluster of three points showed probabilities <5%, with at least one point <1% or two points <2%, on the pattern deviation plots. The diagnostic performance of papillary (*i.e.*, papillomacular and papillofoveal) RNFL bundle defect with ROTA in detecting abnormal 10-2 visual field defects was evaluated. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated to assess the accuracy of ROTA in identifying these VF abnormalities.

Results

149 early primary open angle glaucoma (VF mean deviation > -6 dB) eyes from 111 patients were included. ROTA RNFL defect was observed in 107 eyes (71.8%) for superior papillomacula, 48 eyes (32.2%) in papillofoveal, 41 eyes (27.5%) in inferior papillomacular, and 90 eyes (60.4%) in inferior papillomacula. The prevalence of abnormal 10-2 VF defects was 91.3% (95% CI: 85.5–95.3), with a sensitivity of 94.1% (95% CI: 88.7–97.4) and specificity of 69.2% (95% CI: 38.6–90.9) for ROTA in detecting these defects. The positive predictive value (PPV) was 97.0% (95% CI: 92.4–99.2), indicating that most positive ROTA results correctly identified abnormal 10-2 VF defects. However, the negative predictive value (NPV) was 52.9% (95% CI: 27.8–77.0) , suggesting a moderate reliability of negative ROTA results to rule out 10-2 VF abnormalities. The negative likelihood ratio (-LR) was 0.08 (95% CI: 0.04 – 0.18), underscoring the test's ability to significantly reduce the likelihood of 10-2 VF defects when no ROTA defect was present.

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Image

Table: Diagnostic performance of papillary RNFL bundle defects using ROTA in detecting abnormal 10-2 visual field defects

	Equation	Values	95% CI
Prevalence	Pr(A)	91.3%	(85.5, 95.3)
Sensitivity	Pr(+|A)	94.1%	(88.7, 97.4)
Specificity	Pr(-|N)	69.2%	(38.6, 90.9)
ROC area	(Sens. + Spec.)/2	0.82	(0.68, 0.95)
Likelihood ratio (+)	Pr(+|A)/Pr(+|N)	3.06	(1.35, 6.92)
Likelihood ratio (-)	Pr(-|A)/Pr(-|N)	0.08	(0.04, 0.18)
Odds ratio	LR(+)/LR(-)	36	(9.48, 136.36)
Positive predictive value	Pr(A|+)	97.0%	(92.4, 99,2)
Negative predictive value	Pr(N|-)	52.9%	(27.8, 77.0)

Conclusions

ROTA demonstrates high sensitivity and diagnostic accuracy in detecting abnormal 10-2 VF defects. These findings suggest that ROTA could serve as a reliable tool for glaucoma screening, especially for detecting central VF defects and may guide clinicians in determining the optimal timing for supplementing 24-2 with 10-2 VFs for more comprehensive monitoring of the disease.

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P-RP-012

A NOVEL CONTACT LENS SENSOR SYSTEM FOR CONTINUOUS INTRAOCULAR PRESSURE MONITORING: APPARATUS EVALUATION AND CLINICAL APPLICATION RESEARCH IN CHINESE

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Background
Intraocular pressure (IOP) exhibits fluctuation and circadian rhythm. Continuous 24-h IOP monitoring is critical for glaucoma diagnosis and management. A novel contact lens sensor (CLS) system was developed recently for directly output IOP values in mmHg. This research aimed to evaluate its accuracy, safety and tolerability. Also, we used the CLS to explore positional transition induced IOP changes in normal and glaucoma patients, as well as to investigate the 24-h nyctohemeral rhythms in normal Chinese.

Methods
Eighty eyes including 40 normal and 40 glaucoma eyes (with 30 of normal IOP and 10 of high IOP) performed continuous IOP monitoring using CLS in seated and supine. CLS readings during the two positions were respectively compared with Goldmann and Perkins tonometry values before and after CLS wear. Safety and tolerability were assessed in 30 participants undergoing 24-hour CLS wear. The ocular surface disease index, tear break-up time (TBUT), and corneal fluorescein staining (CFS) were assessed before and after wear. Continuous IOP responses to positional changes (sitting-supine-head down tit, 10min respectively) were monitored in 20 normal and 44 untreated glaucoma patients (14 HTG, 16 NTG, and 14 OHT). The IOP was compared among various positions and groups respectively. Finally, 59 normal Chinese adults underwent continuous 24-h IOP monitoring, with 24-h IOP mean, fluctuation, peak, trough were analyzed.

Results
All IOP differences between CLS and GAT/PAT were within ±2mmHg among groups, with or without statistical significance. Correlation analysis showed moderate to very strong consistency ($0.51 \le r \le 0.95$, $P<0.05$) in most comparisons and Bland-Altman analysis showed that over 80% of points were within ±5mmHg. Safety assessment revealed all participants finished 24-hour lens wear. Indicators including OSDI, TBUT and CFS increased immediately after lens removement ($P<0.001$) and the latter two returned to baseline within a day ($P>0.4$). Positional transitions from sitting to supine increased IOP in normal, HTG, and NTG ($P<0.05$), with HTG showing highest and fastest IOP increases ($P<0.05$). OHT exhibiting no significant changes ($P>0.1$). In 24-h IOP monitoring, there was a lower peak, higher trough, smaller fluctuation, and smaller MAPE ($P<0.05$) but non-significantly different mean ($P=0.695$) in the nocturnal period or sleep time compared to the diurnal period. The 24-h IOP peak and trough showed the frequency of occurrence ranging from 1.69%-15.25% at an interval of 2-h.

Conclusions
With good agreement with applanation tonometers, the CLS provides accurate, safe, and tolerable continuous IOP monitoring in normal and glaucomatous eyes across different positions. It effectively records IOP variations induced by positional transitions and physiological nyctohemeral IOP rhythms of normal Chinese. Its clinical application may promote glaucoma management by elucidating dynamic IOP characteristics and optimizing treatment.

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P-RP-013

RESTORATION OF VISION BY GENE THERAPY USING A CONSTITUTIVE ACTIVE FORM OF INSULIN RECEPTOR IN A MOUSE MODEL OF NORMAL TENSION GLAUCOMA

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Background

Topical insulin administration has been shown to restore retinal ganglion cell (RGC) dendrites and visual function after optic nerve axotomy or in the ocular hypertension model [1)]. However, this approach may be limited by transient efficacy and receptor downregulation. We previously demonstrated that gene therapy with a constitutive active form of the tyrosine kinase receptor (TrkB) can protect RGCs and promote axon regeneration in GLAST heterozygous (GLAST$^{+/-}$) mice, a mouse model of normal tension glaucoma [2)]. In this study, we investigated whether gene therapy using a constitutively active insulin receptor (IR) [3)], another tyrosine kinase receptor, could restore vision in GLAST$^{+/-}$ mice.

Methods

To visualize RGC dendrites, GLAST$^{+/-}$ mice were crossed with Thy1-EGFP mice. An adeno-associated virus (AAV) vector carrying a farnesylated intracellular region of IR (AAV-F-iIR), which induces constitutively active insulin signal, was generated. AAV-DsRed was used as a control. AAVs were administered to mice by intravitreal injection at 12 weeks of age, and analyses were performed at 16 weeks of age. These timepoints were chosen because RGC loss in GLAST$^{+/-}$ mice occurs before 12 weeks of age and no significant further reduction is observed between 12 and 16 weeks of age. RGC dendritic morphology was analyzed using Imaris software. Retinal function was assessed by multifocal electroretinogram (mfERG). Visual function was evaluated using optokinetic response (OKR) or visual cliff (VC) tests.

Results

GLAST$^{+/-}$ mice showed significantly shorter RGC dendrites compared to control Thy1-EGFP mice. AAV-F-iIR treatment significantly restored dendrite length, whereas AAV-DsRed did not. OKR-based visual acuity was significantly reduced in the AAV-DsRed-treated GLAST$^{+/-}$ mice (0.25 ± 0.03 c/d) compared to age-matched WT mice (0.47 ± 0.01 c/d) but significantly restored by the AAV-F-iIR (0.36 ± 0.02 c/d). Similarly, depth perception, evaluated by the percentage of time spent in the safe zone during the VC test, was significantly reduced in the AAV-DsRed-treated GLAST$^{+/-}$ mice (51.8 ± 2.8 %) compared to age-matched WT mice (74.9 ± 2.2 %). AAV-F-iIR treatment also led to a significant recovery in VC performance (63.4 ± 2.6 %).

Conclusions

Our novel AAV-F-iIR significantly restores RGC dendrites in GLAST$^{+/-}$ mice. In addition to the structural recovery, AAV-F-iIR also significantly improved retinal and visual function. These findings suggest that a single dose of IR gene therapy is effective for glaucoma, even in the chronic conditions.

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P-RP-014

XEN VERSUS PRESERFLO VERSUS TRABECULECTOMY - A RANDOMIZED CONTROLLED TRIAL

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Background
Glaucoma is one of the leading causes of blindness worldwide. The primary treatment goal in glaucoma management is lowering intraocular pressure (IOP), typically achieved with eye drops or laser therapy. When these methods become insufficient, surgical interventions are considered. Trabeculectomy remains the gold standard in glaucoma surgery. However, there is an increasing use of bleb-forming stents in glaucoma therapy, promising similar pressure reduction with potentially lower risk. Among those are the XEN Gel-Stent and the Preserflo Microshunt.

Methods
This is a single-center, randomized, prospective study. Patients with progressive glaucoma requiring filtration surgery were randomized to one of three glaucoma surgeries. The primary outcome measure was the reduction in intraocular pressure, assessed preoperatively and at intervals of 1 week, 1 month, 3 months, 6 months, and 1 year postoperatively.

Results
A total of 155 eyes were evaluated. Preliminary results show a reduction of mean IOP from 25.1±7.0 mmHg preoperatively to 16.1±6.5 mmHg postoperatively for Xen Gel-Stent, 25.57 ±7.3 mmHg to 15.59±5.1mmHg for Preserflo Microshunt and 25.8±8.0 mmHg to 13.13 ±4.1 mmHg for trabeculectomy ($p < 0.001$). Revisional surgery within the first year was necessary in 25 % after Xen Gel stent 19,2 % after Preserflo Microshunt and 7,8% after trabeculectomy. Early onset hypotony occurred in 15,3 % after Xen, 19,2% after Preserflo and 68,6% after trabeculectomy.

Conclusions
All three surgical methods—XEN Stent, Preserflo, and trabeculectomy—resulted in significant intraocular pressure reductions one year postoperatively. Trabeculectomy showed the greatest reduction and the lowest risk for revisional surgery within the first year, though all methods provided substantial and clinically relevant pressure-lowering effects in most of the cases. The use of bleb-forming stents, such as XEN and Preserflo, offers effective alternatives with a potentially lower risk profile, supporting their role in modern glaucoma management.

P-RP-015

VISION LOSS AFTER UNCOMPLICATED TRABECULECTOMY IN 1037 EYES WITH ADVANCED GLAUCOMA

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Background

Idiopathic loss of central vision, also known as wipe-out or snuff-out phenomenon, has been reported to occur in 0.95% to 13.6% of eyes after trabeculectomy. Advanced glaucoma specially with a split-fixation and hypotony are commonly identified as risk factors. The term wipe-out very often excludes eye with vision better than PL, excluding those with milder, yet significant visual loss. Other studies which have looked at this, have included many eyes with early glaucoma with short follow-ups

Methods

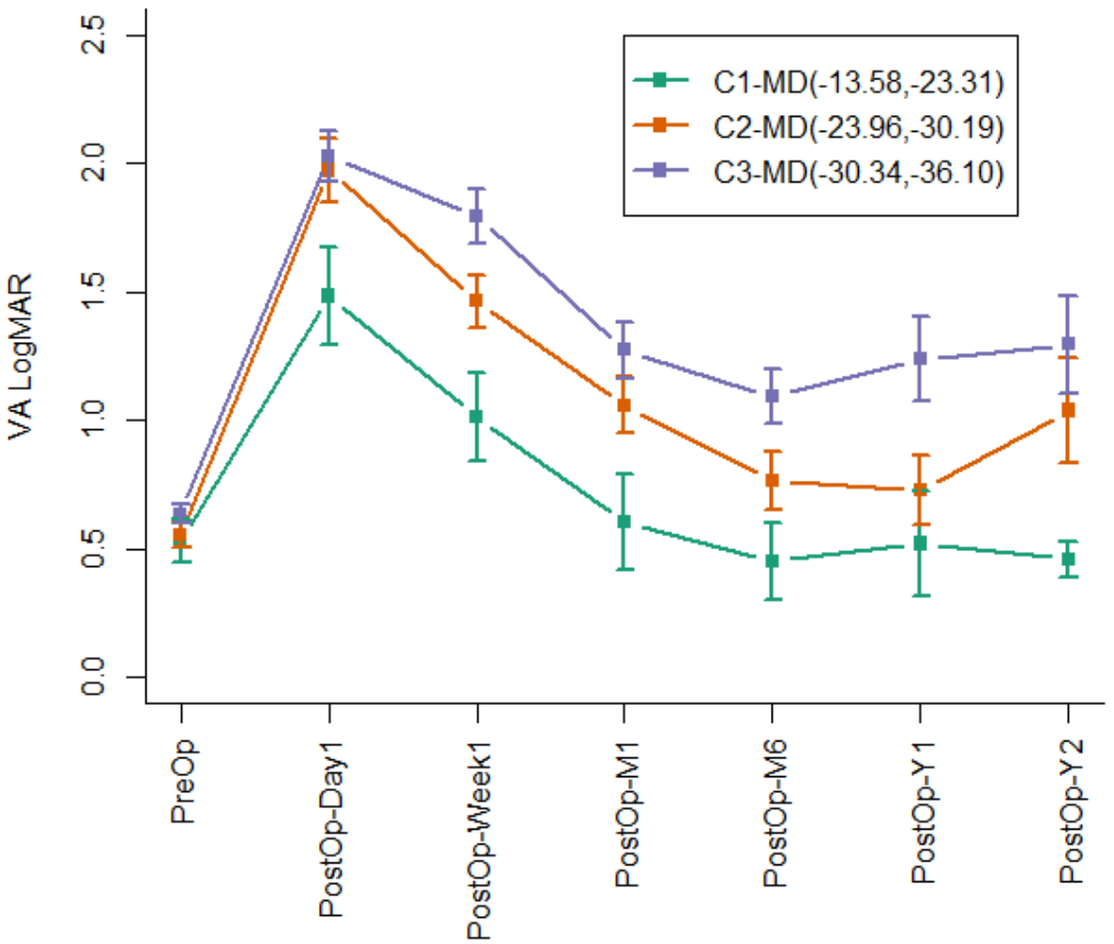
All eyes (age >16 years) with glaucoma that underwent uncomplicated trabeculectomy, with or without simultaneous cataract extraction were reviewed. They were included in the study if:
1. A reliable, recent 10-2 field showed fixation threat (at least 1 paracentral point 0 dB)
2. Significant visual loss (BCVA <20/200 and at least 4 lines reduction or loss of PL) on 1st post-op day

Type of glaucoma, surgery, medications, pre-op IOP, post-op complications, no. of affected paracentral points and hypotony were evaluated as risk factors for poor visual recovery. Recovery was defined as vision improving to within 1 line of preoperative vision.

Results

190 eyes (18%) of 1037 eyes with split fixation had significant visual loss on first post-op day were included and followed-up for 2 years. The surgery performed were trabeculectomy alone (123 eyes) or with cataract extraction (67 eyes). The mean deviation (MD) at baseline was -29.31±4.57 dB. The mean logMAR visual acuity changed from 0.593±0.368 to 1.016±1.158 ($p<0.001$). The IOP reduced from 23.4 ±10.3 to 14.7±6.5 mm Hg ($p<0.001$). 56 eyes (5.4%) that did not recover at last follow-up. Hypotony and number of paracentral points depressed to 0 dB were significant factors predictive of poor visual recovery on univariate analysis. On multivariate analysis only baseline MD was significant. Using linear mixed effect model to analyze the data the eyes were classified into 3 cluster groups at MD of -13.58 to -23.31 (cluster 1, 21 eyes), -23.96 to -30.19 (cluster 2, 75) & -30.34 to -36.10 (cluster 3, 94 eyes). All eyes in cluster 1 recovered, whereas 20 and 34 eyes in cluster 2 and 3 did not recover.

Image



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Conclusions

Significant visual loss is common and usually transient when MD is better than -23.31dB. However, when such loss occurs in eyes with MD worse than -30.34 dB, the chances of visual recovery is poor. This should be kept in mind while advising surgery in such eyes.

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P-RP-016

RESULTS OF ITRACK GLOBAL DATA REGISTRY TO SUPPORT THE ROLE OF CANALOPLASTY FOR TREATMENT OF GLAUCOMA

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Background

The iTrack Global Data Registry (iTGDR) was established to collect comprehensive real-world data on the efficacy and safety of canaloplasty. Key outcomes include intraocular pressure (IOP) reduction, medication use, endothelial cell count, adverse events, and procedure-specific parameters.

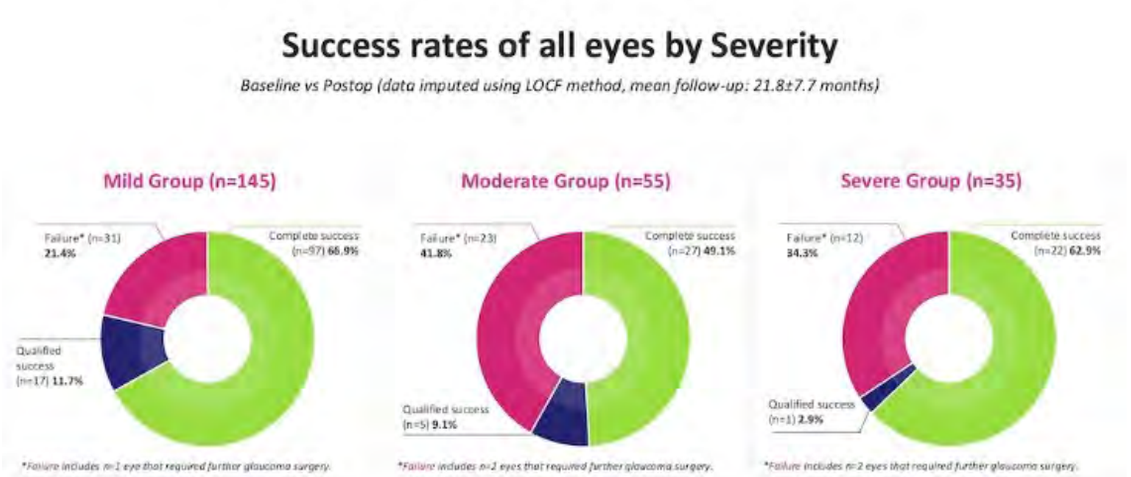
Methods

This is a prospective, multicenter, real-world study conducted in the USA, Canada, Europe, Asia, and Australia. Data were collected in a cloud-based registry and included patients with primary and secondary open-angle glaucoma undergoing canaloplasty. The safety population encompassed all enrolled eyes, while the efficacy population included eyes with at least 12 months of follow-up. Outcomes were assessed at baseline and at the latest observation carried forward (LOCF). Success was defined as an IOP reduction of ≥20% from baseline without an increase in medication use, or IOP ≤18 mmHg without medications.

Results

The safety population included 465 eyes of 353 patients up to November 2024: intraoperative complications occurred in 0.6% of cases (3 eyes), and postoperative complications in 3.4% of cases (16 eyes). The efficacy population comprised 257 eyes with a mean follow-up of 21.8±7.7 months. Mean baseline IOP and medication use were 17.4±5.4 mmHg and 2.1±1.2, respectively, and were significantly reduced to 14.2±4 mmHg and 1.3±1.4 medications (p<0.001). Medication-free eyes increased from 8.2% at baseline to 44.7% postoperatively. Complete success was achieved in 62.3% of eyes at LOCF.

Image



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Conclusions

Canaloplasty performed via an ab-interno approach effectively reduced IOP and medication use in patients with primary and secondary open-angle glaucoma. The iTGDR provides valuable real-world evidence on the clinical effectiveness of canaloplasty, supporting evidence-based decision-making for surgeons aiming to improve outcomes in glaucoma treatment.

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P-RP-017

BANG VERSUS GATT IN PSEUDOPHAKIC EYES WITH PRIMARY OPEN ANGLE GLAUCOMA: 24-MONTHS OUTCOMES OF A RANDOMIZED CLINICAL TRIAL

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Background

Bent Ab interno Needle Goniotomy (BANG) and Gonioscopy-Assisted Transluminal Trabeculotomy (GATT) are two low-cost Schlemm's canal minimally invasive glaucoma surgeries. There are no randomized clinical trials comparing these techniques. The aim of this study is to compare the efficacy and safety of BANG and GATT in primary open angle glaucoma (POAG).

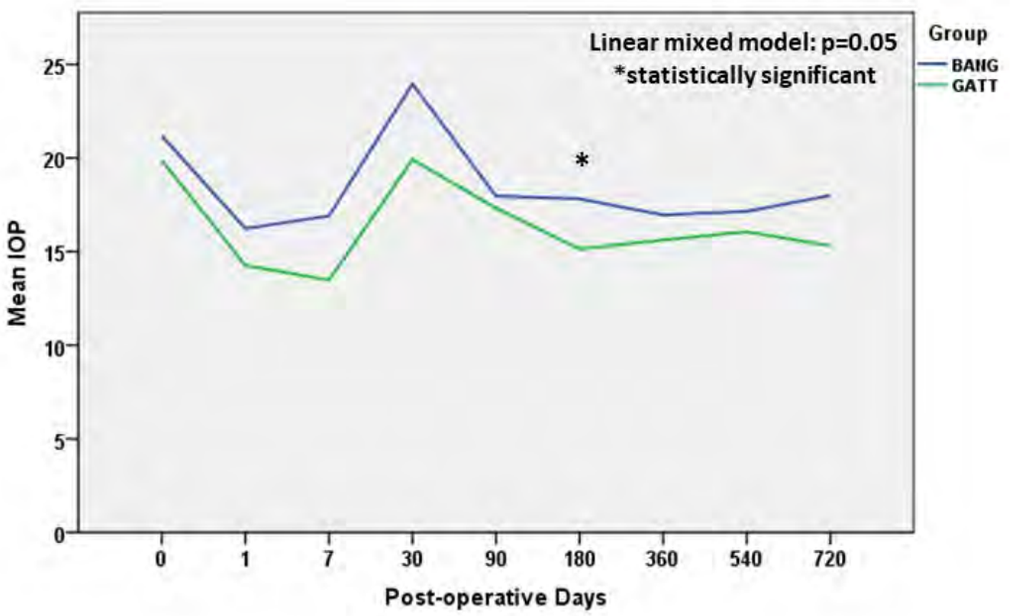
Methods

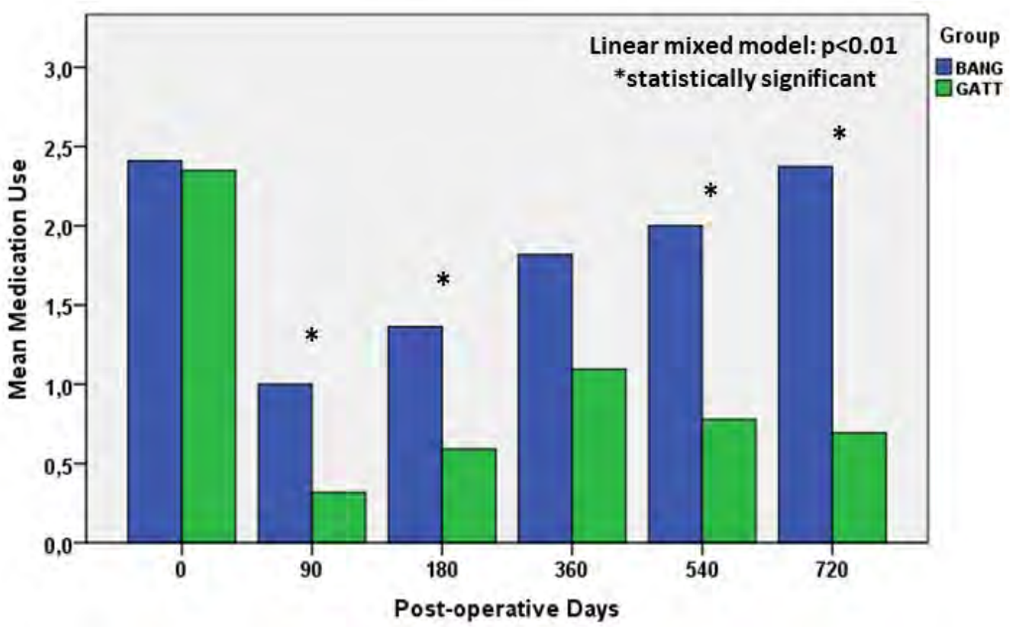
Parallel, double-arm, 1:1 ratio, single masked randomized clinical trial. Mild to moderate pseudophakic POAG eyes, defined by visual field mean deviation (MD), with age between 40-80 years and intraocular pressure (IOP)≥18mmHg were included. Patients were randomized to BANG or GATT. Follow-up visits were 1, 7, 30, 90, 180, 360, 540 and 720 post-operative days (POD). Primary outcome was mean IOP reduction. Surgical success was defined as IOP≤18mmHg and 20% IOP reduction from baseline without the use of medication. Qualified success followed the same parameters, but allowing the use of medication. Longitudinal comparison between the groups was done by a linear mixed model.

Results

Twenty-two eyes underwent BANG and 23 underwent GATT. At inclusion, in the BANG and GATT groups, respectively, mean ages were 72.27±5.63 vs 72.96±5.08 years (p=0.29), visual acuities (LogMAR) were 0.28±0.26 vs 0.14±0.22 (p=0.04), MDs were -4.98±2.28 vs -4.68±2.99dB (p=0.71), mean IOPs were 21.18±2.87 vs 19.87±2.34mmHg (p=0.1) under 2.41±0.9 vs 2.35±0.88 medications (p=0.71). Following surgery, IOPs in the BANG and GATT groups were 16.23±5.43 vs 14.22±6.0mmHg (p=0.24) at POD1, 16.91±7.35 vs 13.48±4.9mmHg (p=0.07) at POD7, 23.95±7.33 vs 19.91±11.85mmHg (p=0.17) at POD30, 17.95±3.6 vs 17.32±7.15mmHg (p=0.71) at POD90, 17.82±2.82 vs 15.14±4.14mmHg (p=0.02) at POD180, 16.95±2.82 vs 15.62±3.29mmHg (p=0.16) at POD360, 17.15±2.41 vs 16.06±3.64 (p=0.28) at POD540 and 18.00±3.18 vs 15.31±5.09 (p=0.09) at POD 720 (linear mixed model: p=0.05). The number of medications used at POD90, 180, 360, 540 and 720 in the BANG and GATT groups were 1.0±0.87 vs 0.32±0.78 (p<0.01), 1.36±1.09 vs 0.59±1.01 (p=0.02), 1.82±1.05 vs 1.1±1.55 (p=0.08), 2.00±1,17 vs 0.78± 1.3 (p<0.01) and 2.28±1.03 vs 0.69±1.03 (p<0.01) (linear mixed model: p<0.01). GATT had a higher rate of complete (60.9% vs 4.5%, p<0.01) and qualified success (60.9% vs 18.2%, p<0.01) than BANG. Additional surgery was needed in 3 BANG eyes and 4 GATT eyes (p=0.73).

Image





Conclusions

At 24-months, GATT presented lower mean IOP and medication use, and higher surgical success than BANG.

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P-RP-018

INCIDENCE, RISK FACTORS AND OUTCOMES OF HYPOTONY FOLLOWING SIBS MICROSHUNT IMPLANTATION

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Background

The purpose of this study was to to investigate the incidence, risk factors and outcomes of early and late-onset hypotony following polystyrene-isobutylene-styrene (SIBS) microshunt implantation in patients with glaucoma.

Methods

In this single centre, retrospective study, all consecutive patients undergoing SIBS microshunt implantation between 2015 and 2019 with at least 1 month of follow up were included. Numeric hypotony was defined as IOP<6mmHg in at least one post-operative visit during the early (within the first 3 months) or late (3 months and beyond) post-operative periods without any clinical signs of hypotony. Clinical hypotony was defined as numeric hypotony plus clinical signs such as choroidal effusion, hypotony maculopathy or shallow anterior chamber. For individuals with hypotony in more than one visit, the first instance of detected hypotony was considered. The first detected clinical sign was recorded as a distinct clinical sign and the first instance of an intervention was recorded as a distinct intervention. Potential risk factors for early clinical hypotony were evaluated in univariable and multivariable binomial logistic models through generalized estimating equation to account for inter-eye correlation.

Results

In total, 416 eyes from 347 patients with median (IQR) age of 61.0 years (52.0-69.0) were included. Median follow up time was 29.5 months (15.4-41.1). Incidence (95% CI) of early post-operative hypotony was 42.3% (37.5-47.2%), including 32.4% numerical and 9.8% clinical hypotony. Incidence (95% CI) of late hypotony was 5.5% (3.5-8.2%) including 3.4% numerical and 2.2% clinical hypotony. Most (88.6%) early hypotony cases occurred during the first post-operative week. Early hypotony was transient and resolved without intervention in 84.7% of eyes. Interventions were required in 10.2% of early hypotony cases all of which involved eyes with clinical hypotony. Median (IQR) time to detection of the first clinical signs and time to the first intervention in eyes with early hypotony were 6.0 days (5.0-29.0) and 12.5 days (2.75-50.75), respectively. Interventions were required in 21.7% of eyes with late hypotony. Median (IQR) time to detection of the first clinical signs and time to the first intervention in eyes with late hypotony were 113.0 days (97.0-194.5) and 113.0 days (99.0-335.0), respectively. After adjusting for confounders, diabetes mellitus (OR 2.59; 95%CI 1.17-5.73) and previous subconjunctival filtering surgery (OR 2.17; 95% CI 1.01-4.36) were significantly associated with increased odds of early clinical hypotony.

Conclusions

Early hypotony is a common transient event following SIBS microshunt implantation, resolving without clinical complications in most cases. Late hypotony is uncommon but requires more interventions. Diabetes mellitus and previous subconjunctival filtering surgery were significantly associated with early clinical hypotony.

P-RP-019

RELATIONSHIP BETWEEN LITERATURE-BASED HIGH INTRAOCULAR PRESSURE FAILURE CRITERIA AND LONG-TERM VISUAL FIELD PROGRESSION RATES

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Background

To assess the relationship between intraocular pressure (IOP) criteria for surgical success and visual field (VF) progression rates in trabeculectomy patients with long-term follow-up.

Methods

A systematic review (Prospero ID: CRD42023460048) identified 144 high IOP success criteria, including 47 variations of the 21-mmHg threshold. Of these, 46 were applicable to this study. The various high IOP criteria were applied to a cohort of patients undergoing trabeculectomy with ≥4 VFs and ≥2 years of follow-up post-surgery. Failure was defined as IOP exceeding these specific thresholds, further glaucoma surgery, ciliodestructive procedures, reoperation for hypotony complications, or loss of light perception. VF progression rates were calculated using linear mixed models with random slopes and intercepts, comparing eyes categorized as "success" or "failure" by each criterion.

Results

We included 199 eyes (199 patients), with a median (interquartile range [IQR]) of 7 (5-9.5) VFs over 4.6 (3.7-6.1) years. The median (interquartile range) postoperative progression rate was -0.33 (-0.12 to -0.63) dB/year. For the 21-mmHg cut-off, the median progression rates ranged from -0.09 to -0.35 dB/year for the success group and from -0.41 to -0.60 dB/year for the failure group, depending on the specific variation of criterion. While mean VF rates were generally faster in failures, differences were often nonsignificant, and rate distributions substantially overlapped (Figure 1). Similar results were seen for other IOP clusters (*i.e.*, 18 mmHg, 15 mmHg, 12 mmHg, %IOP reduction alone).

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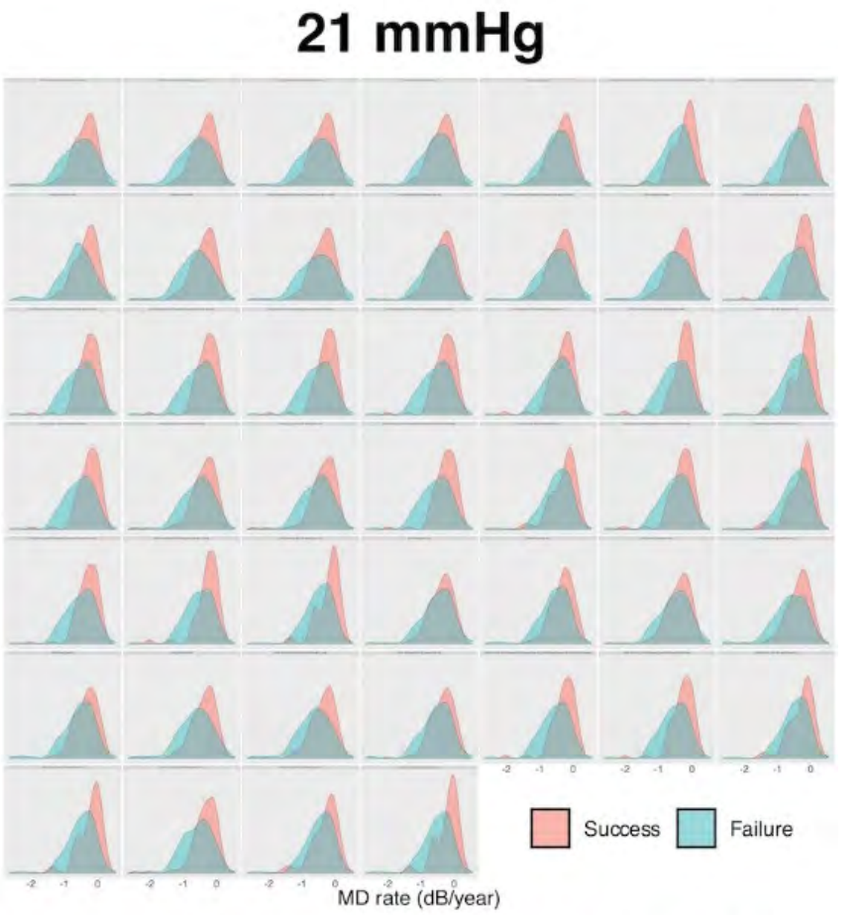

Figure 1. Density plots illustrating the distribution of visual field (VF) mean deviation (MD) rates in eyes classified as success or failure for the various 21-mmHg criteria. IOP: intraocular pressure

Conclusions

High IOP thresholds as failure criteria correlate poorly with long-term VF outcomes, misclassifying many successful surgeries as failures and vice versa. VF progression rates should replace arbitrary IOP thresholds as primary endpoints in glaucoma surgery studies.

P-RP-020

FIVE-YEAR SAFETY AND EFFICACY RESULTS OF A SUPRACILIARY DRAINAGE DEVICE IN OPEN ANGLE GLAUCOMA PATIENTS (STAR-GLOBAL)

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Background
Five-year safety and efficacy of a novel, minimally invasive glaucoma surgery (MIGS) device, MINIject® (iSTAR Medical, Wavre, Belgium), is described. The device was implanted ab interno into the supraciliary space in subjects with medically uncontrolled primary open-angle glaucoma.

Methods
The MINIject device was implanted in a standalone procedure in phakic and pseudophakic eyes in four prospective trials (STAR-I,II,III,IV). There was no medication washout. The trials were completed in 83 subjects in 11 sites in Europe, Asia and Central America with two-year follow-up. Subjects were then invited to enrol into the STAR-GLOBAL study to continue follow-up annually from three until five years post implantation. Outcome measures were intraocular pressure (IOP), IOP-lowering medications, adverse events and measurement of corneal endothelial cell density (ECD). These are preliminary, interim results of subjects only from the STAR-I,II,III trials who have now completed the STAR-GLOBAL trial at five years.

Results
Fifty-six subjects from the STAR-I,II,III trials were enrolled in the STAR-GLOBAL trial, with 47 subjects completing five-year post-implantation follow-up (83.9%). In this STAR-GLOBAL population, mean baseline diurnal IOP prior to implantation was 23.8±3.5 mmHg with a mean of 2.4±1.2 IOP-lowering medications (n=56). At two-years post implantation, mean diurnal IOP was 14.3±4.2mmHg (-9.6mmHg, -39.5%; p<0.0001) on 1.4±1.4 medications in these subjects (n=55). At five-year post-implantation follow-up (n=47), mean diurnal IOP was 14.8±5.6mmHg (-9.1mmHg, -38.4%; p<0.0001) on 1.5±1.4 medications (p<0.0001). Further, 83.0% of subjects achieved an IOP reduction of >=20% from baseline, 78.7% of subjects achieved an IOP <=18 mmHg, and 31.9% of subjects were medication-free at five years. Since STAR-GLOBAL study enrolment, adverse events related to MINIject were two cases of ECD loss, one IOP increase and one iris rubeosis.

Conclusions
Standalone MINIject implantation resulted in a clinically significant reduction in IOP and hypotensive medication use up to five years post-implantation in an ethnically diverse cohort of subjects. This supraciliary MIGS device offers an effective bleb-free treatment option for patients with medically uncontrolled primary open angle glaucoma requiring low and sustained target IOPs.

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P-RP-021

CLINICAL OUTCOMES AND SAFETY PROFILE OF STANDALONE CANALOPLASTY VS. CANALOPLASTY COMBINED WITH CATARACT SURGERY USING ITRACK MICROCATHETER

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Background
To evaluate the clinical outcomes and safety profile of standalone ab-interno canaloplasty performed using the iTrack microcatheter (Nova Eye Medical) compared to ab-interno canaloplasty combined with cataract surgery.

Methods
Data were collected from the prospective multicenter cloud-based database (iTGDR, part of the International Glaucoma Surgery Registry – IGSR), including eyes with glaucoma diagnosis and 12 months of follow-up. Patients underwent canaloplasty using the ab-interno technique with the iTrack or iTrack Advance (Nova Eye Inc., Fremont, USA), either as a standalone procedure (standalone group) or combined with cataract surgery (+phaco group). Success was defined as IOP reduction ≥20% or more compared to baseline and no increase in medication use or IOP ≤18 mmHg with no medications.

Results
A total of 281 eyes were followed for a mean of 21.4±7.8 months. In the standalone group (24 eyes: 18 phakic, 6 pseudophakic), mean baseline IOP and medication use decreased significantly from 20.1±7.3 mmHg and 2.30±0.9 medications to 15.3±6.4 mmHg (p=0.015) and 1.4±1.5 medications (p=0.003). In the +phaco group (257 eyes), IOP and medication use were significantly reduced from 17.4±5.4 mmHg and 2.1±1.2 medications at baseline to 14.2±4 mmHg and 1.3±1.4 medications at follow-up (p<0.001 for both). Success was achieved in 54% of standalone eyes and 62.3% of +phaco eyes. No serious adverse events were reported.

Conclusions
Both standalone canaloplasty and canaloplasty combined with cataract surgery using the iTrack microcatheter significantly reduced intraocular pressure and the number of medications, with no serious adverse events observed.

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P-RP-022

SUCCESSES AND CHALLENGES APPLYING FOUNDATION LARGE LANGUAGE MODELS IN GLAUCOMA

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Background
Transformer-based *foundational* models have recently become a popular artificial intelligence (AI). Typically, the models are trained on large datasets using a self-supervised approach that does not depend on detailed annotation or labels. They can be fine-tuned for specific tasks and often offer improved performance. Foundation models may be general-purpose large language vision models trained on general image and text datasets or more specialized models meant for use within specific domains (*e.g.*, the RETFound ophthalmic model). The goal of our work is to evaluate general-purpose (LLaVA, PaliGemma) and domain-specific (RETFound) foundation models in detecting glaucoma, predicting function, and generating clinically useful descriptions from imaging.

Methods
A dataset consisting of 63,362 Spectralis optical coherence tomography (OCT) optic nerve head (ONH) circle scans from 1,803 participants (3,374 eyes) was collected. Patient demographics, medical history, clinical measurements, ONH examination, and 24-2 visual field (VF) results were also included in the dataset. Clinical text descriptions were automatically generated from this data and patients were assigned a healthy vs. glaucoma label based on VF results. LLaVA, PaliGemma, and RETFound models were fine-tuned to classify eyes as glaucoma or healthy, predict 24-2 VF mean deviation (MD), and generate descriptions of global and local retinal nerve fiber layer (RNFL) thinning.

Results
The LLaVA model achieved the highest area under receiver operating characteristic curve (AUC) of 0.92 (0.86-0.95) for glaucoma detection and lowest mean absolute error (MAE) of 1.79 dB (1.55-2.00) in MD prediction, comparable to the RETFound AUC of 0.91 (0.83-0.96) and MAE of 1.87 (1.57-2.12). The models achieved moderate accuracy with the device segmentation-based ground truth for identifying sectors with RNFL thinning, with accuracy ranging from 0.71 to 0.77.

Conclusions
Fine-tuned general-purpose and ophthalmology-specific foundation models were able to achieve high accuracy in glaucoma detection and functional prediction. They were also able to generate clinically-relevant descriptions of RNFL thinning from OCT imaging. These approaches have the potential to support automated image review and monitoring in clinical practice, as well as facilitate large-scale clinical research studies. Standardized objective metrics to assess descriptive performance are needed to improve evaluation of the models.

P-RP-023

AUTOMATED ANNOTATION IN IRIDOCORNEAL ANGLE IMAGING: AI-DRIVEN PRECISION MAPPING FOR ENHANCED GLAUCOMA DIAGNOSTICS

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Background

This study explores the development and efficacy of an innovative artificial intelligence (AI) model for automated annotation of the iridocorneal angle's anatomical landmarks, aiming to enhance diagnostic accuracy and streamline clinical workflows in glaucoma diagnosis. Through a sophisticated annotation framework, the AI system identifies critical angle structures and provides precise measurements and labels the angle configuration as closed, narrow, open, or wide, based on precise anatomical landmarks, providing a critical tool for assessing angle-related risks in glaucoma. Building on extensive research that underscores AI's transformative potential in ophthalmology, this study examines AI's role in enhancing diagnostic accuracy and streamlining efficiency in the management of glaucoma.[1-4]

Methods

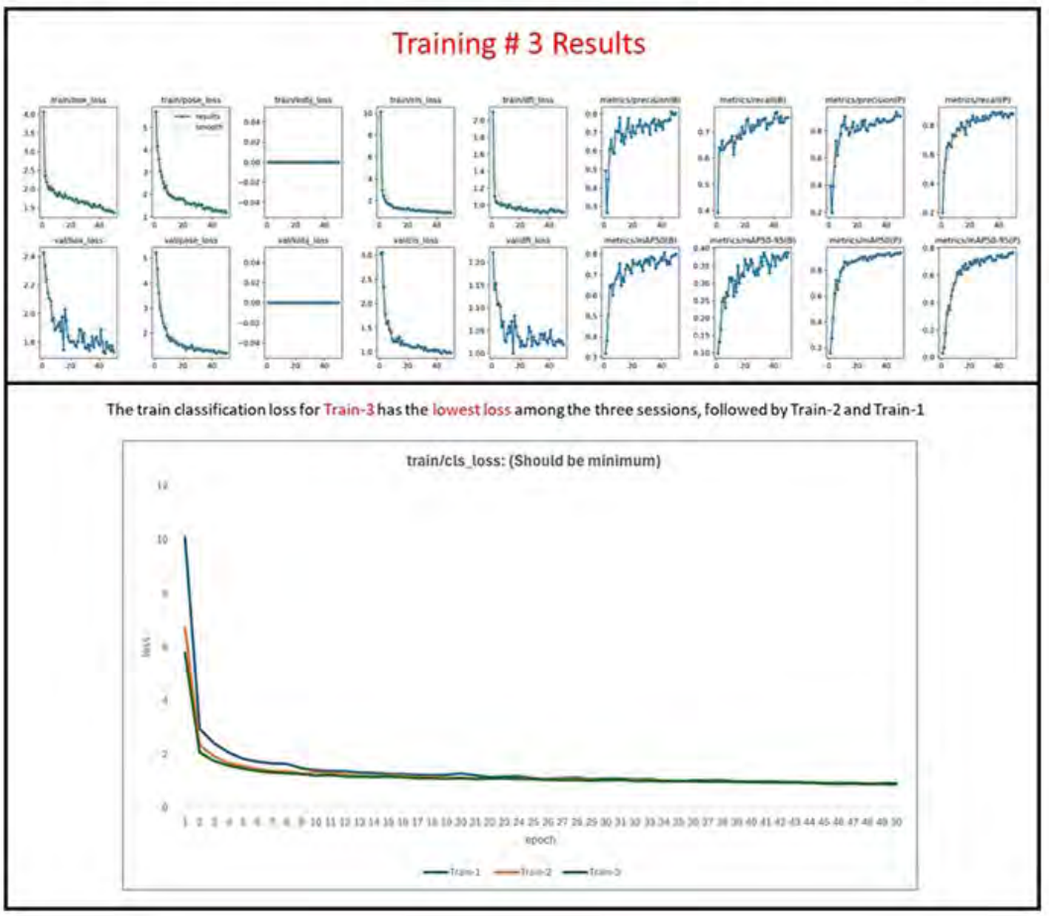
A total of 1500 high-resolution Anterion images were analyzed, with 1370 images (91%) used for training and 130 images (9%) for testing. Training was conducted over three sessions (Train-1, Train-2, and Train-3), assessing metrics such as train/box loss, precision, and recall. Training quality improved progressively, with Train-3 yielding the lowest classification loss. The AI detected key angle structures through a structured annotation protocol: detecting the scleral spur, measuring the trabecular meshwork, marking the angle apex, drawing structural lines for mapping the iridocorneal angle, and calculated the angle structure and classified it as closed, narrow, open, or wide. Testing involved sequential evaluation of the 130 test images, split into three groups (50, 35, and 45 images), with each group assessed over five-day intervals. Predictions were refined based on incremental training insights, improving the model's accuracy in determining angle status.

Results

The AI showed improved prediction in angle configuration annotation across testing phases. The percentage of images with fully correct predictions was 88% (Test 1), 91% (Test 2), and 96% (Test 3). Sensitivity scores improved from 82.61% to 95.24% across the tests, and specificity increased from 92.59% to 95.83%.

Image

Images depicting the training quality at the outset of the training process, focusing on parameters such as train/box loss, metrics/precision and metrics/recall in the initial training outcomes



Conclusions

This AI system shows promising potential in automating iridocorneal angle analysis for glaucoma diagnostics, accurately categorizing angle configurations as closed, narrow, open, or wide. The system's high sensitivity and specificity indicate its readiness as an innovative diagnostic tool in clinical practice, paving the way for AI-assisted precision diagnostics in glaucoma care.

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P-RP-024

NARROW-ANGLE CLASSIFICATION IN AS-OCT IMAGES WITH A LIGHT-WEIGHTED DEEP LEARNING MODEL

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Background
Anterior-segment optical coherence tomography (AS-OCT) can capture the anterior structure of the eye clearly and rapidly. A convolutional neural network (CNN) is a deep learning framework commonly used for image analysis, leveraging convolutional layers to extract and classify image features. A narrow angle is an important feature often requiring treatment or careful observation because it can increase intraocular pressure and cause angle-closure glaucoma. This study aimed to develop an automatic method to detect narrow angles based on AS-OCT parameters and 2 different CNN models; we then compared the performance of the models with each other and with logistic regression.

Methods
The subjects were 1026 eyes of 563 patients without a history of intraocular surgery, injury, or ocular inflammation. We used CASIA2, an AS-OCT device, and acquired 1026 horizontal images. The images were separated into the left and right sides, and the right sides were flipped so that the direction of the right- and left-side images was the same. After unclear images were excluded from the 2052 separated images, 1996 images remained. The images were labeled as showing a narrow angle if the iridocorneal angle was less than 20 degrees. Angle open distance (AOD), an AS-OCT parameter that indicates the distance from the posterior cornea to the iris, was measured automatically by the CASIA2 software. Logistic regression was used for narrow-angle classification based on AOD. We trained two models: VGG16, the representative CNN model, and LWBNA (lightweight bottleneck narrowing with attention), which we developed previously. The models were trained using 5-fold cross-validation for the classification of narrow angles. We compared the performance, model size, and number of parameters.

Results
Among 1996 images, 1121 were labeled as showing a narrow angle. The area under the receiver operating characteristic curve (ROC-AUC) for detecting narrow angles with logistic regression was 0.92-0.96. The ROC-AUCs for detecting narrow angles were 0.98-1.00 and 0.97-0.99, respectively, with VGG16 and LWBNA. The model sizes for VGG16 and LWBNA were 215.2 MB and 20.9 MB, and the number of parameters was 17,926,209 and 1,709,618, respectively.

Conclusions
For detecting narrow angles in AS-OCT images, CNN models tend to be superior to logistic regression based on AOD. The performance was similar in both CNN models, even though LWBNA was about 10 times lighter than VGG16.

P-RP-025

EVALUATING NLP MODELS FOR IDENTIFYING GLAUCOMA PHENOTYPES USING UNSTRUCTURED CLINICAL NOTES

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Background

Researchers often rely on ICD codes to identify patients with ocular phenotypes from electronic health records, however ICD codes are often inaccurate, noisy and lack insufficient detail. Natural language processing models (NLPs) can be utilized to identify disease phenotypes using unstructured clinical data more accurately. We developed an NLP model to accurately identify various glaucoma subtypes from unstructured clinical notes and validated it against glaucoma specialists.

Methods

A clinical dataset from Mass Eye and Ear, comprising 2.2 million notes from 117,695 patients was analyzed. Of these, 1.7 million notes from 115,895 patients were identified as ophthalmology-related using keyword search. Philter package [ref 1] was applied to remove protected health information (PHI). Nine glaucoma subtypes were identified by an NLP model using keyword search based on prior literature [ref 2]. Of this, four conditions have validated against human experts (POAG, PDG, XFS, and XFG). For XFS and XFG searches, notes unrelated to ocular exfoliation, such as skin exfoliation or family history of exfoliation glaucoma, were excluded. Human experts then reviewed 495 notes from 204 patients across four GL subtypes and 451 notes from 344 non-GL patients (Figure 1a). ICD-9 codes 365.52 and 366.11, and ICD-10 code H40.14 were used to detect individuals with XFS.

Results

The mean (SD) age of our cohort was 60.2(18.4) years 91,307 self-identifying as White, 15,768 as Black/African American, 8,820 as Asian, and 1,800 as other races. Figure 2 shows confusion matrices and receiver operating characteristic (ROC) curves for all glaucoma subtypes. The developed NLP model exhibited outstanding performance in identifying glaucoma phenotypes, with particularly strong results for XFS and XFG. Compared with chart reviews, the model achieved a 92% agreement for Non-GL, 94.4% for POAG, 98.7% for PDG, 99% for XFS, and 97.9% for XFG (Figure 2a-e). This indicates that the model outperformed ICD codes with 96.2% agreement compared with chart reviews (Figure 2f). Among the conditions, the best performance was observed for XFS, where the model achieved 99% accuracy, 100% precision, 91.4% recall, 95.3% F1-score. The model's AUC for XFS was 96%, showcasing strong discriminatory power compared to the 86% AUC of ICD codes for the same condition (Figure 1b).

Image

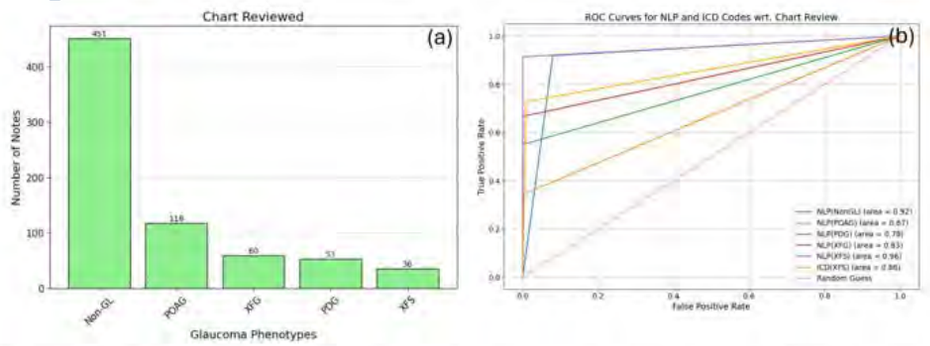

Figure 1. Distribution of Notes by Glaucoma Phenotypes identified by human experts (a) and ROC curves for NLP model and ICD codes with respect to chart reviewed by human experts (b). Non-GL= Non-Glaucoma, POAG= Primary open angle glaucoma, PDG= Pigmentary dispersion glaucoma, XFG= Exfoliation glaucoma, XFS= Exfoliation syndrome.

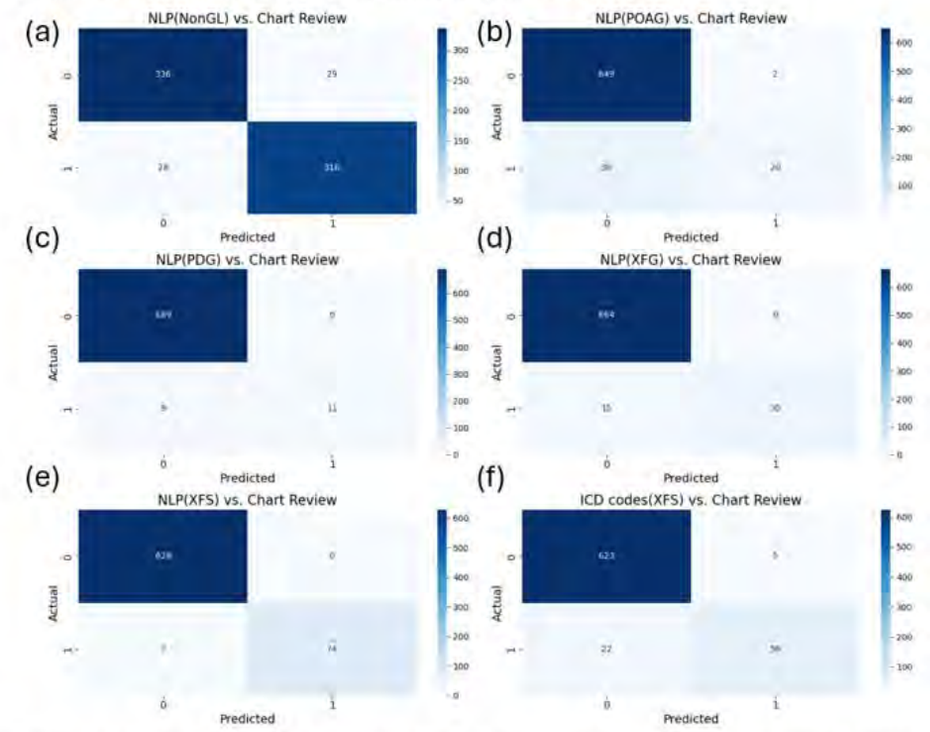

Figure 2. Confusion matrices for all glaucoma subtypes identified by NLP model (a-e) and ICD codes (f) with respect to human experts. All data presented for NLP model with respect to chart reviews.

Conclusions

The developed NLP model advances glaucoma phenotype identification from unstructured clinical notes, overcoming ICD code limitations. Validated against glaucoma specialists, the model achieved exceptional accuracy, particularly for XFS and XFG. It demonstrated robust discriminatory power, with the high AUC. While the model outperformed ICD codes, improvements are needed for some conditions (*e.g.* POAG). This study highlights NLP's potential for scalable and precise clinical data analysis.

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P-RP-026

DEEP LEARNING ANALYSIS REVEALS INCREASED OPEN-ANGLE GLAUCOMA RISK IN HIGH MYOPIA IS PARTIALLY MEDIATED THROUGH RETINAL VASCULATURE CHANGES

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Background

Eyes of open-angle glaucoma (OAG) patients and (high) myopes show similar vascular changes. Using our recently developed model for retinal vasculature analysis, we investigated the key vascular features most relevant for glaucoma, their diagnostic and predictive value, and the possible mediation effect of retinal vasculature between myopia and OAG.

Methods

We analyzed data from three cohorts of the Rotterdam Study, a large prospective population-based cohort study. Vascular features were extracted from color fundus images using our fully automated deep-learning vascular analysis pipeline (VascX). We analyzed the association of the standardized vascular features with OAG and myopia using multivariable logistic and linear regression models. Using Cox proportional hazard models, we estimated the relative risk of OAG. Prediction of POAG was tested with Harrell's C-statistic. We performed sensitivity analysis in an axial-length matched cohort with a 1:4 case:control ratio, and implemented a bootstrap approach (1000 simulations) to estimate a potential mediation effect of retinal vasculature between myopia and OAG. All analyses were adjusted for multiple testing.

Results

In total, 12,734 non-OAG controls and 356 OAG cases were included, with a mean ± SD age of 65.1 ± 9.8 and 68.5 ± 8.6 years and a mean ± SD follow-up time of 10.5 ± 5.9 and 12.7 ± 6.3 years, respectively. Overall, features associated with OAG were arterial, not venous. Features which associated with OAG in the cross-sectional analysis also increased the risk of OAG incidence in the longitudinal analysis (Table 1). The C-statistic (95% CI) for baseline arterial vessel density, age, and sex was 0.74 (0.72, 0.76), including IOP into the model improved the C-statistic (95% CI) to 0.81 (0.79, 0.83).Matching on axial length did not alter the findings. We found a significant mediation effect of arterial vessel density ($p < 0.001$), which mediated (95% CI) 12.3% (4.6%, 63.0%) of the effect of myopia on OAG.

Image

Table 1. Multivariable logistic and Cox proportional hazard regression models for the effect of standardized vascular features on OAG, with corresponding 95% confidence intervals.

Feature	OR (95% CI) / SD	p-value	HR (95% CI) / SD	p-value
Temporal angle arteries	0.89 (0.79, 0.99)	0.038	0.83 (0.74, 0.93)	0,002
Temporal angle veins	0.96 (0.85, 1.07)	0.440	0.90 (0.80, 1.02)	0.093
Central retinal equivalent arteries	0.75 (0.68, 0.83)	**1.206E-8***	0.80 (0.72, 0.89)	**3.20E-5***
Central retinal equivalent veins	0.84 (0.76, 0.94)	**0.002***	0.84 (0.75, 0.95)	**0,003***
Vessel density arteries	0.73 (0.66, 0.82)	**7.342E-8***	0.69 (0.62, 0.78)	**1,571E-9***
Vessel density veins	0.84 (0.74, 0.94)	**0.003***	0.76 (0.67, 0.86)	**8,21E-6***
Median diameter arteries	1.09 (0.98, 1.22)	0.133	0.96 (0.84, 1.09)	0.496
SD diameter arteries	0.75 (0.66, 0.84)	**2.00E-6***	0.66 (0.58, 0.76)	**3,058E-9***
Median diameter veins	1.09 (0.98, 1.22)	0,114	1.00 (0.88, 1.13)	0.969
SD diameter veins	0.86 (0.76, 0.97)	0.015	0.83 (0.73, 0.95)	0,006
Tortuosity arteries	0.80 (0.68, 0.93)	**0,003***	0.86 (0.74, 1.01)	0.068
Tortuosity veins	0.38 (0.19, 0.75)	0,006	0.88 (0.77, 1.02)	0.094
Number of bifurcations arteries	0.75 (0.65, 0.87)	**8.10E-8***	0.78 (0.68, 0.90)	**0,001***
Number of bifurcation veins	0.84 (0.73, 0.96)	0,011	0.79 (0.69, 0.91)	**0,001***

OAG = open-angle glaucoma, OR = odds ratio, HR = hazard ratio, SD= standard deviation

Conclusions

Our study suggests that the increased OAG risk in myopes is partially mediated through vascular changes. Future studies should explore clinical applications of retinal vasculature measurements in OAG management.

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P-RP-027

LASER PUPILLOPLASTY COMBINED WITH OR WITHOUT LASER PERIPHERAL IRIDOPLASTY FOR ACUTE PRIMARY ANGLE CLOSURE : A RANDOMIZED CONTROLLED STUDY

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Background
To compare the effect of argon laser pupilloplasty (LPP) plus argon laser peripheral iridoplasty (LPIP) combined therapy, and LPIP alone therapy on the immediate treatment of acute primary angle closure (APAC) patients using ultrasound biomicroscopy (UBM).

Methods
In this prospective comparative study, we randomized 95 APAC patients into two groups: LPP/LPIP combined group and LPIP alone group. Immediately before and 2 h after either intervention, UBM was performed. Custom software was used to measure pupil diameter, anterior chamber depth (ACD), and the angle opening distance (AOD750), trabecular ciliary process distance (TCPD750), trabecular iris angle (TIA750) and iris thickness (IT750) at 750 um from the scleral spur. The main outcome measure was the change in anterior segment biometrical parameters.

Results
We recruited 95 eyes of 95 APAC patients (21males) who were randomized to receive either LPP and LPIP combined therapy or LPIP alone therapy. LPP/LPIP Group was composed of 49 APAC patients (9 males) with a mean age of 66.84±10.26 years, and LPIP Group, consisted of 46 APAC patients (12 males) with a mean age of 67.78±10.56 years. There were no significant difference in gender (p=0.370), age (p=0.685), visual acuity (p=0.461), IOP (p=0.432), onset time (p=0.107) and number of attacks (p=0.537) between patients of two groups. There were also no significant differences in anterior segment measurements between APAC eyes in the two treatment groups (LPP/LPIP and LPIP) before therapeutic interventions. For LPIP/LPP Group, mean visual acuity was 1.30±0.71 before treatment, 0.72±0.67 1h and 0.66±0.69 2h post treatment (p<0.001), whereas mean IOP was 50.02±7.38 mmHg before treatment, 29.76±13.48 mmHg 1h and 24.90±14.85 mmHg 2h post treatment (p<0.001). For LPIP Group, mean visual acuity was 1.41±0.63 before treatment, 1.03±0.65 1h and 1.04±0.67 2h post treatment (p<0.001), whereas mean IOP was 48.76±8.18 mmHg before treatment, 36.02±13.90 mmHg 1h and 34.57±14.70 mmHg 2h post treatment (p<0.001). The mean decrease in IOP was significantly different between APAC eyes in LPIP/LPP and LPIP Group (25.12±14.05 mmHg vs 14.20±14.05 mmHg, p<0.001). Assessing the change in anterior segment measurements between APAC eyes 2h after treatment and APAC eyes before treatment, Except for AOD750 and IT750, the combined laser group can reduce the PD (p=0.001) and deepen the depth of theAOD750 (p<0.001). Assessing the change in anterior segment measurements between APAC eyes 2h after treatment and APAC eyes before treatment, the eyes which underwent LPIP and LPI combined treatment had a larger increase in ACD (p=0.027), AOD750 (p<0.001) and TIA750 (p<0.001), after adjusting for age, gender.

Conclusions
LPIP+LPP is an emergency effective treatment for APAC. It can effectively reduce IOP, increase ACD, increase AOD, and widen TIA. UBM can safely and effectively quantify the structure of the anterior chamber angle.

P-RP-028

RESPONSIVENESS OF SELECTIVE LASER TRABECULOPLASTY IN THE LASER IN GLAUCOMA AND OCULAR HYPERTENSION TRIAL IN CHINA (LIGHT CHINA)

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Background
This study aims to report the responsiveness and repeatability of selective laser trabeculoplasty (SLT) as the first-line treatment of newly diagnosed open-angle glaucoma (OAG) and ocular hypertension (OHT) in the LiGHT China, and to investigate influence factors of laser efficacy to improve personalized intervention in the primary clinical management of OAG.

Methods
A total of 771 participants newly diagnosed with OAG or OHT were recruited in the LiGHT China (ChiCTR-IOR-15005924) and randomized to Medicine-1st or Laser-1st Arm. Grossly, 642 eyes from 365 participants underwent SLT (standard 360-degree 100-spot SLT) as the first treatment, of which 180 eyes from 105 participants underwent repeat SLT as treatment escalation. Topical medicines lowering intraocular pressure (IOP) were prescribed as additional treatment escalation following initial and repeat SLT. Treatment escalation criteria were predefined in protocol based on the NICE, EGS, and Chinese glaucoma guidelines. Reduction of IOP and escalation-free control rate were used to assess laser efficacy. Mixed linear models and logistic regression were adopted in statistical analysis.

Results
Eyes undergoing merely single SLT had a mean (95%CI) IOP reduction of 5.3 (4.9, 5.7) mmHg at 2 months post-laser, while those requiring repeat SLT had 4.5 (3.9, 5.1) mmHg reduction and exhibited worse baseline visual field mean deviation (difference, −1.8 dB; 95%CI, −2.4to−1.3; P < .001). The mean (SD) IOP before repeat SLT was 18.8 (4.3) mm Hg, lower than the mean (SD) 20.4 (4.9) mm Hg before initial SLT (difference, −1.6 mm Hg; 95% CI, −2.1 to −1.2; P < .001). Repeat SLT achieved a mean (95%CI) IOP reduction of 3.3 (2.7, 3.8) mmHg, and a longer duration of effect (hazard ratio, 0.38; 95%CI,0.29, 0.50; P < .001), compared to initial SLT. Most participants were highly responsive to SLT, while 18 potential non-responsive cases were identified, which more likely to be older (difference, 10.0 years; 95%CI, 1.6 to 18.3 years; P=0.03), females (difference, 42.4%; 95%CI, 18.9% to 45.9%; P=0.01), and with lower baseline IOP (difference, -3.6mmHg; 95%CI, -5.8 to -1.4 mmHg; P=0.001), compared to those with a typical response. Detection of potential non-responsiveness could be achieved using merely baseline and early-stage characteristics, and the mean (SD) area under the ROC curves could reach 0.91 (0.06) under rigorous cross-validation.

Conclusions
This study demonstrates that SLT is effective and repeatable as the first-line treatment of OAG and OHT, and reveals that potential non-responsiveness to SLT can be identified early utilizing baseline characteristics. This study provides high-quality evidence and profound insights into the cost-effective primary care of OAG and OHT.

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P-RP-029

DEVELOPMENT OF A NON-VIRAL DELIVERY CRISPR OCULAR EDITING APPROACH FOR THE POTENTIAL TREATMENT OF MYOCILIN-ASSOCIATED GLAUCOMA

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Background
Mutations in myocilin (*MYOC*) are the leading genetic cause of primary open-angle glaucoma, responsible for about 4% of all cases. Some mutations are linked to severe glaucomatous conditions that can manifest at an early age. *MYOC* gain of function mutations are associated with trabecular meshwork (TM) dysfunction leading to high intraocular pressure (IOP), a key risk factor for glaucoma. Previous studies suggest that reducing mutant MYOC in the TM could benefit patients, as non-adherence to current treatments and surgical limitations often lead to disease progression. We aim to address the root cause of the disease by using a non-viral delivery CRISPR/Cas9 gene editing approach to knock out MYOC.

Methods
We developed lipid nanoparticles (LNPs) able to deliver Cas9 mRNA and guide RNA (gRNA) to TM cells. LNP formulations were screened for delivery to human primary TM cells *in vitro* and to mouse TM *in vivo*. Human eyes from eye banks were used to generate an *ex vivo* anterior segment organ culture (ASOC) model to validate selected LNP candidates. *MYOC* targeted gRNAs candidates were identified from *in vitro* editing screening experiment and assessed for off-target editing by Hybrid-Capture and DiGenome sequencing analyses. Transgenic mice carrying a mutation of human *MYOC* (Y437H) were treated with LNP containing Cas9 mRNA and MYOC guide or only Cas9 mRNA control using intravitreal injection.

Results
LNP screening identified candidates that efficiently delivered to the TM in mouse eyes, leading to high TM editing *in vivo* (up to 90% protein reduction). The selected LNP formulations also showed efficient delivery in human ASOC model leading up to 60% editing at the *MYOC* locus. To generate proof-of-concept in a glaucomatous humanized mouse model carrying $MYOC^{Y437H}$, we selected a *MYOC* guide with up to 98% editing and more than 85% protein reduction in primary human TM cells *in vitro*, and with no off-target editing. Treatment of disease mice with LNP containing Cas9 mRNA/*MYOC* gRNA showed efficacy with significant IOP reduction (~3.4 mmHg) compared to controls, a primary goal for glaucoma treatment. No safety concerns were observed in treated mice or in preliminary non-human primate experiments, where efficient editing was observed using intracameral injection.

Conclusions
This novel gene editing approach using LNP delivery to transiently express CRISPR/Cas9 in TM cells to permanently knock out mutated MYOC shows promise as a treatment for patients with *MYOC*-associated glaucoma.

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P-RP-030

FAS INHIBITION WITH ONL1204 FOR THE TREATMENT OF OPEN ANGLE GLAUCOMA (OAG): PHASE 1B SINGLE-MASKED, RANDOMIZED, SHAM-CONTROLLED STUDY RESULTS

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Background
Death of retinal ganglion cells is associated with progressive glaucoma, and is driven, in part, by activation of the Fas signaling pathway. ONL1204 Ophthalmic Solution, is a first-in-class inhibitor of Fas-mediated cell death and inflammation. The purpose of this study was to assess the safety of ONL1204 in patients with progressing OAG despite good pressure control (NCT05160805).

Methods
Eligible patients had progressive OAG with evidence of either visual field decline (Humphrey Visual Field (HVF) mean deviation (MD) decline of -0.50 dB/yr or more negative) or loss of RNFL thickness (-1.00 µm/yr or more negative by optical coherence tomography (OCT)). Patients were randomized (2:2:1) into 1 of 3 groups (Treatment Groups: ONL1204 50µg (low dose) or 100µg (high dose) injection; or Sham Group: sham injection) and administered intravitreal (IVT) injections of ONL1204 Ophthalmic Solution or sham at Day 1 and Day 90. Study duration was approximately 9 months. Randomization was stratified by baseline HVF MD -5.00 dB to >-10.00 dB and ≤-10.00 dB to -15.00 dB. The primary objective was safety and tolerability of ONL1204, and secondary objectives were to assess efficacy by visual fields and OCT.

Results
Enrollment completed with 25 participants: 9 high dose, 10 low dose, and 6 sham. For overall safety, the majority of the reported TEAEs were of mild or moderate severity. Serious ophthalmic TEAEs were reported in 4 subjects in the ONL1204 50 µg arm, all of which were assessed to be related to study treatment. Overall, ONL1204 had no evidence of dose limiting toxicity. Humphrey 24-2 VFs were used to detect treatment effects on visual function. Change from baseline (CFB) in MD did not show a trend across treatment groups. However, a subgroup analysis of subjects with more severe VF defects at baseline showed a trend for improvement in ONL1204 treated eyes compared to sham treated eyes. Post-hoc analyses of VF results, including an analysis of individual points and clusters of points, suggests that ONL1204 may be most efficacious in areas of the VF with moderate sensitivity loss (-5 to -20 dB) at baseline. OCT imaging of the retina showed trends of increased thickness in the RNFL at the posterior pole and in the GCC in the outer macular region in ONL1204 treated eyes compared to sham treated eyes and fellow eyes.

Conclusions
ONL1204 Ophthalmic Solution, 50 µg and 100 µg, dosed IVT with 2 injections, 90 days apart, was shown to be safe and well tolerated in this Phase 1b study in subjects with progressing OAG. Worsening glaucoma and elevated IOP were observed in 3 subjects in the 50 µg treatment group resulting in 2 subject discontinuations. Analysis of OCT data showed evidence of an increase in RNFL and GCC layer thickness in ONL1204 treated eyes. Pointwise analysis of VF data suggests the possibility of increased sensitivity in areas with moderate loss at baseline. These findings support the further development of ONL1204 as a novel neuroprotective agent for progressive OAG.

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P-RP-031

QLS-111 SIGNIFICANTLY LOWERS IOP IN PHASE 2 STUDIES, OSPREY AND APTERYX, AS MONOTHERAPY AND ADJUNCTIVE THERAPY WITH EXCELLENT SAFETY AND TOLERABILITY

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Background
Identification of drugs that directly lower episcleral venous pressure (EVP) provides a novel opportunity for reducing intraocular pressure (IOP) in glaucoma patients and ocular hypertensives. QLS-111 is a novel ATP-sensitive potassium channel opener that lowers IOP by targeting distal outflow (vasorelaxation) and lowering EVP[1-4]. We assessed safety, tolerability and efficacy of three concentrations and two dosing regimens of QLS-111 or vehicle in two randomized, controlled, double-masked phase 2 studies in primary open angle glaucoma (POAG) patients and ocular hypertensives (OHT).

Methods
Clinical trial NCT06016972 (Osprey) was designed to evaluate dose ranging and regimen. POAG or OHT patients (n=62) were washed out of current IOP meds and randomized to QLS-111 0.015%, 0.03% or 0.075%, or vehicle for 21 days (7 days QAM, followed by 7 days QPM, followed by 7 days BID). In clinical trial NCT06249152 (Apteryx), patients (n=32) stable on latanoprost with IOP of ≥ 19 mmHg at 8 am, were dosed QPM OU with QLS-111 0.015%, 0.030% or 0.075%, or vehicle for 14 days followed by BID OU for 14 days. Safety and tolerability were assessed by adverse events (AE), vitals, and ophthalmic exams including best corrected visual acuity (BCVA), slit lamp, and ophthalmoscopy. In Osprey, IOP was measured by Goldmann tonometry (GAT) at 8 AM, 10 AM and 4 PM on days 1, 8, 15 and 29. In Apteryx, IOP was measured by GAT at 8 AM, 10 AM and 4 PM on days 14 and 28.

Results
Mean age of subjects was 67.3 years with 52% men and 48% women of White (63%), Black (34%), Asian (2%), or Unspecified (1%) race. In Osprey, mean diurnal IOP lowering compared to baseline was significant across all regimens with QLS-111 0.015% and 0.030% concentrations. Mean diurnal IOP baseline was 23.0 mmHg for 0.015%, 23.7 mmHg for 0.030%, 24.1 mmHg for 0.075% and 24.2 mmHg for vehicle. QLS-111 0.015% treatment provided the best IOP lowering response, where QAM dosing lowered IOP by 2.8 mmHg (p=0.0018), QPM dosing by 3.7 mmHg (p=0.0001), and BID dosing by 2.8 mmHg (p=0.0018). IOP lowering from baseline with 0.030%, 0.075% and vehicle at QAM, QPM, and BID dosing can be seen in Table 1.

In Apteryx, both QPM and BID regimens with QLS-111 0.015% adjunctive to latanoprost showed a clinically and statistically significant mean diurnal additional IOP lowering from baseline. With QPM dosing, IOP was an additional 3.2 mmHg (p=0.0005) lower, and with BID dosing, IOP was 3.6 mmHg (p= 0.0002) lower, from a mean diurnal baseline of 19.8 mmHg (Table 2).

No serious ocular or systemic AEs were reported. Minor AEs were limited to intermittent mild hyperemia and irritation in the 0.030%, 0.075% and vehicle arms. No related and or clinically relevant AEs were seen in 0.015% cohorts in either study. No changes on slit lamp exam were noted in any QLS-111 concentrations or regimens in either study.

Image

Table 1: IOP Lowering Effect of QLS-111 as Monotherapy

Osprey

Regimen	QLS-111 treatment conc.	Baseline (mm Hg)	LS Mean Change (mm Hg)	P-value (vs. baseline)
QAM	0.15%	23	-2.8	0.0018
	0.30%	23.7	-2.5	<0.0001
	0.75%	24.1	-1	0.128
	Vehicle	24.2	-1.4	0.2086
QPM	0.15%	23	-3.7	0.0001
	0.30%	23.7	-2.5	<0.0001
	0.75%	24.1	-1.6	0.0151
	Vehicle	24.2	-1.7	0.1516
BID	0.15%	23	-2.8	0.0018
	0.30%	23.7	-2.4	0.0001
	0.75%	24.1	-0.7	0.2405
	Vehicle	24.2	-1.5	0.1968

Table 2: IOP Lowering Effect of QLS-111 Adjunctive to Latanoprost

Apteryx

Regimen	QLS-111 treatment conc.	Baseline (mm hg)	LS Mean Change (mm Hg)	P-value (vs. baseline)
QPM	0.15%	19.8	-3.2	0.0005
	0.30%	19.5	-2.9	0.0011
	0.75%	19.7	-1	0.0385
	Vehicle	19.7	-1.5	0.0159
BID	0.15%	19.8	-3.6	0.0002
	0.30%	19.5	-2.5	0.0036
	0.75%	19.7	-1.4	0.0096
	Vehicle	19.7	-0.9	0.1176

Conclusions

QLS-111 is a well-tolerated, efficacious ocular hypotensive agent in POAG and OHT patients. With its unique and novel mechanism of action, QLS-111 is both a potential monotherapy and an adjunctive therapy to current drugs and drainage devices. Clinical development of QLS-111 for POAG, OHT and normal tension glaucoma is ongoing.

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P-RP-032
GLUCAGON-LIKE PEPTIDE-1 RECEPTOR AGONIST IMPACT ON GLAUCOMA SUBTYPES

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Background
Glucagon-like peptide-1 receptor agonists (GLP-1RA) have demonstrated protective effects across multiple organ systems.[1] In ophthalmology, GLP-1RA promote retinal ganglion cell survival through mitigation of inflammatory glial responses in glaucoma animal models and have shown protective effects against glaucoma in retrospective studies.[2,3] This study examines the impact of GLP-1RA on glaucoma subtypes.

Methods
Utilizing the TriNetX database, which comprises over 100 million patients from over 60 U.S. healthcare organizations, we included patients over the age of 18 with type II diabetes and documented medication and ophthalmology follow up. We compared patients on GLP-1RA to those on metformin, insulin, sulfonylurea, or SGLT2i medications, propensity matching for demographics and chronic conditions. Outcomes included primary open-angle glaucoma (POAG), ocular hypertension (OHTN), low tension glaucoma (LTG), angle closure glaucoma (ACG), and secondary glaucoma (pseudoexfoliation, pigmentary, trauma, inflammatory). Protective effects were evaluated at one, three, and five years. Statistical significance was defined as $p< 0.01$ and hazard ratio (HR) > 1.1 or < 0.9, accounting for database size and multiple hypothesis testing. Analyses were performed with the TriNetX software.

Results
Among 27,324 patients on GLP-1RA for three years, 34.1% were overweight. Propensity matching balanced patient demographics and chronic health condition prevalence. Compared to patients on non-GLP-1RA medications, GLP-1RA significantly reduced the risk of POAG (HR 0.8, 95%CI: 0.72-0.9), LTG (HR 0.4, 95%CI: 0.28-0.56), and ACG (HR 0.62, 95%CI: 0.47-0.81) at three years. POAG, LTG, and ACG risk were consistently reduced at one year. POAG and LTG risk were consistently reduced at five years. There was no significant impact on OHTN or secondary glaucoma at any time point.

Image

B **Three-year cohort**

Patient Characteristic	Prior to propensity matching			Propensity matched		
	GLP-1RA (N=27324)	Non-GLP-1RA (N=97109)	StDiff	GLP-1RA (N=26473)	Non-GLP-1RA (N=26473)	StDiff
Age	56.9 +/- 11.2	60.1 +/- 13.1	**0.264**	57.2 +/- 11.1	56.8 +/- 12.3	0.031
Sex						
Female	16001, (58.6)	50818, (52.3)	**0.126**	15382, (58.1)	15269, (57.7)	0.009
Race and Ethnicity						
Asian	1165, (4.3)	6596, (6.8)	**0.111**	1157, (4.4)	1080, (4.1)	0.014
Black	7224, (26.4)	23848, (24.6)	0.043	6962, (26.3)	6891, (26)	0.006
Hispanic	3768, (13.8)	14775, (15.2)	0.04	3699, (14)	3450, (13)	0.028
White	15263, (55.9)	53058, (54.6)	0.025	14767, (55.8)	15003, (56.7)	0.018
Disease						
Hypertension	17314, (63.4)	50954, (52.5)	**0.222**	16617, (62.8)	16267, (61.4)	0.027
Type 2 Diabetes	24012, (87.9)	69400, (71.5)	**0.417**	23163, (87.5)	22962, (86.7)	0.023
Overweight and Obesity	9305, (34.1)	13435, (13.8)	**0.488**	8461, (32)	8387, (31.7)	0.006
Obstructive sleep apnea	4365, (16)	5557, (5.7)	**0.334**	3626, (13.7)	3537, (13.4)	0.01
Raynaud's syndrome	32, (0.1)	96, (0.1)	0.006	32, (0.1)	22, (0.1)	0.012
Cerebral vasospasm	55, (0.2)	294, (0.3)	0.02	54, (0.2)	25, (0.1)	0.028
Cardiac arrhythmia	781, (2.9)	2887, (3)	0.007	767, (2.9)	613, (2.3)	0.037
Migraine	989, (3.6)	1596, (1.6)	**0.124**	832, (3.1)	737, (2.8)	0.021
Hypotension	331, (1.2)	1177, (1.2)	<0.001	326, (1.2)	225, (0.8)	0.038
Tobacco use	446, (1.6)	994, (1)	0.053	411, (1.6)	356, (1.3)	0.017
Nicotine dependence	1556, (5.7)	5411, (5.6)	0.005	1503, (5.7)	1358, (5.1)	0.024
HbA1c	8.6 +/- 2.0	7.6 +/- 1.9	**0.497**	8.6 +/- 2.0	7.6 +/- 2.0	**0.463**

Conclusions

GLP-1RA reduces the risk of POAG, LTG, and ACG across multiple time points without influencing OHTN, suggesting neuroprotective effects beyond intraocular pressure reduction. These findings highlight the need for prospective trials to explore the impact of GLP-1RA on glaucoma progression.

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POSTER ABSTRACTS

Artificial Intelligence & Big Data

P-PW-0001

COMPARISON OF DEEP LEARNING AND CLINICIAN PERFORMANCE DETECTING REFERABLE GLAUCOMA FROM FUNDUS PHOTOGRAPHS IN A SAFETY NET POPULATION

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Background

To develop and test a deep learning (DL) algorithm for detecting referable glaucoma in the Los Angeles County (LAC) Department of Health Services (DHS) teleretinal screening program.

Methods

Fundus photographs and patient-level labels of referable glaucoma (defined as cup-to-disc ratio [CDR] ≥ 0.6) provided by 21 certified optometrist graders were obtained from the LAC DHS teleretinal screening program. A DL algorithm based on the VGG-19 architecture was trained using patient-level labels generalized to images from both eyes. Area under the receiver operating curve (AUC), sensitivity, and specificity were calculated to assess algorithm performance using an independent test set that was also graded by 13 clinicians with 0 to 10 full years of experience. Algorithm performance was tested using reference labels provided by either the LAC DHS optometrists or an expert panel of 3 glaucoma specialists.

Results

12,098 images from 5,616 patients (2,086 referable glaucoma, 3,530 non-glaucoma) were used to train the DL algorithm. In this dataset, mean age was 56.8 ± 10.5 years with 54.8% females and 68.2% Latinos, 8.9% Blacks, 6.0% Asians, and 2.7% Caucasians. 1,000 images from 500 patients (250 referable glaucoma, 250 non-glaucoma) with similar demographics ($p \geq 0.57$) were used to test the DL algorithm. Algorithm performance matched or exceeded that of all independent clinician graders in detecting patient-level referable glaucoma based on LAC DHS optometrist (AUC = 0.92) or expert panel (AUC = 0.93) reference labels. Clinician grader sensitivity (range: 0.33-0.99) and specificity (range: 0.68-0.98) ranged widely and did not correlate with years of experience ($p \geq 0.49$). Algorithm performance (AUC = 0.93) also matched or exceeded the sensitivity (range: 0.78-1.00) and specificity (range: 0.32-0.87) of 6 certified LAC DHS optometrists in the subsets of the test dataset they graded based on expert panel reference labels.

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Conclusions

A DL algorithm for detecting referable glaucoma trained using patient-level data provided by certified LAC DHS optometrists approximates or exceeds performance by ophthalmologists and optometrists, who exhibit variable sensitivity and specificity unrelated to experience level. Implementation of this algorithm in screening workflows could help reallocate eye care resources and provide more reproducible and timely glaucoma care.

P-PW-0002

AN ARTIFICIAL INTELLIGENCE-BASED PROGNOSTIC MODEL FOR PREDICTION OF FUNCTIONAL GLAUCOMA PROGRESSION FROM CLINICAL AND STRUCTURAL DATA

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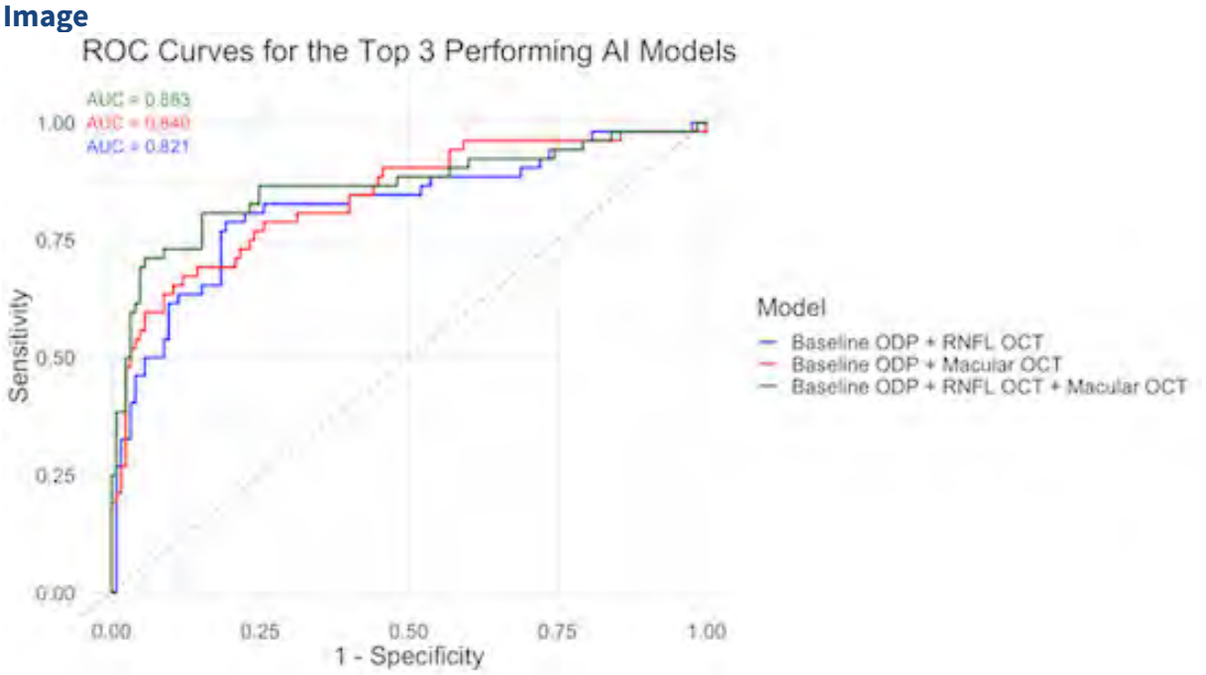
Background
Several pieces of information are available for clinicians to monitor glaucoma progression; integration of various sources of information for prognostic models is an unmet need in glaucoma diagnostics. [1,2] We designed a deep learning-based prognostic model incorporating available clinical and structural data for predicting functional glaucoma progression.

Methods
We included 2,077 eyes (1,176 patients) with ≥5 24-2 visual fields (VF) and ≥3 years of follow-up. VF mean deviation (MD) rates of change were estimated with linear regression. VF progression was defined as a confirmed negative MD slope with $p<0.05$ at the final follow-up. A convolutional neural network pre-trained on ImageNet was designed to predict VF progression using clinical data, baseline disc photographs (ODP), and OCT-derived global and sectoral retinal nerve fiber layer, and macular thickness measurements. The following baseline clinical/demographic data were put into the DL model: gender, ethnicity, age, intraocular pressure (IOP), central corneal thickness, and VF MD, pattern standard deviation and treatment history (IOP lowering drop, laser and filtering surgery). A separate deep-learning model was trained for every combination of the clinical/demographic data and the three structural imaging modalities at baseline. The model was validated on a separate cohort of eyes in which OCTs were done with a different device (291 eyes).

Results
Average (SD) baseline MD and number of VF exams were –3.6 (5.1) dB and 12.6 (8.5). 637 eyes (31%) deteriorated. The mean (SD) follow-up time for stable and progressing eyes was 7.8 (4.9) and 10.4 (5.0) years. The model using baseline ODP, and RNFL and macular OCT measurements performed best (AUC= 0.863; 95% CI: 0.793-0.934) ($p <0.015$ for all comparisons to simpler models except comparison to combined ODP and macular OCT; $p=0.199$). Figure 1 displays the ROC curve for the top 3 AI models. The best-performing model had a similar AUC and accuracy when implemented on the validation cohort (0.854, 95% CI: 0.761-0.947 and 83%, 95% CI: 63%-94%, respectively).

Image



Conclusions

Our newly designed deep learning model can combine baseline demographic and clinical data with widely available structural measurements and provide clinically relevant information for predicting glaucoma progression many years later.

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P-PW-0003

INTEGRATIVE MODELS COMBINING CLINICAL, GENETIC, AND NEUROIMAGING DATA FOR GLAUCOMA RISK PREDICTION

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Background

Glaucoma, a multifactorial disease, is traditionally diagnosed based on clinical ocular findings. This study investigates whether integrating clinical ophthalmic, genetic, and neuroimaging data can enhance the prediction of glaucoma risk.

Methods

This study analyzed adults aged 40–80 years from the UK Biobank with clinical ophthalmic, genetic, and brain MRI data, including 116 glaucoma cases and 2,036 healthy controls matched by age and sex. Glaucoma cases were identified via ICD-10 codes or self-reported diagnoses, excluding those with other ocular, neurological, or diabetes-related conditions. Data included OCT-derived inner retinal thickness and visual acuity (clinical ophthalmic), polygenic risk scores (PRS) for primary open-angle glaucoma (genetic), and brain MRI-derived measures such as volumetry, diffusion-weighted imaging, and functional MRI (neuroimaging).

Five logistic regression models were compared:
1. Clinical ophthalmic (C);
2. Neuroimaging (N);
3. Clinical ophthalmic + genetic (C+G);
4. Clinical ophthalmic + neuroimaging (C+N);
5. Clinical ophthalmic + genetic + neuroimaging (C+G+N).

Weighted error penalization addressed data imbalance, and 10-fold cross-validation assessed model performance. Area-under-the-curve (AUC) confidence intervals (CIs) were calculated using jackknife resampling, and DeLong's test with Bonferroni correction compared models. Feature importance was evaluated with information gain analysis.

Results

Model 5, integrating all data types, achieved the highest AUC (0.80, 95% CI: 0.72–0.82). Model 4, combining clinical ophthalmic and neuroimaging data, showed better performance (AUC: 0.77, CI: 0.68–0.80) compared to clinical ophthalmic (AUC: 0.66, CI: 0.55–0.73) or neuroimaging data alone (AUC: 0.66, CI: 0.55–0.68). Information gain analysis ranked ganglion cell-inner plexiform layer thickness, retinal nerve fiber layer thickness, PRS, gray matter volumes, logMAR visual acuity, and fractional anisotropy in visual processing regions as key predictors.

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Conclusions

Integrating genetic, neuroimaging, and clinical ophthalmic data significantly enhances glaucoma risk prediction. These findings underscore the importance of multifactorial approaches in improving disease understanding and advancing precision medicine for glaucoma.

P-PW-0004

DEVELOPMENT OF A PREDICTIVE NEURAL NETWORK FOR OPTIMAL IOP REDUCTION IN GLAUCOMA MANAGEMENT

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Background
The standard practice for managing glaucoma involves reducing intraocular pressure (IOP) by 20-30% at initial presentation. Despite this, patients may experience glaucomatous progression, particularly in cases of normal-tension glaucoma (NTG), where determining the optimal IOP reduction is challenging. Typically, treatment is initiated, and patients are subsequently monitored for glaucomatous damage. This trial aimed to develop a neural network capable of predicting the necessary IOP reduction at initial presentation.

Methods
Data from Qiu et al. (2015) were used, involving 270 patients, of which 118 had normal-tension glaucoma (NTG). A standard artificial neural network was constructed using the Levenberg-Marquardt algorithm in MATLAB's Neural Network Start tool. The network featured a single layer with five nodes. The dataset was divided into 65% for training, 15% for validation, and 20% for testing. Input factors included eye laterality, age, gender, diagnosis (primary open-angle glaucoma vs. NTG), spherical equivalent (SE), best-corrected visual acuity (BCVA), LogMAR BCVA, central corneal thickness (CCT), vertical cup-to-disc ratio (VCDR), follow-up duration, axial length, initial mean deviation on visual field testing, and total change in mean deviation. The target output was the IOP reduction over the follow-up period. Training was repeated 10 times, and the results were analyzed for specificity, sensitivity, and overall accuracy across the training, validation, and test sets. Once training was complete, a feature importance trial was conducted by systematically removing each input factor and retraining the network 10 additional times. A decrease in network performance was used as the primary indicator of the importance of each feature.

Results
The neural network demonstrated strong predictive performance across all 10 trained models, showing robust consistency and minimal overfitting. The average RMSE values were 1.90±0.29 for training, 2.18±0.34 for validation, and 2.11±0.30 for testing, with high correlation coefficients (r) of 0.92±0.02, 0.88±0.02, and 0.88±0.04, respectively. The best-performing network achieved an RMSE of 1.57 (training), 2.90 (validation), and 1.77 (testing), with r values of 0.93, 0.91, and 0.93, respectively. Notably, optimal performance was achieved after 11 epochs. Feature removal analysis revealed a statistically significant increase in RMSE when key variables such as IOP, axial length, CCT, diagnosis, VCDR, spherical equivalent, mean deviation, and eye laterality were excluded.

Conclusions
We demonstrate that a single-layer neural network with five nodes, trained on a carefully curated dataset, can accurately and consistently predict the necessary IOP reduction at the initial glaucoma presentation. By integrating patient-specific parameters and demonstrating stable predictive performance, the model supports personalized glaucoma management by assisting clinicians in setting individualized target IOP levels to improve patient outcomes.

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P-PW-0005

PREDICTING VISUAL FIELD PATTERN DEVIATION PROBABILITY MAPS FROM VOLUMETRIC OCT SCANS

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Background

Glaucoma is a leading cause of irreversible blindness, necessitating prompt detection through tools like Optical Coherence Tomography (OCT) and Visual Field (VF) tests. Despite the strong structural-functional association, there is currently no clinically applicable system to predict functional VF data from OCT scans.

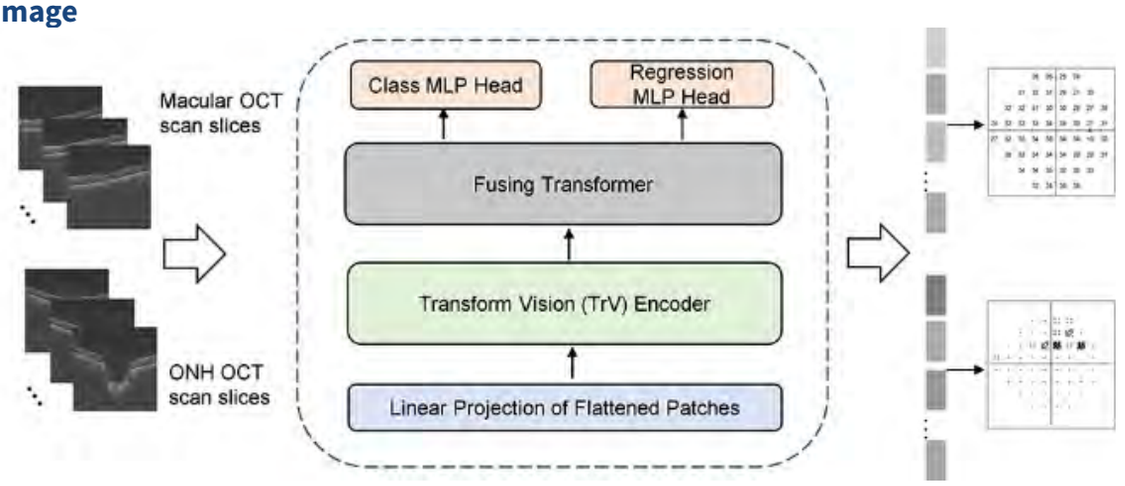
Methods

In this multicenter study, we recruited 5,604 participants from the Zhongshan Ophthalmic Center and Shanghai General Hospital in China. After quality control procedures, the study included 8,908 eligible data pairs of OCT and VF. These were divided into training set (6,902 pairs), internal validation set (1,443 pairs), and external test set (563 pairs). We developed a deep learning (DL) system using paired OCT scans and 24-2 VF tests acquired on the same day to predict Pattern Deviation Probability (PDP) maps of 24-2 VF. The primary outcome measured was the accuracy of our DL models in pointwise PDP prediction. Additionally, to validate the clinical accuracy of our DL system, we asked two senior and two junior ophthalmologists to classify the OCT-VF pairs into glaucoma or non-glaucoma categories based on OCT reports with clinically obtained or DL-generated PDP maps.

Results

In the internal validation set, the DL models based on macular and Optic Nerve Head (ONH) scans demonstrated accuracies of 0.88. In the external test set, the macular scan-based DL model maintained an accuracy of 0.85 and a recall of 0.33, while the ONH-based model showed comparable performance with an accuracy of 0.84. Clinical validation indicated strong agreement, with κ values of 0.86 and 0.73 among senior and junior ophthalmologists, respectively, in diagnosing glaucoma based on OCT reports with clinically obtained or DL-generated PDP maps. The diagnostic accuracy for the two senior ophthalmologists, based on clinically obtained or DL-generated PDP maps, were 0.91 and 0.94, respectively. For the junior ophthalmologists, these metrics were 0.85 and 0.82, respectively.

Image



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Conclusions

Our study confirms that deep learning models based on OCT scans can effectively predict clinically applicable PDP maps, which may provide information to diagnose glaucoma when VF data are unavailable.

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P-PW-0006

PREDICTION OF GLAUCOMA VISUAL FIELD PROGRESSION BASED ON NON-TIME-SERIES CLINICAL DATA USING AN ECHO STATE NETWORK

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Background

Glaucoma is a multifactorial disease, and predicting the progression of visual field (VF) dysfunction from an early stage is important.[1-3] Thus, tools are needed for VF prediction based on early measurements and background factors. We propose a new approach to extend the echo state network (ESN): an ESN can rapidly model time series [4,5] and compare the proposed method with other machine learning (ML) methods to predict the progression of VF dysfunction.

Methods

In this retrospective study, 2420 eyes of 1354 patients with open-angle glaucoma, no surgical intervention, and MD –20dB or higher who visited Tohoku University Hospital from January 2018 to October 2024 were selected for VF testing (Humphrey 24-2) at intervals of 6 months or less. We included 224 patients (age: 54.6 ± 11.0 years; male-to-female ratio: 103:121); the left or right eye was selected at random. Baseline measurements for patient background (age, gender, body weight, and oxidative stress) and ophthalmologic findings (visual acuity [VA], intraocular pressure, axial length, and central corneal thickness [CCT], as well as findings from optical coherence tomography and laser speckle flowgraphy) were considered to be candidate predictors. Variables related to the progression of VF dysfunction were selected from the candidates using some variable selection methods. Analyses were performed using logistic regression (LR), random forest (RF), a support vector machine (SVM), and the proposed method using ESN. Progression of VF dysfunction was defined as MD slope ≤ –1.0 dB/year. Data were split 8:2 into training and test sets, with 5-fold cross-validation repeated 30 times.

Results

VF progression was observed in 17.4% of eyes (n=39). The selected factors were body weight, biological antioxidant potential, number of eye drops, VA, CCT, vertical cup-disc ratio, disc area, and choroidal blood flow. The ESN achieved the highest predictive accuracy with an AUC of 0.87, among the ML methods (LR:0.83, SVM:0.83, RF:0.81).

Conclusions

This study suggests that the proposed method using ESN can learn dynamics and accurately predict glaucomatous VF progression.

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P-PW-0007

FUZZY CLUSTERING OF 10-2 VISUAL FIELD SPATIAL PATTERN CAN DETECT AND PREDICT 10-2 VISUAL FIELD PROGRESSION

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Background
To detect and predict 10-2 visual field (VF) progression using fuzzy clustering of spatial pattern.

Methods
A total of 7,927 10-2 VFs from 5,426 eyes (3,328 patients) were decomposed into 10 archetypal patterns using a hybrid approach combining archetypal analysis (AA) and fuzzy c-means (FCM) clustering. We then selected 108 eyes of 108 patients with at least five 10-2 VFs. Linear regressions were applied to the decomposition coefficients of the 10 archetypes (ATs) in the VF series over time. We compared the areas under the receiver operating characteristic curves (AUCs) of the decomposition coefficient slopes to detect 10-2 VF progression using two criteria: mean deviation slope and sectoral analysis. A multivariable logistic regression analysis was performed to investigate baseline archetypes as predictors of 10-2 VF progression.

Results
Two of the 10 AUCs of the FCM decomposition coefficient slopes ($slope_{FCM}$) outperformed those of the AA decomposition coefficient slopes ($slope_{AA}$) in detecting VF progression for both criteria (AT3, central defect; AT10, normal VF) (both $P \leq 0.022$). Four $slope_{FCM}$ had AUCs > 0.8, whereas none of the $slope_{AA}$ had AUCs > 0.8 in the global analysis. Only two $slope_{AA}$ had an AUC > 0.8, whereas five $slope_{FCM}$ had AUCs > 0.8 in the sectoral analysis. Baseline AT7 (superonasal VF defect) was associated with an increased risk of 10-2 VF progression ($P = 0.037$) using both AA-only and FCM hybrid approaches.

Conclusions
A hybrid approach combining AA and FCM to analyze 10-2 VF can detect and predict VF progression with lossless decomposition.

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P-PW-0008

GUIDE: A MACHINE LEARNING-BASED DECISION SUPPORT SYSTEM FOR GLAUCOMA LONG-TERM MANAGEMENT

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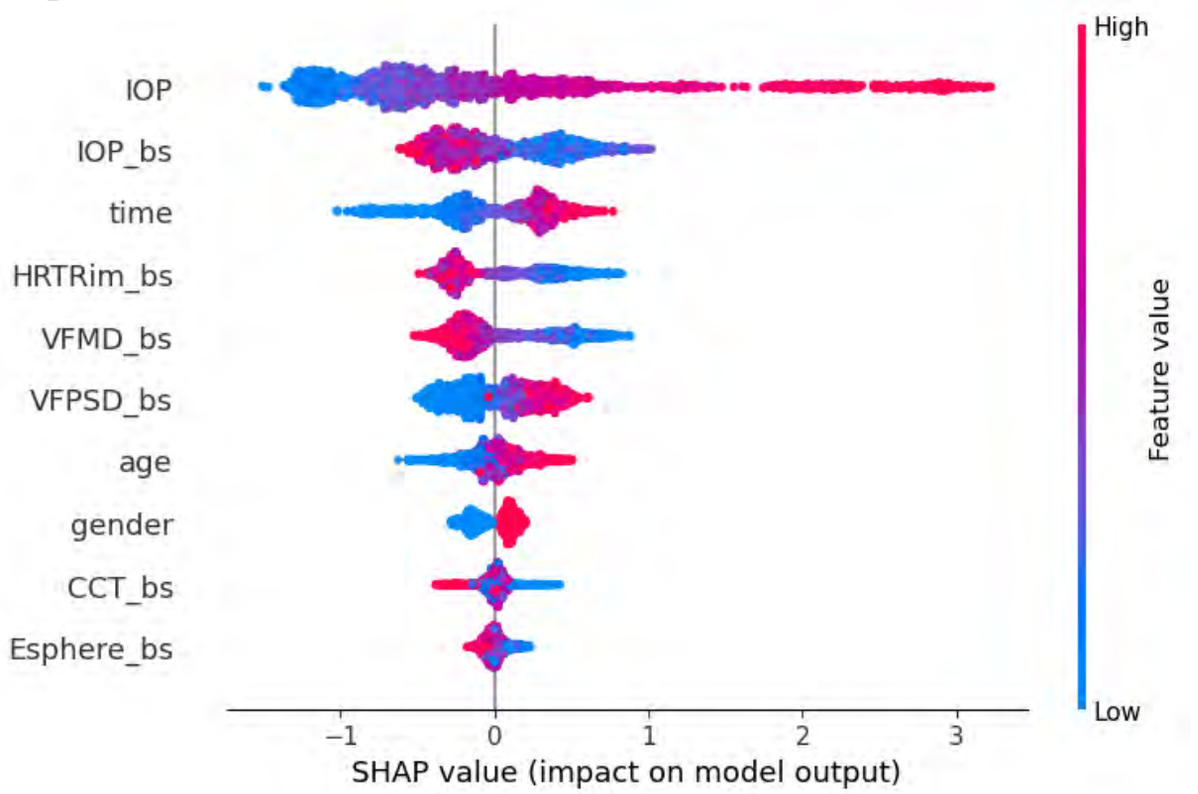
Background
This study focuses on open-angle glaucoma, the leading cause of irreversible blindness, and aims to develop clinical decision-making algorithms for the critical treatment escalation during long-term follow-up leveraging advanced machine learning, to provide insights and improve capabilities in the long-term management of open-angle glaucoma.

Methods
This study included newly diagnosed patients with open-angle glaucoma and ocular hypertension from a large trial, the Laser in Glaucoma and Ocular Hypertension Trial in China(LiGHT China), in which patients underwent 4-year regular follow-up after diagnosis. In the preliminary phase, we utilized a guideline-based decision system to assess whether treatment escalation was needed during patient follow-ups. Glaucoma specialists with more than 10-year experience then determined whether to adopt the system's recommendations, and their final decisions were taken as ground-truth labels to train machine learning-based decision support algorithms. The CatBoost algorithms leveraging ensemble learning stood out for precise and robust performance, as well as cost-effectiveness for potential telemedicine application by using only follow-up intraocular pressure with baseline characteristics.

Results
This study included a total of 771 patients, 1376 trial eyes, and 6889 follow-up records from 2015 to 2023. Based on guideline-based decision system, 765 visits in 6889 were labelled as requiring treatment escalation, in which the reasons included 585 (77%) for uncontrolled intraocular pressure, 131 (17%) for glaucoma progression, and 49 for both. Glaucoma specialists reviewed these initial decisions and modified 192 treatment escalation (25%) to continuing monitoring. We then further taken these decision as ground-truth labels to train machine learning-based decision support algorithms, and the model achieved an AUROC of 0.86 (0.02) and an F1 score of 0.73 (0.04) under 10-time 3-fold cross-validation. The algorithms detected 63.2% of eyes with adequate intraocular pressure control but at high risk of progression. SHapley Additive exPlanations showed the appropriate and robust reasoning of characteristics of the algorithms on decision-making of treatment escalation, and mainly based on real-time intraocular pressure.

Image



Conclusions

This study provides insights in the reasoning process of specialists in the treatment escalation decision-making during long-term management of open-angle glaucoma, and develops rigorously validated algorithms leveraging advancements in computational modelling to achieve automated, robust and explainable decision-making which potentially relieve the heavy burdens of glaucoma management in the future.

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P-PW-0009

MULTIMODAL ARTIFICIAL INTELLIGENCE FOR GLAUCOMATOUS OPTIC NEUROPATHY DIAGNOSIS: INTEGRATION OF VISUAL FIELD, OCT, AND FUNDUS IMAGING

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Background
Glaucomatous optic neuropathy (GON) is a leading cause of irreversible blindness, and its early diagnosis remains challenging due to the complex integration of multimodal clinical data. Recent advancements in artificial intelligence (AI) offer promising solutions for leveraging multimodal datasets. This study focuses on the development of AI algorithms employing two multimodal data fusion methods—task-level fusion and feature-level fusion—and evaluates the performance of algorithms integrating three modalities (visual field [VF], optical coherence tomography [OCT], and color fundus photographs [CFPs]), dual modalities, and single modalities in detecting GON.

Methods
Paired visual field (VF), optical coherence tomography (OCT), and color fundus photographs (CFPs) from glaucoma and non-glaucoma subjects were collected from two hospitals, forming a multimodal dataset split into training (80%) and test (20%) sets. Two fusion methods—task-level and feature-level—were used to develop AI models. For task-level fusion, ResNet50 served as the base framework, with random forest integrating model outputs into ResNet50-RF models. For feature-level fusion, an efficient channel attention (ECA) module was added to ResNet50, creating ResNet50-ECA models that fused multimodal features. Model performance was evaluated using AUC, accuracy, specificity, and sensitivity. Diagnostic performance was compared across three-modal, dual-modal, and single-modal data.

Results
A total of 1,805 paired multimodal datasets (817 glaucoma and 988 non-glaucoma) were collected from 905 subjects, with 1,443 assigned to the training set and 362 to the test set. In the test set, the ResNet50-RF model based on three modalities achieved the highest AUC (0.9998), significantly outperforming the dual-modal model (AUC: 0.9986, $P = 0.003$) and single-modal models (OCT: 0.9775, CFPs: 0.9949, VF: 0.9298, $P < 0.001$ for all). The ResNet50-ECA three-modal model also showed superior performance (AUC: 0.9966) compared to single-modal models (OCT: 0.9780, CFPs: 0.9696, VF: 0.9492, $P < 0.05$) but did not show a statistically significant difference from the dual-modal model (AUC: 0.9918, $P = 0.321$).

High myopia was the primary cause of false positives in the dual-modal ResNet50-RF model, accounting for 5 cases (55.56%), followed by physiologic large cupping with 4 cases (44.44%). In contrast, the three-modal ResNet50-RF model significantly reduced these errors, with only one misdiagnosed case each for high myopia (50.00%) and physiologic large cupping (50.00%).

Conclusions
Three-modal algorithms demonstrated superior performance compared to dual-modal and single-modal algorithms in detecting glaucomatous optic neuropathy (GON), highlighting their value and potential advantages in clinical applications. Both task-level fusion and feature-level fusion proved to be effective methods for integrating multimodal image data.

P-PW-0011

PREDICTING GLAUCOMA SURGICAL OUTCOMES WITH ARTIFICIAL INTELLIGENCE IN A MULTICENTER ELECTRONIC HEALTH RECORDS REPOSITORY

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Background

The purpose of this study was to develop machine learning (ML) and neural network (NN) models to predict glaucoma surgical outcomes, including postoperative intraocular pressure, use of ocular antihypertensive medications, and need for an additional glaucoma surgery, using electronic health records (EHR) from a large multicenter cohort.

Methods

We identified 9386 patients who underwent glaucoma surgery at 10 institutions participating in the Sight Outcomes Research Collaborative (SOURCE), with at least one year of follow-up and 2 postoperative visits with IOP measurement. Patient features were identified from EHR, including demographics, preoperative diagnosis and procedure codes, medications, and eye exam findings. Classical ML and NN models were developed on a training set to predict glaucoma surgical success. Surgical failure was defined with an overall composite outcome and individual outcomes of needing additional glaucoma surgery, intraocular pressure (IOP) <6 or >19mmHg or needing an increased number of glaucoma medications compared to preoperatively. Models were evaluated using standard classification metrics including area under the receiver operating characteristic (AUROC). Two evaluation populations were used: 1) an internal test set of randomly selected patients from the same sites as the training cohort, and 2) an external test set consisting of patients at a SOURCE site which was not part of the training cohort.

Results

8743 (66.4%) of the 13173 surgeries met failure criteria. On the internal test set, the best model for predicting overall surgical failure was a 1-Dimensional Convolutional Neural Network with AUROC of 76.4% and accuracy of 71.6%. The best classical ML model was random forest (AUROC 76.2%, accuracy 72.1%). For predicting individual failure criteria, IOP failure outcomes (AUROC 82%) were easier to predict than the need for additional surgery (AUROC 80%) or need for additional glaucoma medication (AUROC 68%). On the external test set, most models showed a slight AUROC decline (~2-4%) (**Figure**).

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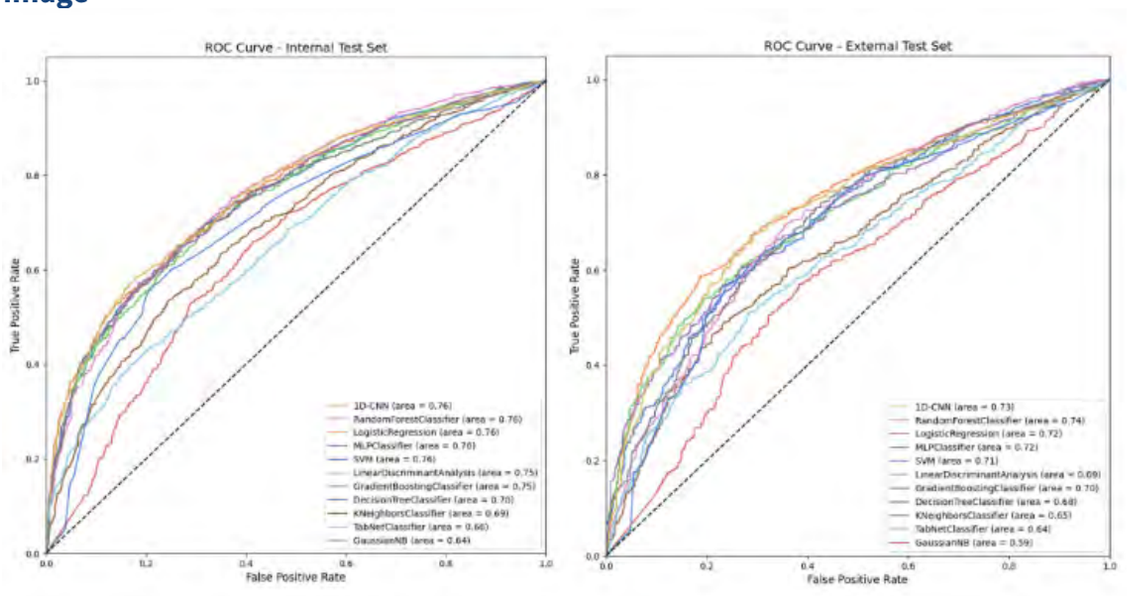
Image



Conclusions

ML and DL algorithms can predict outcomes of glaucoma surgeries, using only preoperative structured data from EHRs. Performance across different populations was generally well-preserved. Such models may eventually form the basis for clinical decision support tools to aid in glaucoma surgical decision-making.

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P-0012

DEEP LEARNING-BASED PREDICTION OF GLAUCOMA SEVERITY AND PROGRESSION USING IMO/TEMPO-SCREENING PROGRAM (ISP)

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Background

We previously developed the rapid screening perimetry (ISP), which has already been implemented for screening glaucoma in multiple facilities across Japan. Here, we present the DeepISP model that enables comprehensive predictions of visual field (VF) information of the Humphrey Visual Field Analyzer (HFA) using just a single rapid ISP test (**Figure 1**). Harnessing the potential of ISP, our DeepISP would allow more precise clinical decisions even in screening settings.

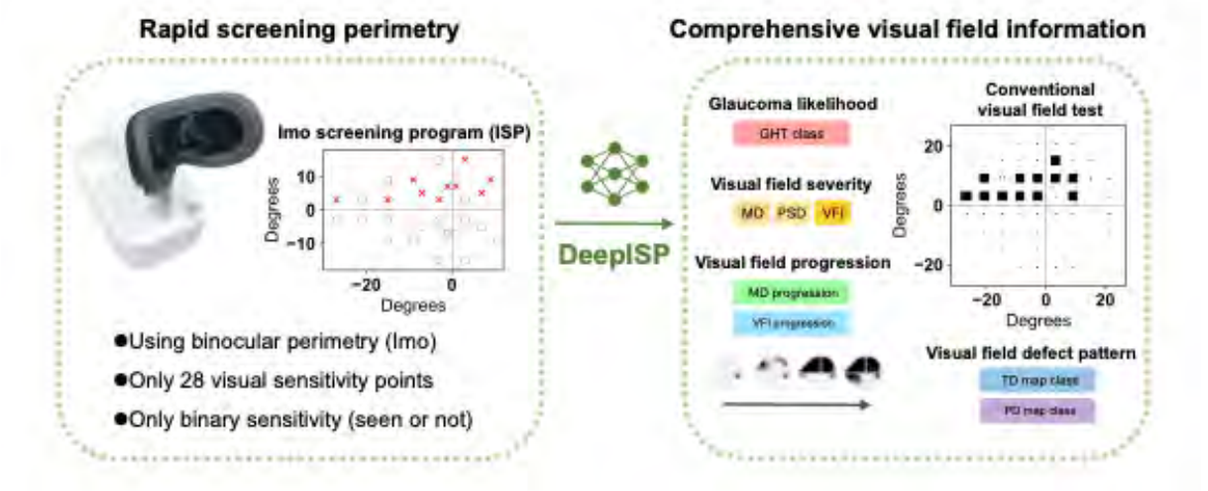
Methods

We retrospectively enrolled patients undergoing ISP and HFA 24-2 tests on the same day in the Jikei University Hospital, excluding those with reliability lower than criteria or with diseases affecting VF other than glaucoma. We developed a multitask neural network to predict HFA 24-2 parameters: probability plots of total deviation (TD) and pattern deviation (PD), mean deviation (MD), pattern standard deviation (PSD), visual field index (VFI), and glaucoma hemifield test (GHT). Another network was also developed to predict MD and VFI progression in longitudinal datasets, using cutoffs of MD slope <-1 and VFI slope <-1.8. Furthermore, we evaluated the efficacy of pre-training by a synthesized ISP dataset, created by combining 20 points from HFA 24-2 and 8 points from HFA 10-2 conducted within 6-months. Model performance was evaluated based on F1-score, mean absolute error (MAE), and area under the curve (AUC).

Results

The actual ISP dataset consisted of 187 eyes from 112 patients, while the synthesized ISP dataset included 3,470 eyes from 883 patients. Among these, the longitudinal dataset comprised 731 synthesized ISPs from 214 patients and 60 actual ISPs from 36 patients. We evaluated the performance of three models: Model 1 trained on the actual dataset, Model 2 trained solely on the synthesized dataset, and Model 3 pre-trained on the synthesized dataset. Consequently, Model 2 achieved the best performance. The mean F1-scores for pointwise probability plots were 0.76 for TD and 0.78 for PD. The MAE values were 1.87 for MD, 1.92 for PSD, and 5.15 for VFI. The AUC values were 0.92 for identifying GHT classification, 0.83 for MD progression, and 0.83 for VFI progression.

Image



Conclusions

Our DeepISP could predict most VF parameters precisely, providing valuable information on glaucoma severity and progression. Furthermore, we demonstrated the effectiveness of data augmentation by synthesizing ISP tests from globally available HFA tests, facilitating the development of domain-adapted DeepISP models worldwide.

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P-0013

GLAUCOMA MEDICATION PERSISTENCE: A RETROSPECTIVE, POPULATION-BASED ANALYSIS OF 77,162 PATIENTS

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Background
Glaucoma, a leading cause of irreversible blindness globally, is effectively managed by intraocular pressure (IOP)-lowering medications. However, medication adherence and persistence remain a significant challenge. In the context of a universal health care system, no prior studies have examined glaucoma medication persistence at the population level.

Methods
Using the Institute for Clinical Evaluative Sciences (ICES) databases, we conducted a population-based analysis of treatment persistence patterns among glaucoma patients aged 65 and older in a provincial, publicly funded universal healthcare system. Patients who initiated topical ocular hypotensive agents between January 1, 2011, and December 31, 2016 were recruited. Persistence was defined as continuing a treatment for the prescribed duration and was classified into four levels: transient users of medications, non-persistence, partial persistence, and full persistence, using the refill-gap method. The analysis identified factors influencing full medication persistence, including patient demographics, socioeconomic status, chronic conditions, and healthcare access.

Results
A total of 77,162 patients was identified. Multivariable logistic regression revealed that female sex (odds ratio [OR]: 1.14, p<0.0001), being in the highest socioeconomic quantile (OR: 1.09, p=0.0072), having a family doctor (OR: 1.14, p<0.0001), being a long-term residents (OR: 1.09, p=0.0134), no diabetes (OR: 1.15, p<0.0001), no hypertension (OR: 1.06, p=0.0032), no dementia (OR: 1.25, p<0.0001), no mental health issues (OR: 1.04, p=0.0391), and hospitalization (OR: 2.00, p<0.0001) were associated with full persistence.

Conclusions
In this study, our gained insights into treatment persistence patterns among glaucoma patients and factors contributing to medication persistence. This is the first project that examined glaucoma medication persistence rates at the population level within a publicly funded, universal healthcare system. Knowledge gained from this study help identify high-risk patients in clinical practice and support public health policymakers in refining strategies for vulnerable populations.

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P-0014

PREVALENCE OF PEDIATRIC GLAUCOMA SUSPECT AND ITS ASSOCIATION WITH MYOPIA: A NATIONWIDE SAMPLE COHORT STUDY

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Background
To determine the prevalence of glaucoma suspect (GS) in children nationwide and to investigate its association with myopia.

Methods
We analyzed 2018 Health Insurance Review and Assessment Service-Pediatric Patients Sample (HIRA-PPS) data, randomly selecting 10% (n=949,354) of all South Korean children and adolescents under 20 years of age. GS was defined as having a diagnosis code of GS based on the International Statistical Classification of Diseases, 10th revision (ICD-10), along with fundus examination and tonometry procedure codes. Myopia was defined as having the diagnosis code of myopia and refraction procedure codes.

Results
Out of 949,354 children, 6,583 had GS, for a prevalence of 0.69% (0.74% in boys, 0.64% in girls). The prevalence of GS increased with age, showing rates of 0.14% for 0-4 years, 0.63% for 5-9 years, 0.80% for 10-14 years, and 1.15% for 15-19 years. The prevalence of GS was 3.69% in children with myopia and 0.38% in children without myopia. The odds ratio (OR) of myopia on GS prevalence was 10.17 (95% CIs, 9.68-10.68). The ORs by sex were 11.10 (10.39-11.87) in boys and 9.22 (8.57-9.92) in girls. The ORs by age were 25.58 (19.97-32.63) for 0-4 years, 8.32 (7.48-9.26) for 5-9 years, 6.84 (6.21-7.54) for 10-14 years, and 12.11 (11.26-13.03) for 15-19 years.

Conclusions
Pediatric GS was more prevalent in boys and children of older age. Children with myopia had higher GS prevalence compared with non-myopic children. These findings may contribute to fuller understanding of disease's pathophysiology and improved nationwide healthcare planning.

P-0015

VISUAL FIELD GLOBAL INDEX PREDICTION WITH DEEP LEARNING MODEL USING OPTICAL COHERENCE TOMOGRAPHY PARAMETERS IN GLAUCOMA PATIENTS

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Background

Standard automated perimetry (SAP) is the reference technique to detect and monitor functional VF loss in the management of glaucoma.[1,2] However, there are some intrinsic limitations of VF test. First of all, it is subjective in the nature of the test. Moreover, it has high intrasubjective variability (high test-to-test variability), lengthy testing time, and requirement for an isolated environment to conduct the test.[3,4] Structure–function relationship is important in the understanding and management of glaucoma.[5-8] Recently, spectral-domain OCT provides a new parameter, Bruch's membrane opening-minimum rim width (BMO-MRW) in addition to the conventional peripapillary RNFL. BMO-MRW measures the minimal distance between the inner opening of BMO and the internal limiting membrane (Figure 1A), which has been introduced for the assessment of optic nerve head.[9-13] BMO-MRW also has been demonstrated to have a stronger structure–function relationship than other disc parameters or RNFL.[14, 15] We aimed to predict three visual filed(VF) global indexes, mean deviation(MD), pattern standard deviation(PSD), and visual field index(VFI), from optical coherence tomography (OCT) parameters included Bruch's Membrane Opening-Minimum Rim Width(BMO-MRW) and retinal nerve fiber layer(RNFL) based on a deep-learning model.

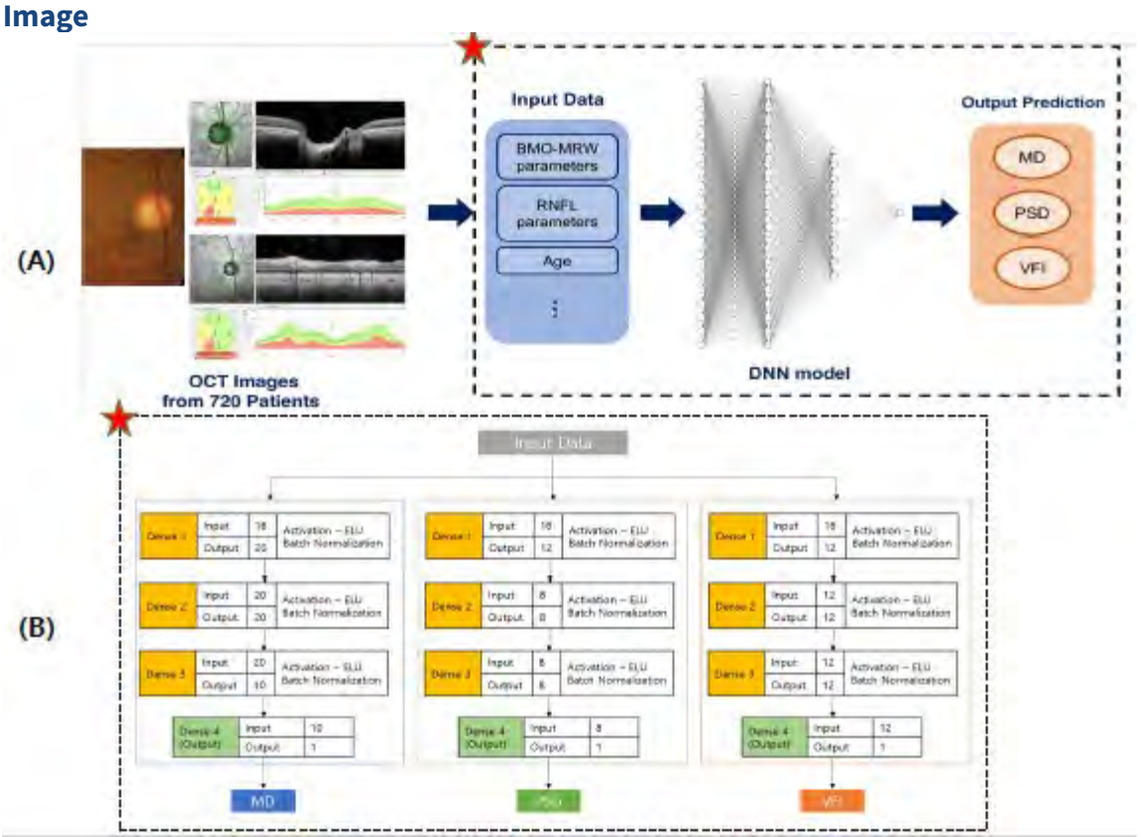
Methods

A total of 720 eyes of 720 glaucoma patients were included in this cross-sectional study. The patients' BMO-based data and RNFL data were included in the dataset. We developed models based on deep neural networks (DNN), which were used to predict the value of VF global indexes. For diagnostic performances of the model, we used mean absolute error (MAE). We applied the DNN model to the test dataset and compared the difference between the real value and the predicted value.

Results

Baseline demographics are as follows: age, 53.7±13.3 years; female, 328(46%); intraocular pressure, 15.6±4.1 mmHg; spherical equivalent, -1.8±2.9 D; MD, -4.5±5.8 dB; PSD 5.3±4.2 dB; VFI 88.6±17.0 %. The DNN model showed significant performance. The MAE range of the DNN model on cross validation was 1.9 - 2.9(dB) for MD, 1.6 - 2.0(dB) for PSD, and 5.0 to 7.0(%) for VFI. The performance of the prediction of VFI was the best among three VF global indexes. The ranges of Pearson's correlation coefficient were 0.76 - 0.85, 0.74 - 0.82, and 0.70 - 0.81 for MD, PSD, and VFI.

Image



Conclusions

The performance of our deep-learning model to predict VF global indexes using OCT parameters including BMO-MRW was considerably acceptable. Since global indexes of VF should be obtained by patient's performance, thus, predicting the global indexes by our DNN model using objective structural data may be useful in clinical practice. Our deep-learning model can aid in the diagnosis of glaucoma, especially in situations when immediate VF results are not available.

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P-0016

EARLY GLAUCOMA DETECTION BY USING STYLE TRANSFER TO PREDICT RETINAL NERVE FIBER LAYER THICKNESS DISTRIBUTION ON THE FUNDUS PHOTOGRAPH

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Background
Objective: We aimed to develop a deep learning (DL)ebased algorithm for early glaucoma detection based on color fundus photographs that provides information on defects in the retinal nerve fiber layer (RNFL) and its thickness from the mapping and translating relations of spectral domain OCT (SD-OCT) thickness maps. We developing and evaluating an artificial intelligence detection tool.

Methods
We pretraining paired data of color fundus photographs and SD-OCT images from 189 healthy participants and 371 patients with early glaucoma were used. The variational autoencoder (VAE) network training architecture was used for training, and the correlation between the fundus photographs and RNFL thickness distribution was determined through the deep neural network. The reference standard was defined as a vertical cup-to-disc ratio of > 0.7, other typical changes in glaucomatous optic neuropathy, and RNFL defects. Convergence indicates that the VAE has learned a distribution that would enable us to produce corresponding synthetic OCT scans. The main outcome measures: similarly to wide-field OCT scanning, the proposed model can extract the results of RNFL thickness analysis. The structural similarity index measure (SSIM) and peak signal-to-noise ratio (PSNR) were used to assess signal strength and the similarity in the structure of the color fundus images converted to an RNFL thickness distribution model. The differences between the model-generated images and original images were quantified.

Results
We developed and validated a novel DL-based algorithm to extract thickness information from the color space of fundus images similarly to that from OCT images and to use this information to regenerate RNFL thickness distribution images. The generated thickness map was sufficient for clinical glaucoma detection, and the generated images were similar to ground truth (PSNR: 19.31 decibels; SSIM: 0.44). The inference results were similar to the OCT-generated original images in terms of the ability to predict RNFL thickness distribution.

Conclusions
The proposed technique may aid clinicians in early glaucoma detection, especially when only color fundus photographs are available.

P-0017
ESTIMATED RGC LOSSES IN GLAUCOMA OVER A LONG FOLLOW-UP PERIOD

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Background
Understanding glaucoma progression and individual changes over time is crucial but has been limited by shifts in diagnostic technologies. Current monitoring relies on standard automated perimetry (SAP) and optical coherence tomography (OCT). A recent deep learning algorithm, Machine-to-Machine (M2M), predicts retinal nerve fiber layer (RNFL) thickness from optic nerve head fundus photographs, which have been used far longer than OCT for structural monitoring. This study aimed to integrate OCT-predicted structural data from fundus photographs with SAP measures and explore long-term changes in glaucoma eyes and those suspected of having glaucoma.

Methods
This longitudinal cohort study included 1492 eyes of 857 subjects (417 glaucoma and 440 suspect) with a mean follow-up of 14.6 years ranging from 10.0 to 27.5 years. A published DL algorithm (M2M) trained on OCT parameters was used to predict global RNFL thickness from fundus photographs. A combined structure-function index was used to estimate retinal ganglion cell RGC counts using SAP sensitivity thresholds and the predicted RNFL thickness, as described by Medeiros et al. (Am J Ophthalmol. 2012; 154:814–824). Linear and nonlinear mixed models were used to estimate change in estimated RGC counts over time.

Results
The mean rate of RGC loss was -9,392 RGCs/year (95% CI: -13,621 to -5,163) for glaucoma eyes and -4,218 RGC/year (95% CI: -8,171 to -264) for glaucoma suspect eyes. Mean rates of estimated RGC loss were significantly faster for glaucoma (P<0.001) compared to suspect eyes (P=0.037).

Conclusions
With a combination of artificial intelligence and statistical models, our study provides the first assessment of estimated rates of RGC loss in glaucoma over a long period of time, averaging almost 15 years. The findings show that rates of change in glaucoma eyes were approximately twice those of glaucoma suspects eyes.

P-0018

DIAGNOSTIC PERFORMANCE OF PAPILLARY RETINOGRAPHY AND ENFACE OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY IN OPEN ANGLE GLAUCOMA

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Background

Some studies have raised the advantages of associating different glaucoma diagnostic procedures and using artificial intelligence (AI) in order to improve the diagnostic performance of the different procedures. Among the most used are spectral domain optical coherence tomography (SD-OCT) and optical coherence tomography angiography (OCTA). Retinography, despite technological advances in both SD-OCT and OCTA, remains essential in any glaucoma consultation. Changes in the papillary neuroretinal rim, papillary coloration and morphology, and wedge-shaped defects in the RNFL are very useful not only in diagnosis but also in patient's follow-up

The aim of this study is to evaluate the diagnostic performance of en-face optical coherence tomography angiography (OCTA) and colorimetric assessment of papillary retinography in primary open angle glaucoma (OAG).

Methods

Prospective observational single-center, cross-sectional study including OAG patients and healthy controls evaluated with papillary retinography, spectral domain optical coherence tomography (SD-OCT) and OCTA. Areas under ROC curves (AUROC) were calculated.

Results

A total of 213 subjects, 109 glaucoma patients and 104 healthy subjects were evaluated.

Glaucoma patients had lower macular and peripapillary vascular density than controls except in the peripapillary temporal and nasal quadrants which showed similar vascular density, although lower blood flow index.

Regarding the colorimetric papillary analysis, OAG patients had a higher papillary excavation, paler optic nerve head (ONH) and both Globin Discriminant Factor (GDF) and Globin Individual Point (GIP) indices significantly more pathological.

The highest AUROC was found for peripapillary vascular density in the inferior sector (0.787; 95%CI 0.728-0.847, p<0.001), followed by GDF (0.752; 95%CI 0.686-0.817, p<0.001), GIP (0.751; 95%CI 0.686-0.817, p<0.001). Vertical papillary excavation was the SD-OCT parameter with the highest AUROC (0.747 95%CI 0.680-0.813, p<0.001). There were no significant differences in the AUROCs of the parameters with the highest diagnostic ability. When a specificity of 90% is required, the SD-OCT vertical papillary excavation had a sensitivity of 51%, the peripapillary vascular density in the inferior sector showed a sensitivity of 46% and a sensitivity of 45% was found for the GDF and GIP indices.

Conclusions

The diagnostic performance of OCTA and colorimetric assessment of papillary retinography is similar.

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P-0020

DEEP LEARNING PREDICTION OF BMO-MRW IN THE CANADIAN LONGITUDINAL STUDY ON AGING (CLSA): ASSOCIATIONS WITH DEMOGRAPHIC AND CLINICAL FACTORS

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Background
The Bruch's membrane opening minimum rim width (BMO-MRW) is a key indicator of optic nerve health and glaucomatous damage. While typically measured using optical coherence tomography (OCT), advancements in deep learning (DL) have enabled its prediction from more accessible fundus photographs. This study investigates predictions of BMO-MRW in the Canadian Longitudinal Study on Aging (CLSA) and their associations with demographic and clinical factors.

Methods
A DL convolutional neural network was trained to predict global SDOCT BMO-MRW from optic disc photographs. The training dataset consisted of 3,267 paired optic disc photographs and corresponding SDOCT BMO-MRW measurements, from 638 eyes of 360 adult subjects, including healthy individuals, glaucoma suspects, and patients with diagnosed glaucoma. The model was then applied to fundus photographs from 52,546 eyes of 27,335 subjects included in the CLSA. We investigated the relationship between BMO-MRW and age, sex, race/ethnicity, and self-reported glaucoma diagnosis.

Results
The mean age of the CLSA participants was 62.2 ± 10.0 years and 51% were women. The mean predicted BMO-MRW was 324.17 ± 41.68 µm. There was a statistically significant relationship between age and predicted BMO-RMW thickness, with each year older age associated with 0.56 µm thinner predicted BMO-RMW (r = -0.134; P<0.001). 1,263 subjects (4.6%) self-reported a diagnosis of glaucoma. These individuals exhibited significantly lower BMO-RMW thickness (296.43 ± 1.04 µm) compared to those who did not report glaucoma (325.48 ± 0.18 µm), with a P-value < 0.001. There was no significant difference between sex. Mean predicted BMO-MRW values across racial/ethnic groups were 315.58 ± 49.36 µm for Asians, 324.30 ± 44.61 µm for individuals of African descent, 324.78 ± 41.37 µm for Caucasians, and 318.54 ± 43.67 µm for Hispanics. Mean differences were statistically significant between Asians and Caucasians (P<0.001), but no other statistically significant differences were found for the other comparisons between groups.

Conclusions
Using a DL model, we successfully predicted BMO-MRW values in a large population-based cohort. Subjects with a self-reported diagnosis of glaucoma exhibited significantly thinner predicted BMO-MRW values compared to those without a glaucoma diagnosis. These findings suggest that DL models can objectively quantify neural loss from fundus photographs and offer a practical solution for large-scale studies where OCT data may not be available.

P-0021

DIRECT PREDICTION OF VISUAL FIELD FROM NUMERIC DATA OF OCT USING DEEP LEARNING

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Background
In recent years, deep learning (DL) has emerged as a significant tool in the imaging-based diagnosis of glaucoma. The assessment of the retinal and optic nerve condition and the extraction of visual field (VF) information using Swept-Source Optical Coherence Tomography (SS-OCT) illustrate notable advantages in DL methodologies. The aim of this study is to explore the possibility of using DL models to predict visual field directly from SS-OCT data.

Methods
A total of 200 patients (392 eyes) who attended our glaucoma clinic were included in this analysis. The dataset was randomly divided into a training set of 158 cases (308 eyes) and a validation set of 42 cases (84 eyes), ensuring no overlap in patients between the datasets. The patient group comprised 108 males and 92 females, with a mean age of 62.2 ± 22.5 years and a mean axial length of 25.4 ± 1.6 mm. The mean deviation (MD) values, obtained from Humphrey Visual Field Analyzer 30-2, were -8.22 ± 5.10 dB for the training set and -9.01 ± 6.11 dB for the validation set.

We developed a DL model to predict the visual field directly from numerical SS-OCT data. The MD value was used as the target variable. For this analysis, we used numeric depth information obtained from SS-OCT, which provided depth data from the internal limiting membrane to the inner plexiform layer/inner nuclear layer for each of the 512 × 128 scanning spots. We constructed a model to predict MD values utilizing these numerical data, employing three transfer learning architectures: ResNet-50, InceptionV3, and VGG16.

Results
Prediction accuracy was evaluated using the Mean Absolute Error (MAE), with ResNet-50 having an MAE of 2.8223, while InceptionV3 and VGG16 had MAEs of 3.2719 and 3.0485, respectively. ResNet-50 demonstrated the highest predictive performance, indicating a practical level of prediction accuracy, although some overfitting was observed with ResNet-50 and InceptionV3.

Conclusions
Our study suggests that DL models can accurately predict visual field metrics from raw SS-OCT data, providing a promising approach for improving glaucoma diagnosis.

P-0023

TRANSFORMER-BASED MODEL IDENTIFIES GLAUCOMA CASES FROM UNSTRUCTURED CLINICAL NOTES

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Background

Research using large biorepositories primarily relies on International Classification of Disease (ICD) codes for disease phenotyping, as manual data extraction is not feasible. However, use of ICD codes may introduce disease misclassification, and often omits nuanced details inherent in clinical narratives. To address this gap, we developed a natural language processing (NLP) model to leverage electronic health records (EHRs) for accurate identification of glaucoma cases from unstructured clinical notes.

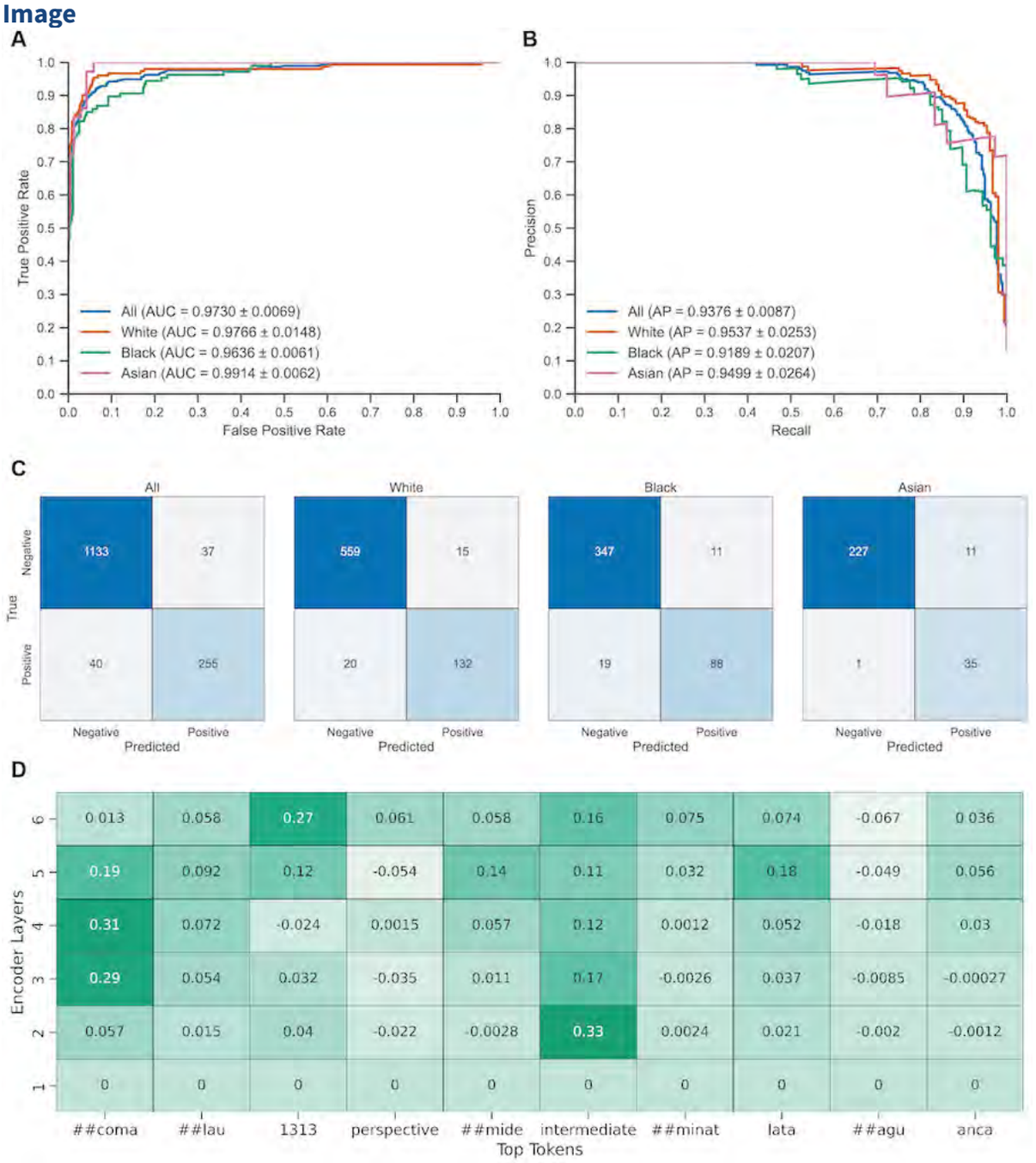
Methods

We constructed a corpus of labeled clinical notes for our supervised learning task by sampling a set of 1,396 clinical notes from 427 unique patients seen at the Massachusetts Eye and Ear Ophthalmology practice. Of these patients, 204 self-reported as white, 116 as black, and 107 as Asian. After pre-processing by anonymization, all notes were manually labeled by clinicians as glaucoma cases or controls. We employed a transfer learning approach by fine-tuning the pretrained ClinicalBERT variant of the DistilBERT family of NLP models. This model was adapted from a masked language model to a binary text classification model by feeding the embedding of the CLS token to two fully connected linear layers and retraining with a cross-entropy loss function. We tested our model's ability through inference on the entire dataset by 5-fold cross-validation.

Results

The model had a receiver-operating characteristic area under the curve (ROC-AUC) greater than 0.95 for all racial groups, and average precision (AP) above 0.9 for all racial groups (Figure 1A). The model also had high accuracy (0.9472 ± 0.0131), precision (0.8750 ± 0.0209), recall (0.8661 ± 0.0388), and F1 scores (0.8701 ± 0.0196). For interpretability, we report the layer conductance values for the 10 tokens that are most influential for identifying cases (Figure 1C). Many of the top tokens identified by the model are sub-words of clinically significant terms. These include the term "glaucoma" itself, an ICD code for severe pigmentary glaucoma, and sub-words from commonly used glaucoma treatments, such as "latanoprost" and "brimonidine".

Image



Conclusions

Through transfer learning, we trained a powerful text classification transformer that accurately identifies glaucoma-diagnosing notes with interpretable attributions, suggesting its potential as an effective method of identifying glaucoma cases from unstructured notes for downstream studies.

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P-0025

DIGITAL GONIOSCOPY BASED ON THREE-DIMENSIONAL ANTERIOR-SEGMENT OCT: AN INTERNATIONAL MULTICENTER STUDY

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Background

To develop and evaluate the performance of a 3-dimensional (3D) deep-learning-based automated digital gonioscopy system (DGS) in detecting 2 major characteristics in eyes with suspected primary angle-closure glaucoma (PACG): (1) narrow iridocorneal angles (static gonioscopy, Task I) and (2) peripheral anterior synechiae (PAS) (dynamic gonioscopy, Task II) on OCT scans

Methods

The study was designed as a cross-sectional, multicenter study. A total of 1.112 million images of 8694 volume scans from 3 centers were included in this study. For Task I, a narrow angle was defined as an eye in which the posterior pigmented trabecular meshwork was not visible in more than 180° without indentation in the primary position captured in the dark room from the scans. For Task II, PAS was defined as the adhesion of the iris to the trabecular meshwork. The diagnostic performance of the 3D DGS was evaluated in both tasks with gonioscopic records as reference.

Results

In Task I, 29.4% of patients had a narrow angle. The AUC, sensitivity, and specificity of 3D DGS on the external testing datasets were 0.943, 0.867 , and 0.878, respectively. For Task II, 13.8% of patients had PAS. The AUC, sensitivity, and specificity of 3D DGS were 0.902, 0.900, and 0.890, respectively, on the external testing set at quadrant level following normal clinical practice; and 0.885, 0.912, and 0.700, respectively, on the external testing set at clock-hour level

Conclusions

The 3D DGS effectively detects eyes with suspected PACG and has the potential to be used in primary eye care for PACG screening.

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P-0026

PREDICTING GLAUCOMA PROGRESSION USING ARTIFICIAL INTELLIGENCE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background
Accurate prediction of glaucoma progression risk is critical for optimal vision preservation. Recent advances in artificial intelligence (AI) have inspired the development of AI models to forecast glaucoma progression. This systematic review examines the performance of AI models in predicting glaucoma progression.

Methods
The review protocol was prospectively registered in PROSPERO (CRD42024524655). A comprehensive search strategy was developed using Medical Subject Headings and keywords, including variations of "artificial intelligence", "glaucoma" and "progression". Searches were conducted across MEDLINE, Embase, Web of Science Core Collection, Cochrane CENTRAL as well as arXiv and MedRxiv to cover eligible grey literature. Only full-text articles in English were screened by two masked reviewers. Studies were included if they tested AI models for predicting future progression in glaucoma and suspect patients. All clinically relevant definitions of progression were deemed eligible, including functional and structural assessments and clinical records. Predictive accuracy metrics were pooled using hierarchical nonlinear random effects modelling. Heterogeneity was assessed using prediction regions and I^2 metrics, and subgroup analyses explored factors impacting predictive accuracy. The risk of bias was evaluated using the Quality Assessment of Diagnostic Accuracy Studies 2 (QUADAS-2) tool.

Results
A total of 2,330 unique records were returned for screening, of which 43 articles met eligibility criteria. 22 articles (21 studies) developed models for binary prediction of progression, with an area under the summary Receiver Operating Characteristic (ROC) curve of 0.862 (95% CI: 0.792-0.909). At 85% specificity, the pooled sensitivity, positive likelihood ratio, and negative likelihood ratio estimates are 79.3% (69.3%-89.4%), 5.289 (4.622-5.957), and 0.243 (0.125-0.361), respectively. Significant heterogeneity was observed. Results from studies predicting numerical and survival outcomes were also pooled and will be presented at the congress. AI model design was significantly associated with predictive performance. 44% (19) studies received low risk of bias ratings across all QUADAS-2 domains.

Conclusions
AI models demonstrate promise in accurately predicting future glaucoma progression and may facilitate more personalised glaucoma management. Future studies should adopt more robust validation and reporting practices to improve generalisability and minimise the risk of bias.

P-0032

AI-DRIVEN PODCASTING FOR GLAUCOMA EDUCATION: A NOVEL APPROACH USING GOOGLE NOTEBOOKLM

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Background
Improving health literacy is critical for empowering individuals at risk of or living with glaucoma. Google's NotebookLM is a tool that uses AI processing to generate audio podcasts based on user uploaded multimodal files – including texts, images, and videos. This project investigates the utility of NotebookLM in creating accessible, educational patient geared podcasts on glaucoma.

Methods
A total of 15 peer-reviewed review articles, 15 expert video presentations, and 15 reputable, textual patient education materials on glaucoma were uploaded to NotebookLM. Source material topics were stratified to cover glaucoma symptoms and risk factors, diagnosis, and management. We then generated and compared five different podcasts. Transcripts were generated, and language was assessed for readability using the Simple Measure of Gobbledygook (SMOG) and Flesch-Kincaid Grade Level (FKGL), against the American Medical Association's recommended 6th-grade reading level. We assessed quality and understandability using the modified DISCERN (1-5, ≥4: high quality) and the Patient Education Materials Assessment Tool for Audiovisual Materials (PEMAT-AV, ≥70%=understandable/actionable).

Results
The average podcast duration was 20 minutes and 14 seconds (range: 13:50 to 27:21). The average grade level (readability) of language in generated podcasts was assessed to be at a 7th-grade reading level (SMOG: 7.1. FKGL: 6.7). Content quality and reliability, evaluated using the modified DISCERN tool, scored a median of 4, indicating a high quality and reliability of information. Additionally, podcasts were of uniformly high understandability and actionability (PEMAT-AV ≥77.7%), indicating podcasts were accessible for the average patient, and contained easy, actionable steps to act upon after listening.

Conclusions
This study highlights the potential of Google NotebookLM to create accessible and reliable audio resources for glaucoma education. It may also particularly benefit visually impaired individuals who may rely on audio formations. By integrating multimodal resources into an engaging and patient-friendly audio format, these podcasts achieved high understandability, and employed easy to understand language, empowering patients to better understand and manage their condition. Future work will focus on refining AI-generated podcasts to meet diverse patient needs by exploring customization options, including adjusting reading levels, tailoring duration, and incorporating direct patient feedback. Overall, our study demonstrates the potential of AI-generated podcasts to transform patient education, improving health literacy, and fostering more equitable access to reliable healthcare information.

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P-0033
SYSTEMIC FACTORS ASSOCIATED WITH FAST PROGRESSION OF OPEN-ANGLE GLAUCOMA

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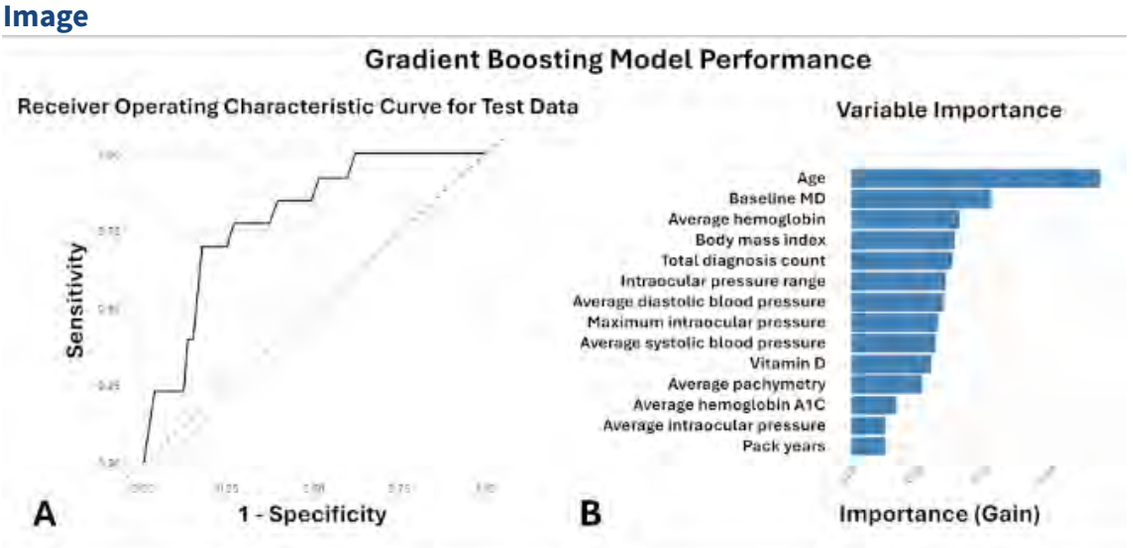
Background
A subset of patients with open-angle glaucoma (OAG) experience rapid visual loss as determined by serial visual fields (VF). This study aims to explore holistic risk factors associated with fast VF progression in OAG by evaluating systemic, ocular, demographic, and social factors and those related to social determinants of health available using electronic medical records.

Methods
This study is a single-center retrospective case series. Patients receiving both primary and eye care at Oregon Health & Science University were included to ensure data accuracy. OAG patients with at least four 24-2 Humphrey VFs were included. Fast progression (FP) was defined as VF mean deviation change of -1.00 dB/year or worse.1 Demographic, systemic, ocular, social factors, Social Vulnerability Index, and Rural-Urban Commuting Area codes were evaluated. Statistical analyses were performed using Mann-Whitney U tests, chi-squared tests, and univariate logistic regression. The data was split into training and testing datasets and were used to train two separate associative models: a gradient boosting model (GBM) and a random forest model (RFM). Both models were trained using every variable. The performance of each model was measured on a held-out test dataset.

Results
Among 700 OAG patients, 138 had FP and 562 were in the non-FP group. Age at initial VF (76.8 vs 70.0 years; p <0.001), hemoglobin (Hgb) A1C (6.37 vs 5.95 mmol/mol; p = 0.015), total diagnosis count (7.0 vs 4.45; p < 0.001), and rates of cardiovascular disease (CVD) (18.8 vs 9.1%; p = 0.013) were significantly higher in FP patients, while diastolic blood pressure (DBP) (70.3 vs 72.4 mmHg; p = 0.018) was lower. Univariate logistic regression found DBP, Hgb, Hgb A1C, age, intraocular pressure (IOP) range, max IOP, total diagnosis count, and CVD history to be associated with FP. On the held-out test dataset, the GBM predicted those with FP with 81% accuracy and an area under the receiver operating characteristic curve (AUROC) of 80% (Figure 1). The RFM predicted those with glaucoma with 71% accuracy, with an AUROC of 75%.

Image


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Conclusions

We found modifiable systemic risk factors that were associated with FP and created two associative models with moderate ability to predict patients with FP using holistic risk factors. These findings suggest further study of extra-ocular factors may offer insight into additional risk factors for FP.

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P-0034

PERFORMANCE OF A SMALL LANGUAGE MODEL VERSUS A LARGE LANGUAGE MODEL IN ANSWERING GLAUCOMA FREQUENTLY ASKED PATIENT QUESTIONS

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Background

Large language models (LLM) have been shown to answer patient questions in ophthalmology similar to human experts. However, concerns remain regarding their use, particularly related to patient privacy and potential inaccuracies that could compromise patient safety. This study aimed to compare the performance of an LLM in answering frequently asked patient questions about glaucoma with that of a small language model (SLM) trained locally on ophthalmology-specific literature.

Methods

We compiled thirty-five frequently asked questions on glaucoma, categorized into six domains: pathogenesis, risk factors, clinical manifestations, diagnosis, treatment and prevention, and prognosis. Each question was posed to both a small language model (SLM) using a Retrieval-Augmented Generation (RAG) framework, trained on ophthalmology-specific literature, and to a large language model (LLM; ChatGPT 4o, OpenAI). Three glaucoma specialists independently assessed the answers using a three-tier accuracy rating scale (poor, borderline, and good). The majority consensus method was applied to assign a final evaluation for each answer, and a quality score was calculated based on the accuracy rating assigned by each evaluator. Readability grade level was assessed using four formulas: Flesch-Kincaid Level, Gunning Fog Index, Coleman-Liau Index, and the Simple Measure of Gobbledygook Index.

Results

The answers from the SLM demonstrated comparable quality with ChatGPT 4.0, scoring 7.9 ± 1.2 and 7.4 ± 1.5, respectively, out of a total of 9 points, respectively (p= 0.13). The accuracy rating was consistent overall and across all six glaucoma care domains. Both models provided answers considered unsuitable for healthcare-related information, as they were difficult for the average layperson to read.

Conclusions

Both models generated accurate content, but the answers were considered challenging for the average layperson to understand, making them unsuitable for healthcare-related information. Given the specialized SLM's comparable performance to the LLM, its high customization potential, lower cost, and ability to operate locally, it presents a viable option for deploying natural language processing in real-world ophthalmology clinical settings.

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P-0035

PREDICTION OF POST-PHACOEMULSIFICATION ANTERIOR CHAMBER DEPTH OF CHRONIC PRIMARY ANGLE-CLOSURE GLAUCOMA: USE OF A MACHINE LEARNING METHOD

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Background
Primary angle-closure glaucoma (PACG) is a major subtype of glaucoma prevalent among Asians. Phacoemulsification (PEI) either with or without goniosynechialysis (GSL) has been recognized as an efficient surgical approach in treating PACG with concomitant underlying cataract[9], through deepening the anterior chamber and reopening the anatomically closed angle. However, the desired deepening of the anterior chamber is not consistently observed post-operatively in all patients, particularly in chronic primary angle-closure glaucoma (CPACG) patients, where the predictability of the postoperative ACD and effective lens position, may be less precise. This study aimed to identify factors affecting anterior chamber depth (ACD) after phacoemulsification surgery combined with goniosynechialysis among CPACG patients and to establish a reliable prediction model of postoperative ACD.

Methods
This retrospective study included 112 CPACG patients who underwent phacoemulsification combined with goniosynechialysis (PEI-GSL) at Eye & ENT Hospital, Fudan University from April 1st, 2019, to June 30th, 2023. All subjects underwent a complete ophthalmologic examination. Preoperative data collection included demographic information and clinical measurements obtained from the IOLMaster 700, Pentacam, ultrasound biomicroscopy (UBM), visual field (VF) and optical coherence tomography (OCT). The relationship between 77 preoperative factors and the extent of anterior chamber deepening following surgery was assessed using Pearson's correlation analysis and Spearman's rank correlation analysis. Predictive model was developed using machine learning techniques, specifically the Random Forest algorithm, and validated with five-fold cross-validation.

Results
Out of the 77 factors evaluated, 8 were found to be associated with the rate of increase in ACD after cataract surgery ($P<0.05$). A greater change in ACD showed an association with older age ($r=0.317$, $P<0.001$), shallower ACD ($r=-0.620$, $P<0.001$), thicker lens ($r=0.604$, $P<0.001$), longer AL ($r=0.214$, $P=0.024$), anterior lens vault ($r=-0.261$, $P=0.006$ and $r=-0.371$, $P<0.001$ for LP and RLP, respectively), and flatter keratometry ($r=0.289$, $P=0.005$ and $r=0.384$, $P<0.001$ for R1 and R2, respectively) in the correlation analysis. Of these 8 factors, 7 retained their association in the multivariate model: ACD, LT, R2, RLP, R1, LP, and AL, with ACD and LT accounting for more than half of the importance. This result remained robust upon cross-validation.

Conclusions
Post-operative ACD following PEI-GSL can be predicted in CPACG patients using preoperative parameters. By using the Random Forest algorithm, a robust prediction model could be established with preoperative parameters measured by IOLMaster.

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P-0036

COMPARISON OF AN AI TOOL PERFORMANCE AGAINST FIRST-YEAR RESIDENTS IN GLAUCOMA SUSPECT ASSESSMENT

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Background

Artificial intelligence (AI) tools in ophthalmology have shown promising results in ocular disease screening and detection. However, their performance in high-volume hospital-based settings remains understudied. We aimed to evaluate the performance of an AI tool (RetinIA, ProsperIA Inc, Mexico City) compared with first-year residents' assessment of glaucoma suspect screening.

Methods

We obtained fundus images from 435 adults undergoing their first ophthalmic evaluation and compared cup-to-disk ratio (CDR) measurements and glaucoma suspect detection made by AI and residents against expert annotations and subsequent medical records. Furthermore, a combined performance was evaluated.

Results

The AI tool did not outperform residents in sensitivity (63.0% vs 50.0%, p=0.12) and specificity (94.5% vs. 90.5%, p=0.06). The AUC-ROC for AI was 0.848 and for residents was 0.801. The combined approach (residents + AI) achieved the highest sensitivity (80.4%, p<0.001) compared to residents or AI alone. Although CDR estimates obtained by the AI tool revealed a lower mean absolute error (0.056 vs 0.105, p<0.001) and a higher correlation (r=0.728 vs r=0.538).

Conclusions

AI did not significantly outperform first-year residents in glaucoma suspect screening overall. However, CDR measurements yielded better results when assessed by the AI tool. A combined approach of AI and residents' assessments could perform better in glaucoma suspect screening, especially in high-volume clinical settings.

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P-0037

RELATIONSHIP BETWEEN VISUAL ACUITY AND CENTRAL FOVEAL THRESHOLD USING MMWIN BIG DATA

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Background

Effective glaucoma treatment requires long-term care and a robust medical network. The Miyagi Medical and Welfare Information Network (MMWIN), launched in 2014, is Japan's largest medical network, enabling the sharing of ophthalmic images and medical records using a unified patient ID. This study aims to analyze MMWIN's medical data to understand the impact of glaucoma on central visual function, which significantly affects patients' quality of life (QOL).

Methods

Patient ophthalmic data were obtained from MMWIN with informed consent. Central visual function was evaluated using best-corrected visual acuity, the central foveal threshold from Humphrey visual field tests (24-2 SITA standard), and mean deviation (MD). Decimal visual acuity was converted to logarithm of the minimum angle of resolution (logMAR) units. Thresholds of 0.7 decimal visual acuity were used to assess visual impairment. Reliable visual field test results were defined as those with fixation loss <20%, false positives <15%, and false negatives <33%. Eyes with prior retinal disease affecting central vision were excluded. The relationship between logMAR visual acuity and the central foveal threshold was analyzed using regression analysis and the value for central foveal threshold corresponding to visual acuity impairment was calculated.

Results

Patient characteristics were as follows: age 62.6 ± 13.9 years; gender: 525 men, 469 women. LogMAR visual acuity was 0.04 ± 0.26 (right) and 0.06 ± 0.28 (left). Intraocular pressure was 14.8 ± 4.9 mmHg (right) and 14.9 ± 4.9 mmHg (left). MD was –10.24 ± 8.60 (right) and –11.64 ± 8.87 (left). A significant negative correlation (Pearson's correlation coefficient –0.69) was observed between the central foveal threshold and logMAR visual acuity. The regression analysis indicated that a central foveal threshold of 28.6 corresponded to logMAR visual acuity of 0.155 which is equivalent to a decimal visual acuity of 0.7.The proportion of patients with a threshold below this value was 1.5%, 2.0%, and 10.3% for those with early, moderate, and advanced glaucoma, respectively.

Conclusions

Analysis of MMWIN data revealed that 3.5% of early-to-moderate glaucoma patients experience a decline in central visual function. This emphasizes the need for early detection and targeted treatment for high-risk patients. Large-scale medical data networks like MMWIN enable better identification of at-risk groups, facilitating earlier intervention and improved patient outcomes in glaucoma care.

P-0038

PREDICTIVE RISK FACTORS AND MACHINE LEARNING MODELS FOR GLAUCOMA PROGRESSION IN MYOPIC PATIENTS: A RETROSPECTIVE COHORT STUDY

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Background
To identify and analyze critical risk factors for myopia-related glaucoma progression in terms of intraocular pressure, structural degradation, and functional impairment(visual field index). This study also evaluates the predictive performance of various machine learning models.

Methods
Design: A retrospective cohort study using statistical and machine learning methods to identify significant predictors of glaucoma progression and to assess model performance.

Setting: The study utilized clinical data from the Department of Ophthalmology at Chung Shan Medical University Hospital, collected between May 2019 and June 2020.

Participants: A total of 85 records of myopic patients were reviewed. The inclusion criteria required at least three follow-ups, and patients with high myopia(≥500 degrees) or incomplete data were excluded.

Main Outcome Measures: Risk factors were categorized into three aspects: intraocular pressure, structural changes, and functional impairment. Eight independent variables were selected based on literature and expert consultation: gender, age, visual inspection, central corneal thickness(CCT), and retinal nerve fiber layer(RNFL) thickness in superior(RNFL SUP), inferior(RNFL INF), temporo-superior(RNFL TS), and temporo-inferior (RNFL TI) quadrants. Dependent variables included intraocular pressure (IOP), mean deviation(MD), and visual field index (VFI).

Statistical methods included correlation analysis, chi-square tests, and odds ratio calculations to determine the significance of potential risk factors. Machine learning methods, such as CART, Random Forest, Support Vector Machine (SVM), C5.0, and C4.5, were applied to rank the importance of variables and build predictive models. Performance metrics included accuracy, sensitivity, specificity, F1-score, and area under the ROC curve (AUC).

Results
Key risk factors identified for intraocular pressure in the myopic group were central corneal thickness (CCT), gender (male predominance), and age (<65 years). For structural degradation (mean deviation), the most significant predictors were RNFL temporo-superior (RNFL TS), RNFL temporo-inferior (RNFL TI), and CCT. For functional impairment (visual field index), RNFL inferior (RNFL INF), RNFL TI, and gender were the leading factors. Among predictive models, CART demonstrated the best performance, with an AUC of 0.8496 for the myopic group in visual field prediction. The models consistently highlighted CCT and RNFL TI as crucial predictors across all domains.

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Conclusions

This study identified CCT and RNFL TI as the most significant risk factors for glaucoma progression in myopic patients, supported by both traditional statistical analysis and machine learning methods. The CART model showed excellent predictive performance, providing valuable insights for clinical decision-making. These findings align with existing literature and emphasize the importance of integrating machine learning into ophthalmic research to improve early detection and management of glaucoma.

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P-0039

UPCYCLED SMARTPHONES FOR SCREENING POSTERIOR SEGMENT DISEASE IN OUTREACH SETTINGS- "BRIDGING THE GAPS"

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Background

Posterior segment diseases like Diabetic Retinopathy, Glaucoma and AMD are increasingly burdening the global eye health. Challenges in screening PSD include asymptomatic nature of disease, inaccessibility to healthcare, need for special equipment and personnel.

This cross sectional study aims to assess the efficacy of utilising upcycled smartphones based fundus camera (Eyelike device) for screening posterior segment diseases (PSD) in patients attending outreach camps following cataract surgery.

Methods

Patients who attended outreach camps, 1 month post cataract surgery were dilated after refraction and anterior segment examination and fundus images of the operated eye was obtained by two technicians using Eyelike device (Fundus camera using Upcycled Samsung phones by LabSD, Korea). It was analysed by an ophthalmologist at the base hospital and categorized into Retinal, Glaucomatous, Neurophthalmological pathologies. The device was validated by comparing the PSD diagnosis with electronic medical records from either preoperative or post operative day 1(POD1).

Results

Out of 811 images captured,758 (93.46%) were gradable. 52(6.41%) had fundus pathology with 17 retinal, 29 glaucomatous, 6 neuropthalmological pathologies. Of which 29 (3.57%) were pre diagnosed on POD1 with 10 retinal, 13 glaucomatous, 6 neurophthalmological pathologies. The Eyelike device identified 23 new cases, accounting for 44.2% of all cases diagnosed by the device, of which 7 were retinal and 16 glaucomatous. These patients were referred to teritiary eye hospital for further management.

Conclusions

This study expresses the potential of upcycled smartphones as powerful tool for screening posterior segment disease in the community. The Eyelike device, with its ability to detect previously undiagnosed pathologies, contributes to timely referral and management. Its use also aligns with sustainability goals, a crucial aspect in todays healthcare landscape, by reducing the carbon footprint in healthcare delivery by its remote diagnosis capabilities. Our study further highlights the value of integrating innovative technologies into community healthcare initiatives.

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P-0040

GLAUCO GUARD: "AI BASED GLAUCOMA RISK PREDICTION TOOL TO GUARD YOUR VISION "

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Background

To predict the sensitivity & specificity of Glauco-guard an AI integrated risk prediction tool to detect glaucoma in patients receiving ocular steroid therapy.The tool leverages advanced machine learning algorithms that is trained on a large data set of patient information enabling it to identify steroid response and to initiate personalized treatment in high risk individuals. This novel tool may provide accurate predictions about the risk of glaucoma

Methods

Glauco guard :AI-powered risk prediction model leverages a robust dataset, incorporating crucial patient factors such as age, IOP, type and dose of steroid,systemic illness,family history of glaucoma, CT and Axl from patients receiving topical or intraocular steroid therapy. Advanced techniques, including Standard Deviation, MSE, and ARIMA, were employed to accurately capture the IOP difference and to identify steroid response. The model was refined through rigorous testing with algorithms like SVC, NuSVC, Random Forest, and Gradient Boosting, optimizing predictive accuracy and ensuring reliable, data-driven insights.

Results

The prototype AI model has shown exceptional performance, with the Gradient Boosting algorithm achieving an accuracy of 79%, precision of 81%, recall of 93%, and an F1 score of 0.83. These results underscore the model's high reliability and predictive power in accurately identifying patients at risk of steroid-induced glaucoma, positioning it as a groundbreaking tool in personalized glaucoma management

Conclusions

Glauco-guard an AI-integrated risk prediction model is a novel and simple glaucoma detection tool that helps in the early detection of steroid induced glaucoma and offer personalized care. The tool enables highly accurate, personalized risk assessments, empowering clinicians to take proactive steps in preventing vision loss due to steroid-induced glaucoma. Glauco-guard has the ability to revolutionize glaucoma care, improve patient outcomes, and set a new standard for precision-based, global healthcare

P-0042

AN INTELLIGENT GLAUCOMA Q&A SYSTEM TO IMPROVE PUBLIC GLAUCOMA AWARENESS IN CHINA

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Background

Glaucoma is the leading cause of irreversible blindness worldwide, with over 76 million individuals affected globally as of 2020, including 21 million in China. Despite its prevalence, public awareness of glaucoma remains low, with many patients unaware of their condition due to the asymptomatic nature of the disease in its early stages. This lack of knowledge contributes to delayed medical visits and increased economic burdens. While platforms in other countries effectively disseminate glaucoma-related knowledge, China currently lacks a comprehensive, easily accessible platform tailored to its population's needs.

Methods

To address this gap, we developed the Intelligent Glaucoma Q&A System (IGQS) within the "Qing Assistant" WeChat Mini Program and the "Glauhelper" public service platform. Utilizing the Bidirectional Encoder Representation from Transformers (BERT) model, IGQS processes user queries, matches them with a database of glaucoma-related information, and provides accurate answers. When queries fall outside the system's scope, they are redirected to ChatGPT, with glaucoma-related responses reviewed by specialists for database updates. The system's accessibility is enhanced through a web portal and integration with popular platforms like WeChat.

Results

Since its launch, IGQS has recorded 7,401 visits with a user satisfaction rate of 73.2%. It enables quick access to reliable glaucoma-related information, facilitating better disease understanding and management. The system's technical implementation, including advanced natural language processing and machine learning techniques, ensures accuracy and relevance in responses.

Conclusions

IGQS effectively addresses the critical need for public education on glaucoma in China, promoting early diagnosis and improved treatment adherence. Future plans include expanding the knowledge base, enhancing response accuracy through continuous model training, and incorporating voice-based functionalities to better serve visually impaired users. IGQS exemplifies a step forward in integrating AI technologies into public health education and chronic disease management.

P-0043

DETECTING RNFL DEFECTS FOR GLAUCOMATOUS OPTIC NEUROPATHY USING CONVOLUTION NEURAL NETWORK: IMPACT OF INTER-OBSERVER AGREEMENT ON PERFORMANCE

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Background
To evaluate the ability of the VeriSee GLC (an artificial intelligent fundus photography interpretation software) to screen glaucomatous optic neuropathy (GON) by the retinal nerve fibers layer (RNFL) change.

Methods
We included 838 fundus photos from 691 subjects. Two glaucoma specialists evaluated these photos first. The fundus photos would be classified as GON if there was wedge-shaped or diffuse RNFL loss. If the interpretation of fundus photos was the same between the two specialists, these photos were assigned to the high inter-observer agreement (HIOA) group. Once the two specialists had different opinions, the fundus photos were submitted to a third, more senior specialist for interpretation. The final result of the interpretation should be the one with the same opinion among two of the three specialists. These photos were assigned to the low inter-observer agreement (LIOA) group. All these photos were simultaneously interpreted by the VeriSee GLC, using sensitivity, specificity, positive predictive value (PPV), accuracy, and area under receiver operating characteristic (ROC) curve to evaluate the ability of the VeriSee GLC to screen GON based on changes in RNFL.

Results
Six hundred sixty-seven fundus photos were classified in the HIOA group and 171 in the LIOA group. In the HIOA group, the sensitivity of the VeriSee GLC for GON screening was 0.94, the specificity was 0.95, the PPV was 0.93, the accuracy was 0.95, and the area under the ROC curve was 0.98. In the LIOA group, the VeriSee GLC screened GON with a sensitivity of 0.88, specificity of 0.79, PPV of 0.82, accuracy of 0.84, and area under the ROC curve of 0.90. Overall, the sensitivity of VeriSee GLC was 0.92, specificity was 0.92, PPV was 0.90, accuracy was 0.92, and area under the ROC curve was 0.97.

Conclusions
The VeriSee GLC performs excellently in screening GON based on changes in RNFL. However, its accuracy drops slightly in cases where it is difficult to interpret (LIOA group).

P-0045

CONVOLUTIONAL NEURAL NETWORK-BASED OPTIC CUP SEGMENTATION FOR GLAUCOMA DETECTION: INFLUENCE OF INTER-OBSERVER AGREEMENT ON DIAGNOSTIC PERFORMANCE

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Background

To evaluate the ability of the VeriSee GLC (an artificial intelligent fundus photography interpretation software) to screen glaucomatous optic neuropathy (GON) by change of the vertical cup-to-disc ratio (VCDR) and the rim-to-disc ratio (RDR).

Methods

Initially, we included 756 fundus photos from 743 subjects. Two glaucoma specialists evaluated these photos first. If there was an enlarged VCDR or a reduced RDR in the upper/lower regions of the optic disc, the fundus photo would be as GON. Once the two specialists had different opinions on VCDR or RDR, the fundus photos were submitted to a third, more senior specialist for interpretation. The final result of the interpretation should be the one with the same opinion among two of the three specialists. Finally, we examined the first three quartiles of interval photos (567 photos from 558 subjects), which were divided based on the mean dice similarity coefficient (DSC) between opinions of any two specialists on optic cup contour. The fundus photos with mean DSC value between 0.86~1.00 were assigned to the high inter-observer agreement (HIOA) group. The fundus photos with a mean DSC value less than 0.86 but greater than 0.80 were assigned to the medium inter-observe agreement (MIOA) group, and the fundus photos with a mean DSC value between 0.68~0.80 were assigned to the low inter-observe agreement (LIOA) group. All these photos were simultaneously interpreted by the VeriSee GLC, using sensitivity, specificity, positive predict value (PPV), and accuracy to evaluate the ability of the VeriSee GLC to screen GON based on changes in VCDR, RDR, or both.

Results

The HIOA, MIOA, and LIOA groups each had 189 photos. In the HIOA group, the sensitivity of the VeriSee GLC for GON screening was 0.90, the specificity was 0.84, the PPV was 0.93, the accuracy was 0.88. In LIOA group, the VeriSee GLC screened GON with sensitivity of 0.75, specificity of 0.95, PPV of 0.93, accuracy of 0.85. Overall, the sensitivity of VeriSee GLC was 0.83, specificity was 0.90, PPV was 0.93, and accuracy was 0.86.

Image

Table. The VeriSee GLC Performance Metrics by Inter-Observer Agreement Groups

Optic Cup Contour Mean DSC	Group	Accuracy	Sensitivity	Specificity	PPV	Number
0.86~1.00	HIOA	0.88	0.90	0.84	0.93	189
0.80~0.86	MIOA	0.85	0.82	0.89	0.94	189
0.68~0.80	LIOA	0.85	0.75	0.95	0.93	189
0.68~1.00	ALL	0.86	0.83	0.90	0.93	567

Conclusions

The VeriSee GLC performs excellently in screen GON based on changes in VCDR and RDR. However, its accuracy and sensitivity drop slightly in cases where it is difficult to interpret (LIOA group).

P-0046

EVALUATING THE PERFORMANCE OF A DEEP LEARNING MODEL IN ESTIMATING VERTICAL CUP-TO-DISC RATIOS (VCDR) FROM FUNDUS PHOTOGRAPHS

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Background

An increased vertical cup-to-disc ratio (vCDR) is a key structural indicator of glaucoma and is easily visualized on fundus photography. Grading it, however, is time-consuming, leading to potential delays in diagnosis and treatment. To circumvent this, we developed a deep learning model (DLM) that estimates vCDR from such images. This DLM was evaluated prior on the online Retina Fundus Glaucoma Challenge (REFUGE) dataset and on fundus images taken in our teleophthalmology clinic with good results. In this study, we sought to specifically evaluate the DLM's performance against glaucoma specialists in vCDR grading.

Methods

The DLM's performance was evaluated by comparing its predicted CDR to the mean CDR of two independent fellowship-trained glaucoma specialists. The glaucoma specialists graded the images using a universal standardized method by taking separate measurements of the vertical cup divided by the disc diameter. This accuracy was measured with three error-thresholds- ≤0.2, ≤0.15 and ≤0.1. To ensure independence, we evaluated the right and left eyes separately.

Results

80 individuals (160 respective fundus images) were selected randomly from a Singapore population study. For the right eye, model performance was ≤0.2 for 79 (98.8%), ≤0.15 for 77 (96.3%) and ≤0.1 for 65 (81.3%) images. The remaining image had a difference of ≤0.3. For the left eye, model performance was ≤0.2 for 79 (98.8%), ≤0.15 for 76 (95.0%) and ≤0.1 for 62 (77.5%) of images. The remaining image had a difference of 0.75, but it was flagged up by the model as a distorted image.

Conclusions

We found that the DLM performed excellently in grading vCDR from fundus photography, almost similar to that of glaucoma specialists. It was also capable of flagging up images that it performed particularly poorly on. We hope to further evaluate its performance in the future by testing it on a specific population of glaucoma and glaucoma suspect patients, as well as comparing its performance to that of junior doctors and trained graders. This could potentially pave the way for earlier identification of patients with suspicious features of glaucoma in Singapore.

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P-0047

GLAUAPP: A MOBILE SOLUTION FOR EARLY GLAUCOMA SCREENING BASED ON THE DISC DAMAGE LIKELIHOOD SCALE

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Background

Glaucoma is a leading cause of irreversible blindness worldwide. This disease can be asymptomatic, and the damage caused by late diagnosis is irreversible, making it essential to implement strategies for early diagnosis and management. To address these issues a mobile application, GlauApp, was developed to facilitate the initial screening of glaucoma by integrating predictive algorithms, one for analyzing optic disc cupping and another for assessing the neuroretinal rim. These algorithms generate key metrics such as perimeters, areas, and distances based on the classification of Spaeth et al., 2006, which refers to the use of the Disc Damage Likelihood Scale (DDLS), a scale that assesses structural damage to the optic nerve due to glaucoma. This scale uses precise and objective measurements to assess the severity of optic nerve damage

Methods

GlauApp includes a mobile interface, a backend, and an image processing server. Fundus images are stored in AWS S3, while patient records and analytical results are managed in PostgreSQL databases. GlauApp's backend connects to a server running two specialized algorithms: one for analyzing optic disc cupping and another for assessing the neuroretinal rim. These algorithms generate key metrics such as perimeters, areas, and distances, which are used to calculate the Disc Damage Likelihood Scale (DDLS) (Spaeth, et al., 2006). Additionally, the processed images are returned with annotations, including contours of the optic cup and neuroretinal rim, allowing doctors to visually identify and highlight these structures in fundus images

Results

Technological tool designed to quickly and accurately, operates as a standalone tool or as an integrable system via RESTful APIs, offering flexibility for implementation in various clinical settings. Doctors can access the tool directly from the mobile application on their smartphones, while medical institutions have the option to use the API to process images by integrating it into their own systems through an API key. This enables the solution to adapt to both individual needs and institutional workflows

Conclusions

This solution has the potential to reduce the global impact of glaucoma, particularly in regions with limited access to specialized services. It provides ophthalmologists with a modern tool that enhances clinical decision-making without replacing their professional expertise, facilitating access to advanced healthcare in underserved communities worldwide

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P-0048

IDENTIFYING KEY RISK FACTORS FOR GLAUCOMA PROGRESSION IN HYPEROPIC PATIENTS: A MACHINE LEARNING ANALYSIS OF IOP, OCT(G), AND FUNCTIONAL INDICATORS

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Background
Glaucoma is a leading cause of irreversible blindness, and hyperopic patients are at unique risk for accelerated progression. Identifying risk factors specific to hyperopic patients with glaucoma can support more effective, targeted management. This study examines key factors influencing glaucoma progression in hyperopic patients by focusing on intraocular pressure (IOP), structural degradation (mean deviation, MD), and functional impairment (visual field index, VFI)

Methods
Clinical data from 47 hyperopic glaucoma patients at Chang Shan Medical University Hospital, collected between May 6, 2019, and June 22, 2020, were analyzed and categorized by disease severity. Key predictive variables included gender, age, central corneal thickness, and retinal nerve fiber layer (RNFL) thickness across multiple regions. Machine learning models, including Random Forest, C5.0, and CART, were applied to evaluate the importance of these variables in predicting glaucoma progression. Performance metrics—accuracy, sensitivity, specificity, and area under the curve (AUC)—were assessed.

Results
Central corneal thickness, RNFL thickness in the temporal and inferior regions, and age emerged as significant predictors of glaucoma progression in hyperopic patients. The CART model demonstrated robust predictive accuracy with an AUC of 0.8147, indicating strong potential for clinical application in identifying high-risk individuals in this population.

Conclusions
This study underscores the need for a hyperopia-specific approach to glaucoma management, highlighting central corneal thickness and RNFL measurements as critical markers for disease progression. Machine learning-driven risk assessment offers valuable insights for early intervention and personalized treatment strategies for hyperopic glaucoma patients.

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P-0050

ARTIFICIAL INTELLIGENCE FOR PREDICTION OF VISION-RELATED QUALITY OF LIFE IN GLAUCOMA

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Background

Glaucoma is an optic neuropathy that leads to irreversible blindness, impacting vision-related quality of life (VRQoL) due to the progressive degeneration of retinal ganglion cells. Compromised visual function affects daily activities such as walking and driving. Questionnaires like the NEI VFQ-25 assess this impact, but their clinical application is limited. Artificial Intelligence (AI) emerges as an alternative to estimate VRQoL using objective data.

Methods

A deep learning (DL) algorithm was developed to estimate the NEI VFQ-25 Rasch-calibrated scores, using a multilayer perceptron network and the holdout test set with k-folded validation set technique. Cross-sectional data were obtained from a Brazilian Longitudinal Glaucoma Study (BLOGS), including complete ophthalmologic examinations and NEI-VFQ-25 questionnaires. The objective parameters analyzed included best corrected visual acuity (BCVA), standard automated perimetry (SAP), and peripapillary retinal nerve fiber layer (RNFL) thickness.

Results

Sixty-four eyes from 32 participants were analyzed, including glaucoma suspects and individuals with glaucoma. From this sample, 30 eyes were from glaucoma suspects and 34 were from patients with glaucoma. Median and interquartile range (IQR) age from study participants was 62 (54 to 67) years, 14 (43.7%) were male, and 18 (56.3%) were female. Median (IQR) BCVA was 0.0 (0.0 to 0.1) logMAR in better eye and 0.1 (IQR, 0.0 to 0.2) logMAR in worse eye. Median (IQR) SAP mean deviation (MD) in better and worse eyes were -0.9 (-2.3 to -0.1) dB and -1.91 (-4.1 to -0.8) dB respectively. Median (IQR) binocular integrated visual field mean sensitivity (MS) was 30.4 (28.8 to 31.2) dB. Median (IQR) global RNFL thickness in better eye was 95.5 (87.0 to 104.3) µm and 87.5 (85.0 to 95.0) µm in worse eye. The DL model achieved a mean absolute error (MAE) of 9.3 on the training data and 11.6 on the test data. In 50% of the predictions in the test data, the error was ≤2 in relation to the actual NEI VFQ-25 Rasch-calibrated score.

Conclusions

A DL algorithm shows potential for assessing VRQoL in glaucoma suspects and patients with glaucoma, estimating NEI VFQ-25 Rasch-calibrated scores based on objective parameters. This approach can complement clinical assessment and improve patient-centered care.

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SILENT PARTNERS IN AGING: UNRAVELING DEMOGRAPHIC RISK FACTORS LINKING GLAUCOMA AND ALZHEIMER'S DISEASE THROUGH A NATIONWIDE EHR ANALYSIS

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Background
Alzhiemer's disease and Glaucoma are both chronic progressive diseases that share similar risk factors. The goal of this study is to explore epidemiological patterns in Alzhimer's patients with a past medical history of glaucoma to evaluate risk factors that increase the odds ratio of developing Alzhiemer's through Epic Cosmos, a dataset with 280-million patients. Our study is among the first large-scale database investigations of patients with Alzhiemer's and glaucoma.

Methods
Patients with a diagnosis of primary open angle glaucoma (POAG) including normal tension glaucoma (ICD H40.1X and corresponding codes) or primary angle closure glaucoma (PACG; ICD H40.2X and corresponding codes) were compared to patients with a diagnosis of Alzheimer's disease (ICD G30.X and corresponding codes) between the years 1/2015 - 12/2023. Epic Cosmos was queried for patient demographic data and disease staging. Odds ratios (OR) were calculated to determine risk factors between patients with either PACG or POAG and Alzheimer's disease. Z-tests and chi-squared were tests run to determine significance.

Results
Of 703603 POAG patients, 25165 patients (38% male) developed Alzheimer's Disease (OD 7.10 [7.02 - 7.20],p<0.01). Of 93300 PACG patients, 3092 patients developed Alzheimer's Disease (OD 6.5 [6.27 - 6.73], p< 0.01). Amongst POAG patients, female sex (OD [1.30, 1.26 - 1.43], p<0.01), age > 85+ (OD [4.85, 4.73 - 4.98], p<0.01), white race (OD [1.19, 1.15 - 1.22], p<0.01), non-hispanic ethnicity (OD [1.32, 1.25 - 1.40], p<0.01) and both intermediate (OD [1.40, 1.36 - 1.44], p<0.01) and severe (OD [1.633, 1.632 - 1.634], p<0.01) disease severity was associated with increased odds of developing Alzhiemer's disease. Among PACG patients, female sex (OD [3.31, 3.01 - 3.63], p<0.01), age between 75-85 (OD [1.13, 1.06 - 1.22], p<0.01) or 85+ (OD [5.88, 5.46 - 6.32], p<0.01), African American race (OD [1.086, 1.00 - 1.17], p<0.05), non-hispanic ethnicity (OD [1.36, 1.19 - 1.54], p<0.01), and severe disease severity (OD [1.39, 1.37 - 1.40], p<0.01). A majority of POAG (72.2%) and PACG (62.7%) were diagnosed within 7 years of Alzhiemer's diagnosis.

Conclusions
In this study, we found that patients with increased age, female gender, non-hispanic ethnicities and severe disease severity were more likely to develop Alzhimer's amongst both POAG and PACG patients. A focus on this population can increase rates of earlier disease intervention and treatment.

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ASSOCIATION BETWEEN ANGIOTENSIN II RECEPTOR BLOCKER AND RISK OF OPEN ANGLE GLAUCOMA IN HYPERTENSIVE CHRONIC KIDNEY DISEASE PATIENTS

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Background

Chronic kidney disease (CKD) is a global health burden, which increased cardiovascular and ocular risks, including glaucoma.[1] Several studies revealed possible mechanism, such as renin-angiotensin-aldosterone system (RAAS) dysfunction, oxidative stress, fluid overload and accumulation of toxic metabolites.[2-5] Glaucoma, a leading cause of blindness, involves optic nerve damage influenced by intraocular pressure (IOP), systemic blood pressure, and ocular perfusion pressure (OPP).[6-8] Angiotensin II receptor blockers (ARBs), which was used as first-line of hypertension, especially in patients with CKD, may alter OPP, potentially influencing glaucoma risk.

Methods

This retrospective cohort study analyzed data from the National Health Insurance Research Database of Taiwan, demonstrating the relationship between ARB use and primary open-angle glaucoma (POAG) in hypertensive CKD patients. Propensity score matching and inverse probability treatment weighting controlled confounding variables, and Cox proportional hazards regression models assessed POAG risk.

Results

There were 357,778 matched participants with hypertensive CKD, including 178,889 ARB users and 178,889 non-users. ARB users exhibited a significantly higher POAG risk (adjusted hazard ratio: 1.19; 95% CI: 1.06–1.34), which was adjusted by sex, age, region of dwelling, degree of urbanization, insurance premium, comorbidities, CCI score, and medication. (Table 1) Regardless of the follow-up duration, a significantly higher risk of developing POAG in ARB user group compared to non-users.

Image

Table 1. Hazard ratios of POAG among CKD with ARBs user (Using COX model)

Variable	POAG			Crude		†Adjusted		Variable	POAG			Crude		†Adjusted	
	n	PY	IR	HR (95% CI)	p-value	HR (95% CI)	p-value		n	PY	IR	HR (95% CI)	p-value	HR (95% CI)	p-value
Non-ARBs user	500	385259	1.30	1.00 (reference)	-	1.00 (reference)	-	Rheumatoid diseases							
ARBs user	1205	796872	1.51	0.98 (0.88, 1.09)	0.66	1.19 (1.06, 1.34)**	0.003	No	1635	1139985	1.43	1.00 (reference)	-	1.00 (reference)	-
Sex								Yes	70	42146	1.66	1.18 (0.93, 1.50)	0.18	1.22 (0.96, 1.55)	0.11
Female	559	491604	1.14	1.00 (reference)	-	1.00 (reference)	-	Osteoporosis							
Male	1146	690527	1.66	1.45 (1.31, 1.60)***	<0.001	1.49 (1.34, 1.66)***	<0.001	No	1531	1048331	1.46	1.00 (reference)	-	1.00 (reference)	-
Age								Yes	174	133800	1.30	0.94 (0.80, 1.10)	0.43	1.06 (0.89, 1.25)	0.53
18-39	187	142875	1.31	1.00 (reference)	-	1.00 (reference)	-	Alcoholism							
40-64	348	205654	1.69	1.33 (1.11, 1.59)**	0.00	1.26 (1.05, 1.51)*	0.01	No	1657	1147925	1.44	1.00 (reference)	-	1.00 (reference)	-
≥65	1170	833602	1.40	1.17 (1.00, 1.37)*	0.05	1.10 (0.93, 1.31)	0.27	Yes	48	34206	1.40	1.00 (0.75, 1.33)	1.00	0.98 (0.70, 1.37)	0.92
Region of dwelling								Nicotine dependence							
Northern	729	526494	1.38	1.00 (reference)	-	1.00 (reference)	-	No	1670	1156993	1.44	1.00 (reference)	-	1.00 (reference)	-
Central	574	362937	1.58	1.16 (1.04, 1.29)**	0.01	1.19 (1.06, 1.33)**	0.003	Yes	35	25138	1.39	1.09 (0.78, 1.52)	0.63	0.92 (0.65, 1.29)	0.61
Southern	363	254637	1.43	1.03 (0.91, 1.17)	0.68	1.02 (0.90, 1.17)	0.72	Cancer							
Eastern	39	38062	1.02	0.74 (0.54, 1.02)	0.07	0.72 (0.52, 1.00)	0.05	No	1423	1012303	1.41	1.00 (reference)	-	1.00 (reference)	-
Degree of urbanization								Yes	282	169828	1.66	1.21 (1.07, 1.38)**	0.00	1.26 (1.09, 1.46)**	0.00
Lowest	139	107266	1.30	1.00 (reference)	-	1.00 (reference)	-	Retinopathy							
Median	701	489399	1.43	1.10 (0.92, 1.32)	0.30	1.09 (0.91, 1.31)	0.34	No	1292	988696	1.31	1.00 (reference)	-	1.00 (reference)	-
Highest	865	585465	1.48	1.13 (0.95, 1.36)	0.17	1.13 (0.94, 1.35)	0.20	Yes	413	193435	2.14	1.70 (1.52, 1.90)***	<0.001	1.62 (1.44, 1.83)***	<0.001
Insurance premium (NT$)								Myopia							
<18000	636	435076	1.46	1.00 (reference)	-	1.00 (reference)	-	No	1683	1175223	1.43	1.00 (reference)	-	1.00 (reference)	-
18000–34999	762	537119	1.42	0.97 (0.87, 1.07)	0.51	0.94 (0.85, 1.05)	0.28	Yes	22	6908	3.18	2.31 (1.52, 3.52)***	<0.001	1.79 (1.17, 2.74)**	0.01
≥35000	307	209936	1.46	0.99 (0.86, 1.13)	0.83	0.94 (0.82, 1.08)	0.41	Cataract							
Comorbidities								No	957	743184	1.29	1.00 (reference)	-	1.00 (reference)	-
Coronary artery disease								Yes	748	438947	1.70	1.38 (1.26, 1.52)***	<0.001	1.29 (1.15, 1.44)***	<0.001
No	1023	710685	1.44	1.00 (reference)	-	1.00 (reference)	-	Uveitis							
Yes	682	471446	1.45	1.04 (0.95, 1.15)	0.39	1.08 (0.97, 1.20)	0.15	No	1670	1168958	1.43	1.00 (reference)	-	1.00 (reference)	-
Stroke								Yes	35	13173	2.66	1.94 (1.39, 2.72)***	<0.001	1.59 (1.14, 2.23)**	0.01
No	1226	821540	1.49	1.00 (reference)	-	1.00 (reference)	-	CCI score							
Yes	479	360591	1.33	0.94 (0.85, 1.04)	0.25	0.94 (0.84, 1.06)	0.32	0	543	364041	1.49	1.00 (reference)	-	1.00 (reference)	-
Peripheral artery disease								1	221	145093	1.52	1.06 (0.91, 1.24)	0.45	1.06 (0.90, 1.24)	0.50
No	1654	1145775	1.44	1.00 (reference)	-	1.00 (reference)	-	≥2	941	672998	1.40	1.00 (0.90, 1.11)	0.96	0.92 (0.81, 1.04)	0.19
Yes	51	36356	1.40	1.02 (0.77, 1.35)	0.89	0.98 (0.74, 1.30)	0.91	Medication							
Atrial fibrillation								Alpha_blocker							
No	1356	936379	1.45	1.00 (reference)	-	1.00 (reference)	-	No	1422	984611	1.44	1.00 (reference)	-	1.00 (reference)	-
Yes	349	245752	1.42	1.03 (0.92, 1.16)	0.61	1.06 (0.94, 1.20)	0.34	Yes	283	197520	1.43	0.88 (0.78, 1.00)	0.06	0.93 (0.81, 1.07)	0.31
Heart failure								Beta_blocker							
No	1403	939948	1.49	1.00 (reference)	-	1.00 (reference)	-	No	884	583851	1.51	1.00 (reference)	-	1.00 (reference)	-
Yes	302	242183	1.25	0.89 (0.78, 1.01)	0.06	0.99 (0.86, 1.13)	0.85	Yes	821	598280	1.37	0.80 (0.73, 0.88)***	<0.001	0.86 (0.77, 0.95)**	0.003
Dyslipidaemia								ACEI							
No	804	567801	1.42	1.00 (reference)	-	1.00 (reference)	-	No	1544	1067420	1.45	1.00 (reference)	-	1.00 (reference)	-
Yes	901	614330	1.47	1.08 (0.98, 1.19)	0.11	1.04 (0.94, 1.15)	0.44	Yes	161	114711	1.40	0.88 (0.75, 1.04)	0.14	0.96 (0.81, 1.13)	0.61
COPD								CCB							
No	1300	900646	1.44	1.00 (reference)	-	1.00 (reference)	-	No	549	359479	1.53	1.00 (reference)	-	1.00 (reference)	-
Yes	405	281485	1.44	1.05 (0.94, 1.18)	0.38	1.02 (0.91, 1.15)	0.70	Yes	1156	822652	1.41	0.77 (0.70, 0.85)***	<0.001	0.84 (0.75, 0.94)**	0.00
Cirrhosis								Diuretics							
No	1687	1166396	1.45	1.00 (reference)	-	1.00 (reference)	-	No	1118	692534	1.61	1.00 (reference)	-	1.00 (reference)	-
Yes	18	15735	1.14	0.85 (0.53, 1.35)	0.48	0.81 (0.48, 1.39)	0.45	Yes	587	489597	1.20	0.68 (0.62, 0.75)***	<0.001	0.73 (0.65, 0.81)***	<0.001
Depression								Other_HTN medication							
No	1545	1067793	1.45	1.00 (reference)	-	1.00 (reference)	-	No	1609	1090648	1.48	1.00 (reference)	-	1.00 (reference)	-
Yes	160	114338	1.40	1.00 (0.85, 1.17)	0.96	0.99 (0.84, 1.17)	0.92	Yes	96	91483	1.05	0.64 (0.52, 0.78)***	<0.001	0.74 (0.60, 0.92)**	0.01
Schizophrenia															
No	1692	1169445	1.45	1.00 (reference)	-	1.00 (reference)	-								
Yes	13	12686	1.02	0.72 (0.42, 1.24)	0.23	0.72 (0.42, 1.25)	0.25								

ACEI: angiotensin converting enzyme inhibitor; ARB: angiotensin receptor blocker; CCB: calcium channel blocker; CI: Confidence interval; CCI: Charlson Comorbidity Index; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; HTN: hypertension; HR: hazard ratio; IR: incidence rate per 1,000 person-years; POAG: primary open angle glaucoma; PY: person-years

†Adjusted HR: adjusted by sex, age, region of dwelling, degree of urbanization, insurance premium, comorbidities, CCI score, and medication; *: p-value<0.05; **p<0.01, ***p<0.001

Conclusions

ARB use in hypertensive CKD patients is associated with higher POAG risk. These findings informed the optimization of antihypertensive drug selection for patients with hypertensive CKD. Future studies should explore the mechanisms underlying this association and assess the impact of alternative antihypertensive therapies.

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P-PW-0055

ASSOCIATION BETWEEN GLAUCOMA AND NEURODEGENERATIVE DISEASES: A CROSS-SECTIONAL ANALYSIS

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Background
Although glaucoma is traditionally considered an ocular disorder, emerging evidence suggests that glaucoma may share common pathogenic mechanisms with neurodegenerative conditions. Understanding these associations could inform integrated screening and treatment approaches.

Methods
Using the All-of-Us Research Program, a national dataset comprising over 1 million individuals in the United States, we extracted electronic health record data from 18,591 individuals with glaucoma (4,780 with open-angle glaucoma [OAG] and 2,714 with angle-closure glaucoma [ACG]) and 55,773 healthy controls. Using 1:3 case-to-control propensity score matching by age, sex, race, and ethnicity, we investigated the associations between glaucoma, family history of dementia, and various neurodegenerative conditions (*i.e.*, Parkinson's disease, Alzheimer's disease, multiple sclerosis) using univariate and multivariate logistic regression analyses, adjusting for the presence of chronic kidney disease, hypertension, coronary artery disease, diabetes, diabetic retinopathy, and smoking status.

Results
Glaucoma patients showed a significantly higher prevalence of neurodegenerative diseases compared to controls (adjusted odds ratio (aOR): 1.65, 95% CI: 1.50-1.83, p<0.001). Multiple sclerosis showed the strongest association with having glaucoma (aOR: 2.42, 95% CI: 2.03-2.88, p<0.001), followed by Alzheimer's disease (aOR: 1.46, 95% CI: 1.19-1.79, p<0.001) and Parkinson's disease (aOR: 1.34, 95% CI: 1.14-1.56, p<0.001) compared to controls. These associations remained in a subgroup analysis of OAG patients (aOR: 1.55, 95% CI: 1.79-2.52, p<0.001) (Table).

OAG patients exhibited a higher prevalence of neurodegenerative diseases compared to ACG glaucoma patients. However, in multivariate analysis, the associations between OAG and specific neurodegenerative diseases — Alzheimer's disease (aOR: 1.27, 95% CI: 0.77-2.18, p=0.36), Parkinson's disease (aOR: 1.31, 95% CI: 0.87-2.05, p=0.21), and multiple sclerosis (aOR: 1.22, 95% CI: 0.93-1.61, p=0.15) — were not significant when compared to ACG.

Family history of dementia was more prevalent in glaucoma patients compared to controls (35.5% vs 32.1%, aOR: 1.27, 95% CI: 1.23-1.32, p<0.001). Similar associations were seen in the sub-analysis in both OAG patients (34.0% vs 31.7%, aOR: 1.25, 95% CI: 1.16-1.35, p<0.001), and ACG patients (36.5% vs 35.5%, aOR: 1.20, 95% CI: 1.09-1.32, p<0.001).

Image

Table. Multivariate analysis for association between open-angle glaucoma, angle-closure glaucoma, and neurodegenerative diseases

	Controls (N=14,340)	Open-angle Glaucoma (N=4,780)	Adjusted Odds Ratio** (95% CI)	P-value
Neurodegenerative Conditions*	335 (2.34%)	231 (4.83%)	1.55 (1.29-1.86)	<0.001
Multiple sclerosis	86 (0.60%)	69 (1.44%)	2.07 (1.48-2.89)	<0.001
Parkinson's disease	152 (1.06%)	96 (2.01%)	1.45 (1.10-1.89)	0.007
Alzheimer's disease	92 (0.64%)	72 (1.51%)	1.45 (1.05-2.01)	0.03
	Controls (N=8,142)	**Angle-closure Glaucoma (N=2,714)**	**Adjusted Odds Ratio** (95% CI)**	**P-value**
Neurodegenerative Conditions*	188 (2.31%)	107 (3.94%)	1.36 (1.06, 1.75)	0.02
Multiple sclerosis	57 (0.70%)	30 (1.11%)	1.55 (0.96-2.45)	0.06
Parkinson's disease	71 (0.87%)	41 (1.51%)	1.30 (0.86, 1.94)	0.20
Alzheimer's disease	53 (0.65%)	35 (1.29%)	1.32 (0.84, 2.05)	0.23

*Includes multiple sclerosis, Parkinson's disease, Alzheimer's disease, frontotemporal dementia, and amyotrophic lateral sclerosis.
**Adjusted for chronic kidney disease, hypertension, coronary artery disease, diabetic retinopathy, type 1 diabetes mellitus, type 1 diabetes mellitus, smoking status

Conclusions

This large-scale analysis reveals that patients with OAG and ACG are more likely to have neurodegenerative diseases compared to patients without glaucoma, although differences between glaucoma subtypes were relatively modest. These findings suggest the possibility of shared neurodegenerative pathways across these conditions and the importance of neurological screening in both OAG and ACG patients. Further research is needed to elucidate these mechanisms and develop targeted treatment strategies.

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P-PW-0056

PROGRESSION PATTERNS AND RISK FACTORS OF AXIAL ELONGATION IN YOUNG ADULTS WITH NON-PATHOLOGIC HIGH MYOPIA: 3-YEAR LARGE LONGITUDINAL COHORT FOLLOW-UP

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Background

With continuous axial elongation, non-pathologic myopia may progress to pathologic myopia, leading to visual impairment. An analysis of progression patterns of axial elongation in pure participants with non-pathologic myopia is warranted.

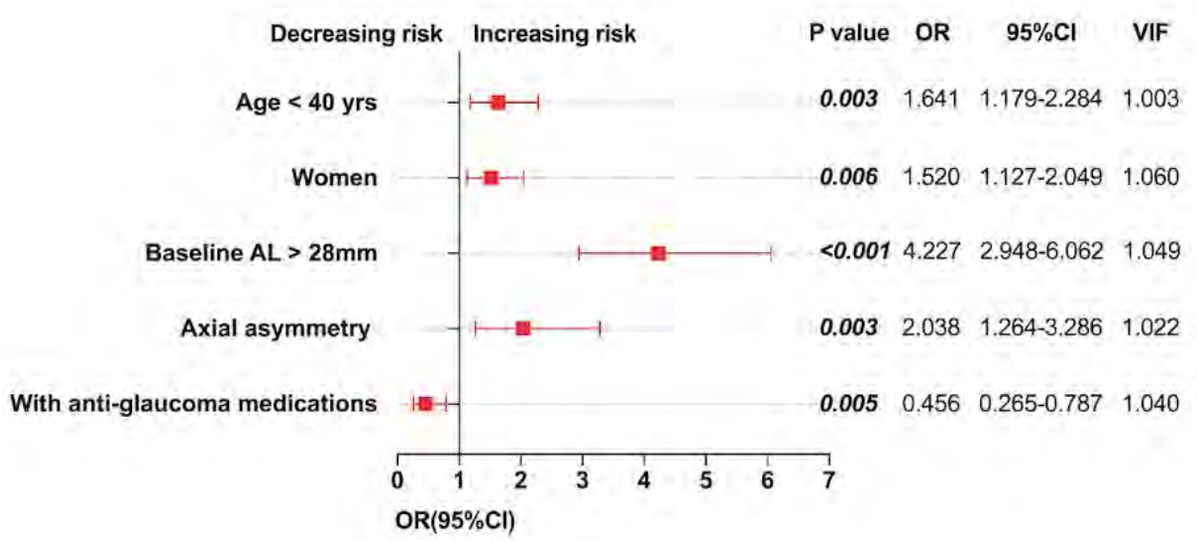
Methods

A total of 1043 eyes of 563 participants (3515 medical records) aged 18 to 50 years with non-pathologic high myopia (axial length [AL] ≥ 26 mm; myopic maculopathy < diffuse chorioretinal atrophy; without posterior staphyloma) were included from 1546 participants (6318 medical records). Annual axial elongation was calculated via linear mixed-effect models. The associated risk factors of axial elongation were determined by ordinal logistic regression analysis, with generalized estimate equations for eliminating an interocular correlation bias.

Results

Based on 5359 times of AL measurements, the annual axial elongation of participants (mean [SD] age 31.39 [9.22] years) was 0.03 mm/year (95% confidence interval [CI], 0.03-0.04, P < 0.001) during a 30.23 (6.06) months' follow-up. Severe (> 0.1 mm/year), moderate (0.05-0.09 mm/year), mild (0-0.049 mm/year), and nil (≤ 0 mm/year) elongation was observed in 122 (11.7%), 211 (20.2%), 417 (40.0%), and 293 (28.1%) eyes. The following risk factors were significantly associated with axial elongation: baseline AL≥ 28 mm (odds ratio [OR], 4.23; 95%CI, 2.95-6.06; *P* < 0.001); age < 40 years (OR, 1.64; 95%CI, 1.18-2.28; *P* = 0.003); axial asymmetry (OR, 2.04; 95%CI, 1.26-3.29; *P* = 0.003), and women (OR, 1.52; 95%CI, 1.13-2.2.05; *P* = 0.006). Using anti-glaucoma medications was a protective factor (OR, 0.46; 95%CI, 0.27-0.79; *P* = 0.005), which slowed 75% of axial elongation from 0.04 (0.06) to 0.01 (0.06) mm/y (*P* < 0.001).

Image



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Conclusions

Axial elongation continued in young adults with non-pathologic myopia. Risk factors included longer baseline AL and axial asymmetry, younger age, and woman. Topical use of anti-glaucoma medications may be useful to reduce ongoing axial elongation.

P-PW-0057

GLOBAL TRENDS AND INEQUALITIES IN THE GLAUCOMA-RELATED BLINDNESS BURDEN, 1990-2021

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Background
Glaucoma is the primary cause of irreversible blindness worldwide. Understanding the global trends and disparities in the burden of glaucoma-related blindness is crucial for informing public health policies and allocating resources effectively. This study aims to investigate the burden (including prevalence and years lived with disability [YLDs]) for glaucoma-related blindness from 1990 to 2021 globally, by region, country and territory.

Methods
This study conducted a retrospective analysis of data from the Global Burden of Disease 2021. We utilized joinpoint regression analysis to assess the trends in glaucoma-related blindness burden from 1990 to 2021 globally, by region, country and territory. The magnitude of change was evaluated using average annual percentage change (AAPC) values, along with their accompanying 95% confidence intervals (CIs). We assessed the inequalities in the burden of glaucoma-related blindness across different countries using the slope index of inequality and the health inequality concentration index, which measure absolute and relative inequality, respectively.

Results
Globally, the prevalence and YLDs of glaucoma-related blindness decreased continuously from 1990 to 2021, as reflected by the AAPCs of -1.52 (95% CI, -1.58 to -1.46) for prevalence and -1.51 (95% CI, -1.57 to -1.45) for YLDs. In 2021, the prevalence and YLDs of glaucoma-related blindness were 43.11 (95% uncertainty interval [UI], 35.42-52.75) and 7.7 (95% UI, 5.07-11.27) per 100,000 population, respectively. Regionally, East Asia exhibited the highest decreases for both prevalence and YLDs. At the country/territory level, Côte d'Ivoire showed the most substantial increases. In 1990, the slope index of inequality indicated an excess of 141.79 (95% CI, 121.66 to 161.93) for prevalence and 24.89 (95% CI, 21.33 to 28.45) for YLDs between countries and territories with the lowest and highest sociodemographic indices (SDIs). By 2021, this excess had decreased to 96.22 (95% CI, 82.45 to 109.99) for prevalence and 17.02 (95% CI, 14.57 to 19.47) for YLDs. The health inequality concentration index indicated a relative gradient inequality of -0.21 (95% CI, -0.25 to -0.16) for prevalence and -0.20 (95% CI, -0.25 to -0.15) for YLDs in 1990 and -0.27 (95% CI, -0.32 to -0.22) for prevalence and -0.27 (95% CI, -0.32 to -0.22) for YLDs in 2021.

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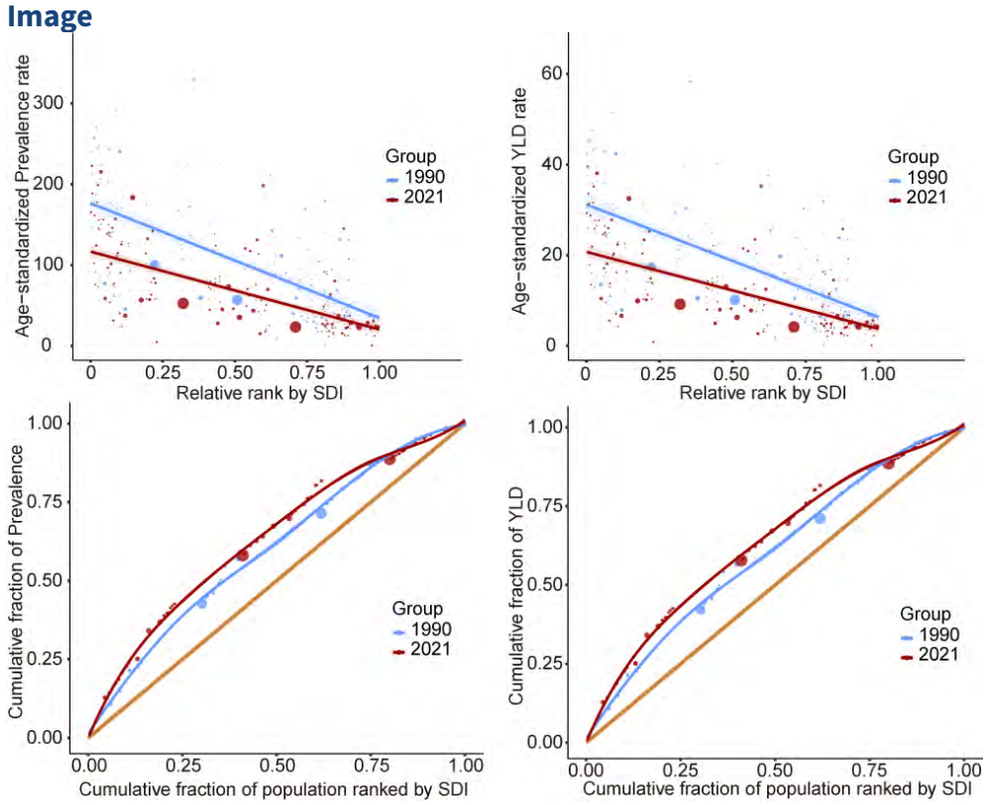

Conclusions

From 1990 to 2021, there has been a significant global decrease in the prevalence and YLDs of glaucoma-related blindness, indicating progress in blindness prevention and glaucoma management strategies. However, substantial inequalities persist across different regions and countries. While absolute inequalities have decreased over time, relative inequalities have increased, highlighting the ongoing need for implementing proportionate universalism and fostering sustained international cooperation.

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P-PW-0058

HIGH RATE OF ACUTE ANGLE CLOSURE RELATED-BLINDNESS IN CHINA: RESULTS OF MULTICENTER REAL-WORLD RETROSPECTIVE ANALYSIS

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Background
Acute angle closure (AAC) is a major global health issue due to its high blindness rate. Despite advancements in glaucoma diagnosis and treatment, it is uncertain whether the rate of AAC-related blindness has decreased significantly. This study offers an updated evaluation of AAC-related blindness in China, including the demographics, clinical characteristics and the associated blindness rates.

Methods
This real-world retrospective analysis used data from 23 hospitals in China, between September 7 and January 6 over three consecutive years spanning 2020 to 2022. The rates of blindness before and after treatment were analyzed. Age, sex, time from symptom onset to treatment (TST), and treatments were compared.

Results
A total of 2626 consecutive AAC patients were included, with 76.0% being female (Female/Male ratio of 3.16) and an average age of 66.8±9.23 years. Among them, only 34.3% had a TST < 3 days. Following initial treatment, the blindness rate based on corrected distance visual acuity (CDVA) dropped from 28.6% to 16.4% ($p<0.001$), and uncorrected distance visual acuity (UDVA)-based blindness decreased from 42.4% to 20.1% ($p<0.001$). Both laser and surgical treatments significantly improve CDVA (from 0.42±0.75 to 0.29±0.54, from 0.88±0.87 to 0.65±0.73, respectively) and UDVA (from 0.91±0.80 to 0.46±0.55, from 1.25±0.82 to 0.84±0.71, respectively).

Conclusions
The blindness prevalence among AAC patients remains unacceptably high. Early treatment with laser or surgery can improve visual outcomes, but only one-third of AAC patients receiving medical intervention within three days of an acute attack. Action is needed to reduce the burden of AAC-related blindness.

P-PW-0059

CAUSAL RELATIONSHIP BETWEEN URIC ACID LEVELS AND RISK OF GLAUCOMA: A MENDELIAN RANDOMIZATION STUDY

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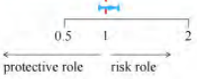
Background
Glaucoma is a leading cause of irreversible blindness, characterized by progressive damage to the optic nerve. Recent studies have suggested a potential link between uric acid levels and glaucoma, but the findings remain inconsistent, possibly due to residual confounding in observational research. To address this, we conducted Mendelian randomization (MR) investigated the causal association between uric acid levels and the risk of glaucoma.

Methods
We performed two-sample MR to investigate the causal association between uric acid and several subtypes of glaucoma, including primary open-angle glaucoma (POAG), primary angle-closure glaucoma (PACG), normotensive glaucoma (NTG), exfoliation glaucoma (XFG), and suspected glaucoma. We employed summary-level genome-wide association studies (GWAS) data on uric acid from the Global Urate Genetics Consortium, which contains GWAS data from 110,347 individuals of European ancestry, along with GWAS data on glaucoma subtypes from FinnGen R12. The inverse-variance weighted (IVW) method was employed as the primary analytical approach. Heterogeneity was assessed using the Cochran Q statistic under a fixed-effect IVW model, with a significance threshold of $P < 0.05$. In cases of significant heterogeneity, a multiplicative random-effects IVW model was used for adjustment. Sensitivity analyses were conducted using MR-Egger, weighted median, and weighted mode methods. Additionally, horizontal pleiotropy was evaluated using the MR-Egger intercept test.

Results
Genetically predicted increased uric acid levels was associated with an elevated risk of NTG (odds ratio [OR], 1.299; 95% confidence interval [CI], 1.108–1.524; P = 0.001) under the IVW method. The findings was corroborated in sensitivity analyses utilizing the MR-Egger (OR, 1.400; 95% CI, 1.042–1.881; P = 0.035), weighted median (OR, 1.322; 95% CI, 1.050–1.666; P = 0.017), and weighted mode (OR, 1.305; 95% CI, 1.033–1.648; P = 0.035) analysis. However, no significant association was found for POAG (OR, 1.065; 95% CI, 0.953–1.190; P = 0.265), PACG (OR, 0.907; 95% CI, 0.730–1.127; P = 0.382), XFG (OR, 1.082; 95% CI, 0.937–1.249; P = 0.278), or suspected glaucoma (OR, 1.037; 95% CI, 0.956–1.125; P = 0.376). No horizontal pleiotropy was detected in the MR-Egger intercept test (all P>0.05).

Image

Exposure	Outcome	Method	nSNP	OR (95%CI)	P value	P Heterogeneity	P Pleiotropy
	PACG	Inverse variance weighted (fixed-effect)	24	0.907 (0.730 to 1.127)	0.382	0.470	0.518
		MR Egger	24	1.015 (0.680 to 1.514)	0.940		
		Weighted median	24	1.014 (0.744 to 1.382)	0.927		
		Weighted mode	24	1.044 (0.777 to 1.402)	0.776		
	NTG	Inverse variance weighted (fixed-effect)	24	1.299 (1.108 to 1.524)	**0.001**	0.459	0.559
		MR Egger	24	1.400 (1.042 to 1.881)	**0.035**		
		Weighted median	24	1.322 (1.050 to 1.666)	**0.017**		
		Weighted mode	24	1.305 (1.033 to 1.648)	**0.035**		
Uric acid	POAG	Inverse variance weighted (multiplicative random effects)	24	1.065 (0.953 to 1.190)	0.265	**0.018**	0.154
		MR Egger	24	1.206 (0.989 to 1.470)	0.076		
		Weighted median	24	1.059 (0.932 to 1.203)	0.374		
		Weighted mode	24	1.074 (0.944 to 1.222)	0.286		
	XFG	Inverse variance weighted (fixed-effect)	24	1.082 (0.937 to 1.249)	0.278	0.286	0.163
		MR Egger	24	0.925 (0.716 to 1.194)	0.556		
		Weighted median	24	0.944 (0.777 to 1.146)	0.563		
		Weighted mode	24	0.995 (0.821 to 1.205)	0.960		
	suspected glaucoma	Inverse variance weighted (fixed-effect)	24	1.037 (0.956 to 1.125)	0.376	0.136	0.093
		MR Egger	24	1.154 (1.001 to 1.331)	0.060		
		Weighted median	24	1.055 (0.955 to 1.165)	0.288		
		Weighted mode	24	1.049 (0.955 to 1.153)	0.326		



P<0.05 was considered statistically significant

Conclusions

This research identified evidence indicating a causal link between elevated uric acid levels and the increased risk of NTG. The results highlight the importance of considering NTG screening in individuals with high uric acid levels and underscore the need for further research to explore whether controlling uric acid could serve as an adjunctive approach in NTG management.

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P-PW-0060

CAUSAL RELATIONSHIP BETWEEN CHOLECYSTITITS AND RISK OF GLAUCOMA: A MENDELIAN RANDOMIZATION STUDY

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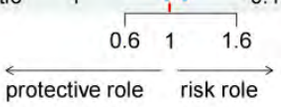
Background
Systemic inflammation has been identified as a potential risk factor for glaucoma. As a common gastrointestinal disease, cholecystitis has become more prevalent in recent years due to an aging population, increasing obesity, metabolic syndrome, and changes in diet and lifestyle. Cholecystitis triggers a systemic inflammatory response, which may have adverse implications for ocular health. However, the specific relationship between cholecystitis and glaucoma remains unclear. This Mendelian randomization (MR) study aimed to examine the association between cholecystitits and risk of glaucoma.

Methods
We used two-sample MR to investigate the causal association between cholecystitits and different subtypes of glaucoma, including primary angle-closure glaucoma (PACG), normotensive glaucoma (NTG), primary open-angle glaucoma (POAG), exfoliation glaucoma (XFG), and suspected glaucoma. We employed summary-level genome-wide association studies (GWAS) data on cholecystitits from the UK Biobank, which contains GWAS data from 486,484 individuals (case = 4052; control = 482,432) of European ancestry, along with GWAS data on glaucoma subtypes from FinnGen R12. Wald ratio method was used to investigate the potential causal associations between cholecystitis and glaucoma subtypes.

Results
Genetically predicted cholecystitits was associated with an increase risk of NTG (odds ratio [OR], 1.272; 95% confidence interval [CI], 1.076–1.505; P = 0.004). However, no significant relationship was found for PACG (OR, 1.019; 95% CI, 0.807–1.287; P = 0.870), POAG (OR, 1.088; 95% CI, 0.992–1.194; P = 0.071), XFG (OR, 1.148; 95% CI, 0.992–1.329; P = 0.063), or suspected glaucoma (OR, 1.052; 95% CI, 0.974–1.136; P = 0.190).

Image

Exposure	Outcome	Method	nSNP	P value	OR (95%CI)
	PACG	Wald ratio	1	0.870	1.019 (0.807 to 1.287)
	NTG	Wald ratio	1	**0.004**	1.272 (1.076 to 1.505)
Cholecystitits	POAG	Wald ratio	1	0.071	1.088 (0.992 to 1.194)
	XFG	Wald ratio	1	0.063	1.148 (0.992 to 1.329)
	suspected glaucoma	Wald ratio	1	0.190	1.052 (0.974 to 1.136)



P<0.05 was considered statistically significant

Conclusions
We identified causal evidence indicating a relationship between cholecystitis and the risk of NTG. In patients with chronic cholecystitis, more thorough screening techniques like fundus examination, optic nerve examination, and visual field examination may help identify NTG in its early clinical stage. This could contribute to the understanding of high-risk NTG populations.

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P-PW-0061

COMPARATIVE INTERRUPTED TIME SERIES ANALYSIS OF LONG-TERM DIRECT MEDICAL COSTS IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA AND A MATCHED CONTROLS

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Background
Primary open-angle glaucoma (POAG) is known as a disease with a significant burden of illness. However, previous studies on healthcare expenditures for POAG have largely focused on relatively short periods and have rarely included non-POAG comparisons. This study aimed to investigate the direct medical costs (DMCs) and their differences between the POAG patients and their matched controls for ten-year period before and after the diagnosis.

Methods
This nationwide cohort study utilized data from the National Health Insurance Service (NHIS)-Sample cohort in South Korea from 2002 to 2019. The newly developed POAG patients were randomly matched with individuals of the same age and sex at the time of the initial diagnosis (time zero). We then sequentially performed 1:3 random sampling for each risk set. Person-level DMCs per quarter were calculated for 5 years before time zero and up to 5 years after time zero. DMCs were defined as the sum of the insurer's payments and copayments, excluding uncovered payments. We compared DMCs between patients with POAG and the matched controls using a comparative interrupted time series analysis.

Results
A total of 11,824 POAG patients and 35,472 matched controls were included. The mean age was 60.8 years, and 51% were women in both groups. DMCs for the POAG patients were higher than those for matched controls at every year during the observation period. DMCs in POAG patients was the highest in the first quarter after time zero (USD 974, 95% CI 943-1005). The difference in DMCs between the groups increased each year from five years before the POAG diagnosis to one year after the diagnosis. Considering the differential changes in DMCs before and after time zero, POAG incurred additional DMCs of USD 374 (95% CI 300 to 449; $p < 0.001$) per patient in the first year after diagnosis. The significant increase in DMCs attributable to POAG was observed for 1 year (difference-in-difference estimate at 1 year 1.16 [95% CI 1.11 to 1.20]; $p < 0.001$). In the subgroups of patients older than 85 years of age, the increase in DMCs attributable to POAG occurred significant even five years after diagnosis (difference-in-difference estimate at 5 years 2.18 [95% CI 1.18 to 4.06]; $p < 0.014$).

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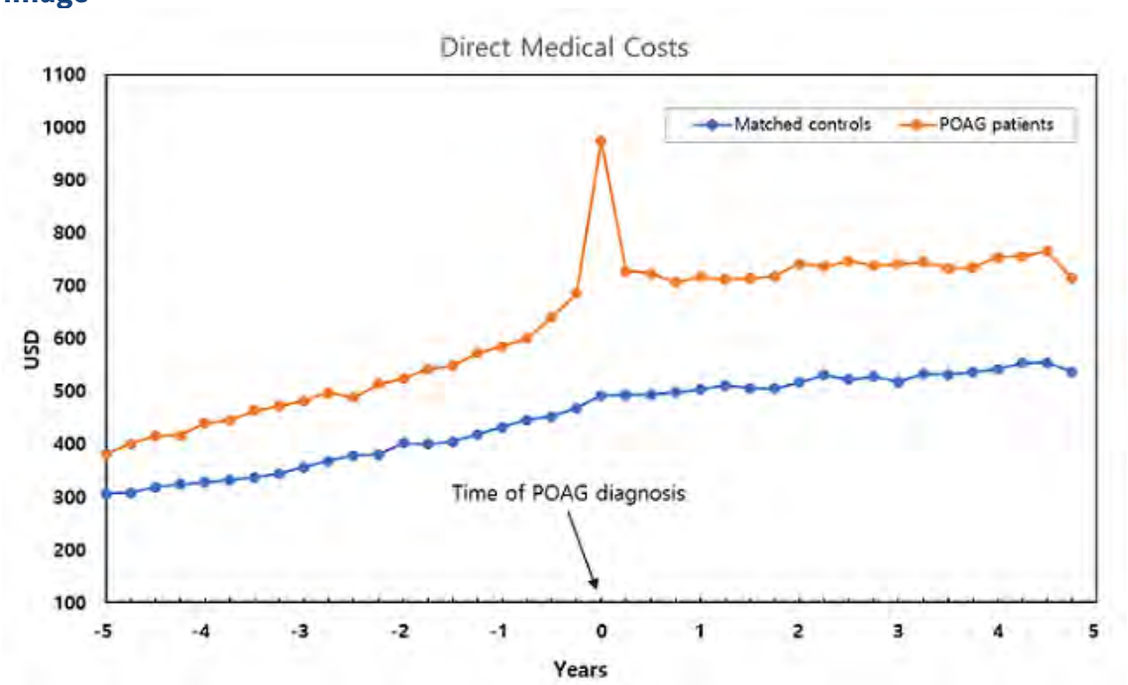

Conclusions

In POAG patients, DMCs were higher every year compared to the matched controls during the 5 years before and after diagnosis. The DMCs because of POAG persisted for one year after diagnosis, and in older adults, the costs increase due to POAG did not recover even five years post-diagnosis.

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P-PW-0063

LONG-TERM TRENDS IN NEWLY DIAGNOSED VISUAL IMPAIRMENT: A 20-YEAR STUDY IN MIE PREFECTURE, JAPAN

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Background
Glaucoma is one of the leading causes of visual impairment worldwide, including Japan. This study aimed to clarify the 20-year trend in newly certified visually impaired individuals in Mie Prefecture, Japan, with particular emphasis on the changing prevalence of glaucoma.

Methods
We conducted a retrospective analysis of individuals newly certified as visually impaired in Mie Prefecture between April 2004 and March 2024. Data provided by the Mie Disability Support Center were reviewed. All certifications were issued in accordance with the Physical Disability Welfare Law, ensuring a standardized assessment process.

Results
A total of 4,457 individuals (2,289 males and 2,168 females; mean age: 70.1±17.2 years) newly received visual impairment certification during the study period. Although the annual number of newly certified visually impaired individuals showed a decreasing trend, it did not reach statistical significance (slope = -2.59, r^2 = 0.12, p = 0.13). The mean age at certification exhibited a slight upward trend (slope = 0.12, r^2 = 0.20, p = 0.05). Regarding the main causes - glaucoma, retinitis pigmentosa (RP), diabetic retinopathy (DR), and macular degeneration - annual trends differed. Glaucoma showed a significant increasing trend (slope = 2.44, r^2 = 0.43, p = 0.002). In contrast, DR demonstrated a significant decline (slope = -1.63, r^2 = 0.59, p<0.001). RP (slope = -0.11, r^2 = 0.012, p = 0.65) and macular degeneration (slope = -0.22, r^2 = 0.073, p = 0.25) did not show significant changes. By severity level of disability, there was an increasing trend in level 2 certifications, while levels 1, 3, 4, and 6 decreased and level 5 showed no significant change.

Conclusions
These findings likely reflect Japan's aging population, amendments to healthcare and welfare-related regulation, and advancements in clinical management. Notably, the increasing trend in glaucoma-related visual impairment suggests that glaucoma may continue to challenge healthcare systems and underscores the need for effective interventions. This report may serve as valuable reference data for understanding and predicting future trends in visual impairment in Japan, particularly as they relate to glaucoma.

P-PW-0064

COMPARATIVE COST-EFFECTIVENESS OF XEN GEL STENT VERSUS TRABECULECTOMY IN THE UNITED STATES MEDICARE SYSTEM

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Background: Trabeculectomy has been widely considered to be the gold-standard intervention when conservative methods have failed to control intraocular pressure (IOP). The Xen45 Gel Stent (XGS) (Allergan, Irvine, CA, USA) is a subconjunctival microstent, cleared by the Food and Drug Administration (FDA) in 2016. Our aim was to assess the cost-effectiveness of XGS versus trabeculectomy in the surgical management of open angle glaucoma in the United States (US) Medicare system.

Methods: Treatment costs and effects were analysed in a Markov model of patients with OAG over a 1-year horizon using TreeAge software. Safety and efficacy outcomes were derived from the landmark randomised controlled trial directly comparing XGS with trabeculectomy. The main outcome measure was incremental cost per quality-adjusted life year (QALY) gained. Treatment effect was measured as mean number of ocular hypotensive medications, reduction in IOP, post-operative interventions and complications. Scenario analyses with future projections were also performed at 2, 5 and 10 years. One-way sensitivity and probabilistic sensitivity analyses were conducted to assess the impact of additional variables, including the post-operative disutility of trabeculectomy, disutility of XGS relative to trabeculectomy, number of follow-up visits and surgical time.

Results: At 1 year, the expected total cost for XGS was USD 11298.94 compared with USD 8279.08 for trabeculectomy. Trabeculectomy yielded higher QALYs at the 1-year horizon, though both were rounded to 0.85. This resulted in a negative ICER, meaning XGS was dominated by trabeculectomy. XGS remained dominated by trabeculectomy at 2, 5 and 10 years. When XGS was given half the follow-up rate of trabeculectomy at 1-year, trabeculectomy remained the cost-effective option as the ICER of XGS was USD 2,878,936.81/ QALY – above the willingness-to-pay threshold of USD 50,000 per QALY. Trabeculectomy remained the cost-effective option even when there was no peri-operative disutility applied to XGS. Probabilistic sensitivity analysis showed that trabeculectomy was cost-effective in 81.4 % of iterations and dominant in 74.5%.

Conclusions: Trabeculectomy appears to be cost-effective compared to XGS in the surgical management of OAG in the US Medicare system. This raises important questions about the impact of XGS on efficient healthcare spending, surgical training and overall patient outcomes.

P-0065

ANXIETY DISORDER AND ITS INFLUENCE ON PRIMARY OPEN-ANGLE GLAUCOMA PROGRESSION

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[1]Creighton University School of Medicine, Phoenix, [2]Florida Atlantic University School of Medicine, Boca Raton, [3]Department of Ophthalmology, Mayo Clinic, [4]Mayo Clinic Alix School of Medicine, Jacksonville, [5]Casey Eye Institute, Oregon Health and Science University, Portland, United States

Background

The literature exhibits an abundance of information on the role of primary open-angle glaucoma (POAG) and other ocular disorders on the incidence of anxiety,[1] however, limited information exists regarding the converse.[2] Anxiety is a disorder characterized by extensive sympathetic overdrive, which may serve as a potential predisposing risk factor for POAG. This study aimed to assess the role of anxiety disorder on the progression of mild-moderate POAG to the severe stage.

Methods

A retrospective cohort analysis of the TriNetX US Collaborative database was done by querying all patients with a diagnosis of mild-moderate POAG. Cohorts were stratified based on whether they had a concomitant diagnosis of anxiety disorder. The outcome of interest was a diagnosis of severe glaucoma at any point after the index event of anxiety and mild-moderate POAG diagnosis. All of the outcomes and diagnoses were defined by ICD-10 codes. 1:1 propensity score matching (PSM) was conducted for age, race, ethnicity, sex, and hypertension. Risk ratios (RRs) were calculated and a 95% confidence interval (CI) that did not cross one was considered significant.

Results

Prior to propensity score matching (PSM), 142,270 were queried in the database. After PSM, 30,127 patients were included in each cohort – patients with mild-moderate POAG and those with anxiety and without anxiety. Risk of progression to severe glaucoma was significantly elevated in patients with anxiety at an assessment point of any time after index event.

Conclusions

This study leveraged the large, national database encompassing data over 118 million patient health records. These data indicate patients with anxiety are at an increased risk for progression of POAG to the severe stage. We suggest that these conclusions may serve as a potential guiding factors in selecting proper management. Earlier intervention and a more aggressive glaucoma management approach may be suitable for patients known to have anxiety disorders as to stunt the progression as soon as possible.

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P-0066

AGE-PERIOD-COHORT ANALYSIS OF THE PREVALENCE OF GLAUCOMA-RELATED VISUAL IMPAIRMENT IN MAINLAND CHINA, 1992-2021

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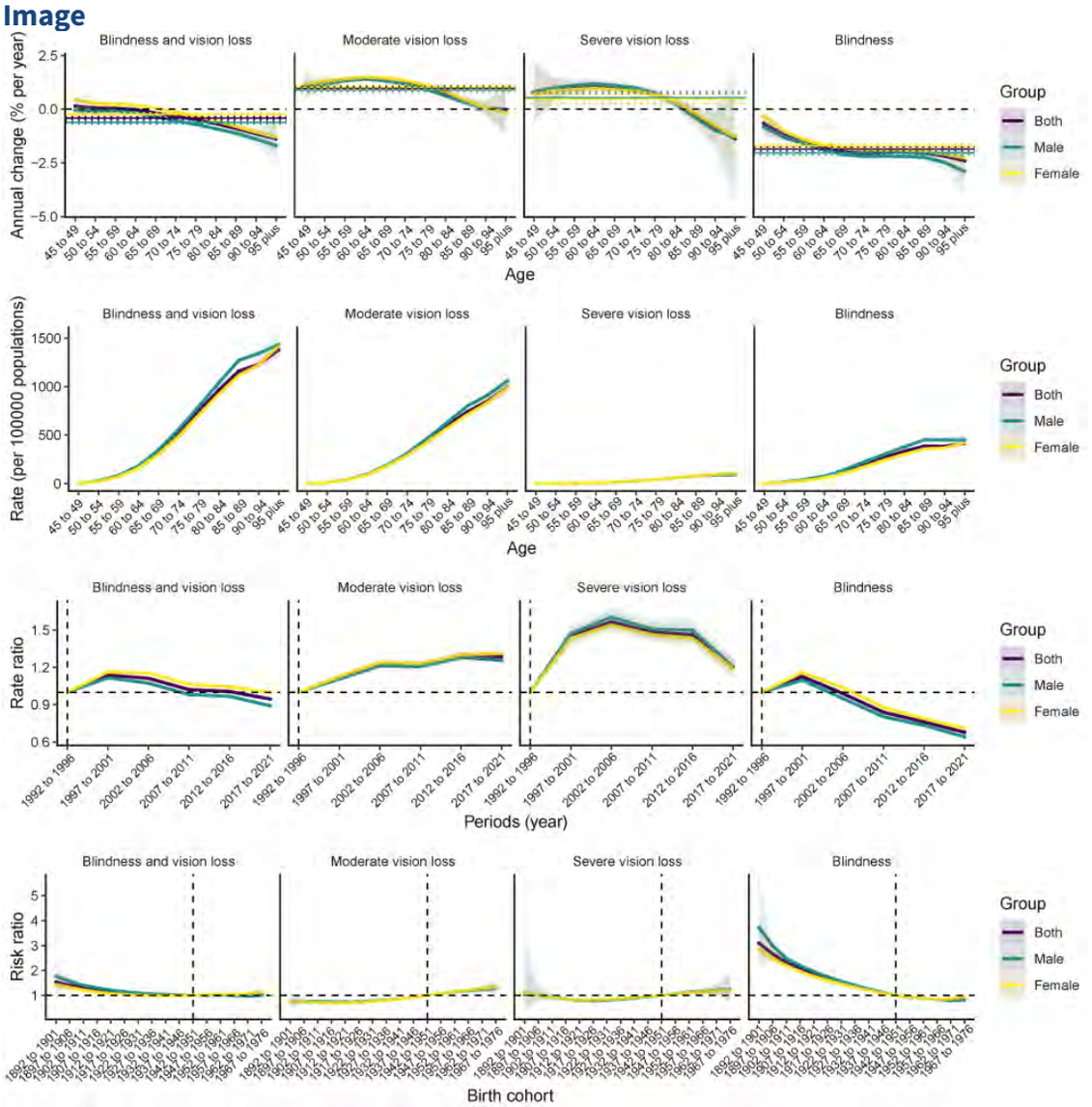
Background
Glaucoma is a leading cause of irreversible visual impairment globally. Understanding the epidemiological patterns on glaucoma-related visual impairment is crucial for developing effective public health strategies. This study aims to assess age-period-cohort patterns of glaucoma-related visual impairment in mainland China over a 30-year period, providing insights into the evolving landscape of glaucoma-related visual health.

Methods
This research performed a retrospective analysis of data from the Global Burden of Disease (GBD) 2021. Visual impairment included moderate vision loss (distance visual acuity of ≥6/60 and <6/18), severe vision loss (distance visual acuity of ≥3/60 and <6/60), and blindness (distance visual acuity of <3/60 or <10% visual field around central fixation). We used age-period-cohort modeling to estimate age, period, and cohort effects in glaucoma related visual impairment burden between 1992 and 2021 in mainland China. Net drift (overall annually percentage variation), local drift (annual percentage variation within each age group), longitudinal age curves (anticipated longitudinal age-specific rates), and period/cohort relative risks were computed.

Results
Both visual impairment and blindness exhibited improvement, as demonstrated by negative net drift (-0.42 [95% CI, -0.49 to -0.35] for visual impairment; -1.86 [95% CI, -1.94 to -1.77] for blindness), whereas moderate vision loss and severe vision loss deteriorated (net drift: 0.97 [95% CI, 0.87 to 1.06] for moderate vision loss; 0.50 [95% CI, 0.28 to 0.71] for severe vision loss). The risk of visual impairment caused by glaucoma increased markedly with age in mainland China. Period effects generally increased before 1997-2001 in visual impairment as well as blindness, followed by significant decreases. For severe vision loss, the period effect increased before 2002-2006, and subsequently decreased. The period effect for moderate vision loss increased almost consistently. Regarding cohort effects, notable improvements were observed for visual impairment as well as blindness, while moderate and severe vision loss exhibited approximately constant increases.

Image



Conclusions

Over the past three decades in mainland China, there has been significant improvement in the prevention of glaucoma-related blindness. This reflects advancements in medical care, increased accessibility to treatment, and successful public health initiatives. However, the cohort effects for moderate and severe vision loss did not show improvement, indicating that newer generations are experiencing higher risks of early-stage glaucoma-related visual impairment, and these risks are persisting over time. Increasing public awareness, enhancing screening programs, and implementing early intervention strategies focused on the early stages of glaucoma are still essential.

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P-0067

LONGITUDINAL CHANGES OF POSITION AND THICKNESS OF PEAK RETINAL NERVE FIBER LAYER THICKNESS IN SCHOOL CHILDREN

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Background
To investigate the longitudinal changes in position and thickness of peak circumpapillary retinal nerve fiber layer (cpRNFL) profile in schoolchildren.

Methods
A prospective cohort study was performed in 75 right eyes of elementary school students for six years (from 8.5 to 14.5 years old). In the first and last year, all participants underwent optical axial length measurement, color fundus photography, and cpRNFL thickness by optical coherence tomography. The angle of the supra temporal (ST-angle) and infra temporal (IT-angle) peaks of the cpRNFL curve relative to the line connecting the fovea and the center of the optic disc and RNFL thickness of the peaks (ST-thickness, IT-thickness) were determined. Wilcoxon signed rank test was used to compare these cpRNFL parameters and axial length in the first and last year.

Results
Mean axial length in the last year (24.82 mm) was significantly longer than that in the first year (23.34 mm) ($p<0.001$). Likewise, the mean ST-angle and IT-angle were significantly narrower in the last year (67.6 and 58.2 degree) than that in the first year (74.2 and 64.0 degree) ($p<0.001$). The mean IT-thickness in the last year (195.1 µm) was significantly thicker than that in the first year (185.0 µm) ($p<0.001$), but no significant changes were observed in ST-thickness ($p=0.163$).

Conclusions
During the period from 8.5 years to 14.5 years of age, ST-peak and IT-peak shifted toward the fovea and IT-thickness became thicker. These changes indicate that nerve fibers are compressed somewhere on the temporal side of the optic disc, especially IT area.

P-0068

BLOOD PRESSURE AND GLAUCOMA-RELATED ENDOPHENOTYPES IN CHINESE ADULTS: FINDINGS FROM THE CHINA KADOORIE BIOBANK STUDY

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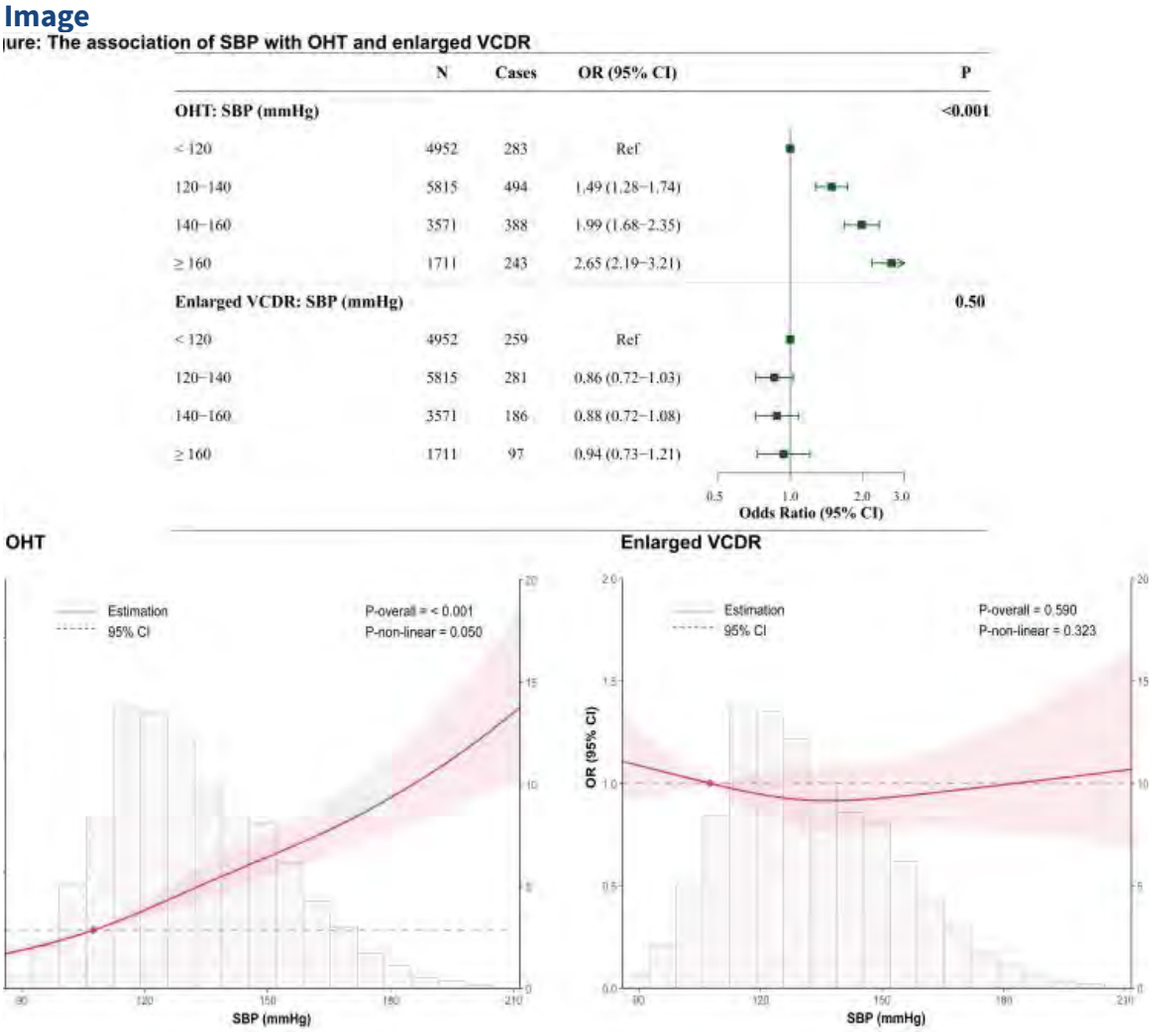
Background
Glaucoma, the leading cause of irreversible blindness, is characterized by progressive retinal ganglion cell loss. East Asians account for nearly half of the global burden. Elevated intraocular pressure (IOP) and increased vertical cup-to-disc ratio (VCDR) are key glaucoma endophenotypes. Systemic blood pressure (SBP) is hypothesized to influence these via altered ocular blood flow and biomechanical effects on the optic nerve. However, existing evidence, primarily from Western populations, has been inconsistent. Therefore, given the high prevalence of both glaucoma and hypertension in East Asia, particularly China, investigating the SBP-IOP/VCDR relationship is crucial for identifying modifiable risk factors and developing effective prevention strategies.

Methods
In the 2020-2021 resurvey of the China Kadoorie Biobank (CKB) study, approximately 25,000 randomly selected participants from 10 diverse localities (5 urban and 5 rural) were surveyed. IOP was measured in each eye (Icare ic100 tonometer; higher value used). Ocular hypertension (OHT) was defined as IOP > 21.0 mmHg. Fundus images of both eyes, captured using an Optomed Aurora camera and subjected to dual-quality control and interpretation, were used to determine VCDR, with enlarged VCDR defined as VCDR > 0.50. Logistic regression and restricted cubic spline (RCS) analyses were performed to assess the associations of OHT/enlarged VCDR with SBP. Sensitivity analyses used cut-offs of OHT > 25.0 mmHg and enlarged VCDR > 0.60.

Results
Among the 16,049 participants included in the final analysis (mean age 62.86±8.45 years, 63.44% women, 34% urban), mean IOP was 14.90 mmHg (women > men: 14.9 vs 14.8, P < 0.05), and mean VCDR was 0.32 (men > women: 0.33 vs 0.31, P < 0.05). After adjusted for several factors (age, sex, region, education, household income, alcohol consumption, smoking, physical activity, BMI, blood glucose and VCDR), SBP reminded a strong positive association with OHT. Compared with participants with SBP < 120 mmHg, the ORs for OHT prevalence increased significantly across SBP categories: 1.49, 1.99, and 2.65 (P for trend < 0.001). RCS analysis confirmed a linear SBP-OHT relationship (P < 0.001). VCDR was also associated with increased OHT risk (OR 1.15, 95% CI 1.09–1.22 per SD increase). However, SBP was not significantly associated with enlarged VCDR. IOP showed a strong association with enlarged VCDR (OR 1.21, 95% CI 1.13–1.30 per SD increase). Sensitivity analyses confirmed these findings.

Image

ıure: The association of SBP with OHT and enlarged VCDR



Conclusions

This study demonstrates a linear association between SBP and OHT, with higher SBP linked to increased OHT risk. VCDR was also associated with OHT. However, SBP was not associated with enlarged VCDR, whereas IOP was. These findings highlight the interplay of systemic and ocular factors in glaucoma and emphasize managing hypertension as a modifiable OHT risk factor, especially in East Asians. Further research is needed to elucidate mechanisms and develop targeted prevention strategies.

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P-0069

POSITIVE ASSOCIATION BETWEEN THYROID DYSFUNCTION AND PRIMARY OPEN ANGLE GLAUCOMA: A NATIONWIDE POPULATION-BASED LONGITUDINAL STUDY IN KOREA

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Background
The etiology of primary open angle glaucoma (POAG) is multifactorial, and while elevated eye pressure is the primary risk factor, inflammatory and autoimmune disease may also play a role. Thyroid dysfunction is a common autoimmune disorder. The link between POAG and thyroid dysfunction (TD) remains unclear, due to conflicting epidemiologic results in different populations. This study used a comprehensive approach with ICD coding aimed at uncovering the potential link between thyroid disorders and POAG risk in the Korean population.

Methods
Nationwide electronic health data from the korean national health Insurance Service Cohort (2002–2019) was used to investigate the association between TD (hypothyroidism and hyperthyroidism) and incident POAG risk over 17 years. For the TD and matched control groups, propensity-scores adjusted for age, sex, and comorbidities, were compared to assess POAG development. Kaplan–Meier analysis was used to report POAG incidence, Poisson regression was used to estimate the incidence rate, and Cox proportional hazards regression was used to evaluate TD–POAG associations.

Results
The TD group comprised of 35,265 participants, while the matched control group comprised of 61,870 non-TD participants. Seventy-nine percent of participants were women. The cumulative incidence of POAG was higher in the TD group than that in the matched control group. Patients with TD were more likely than controls to develop POAG (HR, 1.76; 95%CI, 1.58–1.97). Increased POAG risk in the TD group was predominantly observed in two age groups, 20–29 years and older than 50 years, and in the hypothyroidism subtype group (HR, 1.87; 95%CI, 1.66–2.11).

Conclusions
TD was significantly associated with POAG development after adjusting for potential confounders in the Korean population. These results suggest that a common immune-mediated pathophysiological pathway may exist between TD and POAG; however, the nature of this association requires further investigation.

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P-0070

ASSOCIATIONS BETWEEN OBSTRUCTIVE SLEEP APNEA AND GLAUCOMA IN THE ALL-OF-US RESEARCH PROGRAM

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Background
Obstructive Sleep Apnea (OSA), the most common sleep disorder, has been linked to an increased risk of primary open-angle glaucoma with low-level evidence.[1-2] This study is to determine the association between OSA and glaucoma and its subtypes in a sociodemographically diverse nationwide population of Americans.

Methods
This is a retrospective cross-sectional study of 410,361 participants in the National Institute of Health's All-of-Us Research Program, a national multicenter cohort contributing electronic health records and survey data. We identified 40,083 participants with OSA and 1:3 matched controls without OSA (N=120,249 matched by age, gender, race, and ethnicity). Univariable and multivariable logistic regression models were used to assess associations between OSA and glaucoma (any type, open-angle, closed-angle) adjusted by smoking status, obesity, diabetes, hypertension, hyperlipidemia, cardiovascular disease, and hypothyroidism.

Results
Participants with OSA and matched controls without OSA were similar in age (mean 62 years), gender (54% female), race (63% White), and ethnicity (12.8% Hispanic or Latino). Participants with OSA were more likely than controls to have obesity (39.8% vs. 4.4%, p<0.0001), diabetes (44.1% vs. 12.6%, p<0.0001), hypertension (77.0% vs. 30.5%, p<0.0001), hyperlipidemia (74.4% vs. 29.1%, p<0.0001), hypothyroidism (24.8% vs. 8.9%, p<0.0001), and cardiovascular disease (44.0% vs. 13.7%, p<0.0001). Participants with OSA had a significantly higher prevalence of glaucoma than matched controls in any type of glaucoma (12.9% vs. 5.1%; odds ratio (OR)=2.75, P<0.001), open-angle glaucoma (3.4% vs. 1.4%; OR=2.46, P<0.001), and close-angle glaucoma (1.8% vs. 0.8%; OR=2.31, P<0.001). In the multivariable analysis, participants with OSA had significantly higher odds than controls in having any glaucoma (adjusted odds ratio (aOR): 1.23; 95% CI: 1.17-1.28), open-angle glaucoma (aOR: 1.11; 95% CI: 1.02-1.21), but not associated with close-angle glaucoma (OR: 1.03; 95% CI: 0.92-1.15).

Conclusions
In this large and diverse US population, OSA is significantly associated with a higher risk of glaucoma, particularly open-angle glaucoma, even after adjustment of health comorbidities associated with OSA. OSA should be considered a risk factor for glaucoma, and clinical management of OSA may be considered to reduce the glaucoma risk.

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P-0071

GLAUCOMA BLINDNESS AND VISUAL IMPAIRMENT IN INDIA: FINDINGS FROM NATIONAL BLINDNESS SURVEY

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Background
Glaucoma is responsible 5.5% blindness in Indian population aged ≥50 years[1] and globally 3.6 million are blind due to glaucoma.[2] We aimed to estimate population prevalence and number of persons visually impaired (VI) due to glaucoma in India.

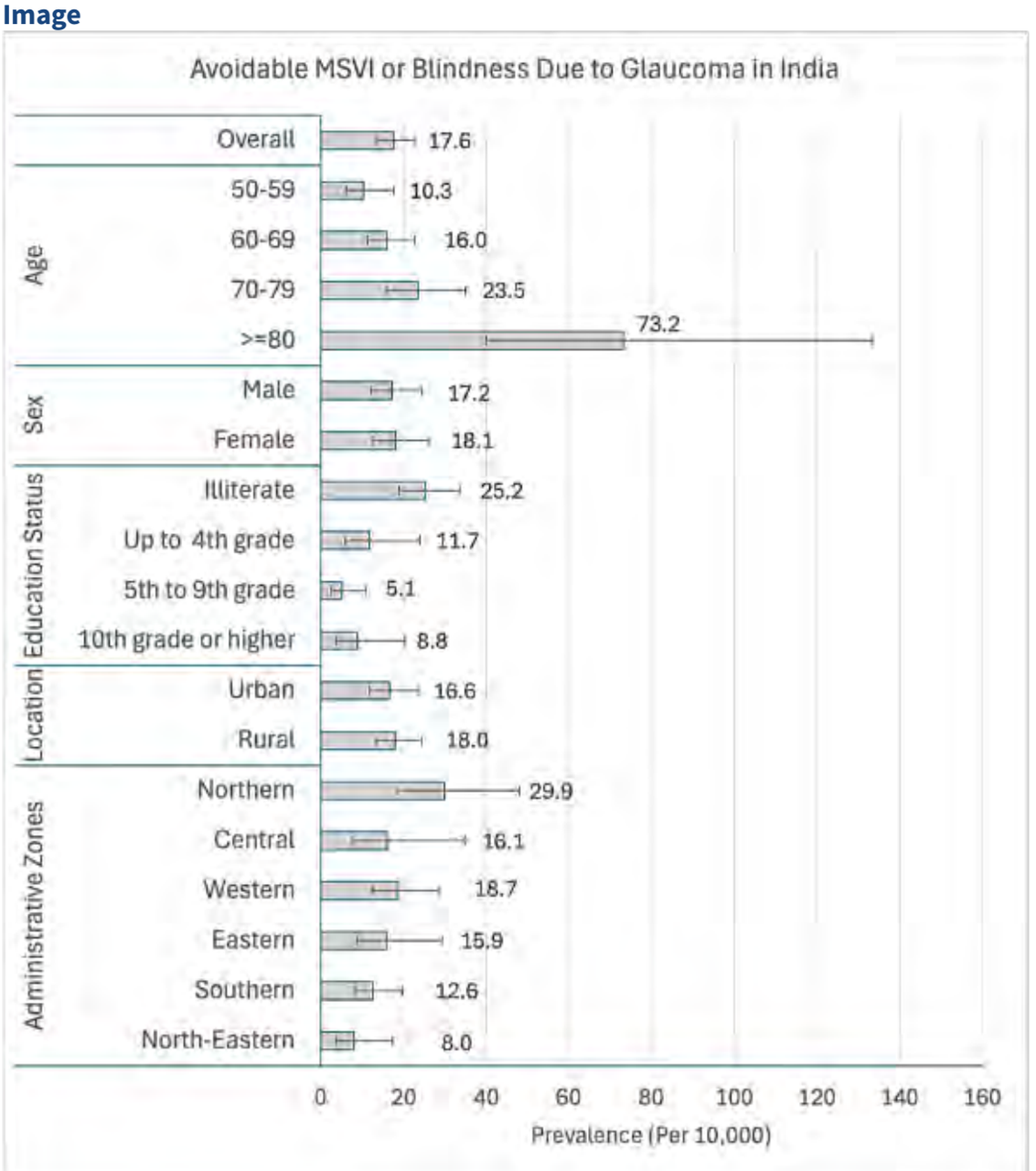
Methods
Deidentified data from National Blindness Survey 2015-19 in population aged 50+ years was analysed to estimate the number of people with vision loss due to glaucoma. Glaucoma diagnosis was based on optic disk assessments. Prevalence (95% confidence intervals, CI), risk factors (odds ratios, OR) and burden for 2023 were estimated at thresholds of presenting visual acuity (PVA) in better eye < 6/18 for moderate severe visual impairment (MSVI) and < 3/60 for blindness.

Results
85135 participants aged ≥50 years were examined. 276 (0.3%) had glaucoma as the main cause of VI in any eye with PVA < 6/18 in better eye. Glaucoma was the most avoidable cause of PVA < 6/18 in 152, and PVA < 3/60 in 88 participants. Another 190 had ≥ PVA 6/18 in better eye but VI due to glaucoma in the fellow eye, and 244 had PVA ≥ 3/60 in the better eye but glaucoma blindness in fellow eye.

Age-sex standardized prevalence of avoidable glaucoma blindness was 9.4 per 10,000 (95% CI: 7.1, 12.5) and avoidable glaucoma MSVI or blindness was 17.6 per 10,000 (95% CI: 13.6, 22.8). In India, an estimated 0.27 million had avoidable blindness due to glaucoma, 0.45 million had blindness with at least one eye having glaucoma and 0.89 million had no blindness but unilateral glaucoma with PVA <3/60 in affected eye in 2023. No perception of light in both eyes due to glaucoma affected 3.46 per 10,000.

The prevalence of avoidable glaucoma blindness increased with age from 5.4 per 10,000 in 50-59 year to 14.1 per 10,000 in 70-79 year age group (adjusted OR 2.0; 95% CI: 1.0, 4.2). No association was observed with female sex, rural residence, education or geographical location. Prevalence of avoidable glaucoma MSVI or blindness increased from 10.3 per 10,000 in 50-59 yr group to 23.5 per 10,000 in 70-79 yr age groups (adjusted OR 1.9, 95% CI: 1.1, 3.3) [Figure 1] and was associated with illiteracy (OR 2.7, 95% CI: 1.2, 6.4) and residence in Northen zone of India (OR 3.7, 95% CI: 1.6, 8.5). Gender and rural residence were not associated with avoidable glaucoma MSVI or blindness.

Image



Conclusions

Glaucoma has significant burden in India based on these conservative estimates as visual fields were not assessed. This burden needs addressal through policy and programmatic interventions.

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P-0072

NATURAL HISTORY OF GLAUCOMA SUSPECTS IN A TERTIARY EYE CENTER IN SINGAPORE

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Background
Glaucoma is one of the leading causes of blindness in the world and affects approximately 10% of Singapore's population. Early diagnosis and management can slow disease progression. However, the management of glaucoma suspects places a significant healthcare burden. Hence, this study aims to evaluate the rate of conversion of glaucoma suspects to glaucoma in a tertiary eye center in Singapore, describe the natural history of glaucoma suspects and assess major risk factors for glaucoma progression.

Methods
This is a retrospective cohort study of patients visiting the Glaucoma Suspect clinic at the National University Hospital, Singapore, for the first time between January 1 and December 31, 2017. These glaucoma suspects were followed for a five-year period from their first visit. Data such as demographics, glaucoma risk factors, glaucoma status (based on clinical and objective diagnostic criteria) and treatments were extracted. Descriptive and statistical analyses such as multivariate logistic regression were performed to determine the rate of conversion to glaucoma and the importance of factors influencing glaucoma progression. Kaplan-Meier survival curves for clinical and objective glaucoma diagnoses were also plotted and compared.

Results
Among 130 glaucoma suspects in the study, 36 (27.7%) progressed to glaucoma while the rest remained as glaucoma suspects or were discharged from the Glaucoma Suspect clinic. Of the 36, 18 (50.0%) had both clinical and objective diagnoses, 14 (38.9%) had a clinical diagnosis only, and 4 (11.1%) had an objective diagnosis only. Kaplan-Meier analyses found that the probability of glaucoma suspects remaining glaucoma-free at 1-year, 2-years, 3-years, 4-years and 5-years was 76.9%, 74.7%, 69.3%, 69.3% and 62.4% respectively. The most important risk factors for glaucoma progression were elevated intraocular pressure (odds ratio (OR): 10.430, p-value = 0.007) and family history of glaucoma (OR: 4.108, p-value = 0.025).

Conclusions
About one in four glaucoma suspects developed glaucoma in a 5-year study period. Elevated intraocular pressure and a family history of glaucoma were significant risk factors for conversion. Since most glaucoma suspects do not progress to glaucoma, a more targeted surveillance strategy to optimize resource allocation and patient identification may help mitigate the growing burden of glaucoma surveillance.

P-0073

CAUSAL RELATIONSHIP BETWEEN NASAL POLYPS AND RISK OF GLAUCOMA: A MENDELIAN RANDOMIZATION STUDY

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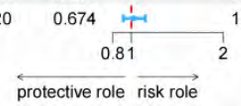
Background
Nasal inflammation has been recognized as a potential risk factor for glaucoma. As a common nasal condition, nasal polyps contributing to severe sinus obstruction and persistent inflammation. However, the causal relationship between nasal polyps and glaucoma remains unclear.

Methods
A two-sample Mendelian randomization (MR) analysis was conducted to investigate the potential causal relationship between nasal polyps and several subtypes of glaucoma, including primary angle-closure glaucoma (PACG), normotensive glaucoma (NTG), primary open-angle glaucoma (POAG), and exfoliation glaucoma (XFG). Summary-level genome-wide association studies (GWAS) data regarding nasal polyps from Saori S et al. . The GWAS datasets for glaucoma outcome were obtained from FinnGen R12. The inverse-variance weighted (IVW) approach was adopted as the primary method in MR, supplemented by sensitivity analysis using MR-Egger, weighted median, and weighted mode methods to balance potential pleiotropy. Heterogeneity test using Cochran Q statistic and horizontal pleiotropy test using MR-Egger intercept test were also performed.

Results
Genetically predicted nasal polyps was associated with an elevated risk of PACG (odds ratio [OR], 1.146; 95% confidence interval [CI], 1.020–1.286; P = 0.021) under the IVW method. This association was validated by sensitivity analyses using MR Egger method (OR, 1.448; 95% CI, 1.066–1.965; P = 0.028). However, no substantial connection was identified for POAG (OR, 1.039; 95% CI, 0.994–1.086; P = 0.086), NTG (OR, 1.044; 95% CI, 0.952–1.144; P = 0.357), or XFG (OR, 1.008; 95% CI, 0.948–1.072; P = 0.786) under the IVW approach. Moreover, the Cochran Q statistic demonstrated no evidence of heterogeneity, and the MR-Egger intercept test also revealed no significant horizontal pleiotropy.

Image

Exposure	Outcome	Method	nSNP	P Value	OR (95%CI)	P Heterogeneity	P Pleiotropy
	PACG	Inverse variance weighted	20	**0.021**	1.15 (1.02 to 1.29)	0.127	0.124
		MR Egger	20	**0.028**	1.45 (1.07 to 1.97)		
		Weighted median	20	**0.074**	1.15 (0.99 to 1.35)		
		Weighted mode	20	0.341	1.14 (0.88 to 1.49)		
	NTG	Inverse variance weighted	20	0.357	1.04 (0.95 to 1.14)	0.051	0.383
		MR Egger	20	0.260	1.16 (0.90 to 1.50)		
		Weighted median	20	0.127	1.09 (0.98 to 1.21)		
		Weighted mode	20	0.116	1.11 (0.98 to 1.26)		
Nasal polyps	POAG	Inverse variance weighted	20	0.086	1.04 (0.99 to 1.09)	0.178	0.245
		MR Egger	20	0.097	1.11 (0.99 to 1.26)		
		Weighted median	20	0.019	1.07 (1.01 to 1.14)		
		Weighted mode	20	0.025	1.09 (1.02 to 1.16)		
	XFG	Inverse variance weighted	20	0.786	1.01 (0.95 to 1.07)	0.706	0.503
		MR Egger	20	0.472	1.07 (0.90 to 1.26)		
		Weighted median	20	0.901	1.00 (0.92 to 1.10)		
		Weighted mode	20	0.674	1.02 (0.91 to 1.15)		



P<0.05 was considered statistically significant

protective role risk role

Conclusions

We discovered causal evidence that suggests nasal polyps were associated with increased risk of PACG. Patients with nasal polyps may require regular glaucoma screening, intraocular pressure measurements, and anterior chamber angle evaluations.

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P-0074

CAUSAL RELATIONSHIP BETWEEN CORNEAL RESISTANCE FACTOR AND GLAUCOMA: A BIDIRECTIONAL MENDELIAN RANDOMIZATION STUDY

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Background
Observational studies have suggested a potential correlation between corneal resistance factor (CRF) and glaucoma. Nevertheless, owing to the inherent limitations of observational studies, which are susceptible to confounding factors and reverse causation, the causal relationship between CRF and glaucoma has not been fully elucidated. This study aims to investigate the causal relationship between CRF and glaucoma utilizing Mendelian randomization (MR).

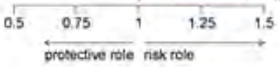
Methods
We conducted bidirectional two-sample MR to investigate causal relationships between the corneal resistance factor (CRF) and various subtypes of glaucoma, including primary open-angle glaucoma (POAG), primary angle-closure glaucoma (PACG), normotensive glaucoma (NTG), exfoliation glaucoma (XFG), and suspected glaucoma. We utilized summary-level genome-wide association studies (GWAS) data on CRF from Jiang X et al., which contains GWAS data from 76,029 European participants, and GWAS data on glaucoma subtypes from FinnGen R12. Inverse-variance-weighted (IVW) methods were employed to assess causal relationships between CRF and glaucoma subtypes. Heterogeneity was evaluated using the Cochran Q statistic under a fixed-effect IVW model, with $P < 0.05$ indicating significant heterogeneity. In instances of significant heterogeneity, a multiplicative random-effects IVW model was applied for adjustment. Sensitivity analyses, including weighted-median, MR-Egger, and weighted-mode, were conducted to validate the IVW results under the assumption of balanced pleiotropy.

Results
Genetically predicted increased CRF was associated with an elevated risk of POAG (Odd ratio [OR]=1.13, 95% confidence interval [CI]: 1.08–1.19, $P<0.001$), XFG (OR=1.09, 95% CI: 1.02–1.17, $P=0.007$), and suspected glaucoma (OR = 1.20, 95% CI: 1.15–1.25, $P<0.001$) under the IVW method. However, no significant associations were observed for PACG or NTG. In reverse MR analyses, genetically predicted POAG (OR=1.06, 95% CI: 1.04–1.08, $P<0.001$) and suspected glaucoma (OR = 1.05, 95% CI: 1.03–1.08, $P<0.001$) were significantly associated with increased CRF. However, no significant causal relationships were observed for PACG, NTG, or XFG.

Image

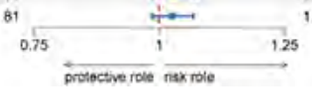
Exposure	Outcome	Method	nSNP	OR (95%CI)	P value	P Heterogeneity
Corneal resistance factor	PACG	Inverse variance weighted (multiplicative random effects)	117	1.08 (0.97 to 1.19)	0.147	0.005
Corneal resistance factor	PACG	MR Egger	117	0.83 (0.66 to 1.04)	0.112	
Corneal resistance factor	PACG	Weighted median	117	1.07 (0.93 to 1.23)	0.323	
Corneal resistance factor	PACG	Weighted mode	117	1.01 (0.83 to 1.25)	0.888	
Corneal resistance factor	NTG	Inverse variance weighted (multiplicative random effects)	116	1.01 (0.93 to 1.10)	0.737	<0.001
Corneal resistance factor	NTG	MR Egger	116	1.04 (0.86 to 1.26)	0.692	
Corneal resistance factor	NTG	Weighted median	116	1.01 (0.91 to 1.11)	0.902	
Corneal resistance factor	NTG	Weighted mode	116	0.92 (0.69 to 1.23)	0.588	
Corneal resistance factor	POAG	Inverse variance weighted (multiplicative random effects)	109	1.13 (1.08 to 1.19)	<0.001	<0.001
Corneal resistance factor	POAG	MR Egger	109	1.11 (0.98 to 1.25)	0.090	
Corneal resistance factor	POAG	Weighted median	109	1.16 (1.09 to 1.23)	<0.001	
Corneal resistance factor	POAG	Weighted mode	109	1.20 (1.08 to 1.32)	<0.001	
Corneal resistance factor	XFG	Inverse variance weighted (multiplicative random effects)	117	1.09 (1.02 to 1.17)	0.007	0.001
Corneal resistance factor	XFG	MR Egger	117	1.03 (0.88 to 1.20)	0.739	
Corneal resistance factor	XFG	Weighted median	117	1.06 (0.98 to 1.16)	0.159	
Corneal resistance factor	XFG	Weighted mode	117	1.05 (0.91 to 1.23)	0.490	
Corneal resistance factor	Suspected Glaucoma	Inverse variance weighted (multiplicative random effects)	106	1.20 (1.15 to 1.25)	<0.001	<0.001
Corneal resistance factor	Suspected Glaucoma	MR Egger	106	1.10 (0.98 to 1.23)	0.101	
Corneal resistance factor	Suspected Glaucoma	Weighted median	106	1.22 (1.16 to 1.28)	<0.001	
Corneal resistance factor	Suspected Glaucoma	Weighted mode	106	1.26 (1.14 to 1.40)	<0.001	

P<0.05 was considered significant



Exposure	Outcome	Method	nSNP	OR (95%CI)	P value	P Heterogeneity
PACG	Corneal resistance factor	Inverse variance weighted	25	1.00 (0.98 to 1.02)	0.818	0.599
PACG	Corneal resistance factor	MR Egger	25	1.04 (0.98 to 1.11)	0.212	
PACG	Corneal resistance factor	Weighted median	25	0.99 (0.96 to 1.02)	0.500	
PACG	Corneal resistance factor	Weighted mode	25	0.98 (0.93 to 1.03)	0.378	
NTG	Corneal resistance factor	Inverse variance weighted	54	1.00 (0.98 to 1.02)	0.716	0.408
NTG	Corneal resistance factor	MR Egger	54	0.98 (0.94 to 1.02)	0.347	
NTG	Corneal resistance factor	Weighted median	54	1.00 (0.97 to 1.03)	0.926	
NTG	Corneal resistance factor	Weighted mode	54	0.98 (0.93 to 1.04)	0.566	
POAG	Corneal resistance factor	Inverse variance weighted	113	1.06 (1.04 to 1.08)	<0.001	0.277
POAG	Corneal resistance factor	MR Egger	113	1.11 (1.05 to 1.18)	<0.001	
POAG	Corneal resistance factor	Weighted median	113	1.07 (1.03 to 1.10)	<0.001	
POAG	Corneal resistance factor	Weighted mode	113	1.06 (0.99 to 1.13)	0.121	
XFG	Corneal resistance factor	Inverse variance weighted	40	1.01 (0.99 to 1.03)	0.198	0.285
XFG	Corneal resistance factor	MR Egger	40	1.02 (1.00 to 1.05)	0.109	
XFG	Corneal resistance factor	Weighted median	40	1.03 (1.01 to 1.06)	0.008	
XFG	Corneal resistance factor	Weighted mode	40	1.03 (1.00 to 1.06)	0.048	
Suspected Glaucoma	Corneal resistance factor	Inverse variance weighted	81	1.05 (1.03 to 1.08)	<0.001	0.228
Suspected Glaucoma	Corneal resistance factor	MR Egger	81	1.03 (0.99 to 1.08)	0.107	
Suspected Glaucoma	Corneal resistance factor	Weighted median	81	1.03 (0.99 to 1.07)	0.186	
Suspected Glaucoma	Corneal resistance factor	Weighted mode	81	1.03 (0.99 to 1.07)	0.213	

P<0.05 was considered significant



Conclusions

This investigation demonstrates a bidirectional causal relationship between CRF and specific glaucoma subtypes, particularly POAG and suspected glaucoma. These findings elucidate the potential significance of CRF in assessing open-angle glaucoma risk and its relevance in the pathophysiology of glaucoma, potentially driven by a biomechanical feedback loop in which elevated CRF increases stress on the optic nerve head, exacerbating glaucomatous damage, while glaucoma-related structural changes further alter corneal biomechanics.

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P-0075

QUANTIFYING THE GLOBAL IMPACT OF POPULATION AGING ON GLAUCOMA-RELATED VISUAL IMPAIRMENT: A DECOMPOSITION ANALYSIS

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Background

Glaucoma is a major contributor to irreversible visual impairment (VI) worldwide. Evidence from clinical studies indicates that the risk of developing glaucoma increases significantly with advancing age. As population aging accelerates, the burden of glaucoma-related VI is anticipated to rise substantially. To better understand the change in epidemiological patterns, we conducted a decomposition analysis to quantify the global impact of population aging to the prevalence of glaucoma-related VI.

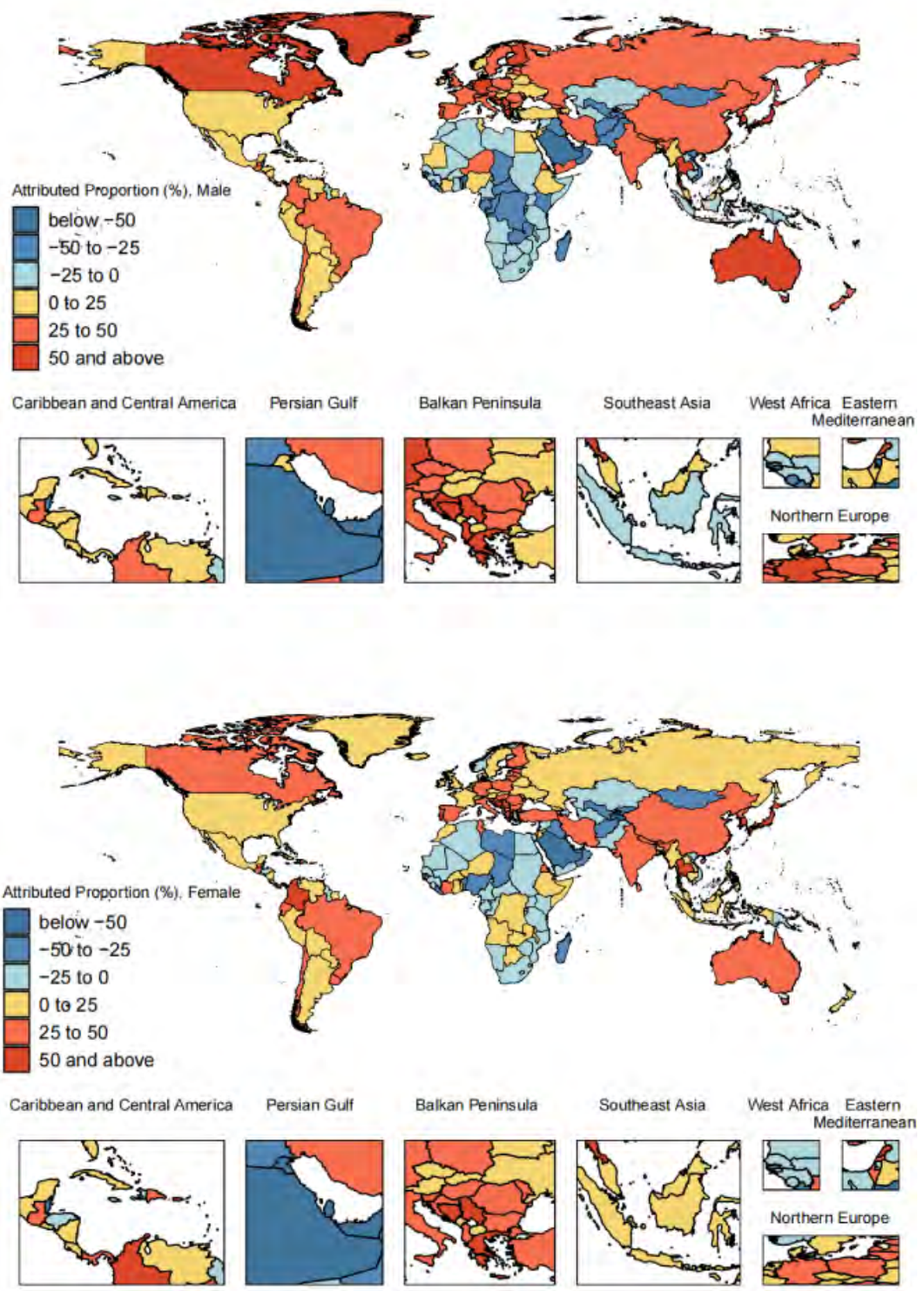
Methods

This population-based study utilized repeated cross-sectional data on glaucoma-related VI from the Global Burden of Disease 2021 study. We analyzed the impact of population aging by decomposing the changes in glaucoma-related VI cases into contributions from population growth, population aging, and epidemiological rate changes, using the decomposition methods developed by Das Gupta et al. We then assessed the impact of population aging on the variation in glaucoma-related VI cases between 1990 and 2021 using absolute and relative contributions as measures. The relative contributions (attributed proportions) were calculated by dividing the absolute contributions by the total number of cases in each subcategory in 1990. We further calculated the E-A ratio (epidemiological rate change/population aging change) to evaluate the relative effectiveness of prevention and control strategies in addressing the impact of population aging.

Results

From 1990 to 2021, global population aging contributed to 636,981.26 cases of glaucoma-related VI, corresponding to an attributed proportion of 15.64%. The impact of population aging was more pronounced in males (21.25%) compared to females (12.14%). Regionally, the effect of population aging was greater in areas with higher sociodemographic index (SDI), corresponding to attributed proportions of 0.62%, 14.12%, 23.92%, 19.52%, and 30.92% in low-, low-middle-, middle-, high-middle-, and high-SDI regions, respectively. At the regional level, the impact of population aging ranged from 100.65% in High-income Asia Pacific to -17.35% in Western Sub-Saharan Africa. Among countries and territories, the effect varied significantly, with the highest contribution in Japan (113.85%) and the lowest in the United Arab Emirates (-261.96%). Globally, the E-A ratio from 1990 to 2021 was -2.40, with regional variations of -57.41, -3.66, -2.31, -2.56, and -0.74 in low-, low-middle-, middle-, high-middle-, and high-SDI regions, respectively.

Image



Conclusions

This study underscores the significant impact of population aging on the global burden of glaucoma-related VI, particularly in high-SDI regions and among males. While preventive strategies have been effective in mitigating this impact in most countries and territories, the relatively insufficient effectiveness observed in high-SDI regions suggests a need for more targeted and comprehensive strategies to address the challenges posed by aging populations in these areas.

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P-0076

INCIDENCE OF AND FACTORS ASSOCIATED WITH THE DEVELOPMENT OF NEOVASCULAR GLAUCOMA IN EYES WITH PROLIFERATIVE DIABETIC RETINOPATHY

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Background

Neovascular glaucoma (NVG) is a known complication of proliferative diabetic retinopathy (PDR), but the frequency of the development of NVG in eyes with PDR is not well understood. We aim to estimate the incidence and identify factors associated with developing NVG in PDR patients. Identifying these parameters may lead to improved prevention and treatment strategies.

Methods

A retrospective study was conducted on PDR patients who had eye exams from 1/2014 to 6/2023 at Lyndon B. Johnson General Hospital. Patients that were initially diagnosed with NVG, had less than 2 years of follow-up, or less than three clinic visits were excluded. If both eyes were eligible, both eyes were included. Demographics and baseline medical and ocular histories were recorded. Annual ocular exams, including the development of NVG, progression date, annual HbA1C, and treatment of PDR, were collected during follow-up. Continuous-time Cox regression analysis with HbA1c, blood pressure, new onset of comorbid medical and ocular conditions, and number and type of PDR treatments were performed as time-dependent variables. Baseline characteristics were treated as time-invariant variables to identify risk factors affecting NVG development in eyes with PDR.

Results

340 eyes from 188 patients were included in the study. The average age was 57.3 ± 8.7 (SD). The incidence of NVG was 4.1% (14 of 340 eyes), with a mean time to develop NVG of 61 months. Factors associated with the progression of PDR to NVG were higher ongoing HbA1c, presence of diabetic macular edema, neovascularization of the iris at baseline, as well as worse baseline best corrected visual acuity. New onset of coronary artery disease (CAD) and older age were found to be protective factors (See Table 1).

Image

Risk Factors	Estimated Hazard Ratio	95% Confidence Interval		P
Baseline Risk Factors				
Age (per year)	0.864	0.770	0.970	0.013
Diabetic Macular Edema	13.59	1.147	161.00	0.039
Best Corrected Visual Acuity (per logMAR)	6.203	1.985	19.39	0.002
Presence of Neovascular Iris	75.43	3.029	1878	0.008
Follow-up Risk Factors				
HbA1c (per unit)	1.396	1.009	1.931	0.044
Presence of Coronary Artery Disease	0.002	0.001	0.383	0.020

Conclusions

This study found that an estimated 4.1% of eyes diagnosed with PDR develop NVG at an average of 61 months. Factors associated with the progression of PDR to NVG include diabetic macular edema, ongoing higher HbA1c, worse baseline visual acuity, and the presence of neovascularization of the iris. New onset of CAD and older age were associated with less risk.

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P-0077

COMPARATIVE COST-EFFECTIVENESS OF PRESERFLO MICROSHUNT VERSUS TRABECULECTOMY IN THE AUSTRALIAN MEDICARE SYSTEM

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Background

Trabeculectomy has been the gold-standard for the surgical reduction of intraocular pressure (IOP) in open angle glaucoma (OAG). The Preserflo Microshunt (PMS) is a novel subconjunctival microstent that has been designed as a potential alternative to trabeculectomy. Its purported advantages include shorter operating time, decreased follow-up rates and less complications. Our aim was to assess the cost-effectiveness of Preserflo Microshunt (PMS) versus trabeculectomy in the surgical management of open angle glaucoma (OAG) in the Australian Medicare system.

Methods

Treatment costs and effects were analysed in a Markov model of patients with OAG over a monthly cycle 5-year horizon using TreeAge software. Safety and efficacy outcomes were derived from the 5-year data of the landmark randomised controlled trial. The main outcome measure was incremental cost per quality-adjusted life year (QALY) gained. Treatment effect was measured as mean number of ocular hypotensive medications, reduction in IOP, post-operative interventions and complications, all of which had a direct impact on transition probabilities between health states. One-way sensitivity and probabilistic sensitivity analyses were conducted to assess the impact of additional novel variables – including the post-operative disutility of trabeculectomy, disutility of PMS relative to trabeculectomy, number of follow-up visits and surgical time

Results

At 5-years, trabeculectomy dominated PMS with a lower cost (AUD 2794 versus AUD 4380) and higher outcomes (4.01 QALYs versus 3.95 QALYs) (Table 1). The baseline deterministic model assumed PMS had half the post-operative disutility of trabeculectomy with a surgical time of 45 minutes versus 60 minutes for trabeculectomy. One-way sensitivity analysis demonstrated the model was also robust to number of follow-up visits, with trabeculectomy dominant at all reduced PMS follow-up rates. Parameters most impacting model outcomes were number of post-operative drops, failure rates and needling rates (Figure 2). Probabilistic sensitivity analysis showed the likelihood of trabeculectomy being cost-effective relative to PMS at 5 years was 92% at a willingness-to-pay threshold of AUD 50,000/QALY.

Conclusions

Trabeculectomy appears to be cost-effective compared to PMS in the surgical management of OAG in the Australian Medicare system. This raises important questions about the impact of PMS on efficient healthcare spending, surgical training and overall patient outcomes.

P-0079

RETINAL NERVE FIBER LAYER AND COGNITIVE FUNCTION IN THE AUSTRALIAN EYE AND EAR HEALTH SURVEY

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Background

Thinner retinal nerve fiber layer (RNFL) is associated with glaucoma and reduced cognitive function.[1-2] This study aims to examine whether RNFL and glaucoma are associated with cognitive function in a sub-sample of participants from the Australian Eye and Ear Health Survey (AEEHS).

Methods

AEEHS is a nationwide population-based, cross-sectional study of vision and hearing in Australians over 50 years. This sub-study was conducted across the first six sites from June 2022 to May 2023. Selected variables based on glaucoma and dementia risk factors included self-reported education level, Indigenous status, language spoken at home, health insurance, smoking status, chronic diseases [diabetes, stroke/transient ischemic attack (TIA)] and glaucoma diagnosis. RNFL thickness measured with optical coherence tomography: average RNFL, in four quadrants and superior-temporal & inferior-temporal clock-hours, in each eye were extracted for analysis. Multiple linear regression was used to model the associations of RNFL thickness, glaucoma, sociodemographic and health factors, adjusted for age and sex, on the Montreal Cognitive Assessment (MoCA) score.

Results

A total of 276 participants completed the MoCA. Mean score was 24±4 (mean±SD), range 10-30, mean age 69±10 years, 128 (47%) were male, 94 (34%) had <12 years of education, 31(11%) were Indigenous, 193 (69%) spoke English, 136 (49%) had health insurance, 13 (5%) had stroke/TIA, 23 (8%) had glaucoma, 95 (34%) were current and former smokers. People with glaucoma had a lower MoCA score (mean: 22.2±4) compared to non-glaucomatous participants (mean: 24.3±4). There were associations of RNFL with cognitive function in univariate analysis, including right average, 7, 8 & 11 o'clock sectors. In multivariable linear regression, age (β= -0.2, p<0.001), being Indigenous (β= -0.5, p=0.005), non-English speaker (β=-0.7, p<0.001), <12 years education (β=0.67, p<0.001), glaucoma diagnosis (β=-0.5, p=0.009), smoking (β= 0.26, p = 0.02), stroke (β=-0.7, p=0.01) and left 4 o'clock RNFL (β=-0.11, p=0.047) were associated with lower MoCA score (R^2=23.4%).

Conclusions

In this population-based sample of older adults in Australia, cognitive function was associated with socioeconomic and chronic disease factors, including a glaucoma diagnosis.

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P-0080

A LONGITUDINAL STUDY OF THE ASSOCIATION BETWEEN GLAUCOMA AND INCREASED RISK OF SUDDEN SENSORINEURAL HEARING LOSS DEVELOPMENT: NATIONWIDE COHORT STUDY

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Background
Sudden sensorineural hearing loss (SSNHL) and glaucoma are considered to share a common pathophysiology. The authors demonstrated the risk of SSNHL in patients with primary open angle glaucoma.

Methods
This study utilized a nationally representative sample of 1,025,340 adults from the 2002–2013 Korean National Health Insurance Survey-National Sample Cohort dataset in South Korea. The study population included 1,432 patients with POAG and 5,728 individuals without POAG, with propensity score matching between groups according to sociodemographic factors and enrollment year.

Results
The overall incidence of SSNHL during the 11-year follow-up was 1.82-fold higher in the OAG group than in the non-OAG group (2.11 vs 1.16 per 1000 person-years; adjusted HR, 1.80; 95% CI, 1.10-2.94). Specifically, the risk ratio for developing SSNHL was significantly greater in males (adjusted HR, 2.87; 95% CI, 1.50-5.46) or aged < 45 patients (adjusted HR, 10.95; 95% CI, 3.43-34,92) with POAG.

Conclusions
According to this observational study, there appears to be a connection between POAG and a higher occurrence of SSNHL. More specifically, the study observed that male or younger individuals with POAG had a greater likelihood of SSNHL.

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P-0081

IDENTIFICATION AND QUALIFICATION OF IMPROVEMENT GAPS IN THE GLAUCOMA-RELATED BLINDNESS BURDEN, 1990-2021

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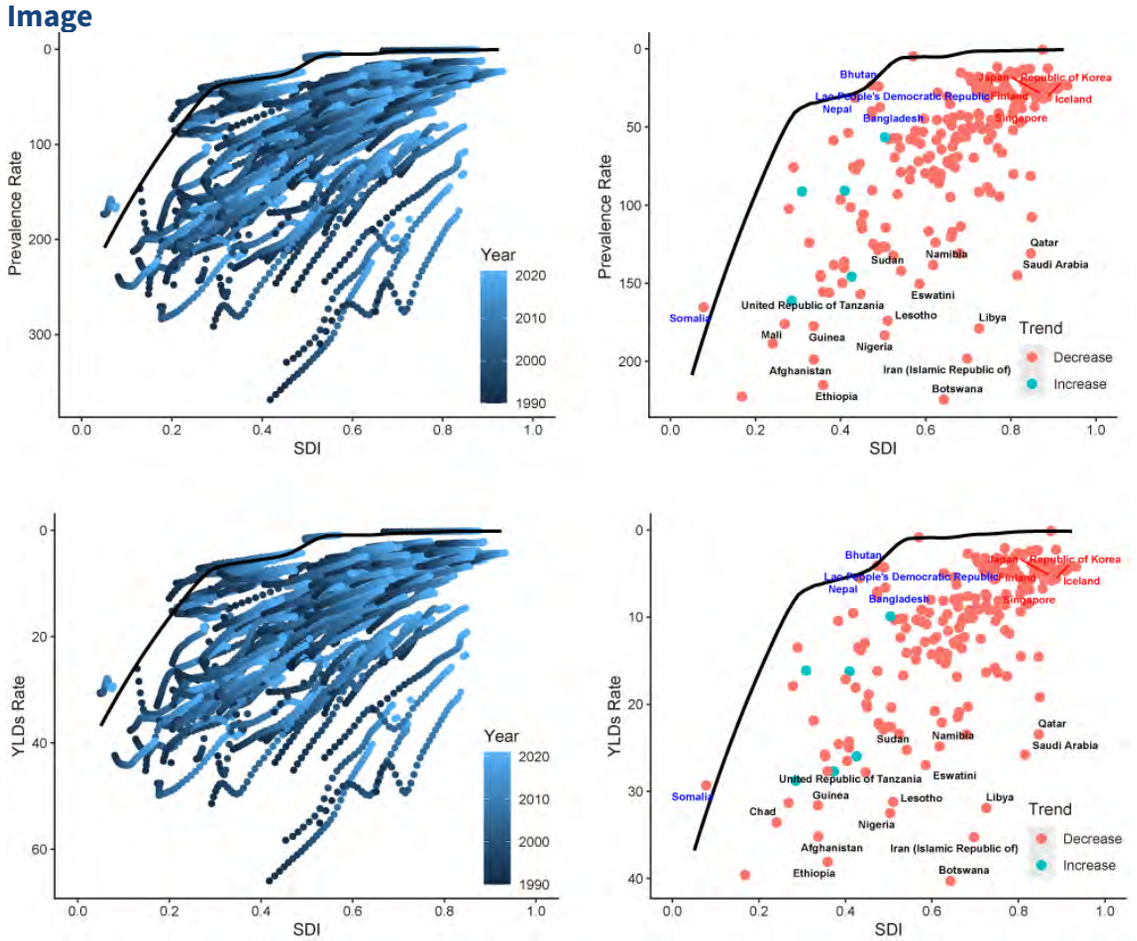
Background
Glaucoma remains a major cause of blindness, with its burden varying across countries and territories partly due to socioeconomic factors. This study examines the gap between the actual and theoretically achievable glaucoma-related blindness burden for countries and territories at different sociodemographic index (SDI) levels, thereby providing critical specific insights for localized reference.

Methods
To identify and qualify the potential improvement gaps of glaucoma-related blindness burden (including prevalence and YLDs [Years Lived with Disability]), we conducted data envelopment and stochastic frontier analyses for the data from the Global Burden of Disease Study 2021. Using the free disposal hull method, we developed the frontier for glaucoma-related blindness burden relative to the SDI, identifying the lowest burden potentially achievable given a location's SDI. The effective differences were further calculated to measure the gap between a location's observed and attainable burden. To account for uncertainty, we used 1000 bootstrapped samples drawn randomly from all countries and territories across all years, calculating the mean burden at each SDI value.

Results
Generally, as the SDI increased, the observed effective differences tended to be smaller and displayed less variability. Notably, most countries and territories exhibited remarkable declines in glaucoma-related blindness burden during the study period, whereas some with a related lower SDI showed unfavourable increasing trends. In 2021, the top 10 countries and territories with the highest effective difference for prevalence and YLDs included Botswana, Iran (Islamic Republic of), Ethiopia, Libya, Nigeria, Lesotho, Afghanistan, Eswatini, Saudi Arabia, Guinea (range of effective difference: 219.50–140.09 for prevalence, and 39.39–25.21 for YLDs). These countries and territories have much greater glaucoma-related blindness than other countries with similar socioeconomic resources.

Image



Conclusions

Our findings suggest that countries and territories with higher effective differences may benefit from tailored interventions to mitigate glaucoma's impact, aligning their blindness burdens more closely with their socioeconomic potential. Future efforts should focus on strengthening healthcare infrastructure and accessibility in these locations, thereby reducing the burden and improving quality of care for those affected.

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P-0082

MIGS, CATARACT SURGERY, OR BOTH? A REVIEW OF CLINICAL TRIAL DATA TO COMPARE EFFICACY, PROLONGED OUTCOMES, AND ECONOMIC IMPACT ON GLAUCOMA PATIENTS

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Background
Glaucoma is the leading cause of global irreversible blindness that is estimated to affect 111.8 million people by 2040.1 There are a number of surgical interventions available to treat glaucoma including MIGS, whose usage has drastically increased due to its safety profile and efficacy.2 The primary objective of this study is to compare the IOP and medication reduction between receiving MIGS, CS, and MIGS and CS (MACS) clinical trials.

Methods
This review consisted of publicly available data on MIGS, CS, and MACS clinical trials using ClinicalTrials.gov that reported on IOP and glaucoma medication outcomes. Data reporting and synthesis adhered to PRISMA guidelines. The primary outcomes were the baseline, post-procedure, and reduction in IOP and glaucoma medication use of each trial. Cohorts were further subdivided by follow-up period (6, 12, and 24 months) as well as medicated or unmedicated status for pre-op IOP measurement.

Results
A total of 21 clinical trials, from 2005 to 2017, were included in this review, comprising 3294 clinical trial participants: 17.51% in the CS cohort, 47.51% in the MIGS cohort, and 34.97% in the MACS cohort. The medicated IOP reduction 12 and 24 months after MIGS was 6.83 and 5.35 mmHg respectively, while unmedicated IOP reduction was 8.85 and 7.99 mmHg respectively. In addition, the medicated IOP reduction 12 and 24 months after MACS was 3.65 and 2.74 mmHg respectively, while unmedicated IOP reduction was 8.21, and 7.57 mmHg respectively. The medication reduction 12 and 24 months after MIGS was 1.84 and 1.54 respectively for the medicated group and 1.03 and 1.51 respectively for the unmedicated group; and after MACS was 1.43 and 1.37 respectively for the medicated group and 1.27 and 1.27 respectively for the unmedicated group. Cataract surgery alone exhibited the least reduction in IOP and medications.

Conclusions
The aggregated results in this analysis indicate that CS, MIGS, and MACS all result in a significant decrease in IOP and glaucoma medications; however, both MIGS and MACS outperform CS alone. The 12 month timeline had the highest reductions in IOP, and the 12 and 24 month timelines had comparable reductions in medication use. Although MIGS and MACS both appear effective with good safety profiles, further review and analysis may help in providing more evidence for use by health-care professionals to guide decisions. Additionally, given the ever-growing breadth of Glaucoma surgical interventions, greater insight and emphasis in clinical trial diversity may allow for a more personalized approach for evaluation and treatment in a cost and outcomes driven era of clinical management.

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P-0083

FACTORS AFFECTING PROGRESSION OF PRIMARY OPEN ANGLE GLAUCOMA AMONG ADULTS: A SYSTEMATIC PROGNOSTIC FACTOR REVIEW AND META-ANALYSIS

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Background

The understanding of prognostic factors is useful for clinicians to estimate risk of disease progression and to identify those who are at risk of losing sight early. Aim of this review was to identify risk factors associated with visual field progression, among adults with primary open angle glaucoma (POAG) and pseudo-exfoliation glaucoma (PXFG).

Methods

We searched CENTRAL, MEDLINE, EMBASE, and two trials-registries on September 2023. We included studies with >2-years of follow-up and a sample size of >200. We accepted the studies criteria of visual field progression. Targeted population consisted of adults >=18 years of age with glaucoma; glaucoma type was restricted to POAG and PXFG. We used Quality in Prognosis Studies (QUIPS) tool to assess risk of bias and conducted meta-analyses where homogenous outcomes were reported, using random-effects, generic inverse-variance model. We evaluated and reported the certainty of evidence using the GRADE guidelines.

Results

We screened 14,294 titles and abstracts and 236 full texts, and 22 studies (n=6082 participants, mean age range 50-78) were included in this review. We judged 20 of the 22 (90%) included studies to be at a high risk of bias overall. GRADE certainty of evidence was low to moderate, and the most common reason for downgrading was indirectness (*i.e.*, Follow-up time). Presence of disc hemorrhage (meta analysed HR 2.03; n=5 studies), decreased retinal nerve fiber layer thickness (increased hazard reported in n=4 studies), abnormal macular ganglion cell parameters (range of HR 1.18-3.07; n=1 study), increased optic disc vessel density (protective; n=1 study), presence of choroidal microvascular dropout (HR 1.7-1.9; n=2 studies), presence of bilateral disease (meta analysed HR 1.77; n=2studies), presence of exfoliation glaucoma (multivariable HR 2.12, n=1 study), and treatment for glaucoma (meta analysed HR 0.44; n=3 studies) could be used as predictors of visual field progression of the POAG. The remaining factors had mixed evidence as to their prognostic associations with glaucoma progression. With regard to intra-ocular pressure (IOP) at baseline, HR was significant (1.08, 95% CI 1.03-1.13) while OR was not (0.96, 95% CI 0.84-1.20), and more than half of the studies reporting IOP found no evidence of a significant effect.

Conclusions

This review has indentified several prognostic factors for disease progression in people with POAG and PXFG that should be considered in clinical practice.

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P-0084

EVALUATING GLOBAL GLAUCOMA AWARENESS EFFORTS: A STUDY OF WORLD GLAUCOMA WEEK ACTIVITIES AND INFLUENCING FACTORS

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Background
Glaucoma is the leading cause of irreversible blindness worldwide, highlighting the need for early detection and timely intervention. This study aims to analyze the global distribution of awareness and screening activities during World Glaucoma Week (WGW) and identify factors associated with activity levels in each country.

Methods
Data on WGW activities from the World Glaucoma Association (WGA) official website were collected for the years 2015–2024. The distribution of activities was calculated annually per 10,000 individuals with glaucoma-related blindness in each country. Correlations between the number of WGW activities and various factors—including the presence of a national glaucoma society, the number of ophthalmologists, Gross Domestic Product (GDP), and Human Development Index (HDI)—were assessed using Pearson correlation coefficients.

Results
The average number of World Glaucoma Week (WGW) activities was approximately 550 per year, with public education as the most common type of activity (30.9%), followed closely by awareness campaigns (30.2%). Manila, Philippines recorded the highest average number of activities per year (35.3), followed by Quito, Ecuador (12.9) and Bogota, Colombia (7.6). Antigua and Barbuda ranked highest for activities per 10,000 individuals with glaucoma-related blindness, with an average of 823 activities per year, followed by Barbados, Croatia, the Bahamas, and Qatar. Regions with the highest activities per glaucoma blindness cases included Australasia, Central Europe, High-Income Asia Pacific, Andean Latin America, and the Caribbean. About 40% of countries have a national glaucoma society, and these countries reported significantly more WGW activities than those without, averaging 6.56 ± 13.86 vs. 0.30 ± 0.64 activities per year ($P < 0.001$). The number of glaucoma blindness patients, number of ophthalmologists, GDP, and HDI showed no significant correlation with the frequency of glaucoma activities across countries.

Image

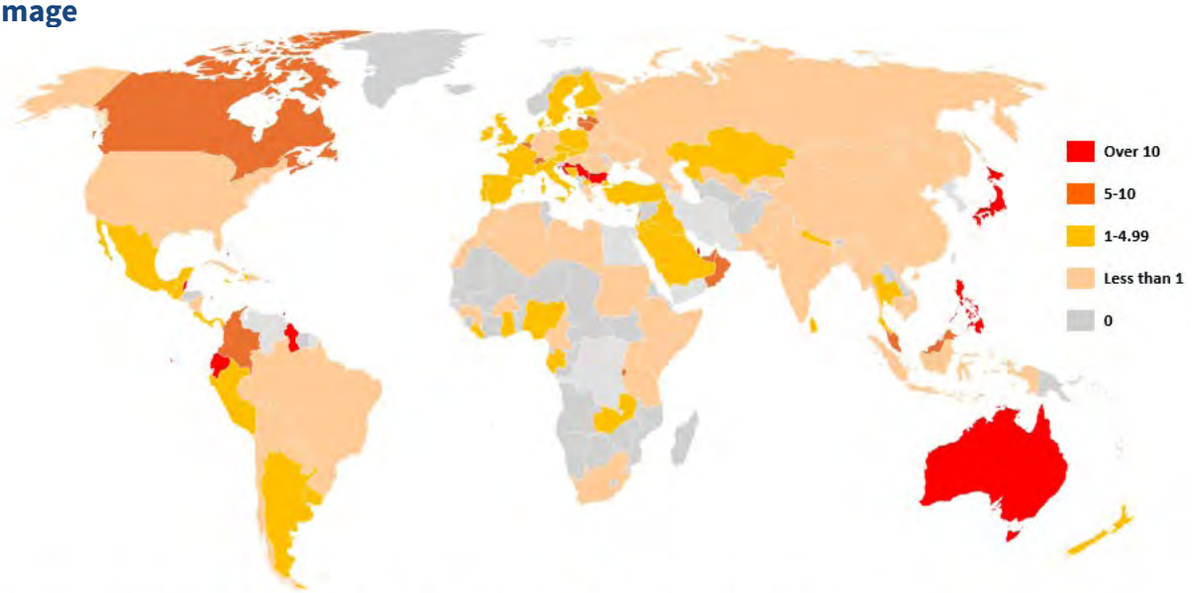

Figure 1 Heat map showing the global distribution of annual glaucoma activities per 10,000 individuals with glaucoma-related blindness.

Conclusions

This study highlights significant disparities in WGW activities worldwide with countries having a national glaucoma society showing significantly higher activity levels. Public education and awareness campaigns were the most common activities. Socioeconomic factors, such as GDP, HDI, and ophthalmologist numbers, showed no correlation with WGW activity levels, highlighting the importance of organized support over economic resources in promoting glaucoma awareness globally.

P-0085

CLINICAL CHARACTERISTICS AND INTERMEDIATE LONG-TERM PROGNOSIS ANALYSIS OF SECONDARY GLAUCOMA IN STURGE-WEBER SYNDROME

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Background
Sturge-Weber syndrome (SWS) is a rare neurocutaneous disorder causing secondary glaucoma and vision loss. This study aimed to describe the characteristics and outcomes of SWS secondary glaucoma in China.

Methods
We retrospectively analyzed 412 patients (445 eyes) with SWS-related secondary glaucoma from 29 provincial areas in China. Demographic and clinical information were collected from clinical records.

Results
The median age at diagnosis was 20.67 months. Up to 73.3% of pediatric patients were found to have early-onset glaucoma. Seizures were present in 24% of patients. Mean intraocular pressure (IOP) and cup-to-disc ratio (CDR) were significantly higher in affected eyes ($p<0.001$). At the first visit, 45.9% of patients had low vision or blindness. Eventually, 85.2% of affected eyes required surgery to control IOP. Incidence of low vision or blindness at the last follow-up was 17.7%. Risk factors for worsening CDR included choroidal thickening, multiple anti-glaucoma operations, initial medical treatment, and undiagnosed SWS at the initial visit. Age at initial diagnosis was significantly associated with advanced glaucoma ($p<0.0001$), with an optimal cutoff of 78 months. Factors associated with low vision or blindness at the last visit were older age, larger CDR, greater corneal diameter differences, and corneal clouding ($p<0.05$), with an area under curve of 0.853.

Conclusions
SWS early-onset glaucoma incidence has been underestimated. Early detection of SWS secondary glaucoma is crucial, as initial signs may be subtle. Prompt diagnosis before age 7 can significantly reduce the risk of advanced glaucoma development, as most pediatric SWS patients require IOP-controlling surgery.

P-0086

PIGMENT DISPERSION SYNDROME IN A LATIN AMERICAN POPULATION AND PROGRESSION TO PIGMENTARY GLAUCOMA: CLINICAL CHARACTERISTICS OVER THE LAST 18 YEARS

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Background

Pigment Dispersion Syndrome (PDS) is an underdiagnosed ocular condition that affects individuals in their twenties to forties. It´s marked by abnormal dispersion of iris pigment, which accumulates in the trabecular meshwork (TM), potentially resulting in ocular hypertension or pigmentary glaucoma (PG). In Latin America, diagnosis of PDS is uncommon. This retrospective, cross-sectional study characterizes patients with PDS, the progression rate to PG, and associated risk factors within a Latin American cohort.

Methods

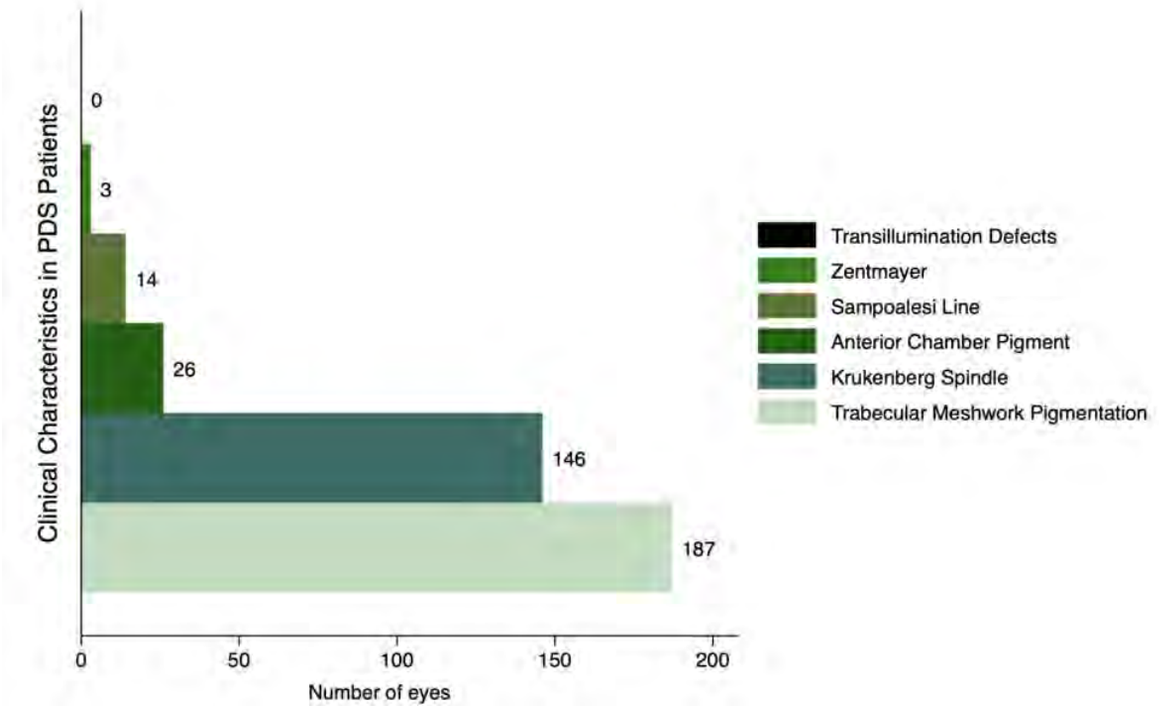
A retrospective analysis was conducted from January 2006 to November 2024 at a glaucoma referral center in Bogotá, Colombia. Patients were included based on a clinical diagnosis of PDS. Those with comorbidities like pseudoexfoliation syndrome, uveitis, or ocular trauma were excluded. PG was diagnosed based on glaucomatous optic nerve damage such as retinal nerve fiber layer thinning, ganglion cell complex loss on Optical Coherence Tomography, and correlation between structural function in the visual field. Multivariate analyses were performed, including Chi-square tests for qualitative variables and analysis of variance for differences in quantitative variables. Ethics committee approval was obtained.

Results

The study included 94 patients (187 eyes) with a mean age of 50.96 years (SD ± 14.21) with a male predominance (59.5%). Among these, 112 (59.89%) did not progress to PG, 37 (19.79%) progressed, and 38 (20.32%) had PG at baseline. The most common clinical finding was TM pigmentation (100%), followed by Krukenberg's spindle (78.07%), anterior capsule pigmentation (13.90%), and Sampaolesi's line (7.49%); no transillumination defects were observed. Zentmayer's ring (1.60%) was exclusively associated with PG at baseline ($p = 0.003$).

Progressors, compared to non-progressors and those with PG at baseline, had a negative mean spherical equivalent (MSE) (-1.25 D vs. -0.25 D and -0.50 D, $p = 0.028$), elevated initial intraocular pressure (IOP) (20 mmHg, IQR: 16–24, $p < 0.001$), and required significantly more glaucoma surgeries and medications ($p< 0.001$). Notably, IOP >21 mmHg was associated with a 3.68 increased odds of PG progression ($p = 0.001$, 95% CI: 1.59–8.49).

Image



Conclusions

In our study PDS was diagnosed at a mean age of 51 years, predominantly in males. The most common clinical finding was TM pigmentation, followed by Krukenberg's spindle, anterior capsule pigmentation, with no transillumination defects observed. In a previous study we found a conversion rate to PG of 37.5% in 4.2 years; in the current study in a 3.2 year follow-up period, the progression rate from PDS to PG was 19.79%, due to shorter and lack of follow-up of patients. More negative MSE were associated with PG progression, while IOP >21 mmHg was identified as a significant risk factor for progression. These findings highlight the need for further research to understand the factors driving PG progression in PDS patients.

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P-0087

CORRELATION OF EYE TRACKER READING PATTERNS BETWEEN FUNCTIONAL AND STRUCTURAL EXAMS AND GLAUCOMA PATIENTS

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Background
Reading is one of the most important complaints of glaucoma patients. The purpose is to correlate reading speed, saccades, fixation of glaucoma patients and functional and structural exams. In addition, to analyse the influence of cognition on reading patterns.

Methods
This is a correlational study including 57 glaucoma patients. Demographic, systemic and ophthalmologic information was obtained. All patients had at least 0.5 logMAR best corrected visual acuity on the left eye. Eye Tracker data were extracted using the ISCAN Software. Participants went through a reading performance test based on 5 MNREAD slides translated and validated in Portuguese. Functional exam was assessed through Humprey 24-2 Standard Automated Perimetry (SAP). Structural exam was assessed through Cirrus Optical Coherence Tomography (OCT). Population was divided into preperimetric and perimetric group. SAP defects were then classified into 4 groups of defects: peripheral superior, peripheral inferior, central superior and central inferior. Mean Ganglion Cell Layer (GCL), Retinal Nerver Fiber Layer (RNFL) and 4 quadrants of the RNFL were classified into within normal limits, borderline and outside normal limits. Cognition was assessed through Montreal Cognitive Assessment (MoCA).

Results
- Even though perimetric patients did not show statistical difference on reading speed ($p>0.05$ in all 5 slides), they showed statistically significant more number of saccades ($p<0.05$ in 3 out of 5 slides) and fixations ($p<0.05$ in 2 out of 5 slides) than the preperimetric group.
- The presence of central superior defect demonstrated slower reading speed ($p<0.005$ in all 5 slides), more number of saccades ($p<0.05$ in 3 out of 5 slides) and fixations($p<0.05$ in 3 out of 5 slides). The central inferior defect had no association with reading speed ($p>0.05$ in all 5 slides) and had a weakear association with saccades and fixations ($p<0.05$ in only one slide each).
- Peripheral defects in SAP did not have any influence on reading speed, number of saccades and fixations ($p>0.05$ in all 5 slides each).
- GCL and RNFL thickness didn't show correlation with reading speed, number of saccades and fixations ($p>0.05$ in all 5 slides each).Thinning of the inferior quadrant of the RNFL was associated with slower reading speed ($p<0.05$ in 2 out of 5 slides).
- Cognition (MoCA) did not have statistical difference ($p=0.570$) between perimetric and preperimetric patients.

Conclusions
Patiens with glaucoma, even without SAP defects, have abnormal reading patterns. Central superior defect in SAP was the most associated with lower reading speed, more saccades and fixations. Peripheral defects have not demonstrated an impact on reading patterns. OCT data had a weaker association regarding reading patterns than SAP.

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P-0088

RISK OF GLAUCOMA ASSOCIATED WITH CALCIUM CHANNEL BLOCKER USE IN PATIENTS WITH CARDIOVASCULAR DISEASE

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Background
Calcium channel blockers (CCBs) are one of the most prescribed agents for cardiovascular disease (CVD) globally and are frequently used as first line agents in treating hypertension. Recent epidemiologic studies have shown an adverse relationship between CCBs use and the incidence of glaucoma, however the studies had significant methodological limitations. This study aims to re-examine the association between CCBs and glaucoma with more robust methodology that may have biased the results of previous studies.

Methods
This was a retrospective cohort study with a case control analysis from 2016-2023 using the IQVIA Ambulatory Database (USA). Three cohorts of new users (CCBs, angiotensin receptor blockers [ARBs] and thiazide diuretics, with the latter two being controls), were created and followed until first diagnosis of glaucoma or end of follow up period (December 2023). Cases included all patients with newly diagnosed open angle glaucoma (OAG) or primary angle closure glaucoma (PACG) as defined by ICD-9/10 codes and had to have no previous glaucoma codes prior to the date of the first antihypertensive prescription. For each case, four controls were matched by age and calendar time. Regular use of a CCB was defined as use of at least one prescription every three months in the year prior to the event date. Descriptive statistics was completed to examine differences in demographics and covariates between the three groups. A conditional logistic regression model was constructed to compute odds ratios (ORs) and account for confounders.

Results
957, 758 patients with CVD were included in the study. 53.1% of the population were women and the mean age 59.4 years old ± SD 15.1. When compared to both thiazide and ARBs users, CCBs users did not have an increased risk for developing OAG (OR = 1.28, 95% confidence interval [CI] 1.06-1.53 and OR = 1.02, 95% CI 0.91-1.15 respectively). CCBs users did have an increased risk for PACG when compared to thiazide users (OR = 1.85, 95% CI 1.14-2.99), but not when compared to the ARBs group (OR = 0.94, 95% CI 0.72-1.24).

Conclusions
Our study found that patients with CVD who used CCBs were at a greater risk for PACG when compared to the thiazide group, but not the ARBs group. Contrary to previously published reports, our study did not find patients on CCBs to be at a higher risk for developing OAG when compared to either thiazides or ARBs, and previous studies that demonstrated a harmful association between CCBs and glaucoma may be attributed to confounding factors such as CVD that was not isolated.

P-0089

CAUSAL RELATIONSHIP BETWEEN GLUTEN-FREE DIET AND RISK OF PRIMARY OPEN-ANGLE GLAUCOMA: A MENDELIAN RANDOMIZATION STUDY

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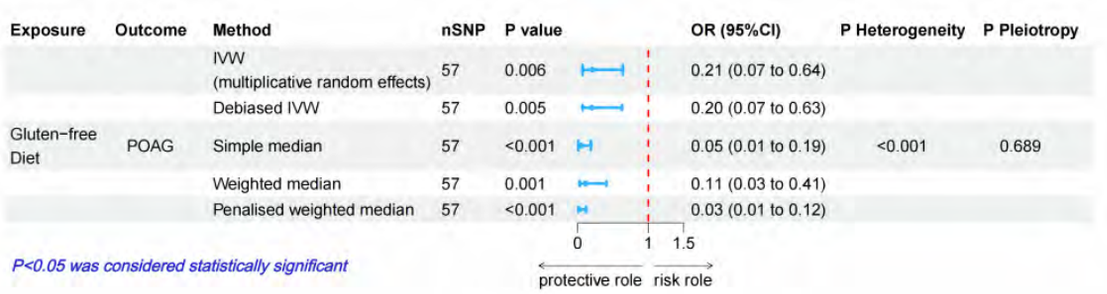
Background
Glaucoma is the leading cause of irreversible blindness, of which primary open-angle glaucoma (POAG) is the most common subtype. In recent years, the role of dietary factors in POAG development has garnered increasing attention. As concerns grow over the potential health risks of gluten proteins in cereal grains, the adoption of a gluten-free diet (GFD) has expanded significantly. GFD is known to lower the risk of autoimmune disorders, as POAG is closely associated with systemic immune-inflammatory responses, suggesting a potential protective role for POAG. However, the precise relationship between GFD and POAG remains underexplored. To address this gap, we conducted a Mendelian randomization (MR) analysis to explore the causal relationship between GFD and the risk of POAG.

Methods
We performed two-sample MR to investigate the causal association between GFD and POAG. We utilized summary-level genome-wide association studies (GWAS) data on GFD (case = 1,376, control = 63,573) from the MRC-IEU, along with GWAS data on POAG from FinnGen R12 (case = 10,832, control = 473,757). The inverse-variance weighted (IVW) method was employed as the primary analytical approach. Heterogeneity was assessed using the Cochran Q statistic under a fixed-effect IVW model, with a significance threshold of $P < 0.05$. In cases of significant heterogeneity, a multiplicative random-effects IVW model was used for adjustment. Sensitivity analyses were conducted using debiased IVW, simple median, weighted median, and penalized weighted median methods. Horizontal pleiotropy was further evaluated using the MR-Egger intercept test.

Results
Genetically predicted adherence to GFD was associated with a reduced risk of POAG (odds ratio [OR], 0.21; 95% confidence interval [CI], 0.07–0.64; P = 0.006) under the multiplicative random-effects IVW method. The findings were corroborated in sensitivity analyses utilizing the debiased IVW (OR, 0.20; 95% CI, 0.07–0.63; P = 0.005), simple median (OR, 0.05; 95% CI, 0.01–0.19; P < 0.001), weighted median (OR, 0.11; 95% CI, 0.03–0.41; P = 0.001), and penalized weighted median (OR, 0.03; 95% CI, 0.01–0.12; P < 0.001) analysis. No horizontal pleiotropy was detected in the MR-Egger intercept test (P = 0.689).

Image



Conclusions

Our study provides evidence supporting a causal association between adherence to a GFD and a reduced risk of POAG. The consideration of a gluten-reduced diet may hold promise as a preventive strategy for POAG in high-risk individuals.

P-0090

INCIDENCE RATE OF SECONDARY GLAUCOMA FOLLOWING CORNEAL TRANSPLANTATION SURGERIES

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Background
Corneal transplantation is a common treatment for corneal diseases. Secondary glaucoma after corneal transplantation is the second leading cause of failure of keratoplasty. The inflammatory cells can be raised and cause trabecular meshwork obstruction. Inflammatory debris can accumulate in the trabecular meshwork area and cause narrowing of the anterior chamber angle. The rise of the intraocular pressure also can be caused by use of long-term steroid drops post keratoplasty. It has been reported that the incidence of secondary glaucoma varies after different types of keratoplasty. This study reviews the incidence of secondary glaucoma in post corneal transplantation surgeries in penetrating keratoplasty (PK), descemets stripping automated endothelial keratoplasty (DSAEK), and deep anterior lamellar keratoplasty (DALK) patients.

Methods
A total of 51 patients were analyzed retrospectively, who were operated for corneal transplant surgeries (PK, DSAEK, DALK) in a primary eye hospital between the time period of January 1st, 2021 and December, 31st 2023 and were followed up till the sixth month. In this study, intra ocular pressure (IOP) was measured by Goldmann applanation tonometry (GAT) wherever possible. For the purpose of this study, we divided the patients into those with normal IOP, transient high IOP, and persistent high IOP. Transient high IOP was defined as patients whose IOP recording was >21 mmHg at any point of time during the study period and anti glaucoma medication (AGM) therapy was prescribed <3 months and there was no associated optic disc damage or visual field abnormality. Persistent high IOP was defined as raised IOP at any point of time during the study period requiring AGM until the follow-up period of 6 months or when glaucoma surgery was needed or patients with glaucomatous damage on fundus evaluation with or without significant cupping. Normal IOP was defined as IOP persistently <21 mmHg and no requirement for AGM.

Results
Out of 51 eyes, secondary glaucoma or persistent high IOP developed in 14 cases (27%). Incidence of secondary glaucoma in post PK 10 cases (19%), in post DSAEK 3 cases (6%), and in post DALK 1 cases (2%). Incidence of post PK glaucoma was found in pseudophakic bullous keratopathy 50%, in corneal opacities including adherent leukoma 30%, and in graft failure 10%. Incidence of post DSAEK glaucoma was found in pseudophakic bullous keratopathy 67%, and in aphakic bullous keratopathy 33%. Incidence of post Dalk glaucoma was found in corneal dystrophy.

Conclusions
The most higher incidence in secondary glaucoma in our study was in post PK cases, followed by DSAEK and DALK. The most common indication of corneal transplant in this study was pseudophakic bullous keratopathy, folllowed by corneal opacities and corneal ulcer including perforated corneal ulcer. Repeat PK done for graft failure also increases the risk of secondary glaucoma because repeat PK increases the risk of PAS formation, and angle closure.

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P-0091

ASSOCIATIONS BETWEEN THYROID EYE DISEASE AND GLAUCOMA AMONG PATIENTS AT A SINGLE TERTIARY-CARE ACADEMIC MEDICAL CENTER

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Background

Thyroid Eye Disease (TED) is an autoimmune condition of the thyroid characterized by shared autoantigens in the orbit. It is most associated with the hyperthyroidism of Graves' disease, but can occur with hypothyroid and euthyroid states. Glaucoma is a condition characterized by cupping and injury of the optic nerve with associated visual field defects. It has been postulated that TED may increase the risk for glaucoma secondary to increased pressure on the globe, altered aqueous outflow through elevated episcleral venous pressure, and steroid induced intraocular pressure (IOP) elevation among other mechanisms. Despite these hypotheses, clinical evidence linking TED to glaucoma remains limited and published work over the last 2 decades yields conflicting incidence rates. Better knowledge of the relationship between TED and glaucoma can further inform practice guidelines in patients with TED.

Methods

Patients aged 18 and over evaluated at a single tertiary care academic medical center from September 2012 through September 2024 were extracted using DataDirect, a proprietary tool that aggregates deidentified clinical data from all patient for analysis. Those with the diagnosis of TED were identified and compared to a randomized matched non-TED control group in a 1:4 ratio, and patients carrying a diagnosis of glaucoma or glaucoma suspect were noted. Bivariate logistic regression was employed to evaluate demographics and glaucoma status across the two groups.

Results

A total of 753 cases of TED were identified, with 3012 non-TED controls. The average age of the TED cohort was 63.9 years (SD 15.4 years), and 77.8% were female. Age, biological sex, diabetes, and hypertension rates did not vary by TED status. Glaucoma was diagnosed in 73 TED cases (9.4%) compared to 17 non-TED controls (0.6%), reflecting a markedly higher prevalence in the TED group. On statistical analysis, those diagnosed with TED were significantly more likely to be diagnosed with glaucoma compared to controls (OR 18.91; 95% CI 11.08-32.27; $p<0.0001$). Glaucoma diagnosis occurred after TED diagnosis in 75% of patients.

Conclusions

When assessing comprehensive data from a single academic medical center, individuals with TED were significantly more likely to be diagnosed with glaucoma or glaucoma suspect. Of note, the recently published database study had a 6.0% incidence of glaucoma in non-TED controls, while the current work had an incidence of 0.6%. This highlights the importance of database enrollment bias in queries assessing the relationship between TED and glaucoma. Moreover, in the current work, glaucoma diagnoses occurred after TED diagnosis in 75% of patients, supporting the theory that inflammatory orbitopathy impacts intraocular pressure and calling attention to the importance of heightened glaucoma screening practices in TED patients. Further analysis and longitudinal studies are warranted to elucidate causal relationships and inform clinical guidelines for TED and appropriate glaucoma screening.

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P-0092

DISPARITIES IN HEALTHCARE ACCESS AND THEIR IMPACT ON AHMED GLAUCOMA VALVE FAILURE IN A SOCIALLY MARGINALIZED MEXICAN POPULATION

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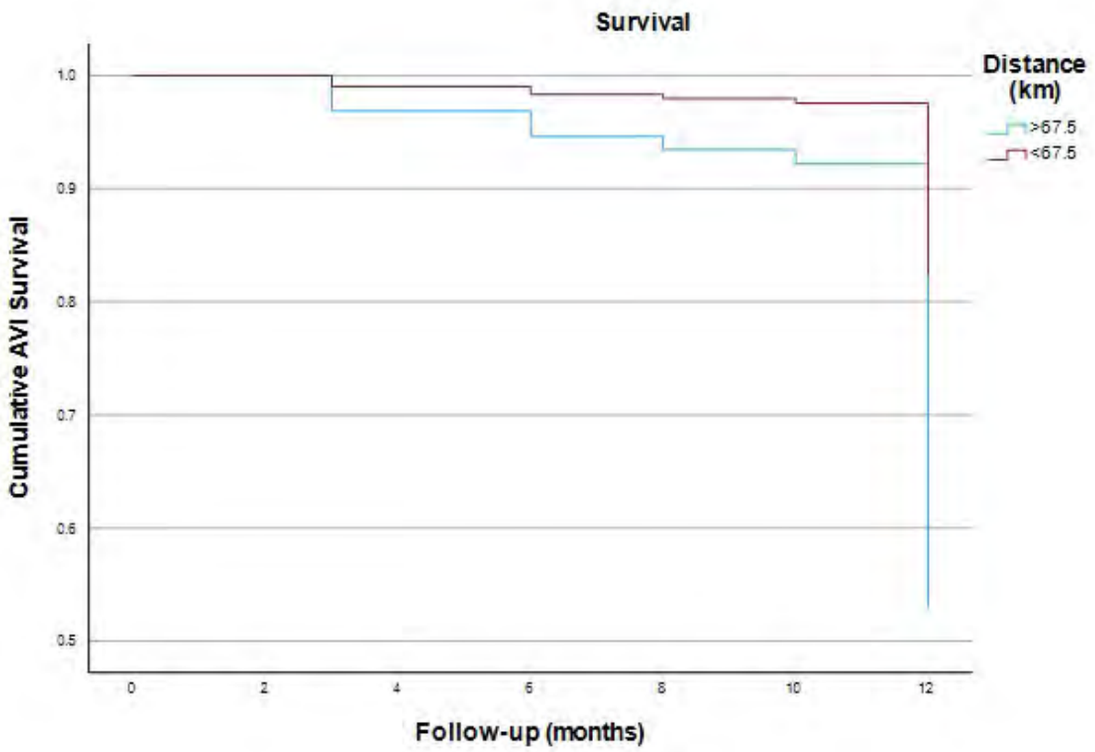
Background
Advanced glaucoma patients face a great challenge in accessing specialized healthcare, this is particularly true in countries with great socioeconomic disparity and a vast territory, such as Mexico. Ahmed Valve Implant (AVI) is the most common glaucoma surgery in uncontrolled Diabetic Neovascular Glaucoma (DNVG). Much has been reported on the ocular risk factors for AVI failure, but the same cannot be said for the predisposing sociodemographic determinants. This study had the goal of determining whether the distance to an ophthalmologic clinic is a risk factor for AVI failure.

Methods
Retrospective cohort of patients with primary AVI surgery over a period of 12 months. The main outcome was AVI failure, defined as Intraocular Pressure (IOP) >21 mmHg with maximal topical therapy or reintervention. Distance to the clinic was converted into a binary variable based on the Interquartile Range (IQR) and the Distance Decay Effect (48.2-96.5 km) reported in previous studies. Cox Regression was used to determine the hazard ratio (HR) for AVI failure of two independent variables, the distance to our clinic and the number of follow-up visits.

Results
116 eyes from 107 patients were recruited. DNVG was the main indication for AVI in 70 (60.34%) eyes. AVI failure was present in 32 (27.35%) eyes The shortest distance to the clinic was 1 km, while the longest was 1501 km. The calculated threshold for short or long distance to the clinic was 67.5 km. Cox Regression yielded the long distance (>67.5 km) to the clinic as an important factor for AVI failure (HR 4.36 [95% CI 1.85-10.27], p<0.001). On the other hand, an increased number of follow-up visits was a protective factor against AVI failure (HR 0.69 [95% CI 0.52-0.90], p=0.05).

Image



Conclusions

There is a great disparity in AVI failure rates based on the distance to an ophthalmology clinic. In Mexico, most AVIs are indicated in DNVG and a great risk of failure is implied in this situation. This should be taken into account in addition to the ocular factors that contribute to AVI failure to improve patient outcomes. The socio-demographic context of patients is of paramount importance when assessing the risk of failure of glaucoma surgery, especially when follow-up is a concern. This study adds to the increasing body of evidence on social determinants of healthcare in surgical glaucoma.

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P-0093

SOCIAL VULNERABILITY AND GLAUCOMA SEVERITY AT DIAGNOSIS: BRIDGING HEALTH EQUITY GAPS

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Background

To determine if a correlation exists between the Social Gap Index (SGI) and the severity of Primary Open Angle Glaucoma (POAG) or Primary Angle Closure Glaucoma (PACG) at the time of diagnosis.. The SGI is a metric developed by the CONEVAL (an independent mexican agency), it measures the risk of poverty of a locality on a comprehensive scale which includes: education level, healthcare access, household basic services, construction quality, and income. The SGI risk group classification can be consulted in Table 1.

Methods

Cross-sectional study. POAG/PACG severity was assessed via the Hodapp-Anderson-Parrish visual field (VF) criteria and patients required to have at least 2 congruent VFs, best-corrected distance visual acuity (BCDVA) was recorded in logMar, and phakic status was also recorded. The SGI was determined by determining the patients' locality and cross-referencing with the CONEVAL's SGI database. An ordinal logistic regression model was utilized to gauge the relationship between glaucoma severity and 3 independent variables: age, sex, and SGI.

Results

300 patients (592 eyes) were recruited, mean age was 70.68, 249 eyes (42.1%) had mild glaucoma, 180 (30.5%) had moderate glaucoma, and 162 (27.4%) had severe glaucoma. 105 patients (35%) belonged to the Very Low risk group, 67 (22.3%) were in the Low risk group, 57 (19%) were in the Medium risk group, 67 (22.3%) were in the high risk group, and only 4 (1.4%) were in the Very High group.

There was a strong positive correlation between the SGI and the severity of glaucoma at the time of presentation (OR 2.86, [95% CI 2.32-3.53], p<0.001) and a weak positive correlation with age (OR 1.086, [95% CI 1.06-1.11], p<0.001). No gender differences were found. When converting the OR into probability, patients with a higher SGI had a 74.1% chance of presenting with a severe glaucoma diagnosis.

Image

SGI Risk Classification	Interval
Very Low	-1.550, -0.850
Low	-0.849, -0.454
Medium	-0.453, 0.032
High	0.033, 0.726
Very High	0.727, 6.827

Table 1. SGI risk. A higher number entails greater socio-economic distress.

Conclusions

Even though Mexico is the 12th biggest economy in the world, an alarming disparity in healthcare access is observed. Patients in a higher SGI are overwhelmingly vulnerable to a delayed glaucoma diagnosis, this should prompt Health Systems to take active part in bridging the gap between patients and healthcare personnel to achieve adequate care.

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P-0094

AGE-RELATED CHANGE OF ANTERIOR CHAMBER ANGLE AT EACH QUADRANT OVER A 10-YEAR PERIOD

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Background

In 2005, we initiated the Kyoto Glaucoma Cohort, a glaucoma-screening program that involves Japanese glaucoma patients and normal healthy volunteer subjects, for our Glaucoma Genome Project. In 2015, those volunteer subjects were asked to undergo a follow-up clinical screening. The purpose of this present study was to investigate age-related changes of the anterior chamber angle (ACA) at each quadrant in those subjects over that 10-year period, as to the best of our knowledge, there are no published longitudinal reports on angle change in non-glaucomatous subjects and it is important to elucidate the natural time course of ACA change to better understand the pathophysiology of primary angle closure diseases.

Methods

In this study, volunteer subjects in the Kyoto Glaucoma Cohort who met the following criteria were selected: 1) over 40 years old at first screening (S1), 2) diagnosed as non-glaucomatous at S1 and S2 (second screening, 10-years later), 3) a refraction error at S1 of between -6 and 6 diopters, 4) both eyes phakic at S2, 5) a good Q score at S1 and S2, as measured using a 3D Rotating Scheimpflug Camera (Pentacam®; OCULUS® Optikgeräte GmbH). The rate of angle narrowing at each quadrant (*i.e.*, superior, inferior, nasal, and temporal) was then calculated using the following formula: ([angle at S1-angle at S2]/angle at S1*100%). Left-eye data was used, and the Tukey-Kramer test was used for multiple comparisons.

Results

A total of 320 volunteers (92 males and 228 females) were included in this study. The mean patient age at S1 was 58.4±8.5 years. At S1 and S2, the ACA degree in each quadrant (superior, inferior, nasal, and temporal) was 29.9, 31.6, 33.7, and 34.7 degrees and 28.0, 30.6, 32.2, and 33.9 degrees, respectively, thus illustrating a significant decrease from S1 to S2. The mean rate of ACA narrowing in the superior, inferior, nasal, and temporal quadrants, respectively, was 7.1%, 2.7%, 4.4%, and 2.7%, thus illustrating the highest rate of ACA narrowing in the superior quadrant, a rate significantly larger than that in the inferior and temporal quadrants.

Conclusions

Our findings revealed that over the 10-year study period, the ACA in all 4 quadrants in the non-glaucomatous volunteer subjects was significantly narrower at S2 than at S1 and that the largest rate of angle narrowing was in the superior quadrant, however, no uniform decrease in the angle narrowing rate was observed.

P-0096

THE IMPACT OF AMBIENT AIR POLLUTION ON GLAUCOMA: A SYSTEMATIC REVIEW OF OBSERVATIONAL STUDIES

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Background
Glaucoma is a leading cause of irreversible blindness worldwide. Emerging evidence suggests that exposure to ambient air pollutants such as particulate matter (PM2.5, PM10), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and carbon monoxide (CO) may contribute to glaucoma incidence, progression, and intraocular pressure (IOP) changes. This systematic review aims to synthesize available evidence on the association between air pollution exposure and glaucoma outcomes.

Methods
This systematic review adhered to the PRISMA guidelines. A comprehensive search of two major databases—PubMed and Embase—was conducted using predefined keywords. The eligibility criteria included observational studies (cohort, case-control, and cross-sectional) assessing the association between air pollution and glaucoma outcomes. Duplicates were removed, titles and abstracts screened, and full-text reviews were performed using the Rayyan platform. The quality of the included studies was assessed using the Newcastle-Ottawa Scale.

Results
The initial database search identified 183 studies. After removing 21 duplicates, a total of 162 studies were screened. Following title and abstract screening, 19 articles were selected for full-text review. Finally, 16 studies met the inclusion criteria and were analyzed.

Exposure: PM2.5 was the most commonly studied pollutant (13 studies), followed by PM10 (4 studies) and gaseous pollutants (NO_2, SO_2, and CO, 8 studies). Exposure assessment methods included air quality monitoring stations, satellite-based models, and land-use regression approaches.

Outcomes: The included studies reported associations with primary open-angle glaucoma (POAG) (8 studies), normal-tension glaucoma (NTG) (4 studies), acute angle-closure glaucoma (AACG) (3 studies), and childhood glaucoma (1 study). Structural progression (*e.g.*, GCIPL thinning), glaucoma incidence, and IOP changes were also assessed.

Results
Long-term exposure to PM2.5 was significantly associated with an increased risk of POAG and PACG, with hazard ratios (HR) ranging from 1.14 to 1.66 per 10 $\mu g/m^3$ increase.

Short-term exposure to NO_2 and CO was linked to AACG, with relative risks (RR) of 1.12 (95% CI: 1.08–1.17) for NO_2 and 1.10 (95% CI: 1.01–1.15) for CO.

PM10 exposure was strongly associated with childhood glaucoma (HR = 6.61, 95% CI: 2.96–14.75).

Consistent dose-response relationships were observed between air pollutant levels and glaucoma risk across studies.

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Conclusions

This systematic review highlights a significant association between air pollution, particularly PM2.5 and NO_2, and glaucoma risk, incidence, and progression. Long-term exposure to particulate matter increases the risk of POAG and PACG, while short-term exposure to gaseous pollutants contributes to AACG. Targeted interventions to reduce air pollution could mitigate glaucoma risk, especially in vulnerable populations.

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P-0097

HYPERTENSIVE ANTERIOR UVEITIS VIRAL PROFILE: CLINICAL AND EPIDEMIOLOGICAL DATA FROM MEXICO

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Background

Herpesviruses are the primary infectious agents linked to IOHS, presenting as anterior uveitis characterized by elevated intraocular pressure, distinctly keratic precipitates, and iris atrophy; often leading to complications such as glaucoma. Diagnosis is challenging due to overlapping clinical manifestations, which frequently hinder etiological identification [1]. This is an essential step for the selection of targeted antiviral therapy for the prevention of complications, including glaucoma and uveitis recurrences [2]. Unfortunately, there is a lack of epidemiological and etiological data on viral hypertensive uveitis (HU) in Mexico. In 2017, only one abstract examined the incidence of herpetic uveitis and reported that 14% of patients had secondary glaucoma and 18% ocular hypertension [3]. The purpose of this analysis is to determine the viral etiology, clinical features, and outcomes of Inflammatory Ocular Hypertension Syndrome (IOHS) in Mexican patients undergoing Aqueous Humour PCR analysis (AHPCR).

Methods

A retrospective analysis of IOHS eyes that underwent AHPCR, with clinical characteristics and outcomes obtained from patient clinical records.

Results

A total of 16 patients with IOHS were included, with a median age of 61 years (range: 32-78) and follow-up of 8 months (range 1-35). Most patients were males (56.25%). The median intraocular pressure at the first visit was 33 mmHg (range: 22-46), and the most common clinical finding were the presence of keratic precipitates (87.5%). Other features included iris atrophy (12.5%), synechiae (12.5%), iris nodules (12.5%) and endothelitis (6.25%). Herpesvirus DNA was detected in 8 patients (50%): EBV (25%), CMV (25%), HSV-1 (12.5%), HSV-2 (12.5%), VZV (12.5%) and one case with EBV and HSV-2 co-infection (12.5%). At the final visit, 3 patients (18.75%) developed glaucoma, all requiring SLT or surgical intervention for intraocular pressure control within a median period of 4 months (range: 3-25). Additionally, 2 patients (12.5%) required topical hypotensive therapy due to elevated IOP.

Conclusions

Targeted antiviral therapy is essential to prevent ocular complications such as glaucoma. However, overlapping clinical features among herpesvirus subtypes can lead to diagnostic challenges. In recurrent cases with complications like synechiae or glaucoma, PCR testing is of ultimate importance. The limited epidemiological and etiological data on viral hypertensive uveitis in Mexico highlights the need for more research to improve patient care strategies through tailored therapy and prevent irreversible vision-threatening outcomes.

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P-0098

KNOWLEDGE AND PERCEPTION OF GLAUCOMA AMONG PATIENTS IN THE TAMALE TEACHING HOSPITAL

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Background
Glaucoma is a term for a heterogeneous group of disorders characterized by a progressive optic neuropathy that results in distinctive structural damage to the optic disc, optic nerve head (ONH), retinal nerve fibre layer (RNFL) and a unique pattern of permanent visual field defects that are common but not always accompanied with increased intraocular pressure (IOP) (Khurana and Khurana, 2014, De-Gaulle and Dako-Gyeke, 2016, Song and Caprioli, 2014, Ocansey et al., 2021a). Glaucoma is the major cause of irreversible blindness and the second leading cause of blindness in the world, following cataracts (Nkum et al., 2015, Boadi-Kusi et al., 2015, Mansouri et al., 2011).

Methods
This study was a hospital-based, descriptive cross-sectional conducted among glaucoma patients at the Tamale Teaching Hospital (TTH) in the Northern Region of Ghana. A purposive non-probability sampling technique was employed to recruit all known glaucoma patients aged 15 years or older into the study. They were recruited after informed consent was given. The study employed quantitative data collection methods and a structured standardized questionnaire was adapted from similar past studies, modified, and used to obtain data and information about glaucoma from respondents attending the eye clinic of the TTH. Data obtained were processed in Microsoft Excel version 2019 and subsequently exported into Statistical Product and Service Solutions (SPSS) Version 25.0 compatible with Windows (SPSS Inc., Chicago, IL, USA).

Results
There were a total of 151 participants, 86 males and 65 females. The age of the respondents ranged from 15 to 83 years and the mean age was 41.9±20.3. Among the participants, 77.5% were aware of glaucoma. The most reported source of information about glaucoma was from the eyecare practitioner (42.4%) followed by the media, the internet, and friends with family members the least reported source. There was no statically significant relationship between occupation and awareness (p=0.79). There were statistically significant association between age, gender, those who had higher formal education and awareness of glaucoma (P=0.000). Yet only 11.9% of these had accurate, in-depth levels of glaucoma knowledge. Approximately 10.7% of the respondents perceived glaucoma to have a spiritual cause, 34.7% of the respondents perceived glaucoma to be a disease of old people, but an encouraging 80% of them acknowledged the disease affects children as well.

Conclusions
The results of this study showed that although glaucoma patients at TTH demonstrated a high level of awareness, they have low levels of glaucoma knowledge as indicated by a mean knowledge score of 9.95 with an overall rate of only 11.9% of them having in-depth knowledge about glaucoma and that patients at the Tamale Teaching Hospital generally hold a relatively negative perception about the disease.

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P-0099

SEVERITY OF GLAUCOMA AND FACTORS AFFECTING IT AT FIRST PRESENTATION IN A TERTIARY EYE HOSPITAL IN NEPAL

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Background

Glaucoma is one of the leading causes of irreversible blindness worldwide. Majority of the glaucoma cases in developing countries remain undiagnosed, and when they are diagnosed, they usually have moderate to severe disease.The major concern regarding late presentation in glaucoma is that the economic burden imposed increases as the disease worsens, and there is a significant risk of subsequent blindness and impaired quality of life. In this study, we aim to determine the severity of glaucoma at diagnosis and identify the factors associated with severe disease at presentation at a tertiary eye hospital in Nepal.

Methods

A hospital-based, prospective, analytical study was performed among 173 newly diagnosed cases of primary open angle glaucoma. The severity of glaucoma was assessed in terms of visual field (VF) loss using mean deviation (MD) and the Hoddap-Parrish-Anderson criteria. Patients were categorized into two groups based on severity: Group I (mild to moderate) and Group II (severe). A multivariate-model-adjusted binary logistic regression analysis was performed to identify the factors associated with severe glaucoma.

Results

More than half (50.28%) of the patients had severe glaucoma. Majority of the patients (n=100, 57.80%), including 60 (68.96%) of the late presenters were≥ 60 years old. Multivariate-model-adjusted binary logistic regression analysis revealed that increased age { adjusted odds ratio (AOR) 1.046, p= 0.002, confidence interval (CI): 1.017-1.076}, higher baseline intraocular pressure (IOP) (AOR 1.183, p <0.001, CI: 1.086-1.289), and thinner central corneal thickness (CCT) (AOR 0.983, p=0.005, CI: 0.971-0.995) increased the odds of late presentation, while a personal history of hypertension (AOR 0.409, p=0.037, CI: 0.177-0.947) decreased the odds of late presentation. Gender, travel time to the closest eye care center, awareness about glaucoma, family history of glaucoma, and personal history of diabetes mellitus did not have significant influence on the severity of glaucoma at presentation.

Conclusions

Majority of our patients were diagnosed with severe glaucoma. Late presentation was significantly associated with older age, elevated IOP, and thinner CCT, while patients with a history of systemic hypertension tended to present earlier.

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P-0100

COMPARING THE RATES OF RETINAL NERVE FIBER LAYER AND GANGLION CELL COMPLEX THINNING IN HEALTHY EYES

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Background
Glaucoma is a neuropathy characterized by progressive degeneration of the optic nerve, featuring the death of retinal ganglion cells (RGCs) and their axons, resulting in characteristic structural changes in the optic disc and retinal nerve fiber layer (RNFL), as well as associated vision loss. Existing studies have demonstrated the importance of RNFL and ganglion cell complex (GCC) parameters measured by OCT in the early screening of glaucoma, as they can detect structural changes associated with glaucoma earlier than visual field tests. Although GCC and RNFL have been gradually applied in the early diagnosis and screening of glaucoma, there is ongoing debate about which is superior. With increasing age, physiological changes may occur in the optic disc structure of healthy eyes (such as changes in area size, vessel diameter, tilt, torsion, area of the peripapillary atrophy, etc.), which may affect the central point anchored by OCT measurements of RNFL, thereby confounding whether changes in OCT measurement parameters during follow-up are physiological or pathological. In response to the current situation of eye health and population aging, we conducted this study specifically to investigate whether OCT parameters in healthy eyes change over a 5-year follow-up period and whether these changes are meaningful, thus addressing the shortcomings of previous studies.

Methods
This longitudinal observational study recruited participants aged ≥50 years. Participants underwent optical coherence tomography-assisted measurements of the peripapillary RNFL and macular GCC and were divided into ONH/PPA changed and ONH/PPA unchanged group according to the disc shape and location of the disc margin relative to the adjacent retinal vessels. The rates of change of RNFL and GCC were compared for each subgroup. Linear regression models were used to evaluate the correlation of the change of inferior RNFL and the change of inferior GCC with ocular and systemic factors.

Results
A total of 149 healthy eyes of 149 participants. The rate of thinning was -0.318±0.79, -0.407±0.83, and -0.235±0.73 µm /y for average RNFL, and -0.132±1.06, -0.064±1.47, and -0.195±0.40 µm /y for GCC, for all participants, ONH/PPA changed group, and ONH/PPA unchanged group, respectively. In the two subgroups, significant differences were observed about the rate of change in the I-hemi and inferior RNFL, while the difference was not statistically significant when compared with other parameters. The change of inferior RNFL was independently associated with baseline AL, the change of AL, the change of disc area and the change of ONH/PPA; the change of average GCC was found to be no significantly associated with all the parameters.

Conclusions
A marked longitudinal changes of RNFL and GCC could be observed in healthy eyes. GCC parameters appears to be a reliable marker reflecting the progression of glaucoma for healthy eyes in the presence of changes in the AL and optic disc structure during follow-up compared to RNFL parameters.

P-0101

OPTIC DISC MEASURES AND INTRAOCULAR PRESSURE AFTER LONG-TERM CONTINUOUS POSITIVE AIRWAY PRESSURE TREATMENT FOR SLEEP APNOEA

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Background
An increased risk of primary open-angle glaucoma has been reported in individuals with obstructive sleep apnoea (OSA). Continuous positive airway pressure (CPAP) therapy – the mainstay OSA treatment – increases nocturnal intraocular pressure (IOP). This study investigates associations of long-term CPAP treatment for OSA with glaucoma endophenotypes.

Methods
Sleep clinic patients with moderate/severe OSA (n=241; 35.7% males; 47.8±10.4 years at baseline) were followed up for a median of 13 years. OSA was diagnosed with laboratory overnight polysomnography. Two groups were recruited for follow-up assessments, including one eye exam at the follow-up; one with long-term regular CPAP treatment (n=122) and another with poor or no CPAP use (n=119). PSG measures of OSA severity include apnoea-hypopnoea index (AHI; events/hour), percentage of sleep time with oxygen saturation <90% (T90), and oxygen desaturation index (ODI; events/hour). The eye examination included rebound tonometry, and disc-centred optical coherence tomography (OCT) and OCT-angiography imaging. OCT and OCT-A measures included peripapillary retinal nerve fibre layer thickness, Bruch's membrane opening minimum rim width, and peripapillary vessel density (VD). The effects of CPAP use were explored using multivariable linear mixed-effect model, with adjustments for age, sex, body-mass index, and systemic blood pressure, and where appropriate, baseline OSA severity, axial length, disc size, and corneal thickness. Given the multiple testing, statistical significance was set at $p<0.0125$ with a Bonferroni correction.

Results
Participants who had regular CPAP therapy tend to have more severe OSA at baseline than those with no/poor CPAP usage ($p<0.001$), higher BMI ($p<0.001$), and higher systemic blood pressure ($p= 0.04$). There was a positive association between T90 at baseline and IOP (estimate=4.6, 95%CI= 1.0 to 8.1; $p=0.012$). There was also trend of an inverse association between ODI and VD (estimate=-0.02, 95%CI=-0.04 to -0.00) but this did not reach statistical significance ($p=0.016$). Despite OSA being virtually abolished during CPAP use (from a baseline AHI median of 50.6 to 1.5 events/hour during CPAP use), there was no difference in IOP, OCT, or OCT-A measures ($p\geq0.27$) between CPAP users and non-users.

Conclusions
OSA-related hypoxia could compromise optic nerve perfusion and raise IOP. The study did not find any evidence that CPAP use could improve or worsen these adverse effects of OSA.

P-0103

KNOWLEDGE, WILLINGNESS, PREFERENCES OF GLAUCOMA PATIENTS TOWARDS TELEMEDICINE AND VISION CENTRES

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Background

Glaucoma is the leading cause of irreversible blindness, accounting for almost 8% of global blindness[1]. In India, around 12 million people suffer from glaucoma; 1.5 million are blind due to glaucoma[2]. In 2020, only 25,000 ophthalmologists were available in the Indian health sector catering to a population of 1.3 billion.

Aravind Eye Care System has multiple permanent set ups known as vision centres (VCs), which provide primary eye care to semi-rural and rural population[3]. Examination is done by an ophthalmic assistant. Real-time teleconsultation is done with an ophthalmologist at the base hospital and the appropriate advice is given. Telemedicine enabled VCs are beneficial for both health-care providers and patients.

Telemedicine is presently employed in specific areas of ophthalmology, particularly for diabetic retinopathy[4] and retinopathy of prematurity (ROP)[5] screening. Its utilization in screening and follow-up of glaucoma patients is still evolving.

This cross sectional study aims to assess glaucoma patients' knowledge, perceptions, preferences and predispositions for telemedicine use as such and additionally the patients' preferences and perceptions regarding the telemedicine enabled through our vision centres. This information will guide us to understand the patients' preferences and will help us in designing successful glaucoma telemedicine programs in future.

Methods

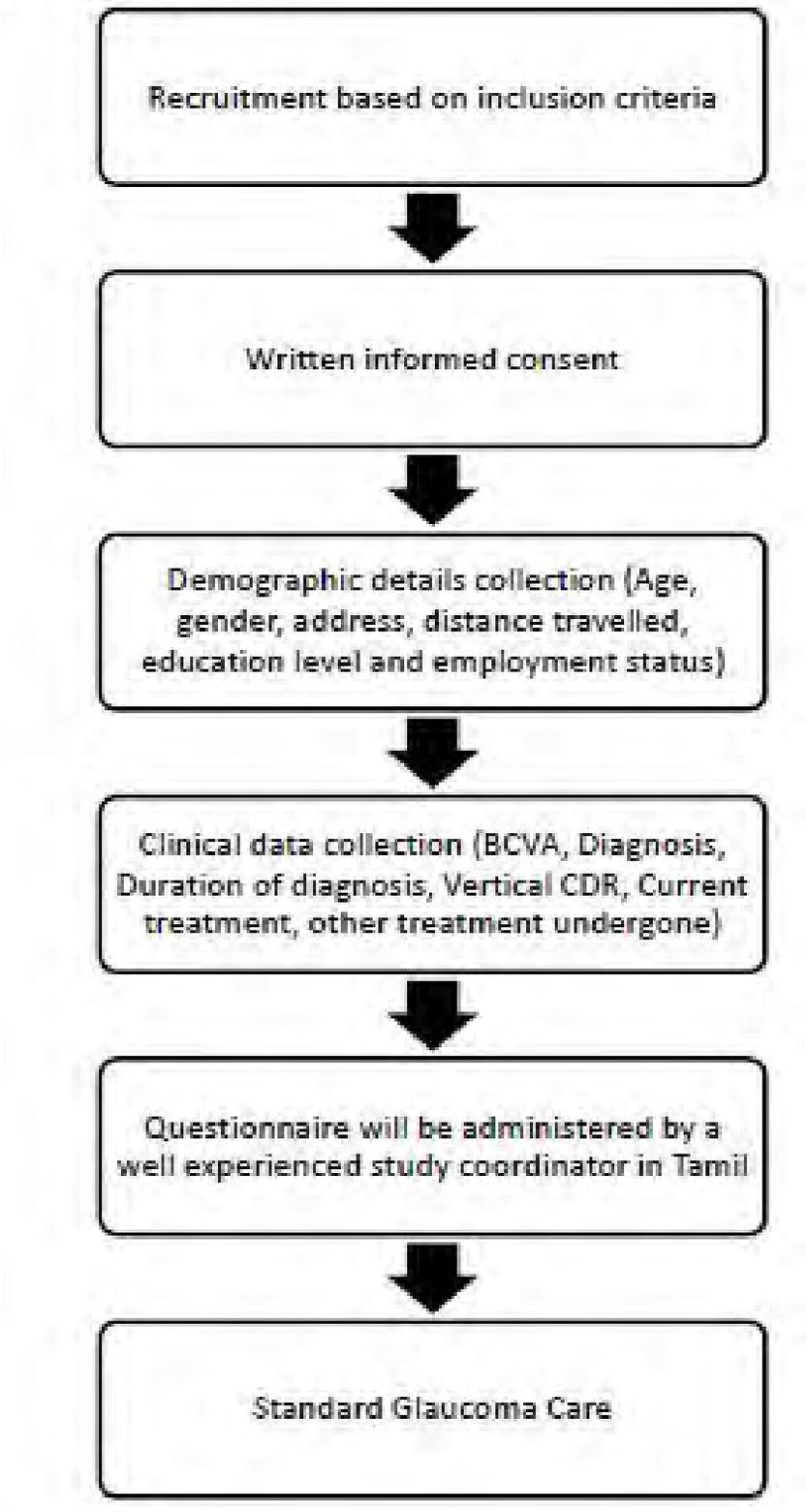
Patients ≥18 years of age with stable glaucoma (well controlled intraocular pressure, no change in medications in past 1 year) who had attended 3 or more visits in the glaucoma clinic were recruited. After obtaining the demographic and clinical details, a validated questionnaire was administered in the local language and the collected data was analysed.

Results

Out of 246 participants 33.33% were aware of telemedicine. 82.52% were willing to follow up via telemedicine. 66.67% preferred video calls for virtual appointments. Vision centre model was the most preferred mode of telemedicine (77.24%). 18.70% preferred the virtual clinic model where an ophthalmic technician conducts the examination and sends data to a specialist and only 3.66% favoured a self-test at home using appropriate devices with data sent to a specialist.

Image

Flowchart of protocol



Conclusions

The study reveals a noteworthy level of awareness and favourable attitudes towards telemedicine among glaucoma patients, with over one-third acknowledging its existence. An overwhelming majority expressed readiness to embrace telemedicine for diagnosis, intervention, and follow-up care, indicating its potential to transform healthcare delivery

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P-0104

THE EVALUATION OF THE QUALITY OF LIFE IN GLAUCOMA PATIENTS USING THE IND VFQ33 QUESTIONNAIRE

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Background

Glaucoma is the second leading cause of irreversible blindness worldwide[1]. The diagnosis of an irreversibly blinding disorder will induce much anxiety among the patients. In addition, activity limitation, mobility limitation, psychosocial impact, and visual symptoms related to glaucoma can compromise their quality of life. The main aim of managing glaucoma is improving their quality of life[2]. IND VFQ 33 questionnaire is a validated method to assess quality of life in ocular diseases[3].

Methods

This prospective cross-sectional study was conducted in a tertiary eye care center in India over 6 months. All subjects were glaucoma patients with characteristic optic disc and visual field changes. A trained field investigator collected the IND VFQ 33 questionnaire. All patients underwent complete ophthalmologic evaluation. Other ocular diseases affecting quality of life were excluded from the study. The components of quality of life as measured by the IND VFQ 33 questionnaire were compared with the mean deviation of visual fields as recorded using a Humphrey visual field analyzer. The glaucoma patients were divided into mild (<6 db), moderate (6-12db), advanced (12-20db), and severe(>20db) glaucomas[4]. Data analysis was conducted utilizing Co Guide REAP software version 2.0[5].

Results

The study included 140 glaucoma patients. The median age of the study population was 63.5 (55,70.5) years, including 69 (49.3%) male and 71(50.7%) female patients. The glaucoma patients were classified based on their visual field mean deviation as mild glaucoma in 41 (29.3%) patients, moderate glaucoma in 25 (17.9%) patients, advanced glaucoma in 45 (32.1%) patients, and severe glaucoma in 29 (20.7%) patients. IND VFQ 33 questionnaire reveals a median general functioning scale of 3.6 (1.2,7.1), psychosocial impact scale of 6.7 (0.0,6.7), and visual impact scale of 14.3 (4.8,23.8). The median general functioning scale score was 2.4 (1.2,4.8) for patients with mild glaucoma, 3.6(1.2,6.0) for moderate glaucoma, 6.0 (2.4,9.5) for advanced glaucoma, and 6.0 (2.4,8.3) for severe glaucoma, which was statistically significantly ($p<0.05$) different. Within the general functioning scale, mobility scale ($p<0.05$) and activity limitation scale ($p<0.05$) scores were statistically significantly different among mild, moderate, advanced, and severe glaucomas.

Conclusions

In glaucoma patients, visual symptoms were more prominent, followed by psychosocial impact, followed by general functioning. General functioning, which includes activity limitation and mobility limitation, increases with the severity of glaucomatous visual field defect.

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P-0106

CLINICAL PROFILE AND OUTCOMES OF PRIMARY ANGLE CLOSURE DISEASE PATIENTS IN A TERTIARY PHILIPPINE HOSPITAL: A RETROSPECTIVE COHORT STUDY

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Background
Primary angle closure glaucoma (PACG) disproportionately affects patients in Asia, with East Asia having the highest prevalence. In the Philippines, it is the most reported glaucoma sub-type in 3 institutions studied. Primary angle closure disease (PACD) encompasses 3 stages, with the defining feature of gonioscopic angle closure. The primary objective of this study is to determine the demographic and clinical profile of PACD patients in a single institution. The secondary objective is to determine the post-treatment outcomes in terms of visual acuity (VA), intraocular pressure (IOP), and mean deviation (MD) in Humphrey automated perimetry in patients managed with PACD.

Methods
This is a single-center, retrospective study. Medical records of patients diagnosed with PACD seen at the Glaucoma clinic of the University of the Philippines – Philippine General Hospital Department of Ophthalmology and Visual Sciences from June 2020 to December 2023 were reviewed. Clinical profile, diagnosis, management, visual outcomes, and IOP trends were summarized by descriptive statistics; exploratory and post hoc analyses were performed to show significant differences between groups.

Results
Two-hundred fourteen patient records (*i.e.* 428 eyes) were included in the study. More than half of the eyes were diagnosed with PACG. VA ranged from 20/20 to no light perception. IOP ranged from 6 to 70 millimeter mercury. Most common initial treatments were laser peripheral iridotomy, trabeculectomy, medical therapy, and phacoemulsification. Improved VA and decreased IOP trends were observed on succeeding follow-ups. Initial and final MD in perimetry tests were stable. Appositional and synechial closure percentages were significantly decreased post-intervention.

Conclusions
The present study established the different stages, severity, and treatment of PACD, and the practice patterns observed in a tertiary institution in the Philippines. PACD mostly affects patients at an older age, and of the female sex. PACG is the most common diagnosis in 5 out of 10 eyes, with 6 out of 10 eyes classified as severe. Most common initial management performed were laser peripheral iridotomy, trabeculectomy, medical therapy, and phacoemulsification; choice depends on the stage of PACD and patient factors. Visual outcomes had improved or remained stable, and IOP had decreased after intervention. Progression to higher stages was low in eyes initially diagnosed with primary angle closure suspect and primary angle closure.

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P-0107

NORMATIVE DATA OF RETINAL NERVE FIBER, GANGLION CELL AND INNER PLEXIFORM LAYER USING OPTICAL COHERENCE TOMOGRAPHY OF ELDERLY THAI POPULATION

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Background

Accurate diagnosis of glaucoma is crucial yet challenging due to anatomical variations in the optic nerve head and retinal nerve fiber layer (RNFL). Spectral domain optical coherence tomography (SD-OCT) provides a non-invasive means of quantifying these structures, enables early detection of glaucomatous optic nerve damage. However, the clinical utility of SD-OCT relies mainly on the comparison of individual data and the normative databases. This study aims to establish normative values for RNFL, ganglion cell layer (GCL), and inner plexiform layer (IPL) thickness in healthy elderly Thai population residing in the Bangkoknoi district of Bangkok as a part of Bangkoknoi Model Project (BANMOP), a prospective cohort study, guided by context-specific electronic health-databases to promote the sustainable well-being of people living in Bangkoknoi district.

Methods

This prospective cross-sectional study involved elderly participants, aged more than 50-year-old in Bangkoknoi district during April to August 2024. The participants underwent comprehensive ophthalmic examinations. The RNFL, GCL, and IPL thickness were obtained using Spectralis SD-OCT (Heidelberg Engineering) with standard mode and the Glaucoma Module Premium Edition (GMPE). Participants with the history of glaucoma, ocular trauma, ocular surgery, diabetes or evidences of retinal diseases were excluded.

Results

Among 1,472 subjects underwent ophthalmic screening in the communities, 696 participants with the mean age of 64.4-year-old received Spectralis SD-OCT examination. The mean of average RNFL thickness measured using the standard mode was 102.6 ± 14.8 µm. The RNFL thickness using the GMPE mode at 3.5 mm, 4.1 mm, and 4.7 mm diameters were 104.0 ± 16.2, 89.4 ± 19.0, and 77.8 ± 10.8 µm, respectively. The mean GCL thickness was 48.2 ± 6.5 µm, and the mean IPL thickness was 39.6 ± 4.3 µm.

Conclusions

This study provides normative data of RNFL, GCL, and IPL thickness in a healthy elderly suburbanized Thai population using SD-OCT (Heidelberg engineering) technology. These normative data are of value for glaucoma and retinal disease detection in Asian population in clinical practice.

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P-0108

PREVALENCE AND SEVERITY OF CAREGIVER OVERLOAD SYNDROME IN CAREGIVERS OF PATIENTS WITH CHILDHOOD GLAUCOMA

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Background

Childhood glaucomas are rare, heterogeneous diseases with significant regional variations in incidence, where caregivers play a crucial role in supporting these patients, yet the high demands of caregiving can result in caregiver burden/overload syndrome, which impacts their physical, emotional, and social well-being. The purpose of this study is to describe the frequency and severity of the caregiver overload syndrome in the primary caregivers of patients with childhood glaucoma and associated demographic and clinical characteristics.

Methods

This cross-sectional study will include the primary caregivers of patients with childhood glaucoma attending a tertiary care ophthalmology center who answer the validated Caregiver Burden Questionnaire (CBQ). This questionnaire consists of 24 questions which evaluate multiple dimensions of caregiver overload syndrome. The total score ranges from 0 to 96, 0 to 32 indicates mild overload, 33 to 64 moderate overload, and 65 to 96 severe overload. Association between the score of the CBQ and sex, age, education level, annual income, and occupation of the caregiver, as well as systemic comorbidities, visual acuity, disease severity, and number of medications of the patient will be analyzed.

The main outcomes will be prevalence and severity of caregiver overload syndrome, and its association with demographic and clinical characteristics.

Results

One hundred and fifty caregivers were included in the study, of whom 54.7% had mild overload, 44.33% had moderate overload, and 2.6% had severe overload scores. The average age of caregivers was 34 years, with a predominance of females at 86.7%. Middle school education was the most frequent. The average caregiving duration was of 7 years, involving a median of 120 hours per week. The most prevalent marital status was married (59%), and the most frequent socioeconomic level was C. The median age of patients was 9.5 years, with a 50.7% male predominance. The most common diagnosis was glaucoma associated with non-acquired ocular pathology and the majority had severe damage. Regarding the number of surgeries, most patients had three or more. No statistically significant factors associated with increased caregiver overload were found.

Conclusions

There is a significant and understudied burden among caregivers of patients diagnosed with childhood glaucoma. Although no factors associated with increased caregiver overload were found in our study, this is a topic that needs more research in order to develop strategies to aid caregivers.

P-0110

IMPACT OF THE COVID 19 PANDEMIC ON THE FREQUENCY OF SURGICAL TREATMENT WITH A FILTERING DEVICE FOR NEOVASCULAR GLAUCOMA SECONDARY TO DIABETES MELLITUS

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Background

Neovascular Glaucoma (NVG) is an aggressive form of glaucoma that can be a sight threatening complication of diabetes. Due to lack of medical control of diabetes, many patients presented with diabetic retinopathy and NVG in 2021on. The aim of this study is to compare the frequency of filtering device surgeries in patients with NVG due to diabetes mellitus (DM), before and after the COVID 19 pandemic.

Methods

Retrospective study. All glaucoma filtering device surgeries performed between 2016 and 2021 at the Dr. Sotero del Río Hospital due to NVG secondary to DM were included. Patients with incomplete clinical records were excluded.

Results

88 eyes of 78 patients were found. 42 eyes (47.7%) were female, 50 (56.8%) were right eyes, and the average age was 58 years. In 2016, 13 surgeries were performed, 14 in 2017, 8 in 2018, 13 in 2019, 16 in 2020 and 24 in 2021. The annual average of surgeries before the pandemic, from 2016 to 2019, was 12, while between in 2020 and 2021 it was 20. The Mean intraocular pressure before surgery was 36.3 mmHg. Reviewing tha data, we noticed that 10 patients out of those 24 total diagnosed with NVG in 2021 were dead by 2022.

Conclusions

It is observed that since 2020 there has been an increase in filtering device surgeries in patients with NVG due to DM, increasing almost double in 2021. This is extremely serious considering the poor prognosis of this condition. Given the decrease in surgery rooms in the context of the pandemic, and the fact that for blind patients at the diagnosis or follow up filtering surgery was not offered, NVG diagnosis could be even higher.The high mortality after NVG diagnosis alerts us the need to optimize the diabetes treatment in public health.

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P-0112

COMPARATIVE STUDY OF CLINICAL PROFILE, TYPES OF GLAUCOMA, SEVERITY OF DISEASE AT PRESENTATION IN INDIA: A MULTI CENTRIC CROSS-SECTIONAL STUDY

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Background
Glaucoma is a leading cause of blindness worldwide. The disease burden of glaucoma is significant, especially in developing countries like India, with diverse demographic and geographic landscape. The study aimed to evaluate the clinical profile, types of glaucoma, and severity of disease at presentation across six hospitals of India that comprise the Indian Ophthalmology Clinical Trial Network (IOCTN).

Methods
This was a prospective observational study from a glaucoma registry of IOCTN. The study included patients diagnosed with glaucoma visiting OPDs of six hospitals : 2 hospitals from Southern India (Kochi and Trivandrum), Western (Mumbai), Central (Chitrakoot), Eastern (Patna) and North-Eastern (Assam) India between July 2023 and April 2024. Data on demographics, vital signs, clinical profiles of glaucoma and ophthalmic assessments were recorded in case report forms.

Results
The study recorded a total of 6274 eyes of 3318 patients with 53.13% males and 46.86% females. The mean age of presentation varied significantly between regions ($p<0.001$). Among Primary Glaucoma, Primary Open Angle Glaucoma was the most prevalent type in Western (85.3%), Eastern (78.16%), Central (64.8%) and NorthEast India (59.1%), while Primary Angle Closure Glaucoma was more common in the Southern India ($p<0.001$). Secondary Glaucoma was observed the most in North-East India (17.75%). Severity at presentation also varied, with more than 60% of patients presenting mild severity in Southern and 59% in Eastern India. Patients from Central (39.68%), West (38.89%) and North-East (38.36%) presented with more severity and advanced glaucoma compared to other regions ($p<0.001$).

Conclusions
The study highlighted the regional variations in the clinical profile and severity of glaucoma in India, emphasizing the necessity for region-specific strategies for glaucoma screening and management.

P-0113

NORMAL TENSION GLAUCOMA AND MYOPIA: ETHNIC DIFFERENCES IN DISEASE ONSET AND PROGRESSION BETWEEN ASIANS AND CAUCASIANS

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Background

Myopia has been linked to earlier onset and increased severity of normal tension glaucoma (NTG), but this relationship remains unclear. This study investigates how refractive status impacts the age of onset and severity of POAG in a cohort of Asian and Caucasian individuals, hypothesizing that myopia is associated with earlier onset and more advanced disease, particularly among Asians.

Methods

A retrospective review of patient records with NTG from a glaucoma clinic in Waterloo, Ontario, from 2010 to 2024. Inclusion criteria were patients over 40 years old with a confirmed NTG diagnosis based on standardized criteria from the American Academy of Ophthalmology. Criteria included structural damage (*e.g.*, optic nerve head changes, RNFL and GCL thinning on OCT) and/or functional deficits (repeatable and characteristic defects on 24-2 or 30-2 visual fields) with open angles confirmed by gonioscopy and IOP 22mmHg. Severity was graded using the Staging System 2 (GSS2) for functional damage and the OCT Glaucoma Staging System (OCT GSS) for structural damage. The Mann-Whitney U test was used to compared age of onset, refractive error (spherical equivalent), and disease severity, with $p < 0.05$ indicating significance.

Results

The dataset included 47 eyes, with 21 (44.7%) from Asian patients and 26 (55.3%) from Caucasians. Asian patients had an earlier age of onset (55.7 ± 1.75 years vs. 63.7 ± 1.72 years; $p = 0.012$) and greater myopia (-4.52 ± 0.67 D vs. -2.53 ± 0.37 D; $p = 0.017$) compared to Caucasians. Functional and structural damage were significantly worse in Asians ($p = 0.006$ and $p < 0.001$, respectively; Figure *1*).

Image

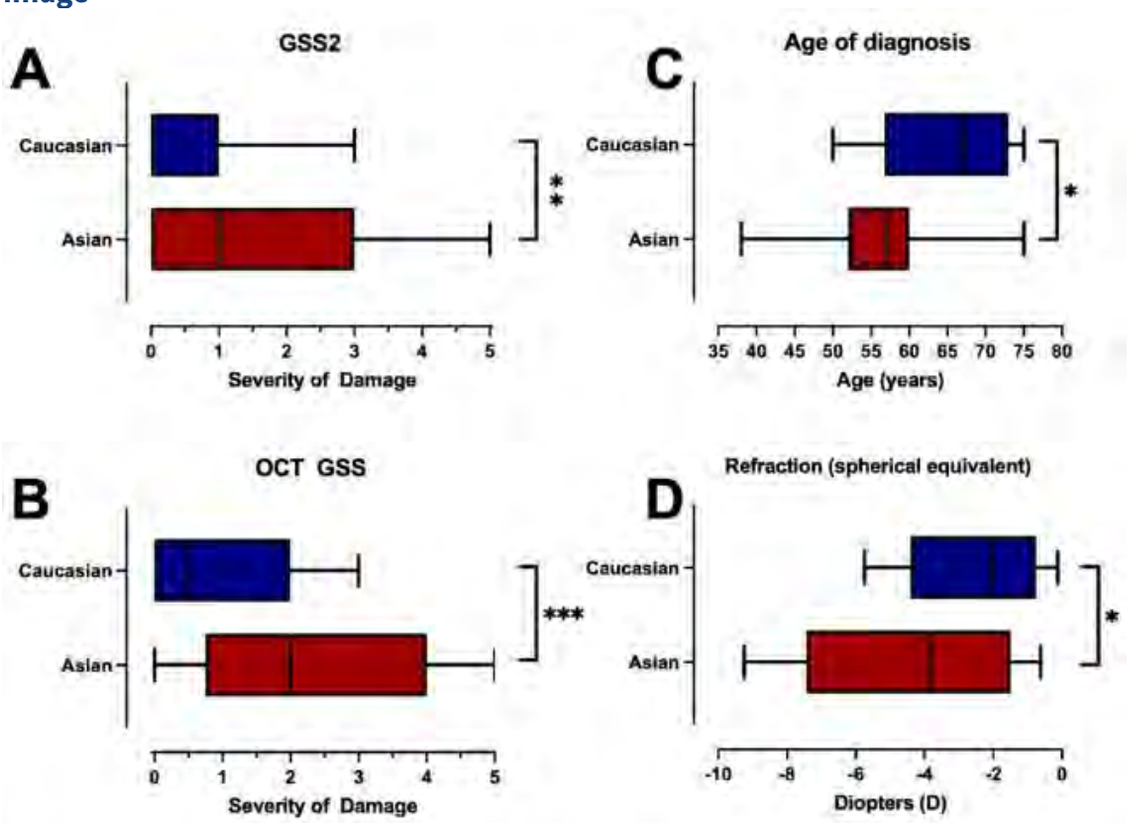

Figure 1:Comparison of age of diagnosis, refraction, and severity of damage between myopic Asians (red) and Caucasians (blue) with normal tension glaucoma. A) Severity of visual field damage, B) Severity of OCT damage, C) age, and D) spherical equivalent refraction at the time of diagnosis. Centre lines within the boxplots represent the median, the box contains lower and upper quartile, and the black whiskers mark the maximum and minimum values. P-value style: 0.033 (*), 0.002 (**), <0.001 (***).

Conclusions

This study highlights significant ethnic differences in NTG presentation, with Asian patients exhibiting earlier onset, greater myopia, and more severe structural and functional damage at diagnosis. These results support the integration of ethnicity and refractive status into risk stratification models and screening protocols for NTG and in addition highlight the importance of tailored screening and management strategies. Future studies with larger, multi-center cohorts are recommended to validate these findings.

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P-0114

PREVALENCE OF CAMBODIAN ADULT PATIENTS PREFERRING SURGICAL INTERVENTION OVER CONTINUATION OF MEDICAL THERAPY IN ADVANCED GLAUCOMA MANAGEMENT

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Background
To identify the factors that affect patients' preferences for surgical interventions as opposed to ongoing medical therapy for advanced glaucoma among Cambodian adult patients, using the Health Belief Model.

Methods
This is an interim report on the cross-sectional study of 487 adult glaucoma patients at Preah Ang Duong Hospital in Cambodia. Face-to-face interviews were conducted to collect demographic data, patients' knowledge and beliefs regarding glaucoma, and treatment preferences. The main outcome was the prevalence of patients preferring surgery over continued medical therapy, and the secondary outcome was an assessment of the factors associated with those options.

Results
Surgical intervention was preferred by only 28.13% of the patients. Patients were usually less knowledgeable about glaucoma; nonetheless, those who desired surgery had significantly higher knowledge scores than those who preferred medical therapy (Percentage Mean Score: PMS = 58.03% versus 54.09%). Patients who preferred surgery had higher scores for perceived susceptibility and severity of long-term medical therapy (93.84% vs. 38.13% and 93.59% vs. 35.56%, respectively), as well as higher values of self-confidence or desire to undergo surgery (88.73% vs. 45.27%). Moreover, they received higher scores for perceived benefits of surgery and desire to avoid the long-term burden of medications (92.21% vs. 51.33%), as well as lower scores for perceived barriers to surgical intervention (19.01% vs. 88.23%), such as cost of operation, doubts about surgical efficacy, and safety concerns. Notably, patients who have a family history and social circles of glaucoma-related visual loss prefer surgical intervention, even after receiving effective medical treatment. The multivariate analysis revealed that age, gender, laterality, glaucoma severity and type, health insurance coverage, and quantity of anti-glaucoma drugs preoperatively did not significantly impact patients' treatment of choice.

Conclusions
Surgery willingness depends on the patient's health knowledge and beliefs. Several factors greatly influence the patient's decision, including perceived benefits, barriers, severity, and self-efficacy. Highlighting the advantages of the procedure, addressing concerns and barriers, and increasing patient confidence while increasing knowledge of the disease's severity are all crucial for improving treatment outcomes and increasing patient involvement in decision-making.

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P-0116

EVALUATION OF VISION-RELATED QUALITY OF LIFE IN HIGH MYOPIA PATIENTS WITH OPEN-ANGLE GLAUCOMA: AN OBSERVATIONAL STUDY

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Background
The deterioration of visual function caused by glaucoma can significantly affect multiple domains of daily life and lead to a significant reduction in vision-related quality of life (VR-QoL). High myopia increases difficulty performing daily visual tasks and suffers from social and emotional handicaps, all of which also contribute to a reduced VR-QoL. Quality of life is an important component of patient-centered outcomes, and a comprehensive understanding of VR-QoL is of great clinical significance to guide the therapeutic decisions. However, to our knowledge, no study has focused on the VR-QoL in highly myopic patients combined with OAG.

Methods
In this observational cross-sectional study, patients with high myopia were consecutively recruited and divided into high myopia with OAG group and high myopia without OAG group (control group). All participants underwent comprehensive ophthalmic examinations, and their demographic information and socioeconomic data were collected. The National Eye Institute Visual Function Questionnaire 25 (NEI VFQ-25) and Depression Anxiety Stress scale-21 (DASS-21) were applied to respectively assess VR-QoL and psychological symptoms in patients. The effect of different factors on VR-QoL was investigated using univariate and multivariate regression models.

Results
Among the 182 highly myopic patients who completed the questionnaires, there were 136 patients with OAG and 46 without. Compared with the control group, the composite score and scores of other vision-related subscales except ocular pain, near activities, and color vision were significantly lower in the high myopia with OAG group (all $P < 0.05$). After adjusting for potentially confounding factors, the multivariate regression analyses showed that best corrected visual acuity of better eye, binocular integrated visual field and psychological symptoms, including depression, anxiety, and stress, were all significantly correlated with the VR-QoL. Specifically, the more severe the visual impairment, the more pronounced the psychological symptoms, and the worse the VR-QoL reported by participants.

Conclusions
VR-QoL of highly myopic patients with OAG was significantly worse, impaired visual function and psychological disorders were the influencing factors. We should pay attention to psychological intervention while protecting visual function in the management of glaucoma.

P-0117

THE IMPACT OF DERMATOLOGICAL TREATMENTS ON INTRAOCULAR PRESSURE AND GLAUCOMA PROGRESSION IN RESOURCE LIMITED SETTINGS

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Background
Glaucoma is one of the most common causes of blindness worldwide. IOP is the most important modifiable risk factor for disease advancement. Ocular complication of dermatological therapies, inparticular the corticosteroids and immunosuppressant drugs prescribed to treat such conditions as psoriasis, eczema, and other autoimmune diseases, are suggested to increase intraocular pressure. This study will consider the impacts of dermatological therapies on IOP and the progression of glaucoma among patients who have received ophthalmic and dermatological care.

Methods
This study among 60 patients (M=30, F=30) undergoing concurrent dermatological treatments for chronic skin conditions. Patients were categorized into three groups: Group A (n=20) receiving long-term topical/systemic corticosteroids, Group B (n=20) on immunosuppressants (methotrexate etc), and Group C (n=20) on non-steroidal dermatological therapies. IOP was measured using Goldmann applanation tonometry at baseline, 3 months, and 6 months. Data on the progression of glaucoma were presented as conditions of the visual field and imaging of the optic nerve.

Results
Patients who used corticosteroids in Group A showed a significant risein IOP, with a mean increase of 3.8 ± 1.5 mmHg at six months compared to baseline, reaching statistical significance, at $p < 0.001$. Group B includes those who received immunosuppressive agents, in whom the increase in IOP was only 1.6 ± 0.9 mmHg ($p = 0.03$), while Group C did not show such an increase in IOP with 0.4 ± 0.7 mmHg ($p =0.43$). Notably, 40% of Group A patients needed alteration in the glaucoma treatment owing to uncontrolled IOP, while 10% showed loss of 6% visual field ($p=0.005$). The history of steroid-responsive dermatoses, such as psoriasis and eczema, when analyzed through subgroup analyses, showed a significantly high risk with an Odd Ratio of 2.9, 95% CI 1.5–4.2, $p<0.01$, of significant IOP rise. Patients from rural areas,where there was limited access to specialty medical services, had a higher rate of late presentation and more advanced disease with evidence of glaucoma damage.

Conclusions
It also has a tendency to show how the corticosteroid-based dermatological treatments influence IOP and the development of glaucoma in susceptible populations with poor access to healthcare. Again, it calls for integrated management approaches by dermatologists and ophthalmologists in minimizing such adverse effects in patients that receive dermatological therapies for extended periods. These findings thus indicate the need for public health interventions, particularly in developing countries like Nepal, for early detection and management of glaucoma among patients receiving therapy for chronic skin disorders. Strict regulatory policies related to the use of corticosteroids, together with increasing awareness in patients about ocular complications resulting from such treatments,will go a long way in decreasing the burden of blindness due to glaucoma.

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P-0118

SOCIAL SUPPORT, MENTAL HEALTH, AND QUALITY OF LIFE IN PATIENTS WITH GLAUCOMA: A MEDIATION ANALYSIS

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Background
Glaucoma, a leading cause of irreversible blindness worldwide, poses significant challenges to patients' quality of life (QoL). This study aimed to assessing the association between QoL and psychosocial factors, including social support, anxiety, and depression in patients with glaucoma, and to determine whether mental health may explain some of the associations between social support and QoL.

Methods
In this cross-sectional observational study, 113 outpatients diagnosed with glaucoma completed a battery of electronic or paper-and-pencil questionnaires between January and December 2024. The 25-Item National Eye Institute Visual Function (NEI-VFQ-25), Social Support Rating Scale (SSRS) and 4-Item Patient Health Questionnaire (PHQ-4) were used to assess the visual-related QoL, social support, and mental health respectively, along with some socio-demographic and ophthalmologic data. Descriptive statistics, *t*-tests or analysis of variance (ANOVA), correlation analysis, and structural equation modelling (SEM) were performed to examine group differences and the pathways linking social support and QoL.

Results
Patients with a disease duration exceeding seven years ($p = 0.022$), lower education levels ($p < 0.001$), higher financial burden from glaucoma treatment ($p < 0.001$), co-existing chronic diseases ($p = 0.048$), and previous smoking habits ($p = 0.016$) showed lower quality of life. Women ($p = 0.028$) and those aged under 40 years ($p < 0.001$) reported lower levels of perceived social support. SEM shown a total effect of 0.513 ($p = 0.006$), a direct effect of 0.295 ($p = 0.068$), and an indirect effect of 0.218 ($p < 0.001$), suggesting that anxiety and depression fully mediated the association between social support and quality of life among glaucoma patients.

Conclusions
Interventions aimed at enhancing social supports in glaucoma patients may contribute to alleviate symptoms of depression and anxiety, ultimately enhancing QoL. Mental health should be prioritized in the management of glaucoma, given its critical role in improving overall patient well-being.

P-0119

CORRELATION BETWEEN HYPERHOMOCYSTEINEMIA AND PSEUDOEXFOLIATIVE GLAUCOMA: A CROSS-SECTIONAL STUDY

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Background

To determine correlation between hyperhomocysteinemia and pseudoexfoliative glaucoma.Some clinical studies indicate elevated levels of Homocysteine Hcy, in plasma and/or in aqueous humor in patients with Open Angle and Pseudoexfoliative Glaucoma, altering the blood-aqueous barrier and zonula.Hcy is a sulfur amino acid that originates from the metabolism of dietary methionine.Elevated plasma Hcy alters the vascular endothelium, causes thromboembolism, coronary heart disease, stroke and neurodegenerative diseases. The main cause is a deficiency of folic acid, vitamin B6 and B12 in the diet. Less common is the genetic origin and vitamin B12 malabsorption.

Methods

A cross-sectional study was carried out on patients with pseudoexfoliative glaucoma at Hospital Italiano de Buenos Aires from January to July 2024. Homocysteine blood levels were measured and association with other systemic diseases were also evaluated. Plasma Hcy testing was carried out in the laboratory, through peripheral blood extraction, using a competitive chemiluminescent enzyme immunoassay.

Patients undergoing medical treatment that may raise homocysteine levels (antidepressant, anticonvulsants, and others) and patients under hormonal treatment or vitamin supplements were excluded from this study. Hyperhomocysteinemia was defined as ≥15 µmol/L blood homocysteine levels.

Results

Involving 52 patients (mean age 78.4), predominantly women (67%) seric homocysteine levels were 12.4 +- 3.6 µmol/L. 12 patients (23%) had high levels of homocysteine (mean 17.6 µmol/L). Association with dyslipidemia (42.3%), hypertension (28.84%) and cognitive impairment (18.86%) were also documented.

Conclusions

In our analized population, a not very high but equally relevant association (23%) was observed between pseudoexfoliative glaucoma and hyperhomocysteinemia, as well as with other important systemic pathologies, such as dyslipidemia, hypertension and cognitive impairment. Being aware of this association could be of special interest since it would allow screening and early treatment of these systemic pathologies in patients diagnosed with pseudoexfoliative glaucoma and it can be considered in the future as a modifiable risk factor.

Early treatment is key and would prevent systemic alterations and glaucoma progression.

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P-0120

FACTORS TO SELECT TINTED LENS FOR PHOTOSENSITIVITY IN PATIENTS WITH LOW VISION

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Background
Tinted lenses have been used to manage visual discomfort and photosensitivity in low-vision patients. However, they have yet to be formally assessed using objective techniques to determine the spectral filters. Photosensitivity is said to be related to ganglion cells; it is suspected that the type of disease or how much it is damaged would affect the preference of the color or the rate of transmittance of the filters. Thus, in this study, we used machine learning to predict the best choice of tinted lenses.

Methods
The patients prescribed the colored lens were included between November 2023 and October 2024. We used age, gender, visual acuity, a diagnosis that caused low vision, the primary use of indoor or outdoor as predictors, and lens color and the light transmittance rate of the lens as targets. The machine learning approach, a random forest regression, was used to predict the filters' color and light transmittance rate.

Results
In total, 160 patients were enrolled (97 female, 63 male). The mean age of the enrolled patients was 59.8 ± 18.0. The mean corrected logMAR in the better eye was 0.45 and 0.98 in the worse eye. Among 160 patients, 38(24%) were glaucoma patients. The accuracy of color prediction was 33%, and the mean decrease in Gini was high in age and visual acuity. The explained variance score of the light transmittance rate was 41%, and the mean decrease in Gini was high in the primary use of indoor or outdoor, visual acuity, and age. The differences in diagnosis that caused low-vision could not have improved the prediction.

Conclusions
The patient's background, age, and visual acuity may help to select the lens color or the rate of light transmittance of the tinted lens. However, diagnosis, whether glaucoma or not, did not affect the preference for the type of tinted lens.

P-0121

MACULAR GANGLION CELL COMPLEX LAYER THICKNESS MEASURED WITH SPECTRAL-DOMAIN OCT IN A LARGE POPULATION-BASED COHORT STUDY

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Background

Around 8.4 million individuals worldwide suffer from bilateral blindness due to glaucoma, which is one of the main causes of blindness and affects up to 3% of the population over 40 [1]. Glaucoma is characterized by progressive degeneration of retinal ganglion cells (RGC) and the axons, which results in thinning of the retinal nerve fiber layers (RNFL) and irreversible visual field (VF) defects [2]. The VF is considered the gold standard clinical test for glaucoma diagnosis [3]. The RNFL, the ganglion cell layer (GCL), and the inner plexiform layer (IPL) made up the macular ganglion cell complex (GCC). Since numerous RGCs are within the macula section, the evaluations of GCC are beneficial for glaucoma early detection [4].

In recent years, spectral-domain OCT (SD-OCT) has been widely used in both scientific research and clinical practice, with high spatial resolution and acquisition speed in a non-invasive way [5]. The assessment of GCC thickness has been widely used in the diagnosis and monitoring of glaucoma.

In the present study, the primary objective was to establish the normal GCC thicknesses profile in the general population using SD-OCT in different macular sectors. Determining the systemic and ophthalmic factors associated with GCC thickness and further identifying the potential risk factors was the secondary objective.

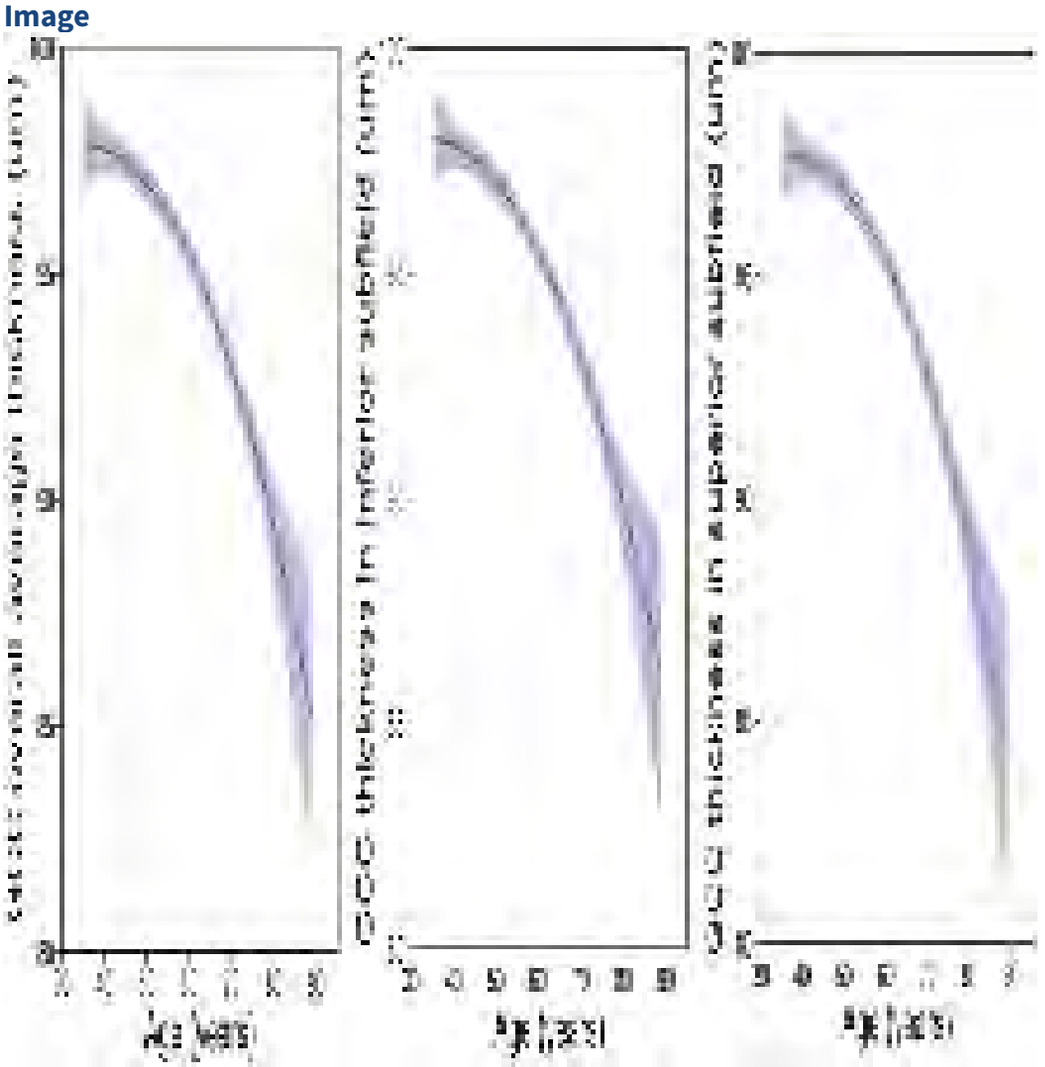
Methods

Participants in the population-based cohort study had to be at least thirty years old. Every participant had a routine ophthalmological examination. Using SD-OCT, the GCC thickness was determined. To assess the relationship between GCC thickness and systemic and ocular characteristics, mixed linear models were used. R V.4.1.1 was the statistical analysis program utilized.

Results

2490 subjects with an average age of 56.60 ± 10.39 years were collected in this analysis. GCC average thickness measured was 95.57±7.47µm. The GCC thickness of the superior (95.46±7.87µm) was the thinnest, and the inferior subfield (95.68±7.66µm) was thickest. In univariate and multivariate regression models, thicker GCC thickness was significantly associated with older age ($P < 0.001$), absence of smoking ($P = 0.002$), higher SBP ($P < 0.001$) and DBP ($P < 0.001$), more diabetes ($P<0.001$), higher HbA1c ($P<0.001$), lower HDL ($P = 0.001$), higher LDL ($P = 0.011$), coronary heart disease ($P < 0.001$), history of coronary heart disease ($P = 0.007$), lower IOP ($P = 0.198$), higher spherical equivalent ($P = 0.009$), and better BCVA ($P < 0.001$).

Image



Conclusions

When diagnosing non-glaucoma patients, it is important to consider the variation in GCC thickness throughout the Chinese community. In the meantime, the thickness of GCC is tightly associated with several ocular and systemic variables. Our results also highlighted the necessity of creating normative databases globally, as well as demonstrating ethnic disparities in GCC thickness and the uniqueness of related ocular and systemic variables.

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P-0122

PREVALENCE AND RISK FACTORS OF GLAUCOMA-SUSPECTS IN SRI LANKA: A COMMUNITY-BASED NATIONAL STUDY

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Background

Glaucoma is the second leading cause of blindness globally. There are national figures for prevalence of glaucoma that have been reported from many countries, but paucity of information on for prevalence of glaucoma-suspect patients. A glaucoma-suspect is a person who has one clinical feature and/or risk factors which increase the possibility of developing visual field impairment in the future due to glaucomatous optic neuropathy. Glaucoma-suspects have a higher risk for developing glaucoma than normal individuals. The aim of this study was to find out the glaucoma-suspect prevalence and the risk factors which would help to pay more attention for early diagnosis of glaucoma to minimize glaucoma-related blindness in the country.

Methods

A country-wide, representative sample was drawn using multistage, cluster, randomized sampling, covering the population of 40 years and above. Sociodemographic information, medical & ocular history were collected. A comprehensive ophthalmic examination, fundus photo analysis and measurement of intraocular pressure (IOP) were done. Glaucoma suspects were identified on clinical criteria, IOP 22 and above , Vertical Cup:DIsc 0.7 or more Glaucoma Optic nerve changes and CD asymmetry 0.2 and more.

Results

Out of 3266 recruited, 484 were detected as glaucoma-suspects (prevalence of 14.8%). The mean age (SD) of the total sample was 58.7 (10) years while that of the glaucoma-suspect was 59.7 (10.2). Majority of the glaucoma-suspects were females (n=269, 58.4%). The commonest systemic association was hypertension (n=199, 41.4%) followed by diabetes (n=130, 26.9%). IOP of more than 22 mmHg was the commonest ocular risk factor. There were 90 right eyes (18.7%) and 169 left eyes (35.1%) with high IOP. There were 79 right eyes (16.5%) and 81 left eyes (17%) with a narrow angle. Thirteen (16.5%) right eyes and 10 (2.3%) left eyes had pseudo-exfoliation. The signs of ocular and surgical trauma, a) corneal scars were present in nine (1.9%) right eyes and nine (1.9%) left eyes and b) Iris atrophy was present in nine (1.9%) right eyes and four (0.9%) left eyes. Diabetic retinopathy was present in six (1.23%) right eyes and six (1.23%) left eyes.

Conclusions

Glaucoma-suspect prevalence of 14.8% is significantly higher than that of Bangladesh (10.1%). This warns of the need for developing comprehensive screening and intervention programs which are easily accessible to patients to detect high risk groups for Glaucoma which helps in managing ocular and systemic risk factors in glaucoma-suspects.

P-0125

CLINICAL UTILITY OF CLINIC-BASED INTRAOCULAR PRESSURE PHASING AMONG GLAUCOMA PATIENTS FROM A TERTIARY GOVERNMENT HOSPITAL IN SINGAPORE LAST 2017

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Background

Glaucoma is a complex and progressive eye disease and intraocular pressure plays a crucial role in its diagnosis and management, making accurate & reliable IOP monitoring vital for effective treatment outcomes. IOP follows a circadian rhythm where it peaks in the morning, gradually diminishes throughout the day and has nocturnal resurgence. However, numerous factors affect IOP including body position, fluid intake, cortisol levels etc. Hence, a single IOP measurement during office hours does not provide accurate assessment of IOP variability over time. IOP measurement is vital to determine the disease progression and patient's visual prognosis and one effective approach to determine such is to implement IOP phasing.

Methods

This is a retrospective study where medical records of patients who were diagnosed as glaucoma suspect (GS), normal tension glaucoma (NTG) and ocular hypertension and those with clinical evidence of progression, who were seen at the glaucoma clinic and underwent in-clinic IOP phasing from January 1 to December 31 2017. Data gathered included the following: patient demographics, address to determine distance from the institution, IOP phasing which were taken every 2 hours using air puff tonometry from 8am to 4pm, indication for phasing, diagnosis pre- and post-phasing and number of drops that the patient is on, if any.

Results

A total of 578 participants were included, all of whom were seen at the glaucoma clinic of SNEC last 2017. Mean age was 66.6 years with 48.9% (n=283) males and 51% (n=295) females. Of the different ethnicities, 87.5% were Chinese, 6.5% Indians and 2.5% for Malays and Caucasians respectively. The participants came from all parts of Singapore where 49% resided more than 15 kilometers away from the institution. About 84% underwent IOP phasing primarily to confirm diagnosis, 10% to determine the necessity of treatment and 6% to assess the adequacy of their current treatment. 289 eyes exhibited fluctuations of >6mmHg which indicate suboptimal IOP control. Glaucoma suspect was the diagnosis in about 77% of eyes which declined to an average of 40% per eye after phasing.

Conclusions

IOP phasing indeed helps confirm the diagnosis, assess the treatment adequacy of each patient and prevent glaucoma progression. It also prevents unnecessary use of glaucoma medications to patients who don't need it thereby decreasing their financial burden.

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P-0126

HIGH PREVALENCE AND COMPLEX MANAGEMENT OF GLAUCOMA FOLLOWING KERATOPLASTY IN KERATOCONUS PATIENTS

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Background
This study examines the prevalence, onset, and management of glaucoma in keratoconus patients who underwent keratoplasty. Understanding these dynamics is essential to improve patient outcomes and ensure graft integrity.

Methods
A retrospective analysis was performed on 192 keratoconus patients who underwent keratoplasty. Data collected included demographics (age, gender), visual acuity, and details of antiglaucoma treatments and surgeries. The study evaluated the timing and types of antiglaucoma interventions initiated post-transplantation.

Results
The cohort included 48 females (25%) and 144 males (75%), with a mean age of 48.39 years (SD = 17.63, range 21–92). Over a mean follow-up of 51.75 months (SD = 20.75, range 12–108), 185 patients (96.35%) were glaucoma-free pre-transplant, but 77 of them (41.6%, $p < 0.001$) developed glaucoma post-transplant. The median onset time was 314 ± 67 days, with 92.2% of new cases observed following penetrating keratoplasty. One year post-transplantation, the best corrected visual acuity (BCVA) was 0.32 ± 0.15 in the non-glaucoma group and 0.25 ± 0.18 in the glaucoma group. Surgical interventions were required in 37 patients (48.05%), with 26 undergoing one procedure, 10 undergoing two, and 1 requiring three procedures. Antiglaucoma therapy was initiated in 56 patients, with 24 managed on monotherapy, 23 on dual therapy, and 9 on triple therapy. Despite surgical and medical interventions, 18 patients required ongoing antiglaucoma therapy.

Conclusions
- Glaucoma developed in 41.6% of keratoconus patients following keratoplasty, with nearly half (48.05%) requiring surgical intervention, indicating a high post-transplant prevalence and significant management challenges.
- Chronic glaucoma emerged in a subset of patients, necessitating intensive medical or surgical therapy, emphasizing the need for individualized treatment strategies.
- Vigilant intraocular pressure monitoring and timely interventions are critical to preserving graft function, ensuring visual acuity, and improving long-term patient outcomes.

P-0127

FACTORS AFFECTING ADHERENCE TO TOPICAL ANTI GLAUCOMA MEDICATIONS IN A TERTIARY CENTRE IN NORTH KERALA

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Background

Glaucoma contributes to 0.6 million disabilityadjusted life years (DALYs) and 1.96% of the overall burden of diseases in India.[1] One of the major challenges in glaucoma management in our country is poor compliance to topical antiglaucoma medications. Compared to North indian states and south Indian states like Tamil Nadu , Keralas literacy rate is high (96.6%). Previous studies on adherence to AGM done in South India and North India ranges from 42-68 %.[1,2] Kerala being a relatively highly literate state we evaluated its relation with adherence in our population. Our purpose was:

- To determine factors affecting adherence to topical antiglaucoma medications (AGMs) in a tertiary centre in North Kerala
- To evaluate the relationship of adherence behaviour with patients demographic data and socioeconomic status
- To evaluate measures to improve adherence to antiglaucoma medications.

Methods

A crosssectional study was conducted on 380 glaucoma patients attending glaucoma clinic in a tertiary centre of North Kerala. Adherence to medication was determined subjectively by structured questionnaire covering demographic parameters, clinical characteristics, adherence behaviour's and barriers. Non adherence was defined as missing at-least one drop of medication for last 1 week. Factors such as glaucoma medication history, problems associated with AGM usage, reasons for non-adherence and suggestions to improve adherence were included in the questionnaire.

Results

Participants predominantly aged 61–75 years (45%), with males 47.4 % and females 52.6% were included in the study. Adherence to glaucoma medical therapy was seen in 79.5 % of patients, with knowledge about glaucoma present in 77% of patients. 65.8% reported issues with AGM, with cost (22.9%), forgetfulness (18.4%), difficulty in obtaining medications (16.1%) side effects (6.1%), being the main barriers . Statistical analysis revealed significant correlation between adherence and distance from the hospital (p=0.032). Similarly, patients with caregivers showed significantly higher adherence (80%) compared to those living alone (53.8%). Suggested strategies to improve adherence include cost reduction (40.8%), tele reminders (25%) and better accessibility to medications (18.9%).

Conclusions

This study highlights the multifaceted nature of adherence to AGM, emphasizing the importance of proximity to healthcare facilities and caregiver support. These findings underline the need for targeted interventions, such as enhancing accessibility like setting up more sub centres in periphery , training more glaucoma practitioners and leveraging caregiver involvement to improve adherence and prevent avoidable vision loss in glaucoma patients.

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P-0128

EPIDEMIOLOGY AND THERAPEUTICALS APPROACHES OF GLAUCOMA IN AN AFRICAN POPULATION "GUINEAN CASE"

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Background

Glaucoma is a group of progressive optic neuropathies characterized by degeneration of retinal ganglion cells, leading to optic neuropathy and an enlargement of the excavation of the optic nerve, which manifests itself as deficits visual field concordants [1] .Glaucoma is the leading cause of irreversible blindness [5]. Of the 33.6 million adults aged 50 and over who were blind in 2020, glaucoma was responsible for 3.6 million of cases equivalent to a prevalence of 11% [6]. In addition, black individuals are 2.8 times more affected than those of European ancestry [5]. visual field concordants [1]. The aim of this study was to evaluate the prevalence of glaucoma in Guinean patients and to describe the therapeutical approaches in our community.

Methods

The study was approved by the Research Ethics Committee of Faculty of Medicine at Gamal Abdel Nasser University . Written informed consent was given by patients for their information to be stored in the hospital database and used for research.

It was a longitudinal, prospective and observational study held on a year from October 20th 2022 to 19th October 2023 at rural department of eye health.

The variables studied concerned age, intraocular pressure before, after treatment, class of glaucoma, type of treatment, secondary effect, life quality.

Were included whom, after having done all the necessary examinations (visual acuity corrected, slit lamp examination, IOP measurement, gonioscopy and fundus examination), were diagnosed with glaucoma, received treatment and were willing to take part in our study

Statistical analysis of the data, intraocular pressure before and after treatment were analyzed using the statistical software JMP to obtain the mean value ± the standard deviation with a significance level P<0 .002.

The study involved 1076 eyes for which intraocular pressure was measured with Goldmann Tonometer .

Results

1076 eyes has been diagnosed with glaucoma with a prevalence of 7.9% , male were predominants (58.4%). The 60 to 69 years old age group was the most affected with an average age of 57.29 ± 17.06 years. The main treatment offered after diagnosed to patients was surgical (90.7%) , medical (8.6%) and physical (6%).

Conclusions

Glaucoma appears to be a potentially blinding pathology which evolves silently in our societies. Among the medications administered, beta blockers were the most represented .Further research into the protection of the optic nerve would be useful in maintaining good quality of life for patients and the popularization of diagnostic and therapeutics through information, awareness and subsidies would make it possible to prevent and/or to treat early and also prevent complications of glaucoma. Medical treatment should be subsidized and diversify in our localities to broaden the therapeutic choice according to the needs of each patient by improving their quality of life without any constraints while taking advantage of the same innovations in care available in highly industrialized countries.

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P-0130

MEDICATION ADHERENCE IN PRIMARY CAREGIVERS OF PATIENTS WITH CHILDHOOD GLAUCOMA

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Background
Childhood Glaucoma can be a devastating condition leading to blindness. The adequate management of this disease relies heavily on the primary caregiver. The psychological implications for the primary caregiver, as well as the influence of their emotional state on the medical care they provide, have not been described on patients with childhood glaucoma. The purpose of this study is to describe self-reported medication adherence in the primary caregivers of patients with childhood glaucoma and its clinical-demographic associations.

Methods
This cross-sectional study includes the primary caregivers of patients with childhood glaucoma attending a tertiary care ophthalmology center. Medication adherence and its association with sex, age, education level, occupation, marital status, and Beck's Depression Inventory (BDI-II) score of the caregiver will be analyzed. The main outcomes will be self-reported medication adherence, prevalence and severity of depression in the caregiver, and their association with demographic, and clinical characteristics.

Results
One-hundred primary caregivers of patients with childhood glaucoma were included. The mean age of the caregivers was 36 years, 89% were female, 72% were married or in a relationship, 52% were employed, and the majority had completed middle school. Self-reported medication adherence revealed 48% of non-adherence among the caregivers. The prevalence of depression among the participants was 52%; of which 33% presented mild depression, 17% moderate depression, and 2% severe depression. Non-adherence showed a statistically significant association with having a higher BDI-II score (P=0.008). No other statistically significant associations were found.

Conclusions
There was a high percentage of caregivers with depression. Severity of depression in primary caregivers of patients with childhood glaucoma showed significant association to therapeutic adherence. It is vital to understand how caregivers are affected by their role in the disease in order to develop interventions that improve their quality of life and at the same time have a positive influence on the medical care of their patients.

P-0132

QUALITY OF LIFE IN PRIMARY OPEN ANGLE GLAUCOMA PATIENTS IN A TERTIARY CARE CENTER IN MEXICO

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Background
Quality of life is an important parameter of success control in glaucoma patients but there is poor information for Mexican population. Glaucomatous damage causes significantly reduce of vision quality with a limitation in daily activities. This study was performed on a tertiary reference care center from North Mexico to evaluate the quality of life in Primary Open Angle Glaucoma patients.

Methods
This is a prospective, cross-sectional and observational study that included 116 patients with Primary Open Angle Glaucoma (POAG) from a tertiary care center from the north of Mexico.

The patients were divided according to their Visual Field in mild (mean deviation > -6dB), moderate (mean deviation between -6.0 and -12.0 dB) and severe (mean deviation <-12.0 dB) group. The instrument to measure Quality of life (QoL) was GCL-15 questionnaire. The following variables were included: QoL score, severity of glaucoma, age, sex and education level.

All analyses were performed using a statistical software package (SPSS). Variables were reported as median and interquartile range. The Kruskal-Wallis test was used to analyze the differences among the groups. A P value <0.5 was considered statistically significant.

Results
We enrolled 17 patients (14.7%) in mild group, 34 patients (29.3%) in moderate group and 65 patients (56%) in severe group. Respect educational level, the proportions of patients with elementary school was 38.8%, middle school was 30.2%, high school was 4.1% and only 6.9% was university career.

The median of Quality of Life-15 total score was 56.0 and interquartile range was 45.5 to 65.0. The mild group score was 19 (17-30.5), moderate group score 49.5 (41.7-54) and severe group 62 (57-60). There was a significant difference between the three groups in terms of QoL-15 total score, with the median being the highest in the severe group, suggesting a poorer Quality of Life (p<0.001).

The QoL-15 subscale scores had association with glaucoma severity, we found the highest scores in peripheral vision and dark adaptation scale that indicate greater difficulty in performing vision-related activities.

Image

Table 1. Glaucoma Quality of life-15 total score

	Median (Interquantile range)
Quality of Life-15 Total score	56 (45.5-65)
Subscale score	
Central and near vision	6.5 (5-8)
Peripheral vision	22.5 (18-26)
Dark adaptation and glare	23 (18-27)
Outdoor mobility	4 (2-5)

Table 2. Glaucoma Quality of Life-15 score by severity group.

Quality of Life-15 score		**p**
Mild	19 (17-30.5)	
Moderate	49.5 (41.75-54)	***<0.001***
Severe	62 (57-60)	
Central and near vision		
Mild	3 (2-4)	***<0.001***
Moderate	6 (5-7)	
Severe	8 (6-9)	
Peripheral vision		
Mild	8 (6-12)	***<0.001***
Moderate	19 (18-22.25)	
Severe	25 (23-29)	
Dark adaptation and glare		
Mild	10 (6.5-12)	***<0.001***
Moderate	20.5 (17.75-23)	
Severe	25 (23-30)	
Outdoor mobility		
Mild	1 (1-2)	***<0.001***
Moderate	3 (2-4)	
Severe	4 (4-5)	

Kruskal-Wallis Test, p value <0.05

Conclusions

There is a strong association between the severity of Primary Open Angle Glaucoma and the decreased quality of life. The significant highest score in severe group indicates visual disability and activity limitation in POAG patients, specifically the peripheral vision and dark adaptation were affected.

The educational level suggests that patients with lower educational level could have more difficulties understanding the disease with poor treatment adherence and decreasing their quality of life.

A progressive decrease of Quality of Life is associate with advancing stages of the disease. Early interventions are need to control progression and improve the quality of life in POAG patients.

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P-0133

PREVALENCE OF HYPERTENSIVE PHASE AFTER AHMED GLAUCOMA VALVE IMPLANTATION

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Background

The hypertensive phase is defined as intraocular pressure (IOP) > 21 mmHg during the first 2 to 6 months in the postoperative course od glaucoma drainage devices, and it is reported to occur in 56 to 82% of these patients, of which 72% doesn´t resolve. This hypertensive peak has been associated with a higher final IOP and it´s an indicator od early valve failure.

Methods

The purpose of this investigation is to establish the prevalence of hypertensive peak in post Ahmed valve surgery patients, to identify the time of appearance of hypertensive peak and to describe the percentage of resolution. A descriptive cross sectional study was conducted, there were reviewed the records of patients who underwent Ahmed valve placement from January 2021 to November 2022 at the National Ophthlamology Unit in Guatemala, a follow up within the first postoperative year was established for the study (at 3, 6 and 12 months). Age, sex, preoperative best corrected visual acuity (BCVA), diagnosis, presence and time to present hypertensive phase, and its resolution were recorded.

Results

The elegible records of 165 eyes (160 patients) were used for review, whom 111 were men (67.3%), most patients were diagnosed with secondary glaucoma and were pseudophakic, preoperatory BCVA was 1.35 log Mar and preoperatory IOP was 36 ± 9.62. In this study, the prevalence of hypertensive phase was 32%, it appears at 107 days after surgery and 90% resolves within 30 days.

Image

HYPERTENSIVE PHASE			
	YES	NO	p
Age	41.5 (22)	44.7 (23.6)	0.4
Sex	41.7 (23.6)	47 (21.8)	0.1
Diagnosis POAG PACG Secundary	 11.4 6.8 81.8	 9.6 10-6 79.8	0.7
Lens Phakic Pseudophakic Aphakia	 47.7% 50% 2.3%	 50% 43.6% 6.4%	0.5

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Conclusions

Incidence of hypertensive phase is lower in our population, the onset and resolution is as expected and a limitation of this study were patients who lose follow up.

P-PW-0135
GLAUCOMA AT HOME: DIAGNOSIS AND FOLLOW-UP

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Background
Glaucoma is the leading cause of irreversible blindness worldwide. In developed countries, more than 50% of affected adults remain undiagnosed. In our multicenter study on diabetic and hypertensive patients, we found an incidence of glaucoma of 7.6%. The Proyecto VER study, conducted in Hispanics, reported a glaucoma prevalence ranging from 0.50% in younger individuals to 12.63% in those over 80 years old. Similarly, the LALES study found an incidence of 15.3% in Hispanics aged 70–79 years, increasing to 24.52% in those over 80 years old. In our setting, more than 50% of elderly patients with chronic diseases such as hypertension and diabetes fail to attend other scheduled medical appointments.

Methods
From a database of over 8,000 hypertensive, diabetic, and/or patients over 60 years old, participants were invited to a home-based telemedicine blindness prevention program. Initial consultations collected demographic data, medical history, and visual acuity. Non-mydriatic fundus photographs were taken using the AURORA (OPTOMED) portable device and evaluated in real-time by two glaucoma specialists. If no abnormalities were detected, annual follow-ups were recommended. Suspected glaucoma cases (intraocular pressure (IOP) ≥21 mmHg, cup-to-disc ratio ≥0.6, or asymmetry >0.2) underwent a second home consultation, including IOP with air tonometer (HUVITZ NTN1), pachymetry, and portable perimetry (VF 2000 PALM SCAN, VIRTUAL VISION 24-2). Patients diagnosed as glaucoma suspects and/or glaucoma were referred to their ophthalmologists, while those with normal findings were scheduled for a 6-month follow-up.

Results
In a period of 3 years and a half, from September 2021 to December 2024 we evaluated a total of 12,351 consultations were conducted with 6.462 patients tests : 1,803 in cardiovascular risk clinics and 10,548 at home. with mean age 69.62 years. We reached an average of 1.91 visits per patient (range: 1–7 visits) and found 4.276 patients diagnostic glaucoma suspect(34%) and 185 patients with previous glaucoma diagnosis (1.49%). A 11% of the total of the consultations was refer to their ophthalmologist to confirm our results

Image

Conclusions

Glaucoma may be underdiagnosed in up to 80% of cases in developing countries like Colombia. This telemedicine-based approach, incorporating fundus photography, pachymetry, IOP curve with water-drinking test, and portable perimetry, evaluated by experts and delivered at home, represents an innovative and highly sensitive method. It effectively reaches high-risk populations with limited access to regular ophthalmologic care.

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P-PW-0136

LOCATION OF OVERLAPPING GLAUCOMATOUS VISUAL FIELD LOSS AND QUALITY OF LIFE

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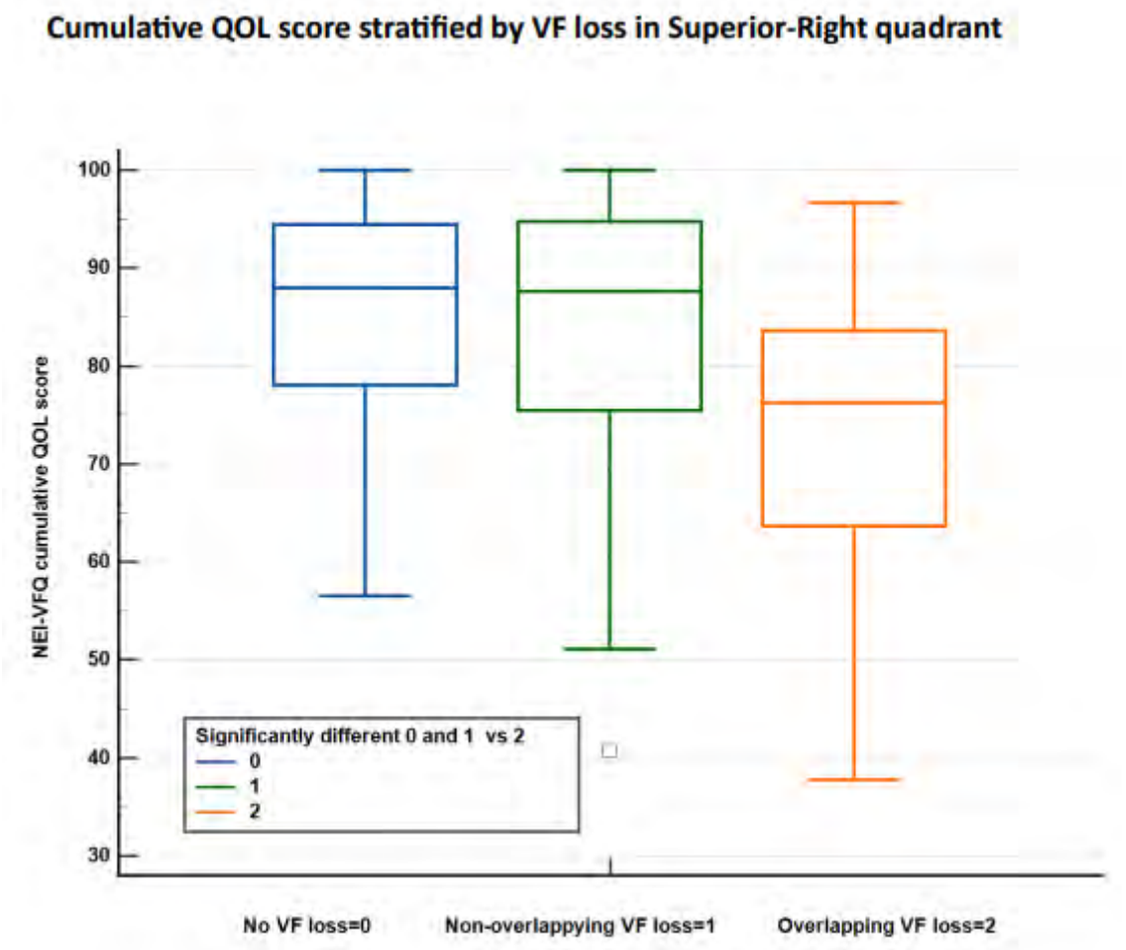
Background
Glaucomatous visual field (VF) defects that occur in the same location for both eyes impact quality of life (QOL) differently versus when VF defects do not overlap. Whether the binocular VF location of overlapping VF loss differentially impacts QOL, however, remains unclear. This study explores the relationships between QOL scores, overlapping vs. non-overlapping VF loss, and location/quadrant of glaucomatous VF loss.

Methods
All subjects were enrolled in an IRB-approved longitudinal glaucoma research study at a U.S. veterans hospital. Inclusion required a diagnosis of primary open-angle glaucoma (POAG) based on open angles on gonioscopy, optic nerve morphology consistent with glaucomatous damage, and corresponding reproducible VF visual field defects on 24-2 and/or 10-2 threshold automated perimetry in at least one eye. QOL was measured with the NEI-VFQ-25 and Rasch-analyzed QOL scores were computed. The binocular VF was partitioned into quadrants (right vs. left and superior vs. inferior), and all VF defects in each eye were assigned to a quadrant to determine whether overlapping VF loss was present. Pair-wise and regression analyses were conducted.

Results
We studied 111 subjects (95% male) with a mean age of 73.3 (±8.5) years. Median (IQR) better and worse eye 24-2 mean deviations (MD) were -1.38 (-3.06,-0.51) dB and -5.05 (-9.87,-2.26) dB respectively. Repeatable 24-2 VF loss was present in 84 right and 83 left eyes (p=0.42). Superior and inferior VF defects were present in 92 and 124 eyes, while temporal and nasal VF defects were present in 135 and 167 eyes respectively.

Bilateral 24-2 VF loss was present in 57 subjects, and 50 of these demonstrated some overlapping VF loss. By quadrant, right-superior (RS), right-inferior (RI), left-inferior (LI), and left-superior (LS) regions had 18, 34, 34, and 21 overlapping VF defects. When comparing cumulative QOL score in subjects by quadrant, QOL score was lower in all quadrants in subjects with vs. without overlapping VF defects though differences were only significant in the RS and LS regions. In regression analyses, associations between cumulative QOL score and 24-2 VF sensitivity were stronger in eyes with vs. without overlapping VF loss, more so in the superior VF quadrants.

Image



Conclusions

These data indicate that bilateral overlapping VF loss distinctly impacts QOL in early glaucoma, particularly in the superior VF quadrants. This information may be useful in tailoring individual glaucoma management.

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P-PW-0137

PSEUDOEXFOLIATION IN ARGENTINA: PRELIMINARY REPORT AFTER SIX MONTHS OF A CROSS-SECTIONAL STUDY

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Background

Pseudoexfoliation (PEX) is an underdiagnosed systemic disorder caused by an alteration in elastin synthesis, leading to deposits in multiple organs. In ophthalmology, it manifests as a whitish material at the pupillary border and is associated with secondary glaucoma due to obstruction of the trabecular outflow. Detection of PEX may contribute to identify cardiovascular, neurological, and digestive diseases, allowing for their early diagnosis(1, 2). The objective of this study is to estimate the prevalence of pseudoexfoliation and its association with systemic diseases and glaucoma in a sample of cases from Argentina.

Methods

This is an epidemiological cross-sectional study with a duration of one year, from July 2024 to July 2025. Ophthalmologists from across the country were invited to participate through the Argentine Glaucoma Association. Those who accepted the invitation were required to submit a monthly report detailing the number of patients over 40 years old seen during that period and a data collection sheet from patients diagnosed with PEX. The collected data included demographic information, intraocular pressure (IOP), lens status, glaucoma, diabetes, cardiovascular, neurological, and other diseases, hearing loss, and the presence and laterality of PEX. PEX was diagnosed based on the presence of typical deposits on the pupillary margin and/or lens capsule. Additional signs under pupil dilation and gonioscopy findings were considered optional procedures.

Results

During the first six months of the study, 1,883 patients with PEX were identified among 67,389 patients examined over the same period, in 19 out of 24 provinces of Argentina, determining a prevalence of 2.79%. Mean age was 75 (8.6) years, with 59% being women. The prevalence of glaucoma was 60%. PEX was bilateral in 58% of cases.

Detected systemic associations were cardiovascular disease in 61%, hearing loss in 23%, diabetes in 17%, neurological diseases in 10%, and other pathologies in 7%.

Conclusions

The prevalence found in this sample is consistent with that reported in populations with similar characteristics (3, 4). Preliminary data highlight the importance of PEX as a condition associated with glaucoma and cardiovascular disease, as well as other comorbidities (4 - 7). Further study completion and deeper analysis of the clinical implications of these findings are needed.

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Genetics Genomics & Biomarkers

P-PW-0139

MULTI-OMICS STUDY OF TEMPORAL GENE EXPRESSION NETWORK OF RGC INJURY IN GLAUCOMA

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Background

Glaucoma is a collection of diseases that lead to an irreversible vision loss due to damage of retinal ganglion cells (RGCs), but the underlying events leading to RGC damage are not fully understood. Several types of genetic and experimental animal models have been developed to mimic glaucomatous neurodegeneration which may help to unveil the mechanism of RGCs damage.

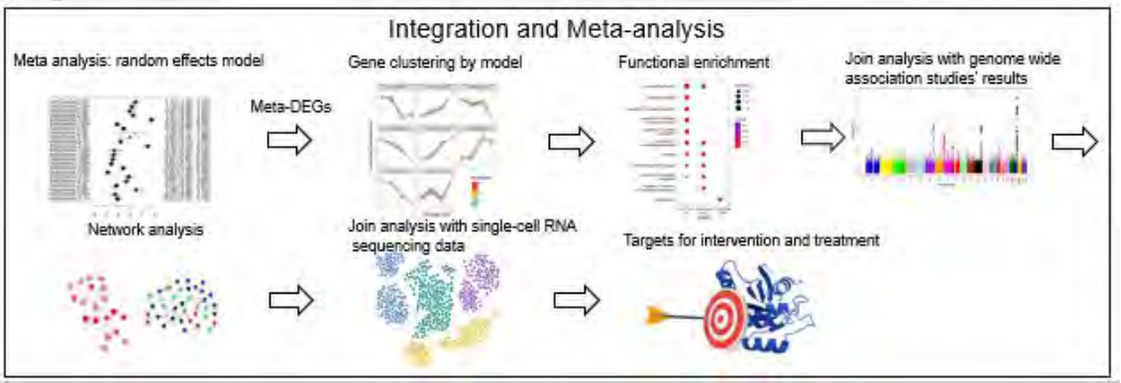
Methods

Fifteen datasets, including optic nerve crush (ONC), hypertonic saline injection, microbeads injection, and DBA/2J mouse models were enrolled, consisting of retina or RGCs from 210 mice or rat samples. Differential gene expression analyses (DGEA) were conducted for each time point compared with controls in the same dataset. A random effect model was employed to combine the effect sizes for each gene within each time points of each type of model, and Meta-differential expressed genes (Meta-DEGs) were identified. Then, there genes were clustered by pattern of their expression changes along time-course for each type of model. And the clusters were subjected to enrichment analysis to investigate their biological function. A joined analysis the Meta-DEGs and glaucoma GWAS loci was performed. Finally, the cell-type-specific expression of the Meta-DEGs using single-cell RNA-seq data of retina was investigated.

Results

4353 genes were identified as Meta-DEGs. DBA2/J model sees the most DEGs, and ONC, DBA2/J and microbeads model share certain consistency in DEG pattern, yet the saline model shows little similarity to other models. Time-course clustering revealed that these genes can be classified into six expression patterns. The down regulated genes were mainly related to synaptic function, while the up-regulated genes were enriched in RNA processing, TGF-β signaling pathway, innate immunity, wound healing, and chemotaxis functions. 1462 glaucoma GWAS loci were retrieved from the GWAS-Catalog, and the differentially expressed genes at each time point were enriched near the glaucoma GWAS loci compared to random gene sets. STRING protein network analysis was performed on Meta-DEGs near GWAS loci, which revealed that the hub nodes of upregulated genes included CDKN2B, ITGB3, PDGFRA, etc., while the hub nodes of downregulated genes included APP, COL11A1, CDH23, etc. Single-cell sequencing data analysis suggested these genes were expressed cell-type specifically in the retina.

Image



Conclusions

Despite the inconsistency among different glaucoma models, conserved gene expression pattern was found. Characteristic change includes the up-regulation of genes related to RNA processing, TGF-β signaling pathway, innate immunity, wound healing, and chemotaxis functions and the down-regulation of genes associated to synaptic functions. These findings provided clues for the identification of molecular markers and the discovery of therapeutic targets for glaucoma.

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P-PW-0140

GENOTYPE-PHENOTYPE ASSOCIATION OF PITX2 AND FOXC1 IN AXENFELD-RIEGER SYNDROME

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Background

PITX2 and *FOXC1* are the most common pathogenic genes associated with Axenfeld-Rieger syndrome (ARS). In this study, we aimed to explore the variation spectrum of *PITX2* and *FOXC1* and their associated phenotype based on data from our study and previously reported literatures.

Methods

Whole exome sequencing was performed on eight probands in our study. Multistep bioinformatic and co-segregation analyses were performed to detect pathogenic variants. Genotype-phenotype correlations of *PITX2* and *FOXC1* and the differences between them were determined. We detected three variants of *FOXC1* and two variants of *PITX2* in five unrelated families with ARS.

Results

Macular retinoschisis had been observed in AR1 with variant in *PITX2* and it is not reported before.Additionally,a review of published literature and our study led to the identification of 593 families with variants of *PITX2* or*FOXC1*, including 316 families with heterozygous variants in *FOXC1*, 251 families with heterozygous variants in *PITX2*, 13 families with variants in double genes, seven families with homozygous or compound heterozygous variants in *FOXC1*, and six families with variants in *ADAMTS17, PRDM5, COL4A1* or *CYP1B1.* Significant differences were observed between the prevalence of missense and in-frame, truncation, and large deletion variants in *PITX2* (32.00%, 42.67%, and 25.33%, respectively) and *FOXC1* (34.49%, 35.13%, 30.38%, respectively) (p =1.16E-43). Enrichment and frequency analyses revealed that missense variants were concentrated in the forkhead domain of *FOXC1* (76.14%) and homeodomain of *PITX2* (87.50%). The percentage of Caucasians withvariants in *FOXC1* was significantly higher than that of *PITX2* (p = 2.00E-2).Significant differences between *PITX2* and *FOXC1* were observed in glaucoma (p = 3.00E-2), corectopia (p = 3.050E-6), and polycoria (p =5.21E-08). Additionally, we observed a significant difference in best-corrected visual acuity (BCVA) between *FOXC1* and *PITX2* (p = 3.80E-2). Among all the family members with *PITX2* or *FOXC1* variants, the prevalence of systemic abnormalities was significantly higher in *PITX2* than in *FOXC1* (89.16% vs. 58.77%, p = 5.44E-17).

Conclusions

In conclusion, macular retinoschisis as a novel phenotype had been observed in patient with variant in *PITX2*.Significant differences were detected in phenotypes and genotypes between *PITX2* and *FOXC1*.

P-PW-0143

GENETIC RISK ASSESSMENT OF DEGENERATIVE EYE DISEASE (GRADE): AN INTERIM REPORT ON THE UTILISATION OF PRS IN GLAUCOMA SCREENING NORMAL POPULATIONS

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Background
Glaucoma is the leading cause of irreversible vision loss. Early detection and subsequent treatment of glaucoma is paramount in preventing vision loss. Current clinical methods of glaucoma screening are time consuming and costly. Polygenic risk scores (PRS) have been shown to be effective at predicting glaucoma in glaucoma suspects, but limited studies have looked at the clinical utility of PRS in screening the normal population for glaucoma. GRADE aims to determine the utilisation of PRS alone in screening the glaucoma in the general population.

Methods
1053 patients over the age of 50 were recruited from the general population. All patients donated a sample of blood or saliva, from which a glaucoma PRS was determined. 100 patients from the top decile, middle 80% and bottom decile were invited to attend a comprehensive glaucoma examination to determine their glaucoma status. Examinations were performed by clinicians who were blinded to the patient's PRS. Following the examination, the available clinical details were collected and graded by a blinded clinician. Patients were determined to have glaucoma if they had a glaucomatous visual field defect with matching optic nerve and/or OCT damage.

Results
140 patients attended a glaucoma examination, with 138 with sufficient quality data to determine their glaucoma status. Two patients were excluded due to a diagnosis of secondary glaucoma. Clinically, 14 patients were determined to have glaucoma, with 12 (86%) of whom were in the top PRS decile. No glaucoma was detected in the bottom PRS decile. PRS was positively associated with glaucoma status ($p<0.001$). After adjusting for age at the examination, patients in the top PRS group had the highest risk of a glaucoma diagnosis (OR 9.56, CI = 2.84-60.65, p = 0.002).

Conclusions
PRS may be a clinically valuable tool in screening the general population's genetic risk for glaucoma, enabling earlier detection and hence treatment. Patient examinations are still continuing.

P-PW-0144

PATHWAY-WIDE GLAUCOMA POLYGENIC RISK SCORES IN ALL OF US IDENTIFY ANCESTRAL DIFFERENCES IN PREDICTIVE POWER OF SPECIFIC BIOLOGICAL PATHWAYS

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Background
Primary open-angle glaucoma (POAG) is a complex-inherited disease with hundreds of risk loci identified to date. Intriguingly, genes in many of these loci function in disease-relevant biological pathways. Here, we generate a comprehensive set of pathway-specific POAG polygenic risk scores (PRSs) and test their predictive power among European (EUR) and African (AFR) individuals in the *All of Us* (AoU) Research Program.

Methods
POAG case/control cohorts were generated using ICD-9/10 diagnosis codes and subdivided by genetically predicted ancestry (EUR: 1339 cases/91,025 controls; AFR: 790 cases/35,378 controls). Genome-wide PRS weights were generated using ancestry-specific TOPMed linkage disequilibrium panels and Lassosum penalized regression trained in AoU. Pathway-specific PRSs were then generated for all 50 MSigDB Hallmark Gene Sets using Lassosum weights of all variants within 50kB of each gene boundary. The pathway PRSs were normalized to the number of non-zero weighted variants present in that pathway. Logistic regression analyses were performed to test the predictive power of each pathway PRS for POAG status, with age, sex, and the top 10 genotype principal components included as covariates.

Results
The percent variance explained by a genome-wide POAG PRS was 11.9% in the EUR cohort and 9.7% in the AFR cohort, consistent with prior studies ($p<0.0001$). 14 MSigDB pathway PRSs had significant Bonferroni-corrected p-value ($p<0.001$) in the EUR cohort, while 11 pathway PRSs were significant in the AFR cohort. The pathway PRSs with the greatest percent variance explained in the EUR cohort were TGF-beta signaling (0.89%), angiogenesis (0.52%), and unfolded protein response (0.26%). In the AFR cohort, greatest percent variance explained was by TGF-beta signaling (0.62%), TNF-alpha signaling (0.27%), and angiogenesis (0.12%).

Conclusions
A comprehensive pathway-wide approach can identify biological pathways with highest relevance to POAG disease risk. The pathways with greatest percent variance explained differed among the AoU EUR and AFR cohorts, which may partially explain differences in disease susceptibility and severity between ancestries. A better understanding of the specific biological drivers of disease in any given individual may allow for personalized approaches to disease prognostication and therapy.

P-0147

UNRAVELING DUAL DISORDERS: A UNIQUE EFEMP GENE VARIANT LINKS DOYNE HONEYCOMB DYSTROPHY WITH JUVENILE GLAUCOMA

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Background

To expand the clinical and mutational spectrum of EFEMP defects demonstrating the first non-p.Arg345Trp *EFEMP1* pathogenic allele for Doyne Honeycomb Retinal Dystrophy/Malattia Leventinese (DHRD/MLVT), associated with a Juvenile Open Angle Glaucoma (JOAG) phenotype.

Methods

We describe a pedigree from Southeastern Mexico with familial juvenile glaucoma. Clinical evaluation of 2 available family members was performed by glaucoma and genetic specialists. Glaucoma was diagnosed according to Childhood Glaucoma Research Network criteria (CGRN). Relevant measurements and a Spectralis OCT were carried out on available patients. Whole exome sequencing was performed in the DNA of the proband with later confirmatory Sanger sequencing. Classification of candidate variants was made at the Franklin/Genoox platform and pathogenicity was classified as per the criteria established by the American College of Medical Genetics and Genomics (ACMG) guidelines.

Results

The analyzed pedigree comes from San Juan Jalapa, Tabasco, Southeast Mexico. The proband is a 28-year-old female with a positive family history of glaucoma and two affected brothers. Proband was diagnosed at 14 years-old and underwent a left trabeculectomy plus maximum topical therapy without IOP control. Follow-up showed total opacity in both lenses and with B-scan findings of vitreous opacities, total retinal detachment, and diffuse choroidal thickening. Proband's son is a 7-year-old boy who had similar clinical progression, although fundoscopy examination revealed laminar hypopigmented lesions forming a honeycomb pattern which was confirmed by a Spectralis OCT. An exome sequencing in the proband's DNA allowed the identification of a novel heterozygous c.1482G>T variant in the *EFEMP1* gene, which predicts a p.Ter494TyrextTer29 extension variant at the protein level. This variant is classified as likely pathogenic and it is not included in population or Mexican databases. Sanger sequencing identified the same heterozygous *EFEMP1* pathogenic variant in the proband's affected children. Similarly, the recurrent p.Arg345Trp EFEMP1 variant classically causing malattia leventinese was absent.

Conclusions

Ocular phenotypes caused by pathogenic variants in *EFEMP1* include DHRD/MLVT, POAG and JOAG. To date, 10 different POAG/JOAG causing variants have been reported. By the other hand, DHRD/MLVT, a retinal dystrophy characterized by a honeycomb pattern of confluent drusen has been associated with a single missense variant in *EFEMP1*, p.Arg345Trp. In our JOAG patient, a honeycomb retinal dystrophy phenotype with the deposition of peripapillary drusen was found at funduscopy, although p.Arg345Trp was absent, and a heterozygous p.Ter494TyrextTer29 pathogenic variant was evidenced. To our knowledge this conjoint phenotype has not been previously reported in the literature and the variant has not been associated with DHRD.

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P-0150

CAUSAL ASSOCIATION OF TYPE 2 DIABETES ON PRIMARY OPEN-ANGLE GLAUCOMA AND INTRAOCULAR PRESSURE ELEVATION IN EAST ASIANS: A MENDELIAN RANDOMIZATION

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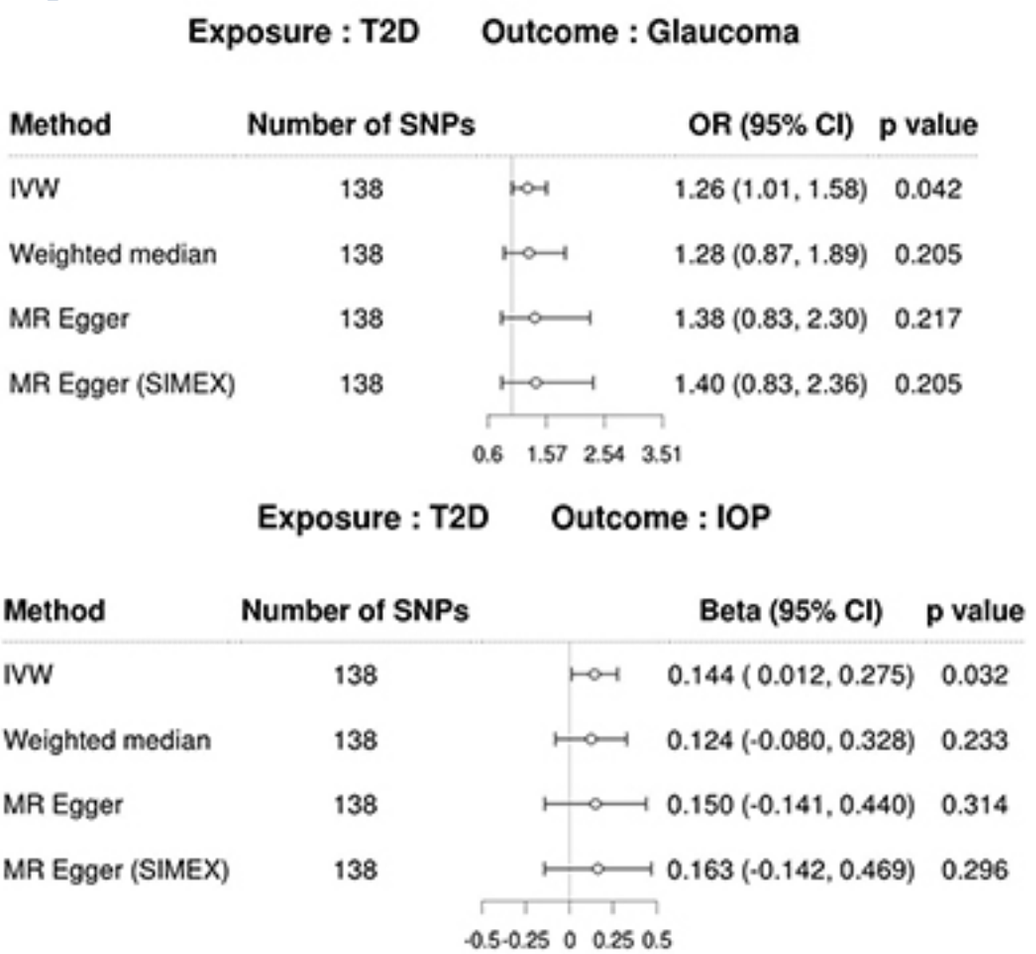
Background
Epidemiologic research has indicated potential relationships between type 2 diabetes (T2D) and primary open-angle glaucoma (POAG). However, most epidemiological studies have been conducted in people of European descent, and some previous studies have concluded that no correlation between diabetes and glaucoma is observed in East Asian population. This study investigated the potential causal association of T2D and POAG as well as intraocular pressure (IOP) in East Asian population.

Methods
Single-nucleotide polymorphisms (SNPs) significantly associated with T2D ($P < 5.0\times10^{8}$) were selected as instrumental variables from a genome-wide association study (GWAS)-based meta-analysis conducted by the Asian Genetic Epidemiology Network consortium. Genetic data for POAG and IOP were obtained from the Seoul National University Hospital Healthcare System Gangnam Center. A two-sample Mendelian randomization (MR) analysis was performed to evaluate the causal effect of T2D on POAG and IOP.

Results
The analysis revealed a significant causal relationship between T2D and POAG (odds ratio [OR] = 1.26, 95% confidence interval [CI] = 1.01–1.58, P = 0.042, using inverse-variance weighted [IVW] method) and elevated IOP (Beta = 0.144, 95% CI = 0.012–0.275, P = 0.032, using IVW).

Image



Conclusions

This study provides genetic evidence supporting T2D as a potential risk factor for increased POAG risk and elevated IOP in East Asians. Further research is required to confirm these findings and to clarify the role of T2D in the pathogenesis of POAG.

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P-0151

SARM1 MODULATION PROTECTS RETINAL CELLS FROM OXIDATIVE STRESS AND PYROPTOSIS VIA THE JNK PATHWAY

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Background

SARM1 is a critical regulator in neurodegenerative diseases, including retinal degeneration and optic neuropathy. However, the precise mechanisms by which SARM1 influences retinal cells in glaucoma remain unclear.

Methods

We generated a glaucoma model using CRISPR/Cas9-engineered mice harboring the MYOC mutation. Intraocular pressure (IOP) was measured using a TonoLab tonometer. Retinal ganglion cell (RGC) loss was assessed through hematoxylin and eosin staining, flat-mount retinal staining, and Nissl staining. In vitro retinal degeneration models were established using 661W cell lines treated with glucose oxidase (GOx) and sodium iodate (NaIO3). To inhibit SARM1's NADase activity, we added DSRM to the culture medium. Additionally, we constructed an shRNA targeting the SARM1 gene to suppress SARM1 expression. Cellular oxidative stress was evaluated by measuring mitochondrial membrane potential (MMP), reactive oxygen species (ROS), superoxide dismutase (SOD), GSH/GSSG, and malondialdehyde (MDA). Cell pyroptosis was examined through LDH assay and flow cytometry. Western blot and qRT-PCR were used to assess the expression of SARM1, its downstream molecules, pyroptosis-related proteins, and JNK pathway proteins.

Results

The CRISPR-engineered MYOC mutant mice displayed elevated IOP, reduced retinal thickness, and RGC loss, consistent with typical glaucoma phenotypes. We observed upregulation of SARM1 expression in both the retina and brain, along with increased expression of pyroptosis-related proteins, while NAD+ and NMNAT2 levels were reduced. *In vitro* studies demonstrated that treatment with DSRM or SARM1 shRNA significantly improved MMP, SOD, and GSH/GSSG levels, while reducing ROS and MDA levels in GOx- or NaIO3-treated retinal cell lines. Furthermore, DSRM treatment and SARM1 knockdown reduced the expression of NLRP3 and GSDMD. LDH and flow cytometry assays confirmed that SARM1 knockdown reduced cell death. Additionally, DSRM inhibited JNK phosphorylation in GOx-treated 661W cells. Treatment with JNK pathway activator, Anisomycin, reversed the protective effects of DSRM against oxidative injury and cell pyroptosis in GOx-induced 661W cells.

Conclusions

Our findings demonstrate that SARM1 expression and activity are elevated in the retinas of glaucomatous models. Both pharmacological and genetic downregulation of SARM1 protect retinal cells from oxidative stress and cell pyroptosis through the JNK pathway.

P-0152

NEUROFILAMENT LIGHT CHAIN IN AQUEOUS HUMOR OF GLAUCOMA PATIENTS CORRELATES WITH PROGRESSION OF RETINAL NERVE FIBER LAYER THINNING

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Background

We recently demonstrated that neurofilament light chain (NfL) levels are elevated in the aqueous humor of glaucoma patients. In this study, we investigate whether NfL levels are associated with future progression of retinal nerve fiber layer (RNFL) thinning.

Methods

This cohort study included 53 patients with glaucoma. Aqueous humor samples were collected during routine glaucoma surgeries. NfL levels in the aqueous humor were measured using the Simoa SR-X Analyzer (Quanterix; NF®LIGHT®, Lexington, MA, USA). Follow-up examinations were conducted at one week, one month, three months, six months, one year, and two years postoperatively. Visual field testing and RNFL thickness measurements were used to assess disease progression.

Results

A total of 53 patients were followed for up to two years after glaucoma surgery. The mean age was 73.7±9.9 years, and the mean preoperative intraocular pressure (IOP) was 26.6±8.4 mmHg. Glaucoma surgery effectively reduced IOP (15.4±4.8 mmHg and 14.7±6.1 mmHg, respectively). There was a significant correlation between RNFL thinning after surgery and NfL levels in the aqueous humor at the time of surgery ($r = 0.71$; $p < 0.001$).

Conclusions

NfL levels in the aqueous humor are significantly correlated with future glaucomatous progression. Given the challenges in monitoring glaucoma progression using conventional methods, our findings suggest that NfL may serve as a promising biomarker for evaluating glaucoma patients.

P-0153

ANALYZING A LARGE COHORT OF CHILDHOOD GLAUCOMA IN NORTH INDIA TOWARDS DEVELOPING EFFECTIVE GENETIC TESTING STRATEGIES

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Background
Genetic variants associated with childhood glaucoma show considerable variation across ethnic groups. Given the lack of established guidelines for genetic testing, this study aims to investigate pathogenic variants (PVs) through whole exome sequencing (WES) in North Indian children with glaucoma, focusing on genotype-phenotype correlations to develop suitable genetic testing strategies.

Methods
The study included children diagnosed with non-acquired glaucoma (NAG) between July 2022 and December 2024. Phenotypes were noted after examination under anaesthesia according to the Childhood Glaucoma Research Network (CGRN) classification. Genetic variants were assessed using ACMG guidelines, validated with Sanger sequencing, and evaluated for genotype-phenotype concordance.

Results
Among 228 children with NAG, the most common NAG phenotypes were Primary Congenital Glaucoma(PCG) (32%), Neonatal-Onset Congenital Ectropion Uvea(NO-CEU) (21%), Axenfeld-Rieger Syndrome (16.2%), Aniridia (8.3%), and Peters Anomaly (6.6%). Pathogenic Variants (PVs) were identified in 58% of cases, 18%were classified as variants of uncertain significance(VUS), and 25% of cases showed no variants. High genotype-phenotype concordance was noted in Microspherophakia, CHED, and Neurofibromatosis and Rubinstein-Taybi syndrome (100% in all). Significant concordance was found in NO-CEU (83.3%) and Aniridia (74%), moderate in PCG (44%) and low in Peters Anomaly (20%). Genetic testing led to reclassification in 11 NAG cases (2.9%).

Conclusions
WES proved effective in identifying phenotypes with both high and low concordance. The lack of a comprehensive genetic database and challenges such as the prevalence of VUS may have influenced the results. Minimal phenotype reclassification suggests that accurate phenotyping remains crucial.

Understanding genotype-phenotype correlations in a specific population is essential for selecting optimal genetic testing strategies for diagnosis and counselling. Phenotypes with high concordance could benefit from small, targeted gene panels, while those with low concordance, like Peters Anomaly, may require whole genome sequencing to discover novel genetic causes.

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P-0154

GENETIC ASSOCIATIONS OF SINGLE NUCLEOTIDE POLYMORPHISMS WITH PHENOTYPIC FEATURES IN KOREAN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA

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Background
The aim of this study was to explore the association between the single nucleotide polymorphisms (SNPs) and the phenotypic features including the optic nerve vertical cup-to-disc ratio (VCDR), retinal nerve fiber layer thickness (RNFLT), and visual field (VF) results in Korean patients with primary open-angle glaucoma (POAG).

Methods
One hundred and sixty POAG and 222 control patients were enrolled. In all patients, DNA was isolated from peripheral blood. In the 100 samples (50 POAG and 50 control patients), the target sequencing was done for 10 genes (DCLK1, SIX1, SIX6, SCYL1, RERE, CARD10, CHEK2, CDKN2B, CDC7, ATOH7) which were previously reported to be associated with phenotypic features in POAG patients. The 24 SNPs with a statistically significant association ($P < 0.05$) in the phenotypes of glaucoma were selected for follow up studies. With additional 282 samples (110 POAG and 172 control patients), a total of 382 samples (160 POAG and 222 control patients) were analyzed using the fluidigm genotyping. The allele frequencies of SNPs were compared between POAG and control patients. In addition, associations of the 24 SNPs with the phenotypes were analyzed.

Results
The allele frequencies of rs1936003 (DCLK1), rs77577824 (DCLK1), rs33912345 (SIX6) and rs76955800 (SCYL1) showed statistically significant differences between POAG and control patients ($P = 0.002$, 0.005, 0.03, and 0.03, respectively). The SNP rs1936003 (DCLK1), rs77577824 (DCLK1) and rs33912345 (SIX6) were associated with VCDR ($P = 0.009$, 0.01 and 0.003, respectively). The allele frequencies of rs1936003 (DCLK1), rs77577824 (DCLK1), rs33912345 (SIX6) and rs748189671 (RERE) were associated with average RNFLT ($P = 0.06$, 0.02, 0.001, and 0.002, respectively). In VF results, SNP rs781519092 (SIX1), rs748189671 (RERE) and rs200886369 (CARD1) were associated with mean deviation (all $P = 0.002$) and rs1805129 (CHEKC2) and rs2069426 (CDKN2B) with pattern standard deviation ($P = 0.03$ and 0.003, respectively). The SNP rs781519092 (SIX1) and rs748189671 (RERE) showed association with VF index (all $P = 0.03$).

Conclusions
This study identified significant associations between specific SNPs in DCLK1, SIX1, SIX6, SCYL1, RERE, CARD1, CHEK2, and CDKN2B genes and various phenotypic features of POAG in Korean patients. The findings suggest that these genetic variants may play a role in the pathogenesis of POAG and could potentially serve as biomarkers for disease risk assessment and progression monitoring in this population.

P-0155

POTENTIAL FUNCTIONS AND CAUSAL ASSOCIATIONS OF GNLY IN PRIMARY OPEN-ANGLE GLAUCOMA THROUGH MULTI-OMICS ANALYSES AND EXPERIMENTAL VERIFICATION

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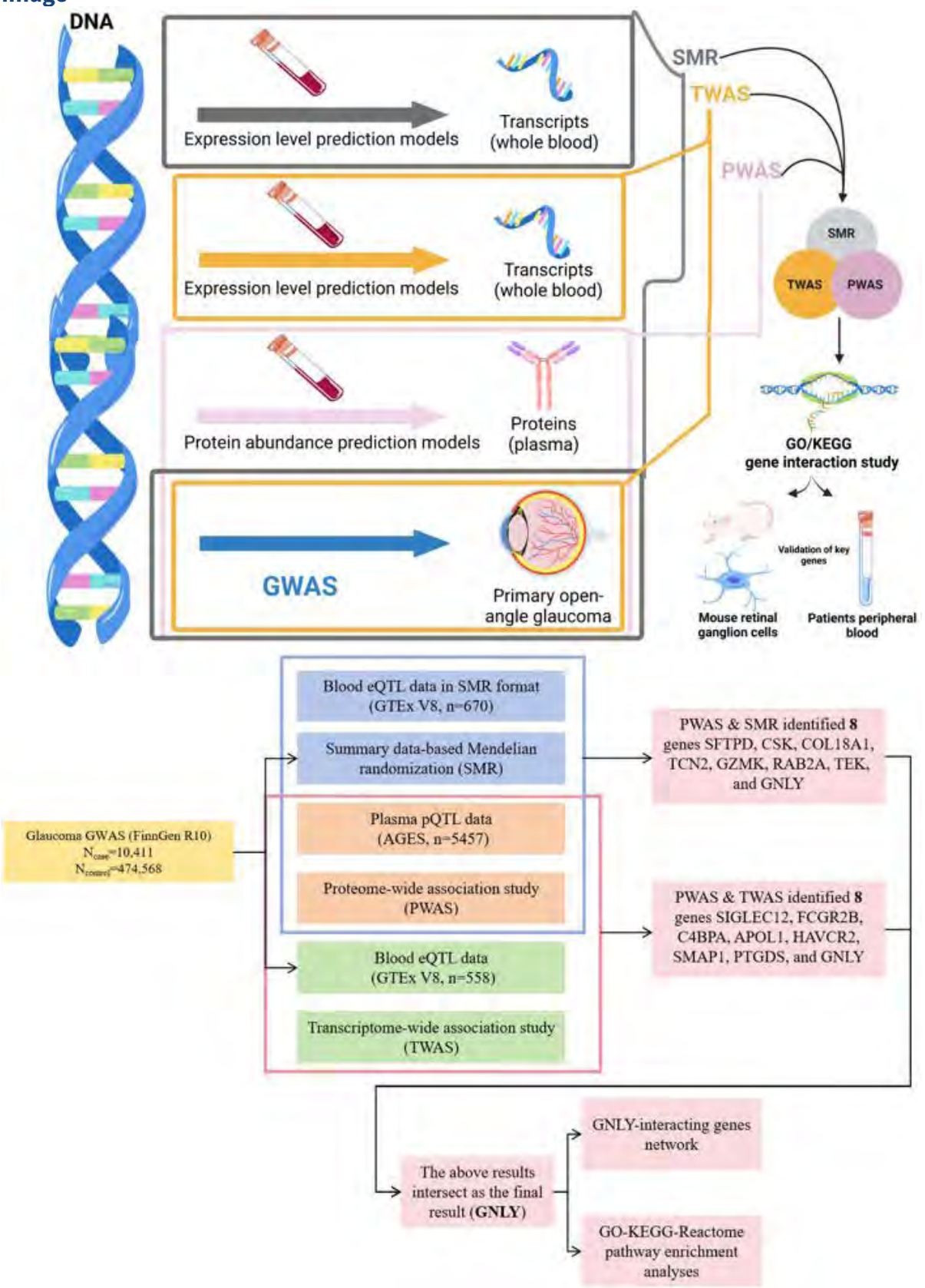
Background
Genome-wide association studies (GWAS) have identified multiple genetic loci associated with primary open-angle glaucoma (POAG). However, the mechanisms by which these loci contribute to POAG progression remain unclear. This study aimed to identify potential causative genes involved in the development of POAG.

Methods
We utilized multi-dimensional high-throughput data, integrating proteome-wide association study(PWAS), transcriptome-wide association study (TWAS), and summary data-based Mendelian randomization (SMR) analysis. This approach enabled the identification of genes influencing POAG risk by affecting gene expression and protein concentrations in the bloodstream. The key gene was validated through enzyme-linked immunosorbent assay (ELISA) analysis.

Results
PWAS identified 86 genes associated with altered blood protein levels in POAG patients. Of these, eight genes (SFTPD, CSK, COL18A1, TCN2, GZMK, RAB2A, TEK, and GNLY) were identified as likely causative for POAG (P_{SMR}<0.05). TWAS revealed that GNLY was significantly associated with POAG at the gene expression level. GNLY-interacting genes were found to play roles in immune dysregulation, inflammation, and apoptosis. Clinical and cell-based validation confirmed reduced GNLY expression in POAG groups.

Image



Conclusions

This study reveals GNLY as a significant potential therapeutic target for managing primary open-angle glaucoma.

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P-0160
OCULAR FINDINGS IN COCKAYNE SYNDROME TYPE II: CASE REPORT

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Background
Cockayne syndrome (CS) is an autosomal recessive disorder with low prevalence (1:100,000). Its main characteristics are dwarfism, developmental delay, photosensitivity dermatitis, typical facial appearance and early senility. There are 3 ways to classify the syndrome (type I, II and III). CS I is the most common form and begins early childhood; CS II begins earlier (congenital CS) with severe symptoms and lower life expectancy and CS III is a milder form that begins late in childhood. The purpose is to describe a case of bilateral congenital cataract and glaucomatous neuropathy in a child with CS type II.

Methods
The family and the patient were attended at the Altino Ventura Foundation (Brazil) and invited to participate in the case study. All information about the study and authorization for participation and use of images were clarified and signed in the Free and Informed Consent Terms. The child had to undergo an examination under anesthesia (EUA) with sevoflurane and propofol.The intraocular pressure (IOP) was measured with a Perkins applanation tonometer (PAT).

Results
An 1 year-old boy was referred for lack of eye contact with parents. The first ophthalmological examination shows both eyes with nystagmus and lens opacity. The right eye (OD) had also buphthalmos e corneal opacity. An asymmetrical deeper orbit (enophthalmos) was noticed in the left hemiface in relation to the right side. The child had to undergo an EUA to analyze details: corneal diameter of 13 mm in the OD and 12 mm in the left eye (OS), IOP of 31 mmHg in the OD and 13 mmHg in the OS. Both eyes have congenital lamellar cataract with central opacification and fundus examination revealed waxy optical disc pallor and mottling of the retinal pigment epithelium. At the same moment, ab externo 240-degree trabeculotomy was performed in OD. IOP remained stable bilaterally after 3 months of follow-up and cataract surgery in the OS was performed. A Miotic pupil with poor response to mydriatics and enophthalmos made cataract surgery difficult. It was necessary to use an iris retractor followed by aspiration of the cataract, anterior vitrectomy, posterior capsulotomy and the intraocular lens implant with the two haptics partially excised. In a new EUA to schedule cataract surgery in the OD, an elevated IOP measured with PAT was identified (27 mmHg) despite the trabeculotomy. Then an Ahmed glaucoma valve (AGV) FP8 was implanted in the OD in the lower nasal position to facilitate incision and handling of the eye during cataract surgery.

Image

Conclusions

CS is associated with an increased risk of childhood glaucoma uni or bilateral. Despite the rarity of the syndrome, it is known that the disease's genetic mutations cause changes in DNA transcription that impact the function and phenotype of ocular structures. Ophthalmological evaluation should be a priority for patients with CS.

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P-0163

PROTEOMIC SIGNATURES IN MILD VS ADVANCED GLAUCOMA: AN EXTENSIVE COMPARATIVE ANALYSIS INVOLVING 8000 MARKERS

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Background

Primary open-angle glaucoma (POAG) accounts for 90% of glaucoma cases in developed countries and is characterized by trabecular meshwork (TM) dysfunction, resulting in elevated intraocular pressure (IOP). While numerous studies have examined biomarkers across various types of glaucoma, extensive investigations linking the biochemical profiles of aqueous humor (AH) to different stages of glaucoma remain scarce. To bridge this gap, this study focuses on identifying proteomic biomarkers in the AH of POAG patients at early and advanced stages, aiming to elucidate the biological pathways underlying disease progression.

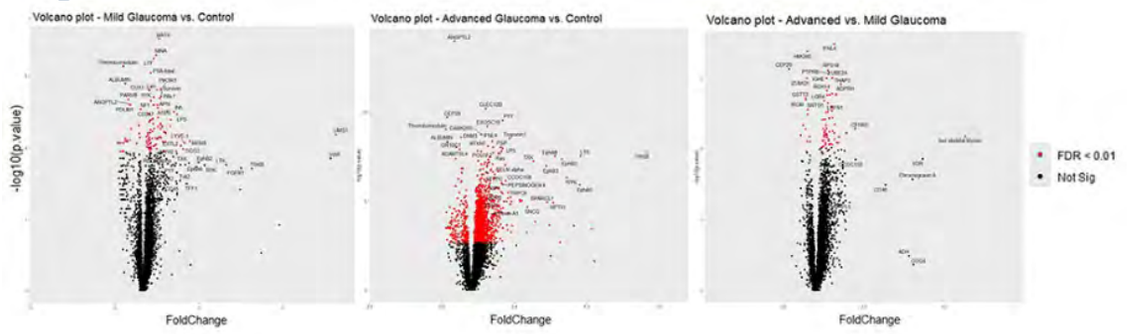
Methods

Three patient groups (control, mild glaucoma, and advanced glaucoma; n = 10/group) were recruited based on visual field mean deviation (MD) values within six months of enrollment, with research ethics board approvals from two participating centers. Aqueous humor (AH) samples (100 µL/eye) were collected before scheduled intraocular surgeries, snap-frozen, and analyzed using the RayBio® L8000 Biotin-Label Based Antibody Arrays to quantify 8,000 proteins. Patient demographics and clinical data, including IOP, visual fields, and OCT measurements, were incorporated into the principal component analysis (PCA). Differentially expressed biomarkers were identified using the Wilcoxon or t-test and a false discovery rate (FDR)<0.01 across the advanced versus control, advanced versus mild, and mild versus control groups.

Results

The advanced glaucoma group exhibited higher levels of specific proteins, including proinflammatory cytokines (IL-1, IL-17, IL-6), immune modulators (CD74, growth-related protein), vascular/angiogenic factors (Angiopoietin-1/2, endoglin), and structural proteins (matrix metalloproteinases, desmin). Clinical parameters were as follows: decision IOP of 18.8 ± 4.5 mmHg, visual field MD of -13.7 ± 7.7 dB, average cpRNFL thickness of 60.4 ± 10.9 µm, and average GCC thickness of 55.9 ± 10.0 µm, compared to 15.6 ± 5.9 mmHg, -4.7 ± 3.2 dB, 67.5 ± 7.5 µm, and 59.7 ± 7.6 µm in the mild group, and 12.1 ± 2.1 mmHg, -1.0 ± 2.5 dB, 83.4 ± 17.2 µm, and 68.2 ± 14.8 µm in controls respectively. Proteomic analysis of 8,000 AH molecules revealed distinct clustering in PCA and hierarchical heatmaps. Statistical tests identified numerous differentially expressed molecules (volcano plots).

Image



Conclusions

Upregulation of specific inflammatory, immune, angiogenic and tissue remodeling pathways correlate with glaucoma progression, and may contribute to disease mechanisms.

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P-0164

EFFECT MODIFICATION OF THE ASSOCIATION OF CAFFEINE INTAKE WITH EXFOLIATION GLAUCOMA BY GENETIC SUSCEPTIBILITY STATUS

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Background

The etiology of exfoliation syndrome and exfoliation glaucoma (XFG) likely involves complex genetic and environmental interactions. We have previously observed (1) that higher caffeine intake was associated with a higher risk of exfoliation glaucoma (XFG), particularly in those with a glaucoma family history. However, whether this association may differ by high susceptibility genetic loci identified by genome-wide association studies has been little studied.

Methods

A total of 36,885 participants in the Nurses' Health Study (1980–2018), Nurses' Health Study II (1991–2019) and Health Professionals Follow-up Study were followed if they were 40+ years old, had no history of glaucoma, had available data on 8 SNPs (*LOXL1* rs3825942, *LOXL1* rs1048661, *CACNA1A* rs4926244, *POMP* rs7329408, *TMEM136* rs11827818, *AGPAT1* rs3130283, *RBMS3* rs12490863 and *SEMA6A* rs10072088 variants) identified in a 2017 XFG GWAS (2) and reported eye exams. Updated self-reported caffeine intake use was assessed from validated food frequency questionnaires administered every 2-4 years. Each SNP was represented as the number of alleles (0,1,2) associated with a higher risk of XFG. Incident XFG cases were confirmed using medical records. We used per-eye Cox proportional hazards models, accounting for inter-eye correlations, to estimate multivariable-adjusted relative risks (MVRRs), 95% confidence intervals (CIs) and used a Wald test of the GRS x caffeine intake term to determine the p-value for interaction for 7 of the 8 SNPS (as models did not converge for *LOXL1* rs3825942); false discovery rate (FDR) was used for multiple testing correction.

Results

During 1,360,888 eye-years of follow-up, 162 eyes with XFG were documented. Among the 7 SNPs evaluated, we observed significant interactions only with *TMEM136* rs11827818 (risk allele=G; p-interaction$_{nominal}$=0.003; p-interaction$_{FDR}$=0.02); prior studies have shown that TMEM136 expression was mainly in ocular vascular endothelia. Among the non-carriers of the risk allele (n=25,997 with 111 incident XFG eyes), greater caffeine intake was not associated with XFG (MVRR$_{\geq 225 \text{ vs. } <225 mg/day}$=1.01; 95%CI: 0.60, 1.68). In contrast, among carriers of the risk allele (n=10,888 with 51 incident XFG eyes), higher caffeine intake was associated with XFG (MVRR$_{\geq 225 \text{ vs. } <225 mg/day}$=2.90; 95%CI: 1.51, 5.55).

Conclusions

Among participants who were carriers of the *TMEM136* rs11827818 risk allele, higher intake of caffeine was associated with a higher XFG risk. If confirmed, these results support gene-environment interactions involving dysfunction of vascular endothelia in XFG etiology.

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P-0165

ASSOCIATION BETWEEN TELOMERE LENGTH IN BLOOD CELLS AND RISK OF GLAUCOMA

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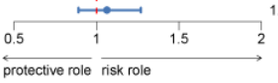
Background
Telomere length serves as a crucial indicator of cellular senescence, reflecting a cell's proliferative capacity and ability to maintain genomic stability. In blood cells, telomere length provides valuable insights into systemic aging and its association with immune-related disorders. Although glaucoma is both age-related and immune-associated, the relationship between telomere length in blood cells and glaucoma risk remains insufficiently investigated.

Methods
Mendelian randomization (MR) was conducted to investigate the associations between telomere length in blood cells and glaucoma, encompassing both primary open-angle glaucoma (POAG) and primary angle-closure glaucoma (PACG). Summary-level genome-wide association study (GWAS) data on telomere length in various blood cell types—granulocytes, lymphocytes, Naive T-cells, Memory T-cells, B-cells, and NK-cells—were obtained from Andreu-Sánchez et al. GWAS data on glaucoma subtypes were sourced from FinnGen R12. To assess the causal relationships between telomere length in blood cells and glaucoma subtypes, inverse-variance-weighted (IVW) methods were employed. Heterogeneity was evaluated using the Cochran Q statistic, and the MR-Egger intercept test was applied to detect horizontal pleiotropy. Sensitivity analyses, including weighted-median and weighted-mode approaches, were conducted to verify the robustness of the IVW findings.

Results
Genetically predicted increases in lymphocyte telomere length were associated with an elevated risk of PACG (Odds Ratio [OR] = 1.378, 95% Confidence Interval [CI]: 1.005–1.890, P = 0.047). Similarly, genetically predicted increases in Naive T-cell telomere length were associated with higher risks of both PACG (OR = 1.336, 95% CI: 1.001–1.784, P = 0.049) and POAG (OR = 1.120, 95% CI: 1.015–1.236, P = 0.024), with the findings replicated in sensitivity analyses utilizing the weighted-median approach (PACG: OR = 1.461, 95% CI: 1.057–2.020, P = 0.022; POAG: OR = 1.135, 95% CI: 1.006–1.282, P = 0.040). No significant associations were observed for other blood cell subtypes. Moreover, no evidence of significant horizontal pleiotropy or heterogeneity was detected.

Image

exposure	outcome	method	nsnp	P value	OR (95%CI)	P heterogeneity	P pleiotropy
Granulocyte telomere length	PACG	Inverse variance weighted	5	0.722	1.045 (0.820 to 1.332)	0.679	0.722
		Weighted median	5	0.460	1.120 (0.830 to 1.510)		
		Weighted mode	5	0.536	1.155 (0.761 to 1.753)		
	POAG	Inverse variance weighted	5	0.549	0.971 (0.883 to 1.068)	0.585	0.204
		Weighted median	5	0.716	0.978 (0.866 to 1.104)		
		Weighted mode	5	0.700	1.041 (0.862 to 1.257)		
Lymphocyte telomere length	PACG	Inverse variance weighted	3	**0.047**	1.378 (1.005 to 1.890)	0.319	0.584
		Weighted median	3	0.077	1.386 (0.965 to 1.991)		
		Weighted mode	3	0.705	1.132 (0.648 to 1.978)		
	POAG	Inverse variance weighted	3	0.384	1.065 (0.924 to 1.227)	0.223	0.599
		Weighted median	3	0.310	1.082 (0.929 to 1.259)		
		Weighted mode	3	0.376	1.142 (0.907 to 1.439)		
Naive T−cell telomere length	PACG	Inverse variance weighted	3	**0.049**	1.336 (1.001 to 1.784)	0.264	0.468
		Weighted median	3	**0.022**	1.461 (1.057 to 2.020)		
		Weighted mode	3	0.201	1.526 (0.982 to 2.371)		
	POAG	Inverse variance weighted	3	**0.024**	1.120 (1.015 to 1.236)	0.816	0.754
		Weighted median	3	**0.040**	1.135 (1.006 to 1.282)		
		Weighted mode	3	0.211	1.141 (0.989 to 1.316)		
Memory T−cell telomere length	PACG	Inverse variance weighted	5	0.488	1.100 (0.840 to 1.441)	0.958	0.596
		Weighted median	5	0.524	1.111 (0.803 to 1.538)		
		Weighted mode	5	0.520	1.132 (0.802 to 1.599)		
	POAG	Inverse variance weighted	5	0.453	1.041 (0.937 to 1.158)	0.651	0.833
		Weighted median	5	0.620	1.035 (0.904 to 1.184)		
		Weighted mode	5	0.690	1.031 (0.897 to 1.185)		
B−cell telomere length	PACG	Inverse variance weighted	4	0.771	0.953 (0.690 to 1.317)	0.247	0.372
		Weighted median	4	0.313	0.825 (0.568 to 1.199)		
		Weighted mode	4	0.378	0.778 (0.483 to 1.254)		
	POAG	Inverse variance weighted	4	0.387	0.953 (0.856 to 1.062)	0.588	0.536
		Weighted median	4	0.328	0.930 (0.804 to 1.076)		
		Weighted mode	4	0.393	0.915 (0.769 to 1.090)		
NK−cell telomere length	PACG	Inverse variance weighted	4	0.336	1.138 (0.875 to 1.481)	0.398	0.773
		Weighted median	4	0.448	1.133 (0.821 to 1.563)		
		Weighted mode	4	0.622	1.118 (0.749 to 1.669)		
	POAG	Inverse variance weighted	4	0.699	1.021 (0.920 to 1.132)	0.461	0.515
		Weighted median	4	0.593	1.036 (0.910 to 1.180)		
		Weighted mode	4	0.546	1.063 (0.891 to 1.269)		



P<0.05 was considered significant

Conclusions

The research findings demonstrated that increased telomere length in lymphocytes and Naive T-cells was associated with a higher risk of glaucoma. Increased telomere length in immune cells, correlated with enhanced proliferation and immune responses, suggest that telomere length may influence glaucoma risk through immune system dysregulation. This relationship appears to be particularly significant in lymphocytes and Naive T-cells, warranting further investigation.

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P-0166

EPIDEMIOLOGICAL AND GENETIC INSIGHTS INTO THE GENDER-SPECIFIC RELATIONSHIP BETWEEN MIGRAINE AND PRIMARY OPEN-ANGLE GLAUCOMA

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Background
Endothelial dysfunction and vasculopathy are linked to both migraine and primary open-angle glaucoma (POAG). Studies on the relationship between migraine and POAG have yielded inconsistent results, likely due to misclassification of headache symptoms and underpowered studies. Understanding this relationship may provide insights into the shared mechanisms of both diseases.

Methods
The case-control arm of the study included 97 patients (aged 40-80 years). Exclusion criteria included history of head injury, intracranial abnormality, secondary glaucoma, or angle-closure glaucoma. We used the International Classification of Headache Disorders-3 criteria for migraine diagnosis. Multivariate logistic regression, adjusted for age, sex, BMI, hypertension, diabetes, and self-reported ancestry, was used to evaluate the relationship between migraine history and POAG status. The genetic arm of the study consisted of sex-stratified GWAS summary statistics derived from the UK Biobank for self-reported migraine (N_{female}=245,494, 10,352 cases; N_{male}=206,770, 2,889 cases) and ICD-10 H40-coded glaucoma (N_{female}=245,494, 2,423 cases; N_{male}=206,770, 2,413 cases). Sex-stratified single nucleotide polymorphism heritability (h^2) and bivariate genetic correlations (r_g) were calculated using Linkage Disequilibrium Score Regression on the liability scale.

Results
In the case-control study, subjects (mean age: 64.9±10.4 years, 65.3% females) were 49.0% Caucasian, 33.7% African, 12.2% Asian, and 4.1% other. POAG prevalence in migraineurs vs. non-migraineurs was 17/28 (60.7%) vs. 14/36 (38.9%) in females and 2/5 (40%) vs. 23/28 (82.1%) in males. The overall odds ratio (OR) for POAG diagnosis in migraineurs vs. non-migraineurs was 2.63 (95% CI: 0.63–10.97). For females, the OR was 9.24 (95% CI: 1.40–61.08), while the male subgroup showed a positive OR with unstable CIs due to a small sample size. Genetic analysis revealed migraine heritabilities of h^2_{female}=0.25 (SE: 0.03) and h^2_{male}=0.11 (SE: 0.05). Glaucoma heritabilities were h^2_{female}=0.12 (SE: 0.05) and h^2_{male}=0.13 (SE: 0.05). Genetic correlation between migraine and glaucoma was $r_{g,female}$=0.17 (SE: 0.12, p=0.18) and $r_{g,male}$=-0.20 (SE: 0.33, p=0.55), showing opposing trends, although neither reached significance.

Conclusions
Our findings emphasize the need for sex-stratified analyses in studying the relationship between migraine and POAG. These analyses may reveal sex-specific mechanisms and clarify genetic and pathophysiological overlap between these diseases.

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P-0168

PHENOTYPE OF CYTOCHROME P4501B1 GENE (CYP1B1) MUTATIONS IN CHINESE PATIENTS WITH PRIMARY CONGENITAL GLAUCOMA

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Background
To screen primary congenital glaucoma (PCG) patients in North China for sequence variants within the CYP1B1 gene and to explore its correlation with the outcomes of microcatheter-assisted trabeculotomy (MAT) and other phenotypes in eyes with PCG.

Methods
149 PCG patients (139 families), 278 unaffected family members of the PCG probands and 100 healthy unrelated individuals were recruited from Beijing Tongren Eye center and Beijing Children's Hospital. Sanger sequencing of CYP1B1 was performed on 139 probands deoxyribonucleic acid samples. MAT was performed as the first glaucoma surgery on 98 eyes with PCG (59 patients). Ultrasound biomicroscopy (UBM) was performed to evaluate characteristics of trabeculodysgenesis. The clinical features were compared between patients with or without CYP1B1 mutation. Surgical success was defined as a postoperative intraocular pressure of ≤21 mm Hg with at least a 30% reduction from preoperative IOP without additional medical or surgical therapy, and with decreased corneal edema, stabilized corneal diameter, and no additional optic nerve damage for at least 6 months after surgery.

Results
Seventeen PCG families (12.2%) manifested disease phenotypes attributable to *CYP1B1* mutations. Seven families possessed homozygous mutant alleles, whereas 10 families carried compound heterozygous mutations. Eight mutations were novel (p.T32P, p.I103Pfs*120, p.S112X p.S131I, p.H309Lfs*19, p.W341X, p.W425X, p.481_481del). The median of onset age for patients with CYP1B1 mutations(0.35±0.7m) is earlier than in patients without mutations(12.4±21.1m). The male: female ratio was 12:7 in the mutation group and 93:37 in the no mutation group. Patients with mutation have poorer corneal transparency, more anterior insertion of iris and ciliary processes, lower success rate of schlemm's canal catheterizing in MAT and poorer surgical outcome.

Conclusions
In patients with CYP1B1mutation, age at onset is earlier, male incidence is lower. They have poorer corneal transparency and more severe trabeculodysgenesis. The success rate of schlemm's catheterizing in MAT is lower and surgical outcomes are poorer.

P-0171

GENETIC SCREENING FOR MYOCILIN (MYOC) MUTATIONS IN FAMILIES OF JUVENILE OPEN-ANGLE GLAUCOMA (JOAG) PATIENTS IN A SOUTH INDIAN POPULATION

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Background
JOAG is a rare form of glaucoma that typically affects individuals aged 3 to 40. It is associated with mutations in the Myocilin (MYOC) gene and is characterized by autosomal dominant inheritance. This condition is marked by its early onset and rapid progression, often leading to high intraocular pressures and significant vision loss if not treated. The purpose of this study was to evaluate the prevalence of Myocilin mutations in the families of patients have JOAG. and test positive for Myocilin.

Methods
: We conducted a retrospective study involving 179 patients diagnosed with JOAG who visited our hospital within the last two years. Among these patients, we identified 56 individuals with a family history of glaucoma and screened them, along with their family members, for myocilin mutations. To begin the mutational screening, we isolated genomic DNA from blood samples. DNA amplification followed, and we performed bi-directional sequencing using a 3130 Genetic Analyzer (Applied Biosystems). The sequencing results were then compared to the reference sequence of the MYOC gene (NG_008859.1) using Chromas Lite (version 2.1) and MEGA software. All study subjects were included in the screening of all three exons of the MYOC gene.

Results
Five different pathogenic myocilin heterozygous mutations, one of which is a novel mutation, were identified in five families. Thirteen JOAG/POAG patients and three normal family members were found to be positive for myocilin mutations. In addition, a homozygous mutation was detected in two families, which were segregated by phenotype. These mutations require further studies to show their role in myocilin glaucoma pathogenesis.

Conclusions
This study shows that 12.5% of families with multiple JOAG patients carry Myocilin mutations. Screening family members of affected individuals is crucial, as it helps identify asymptomatic carriers early. Early diagnosis and intervention can significantly delay or prevent disease progression, preserving vision and improving long-term outcomes

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P-0174
THE POTENTIAL OF IL-18 BLOCKADE IN GLAUCOMA MANAGEMENT

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Background
As 10-15% of glaucoma patients continue to progress despite good intraocular pressure (IOP) control or do not respond to lowering medications, there is an urgent need to identify newer therapeutic targets in the management of glaucoma. Interleukin (IL)-18, a pro-inflammatory cytokine known for its causal role in neuroinflammation and neurodegeneration. Hence, the current study determines the level of IL-18 in aqueous humor (AH) of primary glaucoma (PG) patients and study its causal role in glaucoma.

Methods
AH was collected from110 PG eyes that included Primary open angle glaucoma (POAG, n=65) and Primary angle closure glaucoma (PACG, n=45) during trabeculectomy and from 50 controls during cataract surgery. Further PG patients were grouped as severe and non-severe based on visual field index (VFI) on Humphery perimeter; progressors or non-progressors based on change in VFI over 1 year, and responders or non-responders based on response to IOP lowering medication or trabeculectomy. IL-18 was measured in the AH by bead-based ELISA. The effect of IL-18 on neurons and trabecular meshwork cells were studied *in vitro*.

Results
IL-18 was significantly higher in the AH of PG compared to controls subjects (P≤0.05). In addition, IL-18 levels were observed to significantly higher (i) in patients with severe forms of the disease compared to non-severe forms (P≤0.05); (ii) in progressors compared to stable patients (P≤0.05); (iii) in non-responders to IOP lowering medication compared to responders (P≤0.05); and (iv) in non-responders to trabeculectomy compared to responders (P≤0.05). Mechanistic studies showed that IL-18 reduced neurite length in neuron model and induced fibrosis-associated molecular changes in trabecular meshwork cells.

Conclusions
Our findings demonstrate that increased intraocular IL-18 is associated with poor prognosis, sub-optimal response to therapy and disease pathogenesis in glaucoma.

Clinical Implication: The possibility of objective quantification of IL-18 and targeting options using IL-18 binding protein or monoclonal antibodies opens up the potential of IL-18 blockade as an adjunct to glaucoma treatment, particularly in those refractory to current treatment regimens.

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P-0175
MOLECULAR GENETICS OF BLAU SYNDROME

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Background
To study the clinical characteristics, causative genes, and inheritance patterns of three Chinese families with Blau syndrome.

Methods
Three families with Blau syndrome were enrolled in this study. Ophthalmic examinations and general physical examinations were performed and peripheral blood samples were collected. Genomic DNA was extracted from the peripheral blood of the three probands for Whole Exome Sequencing (WES). After bioinformatics analyses including assessment of deleteriousness, pathogenicity, population frequency and Sanger sequencing combined with co-segregation analysis, suspected pathogenic genes were identified. For a family suspected of germline mosaicism, high-precision targeted sequencing was performed on samples collected from the proband's mother, including oral mucosa, skin epidermal cells, urine, and cervical exfoliated cells. Subsequent chromosome origin analysis was conducted using haplotype analysis.

Results
In family I, the proband suffered from uveitis and secondary glaucoma, with contracture of the interphalangeal joints in the ring and little fingers. Two *NOD2* gene mutations were identified: c.1538T>C: p.M513T and c.2863G>A: p.V955I. Sanger sequencing confirmed that only c.2863G>A was inherited from the mother. Literature review and bioinformatics analysis indicated that c.1538T>C was a de novo and pathogenic mutation, while c.2863G>A was a benign variant. In family II, the proband had uveitis with secondary glaucoma, abnormal interphalangeal joints, subluxation of the left wrist, knee effusion, and ichthyosis-like skin changes. The mother exhibited more severe symptoms than the proband, and both carried the *NOD2* gene mutation: c.1809C>G: p.H603Q, while the other family members were wild type. In family III, the proband had uveitis and secondary glaucoma, abnormal interphalangeal joints, and ichthyosis-like skin changes. His brother was blind, with swollen knee and ankle joints, and ichthyosis-like skin changes. Both patients carried the *NOD2* gene mutation: c.1534G>T: p.D512Y, and the other family members were wild type. High-precision targeted sequencing analysis did not detect low expression of *NOD2* mutations in the somatic cells of the mother in family III. Haplotype analysis confirmed that the chromosomes carrying the *NOD2* gene mutations in the proband and his brother both originated from their mother, thus confirming that she was a germline mosaic.

Conclusions
Three families with Blau syndrome carrying different *NOD2* gene variants were analyzed and four variants were identified: c.1538T>C, c.2863G>A, c.1809C>G, and c.1534G>T. Among these, c.2863G>A was considered a benign variant, while the others were pathogenic, with c.1809C>G being a novel pathogenic mutation. The identification of new pathogenic variants contributed to expanding the spectrum of genetic mutations associated with Blau syndrome and laid the foundation for future clinical diagnosis, genetic counseling, and eugenics.

P-0176

POLYMORPHISM IN THE HSPA5 (-415) LOCUS ASSOCIATED WITH REDUCED RISK OF PRIMARY OPEN ANGLE GLAUCOMA

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Background

Heat shock 70 kDa protein 5 (HSPA5) is a key marker of the unfolded protein response (UPR) chaperones reactive to endoplasmic reticulum (ER) stress to block the apoptotic process. Malfunction of UPR to ER stress and HSPA5 have been implicated in primary open angle glaucoma (POAG) pathogenesis. Promoter polymorphisms in the HSPA5 gene, located at position -415, which may be responsible for transcriptional regulation of HSPA5 protein production. In this study we investigated the possible association between the HSPA5 (-415) polymorphism and the development of POAG.

Methods

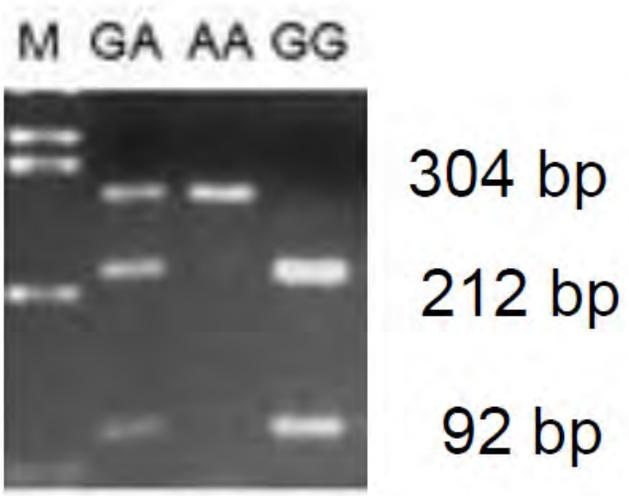
A total of 126 patients with POAG were recruited and compared with 123 healthy controls in a Chinese population. Genomic DNA was amplified by a polymerase chain reaction, followed by the enzymatic restriction fragment length polymorphism technique (PCR-RFLP). Patients and controls were genotyped for the A/G polymorphism at position -415 of the HSPA5 gene promoter region.

Results

The frequency of the HSPA5 (-415)A allele (23% vs. 35%, respectively; p=**0.006**) and the carriers of the HSPA5 (-415)A allele (41% vs.58%; P =**0.01**, OR 0.51, 95%CI 0.31-0.85) were lower in POAG patients compared with those in controls. The genotype AA and AG ware less frequent in POAG patients than in controls. (AA genotype; 6% vs. 12%, respectively, P =**0.04**) (AG genotype; 35% vs. 46%, P =**0.03**).(Table 1,2) (Fig 1)

Image

(Fig.1)



Conclusions

The HSPA5 (-415)A allele polymorphism may be a protective factor in the development of POAG.

P-0179
MICRORNA EXPRESSION IN PSEUDOEXFOLIATION SYNDROME

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Background
Pseudoexfoliation syndrome (PEX) is an age-related clinically important systemic disorder of the extracellular matrix, in which abnormal material accumulates in the anterior segment of the eyeball. Despite numerous studies, the exact etiopathogenesis of PEX remains unknown. MicroRNAs (miR) are single-stranded, non-coding, endogenous regulatory molecule. Their main function is post-transcriptional regulation of the expression of numerous genes that is way miR represent a leading class of gene regulators.

Methods
A fragment of the anterior lens capsule was collected during cataract extraction. Analysis of miR-125b expression in 150 patients was performed using Real-Time PCR and miR sequencing in 10 patients using miSeq. The aim was to analyze the variability of expression of selected miR in pseudoexfoliation syndrome. The comparison of miR-125b expression in PEX group with a control group, primary open angle glaucoma and pseudoexfoliative glaucoma was done, the effect of selected environmental factors on miR-125b expression was checked. Additional goals were to create miR profiles and identify PEX-related miRs which expression should be studied in detail in further studies.

Results
The expression of miR-125b was increased in each of the study groups compared to the control group. Qualitative analysis revealed statistically significant 3.33-fold higher miR-125b expresion in PEX. Quantitative analysis of miR-125b expression carried out between the combined group consisting of all patients with or without pseudoexfoliation syndrome and a control group revealed a statistically significant difference. Lower levels of miR-125b expression were found in smokers compared to non-smokers. The same 10 miRs occur at the highest concentration in the control group and PEX. The top 5 miRs were 90% of reads (miR-184, let-7a-5p, let-7c-5p, let-7f-5p, miR-204-5p). There were 4 miR with statistically significant difference in expression between the groups - miR-671-3p, miR374a-5p, miR-1307-5p and miR-708-5p.

Conclusions
An interesting and innovative aspect of the work was to demonstrate significant relationship between the coexistence of PEX and the increased expression of miR-125b in the lens capsule and also to check that the same 10 miRs were present at the highest concentration in PEX and in the control group. Additionally 4 miRs with a statistically significant difference in expression between the groups were found (miR-671-3p, miR374a-5p, miR-1307-5p and miR-708-5p). That can be crucial to understand the etiology of PEX and which expression should be checked in further studies. MicroRNAs, which are a powerful modulator of cell activity, give hope for effective diagnostic and therapeutic strategies for PEX. More research is needed to determine the role of miR in PEX.

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P-0184

POSTERIOR MICROPHTHALMOS PIGMENTARY RETINOPATHY SYNDROME WITH ANGLE CLOSURE GLAUCOMA: A CASE REPORT

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Background

Microphthalmos is a rare ocular defect that manifests with short axial length, shallow anterior chamber, and thickening of choroid and sclera. This entity can be associated with ocular or extraocular anomalies. An uncommon association includes nanophthalmos or posterior microphthalmos, retinal pigmentary dystrophy, foveoschisis, and optic nerve head (ONH) drusen. This association is considered posterior microphthalmos pigmentary retinopathy syndrome (PMPRS). Angleclosure glaucoma (ACG) is a possible complication of this syndrome. In this study, we aim to describe the case of a patient with a particular form of this syndrome and to discuss ACG management in these eyes.

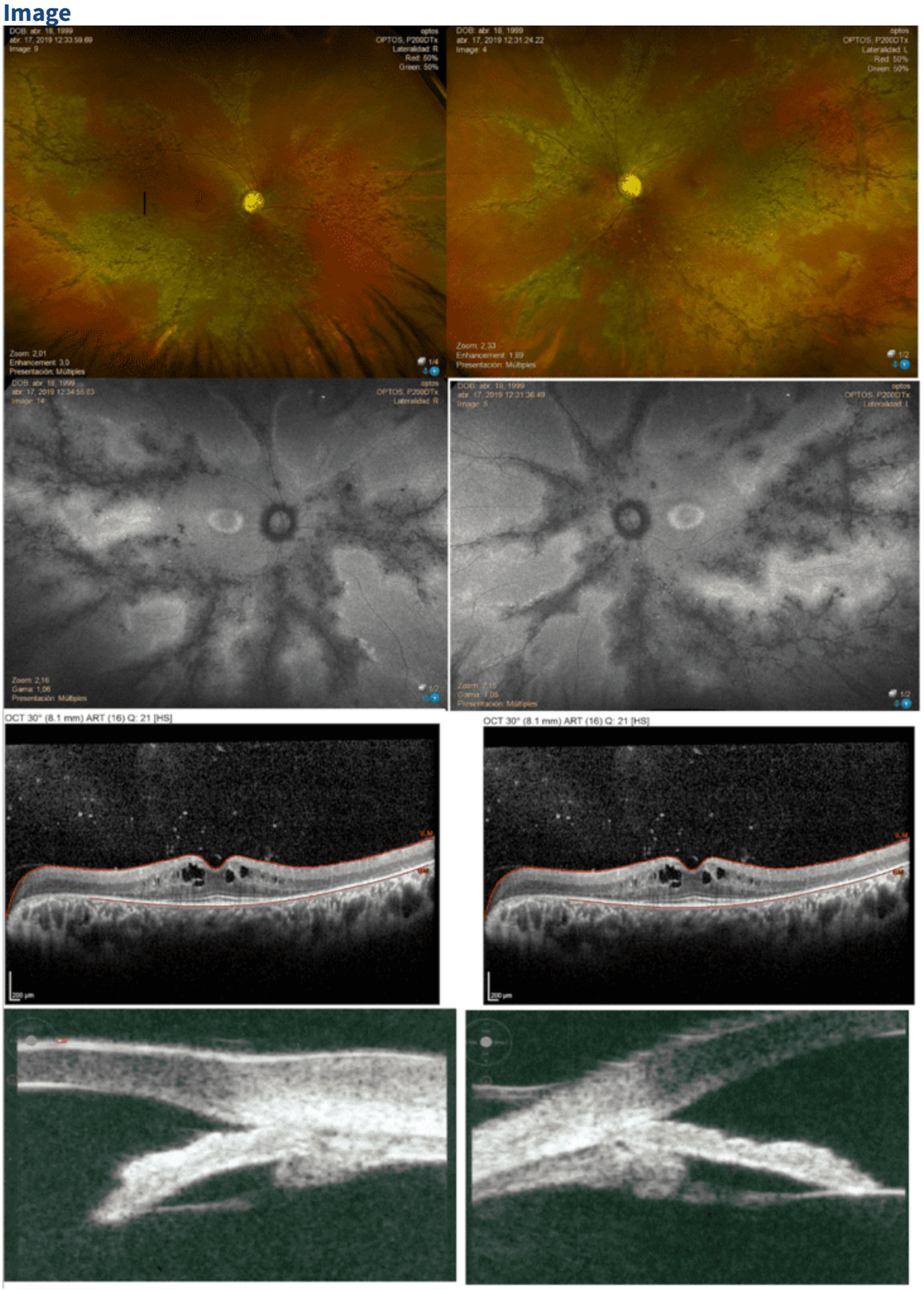
Methods

This is a 25-year-old female patient with progressive visual loss of 5 years' duration. Intraocular pressure was 24 mmHg bilaterally. She had anterior peripheral synechiae in 360º on gonioscopy. On examination of the fundus, the optic nerve was found to have a 0.95 cup, in addition to presenting retinal alterations compatible with retinitis pigmentosa in both eyes. Multimodal studies were performed such as an optical coherence tomography of the macular area which revealed foveoschisis and ocular biometry. This association is considered posterior microphthalmos pigmentary retinopathy syndrome (PMPRS).

Results

Due to ocular hypertension, posterior synechiae and evident damage to the optic nerve, the patient was classified as angle-closure glaucoma. Examination of the retina at the fundus showed arteriolar attenuation, hyperpigmentary changes in the form of bone spicules and optic disc pallor. Optical coherence tomography showed bilateral foveoschisis. Due to this finding, it was decided to perform ocular biometry, which revealed a short axial length. The patient underwent trabeculectomy in both eyes, which required needling and subsequently the application of micropulse transscleral cyclophotocoagulation for adequate control of intraocular pressure.

Image



Conclusions

In its typical forms, PMPR syndrome is an association of nanophthalmos - Retinitis Pigmentosa - foveoschisis and optic nerve head (ONH) drusen. Incomplete phenotypes may lack ONH drusen or foveoschisis. The presence of angle-closure glaucoma is not a typical finding of this syndrome, so an adequate ophthalmologic examination should be performed, including gonioscopy, to detect and treat it in time to avoid further visual loss in eyes already compromised by retinal dystrophy.

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P-0185

THE ROLE OF AQUEOUS HUMOR MICROBIOME IN DIFFERENT EYE DISEASE: A METAGENOMIC PERSPECTIVE

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Background
The recent studies present the evidence of intraocular microbiota in humans, but the relationship between the intraocular microbiome and the diseases still unclear.

Methods
We compared microbiomes in the aqueous humor samples by using metagenomic next-generation sequencing (mNGS), aqueous humor samples were collected from 66 primary open angle glaucoma (POAG) patients, 35 Posner-Schlossman syndrome (PSS) patients, 37 cataract patients and 31 myopia patients with intraocular lens (ICL) implantion surgery as control group.

Results
Differences in microbiota profiles were determined through a comparison of the indicated groups. In our study, AUC model by microbial normalization analysis shows there were microbiomes in different groups. Alpha diversity analysis showed significant differences in microbial community structure between the POAG group and cataract group (P=0.012) and ICL (P=0.01) group. Samples of POAG group displayed decreased richness and diversity of the microbiota compared to PSS, cataract and ICL groups. Key findings include a higher abundance of *Paeniglutamicibacter* and *Sphingomonas* in the POAG group, *Cytomegalovirus* and *Human betaherpesvirus 5* in the PSS group, *Penicillium* in the cataract group, suggesting their potential as biomarkers for difference diseases. In the contrast, *Pseudomonadota, Hankyongella* and *Pandoraea* were more abundant in the ICL group. Correlation analysis further indicated a relationship between microbiomes and diseases. Our data first demonstrated signature intraocular microbiome of POAG and PSS patients with cataract and ICL group as normal control, which could be potential predict biomarkers.

Conclusions
Our findings suggest that alterations in the microbiota may play a role in the complex scenario of different eye diseases.

P-0186

ASSOCIATION OF METABOLIC PARAMETERS IN DIABETIC PATIENTS WITH THE SEVERITY AND PREVALENCE OF GLAUCOMA

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Background
Glaucoma is the leading cause of irreversible blindness worldwide. It is characterized by the loss of nerve fibers in the optic nerve, with progressive deterioration of the visual field. In most cases, its pathogenesis is associated with elevated intraocular pressure and systemic vascular factors. While glycated hemoglobin (HbA1c) is an important marker of glycemic control and microalbuminuria is a parameter linked to microvascular damage, their relationship with glaucoma remains insufficiently understood. The aim of this study was to evaluate the association between metabolic parameters in diabetic patients and the severity and prevalence of glaucoma.

Methods
A descriptive cross-sectional design was used. The 850 participants were selected between 2021 and 2024 from an ophthalmology referral center in Cartagena, Colombia. The sole inclusion criterion was a history of diabetes and available blood biochemistry tests, including glycated hemoglobin and microalbuminuria. All patients underwent a complete ophthalmologic exam by a single glaucoma subspecialist to confirm the diagnosis. Statistical analysis was performed using Epi Info v.72 software.

Results
A preliminary sample of 194 cases from 97 patients was obtained, with a mean age of 61.9 years. 59.8% of the participants were women. 23.7% of the sample had a diagnosis of glaucoma, with open-angle glaucoma being the most frequent type. Among the glaucoma patients, 22.6% had HbA1c values <7, and 21.8% had HbA1c values ≥7, though these differences were not statistically significant. Regarding microalbuminuria, 81.4% of the patients diagnosed with glaucoma had blood levels >31 mg/dL (moderate increase). As for glaucoma severity, 65.2% of patients in moderate to terminal stages had microalbuminuria levels >31 mg/dL. All patients diagnosed with neovascular glaucoma showed moderate to high levels of microalbuminuria.

Conclusions
Preliminary results suggest a strong association between renal damage and glaucoma severity, regardless of type. This highlights the need for comprehensive renal function assessment in the management of these patients. It is important to note that this report is presented as a preliminary phase of the study, which is still ongoing.

P-0187

CYP1B1 VARIANTS IN INDIAN PRIMARY CONGENITAL GLAUCOMA: GENETIC PROFILING AND CLINICAL OUTCOMES

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Background
To profile and analyse CYP1B1 variants in an Indian cohort of primary congenital glaucoma (PCG) and to evaluate clinical outcomes.

Methods
Twenty-eight clinically diagnosed PCG cases from a tertiary eye care centre were subjected to whole exome sequencing. Identified CYP1B1 variants were categorized into A2 (exon 2) and A3 (exon 3) clusters and analyzed using in silico tools. Clinical outcomes were classified as complete success, qualified success, and failure and they were evaluated in relation to genetic and clinical parameters using Cox proportional hazards model.

Results
Seventeen distinct CYP1B1 variants were identified across 28 cases, including 12 missense, 1 nonsense, 2 stop-gain, and 2 frameshift variants. Five were novel. The recurrent variants were p.Arg368His, p.Cys280Ter, and p.Arg390His. A2 cluster variants were observed in 12 cases, and A3 in 16. Protein structural analysis showed hydrophobicity changes, altered hydrogen bonding, and ligand binding variations. Multivariate analysis revealed that genetic clusters, variant conservation, and clinical factors such as gender, age, medication use, and corneal clarity were significantly associated with outcomes. A2 variants were associated with better outcomes, while severe phenotypes were linked to variants like p.Arg390His. Male gender, older age at presentation, and preoperative medications were linked to poor outcomes.

Conclusions
CYP1B1 variants significantly contribute to PCG pathogenesis in Indian patients. A2 variants were protective, while more conserved variants like p.Arg390His were linked to severe outcomes. Tailoring treatment strategies based on genetic and clinical risk factors can improve PCG management.

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P-0188

NEUROPEPTIDE Y AS AN INFLAMMATORY MARKER IN ADULTS WITH PRIMARY OPEN-ANGLE GLAUCOMA AND OCULAR SURFACE DISEASE: A PILOT STUDY

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Background

Primary Open-Angle Glaucoma (POAG) and Ocular Surface Disease (OSD) often coexist, leading to more complex challenges because of chronic inflammation and also because of the side effects that glaucoma medications impose on these patients. The aim of the present study is to identify the characteristics of Neuropeptide Y as an inflammatory marker to clarify the role in both diseases. Till now, the exact involvement of NPY is unclear through different disease stages. Understanding this biomarker can guide targeted interventions, which might be useful in improving the outcome in these patients.

Methods

A prospective, observational, and longitudinal study was conducted involving patients with POAG and OSD, and a control group of healthy individuals. Clinical parameters, such as tear break-up time (TBUT), corneal staining, and Schirmer's tests, were assessed. Tear samples were collected using capillarity methods and analyzed via ELISA for NPY levels. Statistical analyses included correlation tests and regression models to explore relationships between biomarkers and clinical parameters.

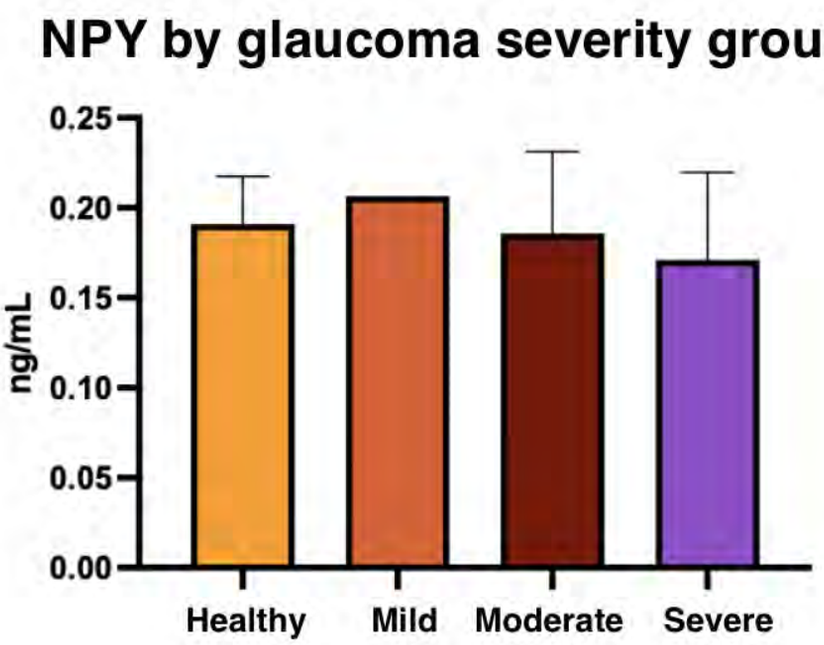
Results

The study analyzed tear samples from 13 POAG patients with OSD and 8 healthy controls. The mean NPY concentration in POAG patients was 0.1856 ng/mL (SD = 0.03396), slightly lower than in controls (0.1909 ng/mL, SD = 0.02653). No statistically significant differences were observed ($p > 0.05$).

When stratified by glaucoma severity, a trend emerged: NPY levels were higher in mild glaucoma (0.2064 ng/mL) and lower in severe stages (0.1712 ng/mL), though this was not statistically significant ($p > 0.05$). Correlation analyses revealed minimal association between NPY levels and clinical parameters, OSD symptom severity (OSDI scores): $r = 0.01082$, $p = 0.9721$ and tear production (Schirmer tests): Schirmer I, $r = 0.1518$, $p = 0.4498$; Schirmer II, $r = 0.09911$, $p = 0.6228$.

The findings suggest stage-dependent variability in NPY levels, with potential compensatory elevation in early glaucoma and decline in advanced stages, reflecting vascular and autonomic dysfunction.

Image



Conclusions

This pilot study highlights the potential role of NPY as a biomarker in POAG with OSD. Although no significant differences were observed between patients and controls, the trend of declining NPY levels with disease progression underscores its potential stage-specific role. Larger studies are needed to validate these findings and further explore NPY's utility as a biomarker and therapeutic target in glaucoma and OSD.

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P-0189

WHY GENETIC TESTING IN EARLY ONSET GLAUCOMA? TWISTS AND TURNS IN DIAGNOSIS

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Background

Aicardi-Goutières Syndrome (AGS) and Singleton-Merten Syndrome (SGMRT) are two rare immunogenetic disorders associated with glaucoma.[1] IFIH1 mutations, which are involved in innate immunity, can be inherited in an autosomal dominant inheritance pattern. In rare instances, these can be also inherited by a de novo gene mutation.The ocular manifestations in AGS include congenital or later onset glaucoma, optic atrophy, and cortical blindness. SGMRT is associated with mutations in the genes DDX58 and IFIH1, 40% of individuals with a mutation in IFIH1 have glaucoma[2,3]

Methods

The proband is a 25-year-old myopic male presented with rhegmatogenous retinal detachment in right eye. Following retinal detachment Surgery he was noticed to have high IOP in both eyes. Right eye was managed with anti glaucoma medications and cyclo diode photocoagulation. Due to uncontrolled IOP in spite of maximum AGM and intravenous mannitol, Left eye decompression vitreous tap was done followed by augmented trabeculectomy. The incidental finding of high IOP in both eye and assocaited retinal detachment prompted us to do a genetic analysis suspecting Sticklers syndrome.

Our patient was the second son of a non-consanguineous marriage. He had an uneventful birth and antenatal history. He was diagnosed with an acyanotic heart disease.. He had a delay in attaining developmental milestones . He is on treatment for hypothyroidism. He had normal early development, this was followed by neurological regression . He has generalized dystonia and spastic paraplegia He also had dentition abnormalities and psoriasiform rashes.

Results

Genetic analysis revealed that the patient had an IFIH1(interferon-induced helicase c domain- containing protein-1) mutation with a 2336G>A (p.Arg779His) variant, which was responsible for two syndromes, Aicardi-Goutières syndrome (AGS) /Singleton-Merten syndrome (SMS). Normal early development followed by neurological regression and delayed psychomotor development with spastic paraparesis, brain imaging changes are features that favour Aicardi Goutriers syndrome type 7. SMS type 1 is a rarer variant with aortic calcifications,acro osteolysis, scoliosis, dentition abnormalities and psoriasiform rash. Our patient had features of both the syndromes suggesting that the IFIH1 mutation with 2336G>A (p.Arg779His) variant is responsible for a phenotype overlap

Image

Conclusions

This case highlights the importance of genetic testing and general examinations of other systems in diagnosing and managing a case of early onset glaucoma. Though rare Aicardi-Goutières Syndrome and Singleton-Merten Syndrome can overlap in same patient presenting with glaucoma

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P-0190
OPHTHALMOLOGICAL MANIFESTATIONS OF AXENFELD-RIEGER SYNDROME

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Background
Axenfeld-Rieger syndrome (ARS) is a rare genetic disorder characterized by the abnormal development of the anterior segment of the eye, including posterior embryotoxon with iris bridging strands (Axenfeld anomaly) and congenital iris abnormalities including iris hypoplasia, corectopia and pseudopolycoria (Rieger anomaly), but is also associated with craniofacial, dental, umblical, cardiovascular and neurologic abnormalities. This syndrome, usually inherited in an autosomal dominant manner, results from mutations in *PITX2 and FOXC1* genes. Glaucoma is seen in approximately 50% of the cases and may present in early infancy, adolescence or early adulthood. The aim of this study was was to evaluate the clinical presentation, glaucoma prevalence, and treatment of ARS patients.

Methods
Fourteen ARS patients (6 females, 8 males) from 6 families were included in the study. The patients underwent a detailed eye examination including best corrected visual acuity (BCVA), biomicroscopy and fundus examination, intraocular pressure (IOP) measurement, anterior segment and angle iamging using Anterion multimodal imaging platform (Heidelberg Engineering, Germany), retinal nerve fiber layer measurement using Spectralis optic coherence tomography (Heidelberg Engineering, Germany) and visual field testing (Humphrey Field Analayzer, Zeiss).

Results
The mean age of the patients was 27.35 years (6-59 years). Mean follow-up period for the patients was 6.57 years (3 months-14 years). Mean BCVA was 0.72 in the right eye and 0.67 in the left eye. Posterior embryotoxon was detected in 12 patients (85.7%), iris stromal hypoplasia in 10 patients (71.4%), corectopia/polycoria in 9 patients (64.3%) and corneal decompensation in 2 patients. Increased IOP was present in 9 patients (64.28%) and 6 patients had structural and functional glaucomatous damage (42.8%), respectively. Cataract surgery was performed in three patients, trabeculectomy and tube surgeries in three patients and trabeculotomy in one pediatric patient. Facial and dental anomalies were observed in 7 patients (50%) and hearing loss was found in one patient.

Conclusions
Early diagnosis, regular follow-up for glaucoma and timely intervention are critical to prevent irreversible vision loss in patients with ARS. Although the initial treatment choice is anti-glaucomatous medications, glaucoma surgery, including trabeculectomy and glaucoma drainage devices is often needed to obtain IOP control.

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P-0193
AXENFELD-RIEGER SYNDROME (ARS): CASE REPORT

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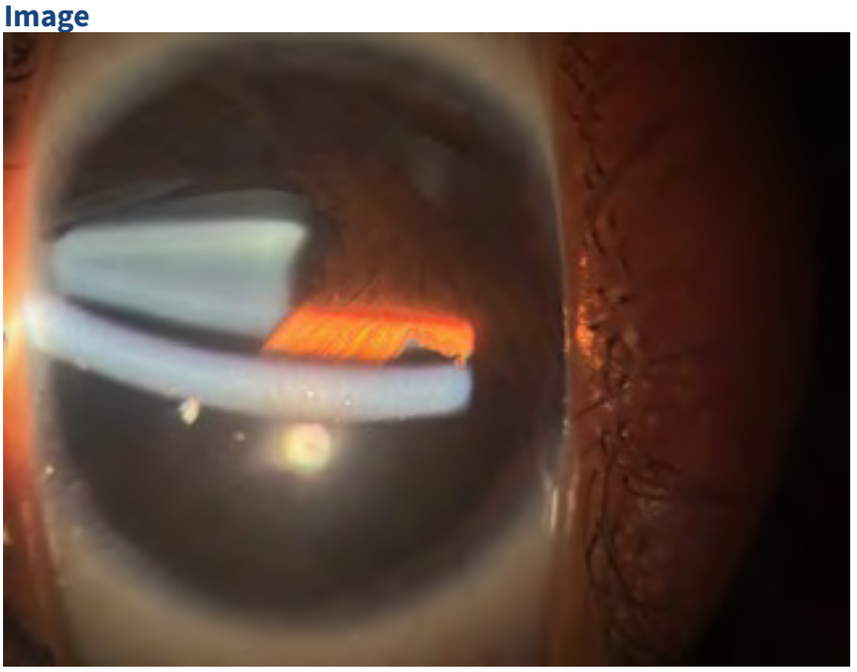
Background
Axenfeld-Rieger syndrome (ARS) is an autosomal dominant disease characterized by anterior segment dysgenesis associated with systemic anomalies. There is great variation in expressivity, with the PITX2 gene being prevalent in patients with the syndrome in Brazil. Regarding ocular characteristics, posterior embryotoxon (anteriorization of the Schwalbe line) is the pathognomonic finding. Axenfeld anomaly comprises congenital anomalies of the iris: hypoplasia, corectopia or formation of holes in the iris similar to polycoria. Rieger syndrome results in systemic changes: facial bone defects, dental, pituitary or umbilical abnormalities. When Axenfeld anomaly accompanies Rieger syndrome, it is called ARS. The presence of glaucoma is not related to the extent or intensity of anterior segment changes, however it is present in approximately 60% of patients with the syndrome. The purpose is to describe a case of ARS with bilateral glaucoma in a brazilian child.

Methods
The family and the patient were attended at the Ophthalmology Department of Hospital das clinicas - Federal University of Pernambuco (Brazil) and invited to participate in a case study that aims to describe ophthalmological characteristics within ARS. All information about the study and authorization for participation and use of images were clarified and signed in the Free and Informed Consent Terms.

Results
A 5-year-old male patient was referred for evaluation due to a complaint of blurred vision in both eyes for approximately 2 years. He has been using latanoprost 0.005%. Ectoscopy shows dental malformation with diastema associated with malformation of the maxilla. Biomicroscopy findings were posterior embryotoxon, iris atrophy and pseudopolycoria in both eyes. Gonioscopy in the right eye (OD) shows inferior angle with synechiae and the remaining sectors with iris with apposition in the iridocorneal angle, left eye (OS) has inferior angle grade III (shaffer classification) and the remaining grade II without synechiae. Intraocular pressure (IOP) was 12 mmHg in both eyes measured with a Goldmann tonometer and fundoscopy presented cup-to-disk ratio of 0.8 both eyes. The diagnosis of ARS is raised for the patient in question based on the clinical and ocular characteristics.

Image



Conclusions

Ocular and systemic characteristics allowed the diagnosis of ARS. Genetic testing can be used to confirm the diagnosis, but is not mandatory. Outpatient follow-up is essential to control IOP and prevent irreversible damage to the optic nerve and blindness according to high risk of glaucoma progression.

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P-0195
ANNEXIN A1 AND RETINA: FROM FUNCTION TO MECHANISM

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Background
Annexin A1 (ANXA1) has been well investigated in immune system, cancer, cardiovascular disease and central nervous system. The human retina is part of central nervous system, which contains similar neurovascular unit, including neural cell (retina ganglion cell), glia cell (microglia) and vascular endothelial cell.

Methods
In the last ten years, our group investigated ANXA1 function in retina, especially focus on retinal ischemia reperfusion injury.

Results
In retina ganglion cell, we found that retinal ischemia reperfusion injury induced ANXA1 nuclear translocation. On the other hand, when increased ANXA1 membrane translocation could attenuate retina ganglion cell death after retina ischemia reperfusion. In retina vascular endothelial cell, we found an increased vascular leakage on *Anxa1 cko* (*Anxa1*$^{fl/fl;tie2\ cre}$) mice. Currently, we found that *Anxa1 cko* (*Anxa1*$^{fl/fl;Cx3cr1\ ert2\ cre}$) mice shown microglia dysfunction and overactivation, which means ANXA1 also involved in retina immune system.

Conclusions
In conclusion, similar to central nervous system, ANXA1 performs significant role in retina. Lacking of ANXA1 in retina endothelial cell, microglia or even retina ganglion cell would induce retina dysfunction. The future challenge is how to well organize ANXA1 expression in retina and how to do ANXA1 supplement on human.

P-0196
GENETIC ANALYSIS USING NGS AND MLPA IN CHINESE ANIRIDIA PATIENTS

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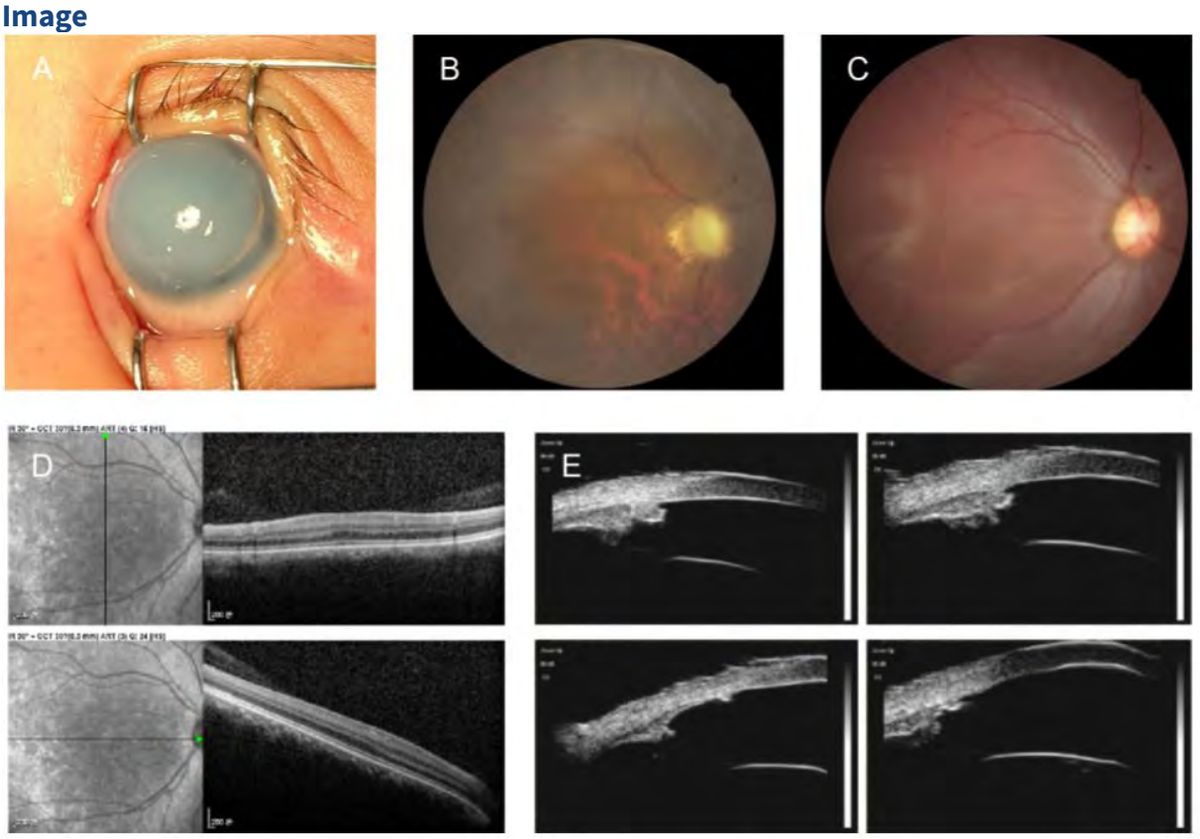
Background
Congenital aniridia is a rare pan-ocular disease characterized by complete irideremia, partial iridocoloboma. The progressive nature of aniridia is frequently accompanied by secondary ocular complications such as glaucoma and aniridia-associated keratopathy, which can lead to severely impaired vision or blindness. The genetic basis of aniridia has been the subject of numerous studies, leading to the development of innovative therapeutic options based on PAX6 nonsense mutations. Specific knowledge of the genetics of aniridia has become increasingly important. To report the clinical features, elucidate the genetic etiology, and reveal the mutational spectrum of congenital aniridia in the Chinese population, sixty patients with congenital aniridia from 51 families were recruited.

Methods
Candidate genes associated with developmental eye diseases were identified and analyzed using panel-based next-generation sequencing (NGS), and mutations were confirmed through polymerase chain reaction and Sanger sequencing. Multiplex ligation probe amplification (MLPA) of PAX6 and FOXC1 was performed to detect copy number variations in the patients without intragenic mutations.

Results
Clinical examination revealed complete iris hypoplasia in 58 patients and partial iris hypoplasia in two patients. Additionally, two patients were diagnosed with Wilms' tumor-aniridia-genital anomalies-retardation syndrome and nephroblastoma. By combining panel-based NGS and MLPA, 43 intragenic mutations or deletions of PAX6, FOXC1, and BCOR were identified in 59 patients, including 33 point mutations (76.7%) in 43 patients and 10 deletions (23.3%) in 16 patients. The total detection rate was 98.3%. Phenotypic variation was observed between and within families.

Image



Conclusions

Variations in PAX6 and its adjacent regions were the predominant causes of aniridia in China. In addition to intragenic point mutations in PAX6, deletion of PAX6 or its adjacent genes is a common cause of congenital aniridia. Furthermore, FOXC1 is an important gene associated with congenital aniridia. The combination of panel-based NGS and MLPA significantly enhanced the detection rate of gene mutations in patients with congenital aniridia.

References

Fig. Images of glaucoma, foveal hypoplasia, and congenital aniridia—anterior segment, fundus, OCT, UBM. (A) cornea edema and opacity. (B) large cup-disc ratio and pale optic nerve. (C) no macular reflex halo. (D) flat macular fovea. (E) only iris stump and unclear scleral process.

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IOP Physiology & Pathophysiology

P-PW-0197

IMPACT OF POSTURE ON OCULAR PERFUSION PRESSURE IN GLAUCOMA AND CONTROL GROUPS

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Background
Intraocular pressure (IOP) significantly increases when glaucoma patients move from sitting to recumbent positions, leading some studies to recommend head elevation during sleep. Whether this advice is beneficial or harmful remains unclear, as no previous research has examined how posture affects ocular perfusion pressure (OPP) in glaucoma patients. Our goal was to study the postural variations in mean ocular perfusion pressure (MOPP) in glaucoma patients and age-matched controls. This would be the first study to address postural MOPP fluctuations in glaucoma patients.

Methods
This was a prospective, randomized case-control study involving POAG subjects and healthy controls ≥40 years old. Exclusion criteria included LTG, secondary glaucoma, past glaucoma surgery (including MIGS), SLT within six months, cataract surgery within one month, and any ocular conditions affecting IOP measurement or blood flow. IOP was measured in both eyes with a pneumatonometer (right eye first) and blood pressure (BP) with an electronic cuff (left arm) during morning hours (6:30-9:00 am) in 6 body positions: sitting; supine with pillow; right and left lateral decubitus; and prone with right and left head turns. MOPP was calculated using published formulas with adjustment for hydrostatic pressure changes in different positions.

Results
Forty glaucoma patients and 40 control subjects were recruited for 80% power. Baseline demographics were similar between the two groups ($p>0.05$). IOP and MOPP increased significantly from sitting to recumbent positions in both groups ($p<0.001$). Both glaucoma patients and controls had the lowest MOPP in the supine with pillow position ($p<0.001$). Compared to supine with pillow position, the dependent eye of both controls and glaucoma patients in the lateral decubitus position had similar IOP ($p>0.05$) but higher MOPP ($p<0.001$). In the prone position, the dependent eye of both controls and glaucoma patients had higher MOPP ($p<0.001$), while controls had similar IOP ($p>0.05$), the glaucoma patients had higher IOP ($P<0.001$) than in the supine with pillow position.

Image

Change in mean IOP & MOPP in different positions from sitting in controls								
	IOP (mmHg)				MOPP (mmHg)			
	OD		OS		OD		OS	
	Mean ± SD	P value	Mean ± SD	P value	Mean ± SD	P value	Mean ± SD	P value
Absolute values in sitting position	17.1 (2.4)		17.3 (2.3)		28.4 (7.0)		28.2 (7.0)	
Change in sleeping positions vs sitting position								
Left lateral decubitus	3.5 (2.0)	<0.001	4.7 (2.0)	<0.001	19.9 (4.7)	<0.001	21.1 (5.1)	<0.001
Right lateral decubitus	5.1 (1.8)	<0.001	3.6 (2.1)	<0.001	9.97 (5.9) *19.8 (5.9)	<0.001 *<0.001	9.6 (5.4) *19.0 (5.4)	<0.001 *<0.001
Supine with pillow	4.7 (1.6)	<0.001	4.7 (1.5)	<0.001	13.7 (4.5)	<0.001	13.7 (4.6)	<0.001
Prone with RHT	4.7 (2.0)	<0.001	5.0 (2.1)	<0.001	20.5 (5.9)	<0.001	22.7 (6.2)	<0.001
Prone with LHT	5.2 (1.9)	<0.001	4.7 (2.0)	<0.001	22.1 (6.8)	<0.001	20.2 (6.4)	<0.001
Change in mean IOP & MOPP in different positions from sitting in glaucoma patients								
	IOP (mmHg)				MOPP (mmHg)			
	OD		OS		OD		OS	
	Mean ± SD	P value	Mean ± SD	P value	Mean ± SD	P value	Mean ± SD	P value
Absolute values in sitting position	17.4 (3.6)		17.7 (4.0)		27.2 (6.1)		26.9 (6.6)	
Change in sleeping positions vs sitting position								
Left lateral decubitus	3.6 (2.2)	<0.001	5.1 (2.6)	<0.001	15.2 (4.8)	<0.001	13.9 (4.4)	<0.001
Right lateral decubitus	5.2 (2.0)	<0.001	3.9 (2.2)	<0.001	4.5 (4.2) *17.9 (4.6)	<0.001 *<0.001	5.8 (4.5) *17.2 (4.7)	<0.001 *<0.001
Supine with pillow	4.8 (1.6)	<0.001	4.5 (1.9)	<0.001	12.1 (5.0)	<0.001	12.3 (5.0)	<0.001
Prone with RHT	5.2 (2.1)	<0.001	5.9 (2.1)	<0.001	13.3 (4.9)	<0.001	12.8 (5.1)	<0.001
Prone with LHT	5.5 (2.3)	<0.001	5.2 (2.5)	<0.001	13.6 (6.0)	<0.001	13.9 (6.1)	<0.001

* After compensating of MBP drop in non-dependent arm (MBP +10 mmHg)

Conclusions

Although IOP increased in the recumbent positions, MOPP was also higher in all recumbent positions compared to the sitting position in both groups. This suggests that sleeping with head elevation may be detrimental instead of beneficial in glaucoma patients with susceptible optic nerve head circulation. Among the recumbent positions, supine with a pillow had the lowest MOPP.

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P-PW-0199

BIOMECHANICAL CORNEAL CHARACTERISTICS IN NORMAL TENSION GLAUCOMA AND PRIMARY OPEN ANGLE GLAUCOMA

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Background
Normal-Tension Glaucoma (NTG) and Primary Open-Angle Glaucoma (POAG) differ in their pathophysiology, with NTG characterized by optic nerve damage despite normal intraocular pressure (IOP), and POAG associated with elevated IOP (>21 mmHg). Corneal biomechanical variations may contribute to these differences and can be assessed using Corvis Scheimpflug Technology. This study aims to compare the corneal biomechanical properties of NTG and POAG patients and evaluate the effects of prostaglandins on these qualities.

Methods
This retrospective study included 77 patients (139 eyes) with medical treatment: 44 diagnosed with NTG and 95 with POAG. Demographic characteristics, IOP, Biomechanical Glaucoma Factor (BGF), stiffness parameter A1 (SP-A1), deformation amplitude (DA), stress-strain index (SSI) and visual field impact were analyzed. Differences were compared between glaucoma types and within each group, stratified by prostaglandin treatment. Statistical significance was set at $p < 0.05$.

Results
Both groups exhibited comparable demographic characteristics. The NTG group had a mean age of 62.38±12.11 years (range 30–88) with 65.38% female participants, while the POAG group had a mean age of 67.86±14.51 years (range 24–89) with 58.82% female participants. Mean IOP was slightly lower in NTG compared to POAG (15.17±1.66 mmHg vs 16.42±4.99 mmHg; $p < 0,05$). Central corneal thickness was 516.61±30.89 um and 538.18±50.97 um, respectively. Visual field damage (MD) was more severe in the POAG group (-10.75±10.45 vs -6.76±5.8; $p = 0.006$). NTG patients exhibited softer corneas, reflected by significantly lower SP-A1 values (118.45±30.89 vs. 122.97±25.90, $p < 0.05$). The BGF was 0.38±0.16 in NTG, while DA and SSI values (1.02±0.08 vs. 1.25±1.4 and 1.13±0.19 vs. 1.28±0.98, respectively) showed no statistically significant differences between groups. Furthermore, prostaglandin treatment was associated with a significant increase in SP-A1 (118.78±17.1 vs. 128.26±8.71, $p < 0.05$) and BGF (0.36±0.18 vs. 0.48±0.19, $p < 0.05$), in the NTG eyes, suggesting a notable effect on corneal biomechanics.

Conclusions
These biomechanical differences between NTG and POAG could play a role in their pathophysiology. These parameters should guide therapeutic decisions and follow-up. Prostaglandin-induced changes in corneal stiffness may influence disease progression, warranting further large-scale studies to confirm these findings and refine personalized glaucoma management.

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P-PW-0201

EFFECT OF IOP FLUCTUATIONS ON GLAUCOMA PROGRESSION IN NORMAL-TENSION GLAUCOMA AND PRIMARY OPEN ANGLE GLAUCOMA: A PROSPECTIVE COHORT STUDY

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Background
50% of primary open angle glaucoma(POAG) patients still have disease progression after intraocular pressure(IOP) lowering treatment, especially in normal-tension glaucoma(NTG) patients. IOP fluctuation may be the cause of disease progression. The aim of this study is to analyze the effects of various parameters reflecting long- or short-term IOP status on the progression rate of peripapillary retinal nerve fibre layer(RNFL) in patients with different subtypes of POAG.

Methods
A prospective cohort study, involving 174 eyes of 101 POAG patients, included 103 eyes of 58 NTG patients and 71 eyes of 43 patients with high-pressure POAG. High-pressure POAG patients were required to have IOP controlled within 21 mmHg during the follow-up period. RNFL thickness was measured by OCT(OPTOVUE, California, USA) for all subjects every 3-6 months, and progression rates for at least 5 visits were calculated by trend analysis(Guided progression Analysis). All subjects were required to receive a baseline 24-hour IOP measurement before the study. The IOP values at each follow-up visit after the study began were recorded, serving as a profile of long-term IOP. Using the 24-hour IOP measurement and the profile of long-term IOP, we obtained a series of parameters reflecting IOP status including: mean IOP , standard deviation of IOP, peak IOP, trough IOP , range of IOP and mean amplitude of IOP excursion(MAPE) . Correlation analyses were used to explore the association between RNFL progression rate and the above IOP parameters.

Results
The 101 POAG patients were followed up for an average of 20.3 months. In NTG patients, the trough IOP of the profile of long-term IOP and the MAPE of the 24-hour IOP measurement were associated with RNFL progression rate(r=-0.21, **p=0.03**; r=-0.24, **p=0.048**), and other IOP parameters were not correlated with RNFL progression rate(p>0.05). In high-pressure POAG patients, all IOP parameters were not correlated to the rate of RNFL progression(p>0.05). In all 101 POAG patients, MAPE of the 24-hour IOP measuremens were associated with RNFL progression rate(r=-0.18, **p=0.047**). The statistical results were shown in **Table 1**.

Image

Table 1. Correlation between RNFL progression and various parameters reflecting long- or short-term IOP status in different subtypes of POAG.

	NTG (103 eyes)		High-pressure POAG (71 eyes)		POAG (174 eyes)	
	r	p	r	p	r	p
Profile of long-term IOP						
Mean IOP	-.069	.494	-.023	.849	.012	.873
SD of IOP	.011	.913	-.055	.651	-.039	.614
Peak IOP	-.030	.769	-.059	.629	-.006	.938
Trough IOP	**-.211**	**.034***	.080	.513	.096	.213
Range of IOP	.046	.645	-.092	.451	-.067	.381
MAPE	-.051	.615	.010	.936	.004	.959
Baseline 24-hour IOP measurement						
Peak IOP	-.183	.133	-.130	.367	-.027	.769
Trough IOP	-.018	.886	.060	.681	.083	.368
Range of IOP	-.232	.055	-.145	.315	-.114	.217
MAPE	**-.239**	**.048***	-.173	.220	**-.181**	**.047***
Mean IOP	-.175	.149	-.037	.792	-.026	.777
SD of IOP	-.224	.065	-.135	.340	-.104	.256

Statistically significant p values ($p < 0.05$) were in boldface.
NTG, normal-tension glaucoma; POAG, primary open-angle glaucoma; IOP, intraocular pressure; SD, standard deviation; MAPE, mean amplitude of IOP excursion.

Conclusions

Fluctuations of IOP were notably associated with the rate of RNFL damage. This association was not significant in high-pressure primary open angle glaucoma with controlled IOP. Long-term IOP profile monitoring and 24-hour IOP measurement are indispensable in the management of NTG.

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P-0203

LONGITUDINAL CORNEAL HYSTERESIS CHANGES PREDICT STRUCTURAL PROGRESSION IN MEDICALLY-CONTROLLED, OPEN-ANGLE GLAUCOMA WITH REFRACTIVE SURGERY

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Background

The present study aims to identify the relationship between longitudinal changes in corneal hysteresis (CH) and progressive retinal nerve fiber layer (RNFL) thinning in a cohort of medically-controlled, early-to-moderate open-angle glaucoma (OAG) patients with a history of laser refractive surgery (LRS).

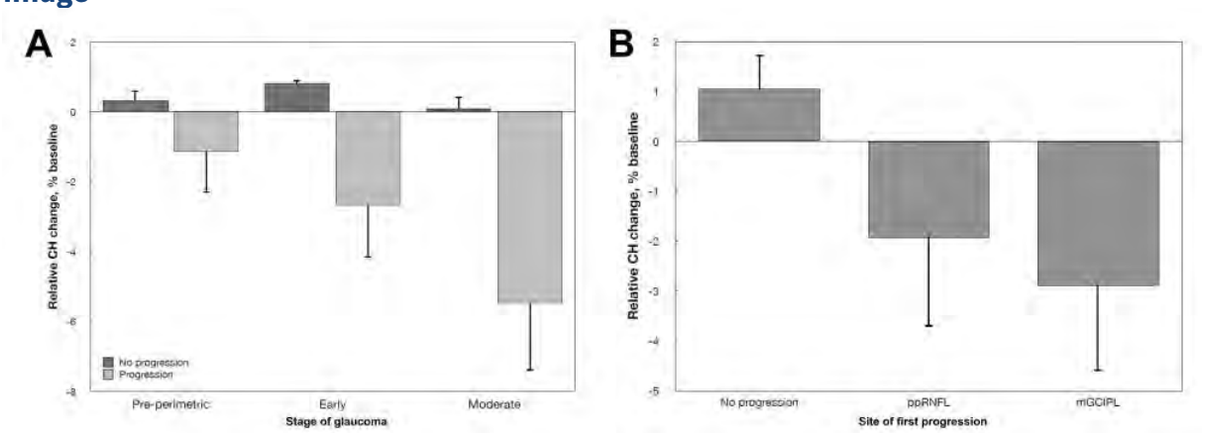
Methods

A total of 123 consecutive eyes with a diagnosis of medically-controlled (peak intraocular pressure (IOP) <18mmHg), early to moderate OAG patients with a history of LRS underwent measurements of CH, corneal-compensated IOP (IOPcc) and RNFL thicknesses every 6 months. Linear models were used to investigate the relationship between CH change over time and RNFL thickness change while adjusting for age, sex and central corneal thickness.

Results

Patients were followed 53.3±18.1 months. Of 123 eyes, 30 eyes (24.4%, 42.9±9.3 years, 36.7% males) demonstrated RNFL loss (93 eyes no progression, 44.4±9.6 years, 30.1% males). No statistically significant difference was found in mean IOP, long-term IOP fluctuation or IOP relative change, but significantly greater decrease in CH was noted in the progression group (-2.525% baseline (95% CI -4.974- -0.076) vs. 1.068% baseline (95% CI, -0.322-2.458); P=0.013). Relative CH change was greater for more advanced stage of OAG among the progression group. Patients with the greatest relative CH decrease over time was 1.7 times more likely to present RNFL loss (HR 1.705, 95% CI 1.113-2.611, P=0.014).

Image



Conclusions

Longitudinal decrease in CH over time was significantly associated with faster RNFL loss in medically-controlled, early-to-moderate OAG with a history of LRS. Relative CH change may serve as a critical indicator of structural progression in OAG patients with a history of LRS.

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P-0204

DUAL-MECHANISM AAV-DJ.COMP-ANG1 IN REDUCING INTRAOCULAR PRESSURE IN OCULAR HYPERTENSIVE AND NORMOTENSIVE MICE

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Background
In humans, the aqueous humor (AH) is primarily drained through the conventional outflow pathway, with the main resistance occurring at the junction between the trabecular meshwork (TM) and the Schlemm's canal (SC). Recent studies showed that the angiopoietin-1 (ANG1)-TIE signaling pathway orchestrates the development and maintenance of the SC, positioning it a promising candidate for anti-glaucoma therapies. In this study, we investigated the intraocular pressure (IOP)-lowering capacity and mechanisms of adeno-associated virus (AAV)-mediated gene augmentation of cartilage oligomeric matrix protein-ANG1 (COMP-ANG1) in both ocular normotensive and hypertensive mice.

Methods
Ocular hypertension models were established by weekly periocular steroid injection in wild-type C57BL/6J mice for 4 weeks. AAV-DJs encoding either COMP-ANG1 or ZsGreen (control) were intracamerally injected in both normotensive and hypertensive mice. The IOP were monitored regularly by rebound tonometer. Structural features of SC were visualized by CD31 immunostaining. Ultrastructural changes in the SC and trabecular meshwork were observed under transmission electron microscopy. Transcriptomic changes after AAV infection were profiled by single-cell RNA sequencing (scRNA-seq) and validated in cell-based assays.

Results
Sustained IOP elevation was induced after steroid injection ($p<0.001$). A single intracameral injection of AAV-DJ.COMP-ANG1 significantly and persistently reduced IOP in both normotensive and hypertensive mice ($p=0.005$ and $p<0.001$, respectively). The SC area ($p<0.001$) and the density of giant vacuoles ($p=0.006$) were increased following COMP-ANG1 overexpression. Concomitantly, the SC endothelia laid on a more discontinuous basement membrane ($p=0.046$) and a more porous juxtacanalicular tissue ($p=0.005$) in the COMP-ANG1 group. scRNA-seq unveiled that the expression of Mafb was upregulated in SC endothelial cells while the extracellular matrix (ECM) components in TM was markedly decreased. In endothelial cells, TIE activation-induced MAFB upregulation was blocked by AKT or ERK inhibition. The pro-angiogenic capacity of TIE activation was eliminated by MAFB knockdown. In human trabecular meshwork cells, COMP-ANG1 treatment significantly downregulated ECM proteins including fibronectin-1 and collagen-1 through integrin pathway.

Conclusions
AAV-DJ.COMP-ANG1 reduces IOP in normotensive and hypertensive eyes through MAFB-mediated SC expansion and integrin-mediated ECM downregulation in TM.

P-0205

INTRAOCULAR PRESSURE IN THE ANTERIOR CHAMBER AND VITREOUS CAVITY OF THE PORCINE EYE: EFFECT VERIFICATION OF IRIDO-ZONULO-HYALOIDO-VITRECTOMY

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Background

We have recently developed a new intraocular pressure (IOP) sensor that accurately measures IOP with a small 30-gauge. We have previously shown that there is a pressure gradient between anterior chamber IOP (aIOP) and vitreous cavity IOP (vIOP) even under normal conditions in ex vivo porcine and *in vivo* rabbits.[1] The other recent study also showed that the rat model of glaucoma presented notably higher vIOP.[2] Irido-zonulo-hyaloido-vitrectomy (IZHV) is known to be an effective surgical treatment for ciliary block. Here we evaluated the aIOP and vIOP using ultrafine IOP sensors in enucleated porcine eyes before and after IZHV.

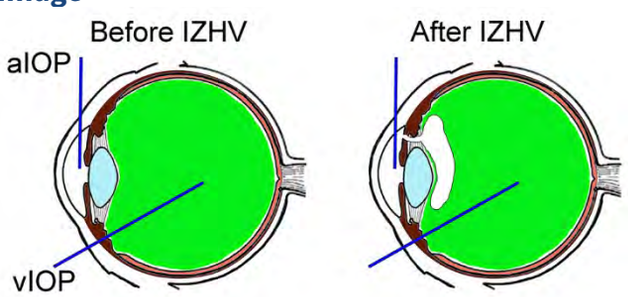
Methods

Three freshly enucleated porcine eyes were examined. We used a 30-gauge microfiber-optic pressure sensor (diameter: 0.3 mm) attached to a signal conditioning system. A 27-gauge infusion cannula connected to a vitrectomy system was inserted into the pars plana, and the intravitreal perfusion pressure was set at 17 mmHg. We measured aIOP by directly inserting a 30-gauge IOP sensor from the limbus into the anterior chamber. The vIOP measurement included inserting a 27-gauge trocar cannula with a closure valve for microincisional vitrectomy into the pars plana, after which a 30-gauge sensor was inserted through the trocar cannula. We simultaneously acquired the aIOP and vIOP when the intravitreal perfusion pressure was changed from 17 mmHg (P1) to 27 mmHg (P2) and 37 mmHg (P3). The same procedure was performed before and after IZHV.

Results

The vIOP was larger than aIOP before the IZHV in all eyes irrespective of the intravitreal perfusion pressure setting; however, the difference between the vIOP and aIOP widely varied from eye to eye (median: 1.26–17.26 mmHg). After IZHV, the difference between vIOP and aIOP decreased to < 0.5 mmHg at all perfusion conditions in all eyes. The difference between vIOP and aIOP after IZHV was significantly smaller than before IZHV in all eyes (P<0.001).

Image



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Conclusions

Although this was an ex vivo animal study, the discrepancy between aIOP and vIOP may vary widely from case to case. IZHV is highly effective in eliminating this difference.

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P-0206

A LARGE STRAIN AND ASYMMETRIC STRESS ON THE LAMINA CRIBROSA IN HIGHLY MYOPIC EYES

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Background
High myopia is a significant risk factor for the development of primary open-angle glaucoma. Previous studies suggest that the optic nerve head (ONH) in highly myopic eyes is more susceptible to axonal damage under biomechanical stress compared to non-highly myopic eyes. However, differences in ONH biomechanical changes under external forces, such as ocular rotation, remain controversial. Therefore, we employed finite element analysis to investigate the impact of biomechanical changes in the ONH on glaucoma progression during ocular rotation in highly myopic eyes with primary open-angle glaucoma.

Methods
This study retrospectively enrolled 147 patients with primary open-angle glaucoma, including 57 with high myopia and 90 without high myopia. Geometric parameters, including axial length, optic disc radius, and optic cup depth, were measured using fundus photography and optical coherence tomography. Personalized ONH models were designed, and simulations were performed at the primary position, 1-degree, and 10-degree eye rotations. Stress and strain on the lamina cribrosa were calculated and compared between the two groups. To assess the impact on glaucoma progression, simulation results were analyzed for correlations with the rate of retinal nerve fiber layer (RNFL) thickness reduction.

Results
As the angle of rotation increased, the highest stress shifted from the anterior central lamina surface to the posterior temporal lamina cribrosa surface. At 10 degrees of ocular rotation, the mean strain on the lamina cribrosa was significantly higher in the high myopia group compared to the non-high myopia group (66.61 ± 2.90 vs. 61.20 ± 3.02, $P < 0.001$). The stress ratio, which indicates asymmetric stress distribution, was also higher in the high myopia group (1.87 ± 0.14 vs. 1.74 ± 0.12, $P < 0.001$). Both the stress ratio and mean lamina cribrosa strain increased significantly with axial length and were correlated with the rate of RNFL thickness reduction (stress ratio: Pearson's $r = -0.168$, $P = 0.042$; strain: Pearson's $r = -0.176$, $P = 0.033$).

Conclusions
High myopia led to increased lamina cribrosa strain and asymmetric stress distribution during ocular rotation. Asymmetry in stress distribution and strain on the lamina cribrosa were also associated with structural progression in glaucoma patients. These findings highlight the importance of considering ONH biomechanics in understanding and managing glaucoma risk in highly myopic patients.

P-0210

AQUEOUS HUMOR DYNAMIC COMPONENTS THAT DETERMINE LNTRAOCULAR PRESSURE RESPONSE AND IOP FLUCTUATIONS

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Background

Despite glaucoma clinical trials, guidelines, and experience to reduce intraocular pressure (IOP) for glaucoma, some patients progress to blindness. To address this problem, our purpose is to determine aqueous humor dynamic (AHD) mechanisms that impact IOP outcomes.

Methods

Eye Dynamics and Engineering Network (EDEN) Consortium includes clinicians and scientists at Universities of Michigan, Ohio State, Nebraska and Mayo Clinic. In two randomized trials with crossover treatments of timolol and latanoprost (NCT01677507, NCT04412096), we test the hypothesis that drug responses and IOP fluctuation are determined by AHD factors of aqueous flow, outflow facility, episcleral venous, and uveoscleral flow.[1] Healthy controls (EDEN1) and cases with ocular hypertension (OHT) or early-to moderate open-angle glaucoma (OAG)(EDEN2) were studied with outcomes of AHD factors, drug response, IOP fluctuations, and ocular perfusion pressure (OPP).

Results

In EDEN1 (92 females/30 males), positional change between supine and sitting IOPs was > 4.7 mmHg (range 0.5 - 11.0 mmHg), and between visit asymmetric IOP fluctuation of > 3 mmHg between eyes among 4 - 12% depending on tonometer.1 Baseline ocular perfusion pressure (OPP; 46.8 ± 8.1 mmHg) increased with latanoprost (49.6 ± 8.2 mmHg), but to a greater degree with timolol (48.5 ± 7.9 mmHg) due to lower systolic blood pressure. In EDEN2, Icare® Home was added to the protocol to capture diurnal IOP fluctuations with 6 measures per day for 1 week before AHD measures at baseline and before the 1-week timolol and latanoprost treatments. Results from 57 subjects show that low aqueous flow is associated with large IOP fluctuations. The parameters of AHD factors, drug response, IOP fluctuations, and OPP are compared between controls (EDEN1) and cases (EDEN2).

Conclusions

Tying-down the AHD factors that help to explain drug response variations and IOP fluctuations will provide new knowledge that will form the basis for future phenotype-genotype studies. Identification of genetic risk alleles of drug response and IOP fluctuations will progress to modeling integrated risk scores combining clinical and genetic risk profiles. Such risk scores may help determine which patient needs earlier and more aggressive treatment which will ultimately lead to more efficient medical management and decreased glaucoma-related blindness.

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P-0211

MÜLLER CELL-DERIVED SEMA4D DRIVES RETINAL GANGLION CELL DAMAGE IN GLAUCOMA VIA YAP SIGNALING PATHWAY

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Background
Müller cell activation contributed to retinal ganglion cell (RGC) damage in glaucoma, but the mechanisms remained undefined. Semaphorin4D (Sema4D), derived from Müller cells, was involved in vascular dysfunction in diabetic retinopathy while its role in glaucoma was unclear. This study aimed to investigate the role of Sema4D in glaucomatous RGC damage and its underlying mechanisms.

Methods
To assess the importance of Sema4D in glaucoma, the levels of semaphorin family members were analyzed in human aqueous humor. Effects of Sema4D on retinal structure and function were evaluated using Sema4D knockout mice as retinal ischemia/reperfusion (IR) and chronic ocular hypertension (COH) models. RNA sequencing was performed to analyze semaphorin family in IR and control retinas. Sema4D/plexinB1 and Yes-associated protein (YAP) signaling pathway were assessed by Western blot and immunofluorescence in primary Müller cells subjected to oxygen-glucose deprivation/reoxygenation (OGDR).

Results
Sema4D levels were significantly upregulated in the aqueous humor of glaucoma patients. Consistently, Sema4D protein expression increased in IR retinas and colocalized with Müller cells. Sema4D knockout markedly alleviated RGC loss and functional impairments induced by IR and COH. Mechanistically, augmented Sema4D expression promoted YAP nuclear translocation, resulting in upregulation of downstream proliferation factors (Ki67, cyclin E1, cyclin D1) and effectors (Tead1, CYR61, CTGF) in OGD/R model. In contrast, Sema4D depletion significantly suppressed YAP nuclear translocation and downstream pathway activation.

Image

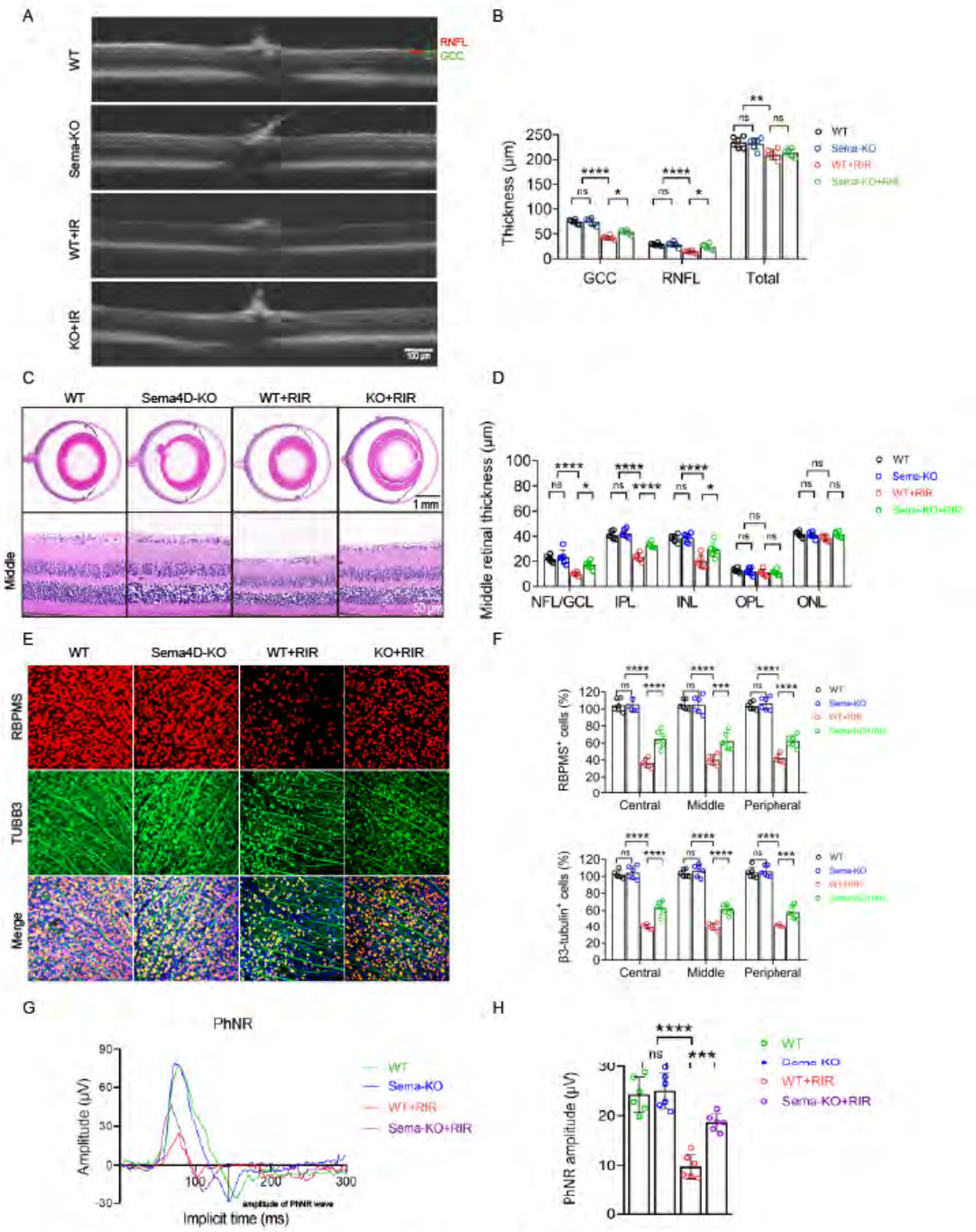

Figure 2. Sema4D knockout preserved the retinal structure and function after IR.

Conclusions

Müller cell-derived Sema4D contributed to RGC damage in glaucoma through the YAP signaling pathway. Targeting Sema4D might be a potential therapeutic strategy for glaucoma.

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P-0212

CHANGES IN OCULAR BIOMECHANICS AND AGREEMENT OF INTRAOCULAR PRESSURE MEASUREMENT USING DIFFERENT MODALITIES FOLLOWING VITREORETINAL SURGERY

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Background
Ocular biomechanical properties influence intraocular pressure (IOP) measurements and are independent risk factors for glaucoma. Pars plana vitrectomy (PPV) impacts the entire eyeball alters ocular biomechanics and IOP measurements. **Purpose:** To evaluate the change in ocular biomechanics [corneal hysteresis (CH)] following PPV and to analyse the effect of these changes on IOP measurement using different modalities: IOPcc, IOPg of Ocular Response Analyser (ORA, Reichert Ophthalmic Instruments), Goldmann applanation tonometry (GAT), iCare (IC200) and noncontact tonometry (NCT). To study the effect of tamponade(silicone oil, gas, or fluid/air) on these changes.

Methods
Seventy-seven patients undergoing PPV (tamponade: air/fluid: 36, silicone oil: 34, gas: 7) for various indications were recruited in a tertiary eye care centre in South India. The CH, CCT, and IOP (as IOPcc, IOPg, GAT, iCare and NCT) were measured preoperatively and at 1 week, 1 month, and 3 months after surgery. Short-term trend analysis of CH and IOP, and agreement analysis of IOP was done.

Results
A significant decrease in CH was observed from baseline values 8.28±1.97 mmHg to 7.32±1.55 mmHg at 1 week (P<0.001), recovering to 8.82±1.26 mmHg by 3 months (P=0.041), being slower with silicon oil tamponade. IOP measured by different modalities (IOPcc, IOPg, GAT, iCare, NCT) showed an increase at 1 week postoperatively, followed by a return to baseline levels by 3 months. We found very good consistency and excellent agreement for the GAT and iCare. The consistency between GAT and iCare was most substantial in descending order at 3rd post-op month (ICC: 0.873, 95% CI: 0.807-0.917), 1st post-op month (ICC: 0.85, 95% CI: 0.7832-0.906), baseline (ICC: 0.837, 95% CI: 0.755-0.893) and 1st post-op week (ICC: 0.822, 95% CI: 0.407-0.708). On Bland-Altman analysis, the mean difference (MDiff) and the limits of agreement (LOA) was: 3rd post-op month: -0.257(-1.363, 0.849), 1st post-op month: 0.066(-1.733, 1.865), baseline: -0.033(-3.200, 3.132), 1st post-op week: 0.512(-2.622, 3.646).

Image

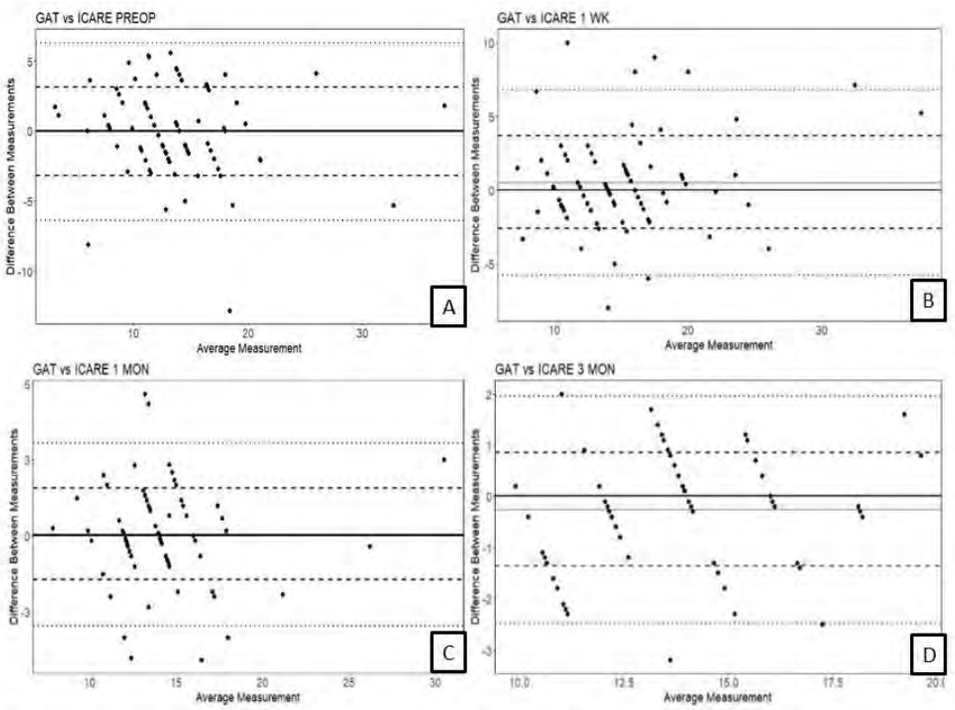

Figure 1: Bland-Altman plots showing agreement between Goldman Applanation Tonometry and iCare at A) baseline, B) 1-week post-op, C) 1-month post-op, D) 3-months post-op

Conclusions

PPV caused a decrease in CH at one week which recovered by three months. IOP measurements also showed a transient increase at one week, returning to baseline by three months, regardless of tamponade used. iCare showed the best agreement with GAT for IOP measurement after vitrectomy. Hence, GAT a contact procedure may be replaced with the iCare in these patients allowing for a simple, non-contact method of IOP measurement.

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P-0215

MOLECULAR MECHANISMS OF OPTIC DISC BLOOD FLOW DENSITY REDUCTION AND RETINAL GANGLION CELL APOPTOSIS INDUCED BY OPTN (E50K) MUTATION IN MICROGLIA

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Background
Abnormal blood supply around the optic disc plays a critical role in understanding the pathogenesis and developing targeted therapies for normal-tension glaucoma (NTG).OCTA analyses revealed a pronounced decline in peripapillary blood flow density in both NTG patients and OPTN (E50K) mutant mice. This study aims to elucidate the mechanisms underlying the reduced peripapillary blood flow density in OPTN (E50K) mutant mice, providing novel insights and theoretical foundations for preserving visual function in NTG patients and identifying new therapeutic targets.

Methods
A CRISPR/Cas9-based model of OPTN (E50K) mutant mice was established. Proteomic and single-cell atlas analyses identified Rpl17 as a highly expressed gene in the retinas of OPTN (E50K) mutant mice. Computational tools (CDB, UCSC, and JASPAR databases) predicted Stat5b as the transcription factor for Apoa1, which was validated through ChIP-PCR. Protein-protein interactions between Rpl17 and Stat5b were confirmed using co-immunoprecipitation (Co-IP) and fluorescence co-localization. Molecular docking technology identified ellagic acid as a potential small-molecule inhibitor of Apoa1, followed by *in vivo* and *in vitro* validation. Visual function was evaluated through light-dark shuttle box tests.

Results
The retinal blood flow density was significantly reduced in OPTN (E50K) mutant mice, accompanied by decreased vascular endothelial cell counts and increased apoptosis. Proteomic and single-cell atlas analyses revealed marked upregulation of Rpl17, primarily in microglial cells. Co-culture experiments indicated increased apoptosis in HUVECs when cultured with BV2_E50K_mut microglial cells. Proteomic screening identified Apoa1 as a downstream functional protein of Rpl17. Knockout of Rpl17 in BV2_E50K_mut cells significantly reduced Apoa1 mRNA and protein expression, which correlated with reduced apoptosis in co-cultured HUVECs. ChIP-PCR demonstrated that Stat5b enhances the transcription of Apoa1. AlphaFold predictions indicated potential binding sites between Rpl17 and Stat5b proteins. Further experiments revealed that the interaction between Rpl17 and Stat5b proteins decreases Stat5b ubiquitination, thereby stabilizing Stat5b and sustaining Apoa1 transcription. Molecular docking identified ellagic acid as an Apoa1 inhibitor, and subsequent treatment resulted in increased peripapillary blood flow density, thickening of the retinal nerve fiber layer, and a significant increase in RGC numbers.

Conclusions
The upregulation of Rpl17 in retinal microglia of OPTN (E50K) mutant mice facilitates the stabilization of Stat5b by inhibiting its ubiquitination, leading to increased Apoa1 expression. This mechanism contributes to reduced peripapillary blood flow density and accelerated RGC apoptosis. Ellagic acid, identified as a small-molecule inhibitor of Apoa1, effectively improves retinal blood flow density, enhances RGC survival, and preserves visual function in OPTN (E50K) mutant mice.

P-0217

MORPHOLOGICAL ANALYSIS OF GLAUCOMATOUS OPTIC DISCS SUPPORT THE AXOTOMY OF NERVE FIBERS IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background

Primary open-angle glaucoma (POAG) is defined as an optic neuropathy implying that nerve fibers are being atrophied similar to non-glaucomatous optic atrophies. Glaucomatous field defects reveal that nerve fibers are being destroyed in an orderly sequence from peripheral-to-central. However, in non-glaucomatous optic atrophies, the nerve fibers are being destroyed randomly. The purpose of this study was to determine if POAG is indeed an optic neuropathy.

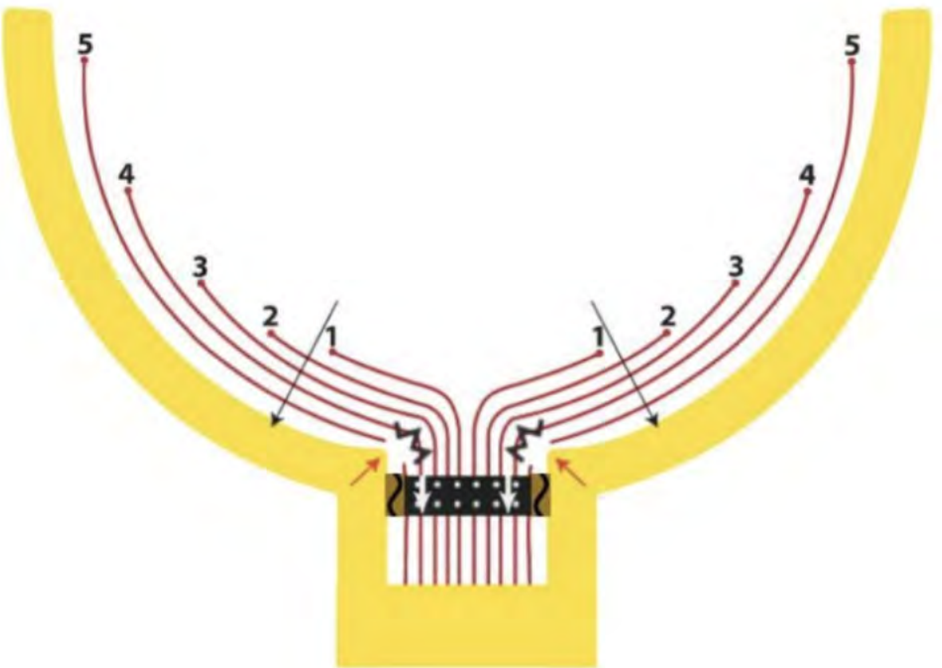
Methods

This comparative study included the morphological analysis of optic disc fundus images. Fundus photographs of all subjects were acquired using a non-mydriatic fundus camera (Topcon TRC-NW6S). The compared groups included 25 glaucomatous discs (GD) and 25 non-glaucomatous atrophic discs (NGAD). Measuring parameters included: course of blood vessels, splinter hemorrhages on the disc margin, and notching at the superior and inferior poles of the optic disc. A visual field test using a Goldmann perimeter was also performed on all subjects to detect for any generalized peripheral constriction of the visual field. The observation of these parameters were compared in both groups and deductive reasoning was applied.

Results

The observed features in both groups were significantly different. The optic disc surface appeared sunken in the GD group, but were flat in the NGAD group. Also present in the GD group was sloping and kinking of blood vessels due to the sunken disc. Additionally, there was notching at the superior and inferior poles of the optic disc, and splinter hemorrhages on the disc margin. These morphological features were not present in the NGAD group. Also, generalized peripheral field constriction was only present in the GD group.

Image



Conclusions

Elevated IOP acting alone can't result in the orderly loss of nerve fibers in glaucoma; only a mechanical process can achieve this outcome. It is proposed that elevated IOP may be destroying some important component of the optic disc first, thereby creating a mechanical process for the orderly loss of nerve fibers in glaucoma.

Primary open-angle glaucoma may be a two-stage disease. The first (biological) stage involves elevated IOP compressing the circulation of the border tissue of Elschnig, resulting in chronic ischemia and its degeneration. The degenerated border tissue leads to loosening of the lamina cribrosa from the scleral wall. This is then followed by the second (mechanical) stage: sinking of the lamina cribrosa resulting in the stretching and severance (axotomy) of nerve fibers at the scleral edge in an orderly sequence from peripheral-to-central.

Glaucomatous field defects such as generalized peripheral field constriction and arcuate field defects are indicative of nerve fiber axotomy. The splinter hemorrhages at the disc margin may be due to severance of the microvasculature which are meeting the same fate as nerve fibers at the scleral edge. This study suggests that glaucoma may not be an optic neuropathy, but an optic disc axotomy- a paradigm shift.

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P-0218

INFLUENCE OF SEX ON THE FUNCTION AND STRUCTURE OF THE NEURORETINA IN NEW EXPERIMENTAL ANIMAL MODELS OF GLAUCOMA

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Background

The study of the influence of sex on glaucoma is demanded. To evaluate the influence of sex and age on the physiological and pathophysiological neurodegeneration of the neuroretina in different models of chronic glaucoma induced.

Methods

A total of 230 Long-Evans rats of both sexes were analyzed: a healthy cohort (n=85), a cohort with chronic glaucoma (n=46: 23 rats induced by episcleral vein sclerosis and 23 rats by the injection of biodegradable microspheres into the anterior chamber), and a cohort with steroid-induced glaucoma (n=88: 43 rats induced by biodegradable microspheres loaded with dexamethasone, and 45 rats by biodegradable microspheres co-loaded with dexamethasone and fibronectin), compared to control rats (n=10 rats induced by the injection of unloaded microspheres). The animals were evaluated by intraocular pressure measurements using a rebound tonometry (Tonolab®), functional neuroretinal tests by electroretinography (ERG Roland Consult RETIanimal®), structural scanning by optical coherence tomography (OCT, Heidelberg Spectralis®), and histological examination over a period of 24 weeks.

Results

Healthy male Long-Evans rats exhibit significantly higher intraocular pressure values than females at all stages of development ($p<0.05$). Structurally and functionally, males also appear more susceptible to neurodegeneration than females during presenile stages. Males exhibited greater reduction in OCT neuroretinal thickness parameters than females ($p<0.05$), from 4 weeks of age onward. Females showed a tendency ofhigher photoreceptor and ganglion cell responses compared to paired aged males throughout the follow-up period, achieving statistical significance at 28 weeks of age ($p<0.05$). In chronic glaucoma models, the structural and functional damage to the neuroretina was greater in the episcleral vein sclerosis model ($p<0.05$). Female Long-Evans rats with steroid-induced chronic glaucoma exhibited neuroretinal protection when exposed exclusively to corticosteroids ($p<0.05$). However, if co-induced with the fibronectin cofactor, they experienced an exacerbated response to da-

mage ($p< 0.05$).

Conclusions

It seems essential to consider the age and sex of the animals under study to understand the physiological changes occurring throughout life and in pathological situations of retinal neurodegeneration, such as chronic glaucoma. This approach will enable more accurate evaluation of potential hypotensive and neuroprotective therapies.

P-0219

PREDICTION OF INTRAOCULAR PRESSURE REDUCTION AFTER CATARACT SURGERY UTILIZING THREE-DIMENSIONAL ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

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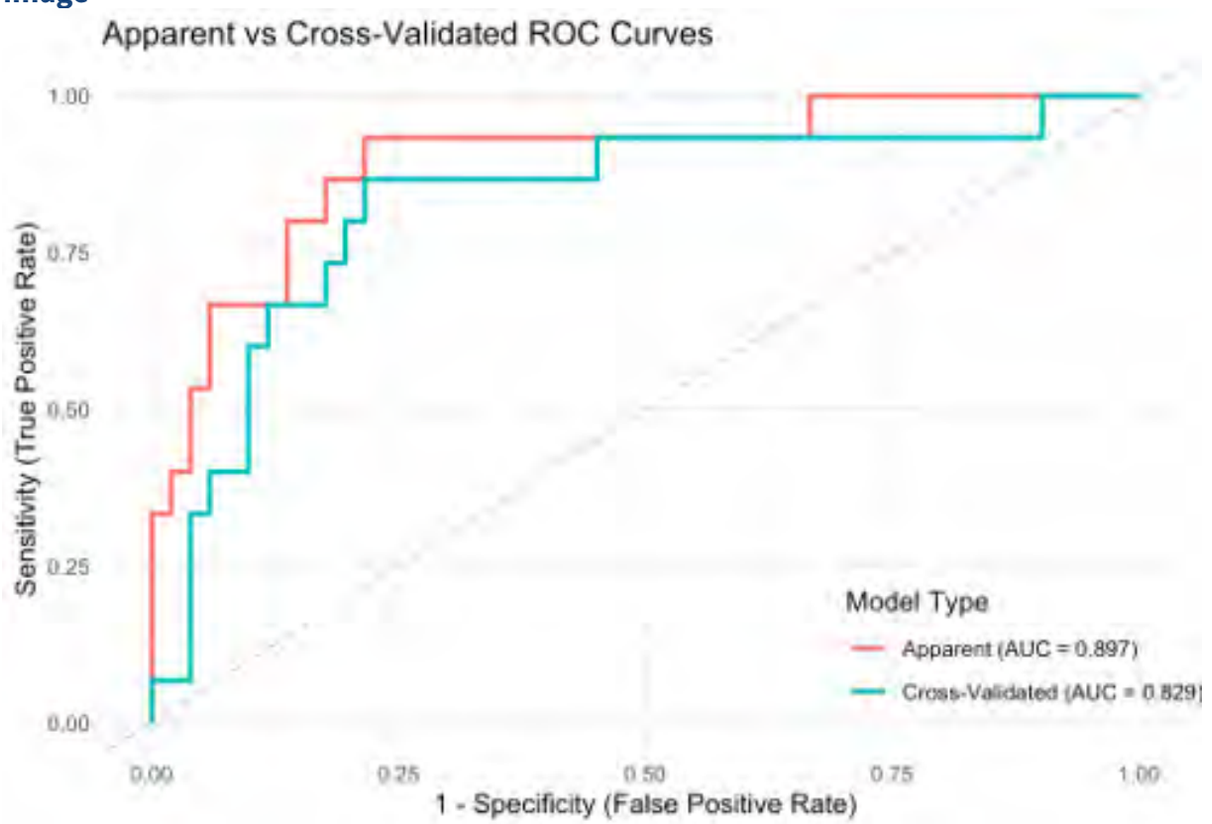
Background
Predicting intraocular pressure (IOP) reduction after cataract surgery is beneficial for surgical planning. Studies indicate that IOP reduction is greater in eyes with angle closure compared to open angles. Advances in anterior segment optical coherence tomography (AS-OCT) enable quantitative assessment of anterior segment morphology. This study investigates the predictive value of three-dimensional AS-OCT parameters for IOP reduction following phacoemulsification.

Methods
In this prospective study, we included consecutive patients with and without glaucoma, encompassing both open and narrow angles, who underwent phacoemulsification performed by a single surgeon. Clinical variables and anterior segment parameters obtained through optical biometry and AS-OCT (CASIA2, Tomey Corp., Nagoya, Japan) were analyzed as preoperative predictors of achieving at least a 20% IOP reduction from baseline at 1 month postoperatively. The AS-OCT parameters included angle, iris, and anterior chamber parameters. Three-dimensional AS-OCT measurements were evaluated using two approaches: (1) Average 3D parameters, representing mean values from 360-degree measurements, and (2) Estimate 3D parameters, representing circumferential areas or volumes. Model selection was performed using least absolute shrinkage and selection operator (LASSO) regression with 10-fold cross-validation.

Results
A total of 130 eyes from 103 patients were included, with a mean age of 71.0 ± 8.7 years. At least a 20% IOP reduction was achieved in 34 eyes (26.2%). The cohort comprised 64 glaucoma eyes and 66 non-glaucoma eyes. For the entire cohort, LASSO identified preoperative IOP as the sole significant predictor, with no AS-OCT or biometric parameters selected. This model achieved an area under the curve (AUC) of 0.77 (95% CI 0.69 to 0.85). In the glaucoma subgroup, the circumferential average of angle opening distance at 500 µm (3D average of AOD500) was the sole predictive parameter. The model achieving an AUC of 0.67 (95% CI 0.52 to 0.82). In the non-glaucoma subgroup, selected predictors included preoperative IOP (odds ratio [OR] 1.7), age (OR 1.1), axial length (OR 0.8), presence of a thick lens (OR 3.0), anterior chamber volume (OR 0.6), and circumferential area of iris thickness at 750 µm (3D estimate IT750) (OR 0.8). This prediction model achieved an AUC of 0.89 (95% CI 0.79 to 0.98).

Image



Conclusions

Three-dimensional AS-OCT parameters demonstrated predictive value for IOP reduction following phacoemulsification. This effect was particularly notable in the non-glaucoma subgroup, where the inclusion of 3D parameters yielded a high discriminative power.

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P-0220

FERROPTOSIS-MEDIATED PRIMARY OPEN-ANGLE GLAUCOMA: INSIGHT FROM GENE SIGNATURE AND IDENTIFICATION OF POTENTIAL SMALL-MOLECULE DRUGS

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Background

Elevated intraocular pressure (IOP), stemming from augmented aqueous humor outflow resistance, has been pinpointed as the primary risk factor driving POAG onset and progression[1]. Recent studies have found that ferroptosis may be involved in the process of trabecular meshwork injury in glaucoma[2-4]. This study aims to reveal ferroptosis-related gene signature in primary open-angle glaucoma (POAG) and identify small molecule drugs as new direction of therapy.

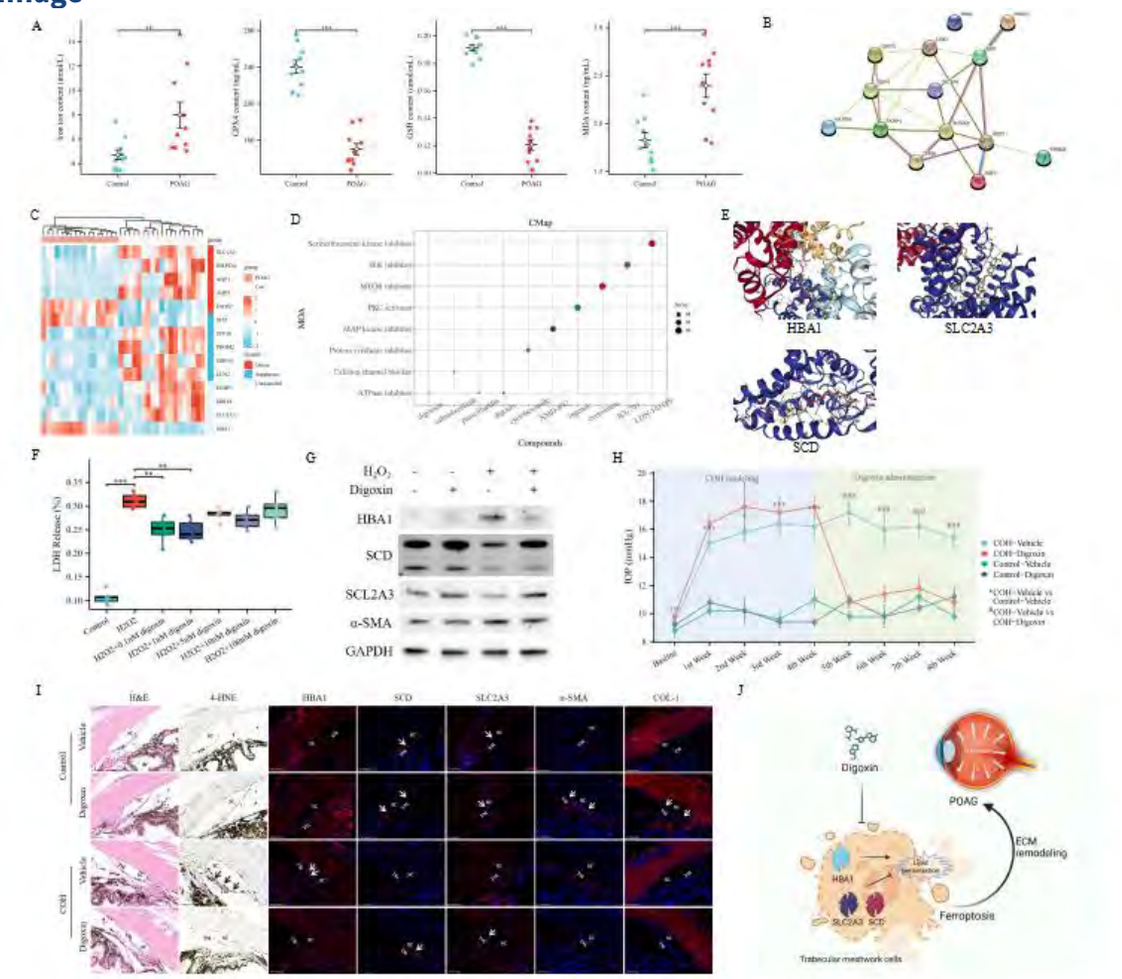
Methods

Ferroptosis-related indicators including GXP4, GSH, MDA and iron ion contents in POAG patients and chronic ocular hypertension (COH) rats were detected by ELISA kits. The dataset (GSE27276) from GEO database and ferroptosis-related genes from FerrDb were downloaded for analysis. PPI analysis was used to screen key ferroptosis-related genes in POAG. Small molecule drugs targeting ferroptosis-related signature components were predicted via CMap database and CB-Dock2. H_2O_2-induced human trabecular meshwork cells (HTMCs) oxidative stress model was constructed to validate the expression of hub genes and efficacy of drugs. Digoxin was made into eye drops to verify its intraocular pressure (IOP) lowering effect *in vivo*.

Results

Ferroptosis levels were enhanced in POAG patients and COH eyes of rats. A total of 14 ferroptosis-related differentially expressed genes were identified. PPI analysis and qPCR of *in vitro* experiments showed HBA1, SLC2A3, DDIT4, PROM2 and SCD played important roles in ferroptosis-mediated POAG. CMap indicated that ATPase inhibitors digoxin might be considered as potential therapeutic drugs for POAG. Molecular docking by CB-Dock2 showed the interactions between digoxin and HBA1, SLC2A3, SCD. Digoxin reversed the H_2O_2-induced increases in MDA and iron ions, as well as the decrease in GPX4 levels in the cell culture medium. Western blot analysis further demonstrated that digoxin reversed the H_2O_2-induced downregulation of SLC2A3 and SCD, as well as the upregulation of HBA1 and α-SMA. Digoxin administration lowered IOP of COH eyes. Digoxin also reversed aberrant expressed 4-HNE, HBA1, SLC2A3, SCD in TM tissue of COH rats.

Image



Digoxin inhibited HTMCs ferroptosis and lowered IOP by targeting SLC2A3, HBA1 and SCD in POAG.
A. The levels of ferroptosis-related markers (MDA, GPX4, iron ion and GSH) in human aqueous humor, N=10; B. PPI network of hub genes; C. Heat map showed expression levels of hub genes; D. Potential small molecule drugs targeting ferroptosis-related signature components by connectivity map (CMap) database; E. The molecular docking between digoxin and corresponding target in CB-dock2; F. The effects of digoxin on H2O2-induced HTMCs cytotoxicity were detected by LDH kit, N=5; G. Western-blot showed protein expression levels of HBA1, SLC2A3, SCD and α-SMA in H2O2-induced HTMCs after digoxin treatment; H. Digoxin effectively reversed the IOP in COH rat models; I. H&E, 4-HNE, SLC2A3, HBA1, SCD, α-SMA and COL-1 staining in the representative COH models; J. Simple schematic diagram of digoxin regulating HTMCs ferroptosis: During the pathogenesis of POAG, oxidative stress promotes the upregulation of HBA1 and the downregulation of SLC2A3 and SCD, leading to ferroptosis of trabecular meshwork cells (HTMCs) characterized by lipid peroxidation and plasma membrane rupture. Digoxin, by targeting and regulating HBA1, SLC2A3, and SCD, inhibits HTMC ferroptosis and ECM remodeling, thereby exerting the effect in lowering IOP.

Conclusions

This study clarified the ferroptosis-related gene signature in the pathogenesis of POAG, which provide a theoretical basis for the prevention and early diagnosis of POAG. Translation of specific small molecule drugs will propose new ideas for therapy of POAG.

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P-0221

OCULAR HYPERTENSION AFTER TRIAMCINOLONE INJECTION IN THYROID EYE DISEASE: INCIDENCE AND RISK FACTORS

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Background
Triamcinolone (TA) injection has shown promising results in treating upper eyelid retraction associated with thyroid eye disease (TED). However, ocular hypertension (OHT) remains a significant complication of this procedure, particularly as TED patients are more susceptible to elevated intraocular pressure (IOP) and glaucoma. This study aimed to evaluate the incidence and risk factors of OHT following TA injections in TED patients.

Methods
A retrospective review was conducted on the medical records of TED patients who received one or more TA injections for upper eyelid retraction. OHT was defined as an IOP of ≥25 mmHg or an increase of ≥10 mmHg from baseline. Demographic, systemic, and ocular variables were compared between patients with normal IOP and those with OHT. Risk factors for OHT development were also identified.

Results
Of 170 eyes evaluated, OHT was observed in 29 eyes (17.0%), with 9 eyes (5.3%) requiring IOP-lowering interventions. Patients in the OHT group were significantly younger than those in the normal IOP group (49.8 ± 15.4 years vs. 55.3 ± 15.0 years, p = 0.038). The number of injections or total dose of TA did not differ significantly between the two groups. However, the OHT group had significantly higher clinical activity scores and more severe TED (p = 0.006 and p = 0.002, respectively).

Conclusions
TA injections for upper eyelid retraction in TED were associated with IOP elevation in 17.0% of the studied eyes. Identified risk factors for OHT included younger age and higher TED activity and severity. These findings highlight the need for careful patient selection and monitoring to minimize the risk of OHT following TA injections.

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P-0222

THE IMPACT OF ENDOGENOUS MELATONIN ON DIURNAL VARIATIONS IN INTRAOCULAR PRESSURE

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Background
Melatonin is a regulator of the circadian rhythm, with blood concentrations low during the day and high at night. Many reports have shown that melatonin administration lowers intraocular pressure (IOP). However, the effect of endogenous melatonin on diurnal fluctuations of IOP is unknown. We compared diurnal changes of IOP in mice with and without endogenous melatonin production.

Methods
Congenic mice with melatonin production (MT+) and without it (MT-) were used, both having a C57BL/6J genetic background (10-15 weeks old). In each group, IOP was measured in 7 males and 8 females using the Icare TONOLAB six times every four hours during a 12-hour cycle of light and darkness (ZT=2, 6, 10, 14, 18, 22). IOP data were examined using a mixed-effects model.

Results
Among the six measurement times, the IOP was significantly lower in the MT+ group than in the MT- group at ZT14 and ZT18 during the dark period (p=0.0012). During the light and dark periods, IOP values from both groups were significantly higher in the dark period than in the light period (+6.3mmHg, p<0.001). There was no difference in the overall 24-hour IOP level between the MT+ and MT- groups (p=0.79). However, the difference in IOP between light and dark periods was significantly smaller in the MT+ group (-2.7mmHg, p<0.001). Moreover, the average 24-hour IOP levels were significantly higher in males compared to females (+3.8 mmHg, p<0.001), but gender differences were not significantly related to the difference in IOP between light and dark periods (p= 0.05).

Conclusions
Endogenous melatonin may influence the diurnal fluctuations of IOP.

P-0223

EFFECT OF VISUAL FIELD TEST ON INTRAOCULAR PRESSURE IN GLAUCOMA PATIENTS

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Background
Studies on the change in intraocular pressure before and after the visual field test in glaucoma patients are limited. Therefore, this study aims to investigate the change in intraocular pressure according to the elapsed time before and after the visual field test in glaucoma patients.

Methods
Among glaucoma patients who visited Konyang University Hospital from September 2024 to October 2024, 66 patients were included, and 66 right eyes were targeted. The vision test used Humphrey visual field(HVF) (Zeiss Humphrey, San Leandro, CA, USA SITA standard program(Central 24-2)). Eye pressure was measured by a time-specific ophthalmologist before the visual field examination, immediately after the visual field examination, 10 minutes after the examination, 30 minutes after the examination, and 60 minutes after the examination. For statistical analysis, SPSS 27.0 was used and repeated measurement ANOVA and univariate and multivariate linear mixed effect model were used. The level of statistical significance was considered statistically significant when the p-value was less than 0.05.

Results
The measured intraocular pressure fell from an average of 15.09mmHg before the visual field test to 14.79mmHg immediately after the test and to 14.47mmHg after 10 minutes, then rose to 15.01mmHg after 60 minutes, restoring the level before the visual field test, and the P-value of the dropped value was significant as 0.001 or less. Statistically analyzing 13 items using univariate and multivariate linear mixing effect models to find the main factors affecting intraocular pressure, it was found that gender, hypertension, and average retinal nerve fiber layer thickness had a significant effect with a P-value of <0.05 in the multivariate linear mixing effect model.

Conclusions
It was confirmed that the intraocular pressure fell from 15.09mmHg before the visual field test to 14.47mmHg for 10 minutes after the visual field test, but the intraocular pressure fell without increasing, and the intraocular pressure recovered to 99.5% to 15.01mmHg after 60 minutes. Measuring intraocular pressure after resting for about 60 minutes following the visual field test may help avoid temporary pressure decrease and allow for more accurate measurement.

P-0226

UNDERLYING MICROSTRUCTURE OF THE LAMINA CRIBROSA AT THE SITE OF MICROVASCULATURE DROPOUT

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Background
To determine the microstructure of the lamina cribrosa (LC) associated with microvasculature dropout (MvD) of the deep optic nerve head (ONH) in primary open-angle glaucoma (POAG) and to identify factors related to the presence of MvD.

Methods
POAG eyes that exhibited MvD in the LC (MvD-LC) or MvD in the peripapillary choroid (MvD-PC) underwent optical coherence tomography and optical coherence tomography angiography (OCTA) to evaluate the structure and microvasculature of the deep ONH, respectively. The presence of MvD-LC or MvD-PC was determined using en face OCTA images of the deep ONH. The sectoral LC thickness (LCT) and LC curvature index (LCCI) (at MvD-LC site, when applicable), the mean LCT and LCCI of the global ONH, and other clinical characteristics were measured and compared between eyes with and without MvD-LC.

Results
The study included 93 eyes with and 51 without MvD-LC. The presence of MvD-LC was associated with lower sectoral LCT (odds ratio [OR] = 0.96, P < 0.001) and mean LCT (OR = 0.97, P = 0.032), larger visual field pattern standard deviation (PSD; OR = 1.20, P = 0.038), and higher pretreatment intraocular pressure (IOP; OR = 1.22, P = 0.012). Fifteen percent of the eyes with MvD-LC (14/93) did not present MvD-PC. Those eyes had younger age (P = 0.043), thicker juxtapapillary choroid (P = 0.018), larger sectoral LCCI (P = 0.040), thicker retinal nerve fiber layer (P = 0.024), smaller PSD (P = 0.008), and higher pretreatment IOP (P = 0.006) than those with both MvD-LC and MvD-PC.

Conclusions
MvD-LC was associated with a localized morphologic alteration of the LC, and eyes with MvD-LC tended to have a higher pretreatment IOP. The clinical implications of MvD-LC should differ from those of MvD-PC in eyes with POAG.

P-0228

EVALUATION OF UPPER EYELID HARDENING IN PROSTAGLANDIN-ASSOCIATED PERIORBITOPATHY SYNDROME USING A HARDNESS METER THROUGH THE UPPER EYELID

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Background

Prostaglandin-associated periorbitopathy syndrome (PAPS) is a side effect of prostanoid FP receptor agonists (FP) , and upper eyelid hardening is one of its typical symptoms. However, no established method exists to quantify this condition. We have been developing the FingerVision tonometer (FVT) to quantify hardness through palpation. This device integrates a hardness meter with a visual-tactile sensor called “FingerVision.” In this study, we measured the upper eyelid hardness in glaucoma patients treated with FP drops and compared the results with those of non-users.

Methods

The subjects consisted of 37 patients (57.3±2.2 years old) with glaucoma who had been using FP receptor agonists for more than one year (FP group) and 35 control individuals (55.1±2.3 years old) with no history of FP receptor agonist use (non-FP group). The FVT probe tip under development was made of silicone. When pressed against the closed upper eyelid, the FVT device generates a graph curve with the X-axis representing the probe’s displacement (unit: mm) and the Y-axis representing the pressure (unit: N/mm). Python-based analysis software calculated the slope (unit: N/mm^2) of the curve, approximating a straight line, which served as an index of hardness. Mode 0 is the low-pressure phase, ranging from 0.02 to 0.32 N/mm, corresponding to the probe’s initial contact with the upper eyelid skin and a displacement up to 2 mm, the anatomical thickness of the upper eyelid. The high-pressure phase, ranging from 0.1 to 0.45 N/mm, occurs when the probe is pressed further to contact the eyeball. Intraocular pressure was measured using the Goldmann applanation tonometer (GAT) before FVT measurements. A one-way analysis of variance (ANOVA) was conducted to compare the groups.

Results

After the probe contacted the upper eyelid skin, it progressed through the low-pressure phase of Mode 0, which reflected eyelid hardness, and then into the high-pressure phase of Mode 1, which indicated the combined hardness of the eyeball and eyelid. There was no significant difference in GAT between the FP and non-FP groups (13.74±0.50 vs. 14.18±0.51 mmHg, P=0.540). However, FVT measurements showed significant differences in slopes between the two groups: 0.10±0.00 vs. 0.09±0.00 N/mm^2 in Mode 0 (P=0.029) and 0.15±0.01 vs. 0.12±0.01 N/mm^2 in Mode 1 (P=0.003).

Conclusions

The possibility of using the FVT device to quantify the upper eyelid hardening associated with PAPS was indicated.

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P-0230

DYNAMICS OF MYELIN DEGENERATION AND ITS RELATIONSHIP WITH AXONAL DYSFUNCTION AND RGC LOSS IN A CHRONIC HIGH INTRAOCULAR PRESSURE MODEL OF GLAUCOMA

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Background
In glaucoma patients, deterioration of myelinated retinal nerve fibers is observed as intraocular pressure (IOP) control worsens, suggesting that demyelination may precede and exacerbate optic nerve damage. Understanding how demyelination affects the loss of retinal ganglion cells (RGCs) and optic nerve degeneration is crucial for revealing the pathophysiological mechanisms of glaucoma. This study aims to explore the role of demyelination in the progression of glaucoma and its association with the mechanical stress related to elevated IOP.

Methods
We established a chronic high IOP model in adult C57BL/6 mice through anterior chamber injections of silicone oil. Evaluations included visual evoked potentials (VEP), electroretinography (ERG), and Western blot analysis for myelin and axonal integrity, performed at 1, 2, 4, 6, and 8 weeks post-induction. Histological analysis of optic nerve and retinal tissues assessed the progression of demyelination and its correlation with neural damage.

Results
The study revealed early demyelination in the proximal optic nerve segments within one week of high IOP induction, preceding any significant loss of retinal ganglion cells (RGCs). Extensive myelin degradation was observed by the second week, correlating with optic nerve dysfunction. Significant RGC damage was evident only after four weeks, confirming that demyelination occurs prior to and may precipitate RGC and axonal loss.

Conclusions
Our findings underscore demyelination as an early, modifiable event in glaucoma pathogenesis, which precedes significant neural damage. This highlights the potential of early intervention targeting myelin preservation to prevent or mitigate glaucoma progression. Further research is warranted to explore the mechanisms by which IOP influences demyelination and to develop novel therapeutic strategies that address this early pathogenic process.

P-0231

RISK OF OBSTRUCTIVE SLEEP APNEA MEASURED USING THE STOP-BANG QUESTIONNAIRE AND ITS ASSOCIATION WITH GLAUCOMA SEVERITY

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Background
Several mechanisms contribute to glaucoma damage that are independent of intraocular pressure (IOP). Previous studies have shown controversial results regarding the association between obstructive sleep apnea (OSA) and glaucoma.

The objective of this study was to investigate the association between obstructive sleep apnea (OSA) risk, assessed using the STOP-Bang questionnaire, and glaucoma severity in patients with open-angle glaucoma (OAG) compared to controls.

Methods
This cross-sectional study included 125 OAG patients and 91 controls from Conde de Valenciana Hospital, Mexico. Participants completed the validated STOP-Bang questionnaire, which evaluates OSA risk based on snoring, tiredness, observed apnea, high blood pressure, body mass index, age, neck circumference, and gender. Based on their scores, participants were categorized as having mild, moderate, or high OSA risk. Data on demographics, medical history, comorbidities, and prior OSA diagnoses were recorded. Glaucoma-related information, including treatment history, intraocular pressure (IOP) control, and diagnostic tests, was extracted from medical records.

Results
The most common glaucoma type among patients was primary glaucoma (52.8%). Median STOP-Bang scores were 2 (IQR: 2–3) for the OAG group and 2 (IQR: 1–3) for the control group ($p = 0.266$). There was no significant difference in the percentage of individuals at risk of OSA between groups; however, tiredness was more prevalent among glaucoma patients (19.2% vs. 7.7%). A statistically significant association was observed between higher STOP-Bang scores (≥3 or ≥5) and greater glaucoma severity ($p = 0.006$ and $p = 0.048$, respectively). Additionally, OSA risk was significantly associated with retinal nerve fiber layer thickness, both overall ($p = 0.0149$) and in the inferior sector ($p = 0.0168$). OSA risk was not significantly correlated with baseline IOP or the number of hypotensive medications. However, the number of medications was significantly associated with glaucoma severity ($p = 0.001$).

Image

Tabla 1: Results STOP-Bang questionnaire

	Control (n=91)	Glaucoma (n=125)	P*
Total score, (IQR)	2 (1–3)	2 (2–3)	0.266
STOP-Bang ≥3	24 (26.4)	34 (27.2)	0.892
STOP- Bang ≥5	9 (9.9)	6 (4.8)	0.146
STOP- Bang ≥2 + BMI > 35 (kg/m2)	4 (4.4)	0 (0)	**0.030**
STOP-Bang ≥2 + Male	38 (41.8)	44 (35.2)	0.327
STOP-Bang ≥2+ Neck circumference	14 (15.4)	24 (19.2)	0.467
Previous diagnosis of OSA, n (%)	4 (4.4)	4 (3.2)	0.646
Hypertension, n (%)	24 (26.4)	46 (36.8)	0.106
OSA symptoms, n (%)			
Snore	35 (38.5)	39 (31.2)	0.267
Fatigue	7 (7.7)	24 (19.2)	**0.017**
Observed apnea	7 (7.7)	13 (10.4)	0.498

BMI: body mass index, IQR: interquantile range, OSA: obstructive sleep apnea.
*Chi-2 test, Fisher's exact test, or Mann-Whitney U test, as appropriate.

Conclusions

In this study we found that OSA is a risk factor for glaucoma severity. The STOP-Bang questionnaire can show this correlation, especially in advanced glaucoma. It is important to study OSA as at risk factor so as to include its treatment in this group of patients. Further research is required to elucidate the mechanisms underlying the relationship between OSA and glaucoma.

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P-0233

WATER DRINKING TEST BEFORE AND AFTER LASER PERIPHERAL IRIDOTOMY IN MEXICAN PATIENTS WITH ANGLE CLOSURE DISEASE

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Background
The water drinking test (WDT) allows us to evaluate indirectly the aqueous humor outflow facility and to estimate the intraocular pressure (IOP) spikes, which are a risk factor for the development and progression of glaucoma [1]. Laser peripheral iridotomy (LPI) is usually the first step in the treatment of angle closure disease (ACD) [2], in many cases despite achieving that the iris doesn´t have any more contact with the trabecular meshwork, the intraocular pressure does not decrease which can be the result of chronic changes [3] that can be demonstrated by the WDT.

Methods
Observational longitudinal prospective study. We included patients who attended to the Department of Glaucoma at the Hospital Conde de Valencia from February 2021 to February 2024 and were diagnosed with ACD and were treatment naïve. They were divided into three groups according to the stages of ACD [2], WDT was performed before and one month after LPI.

Results
A total of 83 eyes (42 individuals) were recruited, 80.95% were female with a mean age of 62.72 years (DE 9.10). According to the stages of ACD, 33.73% (28 eyes) were diagnosed as primary angle closure suspects (PACS), 44.58% (37 eyes) as with primary angle closure (PAC) and 21.69% (18 eyes) as with primary angle closure glaucoma. Mean initial IOP was 14.29 ±2.46mmHg and mean IOP after LPI was 13.77±2.54mmHg (p=0.051). IOP spike during the WDT was 18.76±3.14mmHg and 18.02±4.09mmHg (p=0.002), before and after LPI respectively; when comparing between groups, the difference in IOP spike before and after LPI was significant only in PACS group(18.26±2.69mmHg vs. 16.89±2.74mmHg p<0.008). In general, WDT was positive in 62.65% and in 42.17% eyes (p=0.004), before and after LPI; comparing within groups, there was a significant difference in the PACS group (67.86% vs. 32.14% positivity p=0.007). The success rate of the LPI was 51.85% overall, 92.86% for PACS, 22.86% for PAC and 44.44% for PACG eyes (p=<0.001).

Conclusions
LPI is less effective in separating the iris from the trabecular meshwork as the ACD progresses. The IOP alterations detected by the WDT in ACD patients are less prone to come back to normality after LPI as more advanced is the stage of the ACD. Despite achieving the mechanical aperture of the iridocorneal angle by the LPI, the aqueous humor dynamics do not necessarily become normal once again; this finding suggests that patients with ACD need an exhaustive exploration even if the LPI appears to have been successful.

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P-0235
POSTURE INDUCED CHANGE OF INTRAOCULAR PRESSURE IN VITRECTOMIZED EYES

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Background
To investigate posture related intraocular pressure (IOP) fluctuation in the vitrectomized eyes.

Methods
This study is a prospective cross-sectional investigation. It included patients who underwent vitrectomy for rhegmatogenous retinal detachment (RRD) in one eye while the fellow eye remained healthy. Posture-induced changes in IOP were measured after maintaining each position for 10 minutes: sitting, supine, lateral decubitus position (LDP) with the normal eye dependent, LDP with the operated eye dependent, and facedown position.

Results
The univariate and multivariate analysis of the generalized linear mixed model (GLMM) both indicated that eyes underwent vitrectomy had higher IOP in the facedown position compared to their normal fellow eyes (p=0.013). Rise in the percentage of IOP from the sitting to the facedown position was also more pronounced in vitrectomized eyes (p=0.002)

Conclusions
Our study demonstrated an increase in IOP fluctuation in vitrectomized eyes, particularly in the facedown position. This finding holds significance as it enables ophthalmologists to tailor more precise and effective postoperative management strategies after vitrectomy for RRD repair.

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P-0236

STRUCTURAL CHANGES IN PHOTORECEPTORS IN THE OUTER NUCLEAR LAYER BETTER PREDICT CHANGES IN HUMPHREY FIELD ANALYZER GLOBAL INDICES IN GLAUCOMA SUSPECTS

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Background

Retinal ganglion cell (RGC) dysfunction is the hallmark of glaucoma. The thickness of the ganglion cell layer-inner plexiform layer (GCL-IPL) and the inner retinal layers have been associated with glaucoma and Pattern Electroretinogram (PERG) parameters. Emerging evidence in Optical Coherence Tomography (OCT) studies has shown the involvement of the outer retina and photoreceptors as well. The purpose of this study was to explore the relationship between the outer retina and outer nuclear layer (ONL) thickness and Humphrey Field Analyzer (HFA) 10-2 Global Indices in Glaucoma Suspects (GS).

Methods

In this cross-sectional study, 29 consecutive GS subjects (57 eyes, 27.6% male, 72.4% female) were enrolled at Manhattan Eye Ear and Throat Hospital. Subjects underwent comprehensive eye examination, including HFA 10-2 testing, Spectral Domain-OCT retinal thickness measurements, and PERG measurements. Partial correlation and linear regression models were used for statistical analysis.

Results

After controlling for age and central corneal thickness (CCT), partial correlation analysis revealed a significant negative relationship between visual field mean deviation (MD) 10-2 and ONL center ($r = -0.369$, $p = 0.027$) and ONL central max ($r = -0.420$, $p = 0.011$). Linear regression analysis explored the relationship between ONL thickness and MD 10-2, with MD 10-2 as the dependent variable. Controlling for age and CCT, ONL center thickness explained 12.9% ($p = 0.027$), and ONL central maximum thickness explained 16.7% ($p = 0.011$) of the variance in MD 10-2.

Conclusions

In previous studies, RGC dysfunction was associated with increased ONL thickness and the swelling of photoreceptors. In this study, we report that increased ONL thickness in GS subjects was significantly associated with changes in HFA 10-2 global indices, specifically in MD 10-2. These findings suggest the presence of global RGC dysfunction in GS that disrupts the electrical signaling pathway and creates visual field disturbances.

P-0238

DIURNAL IOP FLUCTUATION AT HOME IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA BY REBOUND HOME TONOMETER

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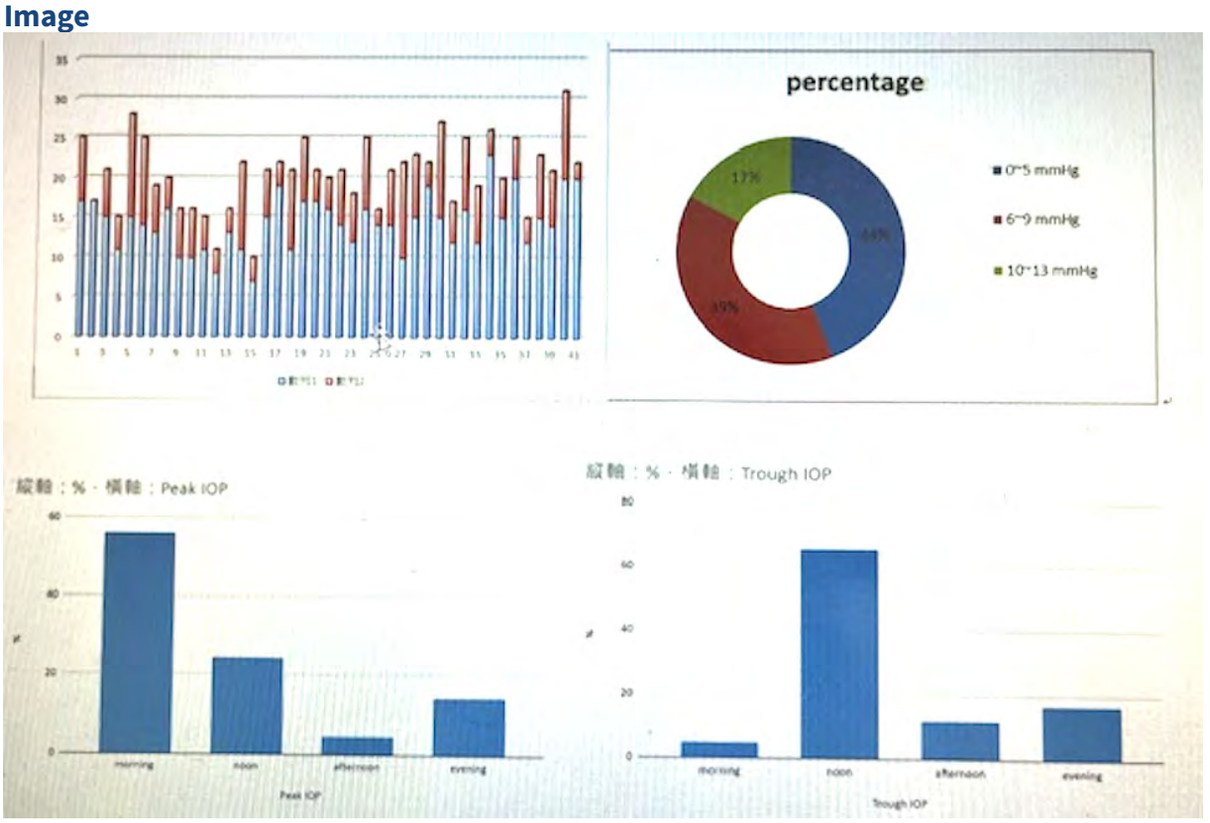
Background
Intraocular pressure (IOP) is a well-known treatable risk factor of glaucoma. Nowadays ophthalmologists mainly rely on IOP measurements at clinic to make diagnosis and treatment. Diurnal IOP fluctuation has been suggested as an independent risk factor for glaucoma and disease progression. In studies of 24-hour IOP monitoring, most glaucoma patients are reported to have their peak IOP recorded outside clinic time. Studies reported that primary angle closure glaucoma eyes had afternoon IOP peaks, whereas primary open-angle glaucoma (POAG) subjects had IOP peaks in the early morning. The purpose of this study is to evaluate the application of IOP using rebound tonometer (iCare-Home) at home by patient and their caregivers and to assess acceptability and accuracy of self-tonometry in glaucoma patients.

Methods
This is a prospective study measuring IOP using iCare Home tonometer (Finland) at home by the patients from the department of ophthalmology at Taipei City Hospital, Taiwan. We recruited 48 glaucoma patients and they received training at clinic to measure IOP at home. IOP readings by Icare Home tonometer were collected and the diurnal variation curves of IOP of the patient were recorded to evaluate the effectiveness of anti-glaucoma medication. Patients recorded their IOP five times a day, at the following time points: 7:00~10:00, 11:00~13:00, 14:00~17:00, 18:00-21:00, and 22:00-24:00. Detailed ocular examinations were performed including visual acuity, visual field report. We will exclude patients with suspect infectious disease, with corneal scar, and with recent ocular surgery. Questionnaires regarding preference and acceptability of the self-tonometer were used to evaluate patients' perception. Factors associated with acceptance and assessment in IOP measurement at home, such as age, gender, impaired visual function… were recorded for analysis.

Results
Total 45 patients with clinical diagnosis of glaucoma were recruited, and total 41 cases were collected for analysis. The average age of participants was 45.2 years old. The majority of disease severity of glaucoma belongs to mild to moderate glaucoma. Regarding diurnal IOP change, the distribution of peak IOP in 24-hours was 56.1% in the morning, 24.4% at noon, 4.8% in the afternoon, and 14.6% in the evening. The distributions of trough IOP were 4.9 % in the morning, 65.9% at noon, 12.2% in the afternoon, and 17% in the evening.

Image



Conclusions

The rebound tonometer was well tolerated and successfully used by patients themselves at home. More than half of patients with POAG showed peak IOP in the early morning and 66% of IOP trough located at noon. With more IOP values and data of IOP diurnal variation at home and at clinic, surgeons or clinicians may have better understanding of IOP control in each patient. Home tonometry provided valuable information in selected patients that verified adequate IOP control or help dictate surgical intervention.

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P-0239

PERIPAPILLARY SCLERAL AND LAMINAR CURVATURE CHANGE AFTER TRABECULECTOMY IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background
Deformation of the lamina cribrosa (LC) has been proposed as a key phenomenon underlying the pathogenesis of glaucoma. Recently, the importance of peripapillary sclera (PS) in glaucoma has been highlighted in that PS is directly connected to the optic nerve head (ONH) which involves LC. The PS provides mechanical support for the ONH tissues. Specifically, the PS and the LC bear the IOP-related stress and strain collectively as a biomechanical unit. Therefore, any alterations in the morphology and biomechanical properties of the PS should strongly influence the biomechanical environment to which RGC axons are exposed within the ONH. Sigal et al. suggested that in eyes with stiff sclera, sclera would deform little under IOP, which allows the LC to be displaced posteriorly by the action of IOP on its anterior surface. The present study aimed to determine changes of PS curvature near the ONH after IOP lowering surgery in primary open-angle glaucoma (POAG), and to examine the relationship between the PS curvature change and the LC-curvature change.

Methods
Fourty-one eyes with primary open-angle glaucoma that underwent trabeculectomy were included. Optic nerve head and peripapillary area were scanned by using enhanced-depth-imaging spectral-domain optical coherence tomography (OCT) before and 3 months after trabeculectomy. The PS and LC curvature were assessed by measuring the PS curvature index (PSCI) and LC curvature index (LCCI) in three B-scan images in each eye.

Results
At 3 months postoperatively, the intraocular pressure (from 22.2±7.7 to 9.8±4.2), axial length (from 24.83±1.88 to 24.60±1.76), PSCI (from 2.83±2.28 to 2.23±2.28), and LCCI (from 11.7±3.1 to 9.4±3.2) had significantly decreased (all $P<0.001$). Twenty-three eyes showed significant PSCI decrease, 13 showed no significant change, and 5 showed significant increase after trabeculectomy. The decrease of PSCI was significantly associated with larger baseline PSCI ($P=0.002$) and greater axial length reduction ($P<0.001$). There was a significant correlation between PSCI and and LCCI decrease ($P\leq0.001$).

Conclusions
A significant decrease in PSCI was observed after trabeculectomy. The PSCI decrease was correlated with the LC curvature reduction.

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P-0240

DISRUPTED CIRCADIAN RHYTHM IMPAIRS VASOACTIVE INTESTINAL POLYPEPTIDE-INDUCED EXPANSION OF SCHLEMM'S CANAL VIA THE BMAL1-ATG14-VPAC2 PATHWAY

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Background
We previously demonstrated that vasoactive intestinal polypeptide (VIP) induced Schlemm's canal (SC) expansion and reduced intraocular pressure (IOP) via VPAC2. VPAC2 belongs to the family of G protein-coupled receptors (GPCRs) and is implied to have a modifiable nature. We therefore investigated whether VIP efficacy was modulated via VPAC2 under disrupted circadian rhythm (DCR), and we further clarified the underlying molecular mechanism.

Methods
DCR was stimulated by constant darkness (DD) and validated in rats. IOP and SC morphology were assessed after VIP administration under DCR, as were Bmal1 and VPAC2 of Schlemm's canal endothelium (SCE).

Results
VPAC2 was correlated with Bmal1 in human umbilical vein endothelial cells (HUVECs) by western blotting (WB), real-time quantitative polymerase chain reaction (RT–qPCR) and cycloheximide chase assays. Autophagic flux was detected by a GFP-LC3 reporter, with endocytic trafficking of VPAC2 probed by antibody uptake assay. The Bmal1-Atg14-VPAC2 pathway was verified by immunofluorescence, co-immunoprecipitation, WB and RT–qPCR, which was further examined with oral administration of melatonin. Our results implied that DCR impaired VIP-induced SC expansion with downregulated expression of Bmal1 and VPAC2. Degradation of VPAC2 through enhanced autophagic flux and lysosome sorting was observed *in vitro* upon Bmal1 knockdown. Furthermore, Bmal1 was found to be a negative regulator of the autophagy-related gene Atg14, which interacted with VPAC2 to promote lysosome sorting. Exogenous melatonin restored VIP-induced SC expansion via the Bmal1-Atg14-VPAC2 pathway under DCR.

Conclusions
As a conclusion, VIP-induced SC expansion was under circadian modulation via the Bmal1-Atg14-VPAC2 pathway, which was dampened under DCR but reinforced with exogenous melatonin supplementation.

P-0241

MICROVASCULAR CHANGES IN OCT-A IN PATIENTS WITH INTRAOCULAR PRESSURE FLUCUTATION UNDER FEMTOSECOND LASER-ASSISTED CATARACT SURGERY

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Background

The Femtosecond laser ring suction may affect the IOP during the cataract surgery and may cause vessel desity changes. The operation times, cataract grading and phaco-power also played an importatnt role. This study aimed to evaluate the correlations beween intraocular pressure (IOP) fluctuation and vessel density (VD) changes before and after femtosecond laser assisted cataract surgery.

Methods

We recuited total 60 eyes in 60 patients and devided them into 2 groups; group A underwent Femtosecond laser-assisted cataract surgery(FLAC) and group B recieved the traditional phacoemusification cataract surgery via crescent knife and continuous curvilinear capsulorhexis forceps during 2024 in Chung Shan Medical Universtiy Hospital, Taichung, Taiwan. Vessel density in macula and optic nerve head were measured by optical coherence tomography angiography before and after. Transient elevation in intraocular pressure caused by application of suction ring(flat applination, Ziemmer 8 Femto) and the phacopower during surgery was also monitored and recorded. The same examination was repeated after 1 months post-operation.

Results

The vessel density of optic nerve head region had no significant changes after the surgery no matter group A nor group B controlled under controlled phaco-power.Vessel density (VD) at deep (DCP) plexus of macular region significantly decreased 1 day after the surgery in group A comparing with group B, under the controled phaco-power regression.

Conclusions

Transiet vessel density changes corresponds to post-op IOP spike even under the phaco-power controled analysis was noted. The IOP and vessel density changes is correlated with suction time and Femtosecond use. Accurate and prompt ducking during Femtosecond assisted catarct surgery may be quite improtant in glaucoma patient.

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P-0246

CHARACTERISTICS AND COMPLICATIONS ASSOCIATED WITH IRIDOCILIARY CYSTS DETECTED BY ULTRASOUND BIOMICROSCOPY IN ADULT PATIENTS

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Background
This study aims to investigate the characteristics of iridociliary cysts detected by ultrasound biomicroscopy (UBM) and their association with complications such as intraocular hypertension and angle-closure glaucoma. Despite their clinical signicance, iridociliary cysts remain underexplored in the existing literature.

Methods
A retrospective, descriptive, longitudinal, single-center study was conducted by reviewing records of adult patients diagnosed with iridociliary cysts at the Instituto de Oftalmología Conde de Valenciana from January 2022 to January 2023. Patient data included visual acuity (VA) via Snellen chart, intraocular pressure (IOP) measured by Goldman tonometry, slit-lamp examination, dynamic gonioscopy, fundus assessment, and UBM parameters such as anterior chamber size, cyst characteristics (size, location, number), and peripheral iris thickness. Associated ophthalmologic comorbidities and treatments were also documented.

Results
The sample included 59 patients (61% female) with a median age of 51 years (range:13–80). Median VA was 20/100 bilaterally, and median IOP was 16 mmHg (right eye) and 15 mmHg (left eye). Corneal pachymetry revealed a median thickness of 540 µm, while anterior chamber depths were 2.56 mm (right eye) and 2.66 mm (left eye). The prevalence of intraocular hypertension was 18.6% (n=11), and angle-closure glaucoma was observed in 23.7% (n=14). Signicant associations were identied between complications and specic variables such as angle classication and the presence of the hump sign.

Conclusions
This study highlights the bilateral nature, location, and characteristics of iridociliary cysts while identifying correlations with complications. Although a direct causal relationship was not established, the ndings underscore the importance of certain clinical features in predicting outcomes. Limitations include a small sample size and retrospective design. These ndings contribute to the understanding of iridociliary cysts and may guide further research and clinical management.

P-0247

INVESTIGATING THE MECHANISM OF AQUEOUS MISDIRECTION IN THE PATHOGENESIS OF PERSISTENT HIGH INTRAOCULAR PRESSURE IN PRIMARY ANGLE CLOSURE DISEASE

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Background
Primary angle closure disease (PACD) is usually described as bilateral disease with similar structures between the affected and fellow eyes, but most patients with PACD present with a monocular onset. The current study compared the differences in biometric parameters between affected and fellow eyes of patients with PACD to investigate the pathogenesis of angle closure.

Methods
This cross-sectional study included patients with unilateral PACD. Central corneal thickness (CCT), anterior chamber depth (ACD), lens thickness (LT), and axial length (AL) of the eyes were captured and measured using an IOL-Master 700. Lens position (LP) and vitreous chamber volume (VCV) were derived by calculation. The differences in these parameters were compared between affected and fellow eyes using paired sample t-test analysis, least absolute shrinkage and selection operator (LASSO) regression, and binary logistic regression models fitted to generalized estimating equations (GEE).

Results
A total of 80 eyes from 40 patients were included in this study. The paired sample t-test analysis showed that in affected eyes ACD ($p = 0.001$), LT ($p = 0.022$), and LP ($p < 0.001$) were smaller, while VCV ($p = 0.005$) was larger. There was no significant difference in AL and CCT between the two groups. Logistic regression showed that significantly smaller LP ($p < 0.001$, OR = 0.13) and larger VCV ($p = 0.025$, OR = 1.63) were still present in affected eyes, though ACD and LT no longer differed significantly by PACD status.

Conclusions
PACD eyes had more zonulopathy and larger posterior volume than fellow eyes. Aqueous misdirection may play a role in the pathogenesis of persistent high intraocular pressure in PACD.

P-0248

OCULAR BIOMETRIC CHARACTERISTICS AFTER TRANSCONJUNCTIVAL XEN45 IMPLANTATION

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Background

Since the eyeball is an elastic tissue, its biometric characteristics changes according to the intraocular pressure (IOP). But previous studies that compared ocular biometrics after trabeculectomy was under the effect of conjunctival suture. Xen45 gel implant, which is recently widely used in glaucoma surgery, can be implanted without incision and suturing of the conjunctiva. The purpose of our study was to evaluate the ocular biometric changes according to the IOP after trasconjunctival Xen45 implantation.

Methods

A prospective observational study was conducted for 34 subjects who visited Chungnam National University Sejong Hospital glaucoma clinic and underwent Xen45 implantation. Comprehensive ophthalmic examinations were done including IOP, visual acuity, and refractive error measurement, keratometry, corneal topography, and optical biometry before and 1 day, 1 week, and 1 month after the surgery.

Results

A total of 32 eyes of 32 participants were finally analyzed. The average IOP of the participants before surgery was 26.5 mmHg, which was significantly decreased to 6.8, 12.0, and 16.9 mmHg (1 day, 1 week, and 1 month after surgery, respectively). The anterior chamber volume, anterior chamber depth, and axial length were significantly decreased at 1 day and 1 week after the surgery, but there was no significant difference in corneal curvature. All the biometric characteristics measured 1 month after the surgery were not significantly different compared to that before the surgery, except for the IOP.

Conclusions

In response to rapid changes in IOP, the anterior chamber depth, anterior chamber volume, and axial length temporarilly decreased, but the corneal curvature remained relatively constant.

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P-0250
CORRELATION OF OCULAR PERFUSION PRESSURE AND COLOUR DOPPLER PARAMETERS

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Background
Blood flow to the eye depends on a pressure gradient, called Ocular Perfusion Pressure (OPP). OPP is defined as the driving force for ocular circulation, calculated by the difference between Mean Arterial Pressure (MAP) and Intraocular Pressure (IOP). An increase in IOP or a decrease in MAP can lead to a decrease in OPP and therefore to reduced flow into the retina and optic nerve if the vascular resistance is unchanged.

The hypothesis of vascular involvement in the disease process has long been considered in glaucoma. The evidence that low ocular perfusion pressure (OPP) is a risk factor for glaucoma supports this concept. This study aims to ascertain to the correlation between ocular perfusion pressure and colour doppler parameters in individuals newly diagnosed with primary open angle glaucoma.

Methods
41 patients diagnosed with POAG between 40 and 70 years, both genders, were chosen from our glaucoma clinic and were cleared of any other systemic conditions that could interfere with the study. Routine ophthalmological examinations, including gonioscopy and visual fields were performed. The patients were subsequently monitored for 24 hours for blood pressure and IOP changes. On the next day, Colour Doppler imaging was performed to look for PSV, EDV, RI of the ophthalmic artery, and central retinal artery. The purpose of this study was to evaluate the correlation between Ocular perfusion pressure and color Doppler imaging (CDI) parameters in patients with primary open-angle glaucoma, providing useful insights into certain hemodynamic abnormalities associated with POAG.

Results
The results of this study contribute to the growing recognition that vascular factors may participate in the pathogenesis of primary open-angle glaucoma (POAG) with significant correlation coefficient for both parameters.

Conclusions
The ocular perfusion pressure has a positive correlation with the mean intraocular pressure as shown in our study. Our study significantly contributes to the existing pool of research on this topic with a good sample size in the South East Asian demography.

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P-0251

PREDICTORS OF LONGITUDINAL VISUAL FIELD CHANGES IN PATIENTS WITH ACUTE ANGLE-CLOSURE ATTACK AND PRIMARY ANGLE-CLOSURE DISEASE

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Background

Previous studies have documented short-term retinal nerve fiber layer (RNFL) changes and visual field (VF) deterioration after acute primary angle-closure (APAC), but there is limited understanding of the long-term progression of these parameters and the role of IOP fluctuations or anterior segment features in predicting outcomes. This study aimed to demonstrate longitudinal changes in RNFL and visual function and predicting factors in patients with acute APAC compared to primary angle-closure disease (PACD).

Methods

This retrospective longitudinal study included 40 eyes with APAC and 83 eyes with PACD treated with laser peripheral iridotomy. Intraocular pressure (IOP) was assessed quarterly, with mean IOP and IOP fluctuation calculated over the first two years. RNFL thickness, mean deviation (MD), and visual field index (VFI) were assessed biannually using optical coherence tomography (Cirrus) and visual field testing (Humphrey). IOP changes in supine and lateral decubitus positions were measured using rebound tonometry (Icare Pro) [1]. Anterior segment parameters were evaluated via anterior segment optical coherence tomography. Linear mixed models analysed longitudinal RNFL and VFI changes and their predictors.

Results

APAC eyes showed faster RNFL thinning than PACD (-1.64 vs. -0.62 µm/year, P=0.006). Although VFI decline rates were comparable (APAC: -1.3 vs. PACD: -0.6 %/year, P=0.108), more APAC patients were progressors (30 vs. 13%, P=0.047). The results of univariable analysis are presented in Figure 1. Multivariable analysis revealed greater IOP elevation at lateral decubitus position (β=-0.18, P=0.034), older age (β=-0.11, P=0.034), and female sex (β=-1.40, P=0.034) were predictive of VFI decline (%/year) in the APAC group. None of the AS-OCT parameters predicted visual field progression in the APAC group. In the PACD group, older age (β=-0.05, P=0.039) and higher lens vault (β=-1.36, P=0.024) predicted VFI deterioration (%/year), while the posture-related IOP change and long-term IOP fluctuation were not associated with VF decline. The positive correlation between lens vault and IOP fluctuation (β=0.05, P=0.020) suggests that a greater baseline lens vault may contribute to increased long-term IOP fluctuation, ultimately leading to VFI deterioration.

Conclusions

Patients with APAC demonstrated higher risks of long-term visual function deterioration than those with PACD. In APAC, greater LDP IOP elevation may be a useful indicator for progression, while lens vault, which led to greater long-term IOP fluctuation, predicted deterioration in PACD.

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P-0252

COMPARISON OF IOP MEASUREMENTS BY PASCAL DYNAMIC CONTOUR TONOMETRY AND BY TONOPEN TONOMETRY IN EYES UNDERWENT PENETRATING KERATOPLASTY

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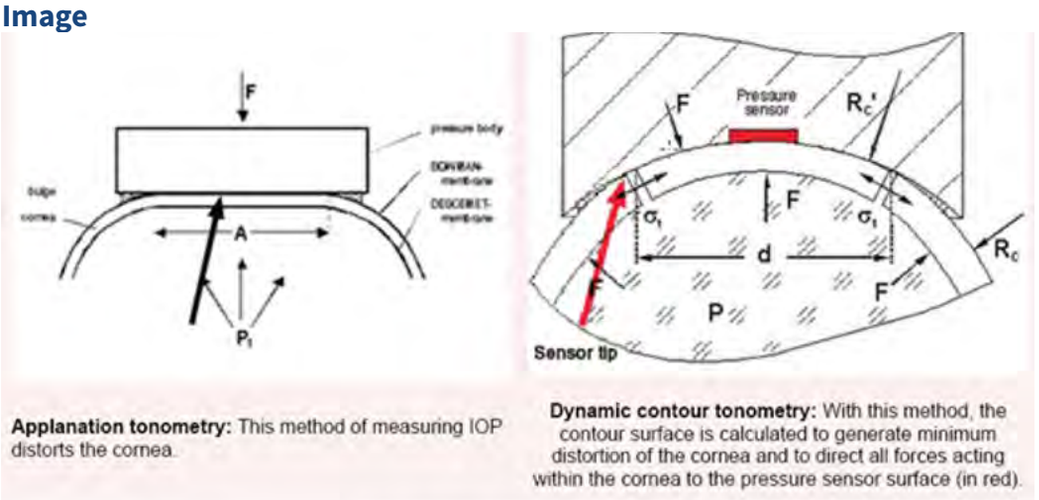
Background
Penetrating keratoplasty (PK) is a common ocular surgery for severe corneal diseases, but it is often associated with complications, including secondary glaucoma. Accurate measurement of intraocular pressure (IOP) in post-PK eyes is crucial for early detection and management of glaucoma, yet it remains challenging due to factors such as corneal irregularity and corneal hysteresis. This study aims to compare the measurements of intraocular pressure (IOP) by Dynamic contour tonometry (DCT) and applination tonometry (tonopen) in eyes underwent penetrating keratoplasty (PK), and to evaluate the ocular pulse amplitude (OPA) of these eyes compared with control group.

Methods
Eighteen eyes of 18 patients after penetrating keratoplasty (PK) and 7 eyes of 7 subjects without any ocular surgery received IOP measurements by DCT and tonopen. We presented Bland-Altman plots to evaluate the agreements and difference between two methods.

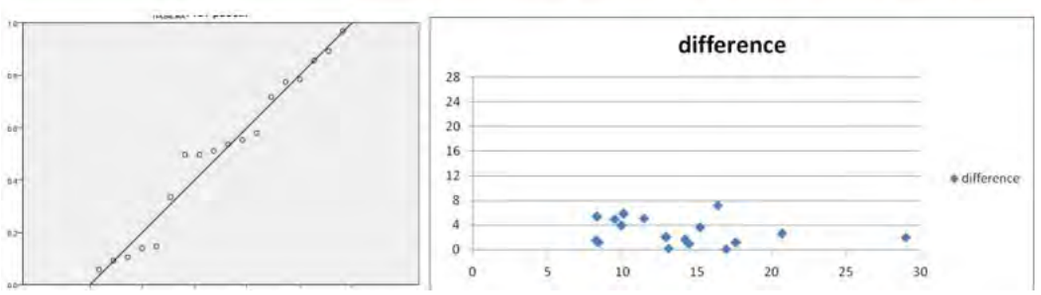
Results
Average of DCT measurements were 13.1±5.4mmHg and tonopen measurements were 14.9±5.25 mmHg in corneal transplant group, and 11.2±2.65 mmHg, 11.9±3.17 mmHg, respectively in control group. Tonopen measurements were higher than DCT measurements in 78%. 44% of the IOP differences was within +/- 2mmHg between two methods. The mean OPA in corneal transplant group and control group were 1.8±0.93 and 1.6±0.79mmHg, respectively.

Image



Applanation tonometry: This method of measuring IOP distorts the cornea.

Dynamic contour tonometry: With this method, the contour surface is calculated to generate minimum distortion of the cornea and to direct all forces acting within the cornea to the pressure sensor surface (in red).



Conclusions

We found a good agreement between two tonometers. The results indicate the application of DCT in patients underwent corneal surgery in clinical practice. DCT has limitations in irregular corneal surface and patient's cooperation is required in this method.

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P-0253

IMPACT OF GUIDED DIAPHRAGMATIC BREATHING ON INTRAOCULAR PRESSURE, PERCEIVED STRESS, AND BIOMARKERS IN A CASE-CONTROL STUDY

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Background

The relationship between perceived stress, elevated stress biomarkers (plasma cortisol, IL-1B, IL-6, TNF-α, β-endorphins, catecholamines), and increased intraocular pressure (IOP) is well-documented[1,2]. Studies show that mindfulness and meditation can lower IOP. Diaphragmatic breathing has been shown to reduce perceived stress, lower stress-related biomarkers such as salivary cortisol, and improve systolic/diastolic blood pressure[3]. Our study aims to use diaphragmatic breathing to lower IOP, reduce perceived stress, and decrease stress biomarkers in healthy individuals.

Methods

This prospective case-control study will take place at a single-center, outpatient ophthalmology clinic, involving fifty healthy participants (one hundred eyes). Inclusion criteria are: (1) age ≥18 years, (2) IOP <21 mmHg, and (3) open angles confirmed by gonioscopy. Exclusion criteria include: (1) prior glaucoma surgeries, (2) ocular surgeries within six months, (3) use of ocular hypotensive medications, (4) use of systemic/topical corticosteroids, (5) medical conditions affecting the HPA axis, and (6) caffeine intake on the day of testing.

Participants will be randomized via software into two groups: 25 in the intervention group (12-minute guided diaphragmatic breathing session) and 25 in the control group (12-minute neutral video). Pre- and post-intervention measurements will include IOP (Goldmann tonometry), perceived stress (standardized questionnaire), salivary cortisol, IL-6, IL-1B, DHEA-S, blood pressure, heart rate, oxygen saturation, and ocular blood flow (Laser Speckle Flowgraphy). Post-intervention IOP will be measured at 2, 10, and 15 minutes.

Video created by the research team in consultation with a breathwork specialist for administration: https://youtu.be/NUUapDjdL3M?si=Afe6IveQmcZQlRSc

Results

Data collection ongoing.

Conclusions

Our study explores diaphragmatic breathing as a potential intervention to reduce IOP in healthy individuals. Stress is a modifiable risk factor for glaucoma, contributing to ischemia, oxidative stress, inflammation, and vascular dysregulation. These mechanisms are not directly targeted by standard treatments for primary open-angle glaucoma (POAG). Our results may indicate that diaphragmatic breathing could serve as a valuable adjunctive therapy for managing IOP and reducing stress. Given its simplicity and accessibility, this technique holds promise as a lifestyle modification alongside standard glaucoma treatments.

Diaphragmatic breathing may provide a non-invasive, accessible method to help lower intraocular pressure and manage stress, complementing existing glaucoma therapies. In addition, reductions in intraocular pressure accompanied by confirmed decreases in stress biomarkers provide clinicians with valuable insights into the pathophysiology of intraocular pressure fluctuations and elevations, helping to guide future interventions.

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P-0254

A COMPARISON OF INTRAOCULAR PRESSURE MEASUREMENT USING SUOER SW-500 REBOUND TONOMETER AND CONVENTIONAL REUSABLE GOLDMANN PRISMS

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Background
To determine the agreement between intraocular pressure (IOP) measurements using conventional Goldmann applanation tonometry (GAT) and SUOER SW-500 Rebound Tonometer.

Methods
This was a prospective observational study where 205 eyes of 106 glaucoma patients had their IOPs measured by 2 fellowship trained ophthalmologists. Data were analysed using the Bland-Altman method of differences. Correlation was measured using the Pearson coefficient.

Results
Most of our patients were Chinese (88.7%) and female (51.9%). The average age was 66.9 years.

The range of IOPs as measured by GAT was 2 to 58 mm Hg. Using the Bland-Altman method to compare GAT and SUOER SW-500 Rebound Tonometer. The tonometer overestimated the IOP by 0.5mm Hg in the right eye and underestimated it by 0.1 mm Hg in the left eye. The Tonometer IOP correlated well with GAT, with a Pearson coefficient of correlation(r) of 0.89 ($P < 0.001$) for the right eye and 0.86 ($P < 0.001$) for the left eye, respectively. In patients with GAT IOP ≥ 21 mm Hg ($n = 25$), the Tonometer underestimated the IOP by 2.96 mm Hg.

Conclusions
The IOP measurements from the SUOER SW-500 Rebound Tonometer correlates with the conventional GAT in measuring the IOP. SUOER SW-500 Rebound Tonometer may be of use, especially if the risk of transmission of infection is high considering that the probes are disposable. It is easy to use and its small size and portability makes it useful in situations where the patient is unable to be examined at the slit lamp.

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P-0256

PERI-INTERVENTIONAL GLAUCOMA TESTING AND THERAPY: UTILIZING HOME-IOP MONITORING TO ASSESS, AND ACHIEVE, TARGET IOP RANGE

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Background

Intraocular pressure (IOP) is the main modifiable risk factor for the development and progression of glaucoma1-7. Unfortunately, a large percentage of patients have elevated IOP levels outside normal clinic hours8-9 and, as such, may lead to over-reliance on IOP levels resulting in missed glaucoma diagnosis or under-diagnosis10,11. When such disease-modifying data is either missing or unreliable, it is difficult to assess and achieve an accurate target IOP range12-15. As this peri-interventional period16 depends on these limiting factors, there is a need to move beyond the standard of care17 with reliable home-IOP monitoring to better accomplish such goals18-21.

This presentation (including patient optic nerve photos, OCT RNFL/GCC, visual field testing images, etc) focuses on these limiting factors and presents a patient with advanced glaucoma who, through the use of home-IOP monitoring and tailored treatment, was able to assess and achieve a desired target IOP range with clinically significant, sufficient, and evidence-based22-26 IOP reduction.

Methods

Upon presenting as a new patient, and after other differentials were excluded, a 64-year old Caucasian male was diagnosed with advanced glaucoma. To better appreciate the unknown pre-treatment IOP levels and ranges, the patient was asked to perform home-IOP monitoring with iCare Home2 (iCare, Finland). Instructions were provided to the patient and the patient performed such testing showing elevated IOP levels above those measurements recorded during clinic hours.

As part of the treatment plan, the patient was scheduled for selective laser trabeculoplasty (SLT) as initial therapy and, 4-6 weeks later, repeat home-IOP monitoring. There was a significant blunt in IOP-related spikes and an overall mean reduction in IOP levels. However, due to the advanced level of glaucoma, and the patient's relatively younger age and residual life expectancy, further IOP reduction was recommended and patient elected for topical adjunctive therapy.

The patient was again asked to perform home-IOP monitoring after using topical hypotensive therapy. Following the home-IOP monitoring period, there was another significant reduction in IOP spikes and an overall mean reduction in IOP levels and to our desired target pressure range.

Results

Clinically significant, sufficient, and evidence-based IOP-reduction was assessed and achieved after initial selective laser trabeculoplasty OU followed by topical ocular hypotensive treatment OU as shown in the images below.

Image

OD	HIGHEST	LOWEST	MEAN	SD	n
BASELINE	23	11	17.6	3.4	26
AFTER SLT	18	8	13.9	3	14
AFTER SLT + TIMOLOL QAM OU	13	9	10.6	1.6	13

Conclusions

Home-IOP monitoring can help the provider better assess and achieve sufficient IOP reduction and better ensure target pressure range. Such peri-interventional testing should be the new standard of care[16,21] for providers and patients.

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P-0257

POSTURAL INFLUENCE ON SELF-MEASURED INTRAOCULAR PRESSURE USING A HOME HANDHELD TONOMETER IN A NORMAL-TENSION GLAUCOMA PATIENT

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Background
To assess the feasibility and clinical significance of self-monitored intraocular pressure (IOP) measurements in different body positions using a home handheld tonometer in a patient with normal-tension glaucoma (NTG).

Methods
A female patient in her 40s with NTG performed self-measured IOP assessments over seven consecutive days using the Icare HOME2 tonometer (Icare Finland Oy). The right eye remained untreated, while the left eye received nightly omidenepag isopropyl instillation. IOP measurements were obtained under four conditions: (1) immediately upon waking in the supine position (W-SupIOP), (2) one hour after waking in the seated position (W-SitIOP), (3) at bedtime in the seated position (B-SitIOP), and (4) after maintaining the supine position for one hour at bedtime (B-SupIOP). Mean IOPs were statistically compared across these conditions.

Results
Upon waking, both eyes demonstrated significantly higher IOP in the supine position compared to the seated position (W-SupIOP: Right 16.7 mmHg, Left 19.0 mmHg vs. W-SitIOP: Right 12.6 mmHg, Left 12.6 mmHg; $p<0.001$ for both eyes). At bedtime, the right eye exhibited a statistically significant higher IOP in the supine position (B-SupIOP: 13.3 mmHg vs. B-SitIOP: 11.0 mmHg; $p=0.038$), whereas the left eye showed no significant difference (B-SupIOP: 11.4 mmHg vs. B-SitIOP: 10.4 mmHg; $p=0.386$).

Conclusions
Self-monitoring of IOP in both supine and seated positions is feasible and provides valuable insights into posture-related IOP fluctuations in NTG patients. The absence of a significant nocturnal supine IOP increase in the treated eye suggests that glaucoma medication may attenuate posture-induced IOP elevations. Incorporating postural IOP assessments and appropriate therapeutic strategies could enhance individualized management and outcomes in NTG.

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P-0258

TWO COLOUR IMAGING OF THE OCULAR SURFACE CAN RECOGNISE CONJUNCTIVAL ARTERIES AND VEINS FROM HAEMOGLOBIN SATURATION PRINCIPLES

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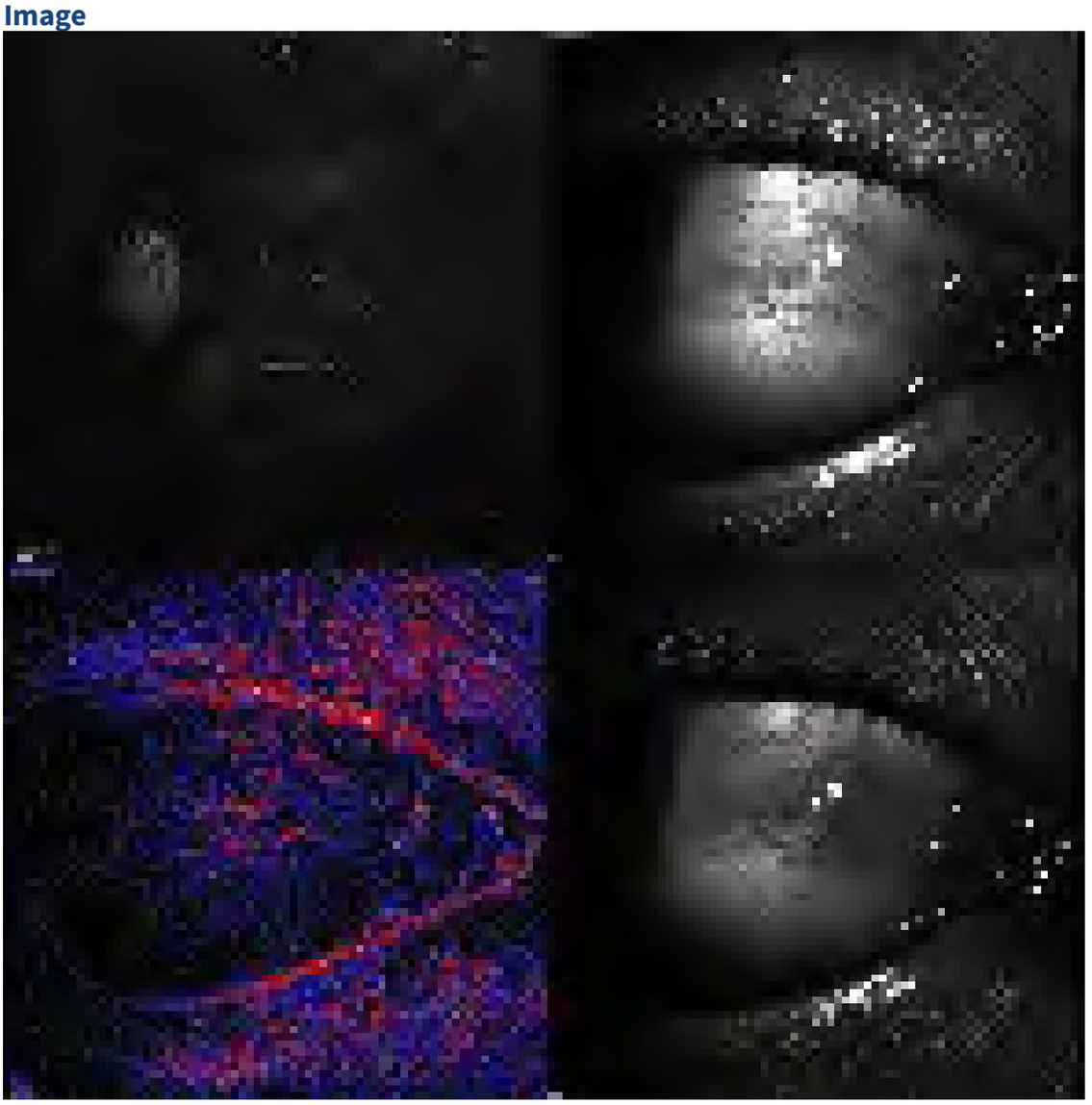
Background
The episcleral venous pressure is ~ 8 mmHg over atmospheric even when upright, and the contributors to this would be useful therapeutic targets in glaucoma. We sought to recognise the oxygen saturation of haemoglobin in conjunctival vessels as a step towards identifying vascular regulation of this raised venous pressure.

Methods
Four healthy volunteers participated in this exploratory study. The multicolour scanning laser imaging of Heidelberg Spectralis was used to image the bulbar conjunctiva with narrow-band 488 nm and 518 nm illumination. The optical density ratio (ODR) represents the relative absorption of each wavelength, and correlates with haemoglobin saturation. The ODR of each pixel was generated using custom macro code in open source image-processing software ImageJ. Fluorescein angiography was used to identify arterioles definitively.

Results
Fluorescein angiography showed that prominent tortuous vessels were arterioles with early phase filling. The ODR values 0.5-1 were expected to represent desaturated haemoglobin, and ODR values 1-1.5 represent oxygenated haemoglobin. The early filling arterioles tended to have pixel ODR values in the 1-1.5 range, while straight, late filling veins tended to have ODR pixel values in the 0.5-1 range. The signal was not clean, but the observed differences between vessels indicated that oxygen saturation could be detected by this two-colour imaging.

Image



Conclusions

The blue/green laser imaging in the Spectralis can recognise haemoglobin saturation in the conjunctival blood vessels. This may be useful in recognising arteriovenous connections and regulation of the episcleral venous pressure.

Laboratory Sciences

P-PW-0259

SENESCENT VASCULAR ENDOTHELIAL CELLS AS KEY DRIVERS OF NORMAL-TENSION GLAUCOMA: FROM MECHANISMS TO TARGETED THERAPIES

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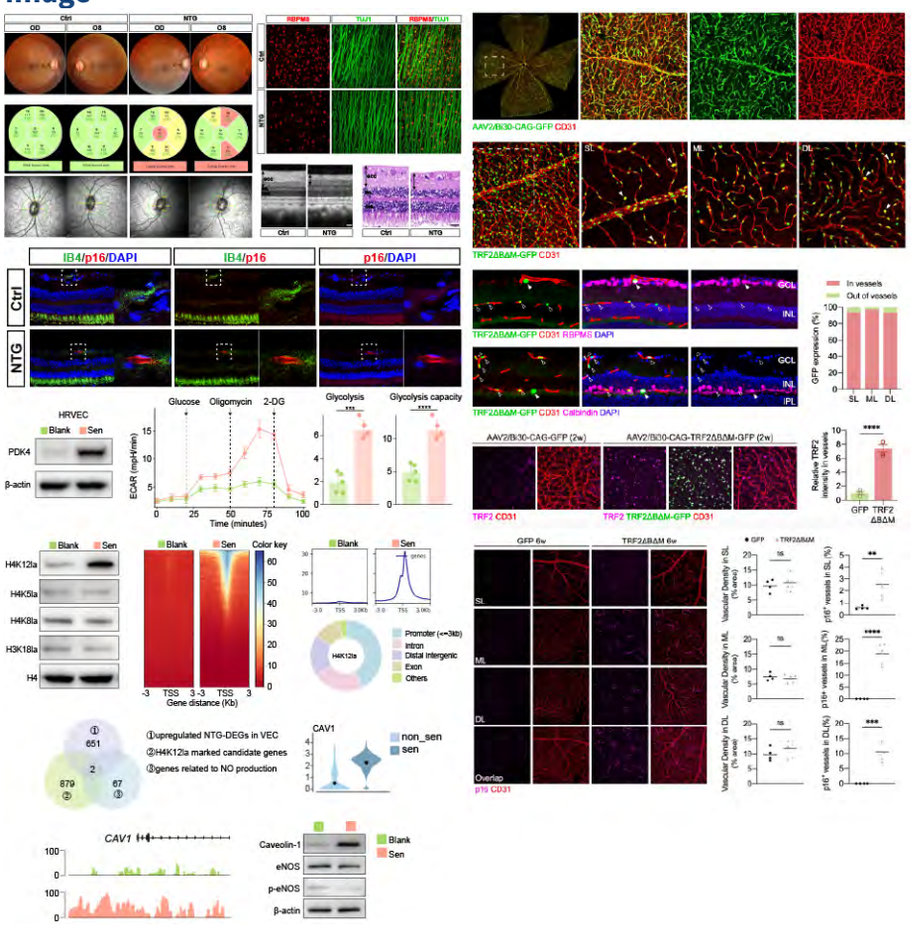
Background
While elevated IOP is a known driver in many glaucoma cases, mechanisms in normal-tension glaucoma (NTG) remain elusive, as NTG patients experience progressive glaucomatous optic neuropathy (GON) despite normal IOP. Recent vascular theories suggest that reduced ocular blood flow (OBF) significantly contributes to GON onset and progression in NTG, with studies indicating impaired retrobulbar hemodynamics. This reduction in OBF appears largely due to vascular dysregulation. Cellular senescence is a biological process in which cells enter a stable cell-cycle arrest in response to stress or damage. Senescent cells remain metabolically active and release pro-inflammatory factors that disrupt tissue homeostasis. The accumulation of senescent cells is now recognized to play a key role in driving various age-related diseases. Given that age is the primary risk factor for glaucoma, it remains unclear whether senescent cells contribute directly to NTG pathogenesis or whether vascular dysregulation in NTG may be associated with cellular senescence.

Methods
We screened approximately 600 cynomolgus monkeys and identified three with spontaneous NTG. Single-cell RNA sequencing and immunofluorescence (IF) validated primate retinal findings. We overexpressed a dominant-negative form of TERF2 in human retinal vascular endothelial cell line (HRVEC) and retinal VECs *in vivo* to establish the VEC senescence model. CUT&Tag, IF, and western blotting were used to investigate molecular mechanisms. IOP measurement, gonioscopy, OCT, fundus photography, and pERG were conducted to assess NTG progression. The novel senolytic agent procyanidin C1 was tested in spontaneous NTG primates and VEC-specific senescent mouse models to evaluate its effectiveness as a targeted therapy.

Results
The senescence burden was significantly elevated only in the VECs of NTG monkeys, with no comparable changes in other retinal cell types. Senescent HRVECs showed increased glycolytic flux, glycolysis reserve capacity, and glycolytic dependency, likely driven by upregulated pyruvate dehydrogenase kinase isoenzyme 4 (PDK4), which inhibits pyruvate conversion to acetyl-CoA and promotes lactate production. Correspondingly, histone lactylation levels, particularly H4K12la, were markedly elevated. Integrative analysis of NTG-DEGs in VECs and endothelium-dependent relaxation related genes identified *CAV1* (encoding Caveolin-1) as a key regulator with H4K12la marks in its promoter, mediating vascular dysregulation in senescent VECs.

Image



Conclusions

In senescent VECs, PDK4 upregulation drives increased glycolysis and lactate production, which in turn elevates histone H4K12 lactylation and activates Caveolin-1 transcription. This activation inhibits eNOS activity, leading to impaired endothelium-dependent relaxation, resulting in ischemic damage to the optic nerve and advancing NTG progression. Targeted clearance of senescent VECs with senolytic agents may restore normal blood perfusion and help alleviate neurodegeneration in NTG.

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P-PW-0262

THE MECHANISM OF ZN2+ IN GLUCOCORTICOID-INDUCED INJURY OF HUMAN TRABECULAR MESHWORK CELLS

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Background

The widespread use of glucocorticoids (GC) in ophthalmology often leads to elevated intraocular pressure (IOP), which may progress to steroid-induced glaucoma (SIG)[1-2]. Despite extensive research, the mechanisms underlying GC-induced IOP elevation remain incompletely understood. Current evidence suggests that trabecular meshwork (TM) dysfunction, characterized by extracellular matrix (ECM) deposition and reduced matrix metalloproteinase (MMP) activity, plays a critical role[3]. Given the essential role of zinc ions (Zn^2) in MMP function and ECM regulation[4], this study investigates Zn^2's involvement in dexamethasone (DEX)-induced TM cell dysfunction and ocular hypertension, with the aim of providing new insights into SIG pathogenesis and treatment.

Methods

Human TM cells were treated with DEX to evaluate changes in intracellular Zn^2 levels and zinc transporter expression. Zinpyr-1 fluorescence imaging, transcriptome sequencing, qRT-PCR, immunofluorescence, and western blotting were used to assess Zn^2 homeostasis and related molecular pathways. Zn^2 modulation via chelation or supplementation was employed to explore its effects on MMP2 expression and ECM remodeling. In vivo, a murine ocular hypertension model was established using subconjunctival DEX injection, and dietary zinc content was manipulated. Aqueous humor Zn^2 levels, IOP, trabecular ECM changes, retinal ganglion cell (RGC) survival, and visual function were assessed using mass spectrometry, tonometry, OCT, histology, and electrophysiology.

Results

DEX treatment significantly reduced intracellular Zn^2 levels in TM cells, impairing extracellular Zn^2 uptake and downregulating ZIP8 expression, while increasing metallothionein transcription. ZIP8 knockdown mimicked DEX's effects on Zn^2 uptake, but Zn^2 chelation did not affect ZIP8 expression, suggesting a direct regulatory effect of DEX. Reduced Zn^2 levels correlated with decreased MMP2 expression, excessive ECM protein deposition (fibronectin and collagen type IV), and ECM structural disarray. Zn^2 supplementation restored MMP2 expression and ameliorated ECM remodeling in DEX-treated cells. In vivo, dietary zinc supplementation significantly reduced DEX-induced IOP elevation, ECM deposition, and collagen content in the TM, preserving visual function and RGC survival.

Image

Figure 1
Zn^{2+} concentration impact MMP2 expression levels and ECM density.

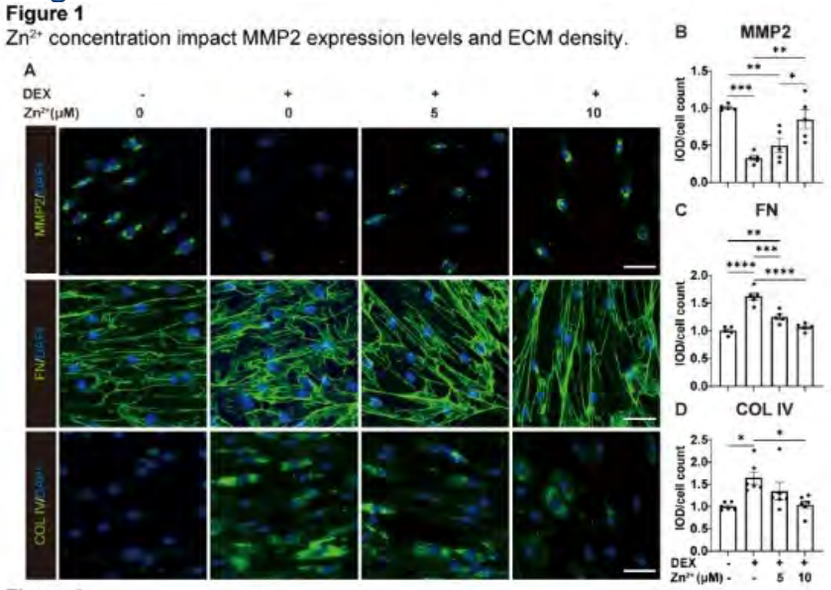
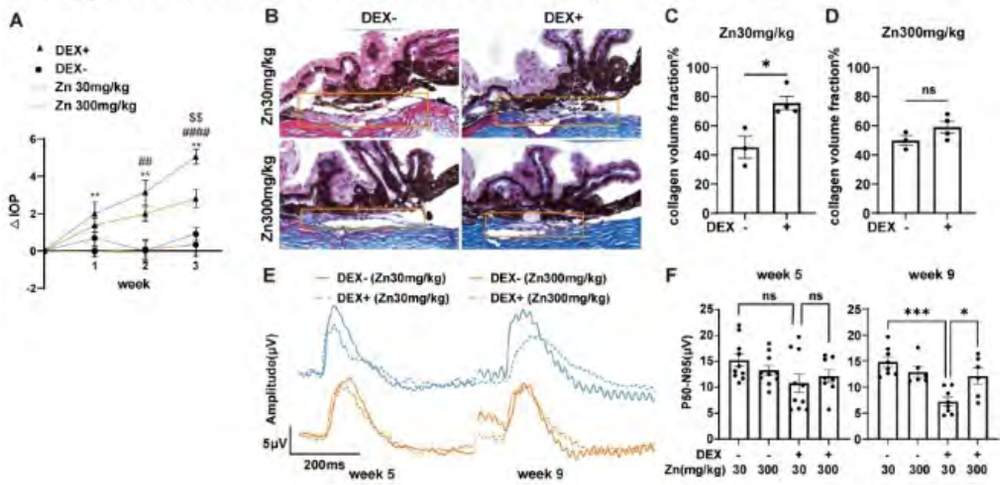


Figure 2
Zinc supplementation alleviated DEX-Induced IOP rise and collagen alterations in mice.



Conclusions

This study identifies Zn^2 as a pivotal regulator of ECM homeostasis in TM cells under glucocorticoid exposure. DEX-induced Zn^2 depletion impairs MMP activity and exacerbates ECM deposition, contributing to SIG pathogenesis. Dietary zinc supplementation effectively mitigates these effects, highlighting its therapeutic potential in managing steroid-induced ocular hypertension and glaucoma. These findings offer a novel perspective on Zn^{2}'s role in ECM regulation and glaucoma pathogenesis, paving the way for innovative treatment strategies.

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P-PW-0263

ASTROCYTE MODULATION AND AXONAL REGENERATION MEDIATED BY CRYSTALLIN BETA B3 IN NEONATAL AND LENS-INJURY-INDUCED RETINAL REPAIR

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Background

Retinal ganglion cells (RGCs) can regenerate their axons both *in vivo* and *in vitro* under certain circumstances[1,2]. Lens injury (LI) enables regeneration possibly due to the release of various lens crystallins modulating astrocytes[3]. Astrocytes are crucial for maintaining neuronal structure and function, and their role in axonal regeneration is increasingly recognized[4]. This study focuses on astrocyte activity and axonal regeneration in the context of LI and neonatal (Neo) retinal regeneration, with particular attention to crystallin beta B3 (CRYBB3).

Methods

Postnatal C57BL/6J mouse pups (P14, showing spontaneous regeneration) and adult male C57BL/6J mice (8–10 weeks old) were used. LI (showing experimental regeneration) was performed on the right eyes of adult mice, while the left eyes served as controls (Ctrl). Retinal explants were cultured under regenerative conditions, and axonal growth was visualized, labeled by β-III-Tubulin (TUBB3) and neurofilament heavy chain (NEFH), and quantified. Proteomic analysis of the retina was conducted using mass spectrometry to identify changes in Neo and adult LI retinas compared to controls. Western blot (WB) analysis assessed astrocyte markers (Glial fibrillary acidic protein [GFAP] and ceruloplasmin [CP]) and downstream neuro-regeneration markers. Immunofluorescence staining evaluated GFAP and CP expression in astrocytes and Müller cells.

Results

Retinas from both Neo and LI groups demonstrated significantly more TUBB3 positive axons as compared to controls, with Neo retinas showing significantly more axonal outgrowth than LI. Proteomic analysis and WB revealed that GFAP expression was significantly reduced in regenerative Neo and LI groups compared to controls. In WB, CP was downregulated in LI compared to Neo and Ctrl retinas, whilst Myelin basic protein (MBP), a downstream marker of CP[5], was significantly higher in Neo retinas compared to Ctrl and LI retinas. Retinal immunofluorescence staining confirmed these findings. CRYBB3 expression was significantly upregulated in LI compared to Ctrl and Neo retinas by means of WB. Our proteomic analysis indicated TSC1, a regulator of MBP, as an interaction partner of CRYBB3. In WB, TSC1 showed lower expression in LI than in Neo and Ctrl groups.

Conclusions

Both neonatal and lens-injury-induced regeneration demonstrated the capacity for RGC axonal growth. LI downregulated pro-inflammatory activation by reducing GFAP and CP expression in Müller cells and astrocytes, whereas neonatal retinas maintained stable CP levels, facilitating MBP activation and a more complete neuro-regeneration process. Crybb3 appears to play a critical role in modulating astrocytic activity and promoting axonal regeneration, potentially mediated through the astrocyte TSC-GFAP-CP-MBP axis. These findings highlight the distinct mechanisms driving regeneration in neonatal and adult retinas, which may offer potential therapeutic target for intervention in ocular diseases.

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P-PW-0264

SHORT-TERM IOP CHANGES FOLLOWING NEUROMODULATION OF OCULAR PARASYMPATHETIC MOTOR NEURONS USING DREADD TECHNOLOGY

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Background

Designer receptors exclusively activated by designer drugs (DREADDs) have emerged as powerful neuromodulatory tools for studying neural circuits. This technique utilizes the expression of synthetic membrane receptors in target cells, coupled with the administration of receptor-specific artificial ligands, enabling precise temporal modulation of neural activity. To investigate the specific *in vivo* effects of efferent parasympathetic nervous signals on intraocular pressure (IOP), we developed mouse models employing chemogenetic approaches with DREADD technology to facilitate targeted activation or inhibition of ocular parasympathetic motor neurons.

Methods

We utilized genetically modified mouse models expressing Cre recombinase (ChAT-Cre) to enhance the specificity of DREADD receptor targeting in parasympathetic motor neurons. To enable activation or inhibition of these neurons, hM3Dq or hM4Di receptors were expressed in ChAT-Cre mice using Cre-dependent adeno-associated viral vectors. The coding sequences for hM3Dq and hM4Di were inserted into a vector containing the mCherry sequence, creating C-terminal mCherry fusion proteins. Intraocular pressures (IOPs) were measured at 10, 20, 30, 40, and 60 minutes following intraperitoneal administration of clozapine-N-oxide (CNO, 1 mg/kg), a ligand for the M3-muscarinic receptor.

Results

In the activation group (n = 6), intraocular pressure (IOP) began to decrease within 10 minutes after CNO injection. The mean baseline IOP was 9.45 ± 0.52 mmHg. Following CNO administration, the mean IOP values at 10, 20, 30, 40, and 60 minutes were 7.12 ± 0.62, 7.21 ± 0.46, 7.12 ± 0.86, 7.09 ± 0.67, and 7.17 ± 0.51 mmHg, respectively. The reduction in IOP from baseline across all time points (10–60 minutes post-injection) was statistically significant ($P < 0.05$, Wilcoxon signed-rank test). Immunohistochemical staining confirmed the activation of parasympathetic neurons.

Conclusions

We developed an animal model that enables specific modulation of ocular parasympathetic activity. Chemogenetic activation of the parasympathetic nervous system led to a significant reduction in IOP compared to baseline levels. This model holds promise for future research aimed at identifying novel targets for IOP regulation through the analysis of differential protein expression.

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P-PW-0266

HISTONE DEACETYLASES INHIBITORS PROMOTE GLAUCOMATOUS OPTIC NERVE REGENERATION AFTER INJURED BY ZINC CHELATION

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Background

The mammalian optic nerve cannot regenerate once it is injured[1]. Our previous study found that mobile zinc (Zn^{2+}) increased rapidly and chelating Zn^{2+} significantly promoted long-distance axon regeneration[2]. And three of the four classes of histone deacetylases (HDAC I, II, IV) are Zn^{2+} -dependent, and HDAC inhibitor (HDACi) has a Zn^{2+} binding site.[3] We aim to explore if HDACi treatment could have positive effect on axon regeneration and play its role through zinc chelation.

Methods

The optic nerve crush model (ONC) was used in this study, HDAC inhibitor (Scriptaid, VPA), zinc chelator (TPEN), or their combination were injected into the vitreous in C57BL/6J mice after ONC. Tuj1 and CTB was used to count survival RGC and regenerated axons 2 weeks after injury;

The acetylation level of RGC after optic nerve injury was measured by immunofluorescence with different concentrations of zinc chelator(TPEN, 10μM, 100μM) HDACi (Scriptaid, 10μM, 100μM) and the negative control of Scriptaid (Nullscript, 10μM, 100μM), and the zinc levels of different groups were compared by retinal Zn2+ staining.

After optic nerve injury, TPEN was injected into vitreous to chelate zinc and MG149 was injected intraperitoneally to inhibit histone acetylation, observe the effect of axon regeneration 2 weeks later.

Results

Zinc chelators, HDAC inhibitors, and their combination have similar protective effects on RGC survival and regeneration;

AceH4 in RGCs decreased significantly after optic nerve injury. High concentration of HDACi and TPEN can both inhibit the elevation of zinc in IPL and the increase of RGC histone deacetylation level after injury.

MG149(AceHistone inhibitor) can block the regeneration effect of zinc chelator TPEN.

Image

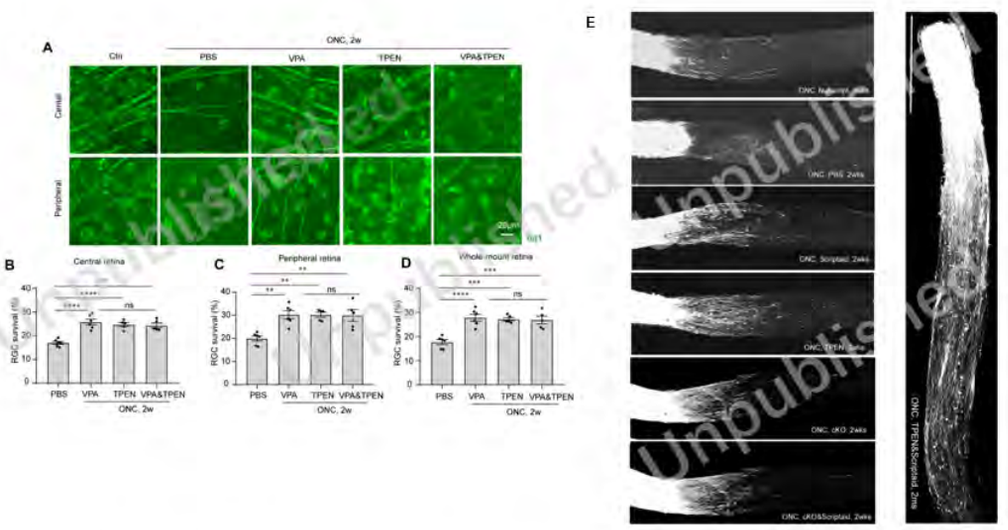

Fig1. Zinc chelators and HDAC inhibitors have similar protective effects on RGC survival and regeneration. (A) Retinal whole-mounts immunostained for Tuj1 to visualize RGCs in the retinas of mice treated with HDACi (VPA)、zinc chelator (TPEN) or their combination(VPA&TPEN) 2 weeks post-injury. (B-D) Quantitative RGC counts in whole-mount, peripheral, and central retinal samples, suggesting that Zinc chelators, HDAC inhibitors, and their combination have similar protective effects on RGC survival. (E) Zinc chelators and HDACi have similar protective effects on on axon regeneration 2 weeks after injury, and VGAT^{Cre}ZnT3$^{fl/fl}$ mice (cKO mice, specific knockout ZnT3 in Amacrine cells) with HDACi promoted long distance regeneration 2 months after ONC.

Conclusions

HDAC inhibitor acts as zinc chelator as it can inhibit the rapid increase of mobile zinc in retina after optic nerve injury and it has concentration-dependent. We conformed the zinc binding group is a key site for HDAC inhibitors activity. This study provides a new understanding of the mechanism of HDAC and a promising therapeutic target for optic nerve regeneration.

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P-PW-0267

THE SENESCENCE-RELATED PROTEIN THROMBOSPONDIN 3: A REGULATOR OF CONVENTIONAL AQUEOUS HUMOR OUTFLOW

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Background
Aging is a significant risk factor for primary open-angle glaucoma (POAG). Abnormal aging in outflow tissues reduces the drainage of aqueous humor. Our previous study demonstrated that senescent Angular Aqueous Plexus (AAP) cells have reduced permeability, similar to the pathogenesis observed in the Schlemm's canal (SC) of POAG. However, the underlying mechanism remains unclear. Our study aimed to investigate the alterations in the whole transcriptome of senescent AAP cells. By constructing a competitive endogenous RNA (ceRNA) network, we sought to identify key targets for regulating intraocular pressure.

Methods
The senescent AAP cells were established through chronic hyperoxia (5% oxygen for 14 days). Whole transcriptome sequencing of these cells was conducted, and a ceRNA network was mapped by comparing miRNA targets among lncRNA, circRNA, and mRNA. Quantitative RT-PCR and Western Blot analyses identified Thrombospondin 3 (TSP3), encoded by the THBS3 gene, as a focus for further research. Upregulation of TSP3 in AAP cells was achieved via a lentivirus delivery system, followed by investigations into permeability and cytoskeleton remodeling in the transfected cells. Topical transfection in mouse eyes was performed using an adeno-associated virus (AAV) via intracameral injection. Subsequently, intraocular pressure and outflow facility were measured, and the ultrastructure of the Schlemm's canal was observed using transmission electron microscopy.

Results
The whole transcriptome sequencing results showed 160 up-regulated differential expressed mRNAs ($p<0.05$, fold change>2), 150 down-regulated differential expressed mRNAs ($p<0.05$, fold change<0.5). According to differentially expressed mRNA-miRNA, circRNA-miRNA and lncRNA-miRNA pairs, a ceRNA network was mapped with five hub genes (THBS3, KIT, ANGPT4, ITGB4, and CTNNB1). The mRNA of THBS3 showed the significantly largest drop among that of all genes. Further time-dependent expression pattern also showed that its expression gradually decreased with the establishment of senescent status. In vitro research showed, TSP3 overexpression can significantly increase the permeability of senescent AAP cells and rearrange actin cytoskeleton. In vivo test revealed that TSP3 overexpression in outflow tissue significantly lowered intraocular pressure and enhanced convention outflow. An increase of pores density was observed in SC of TSP3 overexpressed mouse eyes.

Conclusions
Our study is the first to investigate the senescence-related protein TSP3, identified from the ceRNA network, for its regulatory role in permeability in AAP cells and conventional outflow in mouse. TSP3 may serve as a crucial target for regulating intraocular pressure.

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P-PW-0269

THE ROLE OF SIALYLATION ON NEUROPROTECTION AND OPTIC NERVE REGENERATION

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Background

The study aims to explore the role of sialylation in protecting retinal ganglion cells (RGCs) and promoting optic nerve regeneration after injury, along with its underlying mechanisms.

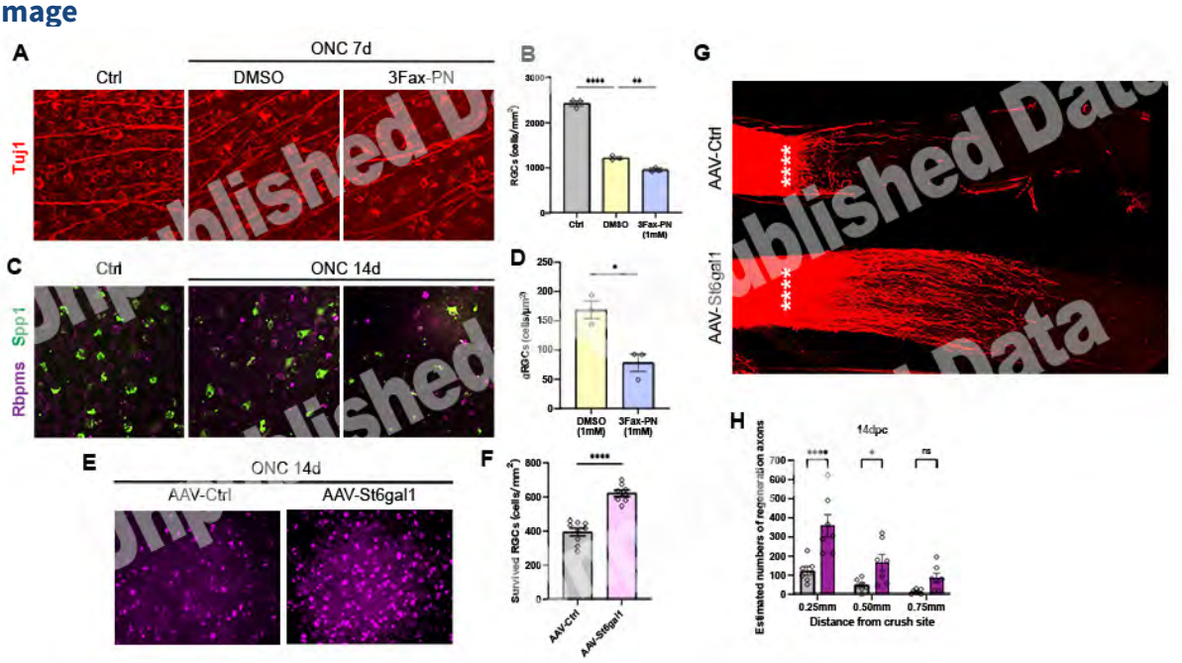
Methods

Optic nerve crush (ONC) was conducted on mice, with immunofluorescent staining of retinal sialyltransferases and sialic acid performed at 1, 3, 5, 7 days post-crush (dpc). The sialyltransferases inhibitor 3FAX-PN was intravitreally injected to evaluate its effect on RGC survival post-injury, particularly in αRGCs. AAV-St6gal1 was also intravitreally injected into wild-type mice 14 days before ONC to over-express ST6GAL1. Microglia activation was observed at 5dpc, while RGCs counting and anterograde labeling of regenerating axons were carried out at 14dpc.

Results

scRNA sequencing revealed that αRGCs expressed higher levels of sialyltransferases than other subtypes. Immunofluorescence confirmed that expression of SNA and ST6GAL1 in RGCs progressively and significantly decreased post-injury, with more ST6GAL1 found in αRGCs than non-αRGCs. 3Fax-PN effectively inhibited ST6GAL1, and the reduced level of sialylation exacerbated RGCs death and particularly the loss of αRGCs. Concurrently, the number of phagocytic microglia in the ganglion cell layer increased. Overexpression of ST-6GAL1 in RGCs via AAV-St6gal1 transfection significantly preserved RGCs survival at 14dpc, and demonstrated robust axon regeneration at two weeks post injury.

Image



Conclusions

Polysialylation, considered an inhibitory signal, may modulate microglial phagocytosis of neurons. We hypothesize that the sialylation may protect αRGCs from phagocytosis by microglia, thereby enhancing their survival, and may also alleviate damage to other RGCs. Our preliminary results demonstrate that ST6GAL1 promotes RGCs survival and axon regeneration following injury, potentially through the regulation of microglial phagocytosis.

P-PW-0270
CONDITIONAL DELETION OF ITGA9 IMPAIRS SCHLEMM'S CANAL ENDOTHELIAL CELL PROLIFERATION AND INCREASES INTRAOCULAR PRESSURE

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Background
Schlemm's canal (SC) is a hybrid vascular structure with both lymphatic and blood vessel characteristics and plays a critical role in aqueous humor drainage. Structural abnormalities in SC, particularly hypoplasia, can lead to elevated intraocular pressure (IOP) and contribute to glaucoma development. ITGA9 is highly expressed in SC (J Clin Invest, 2014) and is known to promote lymphatic endothelial cell proliferation (Developmental Cell, 2009). This study investigated the impact of *Itga9* deletion on SC, focusing on SC area, IOP, total endothelial cell count, and proliferative cell count.

Methods
Conditional knockout (CKO) of *Itga9* was induced in *Itga9$^{fl/fl}$; Rosa26-rtTA; TetO-Cre* mice by administering doxycycline starting at embryonic day 16.5. To assess proliferation, 3-month-old mice were given EdU (200 µM) in their drinking water for one week. Tissues from the iridocorneal angle were collected, and proliferating nuclei were labeled with EdU, while endothelial cell nuclei were identified via ERG staining. EdU-positive cells were visualized using click chemistry with $CuSO_4$ (4 mM), sodium ascorbate (100 mM), and AlexaFluor 568-azide (5 µM). SC tissues were further stained with anti-PECAM1 and anti-ERG antibodies and analyzed with confocal microscopy. IOP was measured in awake mice using a Tonolab rebound tonometer (iCare).

Results
The SC area was significantly reduced in conditional knockout (CKO) mice compared to wild-type (WT) mice (0.75 ± 0.07 vs. 0.87 ± 0.10 µm^2 per 20x field, $P = 0.015$), and IOP was significantly higher (15.97 ± 0.69 vs. 11.55 ± 0.49 mmHg, $P < 0.001$). The number of ERG-positive endothelial nuclei was also significantly lower in CKO mice compared to WT mice (445.00 ± 104.58 vs. 578.79 ± 115.78 nuclei per 20x field, $P = 0.029$). Similarly, the number of EdU/ERG double-positive cells was significantly reduced in CKO mice (5.59 ± 2.99 vs. 10.11 ± 3.94 cells per 20x field, $P = 0.019$). The percentage of EdU/ERG double-positive cells among ERG-positive nuclei was also significantly lower in the CKO group compared to the WT group (1.30 ± 0.26% vs. 2.15 ± 0.24%, $P = 0.029$).

Conclusions
Conditional deletion of *Itga9* led to decreased proliferation, a reduced number of endothelial cells, a smaller SC area, and elevated IOP. These findings underscore the critical role of ITGA9 in supporting cellular proliferation, maintaining tissue integrity, and preserving the functional structure of SC, a unique vessel with both lymphatic and vascular characteristics.

P-PW-0272
MYOFIBROBLAST ACTIVATION IN PROSTAGLANDIN-ASSOCIATED PERIORBITOPATHY

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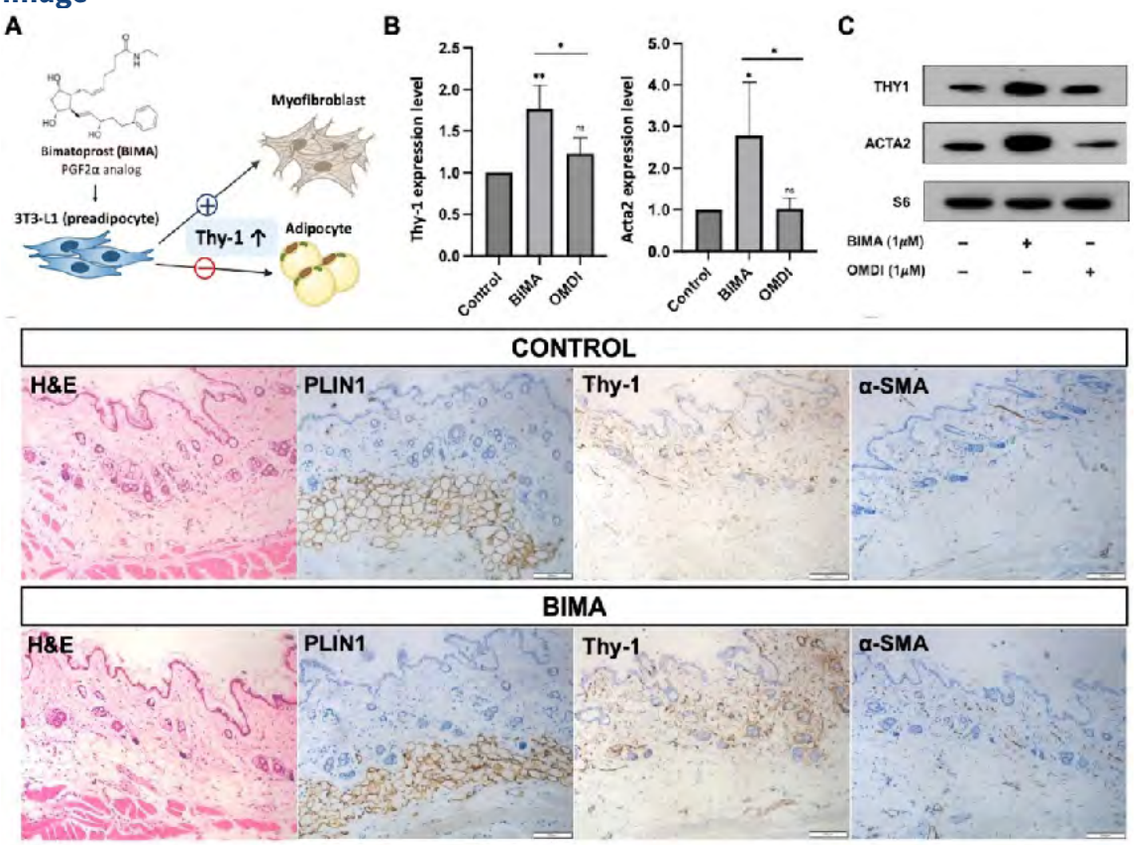
Background
Prostaglandin-associated periorbitopathy (PAP) is associated with fat atrophy, which cannot explain the tight orbit syndrome developed in some patients. Orbital fibroblasts differentiate to either myofibroblast or lipofibroblast depending on the expression of Thy-1 molecule. We hypothesize that topical prostaglandin eyedrops modulate Thy-1 expression, driving orbital fibroblasts toward myofibroblast differentiation that causes tight orbit. The hypothesis is evaluated using C57BL/6J mice and 3T3-L1 cells.

Methods
C57BL/6J mice were treated with 0.03% bimatoprost eyedrop once daily to the right eye, with the left eye as an untreated control. The mice were sacrificed after 21 days, the eyelid tissues were harvested, sections and stained with H&E and IHC for PLIN1 (adipocyte marker), Thy-1, and α-SMA(myofibroblast marker). 3T3-L1 cells were treated with dimethyl sulfoxide(control), 1 μM bimatoprost(BIMA), or 1 μM omidenepag isopropyl(OMDI, negative control) for 48 hours. Whole-cell lysates were collected for western blot. Total RNA was extracted for RT-qPCR and bulk RNA-seq. RT-qPCR was analyzed in GraphPad Prism 9, while RNA-seq data were analyzed in R(v.3.5.1) using the DESeq2(49)v1.22.1 packages. A paired t-test was used for two-group comparisons and one-way ANOVA with multiple comparisons for three or more groups; $p<0.05$ was considered statistically significant.

Results
In C57BL/6J mice, we observed fat atrophy in the BIMA-treated eye, characterized by a decrease in adipocyte size. Additionally, compared to the control eye, the BIMA-treated eye exhibited increased Thy-1 immunoreactivity in the eyelid dermal layer (MD±SE = 25.58±9.09%, $p=0.02$). In 3T3-L1 cells, Thy-1 and Acta2(α-SMA) gene expression levels were significantly upregulated under BIMA treatment (MD±SE= 0.77±0.15 and 1.7±0.52, respectively, both $p<0.05$), but not OMDI treatment (MD±SE= 0.23±0.16 and 0.023±0.53, respectively, both $p>0.05$). Gene expression in BIMA-treated cells positively correlated with the fibroblast activation GSEA dataset (GOBP_FIBROBLAST_ACTIVATION), showing a normalized enrichment score of 1.188. Furthermore, BIMA-treated cells exhibited a stronger fibroblast activation signature compared to both control and OMDI-treated cells.

Image



Conclusions

Elevated Thy-1 expression along with increased myofibroblast activator protein under bimatoprost treatment, suggest myofibroblast activation may be responsible for the tight orbit syndrome in PAP.

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P-0273

CRISPR-CAS9-MEDIATED DELETION OF CARBONIC ANHYDRASE 2 IN THE CILIARY BODY TO TREAT GLAUCOMA

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Background

The carbonic anhydrase 2 (Car2) gene encodes the primary isoenzyme responsible for aqueous humor production. This study aim to disrupt the Car2 gene using the CRISPR-Cas9 system, and evaluate its effectiveness in reducing intraocular pressure (IOP).

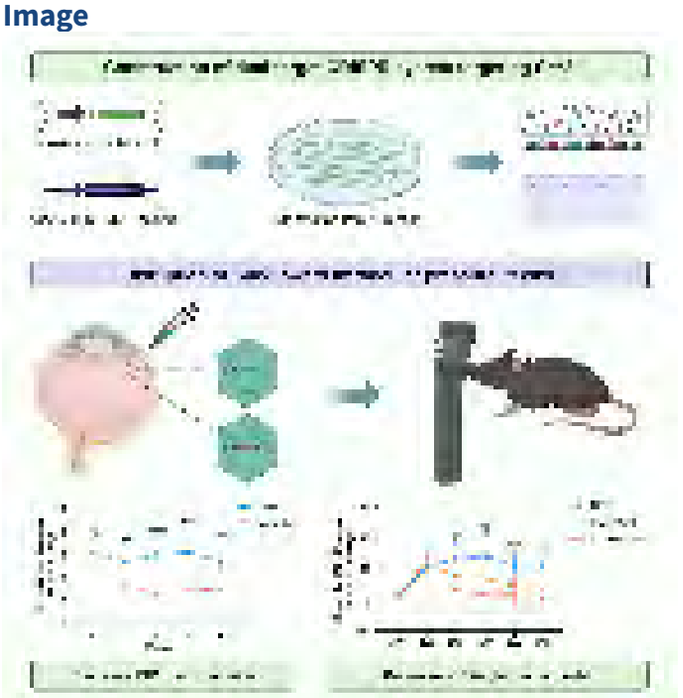
Methods

The CRISPR-Cas9 system based on ShH10 adeno-associated virus (AAV) was used to knock out the Car2 gene in the ciliary body of mice through a single intravitreal injection. Gene editing efficiency was evaluated using the T7 endonuclease I(T7E1) assay.

Results

With a single intravitreal injection, Car2 knockout could significantly and sustainably reduce 20-30% IOP in both normal mice and glaucoma models by inhibiting AH production, and delay the glaucomatous retinal damage induced by prolonged high IOP.

Image



Conclusions

The effective disruption of Car2 gene in the ciliary body was achieved through the dual CRISPR-Cas9 system. Within a single intravitreal injection, this approach not only effectively reduces IOP but also delay the progression of glaucomatous damage.

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P-0274

TRPA1 EXACERBATES SELECTIVE RETINAL GANGLION CELL VULNERABILITY UNDER ACUTE OCULAR HYPERTENSION

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Background

Acute ocular hypertension (AOH), one of the major causes of progressive irreversible vision loss, showed significant retinal ganglion cells (RGCs) degeneration as well as selective RGC vulnerability upon functional tests, yet the mechanisms were far beyond discovery. The single-cell transcriptomics enabled new breakthroughs in the field of neural selective vulnerability, yet more precise new aproaches were required for in-depth analysis.

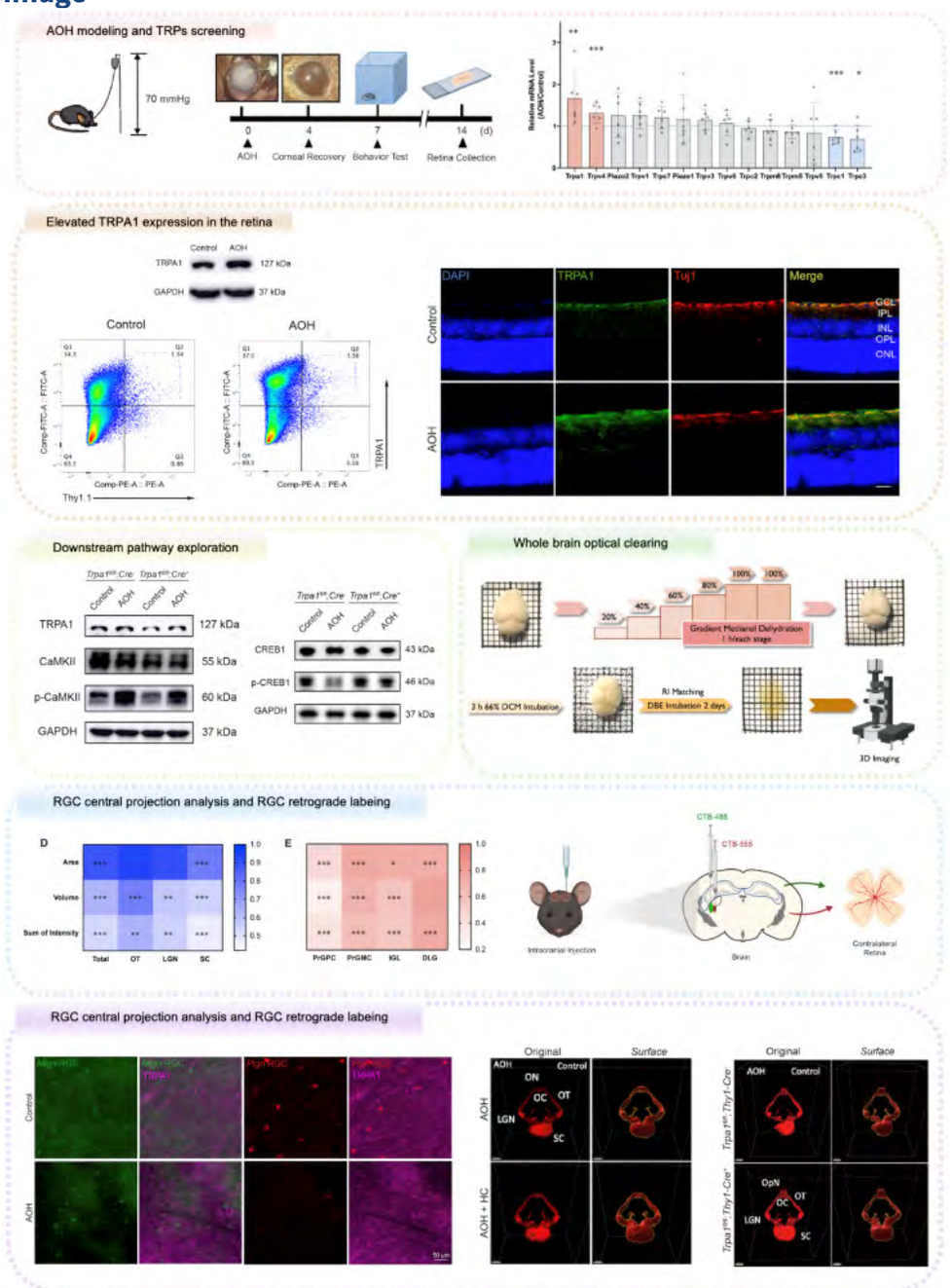
Methods

To uncover the role of transient receptor potential ankyrin 1 (TRPA1), a mechanosensitive ion channel on AOH-induced RGC degeneration and selective vulnerability, RT-qPCR, Western blot, immunofluorescent, flow cytometry and functional calcium imaging tests were conducted. *Trpa1* gene were selectively knocked out in RGCs, as well as TRPA1-specific blocker HC-030031 being intravitrously injected for confirmation. Further, to magnify the selective RGC damage, a modified whole-brain clearing method were applied for 3D visualization and analysis of region-selective RGC central projection damage pattern.

Results

In this work, we first found the elevated expression and activation of transient receptor potential ankyrin 1 (TRPA1), under AOH by RT-qPCR, Western blot, immunofluorescent, flow cytometry and functional calcium imaging tests. Downstream CaMKII/CREB pathways analysis showed significantly elevated phospho-CaMKII and down-regulated phospho-CREB1 under AOH. Further, the modified whole-brain clearing method on AOH mice model, was well-applied for rapid clearing and observation of RGC central projection in C57BL/6J, showing damaged RGC central projection on the AOH side and the most statistically significant degeneration in the superior colliculi (SC). Detailed analysis also revealed a distinct injury pattern among lateral geniculate nuclei (LGN) subregions, with the parvocellular part of the pregeniculate nuclei (PrGPC) being more vulnerable compared with the magnocellular part (PrGMC). The retrograde labeling of RGC subgroups based on brain damage variation showed PrGPC-projecting RGCs (*Plgn* RGC) being smaller than PrGMC-projecting RGCs (*Mlgn* RGC) in size and less in number, yet more vulnerable in terms of degeneration under AOH. Further, *Plgn* RGC presented with higher TRPA1 expression under AOH compared with *Mlgn* RGC. Together with *Trpa1* knock-out or channel inhibition, the exacerbation of TRPA1 on selective RGC vulnerability was confirmed.

Image



Conclusions

TRPA1 was upregulated and activated under AOH, exacerbating RGC degeneration. In the meanwhile, the differential TRPA1 expression pattern might be pivotal in mediating selective RGC degeneration under AOH. In virtue of our modified whole-brain clearing method together with molecular biology, our data provided innovational method to study the mechanisms behind selective vulnerability of neuronal cells, and in the meantime revealed the potential therapeutic opportunity for RGC protection in patients suffering from AOH attack by targeting the ion channel TRPA1.

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P-0275

TARGETING UNFOLDED PROTEIN RESPONSE WITH SMALL MOLECULES COUNTERACTS OCULAR FIBROSIS

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Background
Ocular fibrosis remains a significant unmet challenge in glaucoma treatment, encompassing not only conjunctival fibrosis after glaucoma surgery but also fibrotic cataracts following lens removal. This study aims to explore the role of the unfolded protein response (UPR) in the development of fibrotic cataracts and to elucidate the underlying mechanisms driving this process.

Methods
C57BL/6 mice were punctuated with a 26-gauge needle in the central lens capsule as the fibrotic cataract model. Primary rabbit lens epithelial cells (LEC) were exposed to TGF-β2. eIF2α inhibitor ISRIB was used to treat LEC both *in vivo* and *in vitro*, unfolded protein response inhibitor 4-PBA, ER stressor thapsigargin and tunicamycin, IRE1α inhibitor 4μ8C were used to treat LEC *in vitro*. LECs were transfected with siRNA to knockdown ATF4. Western blot assays and immunofluorescence staining were carried out to measure changes in protein expression such as BIP, eIF2α, IRE1α, LC3-II, p62, FN, α-SMA, etc. mRNA expression was investigated by RT-PCR. Autophagosome was observed by electron microscopy (TEM). Immunostaining and mRFP-GFP-LC3 reporter were applied to indicate autophagy flux. Clinical parameters were measured using slit-lamp bio-microscopy.

Results
Unfolded protein response was activated during fibrotic cataract and TGFβ2-induced EMT of LEC, which in turn enhanced the EMT process. PERK/eIF2α/ATF4 branch of unfolded protein response is selectively required for EMT. Anterior chamber injection of ISRIB in fibrotic cataract mouse model showed significantly improved clinical parameters and limited capsular opacities. Interestingly, we found ISRIB decreased LC3-II, along with impaired the turnover of p62 in a time-dependent manner. Besides, TEM showed abnormally autophagic vacuoles under TGFβ2 stimulation, which was largely abolished by the cotreatment with ISRIB. To further investigate the crosstalk between unfolded protein response and autophagy during fibrotic cataract, autophagic inducer rapamycin and lysosomal inhibitor chloroquine was used. Our results indicated that the suppression of ISRIB on mesenchymal gene expression was attenuated by rapamycin, but augmented by CQ, indicating that the regulation of autophagic flux by ISRIB is implied in the anti-fibrotic process.

Conclusions
Our research for the first time suggests that the activation of unfolded protein response in fibrotic cataract both *in vivo* and *in vitro*. PERK/eIF2α/ATF4 branch selectively regulates EMT process in LEC through autophagy. eIF2α inhibitor, ISRIB, is highly effective at suppressing the development of lens subcapsular plaque and keeping the transparency of lens. Thus, ISRIB may be a potential therapeutic target to reduce EMT and ocular fibrosis.

P-0280

PROSTAGLANDIN F2A, EP2 AND EP3 AGONISTS MODULATE THE FORMATION OF 3D ORGANOIDS OF HUMAN ORBITAL ADIPOSE-DERIVED STEM CELLS

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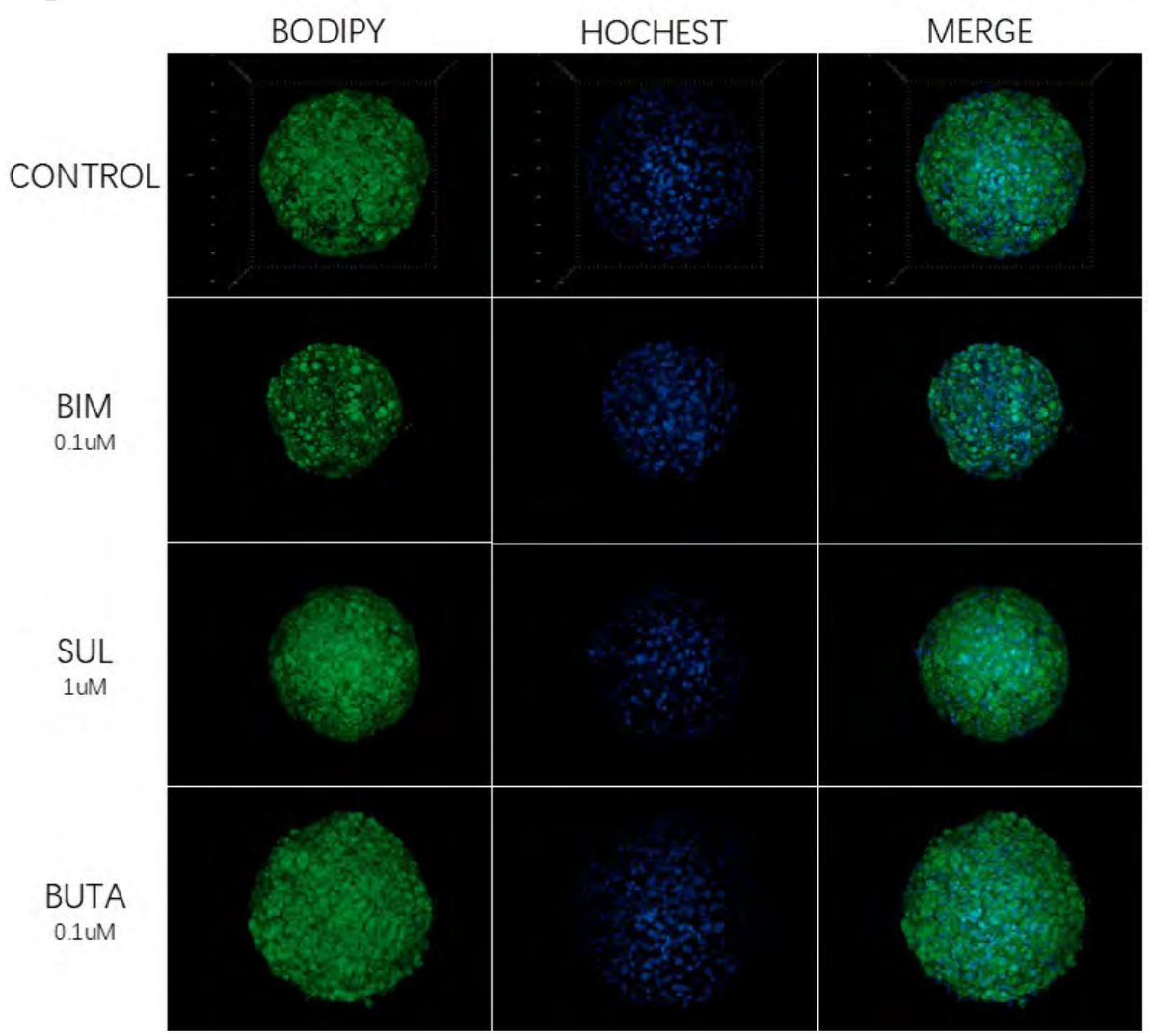
Background
As prostaglandin F2α analogs are increasingly used as first-line treatments for glaucoma, prostaglandin-related periorbital changes have been gradually observed by clinicians. Research suggests that these changes are linked to orbital fat atrophy induced by prostaglandin F2α analogs. However, the effects of the prostaglandin EP2 receptor agonist and the FP/EP3 dual agonist, which are still in phase II clinical trials for glaucoma treatment, on orbital fat remain unclear. To investigate the effect of prostaglandin F2α agonist (bimatoprost), EP2 agonist (butaprost) and EP3 agonist (sulprostone) on 3D organoids of human orbital adipose-derived stem cells (OASCs) during adipogenic differentiation.

Methods
Orbital adipose tissue was obtained from intraoperative samples of three patients with orbital fat prolapse. OASCs were isolated using collagenase digestion. The 3D OASC spheroids were cultured on ultra-low attachment culture plates. These 3D spheroids were treated with various concentrations of bimatoprost, butaprost, and sulprostone (0.0001 to 10 μM). The maximum cross-sectional area of the spheroids was measured at different time points. BODIPY fluorescence staining and confocal microscopy were used to observe the formation and morphology of lipid droplets within the spheroids.

Results
Bimatoprost (0.001 to 10 μM) significantly inhibited the size of 3D spheroids from the onset of adipogenic differentiation induction. Although sulprostone exerted a weaker inhibitory effect compared to bimatoprost, it still led to a significant reduction. High concentrations of sulprostone (10 μM) inhibited spheroid size from the adipogenic induction phase, whereas low concentrations (0.01 μM) only began to show inhibitory effects on maintenance phase. In contrast to sulprostone and bimatoprost, butaprost (0.01 to 1 μM) notably promoted the growth of 3D spheroids. BODIPY fluorescence staining revealed that bimatoprost strongly inhibited lipid droplet formation, while sulprostone facilitated the differentiation of smaller lipid droplets. No significant difference in lipid droplet morphology was observed between the butaprost and control groups.

Image



Conclusions

Different prostaglandin receptor agonists have distinct effects on lipidogenesis. Clinically, prostaglandin EP3 receptor agonists, which are used as anti-glaucoma medications, should be carefully monitored for the potential side effect of orbital fat atrophy with prolonged use.

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P-0281
SMART BIOORTHOGONAL CATALYTIC FACTORY FOR GLAUCOMA THERAPY

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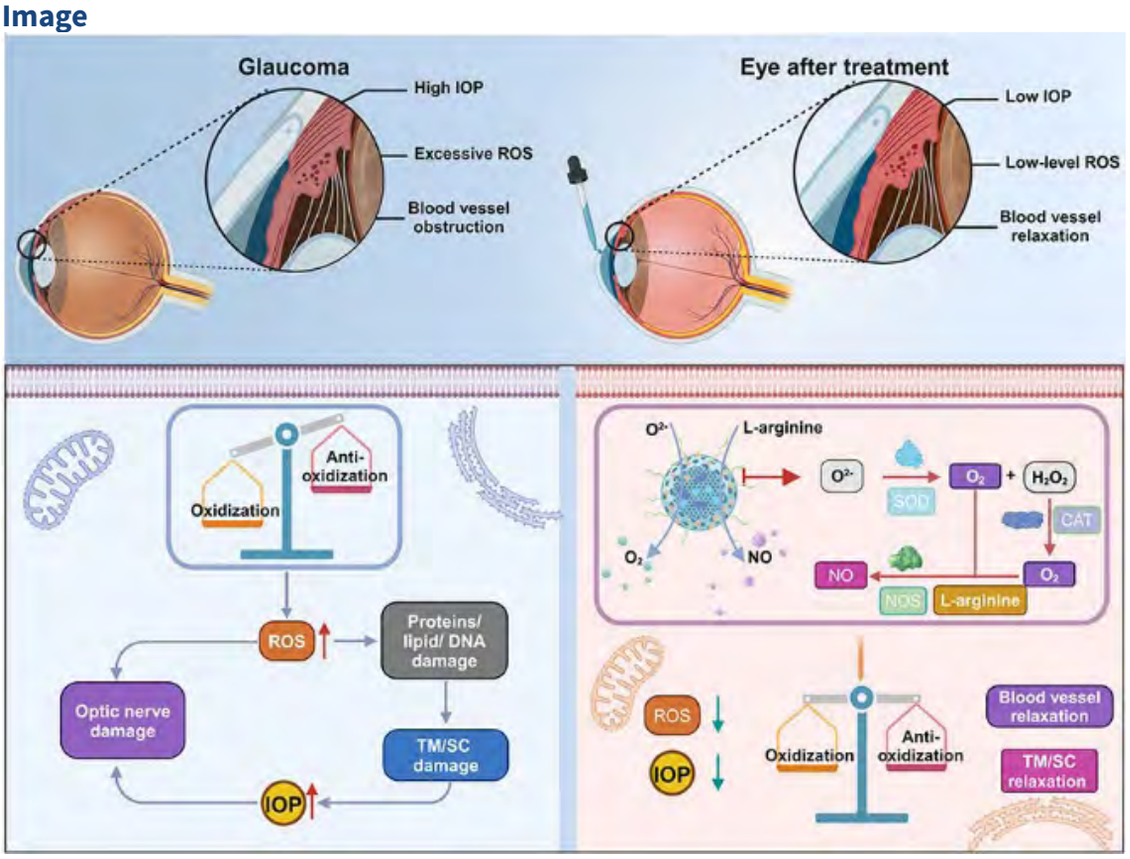
Background
Glaucoma, a leading cause of irreversible blindness worldwide, is characterized by elevated intraocular pressure (IOP), oxidative stress, and progressive optic nerve damage. Oxidative stress plays a critical role in the pathogenesis of glaucoma, with excessive reactive oxygen species (ROS) contributing to trabecular meshwork dysfunction and impaired aqueous humor outflow. Natural enzymes, such as superoxide dismutase (SOD) and catalase (CAT), are highly efficient at scavenging ROS, offering significant therapeutic potential. However, their inherent instability and poor recoverability limit their clinical application. Developing robust strategies to enhance enzyme stability and biocompatibility is essential for advancing glaucoma therapies.

Methods
To address these challenges, we employed a mild room-temperature aqueous-phase enzyme immobilization technique to encapsulate SOD and CAT onto covalent organic frameworks (COFs). The COFs were further functionalized with L-arginine to enhance ROS scavenging capability and modified with DSPE-mPEG to improve biocompatibility, yielding the bioorthogonal catalytic factory (SC@COF-L-D). This multifunctional nanocomposite was designed to protect natural enzymes from inactivation, improve operational stability, and enhance their therapeutic efficacy. In vitro and *in vivo* experiments were conducted to evaluate ROS scavenging efficiency, activation of the soluble guanylate cyclase (sGC) pathway, and IOP-lowering effects.

Results
The SC@COF-L-D nanocomposite demonstrated excellent stability, biocompatibility, and enzymatic activity under physiological conditions.Both SC@COF and SC@COF-L-D eye drops effectively reduced IOP in a dose-dependent manner in NOS3$^{-/-}$ mice. SC@COF-L-D exhibited a more sustained effect, achieving up to a 14.50% reduction in IOP at 10 mg/mL within 1 hour. Additionally, prolonged application of SC@COF-L-D resulted in a sustained IOP reduction of 3.7 mmHg (21.7%) on the 15th day. Mechanistically, SC@COF-L-D reduced nitrotyrosine (NT) levels by 29.2% and increased sGC expression by 2.4-fold in trabecular meshwork (TM) and corneal tissues, mitigating oxidative stress. In vitro, SC@COF-L-D showed biocompatibility in HCECs and HTMCs, increased sGC expression, and enhanced aqueous humor outflow via improved permeability of aqueous angular plexus endothelial cells. These findings highlight SC@COF-L-D as a promising therapeutic for glaucoma.

Image



Conclusions

This study introduces a novel bioorthogonal catalytic nanomaterial (SC@COF-L-D) for glaucoma therapy, addressing key challenges in enzyme-based treatments. By enhancing enzyme stability and biocompatibility, this strategy effectively reduces oxidative stress, activates protective pathways, and lowers IOP, providing a promising new approach for managing glaucoma. This work not only demonstrates the potential of enzyme immobilization in ophthalmic applications but also lays the foundation for future development of biocatalytic materials in oxidative stress-related diseases.

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P-0283

HYPOTENSIVE AND NEUROPROTECTIVE INTRAVITREAL FORMULATION FOR GLAUCOMA

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Background

Glaucoma is the second leading cause of blindness worldwide. This study analyzes the effect of a multiloaded hypotensive and neuroprotective intravitreal formulation in an animal model of glaucoma.

Methods

Eighty-two Long Evans rats both sexes were evaluated. Glaucoma was induced in 65 rats by injecting biodegradable microspheres co-loaded with dexamethasone and fibronectin into the anterior chamber of the right eye. After glaucoma induction, 20 rats were treated with an intravitreal (IV) injection of a multiloaded microspheres formulation containing Ketorolac, Melatonin, Latanoprost and Vitamin E, at 2 and 12 weeks. Intraocular pressure (IOP) was measured using rebound tonometry (Tonolab®, Tiolat Oy Helsinki, Finland). Retinal function was assessed via electroretinography (Roland consult RETIanimal® ERG, Germany), and neuroretinal thickness was quantified *in vivo* using optical coherence tomography (OCT) (Spectralis OCT®, Heidelberg Engineering, Germany). Finally, histological analysis was performed by counting retinal ganglion cells (RGCs) and compared them to 17 healthy rats over a 24-week period.

Results

Treated rats showed a reduction in IOP (healthy: 19.00±4.28 vs. glaucoma: 22.96±2.51 vs. glaucoma + IV treatment: 16.27±2.93 mmHg, p=0.005), an improvement in functionality with shorter latencies and increased amplitude of the RGC-specific photopic negative response (healthy: 11.75±11.94 vs. glaucoma: 5.66±4.57 vs. glaucoma + IV treatment: 22.02±18.07 mV; p=0.126). OCT analysis revealed greater structural thickness in the total retina, RGC layer and retinal never fiber layer (p<0.05) compared to untreated and healthy rats at the end of the study. Additionally, a higher RGC count was observed in treated rats (healthy: 23 vs. glaucoma: 11 vs. glaucoma + IV treatment: 20 cells/mm of retina).

Conclusions

The multiloaded intravitreal treatment effectively controlled IOP and improved both functionality and neuroretinal structure in rats with induced glaucoma at 24 weeks of the study.

P-0284

CRYBB3 PROMOTES RGC AXON REGENERATION VIA MODULATION OF THE TSC1/2-MTOR PATHWAY

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Background

Glaucoma, a leading cause of irreversible blindness worldwide, is characterized by the progressive degeneration of retinal ganglion cells (RGCs) and their axons [1]. Crystallins, structural proteins primarily associated with the lens, are increasingly recognized for their neuroprotective roles in the retina and involvement in neurodegenerative diseases [2, 3]. This study investigates the role of beta-crystallin B3 (CRYBB3) in promoting axonal regeneration in RGCs, a process essential for restoring visual function in conditions such as glaucoma.

Methods

Adult mouse models of lens injury (LI)-induced regeneration and episcleral vein cauterization (EVC)-induced degeneration were employed to assess the effects of CRYBB3 on RGC axon regeneration. An *in vitro* retinal regeneration culture system was also used. Data-independent acquisition mass spectrometry (DIA-MS), Western blot analysis, and immunofluorescence staining were conducted to investigate the underlying molecular mechanisms.

Results

LI significantly promoted axonal regeneration of RGCs, as demonstrated by *in vitro* assays. Proteomic analysis identified CRYBB3 as a critical modulator of neuronal development and neuroregeneration in the regeneration group, acting through its interaction with the TSC1/2-mTORC1 signaling pathway. Western blot analysis further confirmed the upregulation of CRYBB3 and the TSC1/2-mTORC1 axis during LI-induced RGC regeneration. Double immunostaining of CRYBB3 and β3-tubulin revealed strong co-localization, indicating that CRYBB3 is predominantly expressed in RGCs, particularly within their axons, suggesting a specific role in axonal repair. Additionally, *in vitro* experiments demonstrated a significant enhancement of axonal regeneration in the degeneration group upon the inclusion of CRYBB3 in the culture medium, supporting its direct role in facilitating RGC regeneration.

Conclusions

These findings identify CRYBB3 as a potential therapeutic target for promoting RGC axon regeneration, particularly in glaucomatous retinal degeneration. The modulation of the TSC1/2-mTORC1 pathway may provide new insights into neuroprotective strategies for ocular diseases.

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P-0286

TRANSIENT AND TISSUE-SPECIFIC CRISPR TREATMENT OF MYOCILIN-ASSOCIATED GLAUCOMA VIA VIRUS-LIKE PARTICLE

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Background
MYOC mutations are responsible for 3–4% of POAG patients and 10% of patients with juvenile open-angle glaucoma (JOAG). We developed a gene editing therapy for MYOC mutation-associated glaucoma via virus-like particle (VLP) which delivers ribonucleoprotein delivery, and proved its translation potential in mice and non-human primates.

Methods
A glaucoma mouse model was established via knockin N450Y myocilin mutation, which exhibited glaucoma phenotype, such as IOP elevation, retinal ganglion cell loss and visual impairment. The IOP was measured by Tonolab, RGC function was evaluated by ERG photopic negative response (PhNR), outflow facility was measured by flow-through pressure sensor system. The myocilin and ER stress protein expression were detected by Western blot and immunostaining. The CRISPR-Cas9 editing efficiency was detected by deep sequencing.

Results
VLP carrying MYOC gRNA can effectively knockdown the myocilin expression in trabecular meshwork *in vitro* and *in vivo*. Anterior chamber injected VLP-MYOC gRNA efficiently and specifically transfected trabecular meshwork, whereas AAV and LNP preferentially dispersed to mice cornea. VLP-MYOC gRNA could effectively down-regulate the myocilin expression of trabecular meshwork in Tg-MYOC^{N450Y}, and significantly reduced intraocular pressure, enhanced aqueous fluid outflow, and preserved RGC degeneration. No notable side-effects were found during the 12-month follow-up. Remarkably, VLP-MYOC gRNA mediated approximate 35% genome editing by a single injection in NHPs without detecting tissue damage and noticeable acute immune responses.

Conclusions
These findings showed a safe and effective *in vivo* CRISPR treatment via virus-like particle for MYOC mutation-associated glaucoma, which can be a therapeutic strategy for glaucoma.

P-0287

ROCK2 MODULATES CELLULAR METABOLIC FUNCTIONS IN HUMAN TRABECULAR MESHWORK CELLS THROUGH STAT3, CSTA AND S1PR3 LINKED SIGNALING

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Background
A Rho-associated coiled-coil-containing protein kinase (ROCK)1 and 2 inhibitor ripasudil (Rip) is already used as an anti-glaucoma medication in Japan due to its powerful hypotensive effects on conventional aqueous outflow root. However, roles of each ROCK1 and ROCK2 on human trabecular meshwork (HTM) cells which is the critical segment to produce increased aqueous outflow resistance remain to be elucidated. In our preceding study, we showed diverse effects between Rip and a selective ROCK2 inhibitor KD025 on biological activities of *in vitro* three-dimensional (3D) HTM spheroid models replicating non-glaucomatous and glaucomatous HTM, suggesting that ROCK2 plays some unique roles in the pathophysiology of glaucomatous HTM. Therefore, the purpose of present study was to investigate the biological significance of ROCK 2 in the HTM.

Methods
Changes in both metabolic phenotype and gene expression patterns against a specific ROCK2 inhibitor KD025 were assessed in planar cultured HTM cells by using a Seahorse cellular metabolic analysis and RNA sequencing analysis.

Results
A seahorse real-time ATP rate assay revealed that administration of KD025 significantly suppressed glycolytic ATP production rate and increased mitochondrial ATP production rate in HTM cells. RNA sequencing analysis revealed that 380 down-regulated and 602 up-regulated differentially expressed genes (DEGs) were identified in HTM cells treated with KD025 compared with untreated those. Gene ontology analysis revealed that DEGs were more frequently related to the plasma membrane, extracellular components and integral cellular components among cellular components, and related to signaling receptor binding and activity and protein heterodimerization activity among molecular functions. Ingenuity Pathway Analysis (IPA) revealed that the detected DEGs were associated with basic cellular biological and physiological properties including cellular movement, development, growth, proliferation, signaling and interaction, all of which are associated with cellular metabolism. Furthermore, the upstream regulator analysis and causal network analysis estimated IL-6, STAT3, CSTA and S1PR3 as possible regulators.

Conclusions
Present findings herein indicate that ROCK2 mediates the IL-6/STAT3, CSTA and S1PR3 linked signaling related to basic biological activities such as glycolysis in HTM cells.

P-0288

EFFECTS OF TRPV4 ON CHANGES IN FIBROSIS-RELATED FACTORS IN TRABECULAR CELLS UNDER PRESSURE STRESS

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Background
The trabecular meshwork (TM) constitutes the primary conventional outflow pathway for aqueous humor and plays a crucial role in controlling intraocular pressure (IOP). Mechanical stimulation has been proposed as a trigger for regulating aqueous outflow via the TM, but the underlying mechanisms remain poorly understood. We hypothesized that TRPV4 (Transient Receptor Potential Vanilloid 4), a mechanically activated cation channel, may respond to membrane tension and mechanical stretch in human TM cells and may play a role in the fibrotic changes in the tissue.

Methods
In the present study, we investigated the response of human TM cells to pressure, with a focus on changes in the expression of fibrosis-related factors and the role of TRPV4 in these processes. TM cells were isolated from donor corneas and cultured in DMEM with 1% FBS. After overnight serum starvation, the cells were subjected to 30 mmHg of pressure for 24 or 48 hours using a gas pressure stimulator. Protein expression of various fibrosis-related markers was analyzed by immunocytochemistry. Additionally, the fibrotic responses of TM cells in which TRPV4 was knocked down via siRNA (TRPV4 KD) were compared with those of control TM cells using immunocytochemistry and Western blotting.

Results
In control TM cells, 30 mmHg pressure significantly upregulated the expression of F-actin, alpha-smooth muscle actin (α-SMA), and TRPV4 at 24 hours, as well as collagen1A1 and RhoA at 48 hours. In TRPV4 KD TM cells, the pressure-induced upregulation of F-actin, α-SMA, collagen1A1, and RhoA was significantly suppressed compared to control cells ($p < 0.05$).

Conclusions
These results demonstrate that fibrotic changes are enhanced in TM cells in response to mechanical stress and it was suggested that TRPV4 plays a crucial role in this process. Modulating TRPV4 activity could provide a novel therapeutic approach to address TM fibrosis associated with elevated IOP in glaucoma patients.

P-0289

GLAUCOMA CLINIC MONITORING OVER 6 MONTHS USING ONLINE CIRCULAR CONTRAST PERIMETRY VERSUS STANDARD AUTOMATIC PERIMETRY: THE DEVELOPING-WORLD SETTING

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Background
Online circular contrast perimetry provides visual field testing on any computer or tablet without additional hardware. This study compared outcomes of online circular contrast perimetry (OCCP) and standard automated perimetry (SAP) in a developing world setting.

Methods
The longitudinal and observation study was conducted on patients sampled during 2023 at Hanoi Medical University Hospital. Participants were either healthy volunteers as controls or stable glaucoma patients with either primary angle closure or primary open angle glaucoma. They underwent a comprehensive ocular examination, retinal nerve fiber layer optical coherence tomography scan, and visual field tests performed at baseline and after three months and six months, using OCCP and SAP in clinic.

Results
The current study was carried out in 168 eyes of 87 patients at baseline, 133 eyes of 69 patients at three months, and 121 eyes of 63 patients at six months. At baseline OCCP mean deviation (MD) ($R^2 = 0.804$, $p < 0.001$) and visual index (VI) ($R^2 = 0.892$, $p < 0.001$) were strongly correlated with SAP MD and visual field index (VFI) respectively. There was strong agreement and correlation between MD and VI/VFI for SAP and OCCP on repeated testing after 6 months. At 6 months AUC of SAP VFI (0.79) was superior to AUC of OCCP VI ((0.67, $p = 0.036$); otherwise there was no difference in AUC of MD or VI/VFI at baseline, 3 and 6 months, when comparing OCCP and SAP.

Conclusions
OCCP parameters are significantly correlated with those of SAP. OCCP has the potential to provide a complementary role to SAP in glaucoma screening and monitoring.

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P-0291

AQUEOUS HUMOR ANTIOXIDANTS IN GLAUCOMA: CORRELATIONS WITH SUBTYPES, INTRAOCULAR PRESSURE, AND MEDICATION USE

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Background
To investigate the correlation between aqueous humor antioxidant capacity and glaucoma subtypes, intraocular pressure (IOP), and antiglaucoma medications.

Methods
This prospective case-control study included 303 patients undergoing cataract surgery from April 2019 to September 2024. Participants were categorized into primary open-angle glaucoma (POAG), primary angle-closure glaucoma (PACG), neovascular glaucoma (NVG), uveitic glaucoma (UG), and controls (cataract). Aqueous humor samples were collected at surgery onset, measuring total antioxidant capacity (TAC) and ascorbic acid (AA) levels.

Results
Significant differences in TAC levels were observed among glaucoma subtypes, with UG showing the highest TAC, followed by POAG, PACG, and NVG. Multivariate linear regression revealed significant differences in TAC levels among glaucoma subtypes: PACG vs. control, $\beta = -0.60$, $P < 0.001$; NVG vs. control, $\beta = -0.47$, $P < 0.001$; UG vs. control, $\beta = 0.53$, $P < 0.001$; PACG vs. POAG, $\beta = -0.45$, $P = 0.005$; NVG vs. POAG, $\beta = -0.33$, $P = 0.033$, UG vs. POAG, $\beta = 0.67$, $P < 0.001$; UG vs. PACG, $\beta = 1.13$, $P < 0.001$, and UG vs. NVG, $\beta = 1.00$, $P < 0.001$. TAC levels were also significantly associated with maximal IOP history ($\beta = -0.013$, $P = 0.017$) and IOP fluctuations ($\beta = -0.016$, $P = 0.007$), but no correlation was found with glaucoma medications.

Conclusions
Glaucoma subtypes and IOP dynamics significantly influence aqueous humor antioxidant levels. Future research could target antioxidant therapies for patients with low TAC, particularly those with PACG, NVG, or histories of elevated or fluctuating IOP.

P-0292

MITOPHAGY MODULATION IN RETINAL GANGLION CELL INJURY: INSIGHTS FROM TBK1 INHIBITION AND NICOTINAMIDE IN GLAUCOMA AND HYPOTENSION MODELS

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Background
Mitophagy, a selective autophagy process targeting damaged mitochondria, is implicated in retinal ganglion cell (RGC) death in glaucoma. The PINK1-Parkin pathway, a central mediator of mitophagy, has been linked to neurodegeneration. However, its role in glaucoma and hypotension-induced RGC injury remains unclear. This study investigates the involvement of mitophagy and its modulation by BX-795, a TANK-binding kinase 1 (TBK1) inhibitor, and nicotinamide (NAM), a metabolic regulator, in two experimental models of retinal injury: glaucoma and hypotension.

Methods
Two animal models were employed: an intraocular pressure (IOP)-elevation glaucoma model and a hypotension model. Retinal tissues were analyzed at multiple time points (1, 4, 8, and 12 weeks) using immunohistochemical (IHC) staining and Western blotting to assess the expression of key mitophagy markers, including TBK1, LC3B, PINK1, and Parkin. Additionally, stress and survival markers (GFAP, NeuN, and AMPK) were evaluated. BX-795 and NAM were administered to investigate their effects on mitophagy and RGC survival. Quantitative comparisons of marker expression were performed between treatment groups and models.

Results
IHC staining revealed increased TBK1 and LC3B expression in the ganglion cell layer of the glaucoma model, with progressive elevation over 12 weeks. In contrast, the hypotension model showed an initial increase peaking at 8 weeks, followed by a decline at 12 weeks. Western blot analyses corroborated these findings, with TBK1 and LC3B levels consistently rising in the glaucoma model but declining in the hypotension model after 8 weeks. PINK1 expression increased in the glaucoma model during the early phase but gradually decreased, while Parkin showed a transient rise up to 4 weeks. In the hypotension model, PINK1 and Parkin exhibited minimal changes.

Treatment with BX-795 effectively reduced TBK1 and LC3B expression in both models, with significant reductions in the glaucoma model. NAM selectively modulated these markers in the hypotension model, increasing LC3B expression while reducing GFAP and enhancing NeuN staining, indicative of improved RGC survival. In the glaucoma model, BX-795 significantly suppressed GFAP and increased NeuN expression, whereas NAM showed minimal effects.

Conclusions
Mitophagy via the PINK1-Parkin pathway contributes to RGC death in glaucoma, as evidenced by its progressive activation and association with increased TBK1 and LC3B levels. BX-795 effectively inhibits this pathway, promoting RGC survival. Conversely, in the hypotension model, mitophagy appears to serve as a transient survival mechanism, with NAM demonstrating greater efficacy in reducing retinal stress and enhancing RGC survival. These findings highlight the differential roles of mitophagy in glaucoma and hypotension-induced retinal injury and suggest distinct therapeutic approaches targeting mitophagy pathways in these conditions.

P-0294

SUSTAINED AKAP1 EXPRESSION PROTECTS RETINAL GANGLION CELL MITOCHONDRIA, PROMOTES SURVIVAL, AND IMPROVES VISUAL FUNCTION IN EXPERIMENTAL GLAUCOMA

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Background

This study aims to evaluate the effects of A-kinase anchoring protein 1 (AKAP1) amplification on retinal ganglion cell (RGC) mitochondria, survival, and visual function in the context of glaucomatous neurodegeneration.

Methods

We used two established mouse models of glaucoma: the DBA/2J (D2) and microbead (MB)-induced ocular hypertension model. In the D2 model, 5-month-old pre-glaucomatous mice received intravitreal gene therapy with AAV2-Null or AAV2-AKAP1 constructs for five months. For the MB model, 3-month-old C57BL/6J mice received AAV2 constructs 3 weeks before microbead injection and IOP was measured weekly for 8 weeks. RGC survival and axon preservation were assessed via RBPMS immunohistochemistry. Visual function was evaluated using pattern electroretinography (pERG) and pattern visual evoked potential (pVEP). Mitochondrial dynamics and oxidative phosphorylation (OXPHOS) were analyzed through western blot analysis, immunohistochemistry, and electron microscopy. Central visual pathway preservation was examined in the superior colliculus (SC) using cholera toxin subunit B (CTB) labeling.

Results

In both 10-month-old glaucomatous D2 mice and MB model mice, elevated IOP caused a significant decrease in AKAP1 expression in the retina, which was associated with RGC loss. Intravitreal delivery of AAV2-AKAP1 to promote AKAP1 overexpression in the retina effectively protected RGCs in both the middle and peripheral regions compared to glaucomatous Null-D2 or Null-MB mice. Visual function tests further revealed that AKAP1 amplification preserved pERG and pVEP responses in both glaucomatous D2 and MB model mice. In glaucomatous Null-D2 retinas, there was an increase in calcineurin (CaN) and total dynamin-related protein 1 (DRP1) expression, accompanied by reduced DRP1 phosphorylation at serine 637 and lower optic atrophy type 1 levels. Notably, AAV2-AKAP1 gene therapy restored the levels of these mitochondrial dynamics-regulating proteins, along with OXPHOS proteins, in the retina of glaucomatous D2 mice. Furthermore, AKAP1 amplification significantly enhanced mitochondrial biogenesis by upregulating PGC-1α and TFAM protein expression. Finally, AKAP1 gene therapy successfully restored CTB intensity in the SC of glaucomatous D2 mice compared to Null-D2 mice.

Conclusions

These findings suggest that AKAP1-targeted gene therapy represents a promising therapeutic strategy for protecting RGCs and their axons, thereby preserving visual function and the central visual pathway. This protection is mediated through the maintenance of mitochondrial structural and functional integrity in glaucomatous neurodegeneration.

P-0296

BMP-7 AS A PROTECTIVE AGENT AGAINST STEROID-INDUCED ECM ACCUMULATION IN HUMAN TRABECULAR MESHWORK CELLS

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Background

Long-term steroid use, while essential for treating ocular diseases, can increase intraocular pressure (IOP) and lead to glaucoma due to excessive extracellular matrix (ECM) accumulation in trabecular meshwork (TM) cells. This study investigates the protective effects of bone morphogenetic protein-7 (BMP-7) against steroid-induced ECM synthesis in human TM cells.

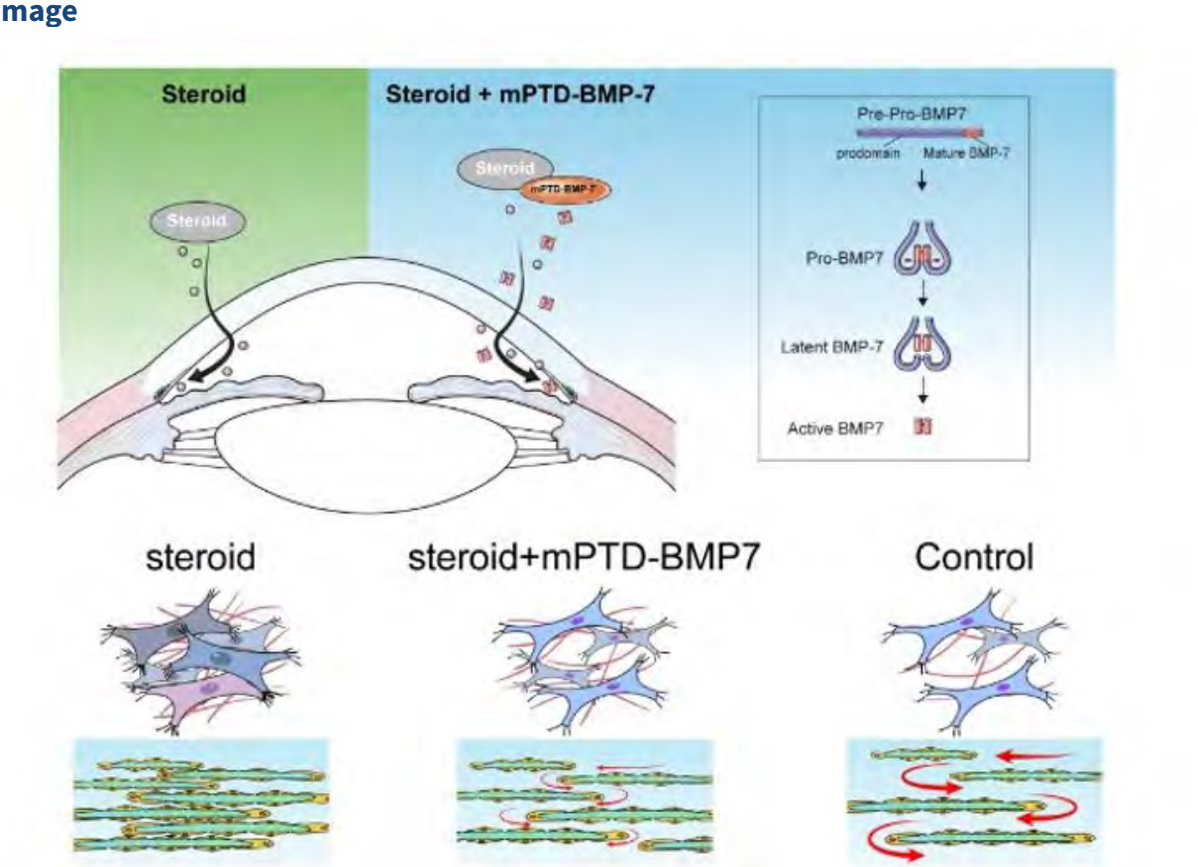
Methods

Human trabecular meshwork cells (HTMCs) were treated with steroids alone or co-treated with steroids and BMP-7. BMP-7 was administered using a micellized protein transduction domain (mPTD)-fused BMP-7 polypeptide to enhance bioactivity. Gene expression analysis identified specific ECM-regulating genes influenced by the treatments.

Results

BMP-7 effectively inhibited steroid-induced ECM accumulation in HTMCs. The co-treatment group exhibited significantly reduced ECM production compared to the steroid-only group. Gene expression profiling highlighted BMP-7's modulation of key ECM-related genes, suggesting its role in maintaining TM homeostasis.

Image



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Conclusions

BMP-7 demonstrated anti-fibrotic properties by reducing steroid-induced ECM production in TM cells. These findings suggest that BMP-7 could be a promising therapeutic target for preventing or treating steroid-induced glaucoma through the preservation of normal aqueous humor outflow and IOP regulation.

P-0298

SUPRACHOROIDAL INJECTION OF NANOLIPOSOMAL LATANOPROST FOR SUSTAINED INTRAOCULAR PRESSURE LOWERING IN THE RABBIT

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Background
Sustained drug delivery in glaucoma addresses poor patient compliance as well as provides increased bioavailability to target tissues. In glaucoma, the suprachoroidal space is an established anatomical space that is targeted by implants to lower intraocular pressure (IOP). Our study investigated the safety and efficacy of a latanoprost loaded lipid nanoparticle system injected into the suprachoroidal space of a rabbit to lower IOP.

Methods
Dutch-Belt rabbits were randomised to receive an injection of either a nanoliposomal latanoprost (150µl of 2mg/ml) or normal saline (150µl) into the suprachoroidal space or once daily topical latanoprost. Baseline IOP was recorded before treatment was given and subsequently measured at set intervals until the IOP returned to baseline. Clinical monitoring was performed with anterior segment photographs, anterior segment optical coherence tomography (AS-OCT), OCT of the macula and pattern electroretinography (PERG).

Results
There was a 23% (4.5 ± 1.6mmHg) decrease in IOP from baseline at 8 hours post nanoliposomal latanoprost injection, reaching a maximum of 40% (7.7 ± 2.3mmHg) decrease on Day 5. Significant IOP lowering of at least 20% reduction ($p<0.01$) was sustained until Day 56 before gradually returning to baseline at Day 90. The IOP lowering from suprachoroidal injection was comparable to the administration of topical latanoprost. No notable change in IOP lowering was observed in the group with normal saline. There were no adverse events recorded following suprachoroidal injection of nanoliposomal latanoprost.

Conclusions
The suprachoroidal space can be explored as an alternative anatomical placement of a sustained drug delivery system in the treatment of glaucoma.

P-0303

CILIARY NEUROTROPHIC FACTOR DERIVED FROM ASTROCYTES PROTECTS RETINAL GANGLION CELLS THROUGH PI3K/AKT, JAK/STAT, AND MAPK/ERK PATHWAYS

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Background

Neurotrophic factors are proteins that play a crucial role in the survival, growth, and function of neurons within the nervous system. Ciliary neurotrophic factor (CNTF) is one of the most extensively studied neurotrophic factors, particularly in relation to retinal degenerative disorders. However, our understanding of the overall mechanisms and genetic effects of CNTF remains incomplete.

This study investigated changes in gene expression in retinal ganglion cells (RGCs) following CNTF treatment to clarify the underlying mechanisms that contribute to its neuroprotective effects.

Methods

RGCs (retinal ganglion cells) isolated from Sprague-Dawley rat pups were treated with recombinant CNTF. The gene expression was analyzed using a microarray. Differentially expressed genes (DEGs) were identified as those with a fold change greater than 2 or less than -2. The DEGs were further investigated using Gene Ontology and Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway analyses.

Results

Our analysis identified 71 genes that were upregulated and 58 genes that were downregulated. Among these, A2m showed the greatest increase in expression, with a fold change of 4.97, while Rho exhibited the most significant decrease, with a fold change of -6.38. Furthermore, Gene Ontology and KEGG pathway analyses indicated a significant involvement in sensory organ development and the phototransduction pathway.

Conclusions

This study offers new insights into the effects of CNTF on gene expression in retinal ganglion cells (RGCs). It suggests that CNTF may have broader neuroprotective mechanisms that could guide future therapeutic strategies for retinal degenerative diseases. Our findings highlight the need for further investigation into the complex gene network responses resulting from CNTF treatment.

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P-0308

UNFOLDED PROTEIN RESPONSE IN OPTIC NERVE HEAD ASTROCYTES ACCELERATED RETINAL GANGLION CELL DEGENERATION IN CO-CULTURED RETINAL EXPLANT *IN VITRO*

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Background
Although advances and breakthroughs in the basic research of glaucoma has been achieved over the past decades, the mechanisms of neurodegeneration in glaucoma are yet to be elucidated, especially in those with normal intraocular pressure (IOP). Altered proteostasis and accumulation of misfolded proteins are common pathological features in neurodegenerative diseases, leading to the stress of endoplasmic reticulum (ER) and activation of the unfolded protein response (UPR).The role of astrocytic UPR activation in glaucoma is still unknown. In present study, we investigated the impact of aberrantly activated UPR in optic nerve head astrocytes (ONHA) on the survival of retinal ganglion cells in an *in vitro* model of retinal explant culture.

Methods
Primary ONHA cultured from adult wild-type mice, were treated with the ER stressors tunicamycin (Tm, 0.5um/ml) for 48h. Western Blot was performed to detect the expression of UPR associated proteins, and enzyme-linked immunosorbent assay (ELISA) was used to measure the inflammatory factor and astrocyte-derived neurotrophic factor secretion in the supernant. Co-culture system of ONHA- or ONHA conditioned medium with the mouse neural retina explants were established. Survival of the RGCs were compared between control or TM-pretreated group.

Results
Tm treatment induces a distinct UPR-reactivity profile in primary cultured ONHA. By 24 h of TM treatment, the pro-inflammatory A1 marker C3 was significantly upregulated in the ONHA, while concentration of CNTF and mRNA expression of BDNF were significantly down-regulated. UPR-reactive ONHA greatly compromised its support to the survival of retinal ganglion cells in explant *In Vitro* and induced non-cell-autonomous UPR reaction in the retina. By day 7, the RGC number in TM-pretreated ONHA or ONHA conditioned medium co-cultured system was significantly lower than that in control groups.

Conclusions
UPR over-activation in ONHA may exert a IOP-independent pathogenic role in the neurodegeneration in glaucoma. It provides new options for the understanding of the mechanism of glaucoma onset and progression, which also may itself be effectively targeted for neuroprotection.

P-0309

REGULATION OF PRIMARY CILIARY MORPHOLOGY AND SIGNALING PLAYS A CRITICAL ROLE IN NEUROPROTECTION AFTER OPTIC NERVE INJURY

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Background

Primary cilia, as signaling hubs rich in receptors and ion channels, are emerging as potential therapeutic targets. Ciliary alterations have been implicated in neurodegenerative diseases like Parkinson's and Alzheimer's, with the regulation of cilia morphology offering promising neuroprotective effects. However, the role of primary cilia and their associated signaling pathways in glaucoma and optic nerve injury remains unclear.

Methods

Primary cilia morphology was assessed using a Zeiss LSM 980 scanning confocal microscope equipped with a 63X oil immersion objective. Adenylate Cyclase 3 (ADCY3), a marker of primary cilia, was quantified using Imaris software. The neuroprotective role of classic sonic hedgehog (Shh) signaling was tested via intravitreal injection of the Shh pathway agonist SAG (n=4) or a control vehicle (n=5). Retinas and optic nerves were harvested 14 days after optic nerve crush (ONC) and 3 days after ischemia reperfusion (I/R). Statistical analyses were performed using unpaired Student's t-test and one-way ANOVA.

Results

In ONC and I/R mouse models, we observed the near-complete loss of primary cilia in ganglion cell layers (GCL). Activation of sonic hedgehog signaling through intravitreal SAG injection increased RGC survival (from 17.60% to 29.08%, p=0.0005) after ONC, although this signaling enhancement had no effect on optic nerve regeneration axons regeneration to 250um, 500um, 750um, 1000um had no significance of difference, p>0.45.

Image

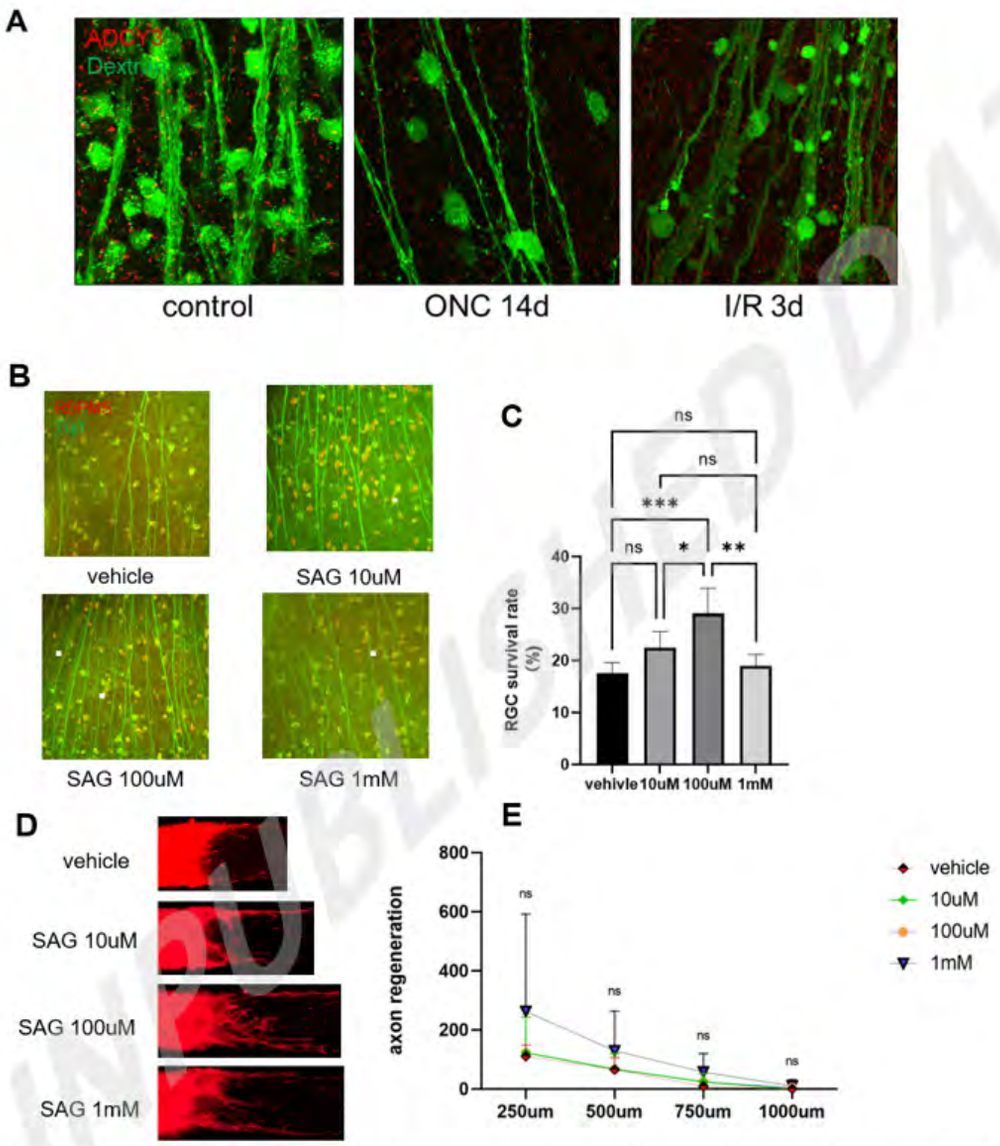

Fig 1. (A) Primary cilia in ganglion cell layers almost completely lost 14 days after ONC and 3 days after I/R
(B and C) SAG intravitreal injection increased the survival rate of RGCs 14 days after ONC
(D and E) SAG has no significant effect on optic nerve regeneration

Conclusions

Our findings suggest that primary cilia and their associated signaling pathways play a critical role in neuroprotection following optic nerve injury. Regulation of ciliary morphology and signaling may represent a promising therapeutic strategy for neurodegenerative diseases such as glaucoma.

UNPUBLISHED DATA

P-0311
INCREASED INFLAMMATORY AND MYOFIBROBLAST MARKERS IN SENESCENT SCLERAL FIBROBLASTS

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Background
Elevated intraocular pressure in mice induced senescence markers in mouse scleral stroma. Here we investigate cell behaviors following serial passage and stress-induced senescence in cultured primary human scleral fibroblasts. We then test whether treatment with the senolytic drug dasatinib alters senescent behaviors.

Methods
Senescence was induced in primary human scleral fibroblast preparations by serial passage (through passage 15) or bleomycin treatment (50 mcg/ml, 4 days) and was assessed by beta-galactosidase (BGAL) activity and RT-qPCR for senescence markers. Transcription of markers for the senescence-associated secretory phenotype (SASP) and myofibroblast differentiation were measured via RT-qPCR. IL-6 levels were measured during senescence by ELISA assay. Senescent cells were treated with the senolytic drug dasatinib (1 µM, 48 hours) to assess its effect on myofibroblast differentiation, SASP expression, IL6 secretion, and cell survival.

Results
Serial passage reliably induced scleral fibroblast senescence after 10-15 passages by BGAL assay (0.7±0.9 BGAL+ cells per field at passage 4 versus 50±12.9 at passage 10, n=3), transcription of CDKN1a (14.0±6.3 fold induction at passage 10 versus 2, p=0.03) and CDKN2a (4.6±2 fold induction at passage 10 versus 2, p=0.08), transcription of SASP-associated genes (IL6, MMP13, IL6R, TGFb2), myofibroblast differentiation (aSMA, ASPN), and increased IL6 secretion (972±540 pcg/ml at passage 2 versus 3142±453 pcg/ml at passage 10, n=3, p=0.002). Bleomycin treatment induced senescence by BGAL assay, transcription of CDKN1a (2.5±0.5-fold induction versus untreated, n=3, p=0.006), and transcription of IL6 (3.3±0.7-fold induction versus untreated, n=3, p=0.005). Increased cell passage was associate with increased susceptibility to dasatinib toxicity (94.5±14% survival at passage 7 versus 34.6±5% at passage 15, n=3, p<0.0001). Dasatinib treatment reduced IL6 transcription and secretion (1411±76 pcg/ml in control versus 658±93 pcg/ml after 1 µM dasatinib, n=3, p<0.0001) as well as myofibroblast differentiation (61.0±15% aSMA transcription of untreated control cells, p=0.02) in serially passaged cells.

Conclusions
Scleral fibroblast senescence is sufficient for increased myofibroblast markers and SASP expression, however, senescence signatures vary with mechanism. Treatment with the senolytic drug dasatinib preferentially targets senescent cells, reduces myofibroblast differentiation, and inhibits SASP.

P-0316

THERAPEUTIC INTERVENTION TARGETING BCL3/NF-KB P50 PATHWAY ATTENUATES RETINAL NEUROINFLAMMATION, PYROPTOSIS AND APOPTOSIS IN GLAUCOMA

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Background
Retinal ischemia/reperfusion injury caused by pathologically high intraocular pressure leads to excessive retinal inflammation, which is regarded as a cause of retinal ganglion cell death in glaucoma[1]. However, lowering IOP is insufficient to stop retinal ganglion cell degradation, as other factors, such as neuroinflammation, also affect retinal ganglion cell survival. Therefore, finding new neuroprotective treatments or targets is crucial and urgent. Resveratrol, a biologically active polyphenol found in grapes, has been shown in clinical studies to possess potent antioxidant and anti-inflammatory effects[2].The anti-inflammatory and neuroprotective effects of resveratrol have been observed in *in vitro* and *in vivo* studies of glaucoma. However, there is a relative scarcity of studies investigating the underlying molecular mechanisms that may support this promising therapeutic agent.

Methods
The morphological changes of retina and survival of retinal ganglion cells were verified using immunofluorescence on flat-mounted retina and H&E staining. The function of the retina was evaluated by conducting F-VEP and F-ERG. The activation and mitigation of inflammation were confirmed by qRT-PCR and immunohistochemistry of microglia. Western blot, TUNEL staining, and electron microscopy were performed to verify the protective effect of resveratrol and JS-6 against pyroptosis and apoptosis. RNA sequencing, qRT-PCR, and western blot were used to identify the molecular signaling pathway of resveratrol.

Results
Our results suggested that resveratrol can significantly rescue retinal ganglion cell death and preserve retinal function. Furthermore, resveratrol can reduce retinal inflammation by inhibiting the activation and redistribution of microglia. We also provided direct morphological evidence to show resveratrol's protective effect against apoptosis and pyroptosis through electron microscopy. Most importantly, we identified the Bcl3/NF-κB p50 signaling pathway as a novel pathway regulated by resveratrol in the ischemia/reperfusion model. By introducing a newly discovered Bcl3-NF-κB p50-specific inhibitor, JS-6, we further confirmed the importance of this pathway in mitigating retinal neuroinflammation, retinal ganglion cell pyroptosis, and apoptosis.

Conclusions
Overall, our work provides insights into the molecular mechanism of resveratrol and new targets for glaucoma diagnosis and treatment.

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P-0319

GLAUCOMA HOME MONITORING USING ONLINE CIRCULAR CONTRAST PERIMETRY OVER 6 MONTHS: PERFORMANCE AND PATIENT ATTITUDES IN THE DEVELOPING WORLD SETTING

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Background
This study assessed the longitudinal performance and user feedback of home online circular contrast perimetry (OCCP) in an Asian population.

Methods
Glaucoma and healthy participants underwent a comprehensive ocular examination and visual field tests in clinic, using OCCP and standard automated perimetry. Within a week, participants were asked to repeat OCCP at home. OCCP were then repeated after 3 months and 6 months at home, followed by a use-experience survey.

Results
No significant difference between clinic and home OCCP for test duration, false negative (FN) and fixation loss (FL) rates was found. False positive (FP) rate of home OCCP was slightly higher than that of clinic OCCP (p = 0.04). Bland-Altman plots indicated small difference between Mean Deviation (MD) (1.26 dB, p = 0.0087) and good agreements between Pattern Standard Deviation (PSD) and Visual Index (VI) of clinic OCCP and home OCCP with insignificant difference of PSD and VI (p > 0.05). Intraclass correlation coefficient (ICC) analysis demonstrated good correlation of MD & VI and poor correlation of PSD between clinic OCCP and home OCCP. Over 6 months, home OCCP indicated moderate to excellent correlation of indices. Participants showed positive attitude toward home OCCP; however, a high dropout rate was noted for the 3- and 6-month at-home testing.

Image

Certificate Number
AU Q00534

Australian Government
Department of Health and Aged Care
Therapeutic Goods Administration

Conformity Assessment Certificate
Full Quality Assurance Procedures
Schedule 3, Part 1 (excluding clause 1.6) of the *Therapeutic Goods (Medical Devices) Regulations 2002*

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This is to certify that the manufacturer's quality management system complies with the relevant provisions of Schedule 3, Part 1 (excluding clause 1.6) of the *Therapeutic Goods (Medical Devices) Regulations 2002*. Certification is based on an assessment of the Full Quality Management System, applied at each stage of medical device manufacture, from the design of a device until its final inspection before being supplied.

Conclusions
Comparable results were observed between clinic and home OCCP at baseline. Acceptable consistency of home OCCP findings over 6 months was recognized. Patients may require additional support to achieve desired adherence to at-home monitoring protocols.

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P-0320

M1 MUSCARINIC ACETYLCHOLINE RECEPTORS PROMOTE AXON REGENERATION VIA REGULATING ZN2+ INTAKE IN RETINAL GANGLION CELLS

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Background
To investigate whether M1 muscarinic acetylcholine receptor (M1 mAChR) involved in the uptake process of zinc ions by retinal ganglion cells (RGCs) and its function after optic nerve crush (ONC) in mice.

Methods
Glycopyrrolate, a general muscarinic receptor The level of Zn^{2+}in the inner plexiform layer (IPL) and ganglion cell layer (GCL) of the retina was stained using autometallography (AMG). The number of survival retinal ganglion cells (RGCs) was determined via dual staining with RGC markers Tuj1 and RBPMS. Individual axons that regenerated to 0.25, 0.5, 0.75 and 1 mm were manually counted in the whole-mount optic nerve labeled by cholera toxin B fragment (CTB).

Results
Glycopyrrolate significantly decreased the Zn^{2+} uptake in GCL and increased Zn^{2+} accumulation in the IPL of retina. Pirenzepine promoted RGC survival in a dose-dependent manner with an optimal concentration of 100 µM. Pirenzepine stimulated intense axonal regeneration compared to control. Furthermore, injecting pirenzepine immediately after injury and again 3 d later, was more effective than a single early injection to augment axon regeneration.

Conclusions
Our results suggest that M1 mAChR antagonist promoted axon regeneration by blocking the Zn^{2+} intake in RGCs, and provide a novel target for glaucomatous optic nerve injury treatment.

P-0321

INVESTIGATION OF THE CONTRACTILE MECHANISM OF THE TRABECULAR MESHWORK BASED ON THE AVB3/RHOA/ROCK/CLAN PATHWAY

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Background
To investigate the regulatory effects of cilengitide, a specific inhibitor of integrin αvβ3, on the RhoA/ROCK signaling pathway in human trabecular meshwork cells (hTMs), and its impact on the formation of cross-linked actin networks (CLANs) induced by transforming growth factor-β (TGF-β). This study aims to provide novel insights into restoring the contractile function of hTMs, which may have therapeutic implications for glaucoma.

Methods
Isolate and culture primary hTMs, stimulate with TGF-β followed by cilengitide intervention. Key molecules in signaling pathways associated with cell contraction in hTMs, including αvβ3, RhoA, and ROCK, were quantified using real-time quantitative polymerase chain reaction (qPCR), western blotting(WB), and immunofluorescence (IF). High-content cell imaging system was employed to measure the maximum cross-sectional area of TM cell spheroids; and the cytoskeleton was stained with phalloidin to evaluate CLANs proportion, which is a functional indicator of the contractile function of hTMs.

Results
Compared to the control group, the TGF-β group exhibited significantly increased expression levels of αvβ3, RhoA, ROCK, and fibronectin, as detected by qPCR, WB, and IF. Additionally, the maximum cross-sectional area of TM cell spheroids was markedly reduced, and CLANs proportion was significantly elevated in the TGF-β group, as shown by high-content cell imaging system and phalloidin staining. In contrast, cilengitide treatment resulted in reduced expression of αvβ3, RhoA, ROCK, and fibrosis-related proteins compared to the TGF-β group. The cilengitide-treated group also exhibited an increased maximum cross-sectional area of TM cell spheroids and a decreased proportion of CLAN formation compared to the TGF-β group.

Conclusions
Cilengitide downregulates key molecules in the αvβ3/RhoA/ROCK signaling pathway and inhibits TGF-β-induced CLAN formation in hTMs, thereby restoring their contractile function. These findings provide a potential therapeutic strategy for the repair of TM dysfunction in glaucoma.

P-0322
GUT- MICROGLIA COMMUNICATION MEDIATES GLAUCOMA NEURODEGENERATION

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Background
Glaucoma neurodegeneration is reported to be associated with microbiota related retinal immune response. While how microbiota regulate the retinal immune response is still unclear.

Methods
Method: Germ-free (GF) mice, Specific pathogen-free (SPF) mice and microbeads injection induced glaucoma mice models were used to study the changes in retinal immune response. Primary microglia were isolated and stimulated by LPS for 24 h. The immunoassaying, cytokine array and RNA-seq analysis were used to characterize the activation pattern of microglia.

Results
Result: Mice under germ free conditions did not show significant retinal microglia activation and neurodegeneration under continuous high intraocular pressure. Primary microglia isolated from germ free mice have different gene profile compared to SPF under LPS stimulation. The differentially expressed genes between GF and SPF enriched into angiogenesis, cell morphogenesis, and ameboidal-type cell migration.

Conclusions
These results support that microbiota effect on glaucoma neurodegeneration by changing retinal immune response. This study provided novel mechanisms and therapeutic targets for glaucoma from the perspective of immune metabolism.

P-0324

DEVELOPMENT FOR SUSTAINED DRUG RELEASE SYSTEM OF LATANOPROST-IMMOBILIZED PCL WITH THE LEAF-STACKED STRUCTURE FOR THE TREATMENT OF GLAUCOMA

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Background
Glaucoma is an eye disease that can cause vision loss or blindness by damaging the optic nerve due to increased intraocular pressure (IOP). A sustained-release delivery system is a mechanism designed to gradually release therapeutic substances over a certain period with a single administration, providing long-term therapeutic effects.

Methods
In this study, we developed a latanoprost-immobilized polycaprolactone (PCL) sustained drug release system with a leaf-stacked structure (LSS), referred to as LAT-PLSS, for the treatment of glaucoma.

Results
The morphology if the PCL exhibited the LSS structure on both the outer and inner surfaces, and the submicron to nano sized pores was discernible at both ends in tube. Furthermore, the latanoprost adsorbed onto the LAT-PLSS was continuously released over a period of 48 days. In vivo animal studies demonstrated the efficacy of LAT-PLSS in reducing IOP over the same duration.

Conclusions
These results suggest that the bioactive molecule-immobilized PCL with an LSS configuration offers a promising strategy for regulating IOP in the eye and an advanced approach for sustained drug release systems with potential for widespread application.

P-0325

INVESTIGATION OF THE PATHOGENIC MECHANISM OF OPTIC NEUROPATHY CAUSED BY AIR POLLUTANTS IN *IN VITRO* STUDY

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Background
Air pollution-related adverse health effects have become a significant concern in recent years. Atmospheric particulate matter is one of the strongest and most consistent predictors of mortality among air pollutants. As research on environmental pollutants and their impact on human health deepens, several studies have highlighted the association between air pollutants and ocular diseases, including glaucoma. However, the relationship between air pollutants and glaucoma remains incompletely understood. This study aims to elucidate the pathogenic mechanism of a representative air pollutant, particulate matter 2.5 (PM2.5), in causing retinal damage through *in vitro* studies.

Methods
We selected two types of PM2.5 originating from Beijing (No. 28) and the Gobi Desert (No. 30). Retinal ganglion cells (RGCs) were isolated from five-day-old mice using a modified immunopanning-magnetic beads method. Müller cells were isolated from 3- to 5-day-old mice. We utilized the DCFDA/H2DCFDA Cellular ROS Assay Kit to measure oxidative stress and the CellTiter-Glo® Luminescent Cell Viability Assay to evaluate cell viability.

Results
After a 2-hour treatment with PM2.5, ROS levels in RGCs and Müller cells were significantly higher compared to the control group in a concentration-dependent manner. ATP levels decreased in both RGCs and Müller cells following 72 hours of PM2.5 exposure.

Conclusions
Exposure to PM2.5 significantly increases oxidative stress and decreases cell viability in both RGCs and Müller cells, indicating potential retinal damage.

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P-0326

STUDY ON THE PROTECTIVE EFFECT OF EXERCISE ON TRABECULAR NETWORK AND OPTIC NERVE IN DBA2J MICE WITH DIFFERENT INTRAOCULAR PRESSURE

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Background
Glaucoma is the first irreversible blinding disease in the world, reducing intraocular pressure is an effective treatment, and increasing aqueous humor outflow resistance is the key factor leading to the increase of pathological intraocular pressure. Long-term aerobic exercise can reduce IOP and the incidence of POAG. However, the protective mechanism of exercise on trabecular network and optic nerve in glaucoma at different intraocular pressure periods is unclear. The aim of this study was to investigate the effects of exercise on extracellular matrix changes and optic nerve protection in glaucoma mice at different intraocular pressure periods.

Methods
Seventy-five 4-month-old DBA2/J glaucoma model mice were randomly divided into 30 control group and 45 exercise group, aerobic exercise three times a week, weight and intraocular pressure were measured every two weeks, and the mice were killed at the ages of 8 months, 10 months and 13 months, respectively, and eyeballs were taken. Immunofluorescence, HE staining, Van kossa staining and Masson staining were used to evaluate the effect of exercise on IOP in glaucoma mice at different periods from protein expression and tissue structure.

Results
Long-term exercise can inhibit the accumulation of fibronectin (FN), collagen type IV (COLIV), A-smooth muscle protein (a-SMA) in the extracellular matrix of trabecular reticulum and inhibit trabecular reticulum fibrosis. Inhibition of stromal Gla protein (MGP) reduction and trabecular reticulum calcification, exercise can reduce intraocular pressure and restore normal trabecular reticulum extracellular matrix COLIV and a-SMA accumulation. Exercise in 8-month-old and 10-month-old mice only had protective effects on FN accumulation and MGP reduction in trabecular network. Exercise can protect the optic nerve injury of 8-month-old and 13-month-old mice, inhibit the senescence of retinal ganglion cells, and reduce the senescence of ganglion cells after the IOP of 13-month-old mice returns to normal. It was not effective in 10-month-old mice.

Conclusions
Exercise can reduce the senescence of ganglion cells and protect the optic nerve.

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P-0328

SPECIES AND TISSUE-SPECIFIC DISTRIBUTION OF VITAMIN K IN OCULAR TISSUES: A COMPARATIVE ANALYSIS

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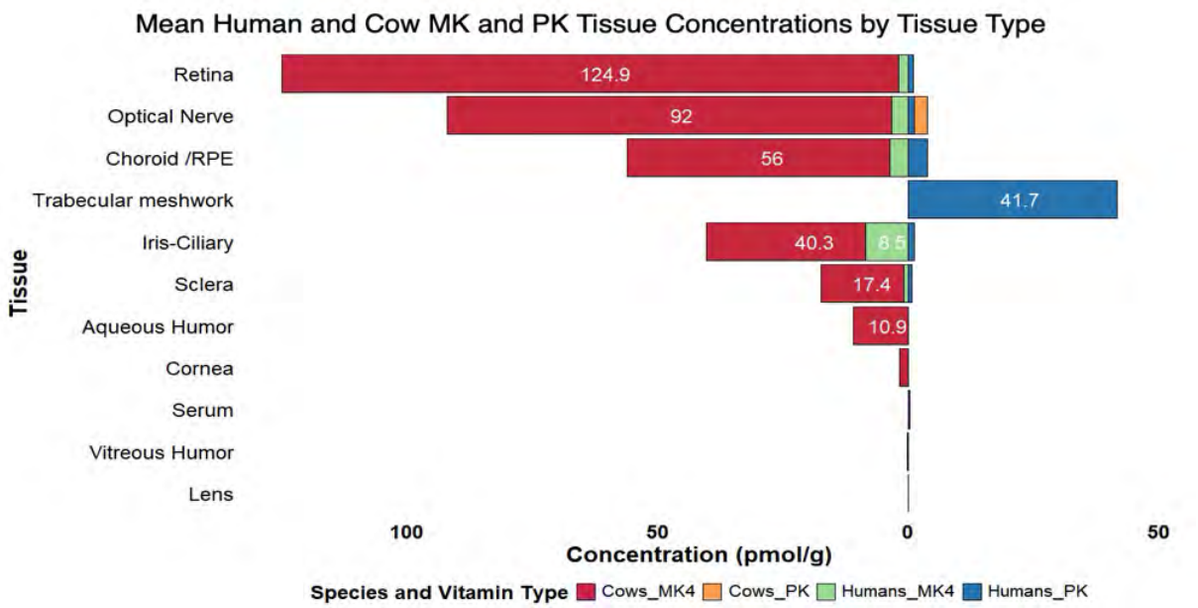
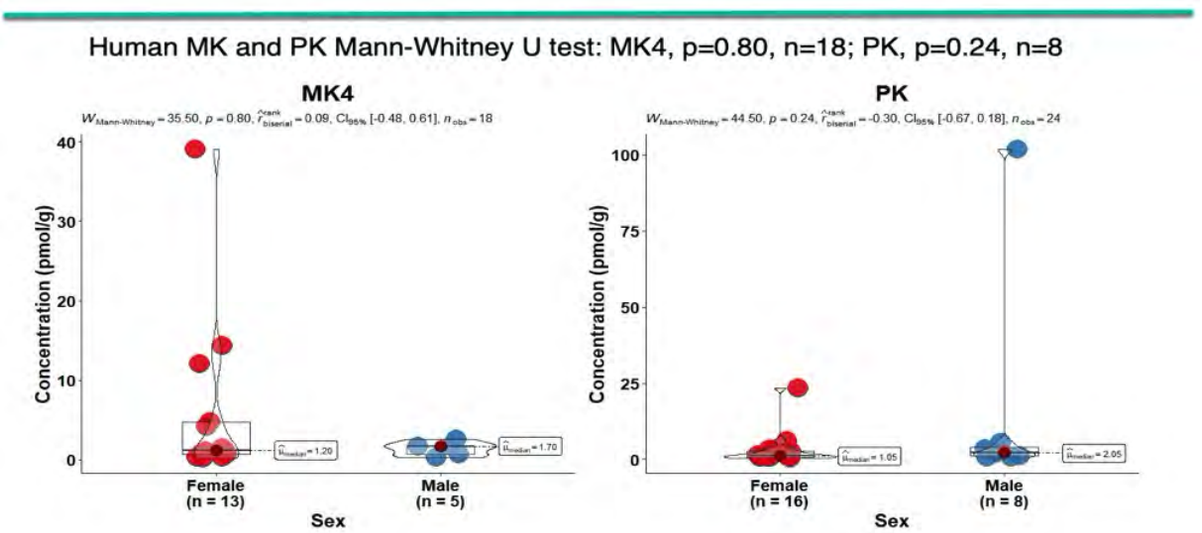
Background

Glaucoma is the leading cause of irreversible blindness with documented disparities in the incidence and severity of the disease[1], yet molecular mechanisms possibly contributing to this variance remain obscure[2]. Evidence is increasing however, that vitamin K (VK), may play a role in glaucoma and other age related conditions in the eye and visual system[3].

Image





Conclusions

Ocular tissue from the three species tested contained VK, with MK4 and PK varying by species and tissue type. No significant association was found between VK concentrations and gender or age. However, the small sample size limits the generalizability of these findings. Further investigation with larger cohorts is warranted to elucidate the functional implications of vitamin K distribution in ocular health and disease, particularly in the context of glaucoma. Additional analysis in rhesus macaques and human donor eyes is underway.

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P-0329

ALL-TRANS RETINOIC ACIDS SYNERGISTICALLY IMPROVE *IN VITRO* 2D AND 3D MODELS OF GLAUCOMATOUS HUMAN TRABECULAR MESHWORK CELLS

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Background

A derivative of vitamin A, all-trans-retinoic acid (ATRA) is a potent regulator of the growth and differentiation of various types of cells. Pharmacologically, ATRA exerts anti-TGF-b effects have been also considered to be potential therapeutic candidates for modulating the TGF-β related pathogenesis. However, as of this writing, little has been known in terms of the drug induced effects of ATRA toward glaucomatous trabecular meshwork (TM), in which TGF-b signaling is also involved in the pathogenesis. Therefore, the purpose of the present study was to elucidate unidentified pharmacological effects of ATRA on glaucomatous human TM (HTM) using *in vitro* two-dimensionally (2D) and three-dimensionally (3D) culture models using HTM cells that had been treated with TGF-β2.

Methods

In the presence of 5ng/mL TGF-β2, the effects of ATRA on 1) the barrier function of the 2D HTM monolayers, as determined by transepithelial electrical resistance (TEER) and Fluorescein Isothiocyanate (FITC) dextran permeability measurements, 2) cellular metabolism analysis by a Seahorse Bioanalyzer, 3) the physical properties, including the size and stiffness, of 3D spheroids, and 4) the gene expression of extracellular matrix (ECM) molecules, ECM modulators including tissue inhibitor of metalloproteinases (TIMPs), matrix metalloproteinases (MMPs), tight junction (TJ)-related molecules and endoplasmic reticulum (ER) stress related factors.

Results

ATRA significantly inhibited the TGF-β2-induced increase in the TEER values and FITC dextran permeability of the 2D monolayers, although an ATRA monotreatment induced similar effects as TGF-b2. A real-time metabolic analysis revealed that ATRA significantly inhibited the TGF-β2-induced shift in metabolic reserve from mitochondrial oxidative phosphorylation to glycolysis in 2D HTM cells, whereas ATRA alone did not induce significant metabolic changes. While, in contrast, ATRA induced a substantially downsized and softened 3D spheroids in the absence and presence of TGF-b2. Similarly, the different effects by ATRA toward 2D and 3D HTM cells were also supported by the qPCR analysis of several proteins as above.

Conclusions

The findings reported here indicate that ATRA may induce synergistical and beneficial effects toward TGF-b2 treated 2D and 3D cultured HTM cells although those effects varied significantly between their 2D and 3D cultures.

P-0330

MELATONIN PROTECTS ISCHEMIA/REPERFUSION INDUCED DAMAGE IN THE ANTERIOR SEGMENT OF EYES THROUGH A SIRT1-DEPENDENT PATHWAY

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Background
The aim of this study was to elucidate the protective role of melatonin (MLT) in the anterior segment after ischemia-reperfusion (I/R) injury and to explore its underlying mechanism.

Methods
We established an I/R mouse model. Melatonin was intraperitoneally injected immediately after I/R induction. Four experimental groups were considered: The sham group, I/R group, I/R+MLT group and I/R+MLT+EX-527 (SIRT1 inhibitor) group. Slit lamp microscope imaging system, anterior segment optical coherence tomography and hematoxylin & eosin staining were used to observe the alterations of the anterior segment morphology and structure. Immunofluorescence staining was used to assess protein expression in the anterior segment tissues.

Results
The expression of SIRT1 was decreased in the cornea, iris, ciliary body, and anterior lens capsule after I/R injury and melatonin effectively enhanced the stability of SIRT1. In addition, melatonin treatment substantially alleviated corneal edema and morphological changes of iris after I/R lesion. I/R-induced oxidative stress, inflammation and senescence in the anterior segment were dramatically attenuated by melatonin intervention. Additionally, EX-527 could counteract the protective effects of melatonin.

Conclusions
Melatonin exerted antioxidative stress, anti-inflammatory and anti-senescent effects by activating the SIRT1 pathway, thereby ameliorating the alterations of morphology and structure in the anterior segment after I/R injury.

P-0331
INVOLVEMENT OF APOPTOSIS INHIBITOR OF MACROPHAGE IN CYTOMEGALOVIRUS IRITIS

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Background
We previously reported that the apoptosis inhibitor of macrophage (AIM) contributes to intraocular pressure (IOP) maintenance by promoting phagocytosis in trabecular meshwork cells (hTM). In this study, we investigated aqueous AIM levels in normal controls, patients with primary open-angle glaucoma (POAG), and those with cytomegalovirus (CMV) iritis. In addition, we verified the involvement of AIM in the pathogenesis of CMV infection.

Methods
Aqueous AIM levels in normal controls, POAG, and CMV iritis were measured by ELISA, and their correlation with IOP was analyzed. AIM expression in CMV-infected hTM, iris pigment epithelial cells, and macrophages were also investigated *in vitro*.

Results
The collected aqueous humor was classified into normal control in 31 eyes, POAG in 43 eyes, and CMV iritis in 17 eyes.Compared with normal controls and POAG, aqueous AIM levels in CMV iritis were significantly increased, and a significant negative correlation was observed between AIM levels and IOP in CMV iritis ($p = 0.04$). AIM expression was elevated in CMV-infected hTM, iris pigment epithelial cells, and macrophages.

Conclusions
AIM may have an important role in IOP elevation and the development of glaucoma in CMV iritis.

P-0334

THE REDUCED OIL TANKER IN GLAUCOMATOUS AXOPLASMIC FLOW—SYNTABULIN

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Background

Disrupted axoplasmic flow is a major cause of optic nerve and retinal ganglion cell (RGC) loss in glaucoma. Maintaining the normal physiological function of the optic nerve requires substantial ATP consumption. However, mitochondria, the primary ATP producers, can only synthesize ATP in the RGC cell body and transport it to the axon via anterograde axoplasmic flow to fulfill their function.In the optic nerve of glaucoma, mitochondria accumulate before the lamina cribrosa, failing to reach the post-lamina axons.Evidence suggests that thedisruption of anterograde mitochondrial axoplasmic flow in glaucomatous optic nerves precedes the disruption of retrograde axoplasmic flow. Syntabulin STB is an adaptor protein that mediates anterograde mitochondrial axoplasmic flow.Currently, no studies have been conducted on the changes of STB in glaucoma.The purpose of our study is to investigate the expression and distribution of STB in the retina and optic nerve, and the changes that occur to STB in glaucoma.

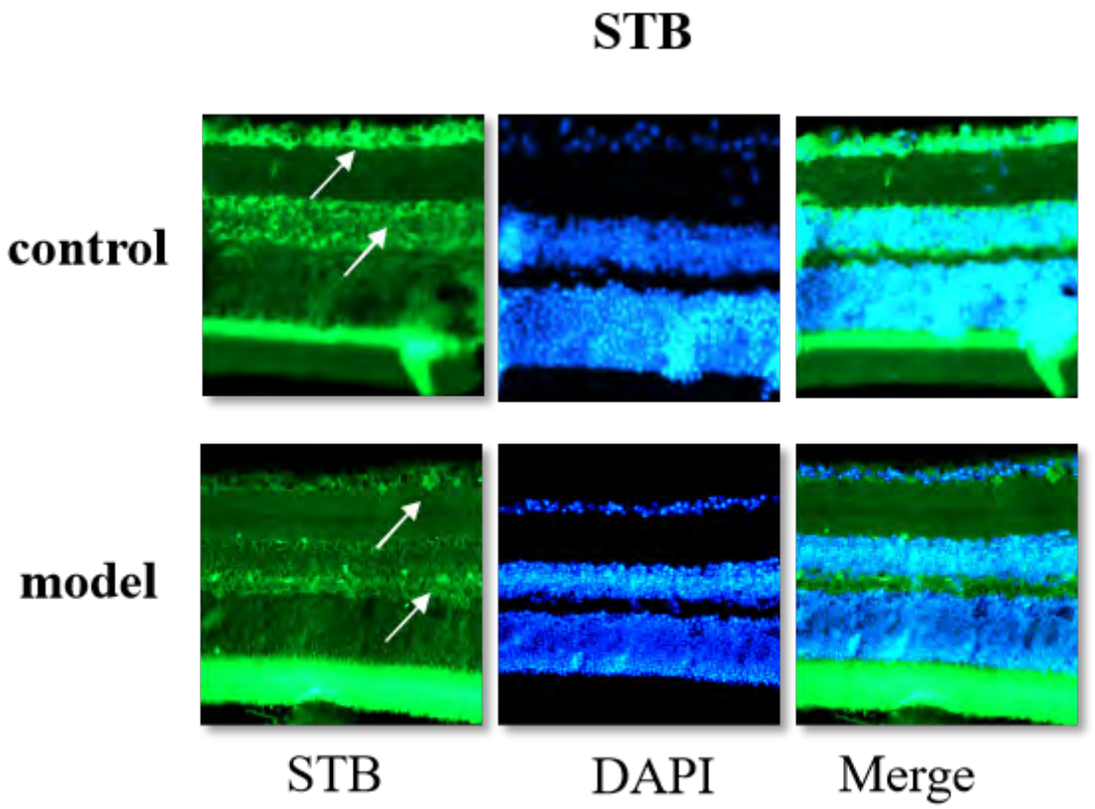
Methods

In this study, 10-week-old female specific pathogen-free (SPF) C57BL/6 mice were used and divided into normal control group and glaucoma model group. An acute ischemia-reperfusion model was established by injecting saline into the anterior chamber of the eye. Model validation was performed by examining the thickness of retinal layers using hematoxylin and eosin (HE) staining, and by quantifying RGC through immunofluorescence IF staining of retinal flat mounts. The expression level and localization of STB were investigated in the retina and optic nerve using Western blotting (WB) and IF staining of paraffin-embedded sections.

Results

HE staining showed that the nerve fiber layer was thinner in the model group compared to the control group. Retinal flat mounts showed reduction in RGC numbers in the model group compared to the control group($P<0.01$, $n=5$). WB analysis showed the presence of STB in the retina and optic nerve, with lower STB expression in the model group compared to the control group($P=0.02<0.05$, $n=5$). IF staining of paraffin-embedded sections showed that STB was distributed in the RGC layer and inner nuclear layer of the retina, as well as in the optic nerve. STB expression in these areas was lower in the model group compared to the control group.

Image



Conclusions

STB is distributed in the RGC layer and inner nuclear layer of the retina, and in the optic nerve. STB expression is decreased in the retina and optic nerve of acute ischemia-reperfusion model mice.

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P-0337

VITAMIN K SUPPLEMENTATION ALLEVIATES RETINAL DAMAGE IN A GLAUCOMA MOUSE MODEL THROUGH ANTI-INFLAMMATORY AND ANTI-FERROPTOSIS PATHWAYS

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Background

The purpose of the present study was to investigate the effects and underlying mechanisms of VitK1 supplementation on the damage of RGCs in a mouse model of glaucoma, which may contribute to development of neuroprotective treatments for glaucoma.

Methods

Mouse model of AOH and VitK1 Administration
DBA/2J glaucoma mouse model
Microglia culture and treatments
Electroretinogram (ERG)
Immunofluorescence
Histological analysis
RGCs Labeling and Quantification
Western Blot analysis
Real-time quantitative polymerase chain reaction (qRT-PCR)
RNA-seq library construction, sequencing, and bioinformatics analysis
Statistical Analysis

Results

1. VitK1 supplementation alleviated RGC apoptosis and ptotect retina
2. VitK1 supplementation improved the ERG response after retinal AOH injury
3. VitK1 supplementation inhibited the activation of microglia whereas the activation of astrocytes
4. VitK1 supplementation exhibit anti-inflammatory and anti-apoptotic effect on retina and BV2 cells
5. RNA-Seq results suggest that the retinal protective effects of Compound A are primarily enriched in anti-inflammatory and anti-apoptotic signaling pathways
6. VitK1 can also inhibit ferroptosis in retinal cells through FSP1 and protect the retina

Conclusions

AOH injury activated the inflammatory response in the retina and exacerbated apoptosis, while VitK1 regulated some inflammation and apoptosis related genes, which might explain the protective effect of VitK1 on retinal tissue. Vitamin K can also inhibit ferroptosis in retinal cells through FSP1 and protect the retina.

P-0338

A RARE CASE OF PEDIATRIC LOCALISED OCULAR AMYLOIDOSIS AND ITS MANAGEMENT

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Background

Amyloidosis refers to a group of rare diseases caused by protein conformation abnormalities resulting in extracellular deposition & accumulation of insoluble fibrillar aggregates – leading to progressive organ damage.

It usually occurs as the result of a mutation, but can also occur secondary to inflammatory, degenerative or neoplastic processes. Ocular involvement, though uncommon, is usually seen in Ig light chain, Transthyretin, Gelsolin, Keratoepithelin, and Lactoferrin types of amyloidosis. Herein, we describe a rare case of localized intraocular amyloidosis manifesting with multifocal iris and anterior chamber spherules and secondary glaucoma.

Methods

A 14-year old female presented with uniocular raised IOP, a pseudo-hypopyon, & multiple spherular deposits in the AC angle. She underwent a detailed ocular & systemic evaluation, including an iris biopsy, and went on to develop secondary cataract, glaucoma & corneal decompensation.

Results

On Iris biopsy, Congo red staining and Apple-green birefringence were positive, diagnosing Ocular Amyloidosis. She underwent a detailed systemic evaluation for the same, and all secondary complications were surgically managed, including an Ahmed Glaucoma Valve Implant, and Optical Penetrating Keratoplasty.

Conclusions

Amyloidosis is a rare genetic/acquired disease characterized by extracellular deposition of abnormally folded proteins throughout various organs. It may present initially through a myriad of ocular manifestations which need to be diagnosed early to facilitate a good visual outcome and systemic management of the disease.

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P-0339

THINNING OF RETINAL INNER LAYER THICKNESS AND INTRAOCULAR PRESSURE IN PROBDNF KI MICE

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Background
Brain-derived neurotrophic factor (BDNF) is one of the major neuroprotective factors. Mice with impaired processing of proBDNF to mature BDNF exhibit depression-like phenotypes. This study investigated the effects of proBDNF R125M/R127L knock-in (KI) mice on retinal thickness and intraocular pressure (IOP).

Methods
IOP was measured in proBDNF KI mice and control C57BL/6 mice at 10, 15, 20, 25, 30, and 35 weeks of age. Retinal inner layer thickness was measured using optical coherence tomography (OCT) at 7, 19, 31, 46, and 62 weeks of age, and the results were compared.

Results
The average IOP (mmHg) in the proBDNF KI group and the control group was as follows:
10 weeks: 13.84±0.85 vs. 13.55±0.95, p=0.48
15 weeks: 13.62±0.95 vs. 13.88±0.56, p=0.47
20 weeks: 13.9±1.0 vs. 13.68±1.2, p=0.66
25 weeks: 13.4±1.3 vs. 13.97±1.5, p=0.39
30 weeks: 13.94±1.06 vs. 13.96±1.35, p=0.96
35 weeks: 13.35±1.53 vs. 13.79±1.76, p=0.55
No significant differences in IOP were observed between the proBDNF KI and control groups at any age.

The average retinal inner layer thickness (pixels) was as follows:
7 weeks: 16.5±0.7 vs. 16.9±0.9, p=0.4
19 weeks: 16.8±0.3 vs. 17±0.4, p=0.17
31 weeks: 16.2±0.5 vs. 17.2±0.4, p=0.002
46 weeks: 15.8±1.2 vs. 17.1±0.8, p=0.03
62 weeks: 15.5±0.6 vs. 16.9±0.7, p=0.002
From 31 weeks onward, the retinal inner layer thickness in the proBDNF KI group was significantly lower than in the control group.

Conclusions
In proBDNF KI mice, the retinal inner layer thickness was significantly reduced, while no differences in IOP were observed.

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Laser Therapies

P-PW-0340

SELECTIVE LASER TRABECULOPLASTY RESPONSE AS A PREDICTOR FOR GONIOSCOPY ASSISTED TRANSLUMINAL TRABECULOTOMY SUCCESS

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Background

Glaucoma is a leading cause of irreversible blindness, and two common treatments for glaucoma are Selective Laser Trabeculoplasty (SLT) and Gonioscopy Assisted Transluminal Trabeculotomy (GATT). The purpose of this study is to investigate the correlation between their success rates and whether the success of SLT can predict the success of GATT

Methods

In this retrospective chart review of glaucoma patients seen at Eye Care Center from August 1st, 2016, to August 1st, 2024, we included 120 patients over 18 years old with at least 6 months follow up post GATT. Participants were categorized into one of the 3 groups of successful SLT, failed SLT, or no prior SLT. The success of SLT was defined as a more than 20% reduction in intraocular pressure (IOP) after 6 weeks. The success of GATT was defined using three criteria: a more than 20% reduction in IOP with IOP < 21 or 18, or 14 at follow up without other intervention. Groups were compared using Kruskal Wallis test and Chi-square test for numeric and categorical variables, respectively

Results

60 right eyes and 60 left eyes from 120 distinct patients, 40 per group, were included in the analysis. Most participants were male (55.0%) diagnosed with primary open angle glaucoma (60.8%) with an average age of 67.0 years at the time of GATT. There was significant difference in intra-ocular pressure among the 3 groups at 1-month, 3-month, and 6-month post-op. The success of GATT was associated with prior SLT success starting 3-month post-op (p=0.046) and became more different after 6 months (p=0.010). The successful SLT might be associated with 15-20% higher success rate of GATT while failed SLT were associated with worse GATT outcome, especially in the 3 to 6-month post-op period (p=0.020)

Conclusions

Our study found that the successful SLT was associated higher success rate of subsequent GATT, and failed SLT tended to be associated with worse GATT outcome. Therefore, the SLT response could be used to predict the GATT outcome for patientsMiaomiao Zhang & Bin Li & Jianrong Wang & Wei Liu & Yan Sun & Xinyi Wu

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P-PW-0341

OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHIC CHANGES IN PERI-LIMBAL CIRCULATORY NETWORKS AFTER DIRECT SELECTIVE LASER TRABECULOPLASTY

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Background
To evaluate alterations to peri-limbal circulatory networks using the optical coherence tomography angiography (OCTA) imaging after trans-limbal direct selective laser trabeculoplasty (DSLT) in subjects with primary angle closure (PAC) and primary angle closure glaucoma (PACG).

Methods
Ten patients with a baseline diagnosis of PAC and PACG and who had received prior laser iridotomy were recruited in this prospective single arm pilot trial. Subjects were either treatment naïve or post-washout with an IOP ≥ 22mmHg but ≤ 35mmHg. One eye per subject received DSLT by non-contact limbal irradiation with power settings standardized at 2.2mJ and 120 shots delivered over 360 degrees. Patients were followed up at week 1, month 2, month 4 and month 6. All patients were prescribed nepafenac drops for a week after laser. OCTA examination was performed using a swept-source optical coherence tomography (OCT) system (PLEX Elite 9000; Carl Zeiss Meditec, Dublin, California, USA) using an anterior segment modular attachment. A 3x3-mm scan pattern was used to acquire AS-OCTA images of the nasal and temporal perilimbal area at baseline before DSLT and at 6 months after DSLT. Enface images were generated using a built-in software (Ver. 1.6.0.21130; Carl Zeiss Meditec). Flattening was performed at the level of the conjunctival epithelium. Images were then processed in ImageJ with a series of filtering and thresholding including Gaussian blurring (Sigma = 4), bandpass filtering (filter large structures down to 40 pixels, and small structures down to 3 pixels, no saturation), and Otsu's Thresholding. The generated binary image was skeletonized for calculating perfusion density (PD; %) and vessel density index (VDI) using pixel counting. Pre and post intervention PD (%) and VDI were compared.

Results
The mean (SD) baseline IOP (mm Hg) in all eyes was 22.6 (1.0). At Month 6, mean IOP was 14.0(2.3; p=0.005) translating to a 38.0% IOP reduction. A laser failure rate of 20.0% was noted. Mean baseline nasal and temporal PD (%) was 10.7(0.7) and 11.0 (0.9) respectively. At 6 months a 14.5% (12.3± 1.0; p=0.001) increase in nasal PD was noted and this proportion increased by 8.0% (11.9± 0.4; p=0.015) for temporal PD. The mean nasal and temporal VDI was 2.7 (0.2) and 2.8(0.2) respectively. At 6 months nasal VDI increased by 9.4% (3.0± 0.1; p=0.009) and this proportion increased by 5.7% (2.9± 0.1; p=0.013) for temporal VDI.

Conclusions
DSLT significantly impacts flow patterns in the perilimbal circulatory networks and correlates with a significant IOP reduction noted at 6 months post laser.

P-PW-0342

EFFICACY AND INFLUENCE FACTORS OF LASER TREATMENT OF ACUTE PRIMARY ANGLE CLOSURE

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Background
Acute primary angle closue (APAC) is common in east Asian population. Argon laser peripheral iridoplasty (ALPI) and laser peripheral iridotomy (LPI) have been reported as effective treatments of APPC patients with uncontrolled intraocular pressure after medical treatment. However, the efficacy of ALPI and ALPI combined with LPI is not investigated clearly. Our study aims to explore the efficacy and influence factors of ALPI with or without LPI in treating acute primary angle closure.

Methods
One hundred and three eyes diagnosed as APAC with uncontrolled IOP after medical treatment were enrolled during Dec 15th, 2022 to Jan 15th, 2023 in this study. Twenty five eyes received ALPI alone and 78 eyes received ALPI and LPI. Characteristics and IOP controlled success ratio after lasers of two groups were collected and compared. The influence factor of IOP controlled success after lasers were analyzed by logistic analysis.

Results
Characteristics including gender, age, IOP before laser, time from onset to laser, axial length, anterior chamber depth, pupil diameter in ALPI and ALPI+LPI groups are not statistically different. The IOP controlled ratio after laser were 52% in ALPI group and 48.72% in ALPI+LPI group(P=0.775). Time from onset to laser was analyzed as the significant influence factor of IOP controlled ratio (P=0.026). The IOP controlled ratio after laser of the patients with time from onset to laser in 0-4 days, 5-9 days, 10-30 days are 85.71%, 56.67%, 37.29%, respectively (P=0.003).

Conclusions
In terms of treating acute primary angle closure, ALPI alone and ALPI combined with LPI showed similar efficacy. Time from onset to laser are the only influence factor of IOP controlled ratio after laser.

P-PW-0343

EFFICACY AND SAFETY OF DIRECT SELECTIVE LASER TRABECULOPLASTY (DSLT) IN THE TREATMENT OF PATIENTS WITH OPEN-ANGLE GLAUCOMA OR OCULAR HYPERTENSION

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Background
Selective Laser Trabeculoplasty (SLT) is a well-established, effective, and safe method for reducing intraocular pressure (IOP) by targeting the trabecular meshwork to enhance aqueous humor outflow. However, conventional SLT is time-consuming and requires significant expertise, which can limit its accessibility. Direct Selective Laser Trabeculoplasty (DSLT), a novel non-contact technique, simplifies the delivery of SLT and has been routinely implemented in our outpatient clinic. This study aims to evaluate the efficacy and safety of Direct Selective Laser Trabeculoplasty (DSLT) in the treatment of patients with open-angle glaucoma (OAG) or ocular hypertension (OHT).

Methods
This retrospective study analyzed consecutive patients with OAG or OHT who underwent DSLT between October 2023 and September 2024 at Shaare Zedek Medical Center, Jerusalem, Israel. The primary outcome was the reduction in mean intraocular pressure (IOP) two months after DSLT. Secondary outcomes included the success rate (defined as ≥20% IOP reduction or a reduction of more than 2 mmHg from baseline without additional medications, or a decrease in anti-glaucoma medications while maintaining baseline IOP), the incidence of IOP spikes (an increase of at least 2 mmHg in IOP within 30 minutes post-treatment), and the occurrence of subconjunctival hemorrhage (SCH).

Results
A total of 272 eyes from 175 patients were included. The mean baseline IOP was 18.9 ± 4.7 mmHg, which decreased to 16.3 ± 4.1 mmHg two months post-treatment. The percentage reduction in mean IOP was highest in eyes not previously treated with IOP-lowering medications compared to medically treated eyes. The overall success rate was 71%, with the highest success observed in treatment-naïve eyes and the lowest in eyes receiving five IOP-lowering medications. IOP spikes occurred in only 11 eyes (4%), while punctate perilimbal SCH was noted in 173 eyes (63.6%). No significant adverse events requiring surgical or clinical intervention were reported.

Conclusions
DSLT is an effective and safe treatment for lowering IOP in eyes with OHT and OAG. In this study, DSLT demonstrated efficacy both as a first-line treatment and as an adjunct therapy. The greatest IOP reductions were observed in treatment-naïve eyes, suggesting DSLT as a valid treatment option for OHT and OAG patients.

P-0344

IMPACT OF REPEATED, LOW-DOSE SELECTIVE LASER TRABECULOPLASTY (SLT) ON INTRAOCULAR PRESSURE IN GLAUCOMA

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Background

Selective Laser trabeculoplasty (SLT) is an effective method to reduce intraocular pressure (IOP) in open-angle glaucoma and annual, repeated low-dose treatment has been suggested as a method to mitigate a reduction of its effect over time. This case-control study seeks to explore whether, following an initial LiGHT Trial dose of SLT, low-dose annual maintenance SLT (mSLT) could provide a benefit over this initial single dose SLT (sSLT).

Methods

This study is designed as a retrospective chart review from a single, large clinical practice setting population, evaluating single eyes of all primary or secondary open-angle glaucoma subjects that underwent selective laser trabeculoplasty (SLT) from 2020 to 2024 (n = 246). The study excluded neovascular glaucoma, active uveitis, subjects that underwent glaucoma surgery during that period or subjects that had follow up less than 3 months post SLT. Both groups received an initial treatment of 100 applications, spread 360 degrees, of 0.8 mJ energy, with the sSLT receiving no further treatments and the mSLT group receiving annual treatments of 50 applications, spread 360 degrees, of 0.5 mJ.

Results

A significant reduction in 12 month IOP was observed after initial treatment in both the sSLT group (n = 121) (from 18.5 ± 4.6 to 14.9 ± 2.6 mm Hg, p = 0.02) and mSLT group (n = 125) (from 18.0 ± 4.0 to 15.4 ± 2.6 mm Hg, p < 0.0001), with the sSLT group achieving greater IOP lowering (p = 0.001). In the mSLT group, the effect of the first repeat treatment at month 12 from initial treatment, resulted in a further reduction of IOP after an additional 12 months (15.4 ± 2.6 to 14.9 ± 2.4 mm Hg, p < 0.0001). Final IOP was equal in both groups (p = 0.2) at final follow up (sSLT 12 to 28 months, mean = 16.7 months versus mSLT 12 to 38 months, mean = 25.0 months). Following the first repeat treatment, the IOP in the mSLT group was maintained at all subsequent time points, regardless of the number of repeat annual applications of low-dose SLT (mean = 2.4 total treatments) (p = 0.2). The mSLT group achieved a greater amount of medication reduction at final follow up than the sSLT group (1.5 to 0.7 medications versus 1.5 to 1.4 medications, respectively P = 0.005).

Conclusions

Annual, low-dose maintenance SLT may contribute to a further, sustained lowering of IOP after a single initial treatment, potentially providing an additional IOP reduction over the baseline treatment. Furthermore, mSLT may benefit in a greater reduction in medications compared to sSLT. While mSLT may provide for a benefit on angle outflow at a more rapid rate than the rate of progressive trabecular meshwork obstruction, a longer-term, prospective study is required to further evaluate the optimal interval for repeated SLT.

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P-0346

SAFETY, EFFICACY AND PATIENT ACCEPTANCE OF DIRECT SLT (DSLT) IN POAG: REAL WORLD OUTCOMES FROM MOORFIELDS EYE HOSPITAL

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Background
Real-world data on the clinical outcomes of the DSLT (Belkin Eagle) laser in treating open-angle glaucoma remains limited. This study evaluates the 2-month efficacy, safety, and patient satisfaction associated with the DSLT laser in a clinical setting.

Methods
This study was a prospective evaluation of 101 eyes from 61 patients with open-angle glaucoma treated using the DSLT laser in a single clinic. Each treatment consisted of 120 applications of a Nd: YAG laser of wavelength 532 nm. Post-treatment assessments included intraocular pressure (IOP), patient satisfaction (pain, discomfort, and willingness to recommend the procedure), medication usage, and adverse events at the 2-month follow-up.

Results
IOP data was available for 101 eyes with a mean baseline medicated IOP of 24.4 (SD 5.3) mmHg on 0.96 (SD 0.97) medications. The total treatment duration averaged 14.95 minutes for unilateral procedures and 17.33 minutes for bilateral procedures. Each DSLT treatment was completed in an average time of 2.38 minutes. Patients reported a mean score of 3.54 out of 10 for “Pain” during treatment and 3.28 out of 10 for “Discomfort” during the procedure. Patients would recommend the procedure to friends or family an average of 9.21 out of 10 times. Patient were followed for an average of 66 days post treatment. The mean IOP following treatment was 20.6 (SD 4.6) mmHg on 0 meds, resulting in a mean IOP reduction of 16.6% (SD 22.5) from baseline. IOP spikes occurred in 8% of (8/101) patients (5 mild, 2 moderate and 1 severe) which resolved with medications. Subconjunctival hemorrhage occurred infrequently in 5% (5/101) of patients.

Conclusions
These findings demonstrate that DSLT treatment was well tolerated and effectively reduced IOP at 2 months post-treatment. The procedure was highly efficient, associated with minimal pain and discomfort, and received strong recommendations on the ‘friends and family’ score from patients who underwent the treatment.

P-0347
DIURNAL FLUCTUATION BEFORE AND AFTER SLT: 12-MONTH OUTCOMES

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Background
Selective laser trabeculoplasty (SLT) is a surgical method of intraocular pressure (IOP) reduction in which a laser applied to the trabecular meshwork improves aqueous outflow and lowers IOP. The Laser in Glaucoma and Ocular Hypertension (LiGHT) trial shows that SLT is associated with lower rates of visual field (VF) progression compared with IOP-lowering medications.[1] Few studies have examined how SLT impacts IOP fluctuation, an independent risk factor for VF progression.[2,3] In this study, we compare parameters of diurnal as well as longer term IOP fluctuation, as measured by patients remotely with the iCare HOME2 tonometer, before and after SLT.

Methods
Inclusion criteria were patients with open angle glaucoma or ocular hypertension between the ages of 18 and 90 scheduled for 360° total SLT treatment and were able to reliably use the iCare HOME2. Patients took 7 days of consecutive measurements at the following times: pre-SLT followed by 6 weeks, 3 months, 6 months, and 12 months post-SLT, targeting daily times of 6am, 9am, 12pm, 3pm, 6pm, and 9pm. IOP fluctuation was compared between baseline and post-SLT. Eyes underwent 360° treatment or two 180° treatments with 4 days of postop QID NSAID drops.

Results
Sixty-four eyes of 40 patients were included with a mean age of 63.28 (+/-13.16) years, 49.2% female. Eyes were on an average of 1.28 IOP-lowering medications, 25% had prior cataract surgery, and 26.6% had prior SLT. Data was collected for 59 eyes at 6 weeks, 56 eyes at 3 months, 57 eyes at 6 months, and 26 eyes at 12 months. Reductions in IOP from baseline were seen with respect to mean IOP (-2.5, -2.1, -2.3, -2.5 mmHg), maximum IOP (-3.8, -3.5, -3.7, -4.3 mmHg), and IOP range (-2.7, -2.3, -2.5, -3.1 mmHg) at 6 weeks, 3 months, 6 months, and 12 months postop, respectively, which were significant at the 95% confidence level. Reductions in SD were not statistically significant. Among pre-SLT maximum IOP values, 37.3% occurred during in the early morning (5-8am), 50.7% during clinic hours (8am-5pm), 7.5% in the evening (5pm-10pm), and 4.5% overnight (10pm-5am).

Conclusions
SLT provides long-term reduction in diurnal IOP fluctuation as well as decreased max IOP as measured with an iCare HOME2 tonometer. The lowering effect is sustained through 12-months post procedure. We will continue to collect 12- & 18-month data.

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P-0348

EFFECTS OF LASER PARAMETERS ON THE EFFICACY AND SAFETY OF MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION IN CHINESE POPULATION

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Background
Given the limited sample size and varying laser parameters, the efficacy and safety of micropulse transscleral cyclophotocoagulation (MP-TSCPC) could be subject to variation. Additionally, racial differences may influence treatment outcomes. In relevant studies, white race accounts for the vast majority, while there are relatively few reports on the Asian population, and further research is needed on laser parameters suitable for Asians. Therefore, in this study, we evaluated the efficay and safety of MP-TSCPC in Chinese population with different laser duration.

Methods
Patients who initially underwent MP-TSCPC treatment from August 2022 to April 2024, with parameters set at 2000 mW for durations of 160 s, 200 s and 240 s, were included in the study. Postoperative follow-up assessments were scheduled at 1 day, 1 week, 2 weeks, 1 month, 3 months and 6 months. Treatment success was defined as a final intraocular pressure (IOP) between 6 and 21 mm Hg or a reduction of at least 20% from baseline, without an increase anti-glaucoma medication.

Results
A total of 175 eyes of 175 patients were included, with 60 eyes in the 160 s group, 35 eyes in the 200 s and 80 eyes in the 240 s. The average baseline IOP was 33.1 ± 9.3, 35.7 ± 10.1, and 38.0 ± 9.1 mmHg for the respective groups. A nadir in IOP was observed 1 week post-surgery, after which there was a rebound. Overall, the IOP in the 160 s group was notably higher than the other two groups. However,there was no significant difference in the mean IOP between the 200 s and 240 s group at any follow-up point (P>0.05). At six months post-surgery, the average IOP for the three groups were 21.8 (95% CI, 18.9 to 24.6), 19.0 (95% CI, 15.5 to 22.4), and 20.8 (95% CI, 18.5 to 23.2) mmHg, respectively. At baseline, the average number of glaucoma medications was 3.3 ± 0.8, 3.4 ± 0.8, and 3.3 ± 0.8 for the respective groups. By the sixth postoperative month, the three groups of drugs significantly decreased to 2.1 ± 1.5, 2.4 ± 1.3, and 1.6 ± 1.4 (P < 0.05). The success rate decreased progressively over time and was 57.9%, 69.7%, and 70.5% at 6 months. Early postoperative complications accounted for 8.3% (5 eyes), 11.4% (4 eyes), and 16.3% (13 eyes) in the three groups, respectively. Interestingly, the baseline IOP, sex and prior anti-glaucoma surgery significantly contributed to postoperative IOP in a generalized liner mixed model. Sensitivity Analysis with propensity score (PS)-matched based on age, baseline IOP and preoperative visual acuity had no significant impact on the results.

Conclusions
MP-TSCPC can safely and effectively reduce IOP in glaucoma patients with primary or refractory glaucoma. A power of 2000mW for duration of 200 seconds as the initial laser parameters is recommended for MP-TSCPC. Longer laser duration is suggested for patients with high baseline IOP, male, and no history of anti-glaucoma surgery.

P-0349

LASER EXCIMER TRABECULOSTOMIES (ELIOS) COMBINED WITH CATARACT SURGERY : 12 MONTHS DATA OF THE EXPERIENCE IN FRANCE

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Background
Minimally invasive glaucoma surgeries (MIGS) are widely favored for treating mild-to-moderate glaucoma due to their compatibility with cataract surgery, which allows for lowering intraocular pressure (IOP) and reducing medication use, all while maintaining a favorable safety profile. Excimer Laser IntraOcular Surgery (ELIOS), a MIGS procedure, employs a 308-nm excimer laser to create trabeculostomies (microchannels), reducing outflow resistance and thereby lowering IOP. The photoablative tissue interaction is non-thermal, resulting in minimal damage to surrounding tissue, reduced inflammation, and limited scar tissue formation.

Methods
Prospective, single-center study of patients undergoing combined Phaco-ELIOS surgical procedure since January 2023. To this day patients continue to be included. The main main outcome measured is the reduction in postoperative intraocular pressure (IOP) and number of postoperative hypotensive medications. Clinical data was collected on day 1, month 1 and every 3 months thereafter in the postoperative period. Intra- and postoperative events were also recorded.

Results
75 eyes of 59 patients (36% Female) were included for the analysis, with a mean age of 69.8 ± 9.5 years. The preoperative IOP was 17.9 ± 5. 3 mmHg with a mean number of 1.8 preoperative hypotensive medications. Postoperatively, IOP was initially increased to 20.9 ± 8.2 mmHg (p=0.04) at D7, and then decreased to 15.5 ± 4.5 at M1 (p=0.04), 14.2 ± 2.4 at M3 (p<0.01) and 15.0±2.0 at M6 (p=0.01). The number of hypotensive medications decreased at M6 to a mean of 1.16 (p<0.01), 9 out of 59 (15.3 %) patients were completely off medication. Complications included early postoperative hypertension in 18 out of 75 eyes (24.0%), intraoperative hyphema in 6 eyes (8.0 %). No serious intra- or postoperative events were reported during this study.

Results might be slightly updated prior to the presentation as future followup data is collected.

Conclusions
Minimally invasive glaucoma techniques are increasingly being adopted, addressing the need for reliable and consistent treatment options for glaucoma while avoiding the significant and sometimes severe complications associated with more invasive procedures like filtering surgeries or valve implants. The combined Phaco-ELIOS procedure demonstrated a notable reduction in intraocular pressure (IOP) and the number of hypotensive medications at 6 months of follow-up.

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P-0350

EFFICACY AND SAFETY OF CONTINUOUS AND MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION IN THE TREATMENT OF REFRACTORY GLAUCOMA: A RCT

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Background

Refractory glaucoma is a challenging subtype of glaucoma in which both medical or surgical interventions fail to control intraocular pressure (IOP)[1]. Transscleral cyclophotocoagulation (CPC) is an effective treatment option and it can be done in a contiuous wave (CW-CPC) or micropulse wave (MP-CPC).[1,2]

Previous studies have shown that both techniques achieve similar IOP reduction, but MP-CPC is associated with fewer complications [3,4,5] . Therefore, this study aims to compare the efficacy and safety of transscleral CW-CPC and MP-CPC diode laser for the treatment of refractory glaucoma.

Methods

Randomized clinical trial. Fifty patients diagnosed with refractory glaucoma and indicated for CPC by the attending physician will be randomly selected to receive either transscleral CW-CPC (control group – 25 eyes of 25 patients) or MP-CPC (study group – 25 eyes of 25 patients). Patients will be followed for a total of 12 months through scheduled visits. The primary outcome is intraocular pressure, and secondary outcomes include the best corrected visual acuity, number of medications, success rate and complications. Success will be defined in two different criteria: criterion A (less strict), IOP between 5 and 21 and at least 20% IOP reduction from baseline; and criterion B (stricter), IOP between 5 and 18 and at least 30% IOP reduction from baseline. The necessity of a new surgery to control IOP will be defined as failure and data will be censored for statistical analysis.

Results

This is an ongoing study; we report preliminary results from 20 patients (11 in the CW-CPC group and 9 in the MP-CPC group) who have at least 6 months from the laser procedure. Table 1 presents the IOP values at baseline and at various time points following surgery. The mean IOP reduction at 6 months was 65% ($p<0,05$) in the CW-CPC group and 56,4% ($p<0,05$) in the MP-CPC group. The number of glaucoma medications decreased by 54% in the CW-CPC group and 12.8% in the MP-CPC group, starting from baseline means of 3.3 and 3.4 medications, respectively. Treatment success rates were higher in the CW-CPC group, with 66.6% (criterion A) and 55.5% (criterion B), compared to 25% (criterion A) and 12.5% (criterion B) in the MP-CPC group. Complications occurred in 6 patients in the CW-CPC group and in 2 patients in the MP-CPC group, most of which were transient, except for persistent hypotony in one CW-CPC patient and loss of light perception in one MP-CPC patient.

Image

Table 1. IOP at different timepoints.

	Group	N	Mean (mmHg)	SD	P value
Baseline IOP	CW-CPC	11	34.9	10.74	0.833*
	MP-CPC	9	36.0	12.03	
1 Day	CW-CPC	11	16.8	13.93	0.102¶
	MP-CPC	9	22.1	8.05	
7 Day	CW-CPC	11	14.5	13.31	0.321¶
	MP-CPC	8	16.6	9.26	
1 Month	CW-CPC	11	16.0	10.43	0.123*
	MP-CPC	9	26.1	17.29	
3 Month	CW-CPC	6	13.7	3.50	0.553*
	MP-CPC	4	16.3	9.54	
6 Month	CW-CPC	6	12.2	1.83	0.093*
	MP-CPC	3	15.7	3.79	

P value: *t-student ¶Mann-Whitney

Conclusions

Although MP-CPC shows promise due to its potentially safer profile, preliminary results from this study indicate that CW-CPC might have superior effectiveness in lowering IOP and glaucoma medications compared to MP-CPC. These findings must be interpreted with caution as the number of patients is small.

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P-0351

SELECTIVE LASER TRABECULOPLASTY AS ADJUNCTIVE TREATMENT FOR GLAUCOMA IN OAG NIGERIAN EYES

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Background
Aim: To determine the intraocular pressure lowering effect of Selective Laser Trabeculoplasty (SLT) as adjunctive treatment in Nigerian patients with open angle glaucoma

Methods
This is a retrospective chart review of 53 eyes of 37 open angle glaucoma (OAG) patients who had SLT as adjunctive treatment after uncontrolled intraocular pressures with topical medications (50) or incisional surgery (3). Assessment of intraocular pressure (IOP) changes and number of glaucoma medications used were done at 1 month, 3 months, 6 months, and 12 months after SLT. Success outcome was IOP reduction of 3mmHg or more without glaucoma incisional surgery or a ≥20% reduction in IOP from the baseline IOP. Data analysis was done using SPSS version 26. P value < 0.05 was considered statistically significant.

Results
The mean age was 65.9 ± 15.5years. The mean IOP prior to SLT treatment was 19.2 ± 7.1mmHg in medications alone group and 14.3 ± 1.5 mmHg in trabeculectomy with medication group. Among patients on medication alone, mean IOP and mean percentage IOP drop was significantly reduced to 14.7±4.8(21.4%), 15.1±5.0(21.2%), 14.4±3.5(21.0%) and 14.7±5.6(18.5%) at 1mth, 3mths, 6months and 12months post SLT respectively ($p<0.05$). Only three eyes had trabeculectomy and medication prior to SLT treatment. There was found no statistically significant reduction in intraocular pressures among this group ($p>0.05$). No significant change in the number of topical medications was observed in both groups. Based on criterion 1 and 2, cumulative survival rate observed was 74.0%, 64.0, 49.5% and 43.9% at 1,3,6, and 12, months respectively.

Conclusions
SLT is effective in lowering IOP as an adjunctive treatment in OAG patients with uncontrolled IOP with topical medications without reduction in the number of medications. There was no effect on the IOP of those who had trabeculectomy and were on medications. However, further studies with higher sample size will be required to properly assess efficacy of SLT as adjunctive treatment after glaucoma incisional surgery.

P-0352

REAL WORLD OUTCOMES OF SELECTIVE LASER TRABECULOPLASTY AS PRIMARY TREATMENT IN ENUGU NIGERIA

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Background
This study sought to assess the efficacy of selective Laser Trabeculoplasty (SLT) as primary treatment in reducing intraocular pressure in open-angle glaucoma patients in Enugu Nigeria

Methods
This was a retrospective chart review of patients who had SLT as primary treatment between 2019 and 2021 at The Eye Specialists Hospital (TESH) Enugu Nigeria. Case notes of consecutive patients who met the inclusion criteria of a minimum follow up period of three months were reviewed. SLT success was defined as IOP reduction of 3mmHg or more without additional intervention or reduction of 20% or more from the pretreatment IOP. Data analysis was done was done using SPSS version 26. P value < 0.05 was considered statistically significant.

Results
Case notes of one hundred and sixteen eyes of 64 patients were reviewed. The mean baseline IOP was 17.0 ±5.0mmHg. Mean post treatment IOP and mean percentage IOP drop at 3,6,12.24 and 36months were 13.5±4.5mmHg(23.1%), 12.5±3.4mmHg(26.3%), 12.2±3.2mmHg(28.2%), 12.8±3.0mmHg(25.0%) and 15.3±6.4mmHg(20.3%) respectively. Intraocular pressures were significantly lower than pretreatment IOP at all intervals $p<0.05$. Sub-group analysis showed greater IOP reduction in eyes with higher pretreatment IOP up till 24months. Number of antiglaucoma medications increased from 0 at baseline to 0.74±1.13 at 12months and 1.25±1.34 at 36months ($p<0.001$). Based on criterion 1 and 2, cumulative survival rate was 82.8%,75.9%,64.2%,53.5% and 43.8% at 3,6,12,24 and 36 months respectively.

Conclusions
SLT is effective as primary treatment open angle glaucoma in reducing intraocular pressure in this population.

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P-0353

NEUROTROPHIC KERATOPATHY AFTER TRANSCLERAL CYCLOPHOTOCOAGULATION - A RETROSPECTIVE COHORT STUDY ASSESSING ITS INCIDENCE AND RISK FACTORS

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Background
Neurotrophic keratopathy (NK) is a serious vision-threatening complication following transscleral cyclophotocoagulation (TSCPC). This complication is often under-reported, and its true incidence remains unclear. This retrospective study represents the largest cohort to date investigating the incidence of NK prsenting as corneal epithelial defects (ED) and the associated risk factors in patients who underwent transscleral micropulse cyclophotocoagulation (MPCPC) and slow coagulation G-probe (G-probe).

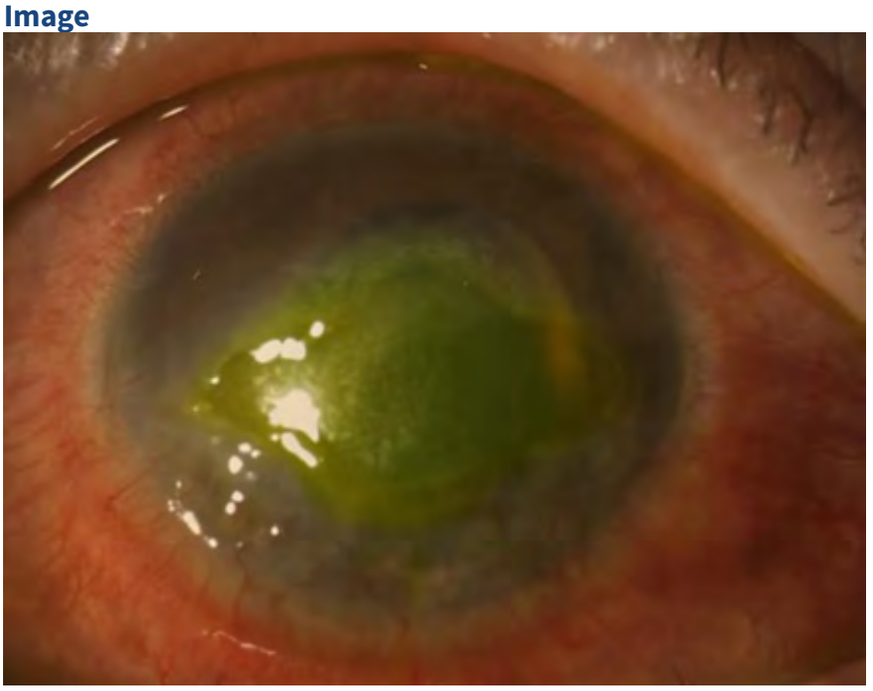
Methods
This retrospective cohort study examined consecutive patients aged 18 or older who received MPCPC and G-probe at a single tertiary eye center (Hong Kong Eye Hospital) from January 2023 to July 2024.

Results
A total of 368 eyes from 255 patients were included in the study. Of these, 310 eyes (84.2%) underwent MPCPC, while 58 eyes (15.8%) received G-probe. The most common diagnoses were primary open-angle glaucoma (POAG) at 26.4%, neovascular glaucoma (NVG) at 22.3%, and uveitic glaucoma at 12%. The mean pre-operative and post-operative (1 month) intraocular pressures were 27.43 mmHg and 17.51 mmHg. The overall incidence of epithelial defects (ED) was 10.1% (n=37), with no significant difference between MPCPC and G-probe (9.7% vs. 12.1%, p=0.58). Among disease categories, NVG had the highest incidence of ED at 19.5%, significantly higher than other diagnoses (p=0.007).

Persistent epithelial defects (≥ 2 weeks) occurred in 23 cases (62.2% of ED cases), with a mean healing time of 27.4 days. All affected eyes received topical antibiotics; 54.1% used bandage contact lenses, and 32.4% received antiviral treatment (acyclovir or ganciclovir). Two cases required amniotic membrane transplantation. Complications included a case of infectious keratitis, a case of endophthalmitis, and two cases of residual dense corneal scars.

Univariate logistic regression identified male gender (p=0.015), diabetes mellitus (DM) (p=0.014), history of ED (p<0.001), neovascular glaucoma (p=0.004), and higher pre-operative IOP (p=0.015) as predictors of ED occurrence in the MPCPC group, while history of ED (p=0.036) was significant in the G-probe group. Multivariate analysis confirmed history of ED (p<0.001) and neovascular glaucoma (p=0.045) as significant predictors in the MPCPC group, further validated using generalized estimating equations to account for inter-eye correlation and repeat treatments (history of ED (p<0.001), neovascular glaucoma (p=0.005)).

Image



Conclusions

Neurotrophic keratopathy (NK), manifesting as a corneal epithelial defect, is not an uncommon complication after TSCPC, with an incidence of 10%. Identified risk factors include male gender, neovascular glaucoma (NVG), diabetes mellitus (DM), history of epithelial defects (ED), and higher pre-operative IOP. These ED often take a considerable time to heal (over 2-3 weeks) and are frequently mismanaged as herpetic keratitis. This can lead to blinding complications including infectious keratitis, endophthalmitis and corneal scarring.

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P-0354

EFFECTS OF SELECTIVE LASER TRABECULOPLASTY ON 24-HOUR INTRAOCULAR PRESSURE IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA

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Background

Large long-term intraocular pressure (IOP) fluctuation is associated with visual field progression in patients with low mean IOP, as reported in the Advanced Glaucoma Intervention Study.[1] Additionally, it was reported that a worse visual field is associated with higher peaks and greater fluctuations in 24-hour IOP in normal-tension glaucoma.[2] Selective laser trabeculoplasty (SLT) has been an essential part of glaucoma management due to its cost-effectiveness and minimal side effects. However, there have been limited reports on its effects on 24-hour IOP patterns. The purpose of this study was to evaluate the effects of SLT on 24-hour IOP in patients with well-controlled but progressing primary open-angle glaucoma (POAG).

Methods

This retrospective study included all well-controlled (clinic IOP before SLT 14 mmHg) but progressing POAG patients treated with glaucoma eye drops that measured 24-hour IOP both before and after SLT. IOP was recorded in the sitting position using iCare HOME® at home at several intervals for over 10 days. The recorded IOP was classified into 8 periods of time. The average, maximum, minimum, and fluctuation (maximum-minimum) of 24-hour IOP were compared before and after SLT.

Results

Sixteen eyes of 13 patients were enrolled. The mean 24-hour IOP before and after SLT was 12 ± 3.0 (mean±SD) and 11.0 ± 2.9 mmHg, respectively (p=0.075). Significant IOP reductions were observed during 3 to 6 AM (p=0.012) and 12 to 3 PM (p=0.038) after SLT. The maximum 24-hour IOP was significantly reduced (p=0.035), while the minimum IOP was not significantly changed after SLT (p=0.092). Although IOP fluctuations decreased after SLT, they were not significantly different (p=0.075).

Conclusions

SLT significantly reduced the maximum 24-hour IOP and IOP during the 3 to 6 AM and 12 to 3 PM periods in patients with low mean IOP but progressing POAG. SLT may improve 24-hour IOP control in patients with POAG controlled with low IOP.

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P-0355

EVALUATION OF PEAK IOP REDUCTION AND SAFETY OF SUBLIMINAL SUBTHRESHOLD LASER: A PILOT STUDY

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Background
Our purpose was to evaluate the efficacy and safety of the subliminal subthreshold laser (SubCyclo) in reducing peak intraocular pressure (IOP) in patients with refractory glaucoma, based on the Water-Drinking Test (WDT).

Methods
This prospective, interventional pilot study included 40 participants with a mean age of 63.8 ± 16.0 years. All patients underwent SubCyclo laser treatment and were followed up for a mean period of 155.25 ± 93.14 days. Baseline measurements included mean IOP (22.22 ± 8.19 mmHg) and mean peak IOP (26.25 ± 11.67 mmHg) during the WDT. Post-treatment IOP peaks were recorded at 1, 3, and 6 months, and the primary outcome was the proportion of eyes achieving success. Treatment success was defined as a reduction in peak IOP greater than 20% from baseline or an IOP of less than 21 mmHg.

Results
At 1 month, the mean peak IOP was 25.79 ± 9.91 mmHg (P = 0.76); at 3 months, 25.50 ± 10.52 mmHg (P = 0.76); and at 6 months, 24.76 ± 10.13 mmHg (P = 0.10). None of these values met the predefined success criteria. Baseline use of hypotensive eye drops was 85% (34 patients) on 4 classes of medications, and 42.5% (17 patients) were on oral acetazolamide. Post-treatment, the proportion decreased to 82.5% (33 patients) and 32.5% (13 patients), respectively. No cases of hypotony, severe inflammation, or other significant complications were observed.

Conclusions
The subliminal subthreshold laser (SubCyclo) did not achieve significant reductions in peak IOP according to the predefined success criteria. However, it was associated with a slight decrease in the need for IOP-lowering medications and demonstrated a favorable safety profile, with no major complications reported. Further studies with a larger cohort and longer follow-up are necessary to better define the clinical role of this treatment in refractory glaucoma.

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P-0356
AQUEOUS HUMOR OUTFLOW IMPROVEMENT AFTER EXCIMER LASER TRABECULOSTOMY

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Background
The purpose of the present study was to investigate the changes in aqueous humor outflow (AHO) after the Elios glaucoma procedure using sequential aqueous humor outflow angiography

Methods
Sequential AHO angiography using 2 different tracers was performed in 10 patients undergoing routine cataract surgery including the Elios glaucoma procedure. After cataract surgery, baseline AHO angiography pattern were acquired using a digital angiography camera (Spectralis Flex, Heidelberg Engineering) and indocyanine green as tracer. The Elios procedure was performed according to the manufacturer's recommendations. Subsequently, a second AHO angiography using fluoresceine was used to assess potential changes in the outflow patterns. Images were acquired at predefined time points (15, 30, 45, 60 and 90 seconds after dye injection). AHO signal intensity was analyzed in the images taken after 60 seconds using a region of interest with 300 pixel diameter center at the cornea. These data were categorized in 5 degree bins for further analysis.

Results
In all 10 eyes, AHO angiography images were acquired successfully. A positive AHO signal could be detected in 3.4 +/- 1.5 bins before and 5.8 +/- 2.4 bins after the surgical intervention ($p = 0.015$, two-sided paired t-test). The AHO improvement was located in the nasal quadrant at the location of the laser treatment or at adjacent analysis bins, but no strict 1:1 relationship was observed between laser application spots and AHO improvement.

Conclusions
The Elios procedure increased AHO outflow in all eyes investigated. Further studies are needed to correlate the AHO improvements seen to the clinical efficacy of the procedure.

P-0357

15 YEARS OF EXPERIENCE WITH PHACOEMULSIFICATION WITH ENDOCYCLOPHOTOCOAGULATION (PHACO-ECP)

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Background

A retrospective evaluation of the results of patients who underwent phaco-ECP in both primary and secondary open-angle glaucoma.

Methods

A retrospective review was performed on patients with ocular hypertension, primary and secondary open angle glaucomas at the Leeds University Teaching Hospitals, UK. Outcomes included pre-op and post-operative IOP, VA, glaucoma drop moieties and surgical complications. Data collected from December 2008 to October 2023 was included in this study and also analysed for demographic factors. Data was extracted using the Medisight audit function tool. We compared our complication rate and data with other single-centre studies.

Results

A total of 613 eyes of 500 patients were included, of which 51% were female. The mean age was 74.1 years. 49% of patients had POAG, 7% had ocular hypertension and the rest were secondary glaucomas or did not have a listed diagnosis. The mean preoperative IOP was 20.7 +/- 5.5, the mean post-op follow up time was 51 days and the mean postoperative IOP was 15 +/- 4.7. This produced a mean IOP decrease of 28% ($p<0.0001$). The mean follow-up time for VA was 54 days and there was a mean postoperative improvement of VA of 27% ($p<0.0001$). Glaucoma drop moieties were reduced by 11.7% post-operatively ($p<0.0001$). Complication rates were 22.3%; the most common complication was postoperative uveitis, affecting 19% of patients compared to 11% (1).

Conclusions

Phaco-ECP appears to lower IOP and in our patient cohort there was a small reduction in the medication burden. The complication rate appears higher than previously reported cases in the literature. Some of the limitations of our study include the Medisight data collection tool being unable to extract data at set time intervals as well as being unable to obtain data regarding previous glaucoma surgical procedures. However the system has evolved over years with various upgrades which could have contributed towards the missing data.

Phaco ECP effectively reduces the IOP and has the advantage of being done as a combined procedure. In our cohort of patients it produced a modest reduction in the medication burden and patients need to be made aware of the one in five risk of developing post-operative uveitis.

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P-0358

SELECTIVA LASER TRABECULOPLASTY: AN ALTERNATIVE IN REFRACTORY GLAUCOMA

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Background

Trabeculectomy is the gold-standard procedure for treating primarily advanced glaucoma which are not controlled with hypotensive drops. With it also comes an important amount of adverse effects where its include bleb failure, which need an additional procedure or add glaucoma drops to lower the eye pressure. In this cases is where we believe that selective laser trabeculoplasty (SLT) shows an alternative as been safe, effective and ambulatory in managing this cases without add another surgical intervention or adding drops to the treatment.

Methods

Patients where selected from Dr. Elías Santana Hospital in Santo Domingo, Dominican Republic. Which already had a phaco-trabeculectomy surgery that were diagnosed with refractory glaucoma due to bleb failure. 58 eyes were evaluated which were randomized in sealenveloped.com and divided in two groups. Group A treated with SLT and Group B with glaucoma drops containing 3 components. Each group had the same follow up, the day after, 1st month, 3rd month and 6th month after the procedure or initiating drops. During the last visit the patient is summited to a survey, using the Glaucoma Symptoms Scale (GSS), to evaluate quality of life. The intervention was classified as successful if lowered 20% of the eye pressure from baseline.

Results

Baseline pressure were 21.7 mmHg (Group A) and 22.3 mmHg (Group B). For group A an 88.6% average of efficacy of the procedure and a 31% drop rate from the baseline pressure versus 52.1% of efficacy and 21% drop rate from baseline pressure for Group B. Also group A demonstrated greater stability in eye pressure during the visits than group B. For the survey summited (GSS), SLT treated patients showed lower percentage of symptoms than the ones treated with conventional glaucoma drops.

Conclusions

Treatment with SLT in patients diagnosed with refractory glaucoma shows to be an effective alternative in lowering the pressure in this patients and also improving their quality of life.

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P-0359

GREEN SELECTIVE LASER TRABECULOPLASTY (SLT) IN ROUTINE OFFICE/ HOSPITAL USE- AN INTERIM ANALYSIS

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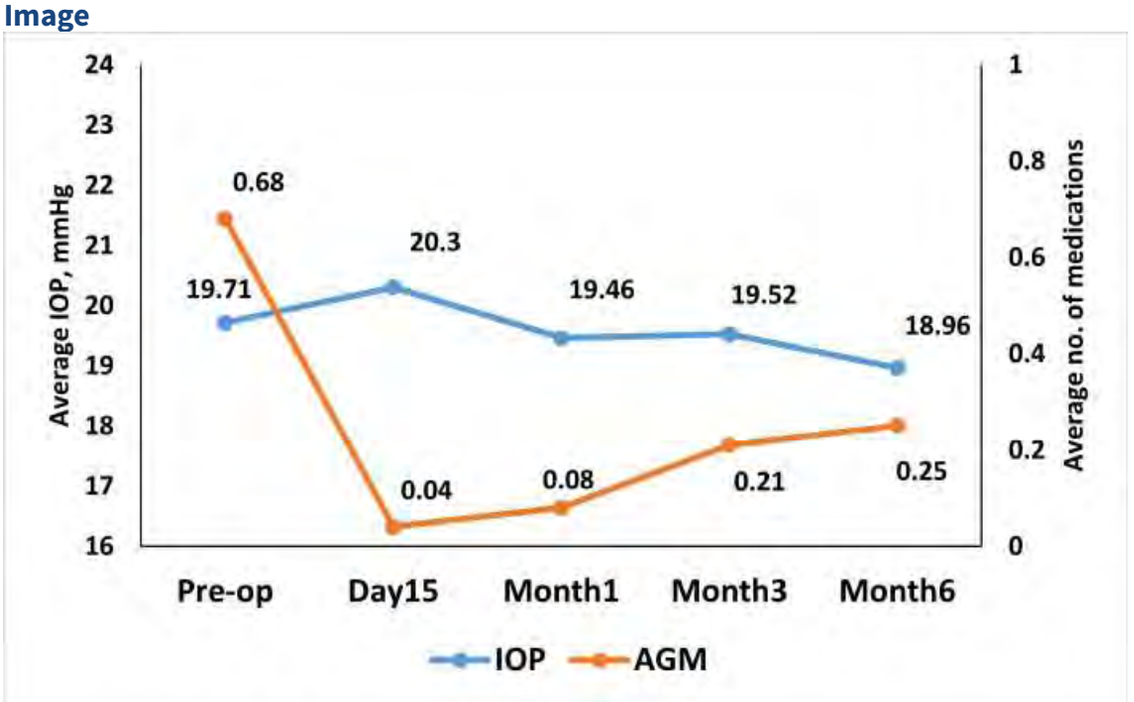
Background
To assess the efficacy of Visulas Green Selective Laser Trabeculoplasty in Open angle and Ocular hypertension at 6 months.

Methods
In this prospective study patients presenting to the glaucoma clinic at a tertiary care facility underwent green selective laser trabeculoplasty after complete ocular examination. They were followed up at day 15 and 30 and at month 3 and 6 and 12. The change in intraocular pressure and need for antiglaucoma medication was analysed.

Results
Sixty eight eyes of 49 subjects were included in the study. The mean age was 55.51 years. The baseline mean Intraocular pressure was 22.63 mmHg and at 6 months it was 18.96 mmHg (a reduction of 15.2%). The preoperative number of medications was 0.68 and it reduced to 0.25 at 6 months. There was no change in the mean deviation and visual field index in standard automated perimetry at 6 months.

Image


Conclusions
This short interim analysis shows the benefits of Green SLT laser in reducing the intraocular pressure and the need for glaucoma medication.

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P-0360

AI-ENHANCED DIGITAL ENDOSCOPIC AND OCT GUIDANCE SYSTEMS FOR TM-BASED MIGS

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Background

ELT, a validated safe and effective laser-based MIGS procedure, iStent and Hydrus all currently require a surgical gonio-lens and rely on the experience, judgement, and skills of the surgeon. We describe 2D Endoscopic and 3D OCT based gonio-lens free guidance systems for laser based and stent based MIGS procedures which enable all cataract surgeons to perform MIGS in patients with primary open angle glaucoma and cataracts.

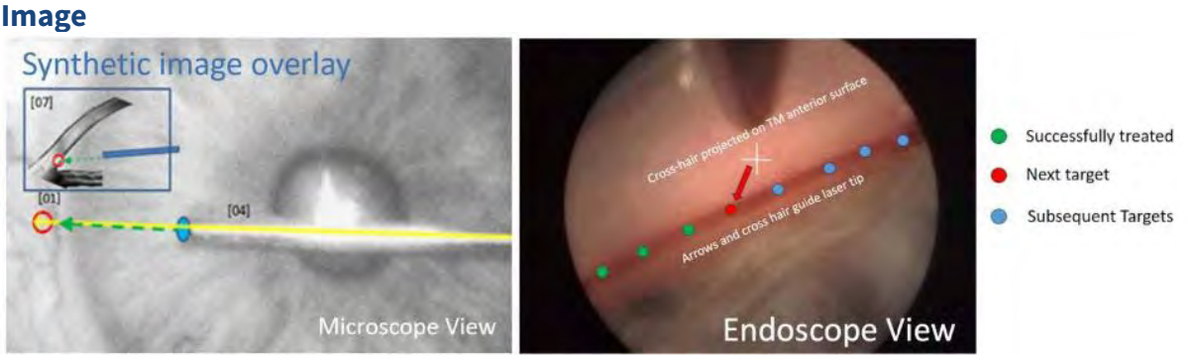
Methods

In Guided ELT, a real-time AI-enhanced image appears in proper relationship to the target and laser probe to guide the surgeon to direct the probe toward the trabecular meshwork overlaying Schlemm's canal without a gonio-lens. In 2D guided ELT a microscope image is combined with real-time, augmented reality, artificial intelligence rendered endoscopic images. In 3D Guided ELT a microscope image is combined with microscope based and fiber-optic based OCT images. Both 2D and 3D iterations render picture in picture views of the surgical field, displaying the laser fiber or stent in relation to the target tissue, simulating a gonio-lens view with no gonio-lens.

Results

2D Guided ELT avoids the need for a gonio-lens with real-time direct endoscopic visualization. 3D guided ELT, using OCT images, enhances guidance precision and enables consistency for every operation. OCT also enables improved targeting of Schlemm's canal and collector channels ensuring accurate placement of both ELT laser channels and stents.

Image



Conclusions

Guidance systems which eliminate the need for surgical gonio-lens skills will enable significantly more surgeons to perform ELT and stent based MIGS.

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P-0361

DIRECT SELECTIVE LASER TRABECULOPLASTY: AN EFFECTIVE IOP-LOWERING THERAPY FOR PRIMARY ANGLE CLOSURE DISEASE

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Background

Trans-limbal direct selective laser trabeculoplasty (DSLT) (Alcon, Fort Worth, Texas, USA) is a new laser delivery method that targets the trabecular meshwork outflow pathway through the peri-limbal sclera. This overcomes some limitations of SLT such as need for a gonioscopy lens and ability to overcomes anatomical obstacles such as narrow angles. We aimed to measure the 6-month efficacy of automated DSLT in reducing intraocular pressure (IOP) in eyes with primary angle closure (PAC) or primary angle closure glaucoma (PACG).

Methods

Patients with a baseline diagnosis of PAC and PACG and who had received prior laser iridotomy were recruited in this prospective single-arm pilot trial. Post washout they had to achieve an IOP ≥ 22mmHg but ≤ 35mmHg. 1 eye per subject received DSLT: 120 shots over 2 seconds, at 2.2mJ, delivered over 360 degrees. Patients were followed up at week 1 and month 2, 4 and 6. All patients were prescribed Nepafenac eye drops, 4 times a day, for a week after DSLT.

Results

We studied 21 eyes from 21 patients, with a mean age of 63.7± 9.3 years. 9 eyes had a diagnosis of PAC and 12 had PACG. 19 eyes were on 1 or 2 glaucoma eye drops prior to DSLT treatment, and the mean IOP at baseline was 24.0 ± 2.7mmHg; 2 eyes were treatment naïve. 4 eyes had prior cataract surgery.

2 months after treatment, the mean IOP was 18.1 ± 3.4mmHg (-24.6%; $p<0.001$). At Month 4, the mean IOP was 17.1 ± 3.3mmHg (-28.8%; $p<0.001$) and at Month 6, the mean IOP was 15.3 ± 2.5mmHg (-36.3%, $p<0.001$).

6 months after treatment, 16 patients (76%) achieved complete success, defined by no medications, with an average IOP lowering of 8.3mmHg from baseline. 8 patients (38%) required a re-treatment with DSLT by month 4, of which 4 had a good response and did not require any further treatment or medications; the remaining 4 were re-started on 1 eye drop. No serious adverse events were observed over the 6-month period.

A sub-analysis of 16 patients who were not any medications found that DSLT alone had a good IOP-lowering effect, with the mean IOP within this cohort at 15.2 ± 2.7mmHg (-35.3%, $p<0.001$).

Conclusions

Automated DSLT is an effective and safe non-contact modality for reducing IOP in PAC and PACG eyes, with a significant proportion of eyes achieving good, medication-free IOP at 6 months.

P-0363

TREATMENT OUTCOMES OF SLOW COAGULATION TRANSSCLERAL CYCLOPHOTOCOAGULATION FOR MEDICALLY UNCONTROLLED GLAUCOMA IN ASIAN EYES

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Background

Slow coagulation transscleral cyclophotocoagulation (SC-CPC) uses modified laser setting with lower energy and a longer duration of application when compared with traditional CPC. This modified technique has proven its IOP lowering efficacy with lower rate of serious postoperative complications in various types of glaucoma.[1-3] When SC-CPC and micropulse laser treatment (MPL) are compared, SC-CPC showed a greater effect and a fewer complications than MPL.[4] This study was conducted to investigate the treatment outcomes of SC-CPC in Asian eyes with medically uncontrolled glaucoma, and to identify the factors affecting the postoperative intraocular pressure (IOP) over 12-month follow-up.

Methods

This retropective study included 95 eyes from 95 patients who underwent SC-CPC to control intraocular pressure (IOP) and completed 12 month follow-up. Laser settings were as like the followings: laser power 1000-1250mW / laser duration 4000ms / 25-35 repetitions over 3 or 4 qudrants. Surgical success was defined as an IOP of 6-21 mmHg with a ≥20% reduction from baseline, no reoperation for glaucoma, and no loss of light-perception vision. Visual acuity, the number of glaucoma medications, corneal endothelial cell count, and postoperative complications were analyzed. Aqueous humour flare values were measured by laser flare photometry before and after the procedure.

Results

Mean IOP decreased from 32.7 ± 13.8 mmHg to 16.2 ± 9.4 mmHg (50.5% reduction) during the follow-up. No statistically significant changes were observed in visual acuity, the number of glaucoma medications, and corneal endothelial cell count. Aqueous humour flare values increased immediately after the procedure and gradually decreased over several months. Notably, the amount of aqueous humour flare change at postoperative 1 week compared with baseline value was significantly associated with the amount of IOP reduction ($p<0.05$). SC-CPC repeated in 18 eyes (18.9%) due to unsatisfactory IOP control. Corneal decompensation and prolonged hypotony were found in only one eye which underwent repeated SC-CPC. Overall, the surgical success rate was 57.1% at 12 month follow-up.

Conclusions

SC-CPC is an effective and safe laser surgical procedure in Asian eyes with medically uncontrolled glaucoma. The association of aqueous humor flare value in early postoperative period seems to be a predictive factor for the treatment outcome, implying the higher degree of intraocular inflammation affects decreased aqueous humour production which results in lower IOP.

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P-0365

MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION IN THE TREATMENT OF GLAUCOMA - A RETROSPECTIVE OBSERVATIONAL STUDY

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Background

We have analyzed the clinical history of 288 patients (371 eyes) that underwent a total of 382 micropulse transscleral cyclophotocoagulation procedures at the Prof. K. Gibiński University Clinical Center of the Medical University of Silesia in Katowice, Poland over three years (2020-2023) as a treatment for diverse types of glaucoma - with Primary Open Angle Glaucoma being the leading type. The mean age of the population was 69 (IQR 60-76), with the average of 3 (IQR 2-3) intraocular pressure (IOP) lowering medications beforehand. Of the procedures, 199 were performed on pseudophakic eyes, 179 on phakic and 4 on aphakic eyes. Prior laser glaucoma procedures included Laser Peripheral Iridotomy (LPI) for 80 of the eyes and Selective Laser Trabeculoplasty (SLT) for 58 eyes. In 330 cases the MP-TSCPC procedure was performed for the first time and in 52 cases there has been a prior MP-TSCPC procedure. The treatment was performed on a 2500 mV power setting in 366 cases, 2000 mV in 13 cases and 3000 mV in 3 cases. Duration of the laser therapy per hemisphere was 20 s, 50 s, 80 s and 90 s for 32, 220, 122 and 8 procedures respectively.

Methods

In this retrospective observational study the abovementioned group of eyes has been observed for 12±3 months. IOP has been measured by means of the Goldmann applanation tonometry and corrected for CCT. Surgical complications, need for further glaucoma pharmacotherapy, necessity of repeated surgical interventions have been analyzed. Subjective ailments reported by the patients in the period of observation have been numbered.

Results

We have observed an IOP drop from 21.0 (18.0-25.0) on admission to 17 (14.0-19.0) on discharge, with further values of 17.0 (14.0-20.0); 16.0 (14.0-20.0); 16.0 (14.0-20.0); 16.0 (14.0-19.0); 15.0 (14.0-18.0); 16.0 (14.0-18.0) at the 2-weeks, 1, 3, 6, 9 and 12-month control points respectively. In the 12-month period we have not observed any significant reduction in the number of administered topical IOP-lowering medications, with the median remaining equal to 3. We have observed a significant decrease in the need for systemic treatment. On admission systemic treatment was needed in 35 patients. At 2-weeks, 1, 3, 6, 9 and 12-month control points 25, 25, 21, 16, 10 and 8 patients respectively required systemic treatment. The only relevant surgery complication has been the recurrence of elevated IOP.

Conclusions

Micropulse transscleral cyclophotocoagulation has been proven to be an effective anti-glaucoma treatment modality, decreasing intraocular pressure and the need for follow-up surgical procedures. Despite statistically significant IOP decrease after MP-TSCPC, in the majority of cases topical IOP-lowering therapy must be continued. The subjective ailments reported by patients have been found to be at an acceptable level as the majority of the population observed has reported a considerable improvement in the quality of life.

P-0366

EFFICACY OF SELECTIVE LASER TRABECULOPLASTY IN OCULAR HYPERTENSION AND OPEN ANGLE GLAUCOMA ACROSS DIFFERENT AGE GROUPS: A REAL-LIFE STUDY

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Background

Selective laser trabeculoplasty (SLT) enhances aqueous humor outflow through the trabecular meshwork, effectively lowering intraocular pressure (IOP) in patients with ocular hypertension (OHT) or open-angle glaucoma (OAG). Unlike controlled clinical trials, real-world practice involves heterogeneous patient populations, often with diverse age-related needs and systemic comorbidities. The primary aim of this study was to assess the efficacy of SLT across different age groups and stages of OHT and OAG in a real-life setting. An additional aim was to identify potential predictors of successful IOP reduction following SLT in these patients.

Methods

This observational, non-interventional, and non-randomized study included all patients with OHT or OAG who underwent SLT between 2021 and 2024 at a single tertiary eye care center. The study adhered to the Declaration of Helsinki and was approved by the local ethics committee. Patients (221 eyes) were stratified into four age groups (<40, 41–60, 61–80, >81 years) to explore potential age-related differences in SLT efficacy. Inclusion criteria ensured that only patients eligible for SLT aimed at lowering IOP and meeting predefined inclusion/exclusion criteria were enrolled. IOP was measured prior to the procedure and at predefined time intervals following SLT. Patients were followed for up to 12 months post-procedure, depending on individual follow-up availability and adherence to the study protocol. Data collection included demographic characteristics, clinical parameters, and treatment history to facilitate analysis of potential predictors of SLT efficacy. Statistical analyses included Student's t-test and one-way ANOVA to assess IOP reduction and linear models to evaluate the effects of age, medication use, and their interactions.

Results

IOP reduction was significant across all age groups (mean: 2.88 mmHg, $p < 0.001$). No differences in efficacy were observed between age groups (ANOVA, $p = 0.424$). Neither age nor the use of pre-procedure medications influenced the outcomes of SLT therapy (multivariate model, $p > 0.05$).

Conclusions

SLT effectively reduces IOP regardless of patient's age or prior medication use, confirming its universal efficacy in OHT and OAG treatment. This highlights SLT as a reliable therapeutic option for a wide range of patients in clinical practice.

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P-0367

HIGHER SUCCESS RATE OF SELECTIVE LASER TRABECULOPLASTY AS FIRST LINE TREATMENT IN MEXICAN PATIENTS WITH OPEN ANGLE GLAUCOMA: 12 MONTHS OF FOLLOW-UP

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Background

Selective Laser Trabeculoplasty (SLT) is a common treatment as first line therapy for managing glaucoma and ocular hypertension (OHT) worldwide; however, the experience in Mexico is scarce. The only existing study in Mexico includes eyes that have been previously treated with topical hypotensive agents, and SLT is employed as an additional treatment. No published studies have assessed the efficacy and safety of SLT as a primary treatment in Mexico

Methods

A retrospective observational study was conducted using medical records of adult patients newly diagnosed with Primary Open Angle Glaucoma (POAG) or OHT, who underwent their first recorded bilateral SLT without any prior treatment between 2019 and 2024. Patient demographics, baseline and target Intraocular Pressure (IOP), and clinical outcomes were extracted. Evaluation was conducted at 1,3,6, and 12 months. The primary outcome was to assess treatment efficacy, defined as a reduction of at least 20% from baseline without medication, evaluated during the specified follow-up intervals. In contrast, failure was defined as the inability to meet success criteria during two successive visits, the initiation of hypotensive medications, or any additional glaucoma procedures following SLT. Hazard Ratios (HR) were determined using the standard uni- and multivariate Cox-regression model

Results

A total of 70 eyes from 38 patients were included. Of these, 25(65.7%) were women, with a median age of 63 years(range: 36–84) and an average follow-up of 12.22 months(SD 19.47). The overall success rate at 12 months was 78.6%, with treatment failure occurring in 15 eyes (21.4%), which required topical hypotensive therapy but no glaucoma surgery. Most eyes(n=55, 78.6%) were classified as mild POAG, and 15(21.4%) were in a moderate stage. Median baseline IOP was 22.35 mmHg(range: 15-38) which was significantly reduced to 15.57 mmHg ($p < 0.001$), 15.74 mmHg($p < 0.001$), 15.42 mmHg ($p < 0.001$); and 16.94 mmHg($p < 0.001$) at months 1,3,6, and 12, respectively. The final overall IOP reduction was 6.32 mmHg(SD = 3.78)

In the multivariate analysis we found two predictors of treatment failure: age and moderate glaucoma. Patients under 60 years old(HR 6.094;95% CI 1.7-21.52; $p = 0.005$) and those with moderate glaucoma(HR 4.41; 95% CI 1.57-12.36; $p = 0.005$)

Only two patients(2.85%) experienced intraocular pressure spikes, and no other complications, such as conjunctival congestion, anterior chamber inflammation, or pain, were observed

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Conclusions

The success rate of primary SLT in Mexican patients appears to be higher compared to that reported in other populations. In the LiGHT study, SLT as a first-line treatment achieved a success rate of around 74% at one year, defined by maintaining target IOP without requiring additional interventions. In comparison, our study demonstrated an overall response rate of 78.6%. Long-term follow-up studies are needed to further assess the effectiveness in visual field progression and need of glaucoma surgery in mexican population

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P-0368

A COMPARATIVE ANALYSIS OF INTRAOCULAR PRESSURE REDUCTION AFTER REPEATED VERSUS INITIAL SELECTIVE LASER TRABECULOPLASTY TREATMENT

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Background

Open-angle glaucoma is one of the leading causes of irreversible blindness worldwide. Although various treatments are available to control this condition, they often come with significant side effects and can adversely impact the quality of life of patients. Selective laser trabeculoplasty (SLT) has emerged as a promising treatment modality for open-angle glaucoma, with encouraging results from multiple studies. However, there is a need to verify the safety and efficacy of repeated SLT treatments over an extended period to ensure its long-term viability.[1,2,3]

Methods

This dissertation presents a retrospective analysis comparing the intraocular pressure (IOP)-lowering effects of repeated SLT treatments to those of the initial SLT treatment. The study aims to evaluate whether repeated SLT can consistently provide significant IOP reductions and maintain its safety profile when administered multiple times.

Clinical data from patients who underwent initial and subsequent SLT treatments were analysed to quantify the IOP reductions achieved and to determine the proportion of eyes that responded to repeated treatments after an initial non-response.

Results

The results indicate that SLT is effective in lowering IOP, with the initial treatment resulting in a mean IOP reduction of -3.77 mmHg across all treated eyes. Among the eyes that responded to the initial treatment, the mean reduction was -4.88 mmHg. Of the 15 eyes that showed no IOP reduction after the first treatment, 13 (86.67%) experienced significant IOP reduction upon repeated SLT, with a mean reduction of -4.62 mmHg. The second SLT treatment demonstrated an IOP reduction in 87.91% of eyes, with a mean reduction of -4.12 mmHg. Furthermore, 7.95% of eyes showed no IOP reduction after the second treatment, indicating a minimal non-response rate.

Notably, out of the eyes that did not respond to the second treatment, 3 underwent a third SLT treatment. All of these eyes experienced IOP reduction, with a mean reduction of -4.33 mmHg.

Conclusions

This retrospective study demonstrates that selective laser trabeculoplasty (SLT) is an effective and safe treatment for lowering intraocular pressure (IOP) in patients with open-angle glaucoma. The findings show significant IOP reductions following both initial and repeated SLT treatments, with minimal adverse effects. The study also highlights the high safety profile of SLT and suggests that the timing between treatments does not significantly impact its efficacy. These results support the use of SLT as a viable long-term treatment option, either as a standalone therapy or in conjunction with other treatment modalities. Our results were obtained in a real-world context of patients and generally agree with current evidence from available literature thus can be generalised. Future research should focus on long-term outcomes, optimal treatment intervals, and comparative effectiveness to further solidify SLT's role in glaucoma management.

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P-0369
INVOLVEMENT OF MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION IN CORNEAL NERVE DEGENERATION

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Background
Micropulse transscleral cyclophotocoagulation (MP-CPC) is a novel laser treatment for glaucoma that has become widespread. In recent years, corneal epithelial damage after MP-CPC have been reported, and it has been suggested that neurotrophic keratopathy may be involved in these complications. In this study, the effects of MP-CPC on corneal nerves were examined in rabbit eyes *in vivo* and in glaucoma patients clinically.

Methods
MP-CPC was performed on rabbit eyes at power levels of 250, 500, 750, 1000, and 1500 mW. One week post treatment, the corneas were extracted and immunostained using the neuronal marker tubulin-beta 3. The effects of MP-CPC on the area of corneal nerve fibers at each power level were compared to the pre-treatment control.

In addition, corneal sensation was measured in patients at pre-treatment, 1 week, and 1 month following MP-CPC.

Results
In rabbit corneas, the area percentages of nerve fibers after MP-CPC were as follows: 2.78 ± 0.27 (pre-treatment), 4.19 ± 1.04 (250 mW, p= 0.126), 0.66 ± 0.28 (500 mW, p = 0.017), 0.51 ± 0.14 (750 mW, p = 0.010), 0.07 ± 0.07 (1000 mW, p = 0.002), and 0 (1500 mW, p = 0.001). Nerve fibers significantly decreased at power levels of 500 mW or higher compared to the pre-treatment control.

Corneal sensation was assessed in 13 eyes from 12 cases. The pre-treatment value was 49.0 ± 2.3 mm, and the post-treatment values at 1 week and 1 month were 37.9 ± 4.2 (p = 0.054) and 40.8 ± 5.7 mm (p = 0.308), respectively. Although the difference was not significant, tendency of decreased corneal sensation at 1 week after MP-CPC was observed.

Conclusions
Neurotrophic keratopathy may play a role in corneal epithelial damage after MP-CPC.

P-0370

COMPARATIVE STUDY OF SELECTIVE LASER TRABECULOPLASTY OUTCOMES IN EYES WITH INTRAOCULAR LENSES VERSUS PHAKIC EYES

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Background
In clinical practice, selective laser trabeculoplasty (SLT) does not always result in immediate intraocular pressure (IOP) reduction. Our previous study using logistic regression analysis demonstrated that phakic eyes, compared to eyes with intraocular lenses (IOL eyes), are a significant factor in achieving IOP reduction following SLT (75th Annual Congress of Japan Clinical Ophthalmology, 2021, Yoshimi et al.). This study aims to compare the efficacy of SLT between phakic eyes (lens group) and IOL eyes (IOL group).

Methods
From January 2018 to December 2020, 169 eyes of 132 patients underwent SLT at our institution. We included cases without prior ocular surgery other than cataract surgery and with at least one month of follow-up. For patients with bilateral SLT, the earlier treated eye was analyzed. Patients were divided into lens and IOL groups, and propensity score matching was performed using covariates such as age, glaucoma subtype (primary open-angle glaucoma [POAG], pseudoexfoliation glaucoma [PE], or others), preoperative medication score, and preoperative IOP. IOP reduction was defined as achieving an IOP ≤18 mmHg and a reduction of ≥10% (Criterion 1) or ≥20% (Criterion 2) from baseline. Outcomes were compared between groups, including the proportion of eyes achieving IOP reduction at one month postoperatively and survival rates.

Results
Thirteen eyes were analyzed in each group. The mean age was 74.7±11.0 years and 73.8±9.8 years in the lens and IOL groups, respectively. The distribution of glaucoma subtypes (POAG, PE, or others) was 7/5/1 and 6/6/1 eyes, respectively. The mean preoperative medication score was 4.5±1.0 and 4.7±1.2, and the mean preoperative IOP was 24.1±7.4 mmHg and 24.1±8.6 mmHg, with no significant differences between the groups. The proportion of eyes achieving IOP reduction at one month postoperatively (Criterion 1: 12/1 vs. 6/7 eyes, p=0.0108; Criterion 2: 9/4 vs. 4/9 eyes, p=0.0499) and survival rates (Criterion 1: p=0.0159; Criterion 2: p=0.0022) were significantly higher in the lens group compared to the IOL group.

Conclusions
Phakic eyes demonstrated significantly better SLT outcomes compared to IOL eyes.

P-0371
ANTERIOR CHAMBER DIMENSIONS AFTER DIRECT SELECTIVE LASER TRABECULOPLASTY

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Background
Direct Selective Laser Trabeculoplasty (DSLT) Eagle (Belkin) is a novel, minimally invasive procedure for glaucoma management, targeting aqueous humor outflow through selective trabecular meshwork activation. This study evaluates changes in anterior chamber dimensions and intraocular pressure (IOP) post-DSLT, providing a comprehensive analysis of its effects.

Methods
A prospective, paired-sample analysis was conducted on 28 patients (mean age: 63 ± 7 years; 18 women, 10 men) undergoing DSLT.

Measurements of anterior chamber parameters, including lens vault, pupil diameter, trabecular-iris space area (TISA 500 and 750), angle opening distance (AOD 500 and 750), scleral spur-to-spur distance, and central corneal thickness (CCT), were obtained using anterior segment optical coherence tomography (Anterion, Heidelberg Engineering) before and 7 days post-procedure. IOP was measured with Goldmann applanation tonometry.

One eye per participant was analyzed. Measurements were taken before and seven days after the procedure. Statistical significance of changes was assessed using paired t-tests, with significance set at $p < 0.05$.

Results
The mean age of patients was 55.6 ± 12.0 years; 18 were women, and 10 were men. Significant reductions in IOP were observed (22.64 ± 2.47 mmHg pre-procedure vs. 19.04 ± 3.26 mmHg post-procedure; mean difference: -3.61 mmHg; $p < 0.001$). The lens vault showed a non-significant decrease (0.563 ± 0.336 mm vs. 0.534 ± 0.337 mm; $p = 0.386$). Pupil diameter slightly decreased from 4.79 ± 1.04 mm to 4.62 ± 1.39 mm ($p = 0.372$). TISA 500 and AOD 500 exhibited minimal changes, with no statistical significance. The scleral spur-to-spur distance, CCT, and anterior chamber depth (ACD) also remained stable.

Conclusions
DSLT significantly reduces IOP, with minimal impact on anterior chamber dimensions, including pupil diameter and lens vault. These findings suggest that DSLT is effective for IOP reduction without causing notable structural changes in the anterior segment. Further studies are warranted to explore long-term effects.

P-0373

DIRECT SELECTIVE LASER TRABECULOPLASTY FOR ANGLE-CLOSURE GLAUCOMA: PRELIMINARY RESULTS

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Background

Selective laser trabeculoplasty (SLT) is primarily indicated for primary open-angle glaucoma (POAG), although it has also been explored for use in primary angle-closure glaucoma (PACG). Studies have shown that SLT can effectively reduce intraocular pressure (IOP) in patients with PACG who have persistent elevated IOP. Direct Selective Laser Trabeculoplasty (DSLT) is a novel treatment modality for POAG, utilizing similar laser parameters to SLT. The key advantages of DSLT include its faster and simpler procedure, as well as the elimination of the need for a goniolens, offering a more comfortable experience for the patient. This study aims to report the preliminary outcomes of DSLT in eyes with angle-closure glaucoma (ACG).

Methods

This retrospective, single-center case series included patients with ACG treated with DSLT. All patients were phakic at the time of the procedure and had previously undergone peripheral iridotomy. The primary outcome was the percentage reduction in IOP following treatment. Secondary outcomes included treatment success, IOP reduction of 20% or more from baseline or a decrease in the number of glaucoma medications while maintaining baseline IOP, corrected distance visual acuity (CDVA), and complications.

Results

Eleven eyes of seven patients with ACG were included. The mean follow-up period was six months (range 2–9 months). The mean patient age was 69.3 ± 8.8 years (range 59–85). Baseline mean IOP was 16.9 ± 2.4 mm Hg (range 12–20), which decreased to 13.8 ± 3 mm Hg (range 10–19) at follow-up. An IOP reduction of more than 20% was achieved in 64% of eyes (n=7), with a mean IOP reduction of 18.4% ± 10.8% (range 5–42%). The mean number of glaucoma medications decreased from 3.36 ± 1.36 (range 1–5) to 3 ± 1.5 (range 0–4) at follow-up. A complete discontinuation of medications was achieved in four eyes (two patients). The mean CDVA before DSLT was 0.62 ± 0.2 (range 0.13–1), and post-procedure CDVA was 0.66 ± 0.3 (range 0.05-1). Common post-procedure findings included anterior chamber cells and subconjunctival hemorrhage. No immediate postoperative IOP spikes or significant complications were reported.

Conclusions

Our preliminary results suggest that DSLT is an effective and safe procedure for managing ACG, achieving meaningful reductions in IOP and glaucoma medications without major complications. Further studies are warranted to validate these findings.

P-0374

EARLY EXPERIENCE WITH MICRO-PULSE TRANSSCLERAL DIODE CYCLOPHOTOCOAGULATION FOR REFRACTORY PEDIATRIC GLAUCOMAS

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Background
Compared to continuous-wave transscleral cyclophotocoagulation (CW-CPC) and endoscopic cyclophotocoagulation (ECP), data on micro-pulse transscleral cyclophotocoagulation (mpCPC) in children is limited.

Methods
Retrospective consecutive case series of eyes with refractory pediatric glaucomas at a tertiary center that underwent mpCPC. Success was post-operative IOP less or equal to 24 mmHg with or without medications, without additional glaucoma surgery, and with at least 6 months follow-up.

Results
10 eyes of 7 patients included. 5 patients (8 eyes) were less than 2 years-old, 1 was 12 years-old, and 1 was 16 years-old. Types of glaucoma: primary congenital glaucoma (5), glaucoma following cataract surgery (2), glaucoma associated with non-acquired ocular anomalies (1), glaucoma in a non-acquired syndrome (2). Mean degrees of ciliary body treated was 300 (range 180 – 360). 8 eyes were treated once, 1 eye twice, and 1 eye thrice. Mean follow up was 15.2 months (range 6 - 21). Mean preoperative IOP was 26 (range 21 – 36) mmHg. Mean postoperative IOP was 21 (19-23) for successes and 34 (25 – 42) for failures. The mean number of glaucoma medications (2.6) was unchanged from pre-operatively to post-operatively. In eyes 26 months-old and younger, axial length progressed in all failures (5) and plateaued in all successes (3). Overall success was 40%. All failures required incisional glaucoma surgery. There were no significant complications.

Conclusions
mpCPC was performed safely but with limited success in this small cohort of heterogenous childhood glaucomas. mpCPC may be offered cautiously for refractory childhood glaucomas, emphasizing that repeat treatments or surgical escalation may be necessary.

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P-0375

FACTORS ASSOCIATED WITH POST-SELECTIVE LASER TRABECULOPLASTY (SLT) INTRAOCULAR PRESSURE (IOP) SPIKE

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Background
Intraocular pressure (IOP) spike is an uncommon complication after selective laser trabeculoplasty (SLT). This study aims to identify factors associated with post-SLT IOP spike to enhance safety.

Methods
Retrospective chart review of 328 consecutive patients who underwent SLT in a local eye hospital between July 2021 and June 2023. Baseline IOP was defined as the mean of three clinic IOP measurements within 1 year before SLT. IOP spike was defined as IOP elevation ≥ 5mmHg within 1 hour post-SLT compared to baseline IOP. A drop of IOP-lowering medication (Brimonidine or Timolol 0.5%) was given prior to and after SLT. Post-SLT IOP/no. of IOP-lowering medications/ %IOP reduction were defined as the mean of measurements at 1-week and 1-month post-SLT.

Results
We included 490 eyes of 328 patients (mean age 66.27 years), with 420 eyes (85.7%) receiving one SLT. The most common diagnoses were primary open angle glaucoma (POAG) (77.1%), followed by normotension glaucoma (NTG) (14.3%) and primary angle closure glaucoma (PACG) (5.3%). The baseline visual field (VF) mean deviation (MD) was -14.53dB, with 51.8% of eyes having advanced glaucoma (MD ≤-12dB). Mean baseline and post-SLT IOP and no. of IOP-lowering medications were 18.2mmHg and 17.0mmHg, and 3.40 and 3.54 respectively (n=570, p<0.001 and <0.001 respectively, paired t-test). The mean %IOP reduction was 6.92%.

Intraocular pressure spike occurred in 9.4% of eyes. Younger age (p<0.001), NTG (p<0.001), previous post-SLT spike (p<0.001), more negative MD (p<0.001), thinner retina nerve fiber layer (RNFL) (p<0.001), less total energy used (p<0.001), no IOP-lowering medication used immediately post laser (p<0.001), performance of SLT by trainees (p<0.001) were significant predictors of IOP spike while NTG (p<0.001) compared with POAG was a significant protector of IOP spike by univariate analysis. With multivariate logistic regression, only younger age was a significant predictor (p<0.001). After accounting for inter-eye correlation and the effect of multiple treatments with generalized estimating equations, younger age was a significant predictor (p<0.001). The IOP reduction was significantly less in patients with post-SLT IOP spike (0.088mmHg) than those without (1.382mmHg) (P<0.001).

Conclusions
The incidence of a post-SLT IOP spike is comparable to that of the current literature. The most significant predictor is young age.

P-0378

SAFETY AND EFFICACY OF MICROPULSE IN PAEDIATRIC EYES WITH REFRACTORY GLAUCOMA

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Background

Purpose: To analyse the safety and efficacy of Micropulse transscleral cyclophotocoagulation (MP-TSCPC) in paediatric eyes with refractory glaucoma.

Design: Hospital based prospective interventional study.

Methods

Patients less than 18 years of age, receiving MP-TSCPC between 1st Dec 2022 to 31st May 2023 with at least 3 follow ups within 6 months period were included in the study. Post laser evaluation was done at day 1, 1 month, 3 months and 6 months. Success outcomes was calculated at 1, 3 and 6 months follow up.

Results

23 eyes of 23 patients were included in the study. Mean intraocular pressure (IOP) lowering agents (p = 0.041) had significant change compared to baseline value, however, the change was insignificant when eyes requiring additional IOP lowering surgeries during the follow up period were excluded. There was significant reduction in IOP at each follow up visit compared to baseline (p = 0.000014). Two (8.6%) eyes required additional intervention within one month follow up, another six eyes (26%) between 1-3 months, and three eyes (13%) between 3-6 months of MP-TSCPC. Total success was highest 56.5% (13 eyes) at 1 month follow up, and least 34.7% (8 eyes) at 6 months follow up. No major complications were reported in our study.

Conclusions

MP-TSCPC was found to be safe and effective in paediatric population. However, we observed a gradual reduction in the success with time, and thus it can be individualized to patients with high risk for incisional surgery or those requiring immediate IOP reduction.

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P-0379

PRELIMINARY REAL-WORLD RESULTS OF ZEISS VISULAS GREEN SELECTIVE LASER TRABECULOPLASTY IN ASIAN PRIMARY OPEN-ANGLE GLAUCOMA POPULATION

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Background
ZEISS VISULAS green selective laser trabeculoplasty (SLT) is a device with 532nm green light as laser source, which was different from conventional SLT. This study reported preliminary data of efficacy and safety of ZEISS VISULAS green selective laser trabeculoplasty (SLT) in Asian primary open-angle glaucoma (POAG) population in a real-world clinical setting.

Methods
We collected data of patients in our hospital (National Cheng Kung University Hospital, Tainan, Taiwan). Inclusion criteria were adult patients, diagnosis of POAG or OHT. Exclusion criteria were previous anti-glaucomatous eyedrops, laser trabeculoplasty, filtration surgery, and cyclophotocoagulation procedures. All the procedures were performed by one glaucoma specialist. Adverse events were recorded.

Results
We included 10 eyes of 5 patients. All of the patients were Asian. 3 were male and 2 were female. The mean baseline IOP was 18.9 mmHg preoperatively. The mean IOP at week 4 was 17.1 mmHg. No patient received a second SLT treatment or underwent filtration surgery or cyclophotocoagulation procedures during the follow-up. No major ocular or systemic side effects were found.

Conclusions
We reported the preliminary short-term data of efficacy of ZEISS VISULAS green SLT treatment in treatment naïve Asian POAG population. To the best of our knowledge, this is the first report of ZEISS green SLT in Asian population.

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P-0380

EFFICACY OF TRANS-SCLERAL MICROPULSED LASER IN GLAUCOMA USING SUBCYCLO PLUS THERMOCYCLIC PROTOCOL

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Background

Glaucoma is the leading cause of irreversible blindness worldwide. The main risk factor is increased intraocular pressure (IOP) and various treatments are aimed at reducing it. Trans-scleral micropulsed laser (TML) has emerged as a promising therapeutic alternative due to its minimal adverse effects and repeatability. This approach can reduce IOP without the need for invasive procedures. However, studies using the original TML protocol have not shown positive long-term results. The aim of this study was to evaluate the efficacy of TML therapy using a novel subcycle plus thermocycle protocol.

Methods

This descriptive, prospective, and longitudinal study was conducted at an ophthalmological referral center in Cartagena - Colombia from year 2022 to 2024. All patients underwent a comprehensive ophthalmological examination, including assessment of best-corrected visual acuity. The number of medications and complications associated with the procedure were recorded. The TML protocol used consisted of applying subcycles in quadrants for 50 seconds, with a power of 2 mW and a duty cycle of 31.1%. A 6-point thermocycle dose was applied for 5 seconds with a power of 1,25 mW. Follow-up visits were scheduled at 8, 30, 90, 180, and 365 days after the procedure. Data analysis was performed using Epi Info software.

Results

A total of 49 eyes from 35 patients were included, with a mean age of 64 years. Of the participants, 69.4% (34 eyes) were male. The mean baseline IOP was 27.8 mmHg. At 8 days postoperatively, the mean IOP was 16.3 mmHg, at 30 days it was 17.3 mmHg, at 90 days it was 18.0 mmHg, at 180 days it was 16.4 mmHg, and at 365 days it was 17.6 mmHg. The IOP reduction rate at 1 year of follow-up was 36.6%. The average number of medications before the procedure was 3.0, which decreased to 2.5 at 180 days, a statistically significant reduction. At 365 days, the average number of medications increased slightly to 2.8. Visual acuity remained stable at 1 year of follow-up, with an average of 0.4 LogMar (20/50 on the Snellen chart).

Conclusions

These results show that the new proposed TML protocol, adding a dose of subcyclo plus thermocyclo, is effective in reducing IOP by approximately 37% after one year. This approach also leads to a reduction in the number of medications needed, without affecting patients' visual acuity.

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P-0381

EFFICACY AND SAFETY OF ENDOSCOPIC CYCLOPHOTOCOAGULATION VERSUS TRANSSCLERAL CYCLOPHOTOCOAGULATION IN THE TREATMENT OF ADULTS WITH GLAUCOMA

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Background
In cyclophotocoagulation, the laser is administered via either a transscleral or endoscopic method targeting the ciliary processes to reduce aqueous output. In the current systematic review and meta-analysis, we aimed to compare between endoscopic cyclophotocoagulation (ECP), and transscleral cyclophotocoagulation (TCP) whether used alone or combined with phacoemulsification (phaco) regarding efficacy and safety in glaucoma patients.

Methods
We searched PubMed, Web of Science, and Scopus for articles comparing ECP and TCP in glaucoma patients using the following search strategy: “Endoscopic” AND “Cyclophotocoagulation” AND “Transscleral” from inception till September 2024. We used mean difference (MD) for continuous variables to compare ECP and TCP in the change from baseline values, between baseline and posttreatment values, and odds ratio (OR) for dichotomous variables at a 95% confidence interval (CI).

Results
TCP was significantly associated with higher reduction in intraocular pressure (IOP) compared with ECP at 3-, 6-, and 12-month measurements with MD= 5.65 (95%CI: 2.69, 8.61, p=0.0002), MD= 4.05 (95%CI: 2.01, 6.08, p<0.0001), and MD= 3.5 (95%CI: 1.52, 5.48, p=0.0005. However, no significant difference was observed between both groups regarding the number of glaucoma medications at the 3 measurement periods. No significant difference was observed between both groups regarding complications (OR= 1.27, 95%CI: 0.62, 2.6, p=0.51) and macular edema (OR= 2.72, 95%CI: 0.95, 7.82, p=0.06). ECP was significantly associated with decreased IOP after 6- and 12-month periods compared with baseline with MD= 7.26 (95%CI: 4.96, 9.57, p<0.00001), and MD= 8.02 (95CI: 6.15, 9.89, p<0.00001), respectively. Also, TCP was associated with decreased IOP at 6- and 12-month periods with MD= 11.98 (95%CI: 6.17, 17.79, p<0.0001), and MD= 15.41 (95%CI: 9.36, 21.46, p<0.00001), respectively. Both ECP and TCP were also associated with decreased medications at 6-and 12-month measurements.

Conclusions
Both ECP and TCP are effective in the management of glaucoma and in lowering IOP, however, TCP is more effective, and they are equally safe.

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P-0383

DIRECT SELECTIVE LASER TRABECULOPLASTY IN GLAUCOMA TREATMENT – SHORT-TERM OBSERVATIONS

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Background
The aim of the study was to evaluate the efficacy and safety of direct selective laser trabeculoplasty in glaucoma patients during a short-term observation period.

Methods
In this prospective follow-up clinical study 59 patients with primary and secondary glaucoma were enrolled to undergo direct selective laser trabeculoplasty (DSLT) using Eagle device (Belkin Vision, Yavne, Israel). The primary outcome measures were intraocular pressure (IOP) reduction, success rates, glaucoma medication use and visual acuity after laser treatment. An IOP reduction of 20% compared to the baseline value without re-intervention was considered a successful treatment. Complete success was defined as cessation of antiglaucoma medications. Secondary outcome measures included intraoperative and postoperative complications. Measurements were performed preoperatively and at 1 week, and 1, 3, 6 and 12 months postoperatively.

Results
The mean ± SD values of IOP preoperatively and postoperatively, and at 1 week,1; 3; 6; 12 months postoperatively were 19.2 ± 5.3 mmHg, 20.8 ± 6.1 mmHg, 16.8 ± 4.7 mmHg, 17.5 ± 5.7 mmHg, 17.2 ± 4.0 mmHg and 16.7 ± 4.1 mmHg ($p<0.001$ for all values), respectively. The mean IOP at the last follow-up was reduced by 13.0 %. Other than the commonly observed small subconjunctival hemorrhages, no intraoperative or postoperative complications were reported following the procedure.

Conclusions
DSLT is well-tolerated and safe for reducing IOP in glaucoma patients during short-term follow-up; however, its success is moderate. Randomized, larger-scale studies are needed to validate these findings.

P-0384

SHORT-TERM INTRAOCULAR PRESSURE REDUCTION EFFECT OF SELECTIVE LASER TRABECULOPLASTY IN EYES WITH HIGH MYOPIA

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Background
To analyze the intraocular pressure (IOP)-lowering effect of selective laser trabeculoplasty (SLT) in highly myopic and non-highly myopic eyes.

Methods
Patients who underwent SLT at the Glaucoma Clinic of Science Tokyo University Hospital from January 2023 to July 2024 were categorized into two groups: a non-high myopia group (axial length < 26.0 mm) and a high myopia group (axial length ≥ 26.0 mm). IOP was measured at 1 and 3 months postoperatively, and retrospective comparisons were conducted. The paired t-test was used for pre- and post-treatment IOP comparisons within each group, and the Mann-Whitney U test was used to compare IOP changes between the high and non-high myopia groups.

Results
The average preoperative IOP in the high myopia group (23 cases, 39 eyes) and the non-high myopia group (10 cases, 19 eyes) was 14.2 ± 3.2 mmHg and 16.9 ± 4.9 mmHg, respectively. At 1 month post-SLT, the mean IOP was 11.8 ± 2.2 mmHg and 13.2 ± 3.0 mmHg, and at 3 months post-SLT, it was 11.8 ± 2.3 mmHg and 12.1 ± 2.3 mmHg, respectively. Both groups demonstrated significant IOP reduction at 1 and 3 months post-SLT. Additionally, the highly myopic eyes exhibited an IOP reduction comparable to that observed in non-highly myopic eyes at both the 1- and 3-month follow-ups.

Conclusions
SLT can be performed with the expectation of achieving similar IOP reduction in highly myopic eyes as in non-highly myopic eyes.

P-0385

CORNEAL ENDOTHELIAL GRAFT FAILURE AFTER ENDOSCOPIC CYCLOPHOTOCOAGULATION: A CASE REPORT

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Background

Endoscopic cyclophotocoagulation (ECP) is a procedure that aims to reduce intraocular pressure (IOP) by directly irradiating the ciliary processes with a laser under endoscopic observation. Compared with trans-scleral cyclophotocoagulation, which has a risk of overexposure because indirect laser irradiation is used, ECP has a lower incidence of complications such as phthisis and hypotony. In addition, ECP that requires only a small incision in the limbus can be performed relatively easily even in eyes with refractory glaucoma with scars in the conjunctiva and sclera caused by multiple surgeries.

However, compared with the low invasiveness indicated by the observed ocular findings, intraocular changes induced by ECP may be substantial. After ECP, aqueous humor production from the ciliary body decreases, which may change its composition of the aqueous humor and affect the function of corneal endothelial cells.

Methods

We report a case of corneal endothelial graft failure after ECP following Descemet's stripping automated endothelial keratoplasty (DSAEK).

Results

The patient was a 69-year-old Japanese woman with primary angle-closure glaucoma. She underwent phacoemulsification with intraocular lens implantation and goniosynechialysis for peripheral anterior synechiae (PAS) in her right eye, followed by trabeculectomy, repeat bleb revisions, Baerveldt glaucoma implant (BGI) surgery, and finally Ahmed glaucoma valve (AGV) implantation with tube insertion into the anterior chamber in past 2 years. Subsequently, the tip of the AGV tube came into contact with the corneal endothelium, and despite the AGV removal, she developed bullous keratopathy. First DSAEK was performed in July 2020. Then, iris adhesion and atrophy progressed around the BGI tube, and PAS became severe, resulting in graft failure. Therefore, a second DSAEK combined with pupilloplasty was performed in November 2021. After that, graft transparency was maintained. From March 2022, IOP increased to around 25 mmHg despite treatment with the maximum medication. In September 2022, ECP was performed to reduce IOP. In this surgery, three-fourths of the circumference of the ciliary process was irradiated with a laser. The IOP decreased to 12-14 mmHg after ECP, however, she developed graft failure within a few months. A third DSAEK was performed in July 2023.

Conclusions

For eyes with borderline corneal endothelial cell decompensation, the indication for ECP should be determined with caution.

P-0386

CORNEAL ENDOTHELIAL DYSFUNCTION AND HYPHEMA AFTER SELECTIVE LASER TRABECULOPLASTY FOR EXFOLIATION GLAUCOMA : A CASE REPORT

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Background
To report a case of transient corneal endothelial dysfunction and hyphema after selective laser trabeculoplasty (SLT) for exfoliation glaucoma

Methods
Case report

Results
A 93-year-old man with uncontrolled exfoliation glaucoma was treated with carteolol hydrochloride/latanoprost fixed combination ophthalmic solution. His corrected visual acuity was 20/25 in the right eye and 20/32 in the left eye, and IOP was 19~25mmHg in both eyes. He was received SLT in both eyes for better IOP control. Mild hyphema occurred in both eyes during SLT. One week after SLT, he presented with bilateral blurred vision. He also had mild corneal opacity in both eyes. Specular microscopy showed corneal endothelial dysfunction in both eyes, and mild hyphema in the left eye. IOP was 14 mmHg in both eyes. Betamethasone 0.1% eye drops 4 times per day were added in both eyes. Three months later, the corneal endothelial dysfunction and hyphema had completely resolved and his visual acuity had returned to 20/25 in both eyes. IOP was 15mmHg in both eyes.

Conclusions
SLT is an effective IOP lowering therapy with a low risk of complications. Although corneal endothelial dysfunction and hyphema are rare complications after SLT, we experienced a case where both complications occurred in both eyes.

P-0388

EFFICACY AND SAFETY OF A MICROCPC® PROTOCOL IN PATIENTS WITH GLAUCOMA: 6-MONTH FOLLOW-UP

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Background

Glaucoma is a progressive optic neuropathy and the leading cause of irreversible blindness worldwide. The primary objective of glaucoma treatment is to reduce intraocular pressure (IOP) through pharmacological, laser, or surgical interventions.

Cyclodestructive procedures have demonstrated effectiveness in lowering IOP but are often associated with severe side effects, such as hypotony, inflammation, and phthisis bulbi. To address these limitations, MicroCPC® was developed. This technology employs an 810nm laser with “on-off” bursts delivered to the ciliary body. This approach allows for the accumulation of thermal energy without inducing photocoagulative damage, potentially resulting in fewer complications while maintaining hypotensive efficacy.

However, current evidence regarding the efficacy and safety of this procedure remains limited.

Methods

This prospective, interventional, and non-comparative study was conducted over six months, beginning in June 2023, at the Glaucoma Department of Dr. Luis Razetti Hospital in Barcelona, Venezuela. Twenty patients (29 eyes) were included in the study.

Inclusion criteria included: age 18 years or older, diagnosis of primary or secondary open-angle or closed-angle glaucoma, and inadequate IOP control with maximum medical therapy. Exclusion criteria encompassed: pregnancy, prior ocular surgery or laser treatment within the past three months, and uveitis.

The study was approved by the Medical Ethics Committee, and informed consent was obtained from all participants. A comprehensive ophthalmologic evaluation was performed, with a focus on assessing pre- and postoperative IOP changes (1 day, 1 week, 1, 3, and 6 months), the number of hypotensive medications, and the identification of potential complications.

The MicroCPC® protocol was administered using a FOX III device (A.R.C LASER, Germany). The procedure involved four sweeps of 20 seconds per hemisphere (160 seconds per eye), with a 33.3% duty cycle, 2.5W of power, for a total energy of 106J.

Results

Demographics: The majority of patients were male, and the most common age group was 62-72 years. Primary open-angle glaucoma was the most prevalent type.

IOP Reduction: Preoperative IOP levels had a median of 20 mmHg. A 30% reduction in IOP was observed at the 6-month follow-up.

Medication Reduction: On average, patients required two fewer hypotensive medications compared to baseline.

Complications: 38% of patients experienced no complications. The most common complication was anterior uveitis, observed in 48% of cases.

Conclusions

The MicroCPC® protocol demonstrated significant IOP reduction from baseline to the 6-month follow-up. A concomitant reduction in hypotensive medications was also observed.

Regarding safety, the procedure was generally well-tolerated. Most complications were mild and resolved promptly with medical treatment.

However, further investigation with a longer follow-up period and a larger sample size is warranted to evaluate the long-term stability of these results.

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P-0392

A DIFICULT CASE OF UVEITIS-GLAUCOMA-HYPHEMA (ELLINGSON SYNDROME) - HOW TO MANAGE IT?

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Background

Ellingson Syndrome is classically characterized by the triad of intraocular inflammation, recurrent hyphema and elevated intraocular pressure occurring in pseudophakic patients. A mechanical irritation of the iris, ciliary body or iridocorneal angle by foreign material, typically an intraocular lens (IOL) implant, can result in pigment dispersion, hyphema, vitreous hemorrhage, increased intraocular pressure, intraocular inflammation and/or cystoid macular edema. This case report details a recurring case of uveitis-glaucoma-hyphema (UGH) in a 62-year-old female after vitrectomy and scleral IOL fixation, successfully managed with peripheral laser iridoplasty and iridotomy.

Methods

Case report of a UGH 62- year-old female patient successfully managed with laser treatment, after previous vitrectomy and scleral IOL fixation. Assessment of clinical records and multimodal imaging (anterior segment optical coherence tomography (AS-OCT), anterior segment ultrasound biomicroscopy (UBM) and photography) was performed.

Results

A 62-year-old female complained of sudden vision loss and presented hyphema, vitreous hemorrhage, iris transillumination defects and ocular hypertension (OHT). Past ocular history included myopic LASIK and cataract surgery with IOL implantation in the ciliary sulcus. She presented several similar episodes some years before and was treated with pars plana vitrectomy (PPV) and IOL scleral fixation. She had no more UGH episodes during a 4-year follow-up period. However, she experienced recurrent crises of inflammation, OHT, hyphema and vitreous hemorrhage. AS-OCT and UBM revealed apposition of the posterior iris surface to the anterior IOL face. Peripheral diode-laser iridoplasty was performed to anteriorize the iris and prevent further contact with the IOL. After a couple of months hyphema recurred and a YAG-laser iridotomy was performed in the peripheral iris to revert an inverted pupillary block observed at AS-OCT. The patient has been without complaints for several months.

Conclusions

Successful management of recurrent UGH in a patient with a prior IOL positioned in the ciliary sulcus. Despite an initial PPV and IOL scleral fixation, symptoms appeared after a 4-year follow-up period. Peripheral diode-laser iridoplasty and YAG-laser iridotomy were performed to prevent further contact with the IOL and successfully separate the iris from the IOL.

P-0393

INTRAOCULAR PRESSURE-DEPENDED NEUROPROTECTION AFTER SELECTIVE LASER TRABECULOPLASTY PROCEDURE

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Background
To determine the impact of selective laser trabeculoplasty (SLT) procedure on visual field progression parameters in patients with accompanying primary open angle glaucoma (POAG) or ocular hypertension (OHT).

Methods
In this pilot retrospective study, we analyzed medical records of SLT-treated patients between 2019 and 2023, and we selected laser-treatment-naïve eyes (n=19) of adult patients diagnosed with POAG or OHT who underwent SLT on homogeneous settings and followed up for a mean of 30 months. Success of treatment was defined as achieving at least 20% reduction of intraocular pressure (IOP) and IOP <19 mmHg.

Results
Baseline IOP (standard error of the mean (±SEM)) was 19.26 (±0.32) mmHg. Baseline MD (±SEM) of standard automated perimetry was 1.31 (±0.42) and baseline LV 5.74 (±0.97). The analysis showed significant reduction of the LV value 30 months after SLT procedure (3.25 (±0.63; p=0.03, Wilcoxon paired test).

Conclusions
Treating of POAG and OHT with first-line SLT could achieve not only IOP reduction, impacting the risk of glaucoma development and progression, but also could be an effective neuroprotection strategy by improving functional parameters of the retina.

Medical Treatment & Non-Incisional Surgery

P-PW-0395

SAFETY, TOLERABILITY, AND OCULAR HYPOTENSIVE EFFICACY OF QLS-111, A NOVEL ATP-SENSITIVE POTASSIUM CHANNEL OPENER ADDED TO LATANOPROST THERAPY

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Background

Therapeutic lowering of episcleral venous pressure (EVP) provides an opportunity to further reduce intraocular pressure (IOP) for enhanced glaucoma management. QLS-111 is a novel ATP-sensitive potassium channel opener that lowers IOP by targeting distal outflow (vasodilation) and lowering EVP[1-4]. We assessed safety, tolerability and efficacy of three concentrations and two dosing regimens of QLS-111 or vehicle when added to latanoprost in primary open angle glaucoma (POAG) patients.

Methods

Patients (n=31), on latanoprost with an IOP of ≧ 19 mmHg at 8 am, were dosed QPM OU with QLS-111 0.015%, 0.03% or 0.075%), or vehicle for 14 days followed by BID for 14 days, in a randomized, 5 sites, double masked study. Safety and tolerability were assessed by adverse events (AE), vitals, and ophthalmic exams including best corrected visual acuity (BCVA), slit lamp, and ophthalmoscopy. On days 1, 8, 15 and 29, IOP was measured at 8AM, 10 AM and 4 PM by Goldmann tonometry.

Results

Mean age of subjects was 67.2 years evenly split with 50% men and women from white (39%), black (58%) or Asian (3%) races. No significant ocular and zero systemic AEs were reported. Minor AEs were limited to five self-reported hyperemia and irritation with dosing, all at a single site. No changes on slit lamp exam were noted in any QLS-111 arms. Average mean diurnal baseline IOP across groups was 20.5 mmHg. When compared to baseline, mean diurnal additional IOP lowering adjunct to latanoprost was significant across all QPM and BID QLS-111 regimens. With QPM x14 days, IOP lowering was -2.9 mmHg (0.015% QLS-111, p=0.0181), -2.4 mmHg (0.030% QLS-111, p=0.0162), -1.0 mmHg (0.075% QLS-111, p=0.0378)), and -0.8 mmHg (vehicle, p=0.1338). With BID x 14 day treatment, IOP lowering was -3.1 mmHg (0.015% QLS-111, p= 0.0169), -2.3 mmHg (0.03% QLS-111, p=0.0037), -1.5 mmHg (0.075% QLS-111, p0.0453), and -0.6 mmHg (vehicle, p=0.4033).

Conclusions

QLS-111 is a well-tolerated, efficacious ocular hypotensive agent that shows additional IOP reduction of roughly 3.0 mmHg with a 0.015% concentration in POAG patients already on latanoprost. With its unique and novel mechanism of action, QLS-111 in a fixed dosed combination with prostaglandins (*e.g.* latanoprost) or as an adjunctive therapy is an exciting IOP lowering therapy. Additional clinical development of QLS-111 in POAG/OHT and normal tension glaucoma are ongoing.

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P-PW-0397

OUTCOMES OF NETARSUDIL/LATANOPROST IN OPEN ANGLE GLAUCOMA IN A REAL-WORLD SETTING

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Background
The new fixed-dose combination (FDC) of Latanoprost and Netarsudil has recently been introduced for reducing intraocular pressure (IOP) in patient with open angle glaucoma (OAG) or ocular hypertension (OHT). Given its recent FDA approval, evidence regarding the clinical utility of this FDC remains limited. Our study aims to assess the safety and efficacy of the fixed-dose combination of Netarsudil 0.02%/Latanoprost 0.005% ophthalmic solution (RoclandaÒ) in a cohort of OAG patients.

Methods
Prospective study of patients with insufficiently controlled OAG who received at least one month treatment of Netarsudil/Latanoprost. Patients were included in the Lausanne INTEGRAL study. IOP reduction, number of medications and potential adverse effects (AEs) were assessed at 1, 2, 3 and 6 months.

Results
Overall, 60 eyes of 33 patients treated with Netarsudil/Latanoprost once daily at night were included. Mean age was 72.3 ± 13.1 years, 57.5% women. Mean baseline IOP was 17.5±4.9 mmHg with a mean of 1.7 ± 0.9 agents. At one month follow-up, mean IOP was 14.8±3.8 mmHg with 2.3 ± 0.6 agents ($p<0.001$), with a reduction greater than 20% observed in 43.3% cases. The most common treatment-related side effects were corneal verticillata (3 cases) and conjunctiva hyperemia (5), which lead to treatment discontinuation in 3 cases (5.0%). No serious treatment-related AEs were observed. Two patients (3.3%) underwent additional surgical procedures during the 6 months follow-up, whereas glaucoma surgery was averted in 6 (10%) cases as a consequence of the combined treatment.

Conclusions
A daily dose of Netarsudil/Latanoprost demonstrated a significant reduction in IOP, potentially postponing the need for surgical intervention in patients with OAG. Mild/moderate AEs were reported and consistent with findings previous findings.

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P-PW-0398

PRECLINICAL ASSESSMENT OF QLS-111, A NOVEL ATP-SENSITIVE POTASSIUM CHANNEL OPENER, ALONE AND IN COMBINATION WITH APPROVED OCULAR HYPOTENSIVE DRUGS

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Background

ATP-sensitive potassium (K_{ATP}) channels are biologic sensors that link the metabolic state of cells to their membrane excitability. These channels perform vital functions, including regulation of smooth muscle contractility and vascular tone (*e.g.*, vasodilation). Additionally, K_{ATP} channel openers have been found to have ocular hypotensive activity in several normotensive and ocular hypertensive animal models. Qlaris Bio has developed QLS-111, a novel formulation of an K_{ATP} channel opener for clinical use in human patients. This study was performed to evaluate the safety, tolerability, and ocular hypotensive properties of QLS-111 in preclinical animal models.

Methods

Optimal effective dose for intraocular pressure (IOP) reduction was determined in C57BL/6J (n=25) mice after treatment with various concentrations of QLS-111 (0.00015% - 0.15%). Aqueous humor dynamics of QLS-111 treatment were assessed by constant flow infusion in mice. Safety and tolerability properties of QLS-111 were assessed in Dutch belted pigmented rabbits treated topically with three doses of QLS-111 (0.03%, n=6; 0.075%, n=6; 0.15%, n=10) or vehicle (n=10) for 28 consecutive days. Efficacy of QLS-111 combination therapy was evaluated in mice using a fixed dose formulation with latanoprost or concomitant therapy with timolol.

Results

Optimal dose for IOP reduction in mice was determined to be 0.015%, with a maximal IOP decrease from 16.5 ± 0.5 mmHg to 12.3 ± 0.9 mmHg (4.9 ± 0.7 mm Hg; $p<0.001$). In contrast, mice treated with vehicle showed no change from baseline IOP (16.3 ± 0.3 mmHg to 16.4 ± 0.5 mmHg). Mice treated with QLS-111 showed a significantly ($p=0.0002$) lower episcleral venous pressure (4.1 ± 0.4 mmHg) compared to vehicle-treated controls (9.8 ± 1.1 mmHg). No significant changes were found in outflow facility, uveoscleral outflow or aqueous humor inflow. In rabbits, QLS-111 was well tolerated with no drug related adverse events or ocular inflammation. In combination studies, 0.015% QLS-111 + 0.005% latanoprost fixed dose formulation showed additional IOP lowering of 2.0 mmHg ($p<0.003$) compared to monotherapy with QLS-111 (4.53 ± 0.25 mmHg) or latanoprost (4.09 ± 0.22 mmHg). QLS-111 (0.015%) in combination with 0.5% timolol showed significant additive effect ($p<0.004$), further lowering IOP by over 2.1 mmHg compared to monotherapy (0.015% QLS-111, QPM, 4.13 ± 0.3 mmHg; 0.015% QLS-111, BID, 4.53 ± 0.29 mmHg; 0.5% timolol, BID, 4.33 ± 0.48 mmHg).

Conclusions

QLS-111 is a well-tolerated and effective ocular hypotensive agent in preclinical animal models. Due to its unique ability to reduce distal outflow resistance and lower episcleral venous pressure, QLS-111 shows significant additivity with approved ocular hypotensive medications. QLS-111 is currently being evaluated in three phase 2 clinical trials for safety, tolerability, and ocular hypotensive efficacy in primary open angle glaucoma and normal tension glaucoma patients either in monotherapy or as an additive agent with latanoprost.

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P-0399

TWELVE-WEEK RANDOMIZED CROSSOVER TRIAL ON THE SAFETY AND EFFICACY OF IOP-LOWERING EYEDROPS ADMINISTERED WITH THE NANODROPPER® IN GLAUCOMA PATIENTS

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Background
One major barrier to topical treatment adherence stems from difficulties with self-administering eyedrops.[1] A previous report found that 25% of glaucoma patients ran out of their medications before insurance covered their next refill, which we will refer to as premature bottle exhaustion (PBE), at least once per year due to such challenges.[2] Microvolume delivery adaptors that create microdrops (MD; defined here as < 20 µL) of topical ophthalmic medications, like the Nanodropper® Adaptor, have been proposed as a potential solution to PBE since these devices increase the number of drops per bottle.[3] The purpose of this study was to examine whether intraocular pressure-lowering (IOP-L) using latanoprost 0.005% or timolol maleate 0.5% MD dispensed with the Nanodropper® Adaptor provided non-inferior IOP-L over 12 weeks compared to conventional drops (CD) in primary open-angle glaucoma (POAG) and ocular hypertension (OHT) patients.

Methods
The study was structured as a prospective, non-inferiority, crossover, single-center, single-masked, active-controlled, randomized trial. Subjects were stable POAG/OHT patients receiving care at Wilford Hall Eye Center on Lackland Air Force Base in San Antonio, TX, USA. We randomized subjects to administer CD or MD of their IOP-L eyedrops for 12 weeks before crossing over to the other treatment. IOP, adverse effects (AEs), PBE, and device usability were assessed at baseline, crossover, and final visits. IOP was the primary outcome measure. Secondary outcomes were PBE, AEs, and measures of Nanodropper Adaptor usability.

Results
Non-inferiority and superiority of MD were established for IOP-L efficacy compared to CD. Whereas CD decreased IOP from baseline by 0.13 mmHg (95% CI: -0.26 to 0.52), MD significantly decreased IOP from baseline by 1.59 mmHg (95% CI: 0.88 to 2.29). MD significantly decreased the prevalence of experiencing PBE at least once, from 83% with CD to 17% with MD. The prevalence of experiencing at least one AE with CD and MD was 83% and 62%, respectively ($p = 0.07$), and AE severity was lower with MD compared to CD. Most subjects reported valuing several features of the adaptor and the benefits it provided. Most subjects had no difficulty using the Nanodropper Adaptor and believed it prevented them from wasting their eyedrops.

Conclusions
MD provided non-inferior and superior IOP-L efficacy, decreased prevalence of PBE, and decreased prevalence and severity of non-systemic AEs compared to CD in this cohort of stable POAG/OHT patients. These findings suggest that the Nanodropper Adaptor could optimize IOP-L medications to potentially alleviate barriers to adherence, improve vision outcomes, and elevate the patient experience. The adaptor may help both newly diagnosed and current glaucoma patients using IOP-L therapies maximize duration at goal IOP without having to change or add medications to ultimately lower the overall treatment burden.

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P-0400

NEGATIVE PRESSURE APPLICATION BY THE OCULAR PRESSURE ADJUSTING PUMP TO LOWER IOP IN NORMAL-TENSION GLAUCOMA: HERCULES STUDY

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Background

Patients with normal tension glaucoma have a higher proportion of nocturnal IOP elevation and pose difficult therapeutic challenges. This study was designed to evaluate the safety and nocturnal IOP-lowering efficacy of the Ocular Pressure Adjusting Pump with negative pressure application in subjects with normal-tension glaucoma.

Methods

In this prospective, multi-center, masked, randomized, controlled trial, subjects with an IOP ≥12 mmHg and ≤21 mmHg and confirmed NTG were enrolled. One eye of each subject was randomized to receive negative pressure application; the fellow eye served as a control. The negative pressure was programmed by subtracting a reference IOP of 6 mmHg from the baseline IOP. The primary effectiveness endpoint was the proportion of eyes achieving an IOP reduction ≥20% at Week 52 during the day. The secondary endpoint was the proportion of eyes achieving a nocturnal IOP reduction ≥20% at Week 52. Exploratory endpoints included mean IOP reduction in clinic and in the sleep lab.

Results

186 eyes were randomized across 11 sites. 120 eyes successfully completed all visits across 52 weeks without protocol deviations. At Week 52, 88.3% (n=53) of study eyes versus 1.7% (n=1) of control eyes met the primary endpoint. For the secondary endpoint, 96.7% (n=58) of study eyes versus 5.0% (n=3) met the endpoint. For exploratory IOP analysis, the mean nocturnal IOP reduction at Week 52 was 8.0 mmHg (39.1%) from a baseline of 20.4 ± 2.5 mmHg to 12.4 ± 2.7 mmHg. There were no serious adverse events (AEs). The most commonly reported adverse events were lid (11.8% study, 1.1% control) and periorbital edema (12.9%, 1.1%).

Conclusions

The Ocular Pressure Adjusting Pump safely and effectively lowers nocturnal IOP in patients with normal-tension glaucoma.

P-0401

STRUCTURAL AND FUNCTIONAL OUTCOMES OF PHACOEMULSIFICATION VERSUS PHACOEMULSIFICATION COMBINED WITH MIGS IN ANGLE-CLOSURE GLAUCOMA

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Background

The purpose of this study is to describe long-term structural and functional outcomes in patients with angle-closure glaucoma (ACG) who underwent phacoemulsification alone (Phaco) versus phacoemulsification combined with minimally invasive glaucoma surgery (Phaco-MIGS).

Methods

We retrospectively reviewed the medical records of patients with ACG who underwent phaco or Phaco-MIGS with a 12-month- follow-up. We included different types of angle-based MIGS. The main outcomes were changes from baseline in Optic Nerve Head (ONH) Retinal Nerve Fiber Layer (RNFL) Optic Coherence Tomography (OCT), Humphrey Visual Fields (HVF) and Visual Acuity (VA).

Results

395 eyes of 303 patients were included, 82% were female, with a mean age of 73.8 years. 129 eyes underwent Phaco and 266 Phaco-MIGS. Phaco-MIGS group included Kahook Dual Blade (KDB), Endocyclophotocoagulation (ECP), synechiolysis, and Gonioscopy Assisted Transluminal Trabeculotomy (GATT). At final follow-up RNFL values remained stable in both groups, except in the temporal sector, which improved compared to baseline ($p<0.001$) with no significant differences in the magnitude of change between groups. The Visual Field Index (VFI) showed significant improvement in both groups, the Phaco-MIGS group had a statistically significant more notable change. BCVA had a significant improvement from baseline to final follow-up but there was no difference between groups. Number of medications had a significant reduction from baseline, but there was no statistically significant difference between groups.

Conclusions

Both Phaco and Phaco-MIGS appear to be effective for improving BCVA and stabilizing RNFL thickness and HVF parameters in patients with ACG.

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P-0402

USE OF QUANTUM MOLECULAR RESONANCE (QMR) IN PRIMARY OPEN ANGLE GLAUCOMA (POAG): OUR EXPERIENCE WITH AN INNOVATIVE APPROACH

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Background

Quantum Molecular Resonance (QMR) is an innovative application of quantum physic that offers the ability to modify the molecular structure of biological tissues with extreme precision. QMR technology utilizes non-ionizing high-frequency waves, ranging from 4 to 64 MHz, to produce low-intensity energy quanta that interact with cellular components.

This study investigates the efficacy and safety of QMR administered by the Rexon-Eye® device (Resono Ophthalmic, Sandrigo, Italy) as an innovative neuroprotective treatment in patients with POAG.

Methods

Inclusion criteria were IOP <17±2 mmHg, stable regimen of single topical medications with at least 4 weeks before inclusion, cup/disc ratio < 0.5, BCVA ≥0.00 logMAR, diagnosis of POAG made with alteration at the visual field according to Glaucoma Staging System, absence of concomitant neurological and systemic diseases. Exclusion criteria were ocular hypertension or glaucoma with severe visual field defects, ≥ 2 topical hypotensive treatment, any previous ocular surgeries, any systemic disease like diabetes mellitus.

48 eyes of 48 consecutive patients with a diagnosis of POAG in only one eye were divided in 2 groups:
Group A (QMR group): 26 patients, treated with QMR;
Group B (control group): 22 patients, not treated with QMR.

Complete ophthalmological evaluation was made at the inclusion time and then at 1, 3, 6 and 12 months in the same way in Group A and Group B. QMR treatment was administered by the Rexon-Eye® device with a low intensity, high frequency (35 MHz) electric field completely painless. Our patients were treated with QRM for 20 minutes two times per week for four consecutive weeks. Single treatment sessions were scheduled 3 and 6 months after the time of inclusion.

At the screening visit and at every single follow up visit, both Group A and Group B patients completed the Visual Function Questionnaire (NEI-VFQ-25). The statistical analysis was performed using the STATA 14.0 software.

Results

Group A patients and Group B patients were monitored after 1, 3, 6, and 12 months with the same tests used before administration. Our study showed a slight but statistically significative improvement in visual field emerged for the subject in Group A; this improvement became evident only after 30 days of stimulation with Rexon-Eye® device and remained generally consistent at 3-, 6- and 12-month follow-ups after the start of treatment. QMR group showed a statistically significant more stable data obtained from OCT RNFL measurements compared to those of Group B. In QMR Group, 61.5% of patients reported an improvement in global life quality as reported by the NEI-VFQ-25 questionnaires. None of the patients treated with QMR showed adverse effects.

Conclusions

To the best of our knowledge, this is the first study to evaluate the neuroprotective role of QMR in patients with POAG. A critical analysis of the results from our experience suggests that the Rexon-Eye® protocol is an effective adjunct treatment for patients with POAG.

P-0403

CHANGE IN INTRAOCULAR PRESSURE WITH PRESERVATIVE-FREE LATANOPROST EYE DROP CATIONIC EMULSION OR PRESERVED LATANOPROST: ANALYSIS BY PRIOR MONOTHERAPY

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Background

A Phase 3 trial examined the change in intraocular-pressure (IOP) with the preservative-free (PF) latanoprost eye drop cationic emulsion or preserved latanoprost in open-angle glaucoma (OAG)/ocular hypertension (OHT) patients.[1] Current analyses explored IOP outcomes according to the topical monotherapy used at screening.

Methods

A prospective, parallel, investigator-masked, randomized, non-inferiority trial was conducted in OAG/OHT patients (IOP ≤18 mmHg) using topical monotherapy. After washout, patients with IOP ≥22 mmHg (≤32 mmHg) were randomized 1:1 to receive 0.005% PF latanoprost eye drop cationic emulsion or preserved latanoprost for 12 weeks. Current analyses examined the change in peak (9 AM) IOP at Week 12, from screening (before washout), with subanalysis according to prior monotherapy. A mixed-effect model for repeated measures was used to calculate the least square (LS) mean IOP change and the p-value for treatment arm comparisons.

Results

Each arm included 192 patients. Mean (standard deviation [SD]) age was 63.1 (11.2) years and 61.5% were female. Most patients used prostaglandin analogs (PGAs; 72.8%), carbonic anhydrase inhibitors (CAIs; 13.6%) and beta-blockers (9.4%) at screening. Mean (SD) peak IOP was 16.2 (1.7) mmHg in the PF latanoprost cationic emulsion arm and 16.3 (1.8) mmHg in the preserved latanoprost arm. At Week 12, the LS mean (standard error [SE]) change in peak IOP from screening was -0.7 (0.2) mmHg with PF latanoprost cationic emulsion and -0.1 (0.3) mmHg with preserved latanoprost (P=0.041; Figure). Patients using PGAs at screening showed LS mean (SE) changes in IOP of -0.5 (0.3) mmHg (PF latanoprost cationic emulsion) and 0.1 (0.3) mmHg (preserved latanoprost) at Week 12 (P=0.084). Prior beta-blocker users demonstrated LS mean (SE) IOP changes of -0.6 (0.9) mmHg (PF latanoprost cationic emulsion) and -0.2 (0.8) mmHg (preserved latanoprost) at Week 12 (P=0.725). Prior CAI users showed LS mean (SE) changes in IOP of -1.3 (0.7) mmHg (PF latanoprost cationic emulsion) and 0 (0.8) mmHg (preserved latanoprost) at Week 12 (P=0.072).

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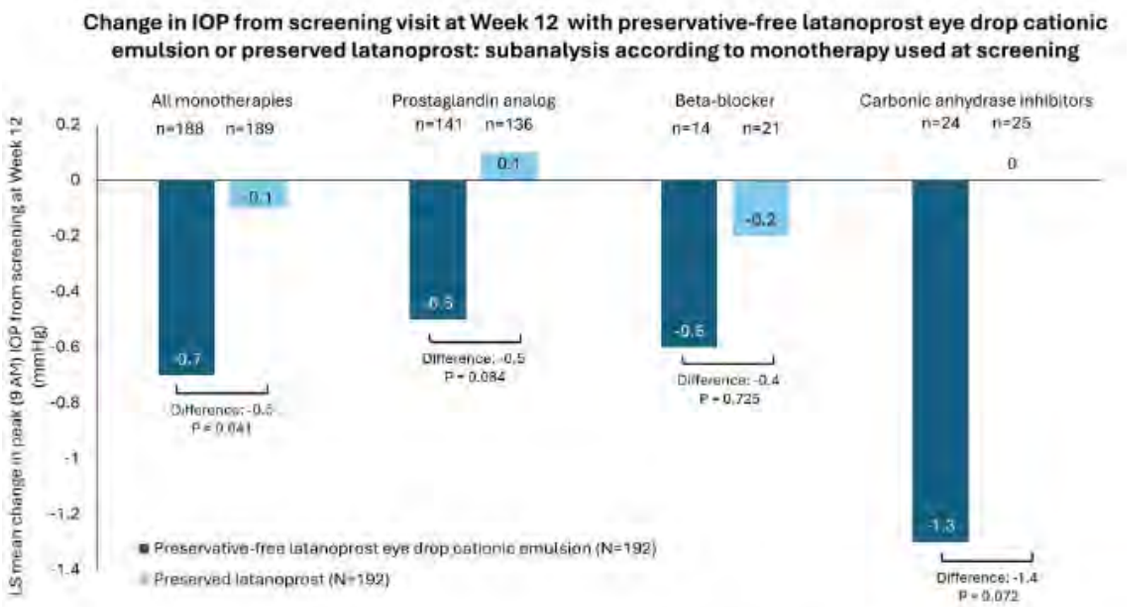

The LS mean and p-value for each subgroup was obtained using a mixed-effect model for repeated measures
Abbreviations: IOP, intraocular pressure; LS, least square.

Conclusions

OAG/OHT patients showed numerically greater reductions in peak IOP at Week 12 from screening with PF latanoprost cationic emulsion treatment compared with preserved latanoprost regardless of prior monotherapy used at screening. These findings suggest switching from any glaucoma monotherapy to the PF latanoprost eye drop cationic emulsion may offer additional peak (9 AM) IOP lowering.

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P-0404

24-HOUR FLUCTUATION IN IOP OF SEPETAPROST VS LATANOPROST IN PATIENTS WITH POAG OR OHT

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Background
To assess 24-hour fluctuation in intraocular pressure (IOP) in adults with primary open-angle glaucoma (POAG) or ocular hypertension (OHT) treated with sepetaprost (SEP) ophthalmic solution 0.002% or latanoprost ophthalmic solution 0.005% (LAT); and IOP lowering efficacy after treatment cessation.

Methods
Post hoc analyses of a phase 2 exploratory study (EudraCT: 2020-004836-93) in adults with POAG/OHT randomized to once-daily SEP or LAT for 3 months (M) following a ≤35-day (d) screening period. The primary endpoint was met: mean 24h IOP at M3 was consistently numerically lower with SEP vs LAT. Post hoc analyses compared efficacy of SEP vs LAT in reducing 24h IOP fluctuation from baseline (BL) to Wk 6+1d and M3. Fluctuation was calculated by subtracting lowest from highest IOP readings within the 24h curve per participant; mean difference between groups was calculated for each timepoint. Further analyses assessed durability of IOP-lowering efficacy after treatment cessation at M3+1d. Mean IOP change from BL at M3+1d, 36h after last SEP administration (measured at 8:00) and 24h after last LAT administration (measured at 20:00) were compared.

Results
Participants (n=33) received SEP (n=17) or LAT (n=16) for 3 M. Reduction in 24h IOP fluctuation from BL at Wk 6+1d was numerically greater for SEP vs LAT; mean (standard error: SE) difference −1.99 (1.11) statistically significantly favored SEP at 90% confidence interval (CI) (−3.87, −0.10) but was not significant at 95% CI (−4.25, 0.28). Mean (SE) reduction in IOP fluctuation from BL at M3 with SEP was numerically greater vs LAT but not statistically significant at 90% CI (−2.15, 1.15) or 95% CI (−2.49, 1.49). IOP change from BL at M3+1d, 36h post-administration with SEP, was numerically greater vs LAT 24h post-administration: mean (SD) –5.22 (4.36) vs –4.16 (2.21), respectively; mean (SD) percentage changes: –19.0% (17.59) vs –18.5% (9.49), respectively.

Conclusions
In participants with POAG/OHT, sepetaprost in comparison with LAT significantly reduced IOP fluctuation vs BL at Wk 6+1d and numerically reduced fluctuation at M3. IOP reduction up to 36h and 24h after cessation of 3 months' treatment with SEP or LAT, respectively, was numerically greater with SEP vs LAT, indicating possibly longer duration of action with sepetaprost in this population, although direct comparison cannot be made due to the different timepoints assessed.

P-0405

EFFECTS OF MULTIFACETED BEHAVIORAL INTERVENTIONS ON ADHERENCE TO TOPICAL HYPOTENSIVE THERAPY AND INTRAOCULAR PRESSURE IN GLAUCOMA

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Background

Topical hypotensive therapy (THT) for glaucoma is the most commonly used first-line treatment option.1 Poor adherence to medication is associated with vision loss, yet adherence is estimated to be as low as 20% in some cases.2,3 We assessed the effects of multifaceted behavioral interventions (*e.g.*, combined education [edu], reminders [rem], communication [com], or devices [dev]) on THT adherence and intraocular pressure (IOP).

Methods

We conducted a Cochrane systematic review. We searched 5 bibliographic databases and 2 trial registries in May 2024. We included randomized controlled trials of multifaceted interventions compared to standard care or single interventions in adults ≥18 years using THT. We independently screened records and assessed all articles for risk of bias, adjudicating discrepancies with a third reviewer. We synthesized results for each outcome using a random-effects meta-analysis of risk ratios (RR) or standardized mean difference (SMD) as applicable. We qualitatively synthesized the results following Cochrane recommended approaches where meta-analysis was not possible. We used the GRADE approach to assess the certainty of the body of evidence.

Results

From 19456 records, we screened 12000 titles/abstracts and retrieved 153 full-text reports for further review, of which we included 17 studies (34 records). The 17 studies included 4753 participants with a mean age range from 42 to 72. Where reported, 2248 (52%) were male, and 2037 (48%) female, and most were White (n=2193; 62%). Most studies were conducted in the United States (n=8) and were funded by the government (n=9) and industry (n=8). Study follow-up ranged from 3 to 24 months with the most common outcomes being adherence (n=17) and IOP (n=8). Other prespecified outcomes, including disease stability, optical coherence tomography, visual fields, were not reported or rarely reported.

Overall, evidence was inconsistent with low certainty and moderate to high RoB. Subgroup analyses of interventions with [edu+com/rem] or [edu+com] may have little to no effect on final mean adherence (SMD -0.05, 95% CI -0.19, 0.09; n=758; I2=36%) or the proportion of adherent participants(RR 1.09, 95% CI 0.93, 1.28; n=1943; I2=71%) compared to standard care alone or with a single intervention. However, subgroup analysis of [rem+other] may increase the proportions of adherent participants compared to standard care (RR 1.59, 95% CI 1.23, 2.05; n=149; I2=0%). See Figure for full and subgroup analyses. Qualitatively, multifaceted interventions to improve adherence may have little to no effect on IOP reduction (low certainty).

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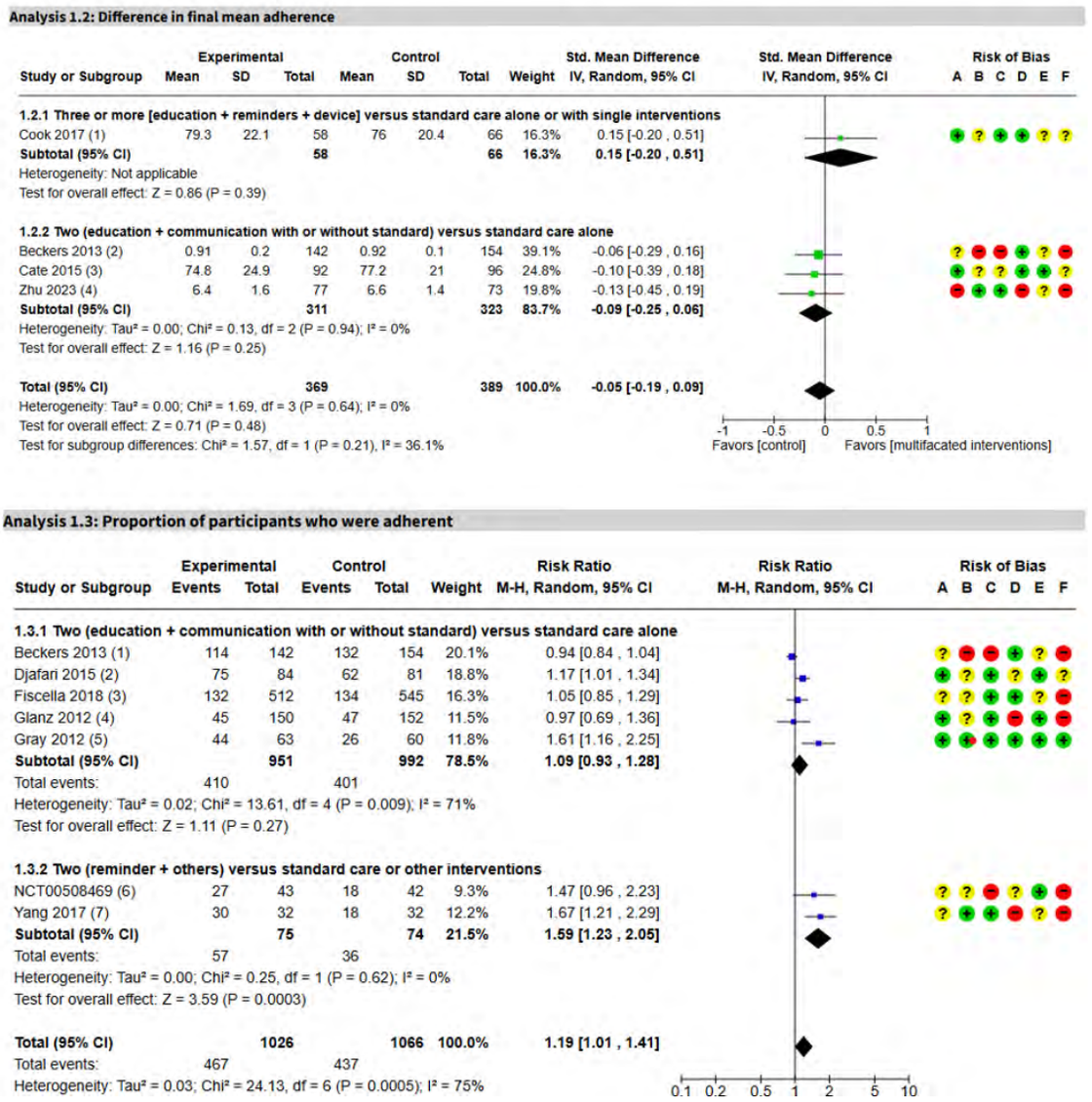

Conclusions

The certainty of evidence was low on the effects of multifaceted interventions on IOP and patient adherence to THT. Due to inconsistent metrics, measures, and reporting, it was not possible to meta-analyze the outcomes across most studies. This review highlights the need for standardized measures and outcomes, particularly ones relating to disease stability, for future studies.

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P-0406

RESPONSE TO PROSTAGLANDIN ANALOGUE THERAPY AND PREDICTORS FOR INTRAOCULAR PRESSURE TREATMENT EFFECT: LIGHT AND UKGTS TRIALS

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Background

Prostaglandin analogues (PGA) are the most widely recommended first-line medication for glaucoma[1], for which the intraocular pressure (IOP) lowering effect is well documented. To date, the only known predictor of treatment response to PGA therapy is baseline IOP. This post-hoc analysis aimed to describe the response to PGA eye drops across two randomized controlled trials (LiGHT[2] and UKGTS[3]) and to determine predictors for IOP treatment effect at early and late timepoints.

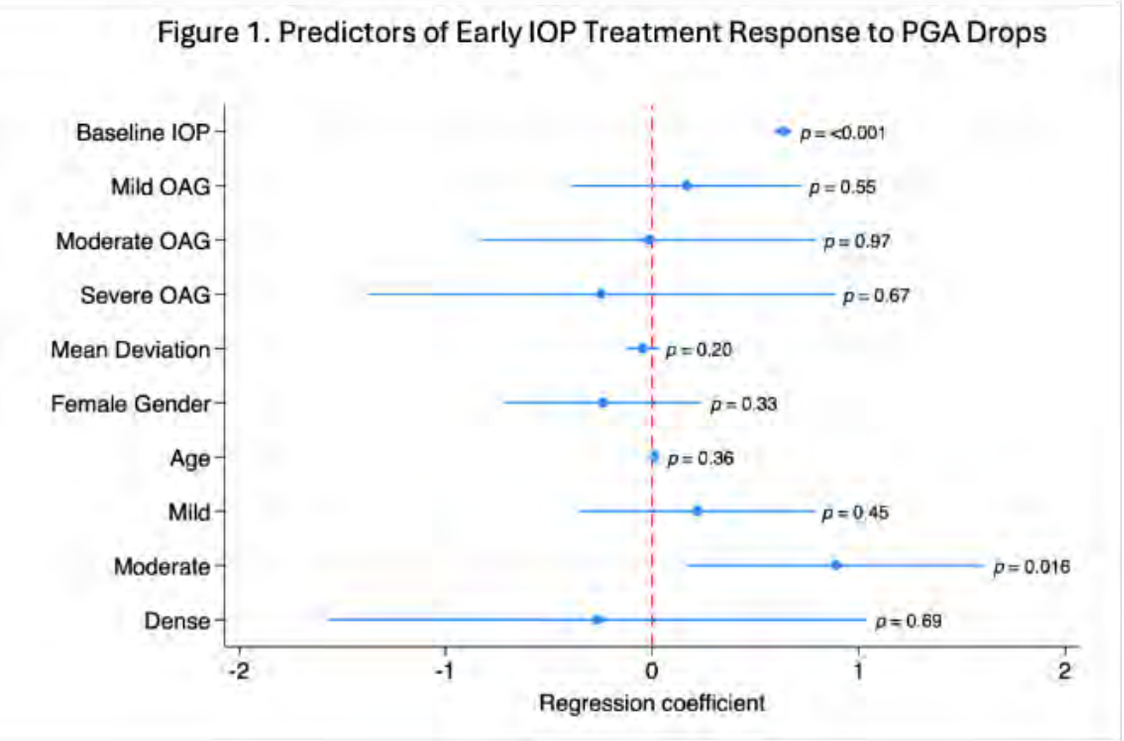
Methods

IOP reduction at 8 weeks following treatment initiation with PGA drops was assessed in treatment-naïve eyes with ocular hypertension (OHT) or open angle glaucoma (OAG). Using a combined cohort from LiGHT and UKGTS studies, predictors for early treatment effect were assessed with a linear mixed effects model. Survival analysis determined predictors for failure to remain at target IOP, on PGA drops alone, up to 2 and 3 years (for UKGTS and LiGHT, respectively).

Results

A total of 1059 eyes from 573 patients were included in this analysis. 169 eyes had OHT and 890 eyes had OAG. Mean IOP reduction was 6.14 mmHg (26% reduction) at 8 weeks. For the combined LiGHT and UKGTS cohorts, greater IOP lowering at 8 weeks was associated with higher baseline IOP (coefficient (95% CI) = 0.63 (0.59 – 0.68), $p < 0.001$) and moderate trabecular meshwork pigmentation (0.89 (0.17 – 1.61), $p = 0.02$), see Figure 1. For the UKGTS cohort, predictors for failure to remain at target IOP on PGA drops alone, up to 2 years, included lower baseline IOP (HR 0.81, $p < 0.001$), higher IOP at 8 weeks (HR 1.21, $p < 0.001$) and increased disease severity (compared to mild OAG: moderate HR 2.05, $p = 0.02$, severe HR 4.33, $p = 0.02$). For the LiGHT cohort, predictors for failure to remain on PGA drops alone, up to 3 years, included lower baseline IOP (HR 0.93, $p = 0.008$), higher IOP at 8 weeks (HR 1.24, $p < 0.001$), increased age (HR 1.03, $p = 0.01$), and increased disease severity (compared to OHT: mild HR 2.06, $p = 0.009$, moderate HR 3.34, $p = 0.006$, severe HR 3.96, $p = 0.012$).

Image



Conclusions

Early treatment response to PGA drops is primarily influenced by baseline IOP, whereby higher baseline IOP produces a greater IOP lowering effect. In terms of durability of treatment effect over time, patients with higher baseline IOP and greater early treatment response to PGA drops were more likely to remain at target IOP on PGA drops alone up to 3 years. Increasing age and disease severity were risk factors for treatment failure.

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P-0407

CROSSOVER STUDY OF LATANOPROSTENE BUNOD VERSUS PROSTAGLANDIN ANALOGUES IN EYES WITH PRIMARY OPEN-ANGLE GLAUCOMA

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Background

Latanoprostene bunod 0.024%, was the first modified prostaglandin analog approved by the FDA for the treatment of primary open angle glaucoma and ocular hypertension. This combination results in a dual mechanism for lowering IOP: latanoprost acid increases aqueous outflow through the uveoscleral pathway and nitric oxide increases aqueous outflow through the trabecular meshwork and Schlemm's canal. Pooled data from two separate Phase 3 studies comparing LBN 0.024% once daily to timolol 0.5% twice daily demonstrated a reduction from baseline in IOP among patients treated with LBN ranging from 7.5 to 9.1 mm Hg.

Methods

This is a prospective, open-label, randomized, cross-over study. Patients with primary open-angle glaucoma and ocular hypertension who were on maximal antihypertensive therapy including a prostaglandin analogue and who had maintained this treatment for at least 3 months were selected. The analogue was changed to latanoprostene bunod 0.024% (Vyzulta) for 3 months, restarting after this time their initial prostaglandin analog.

Results

A total of 22 eyes were evaluated. The number of drugs used was between 3 and 4, with 3 being used in the majority of the eyes evaluated (59.1%); the most commonly used prostaglandin analogue was latanoprost (40.9%). The mean deviation of the visual field was -9.36 (interquartile range -5.08 to -16.98). Regarding visual capacity, the largest proportion of patients had 20/25 vision (31.8%).

Intraocular pressure was analyzed at the beginning of the study, finding a non-parametric distribution with an initial median of 13 mmHg. After the start of latanoprostene bunod, the median IOP was reduced to 12 mmHg ($p=0.028$), after the initial prostaglandin was restarted, an increase to 14 mmHg was shown ($p=0.007$), with the difference being greater when comparing the use of latanoprostene bunod followed by the initial prostaglandin restart ($p<0.001$).

Regarding the evaluation of the severity of dry eye using the OSDI test, the initial mean score in the study was 22, after the start of LBN the mean score was reduced to 13 points ($p<0.001$).

At baseline, the median tear break-up time was 7 seconds, which was significantly prolonged with the use of LBN to 9 seconds ($p<0.001$), while the tear break-up time decreased again to 7 seconds when the initial prostaglandin was restarted ($p<0.001$).

Image

Initial variable	Results (n=22)	Comparative variable	Results (n=22)	p value
Initial IOP (mmHg)	13 (12-15)	**IOP 3 months after initial PG reset (mmHg)**	14 (13-16)	0.007
Initial IOP (mmHg)	13 (12-15)	**IOP 3 months after latanoprostene bunod (mmHg)**	12 (11-14)	0.028
IOP 3 months after latanoprostene bunod (mmHg)	12 (11-14)	**IOP 3 months after initial PG reset (mmHg)**	14 (13-16)	<0.001

Conclusions

This study demonstrated that intraocular pressure was significantly reduced with the use of latanoprostene bunod at 3 months after switching from other prostaglandin analogues. IOP increased when the previous prostaglandin analogue was restarted. Regarding ocular surface data, there was a decrease in the OSDI score, as well as a decrease in the Oxford classification; as well as an increase in tear break-up time with the use of LBN.

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P-0409

TAFLUPROST PROMOTES AXON REGENERATION AFTER OPTIC NERVE CRUSH VIA ZN2+/MTOR PATHWAY

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Background
To investigate whether tafluprost, which is a prostaglandin F2 (PGF2) analogue and a first-line medical treatment for patients with primary open angle glaucoma (POAG), could promote optic nerve regeneration in mice after optic nerve crush (ONC), and to find out the underlying molecular mechanism.

Methods
Multiple concentrations of tafluprost (1uM, 10uM and 100uM of which dissolved in 0.1% dimethylsulfoxide (DMSO)) or 0.1% DMSO was injected immediately into the vitreous of 8-10-week-old male C57BL/6J mice after ONC. At 7 and 14 days after ONC, the numbers of survival retinal ganglion cells (RGCs) were counted with co-stained by neuronal class βIII tubulin (TUJ1) and RBPMS. Individual axons that regenerated to 0.05mm, 0.1mm and 0.2 mm were manually counted in the whole-mount optic nerve labeled by Cholera toxin B (CTB). The level of Zn^{2+} in inner plexiform layer (IPL) of retina with or without tafluprost was stained by autometallography (AMG). Retinal sections were subjected to p-mTOR, p-Akt, p-S6 and 4EBP1 staining to detect protein activation.

Results
Tafluprost eliminated the AMG signal in the IPL when examined at 6h after ONC ($P<0.05$). Tafluprost significantly protects RGCs from apoptosis at both 7 and 14 days after ONC ($P<0.01$ and $P<0.001$ respectively). At 2 weeks post-injury, tafluprost promotes greater optic nerve axon regeneration with CTB-positive fiber at multiple sites distal to the lesion than the DMSO-treated group. The high-affinity, membrane-permeable Zn^{2+} chelator TPEN (N,N,N′,N′-tetrakis (2-pyridylmethyl) ethylenediamine) can reactive the mTOR signal pathway after ONC with the observation of elevated intensity of p-S6 in the retina.

Conclusions
Our results suggest that tafluprost promoted axon regeneration via the regulation of Zn^{2+}-mTOR pathway, and provide novel research directions for the mechanisms of glaucomatous optic nerve injury.

P-0410

MANOMETRIC INTRAOCULAR PRESSURE REDUCTION WITH NEGATIVE PRESSURE USING OCULAR PRESSURE ADJUSTING PUMP (OPAP) GOGGLES

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Background
The Ocular Pressure Adjusting Pump (OPAP) is a novel, non-invasive and non-pharmacological intraocular pressure (IOP)-lowering device consisting of goggles attached to a negative pressure (NP) pump. This study aimed to determine the effect of negative pressure in OPAP goggles on IOP using continuous direct manometry.

Methods
This prospective, single-arm, single-center, trial was performed in adult patients undergoing cataract surgery. Direct manometry was performed via an anterior chamber cannula attached to an IOP sensor placed immediately prior to cataract surgery. IOP was continuously monitored every 0.5 seconds through the following sequence of 30 seconds each: baseline IOP measurement, NP -10 mmHg, NP off, NP -20 mmHg, and NP off.

Results
All seventeen subjects had a dose-dependent reduction in IOP, with a mean IOP decrease from 16.9 to 11.3 (33%) with -10 mmHg of NP and from 15.7 to 7.7 (51%) mmHg with -20 mmHg of NP. IOP returned to baseline for each cycle when NP was discontinued. There were no patients with increased IOP.

Conclusions
Negative pressure with OPAP results in a consistent dose-dependent reduction in IOP, with return to baseline IOP when NP is discontinued.

P-0411

EFFICACY OF MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION PLUS IN REFRACTORY GLAUCOMA

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Background
Refractory glaucoma is a challenge for ophthalmologists. The disease can progress, leading to permanent blindness or pain that affects the patient's life. At that time, ciliary body destruction can be proposed and the method of implementation is additional transscleral ciliary micropulse photocoagulation plus using a diode laser (810 nm) combining 2 techniques sweeping and discrete spot for intraocular pressure lowering and does not have serious complications of patients with uncontrolled IOPs who had previous micropulse transscleral photocoagulation with only performing techniques sweeping. Therefore, we conducted a survey of evaluating the efficacy of micropulse transscleral cyclophotocoagulation plus in treating refractory glaucoma.

Methods
Prospective study involved with uncontrolled clinical trial. The patient received treatment with additional transscleral ciliary micropulse photocoagulation using the Supra810 machine from Quantel Medical with a 600 µm diameter Subcyclo probe placed perpendicularly, 3 mm from the limbus. Parameters set power level: 2.0W, 31.3% duty cycle (on time: 0.5 ms; "off" time: 1.1 ms). Laser time: total 136 seconds. In which, the first 100 seconds perform the scanning technique for the upper and lower halves. During the 36 seconds after performing the scoring technique, each scoring stops for 3 seconds, divided equally between the upper half and the lower half. Avoid the 3 o'clock and 9 o'clock positions where nerves and arteries are located below, or avoid areas where the sclera is thin, or trabecular bleb, or drainage devices. The main outcome measurement was IOP at 1day, 1 week, 1 month, 3 months, 6 months post-procedure, with success defined as a 20% reduction in baseline IOP or IOP from 6 to 25 mmHg, and no need for further reoperation.

Results
The study included 39 eyes with refractory glaucoma, average age was 55.2 ± 12.9 years, ratio of male and female = 1,2 : 1. The diagnosis of neovascular glaucoma accounted for the highest rate in the study group (38,5%). Visual acuity from no perception of light to count fingers 0,5 m. All diseases have CDR = 1.0. The average preoperatively IOP was 43,1 ± 9,6 mmHg and posttreatment 6 months were 20,7 ± 13,5 mmHg (60%)($p < 0,001$). There was a reduction in glaucoma medications form 3,6 ± 0,6 preoperatively to 1,5 ± 1,1 at 6 months $p < 0,001$). There were no cases of serious complication as hypotony.

Conclusions
Micropulse transscleral cyclophotocoagulation plus is effective and safety in lowering intraocular pressure in eyes with refractory glaucoma after previous failed micropulse transscleral photocoagulation.

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P-0412

PERCENTAGE OF INTRAOCULAR PRESSURE REDUCTION TO PREVENT PROGRESSION IN TAIWANESE PATIENTS WITH NORMAL TENSION GLAUCOMA AND PRIMARY OPEN ANGLE GLAUCOMA

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Background
Intraocular pressure (IOP) is the only modifiable factor to prevent glaucoma progression; however, determining this progression using visual field (VF) and optical coherence tomography is necessary but time-consuming. Additionally, literature regarding the percentage of IOP reduction needed for glaucoma stabilization in Taiwanese patients is still limited. The aim of this study is to investigate the IOP reduction percentage required to prevent glaucoma progression and thus enable timely clinical interventions.

Methods
This retrospective cohort study included treatment-naïve primary open angle glaucoma (POAG) and normal tension glaucoma (NTG) patients who underwent regular visual field exams and had a minimum follow-up of 5 years. Exclusion criteria included any prior glaucoma treatment or any contraindication to the four major types of anti-glaucoma eye drops upon glaucoma diagnosis. Stabilized glaucoma was defined as VF progression within -0.5 dB/year, without further medication fortification. The average of IOP measurements after achieving glaucoma stabilization was used to calculate the IOP reduction percentage from baseline. The required anti-glaucoma medication and IOP reduction percentage were compared between POAG and NTG cases.

Results
We reviewed 274 treatment-naïve cases with follow-up for more than 5 years at multiple referral centers, excluding patients with irregular VF exams or incomplete medical records. Eventually, 148 patients were enrolled, including 41 POAG cases (27.7%) and 107 NTG cases (72.3%). Among these, 95.2% of POAG cases and 87.9% of NTG cases achieved glaucoma stabilization within the follow-up period. On average, it took 2 years to achieve glaucoma stabilization with a mean VF deterioration of -1.41 dB. Compared to the NTG group, the POAG group required a higher IOP reduction percentage (29.4% vs. 16.9%, $p < 0.001$) and more types of anti-glaucoma eyedrop (2.08 vs. 1.71, $p = 0.007$). With IOP reductions of 10%, 20%, 30%, and 40%, respectively, 22.4%, 60.7%, 79.5%, and 85% of NTG patients achieved glaucoma stabilization. In contrast, in the POAG group, 0%, 17.1%, 48.8%, and 87.8% of patients achieved glaucoma stabilization with the same percentages of IOP reduction.

Conclusions
POAG patients required a higher IOP reduction percentage than NTG cases. An IOP reduction of 20% can prevent glaucoma progression in nearly 80% of NTG cases, but a reduction of 30% is required to achieve a similar protective effect in POAG cases.

P-0413

EFFECT OF TOPICAL MEDICATIONS FOR THE TREATMENT OF GLAUCOMA ON THE CORNEAL EPITHELIUM AT ONE YEAR OF FOLLOW-UP

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Background

Glaucoma is the leading cause of irreversible blindness worldwide. The main risk factor is increased intraocular pressure (IOP) and various treatments are aimed at reducing it. The use of first-line drugs is the cornerstone for IOP control, but the adverse effects associated with their use on the ocular surface are well known. There is no clear quantitative or objective evidence of the effect of these drugs on the corneal epithelium. The purpose of this study was to evaluate the effect of antiglaucomatous drugs on the corneal epithelium and tear film over a year.

Methods

Observational, longitudinal and prospective study. Patients were selected from the Ophthalmology Clinic of Cartagena, Colombia, with a first-time diagnosis of glaucoma, meeting the selection criteria, including that they had never received antiglaucomatous therapy and that they had no alterations in the ocular surface. Those who had surgery or trauma affecting the ocular surface during the study were excluded. All patients received a complete ophthalmologic examination at each visit and completed the Ocular Surface Disease Index (OSDI) survey. Patients were assessed with the OCT-CIRRUS 6000 and the Ocular Surface Analyzer (OSA) prior to the start of treatment and then at 90, 180, and 365 days after starting treatment. Statistical analysis was performed with Epi Info v.7.2 software.

Results

84 eyes of 42 patients were included, with an average age of 62.7 years. 62% were women. The average baseline corneal thickness was 536 microns and at one year it was 543.5 microns. The average initial corneal epithelial thickness was 45.5 microns, while at one year it was 43.1 microns. The OSDI score reported an average value of 7.6 at baseline (normal), and increased significantly to 17.4 (mild dry eye) at one year. The OSA analysis showed a decrease in BUT from 8.3 at baseline to 7.1 sec. at one year, the rate of meibomian gland loss showed an increase from the baseline value of 12.4 to 20.5% at one year, both results were statistically significant. The height of the tear meniscus showed a decrease from 0.37 at baseline to 0.35 mm at one year.

Conclusions

These results show the decrease in the corneal epithelium with the use of antiglaucomatous medications and suggest an increase in corneal thickness that could be explained by secondary stromal edema. The BUT and the loss of the meibomian glands are the clinical data that are most altered with the use of these medications.

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P-0414

DRUG INTERACTIONS IN GLAUCOMA: TIMOLOL AND THE IMPACT OF SELECTIVE SEROTONIN REUPTAKE INHIBITORS (SSRIS)

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Background

Timolol, a medication used to lower intraocular pressure (IOP), is metabolized by the liver enzyme CYP(450)2D6. Although the pharmacodynamic effects of antidepressants on IOP remain unclear, their pharmacokinetic interactions with glaucoma treatments, like timolol as well as the associated adverse effects are rarely investigated. This is primarily due to the belief that eye drops exhibit minimal systemic bioavailability. Nevertheless, adverse cardiovascular events have been reported in CYP2D6 poor metabolizers (PM) who are treated with timolol (1). Since many antidepressants act as CYP2D6 inhibitors, we examined the prevalence of cardiac side effects associated with their co-administration with timolol.

Methods

A systematic search of studies was conducted on PubMed using pre-defined search criteria, complemented by manual examination of citations and references.

Results

Based on pre-selected criteria, including preclinical studies, case reports involving glaucoma patients, and pharmacokinetic studies, the research revealed the following findings: 1. Fluoxetine and paroxetine are strong inhibitors of CYP2D6, making clinically relevant adverse events to timolol more likely with these drugs compared to other selective serotonin reuptake inhibitors(2). 2. Timolol eye drops can undergo systemic absorption and have been associated with bradycardia when used concomitantly with venlafaxine or sertraline (3). 3. Clinically significant systemic concentrations of timolol were detected in patients concurrently treated with paroxetine (4).

Conclusions

Cardiac adverse effects from overexposure to timolol, caused by strong CYP2D6-inhibiting SSRI antidepressants, have been documented. Glaucoma specialists should consider inquiring about these drugs before safely prescribing timolol. Future research should focus on consistent reporting of outcomes and adverse effects especially in patients with already CYP2D6 poor metabolizer status.

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P-0415

PROSTAGLANDIN-ASSOCIATED OCULAR ADNEXAL PATHOLOGIES : INSIGHTS FROM THE LARGEST POPULATION STUDY USING THE FAERS DATABASE

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Background
Prostaglandins are widely prescribed for glaucoma but are associated with ocular adnexal pathologies including orbitopathy, lid swelling, and periorbital color changes. Despite their widespread use, large scale data on these adverse effects remain limited.

Methods
Patient data was gathered from the international FDA Adverse Event Reporting System (FAERS) database. Patients with ocular side effects formed the case group, while those without ocular symptoms constituted the control group. Variables studied included the indication for prostaglandin use, type of glaucoma, gender, age, and specific medication. Exclusion criteria included reports from non-healthcare practitioners, cases with multiple potential causes of side effects, and unclear indications for prostaglandin use.

Results
A total of 12,264 patients met the eligibility criteria.

Gender: Men were more likely to report orbitopathy (OR 2.50, p=0.003), lid swelling (OR 5.78, p<0.0001), and periorbital color changes (p<0.0001) than women.

Age: Patients who reported ocular adnexal pathologies were significantly younger than those without the corresponding symptoms.
- Lid swelling: 55.36 years vs. 64.28 years (p<0.0001).
- Periorbital color changes: 58.23 years vs. 64.21 years (p<0.0001).
- Any oculoplastic symptom: 58.15 years vs. 64.74 years (p<0.0001).

Indications: Patients using prostaglandins for lash growth were more likely to report lid swelling (OR 11.26, p<0.0001), periorbital color changes (p<0.0001), and any oculoplastic symptom (p<0.0001) compared to those using prostaglandins for glaucoma. Patients with pseudoexfoliation glaucoma (PXG) had significantly higher rates of orbitopathy (41.67%) compared to other glaucoma types (7.41%, p<0.0001) and were more likely to report higher risk of any oculoplastic symptom (41.67%, p=0.0039).

Specific Medication: Bimatoprost was associated with the highest rates of orbitopathy (13.06%, p<0.0001), lid swelling (13.06%, p<0.0001), periorbital color changes (16.88%, p<0.0001), and any oculoplastic symptom (27.94%, p<0.0001) compared to latanoprost, travoprost and tafluporst.

Conclusions

Prostaglandin associated oculoplastic adverse effects are more pronounced in men, in younger patients, in those patients using prostaglandins for lash growth verses glaucoma, and those using bimatoprost. PXG was identified as a significant risk factor for orbitopathy. This represents the largest population study of ocular adnexal pathologies associated with prostaglandins to date and underscores the need for clinicians to consider these findings when prescribing prostaglandins, particularly in high-risk populations.

P-0417

EFFICACY OF BIMATOPROST SUSTAINED-RELEASE IMPLANT IN TREATING SEVERE INTRAOCULAR PRESSURE IN OPEN ANGLE GLAUCOMA: A SYSTEMATIC REVIEW & META-ANALYSIS

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Background
Glaucoma, a leading cause of irreversible blindness, is characterized by progressive optic neuropathy resulting from elevated intraocular pressure (IOP). The bimatoprost implant, a sustained-release and biodegradable solution, can be inserted into the eye's anterior chamber to reduce IOP in patients with open-angle glaucoma (OAG). However, additional research is necessary to comprehensively evaluate the efficacy of the bimatoprost 10 µg implant in treating OAG patients compared to other available treatment options.

This study aimed to systematically review and meta-analyze the efficacy and safety of the bimatoprost 10 µg implant in managing severe intraocular pressure in patients with OAG.

Methods
This meta-analysis of recent randomized controlled trials (RCTs) adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Protocols to ensure methodological rigor and address the research aims. To identify relevant research articles, a comprehensive search was conducted across four electronic databases: PubMed, EMBASE, Cochrane Library, and clinicaltrials.gov. Primary outcomes included intraocular pressure (IOP), rescue rate, proportion of individuals achieving desired IOP reduction, and adverse events. The Cochrane Risk of Bias tool was employed to assess the methodological quality of each included RCT. Pooled analysis was performed using RevMan (Review Manager) software version 5.4.

Results
A meta-analysis of twelve studies involving 2808 OAG patients aged 60-80 with severe or uncontrolled IOP found that the bimatoprost SR implant is effective and safe in lowering IOP. The implant significantly reduced IOP levels compared to placebo, as demonstrated by a mean difference of -1.53 mmHg (95% CI: -0.43 to -2.64). Additionally, the implant was associated with a slight increase in the proportion of patients with reduced IOP (OR: 0.70, 95% CI: 0.57-0.86) and a modest increase in the rescue rate (OR: 2.02, 95% CI: 0.55-7.52). The bimatoprost SR implant was well-tolerated, with fewer adverse events and no treatment-emergent adverse events (TEAEs) reported in the treatment group compared to the placebo.

Conclusions
This meta-analysis demonstrated that the bimatoprost implant is an effective and safe option for treating OAG by reducing intraocular pressure IOP. However, further research is warranted to fully evaluate its potential for delaying disease progression. Given its efficacy in managing severe glaucoma, the bimatoprost SR implant may be a valuable tool for optimizing IOP control and improving patient outcomes.

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P-0419

INCIDENCE AND RISK FACTORS FOR BLEPHARITIS OF 0.4% RIPASUDIL IN JAPANESE GLAUCOMA PATIENTS

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Background
Ripasudil hydrochloride hydrate (GLANATEC® Ophthalmic Solution 0.4%; Kowa Co., Ltd.), a rho-associated protein kinase inhibitor that reduces intraocular pressure (IOP) via direct modulation of the main aqueous outflow pathway, was first approved for the treatment of glaucoma in Japan in 2014. However, previous studies have reported a relatively high rate of blepharitis occurrence in glaucoma patients post initiation of ripasudil use. In this study, we investigated the incidence rate and associated risk factors of blepharitis occurrence in glaucoma patients using ripasudil.

Methods
In this retrospective study, we reviewed the medical records of 501 glaucoma patients (227 males and 274 females; mean age: 67.4±13.3 years; mean observation period: 11.0±12.0 [mean±SD] months) who were prescribed ripasudil at our eye clinic between December 2014 and November 2023. The patients were classified into the following two groups: 1) Bleph Group (those in whom blepharitis occurred) and 2) Non-Bleph Group (those in whom blepharitis did not occur). Clinical factors, such as age, sex, glaucoma type, number of glaucoma drugs used, use of brimonidine tartrate eye drops, a history of discontinuation of glaucoma eye-drop medication due to side effects, and a history of atopic dermatitis, were noted, and the risk factors of blepharitis occurrence were investigated using multivariate logistic analysis.

Results
Of the 501 patients, there were 131 (44 males and 87 females; mean age: 65.4±12.3 years) in the Bleph Group and 370 (183 males and 187 females; mean age: 68.2±13.6 years) in the Non-Bleph Group, thus showing that the incidence of blepharitis occurrence was 26.1%. The mean elapsed period from ripasudil initiation to the onset of blepharitis was 9.0±8.0 months (range: 1-60 months), yet in all cases, blepharitis disappeared post discontinuation of ripasudil use. Significant risk factors for the occurrence of blepharitis were female sex (odds ratio [OR]: 1.57, P=0.045) and a history of glaucoma eye-drop medication being discontinued due to side effects (OR: 2.37, P<0.001) via multivariate logistic analysis findings.

Conclusions
Our findings revealed that strict long-term follow-up is necessary in glaucoma patients being treated with ripasudil, as ripasudil-induced blepharitis can occur at several months post the initiation of use, especially in female patients and patients who have a history of discontinuing glaucoma medications due to side effects.

P-0420
CHANGES IN OCULAR SURFACE AFTER SELECTIVE LASER TRABECULOPLASTY

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Background
Selective Laser Trabeculoplasty (SLT) has been shown to safely and effectively reduce intraocular pressure (IOP) and number of medications as well as to improve quality of life, however, its effects on the ocular surface remain underinvestigated. The purpose of our study is to describe changes in Ocular Surface after Selective Laser Trabeculoplasty (SLT) in patients with Open Angle Glaucoma (OAG) or Ocular Hypertension (OHT).

Methods
Prospective Cohort. Patients over 40 years of age with mild to moderate OAG or OHT with use of topical glaucoma medication were subsequently recruited. We excluded patients with: history of refractive surgery, radiotherapy, chemotherapy, Thyroid disease, Autoimmune disease, chemical burns or other ocular surface inflammatory disorders (OSID).

On the day of enrollment, patients underwent a complete ophthalmological examination, Humphrey Visual Fields (HVF), Retinal Nerve Fiber Layer (RNFL) Optic Coherence Tomography (OCT) and ocular surface assessment that included Ocular Surface Disease Index (OSDI) Test, Schirmer Test, and Tear Break up time (TBUT) measured by Keratograph. Enrolled patients underwent SLT. The main outcomes were changes from baseline in OSDI, Schirmer Test and TBUT at week 1, month 1 and month 3 after SLT.

Results
Fifty eyes were included. Mean patient age was 61.8 years, 51.7% were female; regarding diagnoses: 41.4% had POAG, 34.4% OHT, 17.2% Pseudoexfoliation glaucoma, and 6.9% steroid induced glaucoma. Significant improvement in OSDI scores was observed, from a baseline median of 15 to median of 5 at three months after SLT ($P < 0.01$). Schirmer Test also improved from a baseline mean of 6mm (4mm-8mm), to 7mm (5mm-10.8mm) at 3 months after treatment (P 0-02). Mean TBUT measures improved from a mean of 11.01 seconds at baseline to 12.21 at final 3 month follow-up. Glaucoma medications reduced from 1.58 before SLT to 0.517 at month 3.

Conclusions
SLT demonstrated improvement in ocular surface health metrics, as evidenced by significant significant changes in OSDI scores, Schirmer test results, and TBUT. A significant reduction in number of medications was also observed, which aligns with the enhancement of the ocular surface. Further studies with larger cohorts are needed to validate these results and explore the broader implications of SLT on the ocular surface.

P-0421

TREATMENT OF GLAUCOMA WITH ULTRASOUND CYCLO PLASTY: EFFICACY, SAFETY AND IMPACT ON ANTERIOR CHAMBER PARAMETERS

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Background
To evaluate the efficacy, safety and impact on anterior chamber parameters of ultrasound cyclo plasty (UCP) for the treatment of glaucoma.

Methods
From January 2021 to May 2023, 56 eyes of 56 Chinese patients with primary and/or secondary angle closure glaucomas treated with UCP were enrolled in this study. The follow-up was arranged at Day-1, Week-1, Month-1, 3 and 6 post surgery. The visual acuity, intraocular pressure (IOP), anterior chamber depth (ACD) and degree of anterior chamber angle opening were evaluated. The number of anti-glaucoma medications and complications were also analyzed.

Results
Mean IOP reduced significantly from 39.08 ± 14.75 mmHg to 20.24 ± 8.79 mmHg ($p < 0.01$) before and 6 months post UCP treatment, corresponding to a mean IOP reduction of 46.96%. The greatest decrease in mean IOP occurred at 1 week post UCP treatment. Mean ACD increased from 2.10±0.91 mm (preoperative) to 2.20±0.88mm at 1 week ($p < 0.05$) post UCP treatment, corresponding to a mean ACD increase of 4.76%. Mean ACAn (angle between the posterior corneal surface and the anterior iris surface) increased from 5.81±15.64° before UCP procedure to 8.96 ±16.99° 1 Week post UCP treatment ($p < 0.05$), corresponding to a mean ACAn increase of 54.22%. Most patients had no change or varying degrees of improvement in visual acuity compared to preoperative vision. Eight cases of conjunctival congestion and 3 cases of anisocoria were observed. These complications were relieved between 1 week and 1 month post UCP treatment.

Conclusions
UCP was effective in lowering IOP, increasing ACD and degree of anterior chamber angle opening.

P-0422

PATIENT-REPORTED EXPERIENCES WITH BIMATOPROST IMPLANT FOR OPEN-ANGLE GLAUCOMA: QUALITATIVE RESULTS FROM THE ARGOS TRIAL

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Background
The purpose of this study was to report the results of 25 qualitative interviews that assessed treatment effectiveness and satisfaction with the bimatoprost intracameral implant (10 mcg) among a selected patient cohort in the Phase 4 ARGOS real-world clinical trial.

Methods
A subset of 25 patients enrolled in the ARGOS trial consented to pre-specified qualitative exit interviews lasting 60 minutes that were scheduled 4-6 months after bimatoprost implantation for open-angle glaucoma (OAG). A 3rd party interview team with training in qualitative interview methods administered all interviews. All interviews were conducted via video conference and consisted of topics, questions, and probes designed to understand the following concepts: OAG signs, symptoms, and impacts, in addition to the patient's prior glaucoma treatments, treatment preferences, treatment satisfaction, and experience in the ARGOS trial. All interviews were audio recorded, transcribed, and anonymized. For each concept, results are based on evaluable data (*i.e.* number of patients who provided data for each concept).

Results
Twenty-five patients underwent exit interviews, of whom 32% (n=8) had mild glaucoma, 52% (n=13) had moderate glaucoma, and 16% (n=4) had severe glaucoma. Patients' expectations before bimatoprost implantation showed that most patients (n=16 of 18, 88.9%) expected to reach their target eye pressure post-implantation. Most patients (n=16 of 18, 94.4%) expected to reduce or stop using their eye drops after bimatoprost implantation. Most patients reported overall satisfaction after receiving the bimatoprost implant (n=21 of 25, 84.0%), and most patients (n=16 of 25, 64.0%) reported that they experienced an overall meaningful change after receiving the bimatoprost implant, commonly attributed to a decrease in eye pressure. One-third of patients (n=8 of 24, 33.3%) reported that the attribute they most liked about the bimatoprost implant was that it reduced or eliminated the use of eye drops. The two most common improvements for patients included a decrease in eye pressure (n=12 of 25, 48%) post-implantation and improvements in vision (n=8 of 22, 36.4%). Most patients (n=19 of 24, 79.2%) reported preferring the study implant over other treatment options, such as eye drops or laser therapy.

Conclusions
Our qualitative findings bolster the quantitative findings of the ARGOS trial and may aid in understanding patient expectations and experience with the bimatoprost implant.

P-0423

THE STUDY OF CHANGE OF BMO-MRW AFTER IOP REDUCTION BY 25% WITH TOPICAL AGM VS PLACEBO IN GLAUCOMA SUSPECT PATIENTS: A RANDOMIZED CONTROLLED TRIAL

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Background
Intraocular pressure lowering strategies with medications, laser or surgery are the only proven methods to slow glaucoma progression. Recently, Bruch's membrane opening (BMO) derived neuro-retinal rim parameters were shown to have better diagnostic performance and better correlation to the visual field than traditional disc margin-based rim measures. Reversal of BMO- MRW has been noted after control of IOP in POAG and PACG in different study. Our research question is can this reversal of BMO MRW parameter help to differentiate pre perimetric glaucoma to physiological disc in the glaucoma suspect cases. Our objective was to compare the changes in BMO-MRW parameters between the intervention group (25% IOP reduction) and the placebo group.

Methods
All glaucoma suspect patients age between 40 to 60 yeas having family history of glaucoma, Vertical CD ratio >= 0.5. asymmetric CD ratio >0.2 between two eye, diffuse or focal narrowing or sloping of the disc rim, but Normal visual, consenting for participation were recruited in the study. Patients were thoroughly evaluated for ocular and systemic examination. Randomisation was done by computer software. Patients randomised to the intervention group were advised topical prostaglandin analogue eyedrops with the aim of 25% reduction from baseline IOP. Patients randomised to the placebo group were advised artificial tear drops. Patients were followed up after two weeks to check IOP reduction by 25 %. The subsequent follow-up was after one month, 3 months, and 6 months.

Results
A total of 44 patients were enrolled on the study, of which 22 were randomised to Group A and 22 were to Group B. 21 patients in Group A and 19 patients in Group B were evaluated. The mean baseline BMO MRW in group A and group B are 227.78±27.13µ and 230.38±34.14µ respectively There is no statistically significant difference in BMO- MRW was noted from basline in both the group in each follow up.

Conclusions
NO reversal of BMO-MRW was noted after reduction of 25% of IOP in patient having glaucoma suspected disc. BMO-MRW fail to differentiate pre perimetric glaucoma to physiological cupping.

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P-0424

HALT OF PROGRESSIVE VISION LOSS BY OPTIC NERVE STIMULATION IN GLAUCOMA

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Background
Glaucoma is characterized by optic nerve degeneration and loss of retinal ganglion cells causing visual field loss. The current standard approach in glaucoma therapy is reduction of the intraocular pressure (IOP). Despite effective medications leading to IOP-lowering, glaucoma exacerbation and progressive vision loss among patients is common. Electrical stimulation of the optic nerve (ONS) facilitates axonal regeneration and survival of retinal ganglion cells. The follow-up study provides real-world evidence for long-term clinical efficacy of ONS in glaucoma.

Methods
78 glaucoma patients, between 27 and 86 years old, with progressive vision loss despite therapeutic IOP reduction underwent electrical ONS. Closed eyes were separately stimulated by bipolar rectangular pulses with intensities up to 1.2 mA sufficient to provoke phosphenes. Ten daily stimulation sessions within 2 weeks lasted about 80 min each. Right before ONS at baseline (PRE), visual field loss was documented by static threshold perimetry in the central 30° visual field and compared to the same assessment approximately one year afterwards (POST). Mean defect (MD) was defined as primary outcome parameter. Only perimetries with a reliability factor (RF) of max. 20% were considered.

Results
The perimetry follow-up of 111 eyes in 78 patients fulfilled the inclusion criteria. IOP before ONS was 12.5±2.8 mmHg (mean±SD). MD significantly decreased from PRE 13.6±6.8 dB to POST 13.1±7.1 dB one year after ONS ($p<0.01$) corresponding to an average improvement of visual fields. The MD change from PRE to POST amounted to -0.6±2.1 dB ranging from -8.5 to 6.6 dB. In 70 out of 111 treated eyes, MD change between 0 and -8.5 dB indicated a treatment response with a responder rate of 63%.

Conclusions
Innovative treatments that preserve visual function through mechanisms other than lowering IOP are required for glaucoma with progressive vision loss. The present long-term data document progression halt or even improvement of visual fields in 63% of affected eyes after ONS and, thus, extend existing evidence from clinical trials.

P-0425

SUSTAINABLE BRIMONIDINE DELIVERY VIA CONJUNCTIVAL SAC INSERT FOR INTRAOCULAR PRESSURE REDUCTION

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Background

Glaucoma is a leading cause of irreversible blindness worldwide. Lowering intraocular pressure (IOP) remains the main approach to slowing the progression of the disease, with the use of daily eye drops being the most common treatment method. However, the limited duration of action and low bioavailability of eye drops often result in unsatisfied therapeutic outcomes and poor patient compliance.

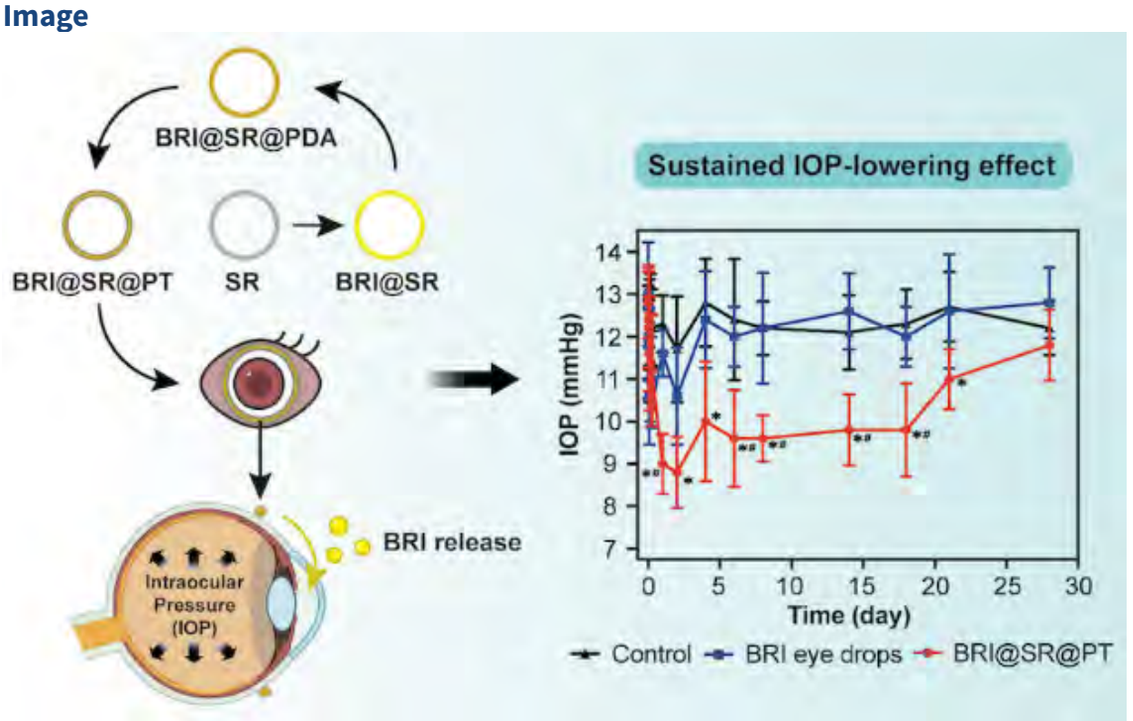
Methods

In this study, we designed a novel silicone rubber (SR) insert loaded with brimonidine (BRI) and coated with polydopamine and thermoplastic polyurethane (BRI@SR@PT insert). The insert was thoroughly characterized, and its *in vitro* biocompatibility and drug release behavior were both evaluated. The BRI@SR@PT insert was then administered to eyes of New Zealand rabbits, and the *in vivo* drug release profile, IOP-lowering effectiveness, and biosafety of the insert were comprehensively examined.

Results

The BRI@SR@PT insert demonstrated excellent thermal stability and elasticity, providing sustained release of BRI for nearly one month with little *in vitro* toxicity. Compared to a few hours of action for BRI eye drops, the BRI@SR@PT insert effectively reduced IOP for 21 days through sustained drug release. The insert is administered noninvasively in the conjunctival sac of rabbit eyes with great biosafety.

Image



RF

P

I

Conclusions

The BRI@SR@PT insert represents a potential drug delivery system, offering sustained IOP-lowering effects for individuals with ocular hypertension or glaucoma, without the need for invasive treatments.

P-0426

RISK OF ANGLE CLOSURE GLAUCOMA AND SYSTEMIC OVERACTIVE BLADDER TREATMENT

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Background
To compare anterior segment and angle parameters between eyes treated by systemic anticholinergic drugs and normal control subjects using anterior segment optical coherence tomography (AS-OCT) imaging and Pentacam.

Methods
Prospective cross-sectional study

Thirty-three subjects with overactive bladder and thirty-one healthy subjects as the control group were recruited from urological and ophthalmological clinic. All subjects underwent a complete ophthalmologic examination, axial length measurement, AS-OCT and Pentacam imaging. Anterior segment and angle parameters were evaluated, in the overactive bladder group before and during treatment. The follow-up period was one year.

Results
Data from 66 eyes with the treatment and 62 eyes of normal control subjects were analyzed. Anterior chamber depth was not significantly shallower in eyes with systemic medication before and during treatment and same compared with eyes of control subjects.

The differences in anterior chambre angle parametrs (AOD500,AOD750,TISA500 and TISA750) were not significant among study groups. Lens vault was 0.306mm ±0.20SD before and 0.315mm±0.21SD during anticholinergic drugs treatment and 0.321mm±0.24SD at the beginning and 0.319mm±0.23SD in the control group.

Conclusions
Anterior segment morphologic features are generally comparable between the 2 groups in follow-up time. Systemic treatment with anticholinergic drugs (Solifenacin) did not show the risk of developing occludable angle.

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P-0427

IMPACT OF SWITCHING TO TRIPLE THERAPY ON INTRAOCULAR PRESSURE CONTROL

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Background

To assess the short term intraocular pressure lowering effect of the fixed dose combination drug Trisopt (Timolol/Brinzolamide/ Brimonidine) on treatment escalation or for rationalizing treatment in triple or quadraple therapy.

Methods

We analysed retrospectively 2 groups one in which Trisopt was used for treatment escalation (Group 1) and the other were in Trisopt was used to rationalize therapy (Group 2) with a minimum follow up of 6 weeks.

Those who were already on Trisopt were excluded.

Results

177 eyes were analyzed. Mean age was 51+/- 20 years. There were 111 eyes in the treatment escalation group (Group 1) and 66 eyes in the treatment rationalization group (Group 2). The IOP reduced from 27.03+/-12.85 to 17.94+/-9.35 mm Hg in group 1 and from 25.70+/-11.52 to 18.32 +/- 7.66 (P 0.000) (P 0.000) in group 2 in a duration of 6 weeks. There were no adverse effects reported due to the drug.

Conclusions

The fixed dose combination drug Trisopt may be an useful alternative to polytherapy having good efficacy in terms of intraocular pressure reduction.

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P-0428

OUTCOMES OF GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) IN PATIENTS WITH STEROID-INDUCED GLAUCOMA

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Background

Glucocorticoids are a class of anti-inflammatory drugs widely used to treat different kinds of ocular and systemic conditions. Steroid responders are characterized as persons who respond to glucocorticoids with the elevation of the intraocular pressure [1]. The steroid-induced glaucoma (SIG) is defined as a disease which patients have secondary ocular hypertension and secondary open angle glaucoma associated with any routes of corticosteroid administration, such as topical and intraocular route, periocular route, systemic route and endogenous route [1,2]. The pathogenesis of the elevation of intraocular pressure (IOP) caused by steroids is often attributed to alterations in cell cytoskeletal dynamics, and a dysregulation in extracellular matrix (ECM) deposition and remodeling which result in morphological changes at trabecular meshwork (TM) level and finally reduction in facility of aqueous humor outflow.

Gonioscopy-assisted transluminal trabeculotomy (GATT), firstly reported by Grover DS and colleagues, is an ab interno approach for 360-degree circumferential trabeculotomy that improves the outflow of aqueous through Schlemm's canal and adjacent collector channels without bleb information . Currently, several investigations have been presented that GATT can be effective in the treatment of primary open angle glaucoma and childhood glaucoma [5,6,8]. Given the mechanism of steroid-induced IOP elevation, it is assumed that GATT procedure may eliminate the primary site of resistant of aqueous outflow and get better IOP decreased. The purpose of this study was to present the efficacy and safety of GATT for the patients with steroid-induced glaucoma.

Methods

This was an observational and retrospective study recruited 17 SIG patients underwent GATT procedures since 2016 at Beijing Tongren eye center. The main outcome measures included IOP, glaucoma medications, the history of steroid administration and postoperative complications.

Results

The IOP was reduced from 34.6±12.0 mmHg on 4.2±0.9 glaucoma medications preoperatively to 16.3±5.9 mmHg on 0.8±1.2 glaucoma medications at 6 months, to 17.4±6.5 mmHg on 0.8±1.2 glaucoma medications at 12 months, and to 16.5±7.5 mmHg on 0.6±1.2 glaucoma medications at 24 months. 52% of surgical eyes occurred IOP spike and most of them occurred within 1 week. The most common postoperative complication was a transient hyphema (24% at 1-week visit). None of them required anterior chamber washout.

Conclusions

GATT is an effective and safe surgical procedure to decrease IOP for the patients with SIG.

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P-0429

SAFETY AND EFFICACY OF GONIOTOMY FOLLOWING FAILED SURGERY FOR GLAUCOMA

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Background
To evaluate the efficacy and safety of goniotomy (GT) in patients with prior failed surgery for glaucoma.

Methods
A prospective, observational multicentered study was performed for patients who underwent GT with prior single or multiple surgery for glaucoma. Outcome measures included intraocular pressure (IOP) change, best-corrected visual acuity (BCVA) change, ocular hypotensive medication use, and occurrence of adverse events through 12 months. Complete success was defined as a postoperative IOP within 6 to 18 mmHg and a 20% reduction from baseline without ocular hypotensive medications. Qualified success was the same as the definition of complete success, except for post-operative use of medication. Logistic regression models were used to investigate the potential factors for surgical success.

Results
A total of 38 eyes of 34 patients were included. Twenty-three eyes had only 1 prior surgery, 13 eyes had 2 prior surgeries, 1 eye had 3 prior surgeries, and 1 eye had 4 prior surgeries. At month 12, there was complete success in 42.1% of the eyes and qualified success in 78.9% of the eyes. Preoperatively, the mean IOP was 29.4±6.9 mmHg and the median number of glaucoma medications used was 3.0 (2.0, 4.0); this decreased to 16.7±3.6 mmHg (43.2% reduction; P <0.001) and 2.0 (0.0, 3.0) (P <0.001) at month 12, respectively. The most common complications included hyphema (13.2%), IOP-spike (7.9%), and corneal edema (5.2%). Older age significantly contributed to surgical success.

Conclusions
GT appears to be a safe and effective procedure for patients with prior failed surgery for glaucoma.

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P-0431

A COMPARATIVE STUDY OF VISUAL FIELD PROGRESSION OF PSEUDOEXFOLIATION VS PRIMARY OPEN ANGLE GLAUCOMA

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Background
To compare the rates of progression of pseudoexfoliation (PXF) vs primary open angle glaucoma(POAG).

Methods
85 PXF with more than 5 reliable visual fields were compared with 85 POAG patients. Demographics, IOP, inter –visit IOP fluctuation, mean deviation (MD), pattern standard deviation, visual field index, anti-glaucoma medications (AGM) and rates of progression by trend analysis and event based analysis were compared. Progression was defined as a rate of progression >-1%/year on trend analysis or likely and possible progression on event analysis or both on the Guided Progression analysis (GPA).

Results
Mean age (73.4 PXF vs 65.9 POAG , p <0.001) was statistically significant. Mean baseline IOP (17.2 PXF vs 16.7 POAG, p = 0.503) and mean baseline MD (-11.19 PXF vs-10.51 POAG , p = 0.625) were not significant. At the final visit mean follow up PXF (8.20 years) and POAG (7.83 years) were similar (p = 0.844), mean IOP and the total number of AGMs being used were not statistically significant. Mean IOP fluctuation across visits was significantly greater (PXF 3.06 (SD 1.74) vs POAG 2.41(SD:1.23), p = 0.005). PXF had a higher change in MD (4.02 PXF vs 0.72POAG, p=<0.01) and at the final visit PXF had worse MD (-15.21 vs -11.23, P=0.004). Rate of progression trend(-2.14 %/year PXF vs -0.08 %/ year POAG , p<0.001) was statistically significant. More PXF eyes showed progression 54 (63.5%) compared to POAG (P<0.005). After adjusting for age, duration and AGM use multivariate analysis showed PXF (OR: 5.43, 95% CI:2.56-11.51)was a risk factor for progression.

Conclusions
PXF had a higher rate of progression compared to POAG possibly related to greater IOP fluctuation and need closer follow up and more aggressive therapy.

P-0432

CONCENTRATION-DEPENDENT STRUCTURAL EFFECTS OF PILOCARPINE ON THE ANTERIOR SEGMENT OF THE EYE

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Background

Pilocarpine, a nonselective muscarinic receptor agonist is commonly used for pre-treatment in patients undergoing laser procedures, including selective laser trabeculoplasty (SLT) and laser peripheral iridotomy (LPI) for glaucoma.

Pilocarpine lowers the intraocular pressure by binding to the muscarinic receptors of the ciliary smooth muscles and iris sphincter muscles. Although the effect of pilocarpine on anterior segment have been documented previously, these studies were either limited by: 1. a small sample size, 2. the use of single concentration of pilocarpine, 3. studies mostly on healthy eyes and, 4. did not use anterior segment optical coherence tomography (AS-OCT), to our knowledge, none using the CASIA SS-1000 OCT (CASIA).

Methods

Objectives: To examine the concentration- and time-dependent relationship of pilocarpine on the magnitude of structural changes of the anterior segment.

Study design: Single blind, randomized controlled trial

A randomized controlled trial wherein glaucoma patients undergoing SLT or LPI were divided into three subgroups, each pretreated with 1%, 2%, or 4% pilocarpine. Anterior segment structural parameters were measured using the CASIA AS-OCT before, and 30 and 60 minutes after administration of a single drop of pilocarpine

Results

Following pilocarpine the pupil diameter (PD) decreased significantly in all three groups. The PD decrease in SLT group receiving 2 and 4% was more significant compared to 1%. The mean PD for group 1 (1%) before treatment was 4.930±0.17, at 30 min 2.882±0.27 and at 60 min 2.766±0.29. The mean PD for group 2 (2%) before treatment was 5.129±0.21, at 30 min 2.511±0.22 and at 60 min 2.279±0.21. The mean PD for group 3 (4%) before treatment was 5.362±0.22, at 30 min 2.483±0.27 and at 60 min 2.254±0.29.

The mean anterior chamber depth (ACD) before treatment in group 1% was 2.739 ±0.096; 2.678 ±.094 at 30 min and 2.687±.093 at 60 min. The mean ACD before treatment in group 2% was 2.739±0.10, at 30 min 2.671±0.10 and at 60 min was 2.720±0.08. The mean ACD before treatment in group 4% was 2.683±0.09, at 30 min was 2.607±0.09 and at 60 min was 2.610±0.09.

While PD continues to change after 30 min in groups treated with 2% and 4%, there was no further change in ACD after 30 min. Further, in 2% group the ACD returned to baseline at 60 min.

Conclusions

In this study, we have demonstrated that pilocarpine induced decrease in pupillary diameter is consistent at both 30 and 60 min and across different concentrations of pilocarpine. Whereas the effect on ACD is maximum only at 30 min. While pupillary changes were equally significant in 1% compared to 2% and 4% the ACD changes were less significant in 2%. The decrease in ACD is less significant in eyes undergoing LPI compared to SLT.

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P-0433

"THE PRICE OF A SWITCH: BILATERAL CME AFTER OMIDENEPAG THERAPY IN A LONG-TERM PGA USER WITH NTG"

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Background

Omidenepag isopropyl, a selective EP2 receptor agonist, is a relatively new option for lowering intraocular pressure (IOP) in glaucoma patients. While generally effective, it has been associated with rare adverse effects such as cystoid macular edema (CME), particularly in pseudophakic patients. This case highlights the challenges of transitioning a long-term prostaglandin analog (PGA) user with normal-tension glaucoma (NTG) to Omidenepag and raises questions about the next steps in IOP management when complications arise.

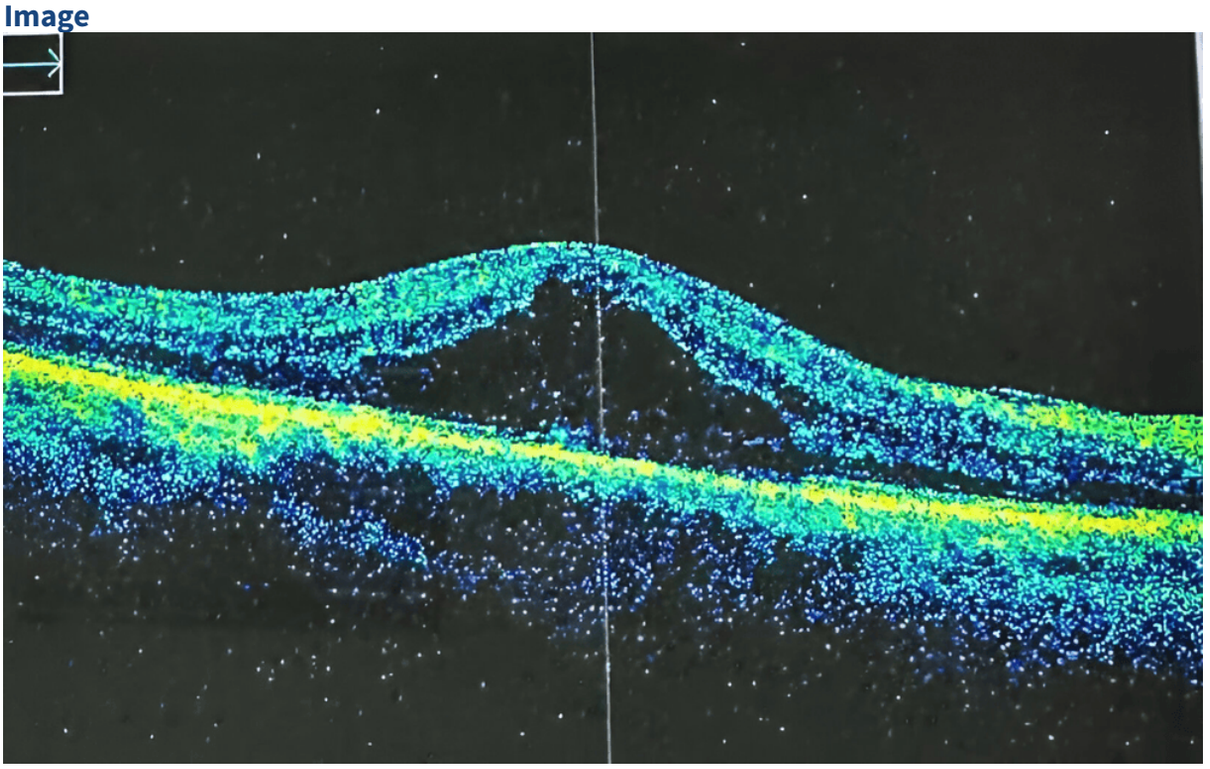
Methods

Case report

Results

A pseudophakic patient with NTG who had tolerated tafluprost for two years, was switched to Omidenepag due to hyperpigmentation of the lower lids and early signs of prostaglandin-associated periorbitopathy (PAPS). At baseline, visual acuity (VA) was 20/20 (RIGHT) and 20/30 (LEFT) for distance, with J1 near vision in both eyes, and IOP measured at 14 mmHg (RIGHT) and 16 mmHg (LEFT). After one month of Omidenepag, the patient reported reduced vision. VA declined to 20/25 (RIGHT) and 20/30 (LEFT), with near vision decreasing to J3. Optical coherence tomography (OCT) confirmed bilateral CME. Omidenepag was discontinued immediately, and nepafenac 0.1% (Nevanac) was initiated. Subjective vision improvements were noted within two weeks, and by the one-month follow-up, CME resolution was confirmed on OCT. VA had returned to baseline (20/20 RIGHT, 20/30 LEFT, J1 near vision), and IOP remained below 15 mmHg without medication. However, as further IOP control was required, potential management options included selective laser trabeculoplasty (SLT), non-PGA medications such as Rho kinase inhibitors or carbonic anhydrase inhibitors, or minimally invasive glaucoma surgery (MIGS).

Image



Conclusions

Omidenepag is a relatively new drug for glaucoma control, and reports of its adverse effects, such as cystoid macular edema, remain limited. The mechanisms behind these complications are not yet fully understood, emphasizing the need for vigilance, particularly in pseudophakic patients. This case underscores the importance of individualized NTG management to balance patient preferences, drug safety, and effective IOP control. Future strategies, such as SLT, non-PGA alternatives, or MIGS, may offer viable solutions for patients preferring non-surgical or minimally invasive options while maintaining safety and efficacy.

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P-0434

CORNEAL THICKNESS AND ENDOTHELIAL CHANGE AFTER USE OF ANTI-GLAUCOMA DRUG

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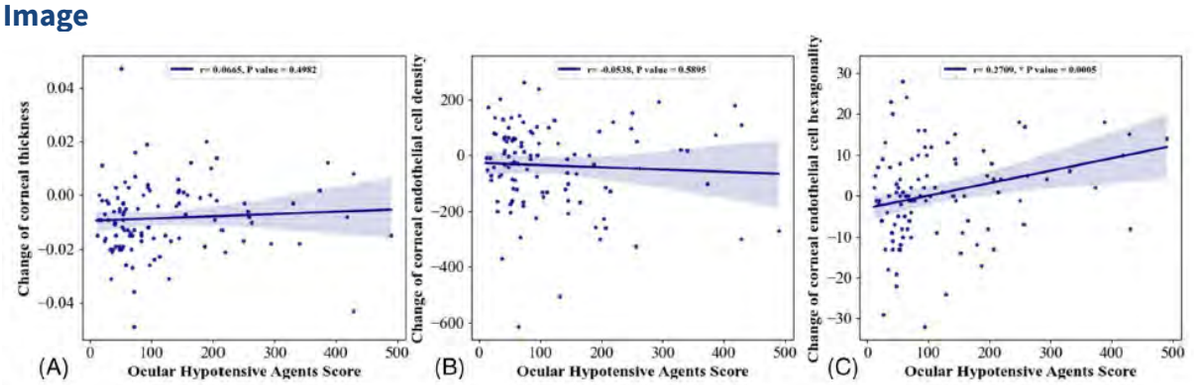
Background
Corneal transplantation can restore visual function when visual impairment is caused by a corneal disease. However, this treatment is associated with the scarcity of cornea donors. The suitability of corneal donation from patients with glaucoma using ocular hypotensive agents (OHAs) is controversial. This study aimed to elucidate changes in corneal thickness, corneal endothelial cell density, and corneal endothelial cell hexagonality after OHA use in patients with primary open-angle glaucoma.

Methods
We retrospectively reviewed the data of 53 glaucoma suspect eyes without OHA use and 106 primary open-angle glaucoma eyes under OHA use. All participants underwent corneal parameter assessment using SP-3000P (Topcon Corp., Tokyo, Japan) at the time of diagnosis and the final visit. The OHA dose and timing of use were recorded. The ocular hypotensive agents score (OHAS) was determined based on the number, formula, frequency, and duration of OHA use.

Results
Baseline data showed no significant differences between the two groups with and without OHA use. At the final visit, the OHA-treated group showed significantly lower corneal thickness and corneal endothelial cell density than those of the control group. A weak positive correlation between the OHAS and changes in corneal endothelial cell hexagonality was noted. However, no correlation was observed between the OHAS and changes in corneal thickness or endothelial cell density.

Image


Conclusions
The annual percentage changes in corneal thickness was more significant in the OHA-treated group compared with that in the control group. Nevertheless, this decrease remained limited and fell within the normal range associated with aging. In addition, no significant difference in the annual percentage change in corneal endothelial cell density was observed between patients with and without OHA use. However, a weak positive correlation between the OHAS and changes in corneal endothelial cell hexagonality was noted. Therefore, pa-

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tients with open-angle glaucoma using OHAs should undergo the corneal structural properties examinations before donation to ensure the quality of donor cornea.

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P-0435

VISIBLE LIGHT-TRIGGERABLE NO DONOR FOR TARGETED THERAPY AND REAL-TIME MONITORING IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background

Primary open-angle glaucoma (POAG), the most common form of glaucoma, is characterized by a gradual increase in intraocular pressure (IOP). Nitric oxide (NO) donors are promising treatments for POAG due to their ability to regulate IOP. However, the effectiveness of NO donors requires selective and controlled NO release triggered by ocular-relevant stimuli.

Methods

We introduce RhNO-Ab, a visible light-activatable NO donor and fluorescent probe. RhNO-Ab releases NO from its N-nitroso group and simultaneously transforms from a non-fluorescent spirolactone to fluorescent Rhodamine (Rhb) upon NO release. In vitro studies, conducted at both bulk and single-molecule levels, assessed the dynamics of NO release and fluorescence recovery under light irradiation. Immunofluorescence assays were used to confirm enhanced delivery of RhNO-Ab to target tissues following ABCA1 antibody modification. Functional experiments included:

1. Administration of RhNO-Ab at concentrations of 30 µM, 20 µM, and 10 µM with light activation to NOS3 knockout (KO) mice, followed by IOP measurement.
2. Evaluation of transendothelial electrical resistance (TEER) in Schlemm's canal endothelial cells.
3. Analysis of sGC mRNA and protein expression in mouse outflow tissues and human trabecular meshwork (HTM) cells.

Results

RhNO-Ab demonstrated rapid NO release and fluorescence recovery upon light irradiation *in vitro*, with enhanced tissue targeting achieved through ABCA1 antibody modification, as confirmed by immunofluorescence. In NOS3 KO mice, administration of RhNO-Ab at concentrations of 30 µM, 20 µM, and 10 µM with light activation significantly reduced IOP by 1.9 mmHg (11.83%, *p < 0.05, n=7), 1.38 mmHg (7.73%, *p < 0.05, n=6), and 1.55 mmHg (7.96%, *p < 0.05, n=7), respectively, three hours post-treatment. Additionally, RhNO-Ab with light activation reduced TEER in Schlemm's canal endothelial cells (*p < 0.05, n=3) and upregulated sGC mRNA and protein expression in mouse outflow tissues and human trabecular meshwork (HTM) cells. These results highlight the efficacy of RhNO-Ab in IOP regulation and downstream signaling activation.

Conclusions

RhNO-Ab offers a novel visible light-triggered therapeutic strategy for POAG. It enables controlled NO release and simultaneous real-time monitoring through fluorescence. By demonstrating significant IOP reduction, tissue-specific targeting, and downstream signaling activation, RhNO-Ab shows promise as an innovative treatment approach for POAG.

P-0436

EFFICACY OF SLOW-COAGULATION CYCLOPHOTOCOAGULATION AFTER FAILED MICROPULSE CYCLOPHOTOCOAGULATION IN REFRACTORY GLAUCOMA

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Background

Slow-coagulation continuous wave transscleral cyclophotocoagulation (CW-TSCPC) has been shown to be an effective treatment option for refractory glaucoma. However, its efficacy following a failed micropulse transscleral cyclophotocoagulation (MPCPC) procedure remains unexplored[1,2]. We aimed to assess the efficacy of slow-coagulation TSCPC in glaucoma patients with uncontrolled intraocular pressure after undergoing MPCPC.

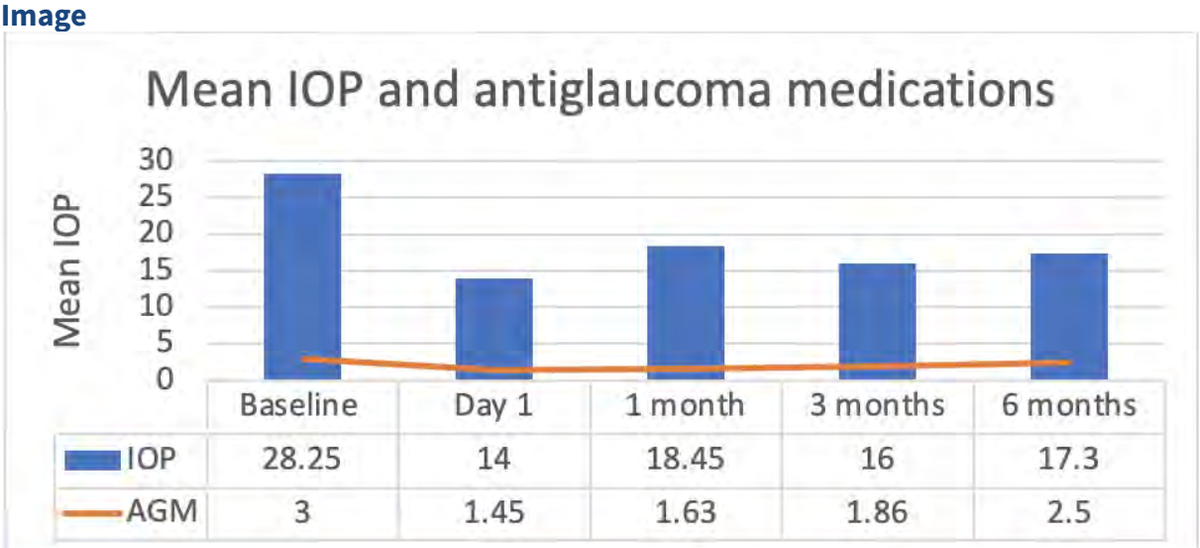
Methods

This was a retrospective case series of patients with medically uncontrolled glaucoma after MPCPC who subsequently underwent slow-coagulation CW-TSCPC at a single institution between January 2022 and October 2024. Patients with <3 months follow-up were excluded. All patients underwent slow-coagulation CW-TSCPC (1250-milliwatt power and 4-second duration per application. The surgical success was defined as intraocular pressure (IOP) between 6 to 21 mm Hg with a reduction ≥20% from baseline on topical medication, no reoperation for glaucoma, and no loss of light perception vision.

Results

Nine patients (12 eyes) with a mean age of 46±22.6 years met the eligibility criteria. All twelve eyes had prior Tube/Trabeculectomy surgeries. There was a significant decrease in IOP from 28.25±10.48 mm Hg on 3±0.95 antiglaucoma medications (AGM) preoperatively to 18.67±10.07 mm Hg (p=0.005) on 2.17±1.40 AGM at a mean follow-up of 9.89 ±3.44 months postoperatively with a success rate of 83.33%. Two eyes required AGV implantation. One eye had prolonged (>1 month) anterior chamber inflammation that resolved with medical management. No eyes had persistent hypotony or drop in Snellen visual acuity of >2 lines.

Image



	Baseline	Day 1	1 month	3 months	6 months
IOP	28.25	14	18.45	16	17.3
AGM	3	1.45	1.63	1.86	2.5

P value (IOP) vs baseline	0.001	0.002	0.03	0.01

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Conclusions

Slow-coagulation CW-TSCPC is an effective and relatively safe surgical intervention in medically uncontrolled glaucoma refractory to MPCPC. Patients who underwent slow-coagulation CW-TSCPC in our study maintained visual acuity with a low side effect profile compared to traditional CPC settings. The results of our study are helpful in expanding the role of the slow-coagulation CW-TSCPC technique in the management of glaucomatous patients.

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P-0437

UNLOCKING THE UNTAPPED POTENTIAL OF PHOTORESPONSIVE DUAL-GAS NANOMEDICINE IN GLAUCOMA THERAPY

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Background

Glaucoma is a leading cause of irreversible blindness globally, primarily resulting from optic nerve damage associated with elevated intraocular pressure (IOP). While gas therapy has shown promise in glaucoma treatment, single-gas therapies are often limited in efficacy due to their functional constraints. Addressing these limitations requires the delivery of multiple gases to targeted tissues for synergistic action, which poses significant challenges.

Methods

In this study, a photoresponsive dual-gas nanomedicine was developed for glaucoma therapy. Mesoporous palladium hydride (PdH) was chosen for its high hydrogen (H_2) storage capacity and porous structure, which enables the loading of sodium nitroprusside, a nitric oxide (NO) donor. This PdH-based nanomedicine, termed PdH-D-S, was designed to penetrate the cornea and accumulate in the trabecular meshwork and Schlemm's canal—key tissues in IOP regulation. Upon 808 nm laser irradiation, the heat generated by PdH-D-S enabled the controlled release of H_2 and NO.

Results

The PdH-D-S nanomedicine effectively reduced IOP in glaucomatous mice. Mechanistic studies in human trabecular meshwork cells and outflow tissues revealed that PdH-D-S activates the AKT/p-AKT/eNOS/sGC pathway, which enhances aqueous humor outflow. This dual-gas therapeutic approach demonstrated synergistic effects, overcoming the limitations of single-gas therapy.

Conclusions

This innovative strategy combines dual-gas therapy with precise photoresponsive control, providing an effective and promising approach for glaucoma management. By leveraging the synergistic effects of H_2 and NO, this nanomedicine could address the challenges of conventional therapies and offer new avenues for reducing IOP and managing glaucoma progression.

P-0438
TAMOXIFEN TREATMENT INDUCES CORNEAL THICKNESS REDUCTION

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Background
Tamoxifen is a selective oestrogen receptor modulator commonly used in breast cancer treatment. While its use is associated with ocular side effects such as corneal deposits and retinal opacities, glaucoma has not yet been identified as a common complication. This study sought to investigate whether long-term Tamoxifen treatment may induce the development of glaucoma.

Methods
A cohort of 89 women undergoing Tamoxifen therapy (10-20 mg/d) for breast cancer was initially examined between August 2016 and February 2017. Of these, 12 women aged 50-74 years (mean age 60±7.3 years), without a history of glaucoma, underwent follow-up between October and December 2024. Follow-up assessments included visual acuity, visual field testing, retinal nerve fibre layer (RNFL) measurements by optical coherence tomography (OCT), corneal pachymetry and slit-lamp examination with Goldmann tonometry. Statistical analysis of corneal thickness, RNFL thickness (superior and inferior nasal and temporal quadrants) and visual field mean defects (MD) was performed using t-tests with a significance level of $p<0.05$.

Results
The mean follow-up duration was 8.02±0.13 years. Mean Tamoxifen treatment duration was 6.87±0.13 years, with a cumulative mean dose of 49.85±15.59 g. From baseline to follow-up, a significant reduction in the thinnest corneal thickness was observed of -7.92±5.53 µm (p=0.0002) in the right (OD) and -6.33±5.45 µm (p=0.001) in the left eye (OS). At follow-up, central corneal thickness (CCT) was 544.17±34.27 µm (OD) and 546±38.12 µm (OS) with mean intraocular pressures of 13±2.7 mmHg (OD) and 13±2.95 mmHg (OS). RNFL thickness remained within standard values and no glaucomatous visual field defects were detected.

Conclusions
Our findings demonstrate a significant corneal thinning over time in patients undergoing Tamoxifen therapy, with a mean CCT below 550 µm, which is a known risk factor for primary open-angle glaucoma (POAG). However, RNFL thickness was not significantly reduced compared to the norm and our patients did not develop relevant visual field defects. Long-term studies on larger cohorts are needed to evaluate whether Tamoxifen treatment does indeed pose a risk for the development of glaucoma.

P-0439

"RESULTS OF PHACOEMULSIFICATION PLUS 360° EXTERNAL TRABECULOTOMY WITH SUTURE IN PATIENTS WITH CHRONIC GLAUCOMA"

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Background

The purpose of trabeculotomy is to reduce the resistance of aqueous outflow via mechanical cleavage of the trabecular meshwork and the inner layer of Schlemm canal. Trabeculotomy effectively reduces intraocular pressure (IOP) in adult patients with primary open-angle glaucoma (POAG) and is associated with a lower rate of postoperative complications.The IOP-lowering potency of trabeculotomy combined with phacoemulsification and intraocular lens (IOL) implantation has been substantiated in several studies, being an advantageous to patients with glaucoma and coexisting cataract because it produces a better quality of vision than trabeculotomy alone.

The purpose of this study is to investigate the success and safety of 360-degree sutured external trabeculotomy combined with phacoemulsification (SET) in patients with glaucoma.

Methods

Medical records of patients with open and close crhonic glaucoma having a 360-degree sutured external trabeculotomy (SET) with cataract surgery were reviewed in a case series. The main outcome measures were the surgical success rate, mean postoperative intraocular pressure (IOP), number of glaucoma medications, and surgical complications. The mean follow-up period was 12 months.

Results

We included 36 eyes of 30 patients with primary open (27 eyes) and close (09 eyes) chronic glaucoma. The baseline IOP decreased from 14.97 ±3.19 mm Hg with 2.33 ± 1.53 medications to 12.6 ±2.84 mm Hg (p = 0.01) with 0.86 ± 1.40 medications (p = 0.01) at 12 months postoperative, representing a 16% reduction. The complete and qualified success rates were 50% and 100%, respectively, at 12 months. The entire circumference of Schlemm's canal was successfully opened in all cases. Intraoperative hyphema was observed in all cases, 15 cases of postoperative hyphema, and transient IOP elevation (>30 mmHg) in 5 cases.

Conclusions

Phacoemulsification combined with 360-degree sutured external trabeculotomy (SET) appears to be a valuable option for the surgical treatment of both open and closed-angle glaucoma. Future studies are needed to explore the long-term side effects and the long-term impact of this procedure on IOP.

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P-0440

A DOUBLE-EDGED SWORD: RIPASUDIL-INDUCED LATE-ONSET CHOROIDAL DETACHMENT AS AN IDIOSYNCRATIC COMPLICATION IN GLAUCOMA MANAGEMENT

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Background

Early choroidal detachment (CD) typically occurs after trabeculectomy and glaucoma drainage surgery due to overfiltration, with occurrence rates reported at 11–19% for trabeculectomy and 16% for glaucoma implant surgery.[1,2] Late-onset CD is a rare complication and has been linked to antiglaucoma medications (AGMs), with or without prior surgery. To date, there has been no report of Ripasudil eye drops causing spontaneous CD. We report a rare case of late-onset CD in a 64-year-old male with advanced glaucoma, glaucomatous optic atrophy, and bilateral cataracts. The patient underwent phacoemulsification with posterior chamber intraocular lens (PCIOL) implantation, followed by trabeculectomy with mitomycin-C, and was later reintroduced to Bimatoprost (0.03%) and Ripasudil (0.4%).

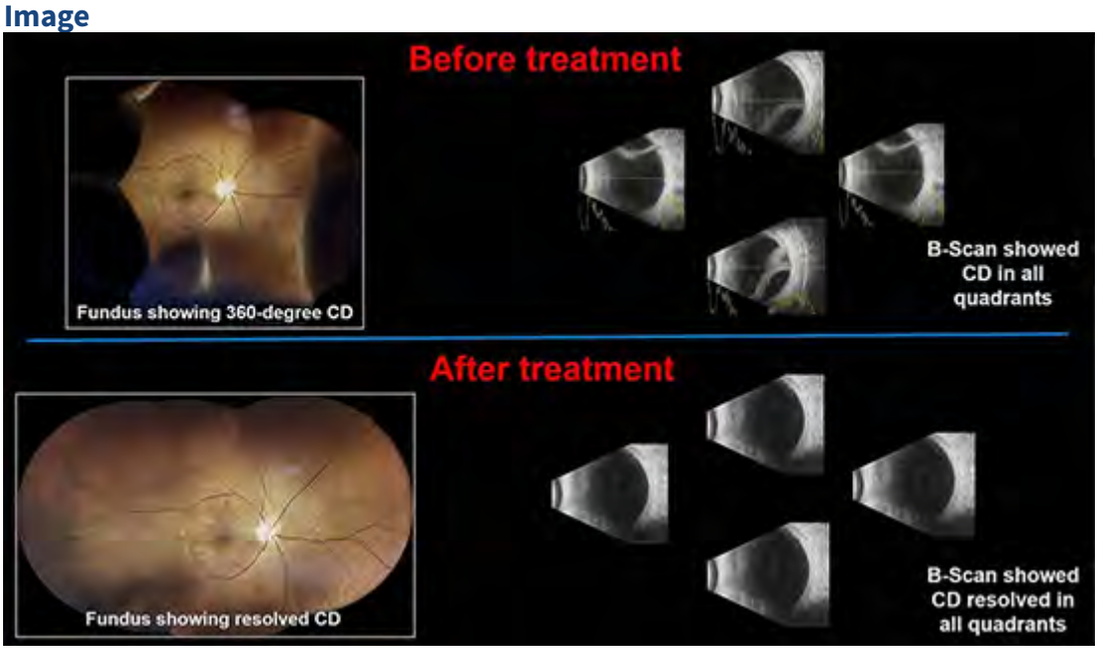
Methods

The patient presented with advanced primary open-angle glaucoma, glaucomatous optic atrophy, and bilateral cataracts, with more severe involvement in the left eye. The baseline intraocular pressure (IOP) was 20 mm Hg, despite maximum tolerated medical therapy. After undergoing phacoemulsification with PCIOL implantation and trabeculectomy with mitomycin-C in the left eye, his IOP stabilized at 13 mm Hg without medication. Two months later, due to an increase in IOP to 20 mm Hg, Bimatoprost (0.03%) and Ripasudil (0.4%) were reintroduced. Three months after restarting the AGMs, the patient developed blurred vision, and had an IOP of 5 mm Hg. B-scan ultrasonography confirmed a 360-degree CD. Visual field analysis showed a mean deviation of -27.83 dB.

Results

Discontinuation of the AGMs and initiation of steroid therapy (Prednisolone e/d 1% and oral Prednisolone) resulted in complete CD resolution within one week, as confirmed by repeat imaging. Although CD could be attributed to multiple factors, the significant improvement upon discontinuation of Ripasudil strongly suggests a causal link. Bimatoprost had been in long-term use without incident, whereas Ripasudil had been recently added to the regimen. Though a rechallenge could confirm causality, such an approach would be ethically questionable and may not reliably reproduce the adverse event.

Image



Conclusions

This case reports a rare occurrence of late-onset CD following trabeculectomy, likely induced by Ripasudil eye drops in the setting of hypotony. Discontinuation of the AGMs and prompt steroid therapy led to successful resolution, highlighting the importance of close monitoring and timely intervention in managing glaucoma post-surgery.

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P-0441

BIMATOPROST CAN IMPROVE EYELID FULLNESS AND EXOPHTHALMOS OF THYROID EYE DISEASE

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Background

Bimatoprost is a synthetic prostamide analogue indicated for treatment of glaucoma. Recognised side effects include periorbital fat atrophy and eyelash growth. Thyroid eye disease (TED) is first-line symptomatically treated with ocular lubricants. Exophthalmos is treated with steroids, orbital surgery or radiation. Whilst bimatoprost is often used off-label for treatment of hypotrichosis, it has not yet been reported for use in thyroid eye disease.

Methods

A 69-year-old Caucasian woman with a 22-year history of open-angle glaucoma, fibromyalgia, Meniere's disease and metastatic invasive ductal carcinoma of left breast in remission, was treated with various eyedrops including Timoptol XE, Alphagan, Betoptic S. Bilateral inferior selective laser trabeculoplasty (SLT) was performed in 2006 to success, controlling intraocular pressures. In 2019, she was diagnosed with autoimmune thyroiditis. For her exophthalmos she was started on mycophenolate and required pulse IV methylprednisolone. She developed shingles and noting her breast cancer history, these immunosuppressive agents were ceased by her endocrinologist.

Her IOP in both eyes peaked to 24mmHg, and her symptoms of exophthalmos, diplopia and eyelid fullness worsened. SLT was repeated for both eyes in 2021, and she was resumed on Xalatan which did not lower IOP sufficiently. This was changed to Ganfort (bimatoprost + timolol) in September 2022.

Results

At 2-month follow-up, IOP was controlled in both eyes (R 19 mmHg and L 18 mmHg). At 4 months, there was notable reduction in periorbital fat swelling of upper lid as noted in photos. The patient reported that her symptoms of diplopia, exophthalmos and eyelid fullness had improved.

Conclusions

This case demonstrates that using bimatoprost to treat glaucoma in a patient with thyroid eye disease helped improve symptoms of diplopia, exophthalmos and eyelid fulness. This suggests that Bimatoprost can be used off-label to treat symptoms of thyroid eye disease in patients who do not have glaucoma.

P-0442
JUVENILE XANTHOGRANULOMA -A CASE REPORT

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Background
Juvenile xanthogranuloma (JXG) is a non-Langerhans histiocytic skin disorder mainly affecting infants and children, 75% of the cases occurring in the first 9 months of life (1), (2), (3). We report the case of an 11-month-old girl with recurrent hyphema due to ocular JXG.

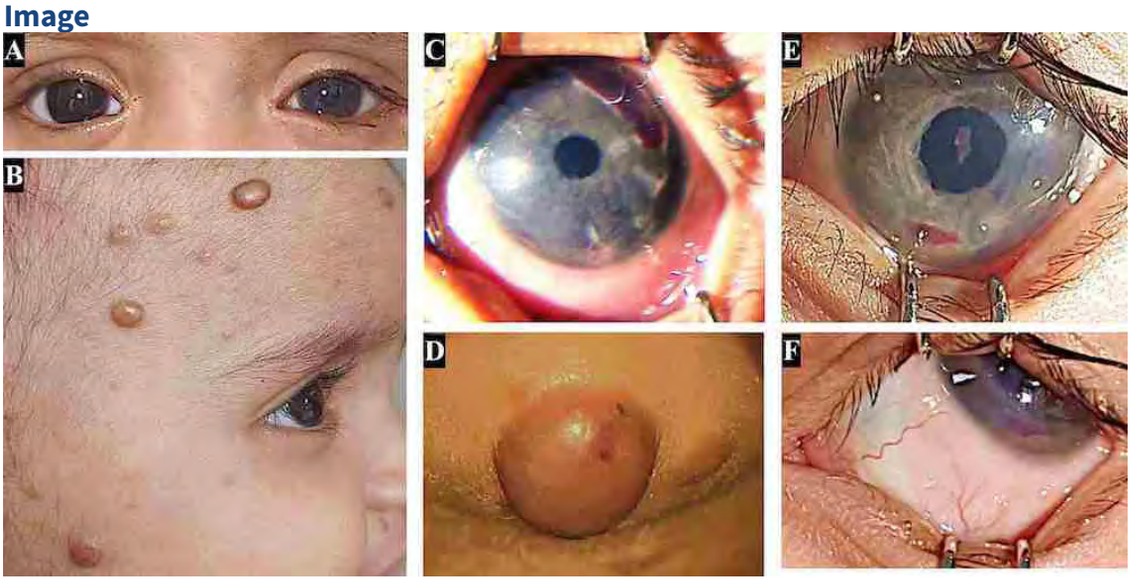
Methods
An 11-month-old girl brought with redness, watering, and photophobia in her left eye persisting for one month, along with cutaneous nodules on her face, trunk, and limbs noticed over the past two months. On examination, the right eye anterior segment was normal. In the left eye, examination revealed hyphema with organized blood in the peripheral superotemporal and inferonasal quadrants.The corneal diameters were equal in both eyes (11 mm), with no limbal stretching. However, the intraocular pressure and axial length were higher in the left eye (axial length: 18.88 mm in the right eye and 20.08 mm in the left eye; IOP: 14 mmHg in the right eye and 20 mmHg in the left eye).

Ultrasound B-scan was normal. The patient was started on prednisolone 1% eye drops , homatropine 2% eye drops , and dorzolamide eye drops for antiglaucoma treatment. The patient underwent evaluation by a pediatric oncologist and dermatologist. A peripheral blood smear examination revealed microcytic hypochromic anemia, along with elliptocytosis, teardrop cells, pencil cells, and activated lymphocytosis. An incisional skin biopsy was performed above the right shoulder. Histopathologic examination of the dermis showed infiltration of histiocytic cells arranged in sheets, characterized by eosinophilic to granular cytoplasm, ovoid nuclei, scattered eosinophils and multinucleated Touton giant cells. Immunohistochemistry demonstrated positivity for CD68 and CD163, suggestive of juvenile xanthogranuloma (JXG).Imaging with MRI and PET-CT was conducted. the PET-CT scan indicated increased focal metabolism in the left shoulder and diffuse low-grade metabolism in the spleen without skeletal or marrow lesions.The child was started on oral prednisolone and chemotherapy with injectable vinblastine (6 mg/m^2 based on body weight during the induction phase), along with adequate hydration.The patient showed significant improvement at 8 weeks. The patient is being monitored with serial IOP and axial length measurements while undergoing the induction phase of chemotherapy.

Results

Juvenile xanthogranuloma (JXG) is a rare non-Langerhans cell histiocytosis .(4)The pathogenesis is presumed to involve granulomatous histiocytic reactions to unknown stimuli.(5) It typically manifests as cutaneous lesions, most frequently involving the head and neck. Systemic involvement in JXG, although rare, can affect various organs, including the eyes, (6) (7) (8)(9). Treatment options includes immunosuppressive medication, radiation, chemotherapy, and surgery. (10)

Image



Conclusions

Managing JXG involves a multidisciplinary approach, integrating ophthalmic care with systemic evaluation by pediatric oncologists and dermatologists.

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P-0443

SELECTIVE LASER TRABECULOPLASTY: SUCCESS IN MANAGING OCULAR HYPERTENSION POST-FLUOCINOLONE ACETONIDE (0.19 MG) IMPLANTATION

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Background
Corticosteroids (CCT) have an important role in managing diabetic macular edema (DME) by reducing inflammation and vascular permeability. Although effective, CCT can elevate intraocular pressure (IOP). This adverse event is influenced by several factors: CCT molecule, dosage, route of administration, and treatment duration. Fluocinolone acetonide (FAc 0.19 mg) is a long-acting intravitreal CCT implant approved for managing persistent and/or recurrent DME. This study investigates the effectiveness of selective laser trabeculoplasty (SLT) in lowering IOP in patients with ocular hypertension (OHT) following FAc 0.19 mg implantation.

Methods
A retrospective analysis was conducted on 19 eyes (12 patients) with increased IOP after receiving an FAc 0.19 mg implant and treated with SLT. Outcomes included IOP changes, the need for IOP-lowering medications, or incisional surgery. Success was defined by a reduction in IOP and/or fewer medications. Secondary outcomes included changes in best-corrected visual acuity (BCVA) and central macular thickness (CMT). Follow-ups occurred at 1 month, 3 months, 6 months, and quarterly, thereafter.

Results
The mean patient age was 65.6±11.1 years, with 47% having pre-existing OHT. Over a mean follow-up period of 44.1±21.6 months, median baseline IOP was 19 mmHg (range 15-22 mmHg). All eyes required IOP-lowering medications during follow-up. SLT was performed at a mean interval of 19±14 months post-implantation. SLT had positive outcomes in 93.3% of eyes, with 60% requiring fewer medications and 93.3% achieving IOP reduction. Three eyes required incisional surgery post-SLT. BCVA improved 5 letters [median of 53.9 to 58.9 ETDRS letters (p=0.09)], and median CMT significantly decreased [496 µm to 259 µm (p=0.002)].

Conclusions
SLT should be considered a viable alternative to traditional methods for managing HOT following FAc 0.19 mg implantation, particularly in patients with persistent HOT or those intolerant or non-compliant with medical therapy.

P-0445

A 10 YEAR STUDY AND OVERVIEW OF GLAUCOMATOCYCLTIC CRISIS USING NSAIDS

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Background

Glaucomaticcyclitic crisis is also known as Posner Schlossmann Syndrome(PSS) is a rare self limiting unilateral inflammatory glaucoma with elevated intraocular pressure affecting individuals between 20 - 60 years of age group with mean age of 35 years.The onset of symptoms is usually acute. Patients present with mild ocular discomfort , blurred vision ,colored halos at night.Diagnosis of PSS can be challenging with only mild inflammation that may not be detected.Examination usually reveals a highly elevated Intraocular pressure usually upto 60 mm hg. Eye appears quiet with very little hyperemia.There may be loss of vision due to glaucomatous optic nerve damage

Methods

We reviewed retrospectively the medical records of all patients diagnosed with PSS during a 10 year period.The following subjects were excluded (Exclusion Criteria) from study: Patients diagnosed with acute congestive glaucoma , Primary angle closure glaucomas, Primary open angle glaucomas, ocular hypertension, and some secondary glaucomas.Patients included in our study underwent a thorough Ocular examination which included visual acuity-,slit lamp examination, goldmann applanation tonometry, gonioscopy and thorough retinal examination comprising of optic disc evaluation and retinal nerve fibre layer assessment. All the patients underwent Humphreys visual field analysis. Patients diagnosed with Posner Schlossman syndrome were treated initially for two weeks with anti glaucoma therapy and NSAIDS. After two weeks when the IOP was normal, anti glaucoma therapy was stopped and they continued to have NSAIDS for six weeks.

Results

A total of 70 patients with PSS (52 males and 18 women) met the retrieval criteria. The mean age of these subjects at the first clinic visit was 35 ±15 years. Intraocular pressure (IOP) of the initial record was 39.91±15.37 mm Hg. The majority of these patients were aged 35-60 years. A detailed evaluation of the 10 year sudy is done using Statistical analysis and interpretations are recorded.The same will be presented in the scientific paper.

Conclusions

Our results suggest that NSAIDS played a vital role in resolution and control of intraocular pressure without any side affects,

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P-0446

ACUTE PIGMENT DISPERSION SYNDROME POST PHOTOREFRACTIVE KERATECTOMY

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Background

Pigment Dispersion Syndrome (PDS) is a rare condition characterized by the abnormal presence of pigment in the structures of the anterior chamber. This can lead to ocular hypertension and glaucoma. It mainly affects myopes and is typically bilateral. It is common for these patients to have undergone refractive surgeries. The prevalence of PDS has been reported in up to 26% of myopic patients seeking refractive surgery, higher than in the general population, being even much more rare the acute form.

Methods

Presentation of a clinical case involving acute PDS after Photorefractive keratectomy (PRK) highlighting the diagnosis, clinical findings and therapeutic approach.

Results

A 43-year-old female patient underwent unilateral myopic PRK in the left eye (OS) without intraoperative complications. After 20 days post-surgery, the patient complained of poor visual quality.

Physical Examination:
Best Corrected Visual Acuity (BCVA): RE: 1.0LE: 0.8
Intraocular Pressure (IOP): RE: 14 mmHgLE: 36 mmHg
Slit-Lamp Examination: RE: normal LE: Pigmented Tyndall sign, iris heterocromy due to its surface pigment deposit, areas of iris hypopigmentation and atrophy on retroillumination, posterior synechiae of the iris.
Gonioscopy: RE: normal LE:: Dense pigmentation of the entire trabecular meshwork up to the scleral spur, consistent with severe pigment dispersion
Fundus Examination: RE: normal LE : Pink optic disc with excavation 0.6/1.0.
Additional findings:
OCT SA: RE: normal: LE: Increased concavity of the iris toward the lens.
UBM: RE: normal LE : Iris-lens apposition and similar iris curvature toward the lens.
OCT Disc: RE: normal LE: Normal.
CVC: RE: normal LE: normal.
The condition is interpreted as Acute Pigment Dispersion Syndrome. A peripheral iridotomy is performed. Hypotensive drops and topical corticosteroids are prescribed.
Evolution: The patient continues with Brinzolamide twice daily and follow-up with OCT and CVC every 3 months.

Conclusions

The prevalence rate of PDS in young myopic patients is high. Refractive surgeons should be aware and include gonioscopic examination in these patients, this syndrome could masquerade an acute anterior uveitis. PDS is not an exclusionary condition for refractive surgery, and no negative effects on visual acuity have been reported post-procedure. However, these patients should have closer postoperative monitoring to detect early signs.

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P-0447

IMPACT OF A SMARTPHONE-BASED MEDICATION ASSISTANCE SYSTEM ON MEDICATION ADHERENCE IN GLAUCOMA PATIENTS

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Background
Medication adherence is critical for effective glaucoma management, as poor adherence can lead to disease progression and vision loss. However, many glaucoma patients struggle with maintaining proper adherence and compliance due to factors such as complex dosing regimens and forgetfulness. Digital tools, such as smartphone-based systems, offer a promising solution to address these challenges by providing real-time support and personalized assistance. This study aimed to develop a smartphone-based medication assistance system to address the issues of poor medication adherence and inadequate compliance among glaucoma patients, and to preliminarily explore its feasibility and effectiveness.

Methods
A smartphone-based intelligent medication assistance system for glaucoma was established using the WeChat Mini Program *Qing Zhi Zhu* and the WeChat Official Account *Qing You Yi Zhan*. Four core functions were developed: medication schedule planning, medication reminders, medication monitoring, and medication guidance. The study enrolled outpatient glaucoma patients who were on glaucoma medication and had a Morisky Medication Adherence Scale (MMAS) score of ≥2. The intervention consisted of using the system for one month. Feasibility and acceptability were assessed via patient questionnaires, and changes in medication adherence were evaluated using the MMAS.

Results
The smartphone-based glaucoma medication assistance system was successfully developed. Fifteen glaucoma patients with an average baseline MMAS score of 6.00 participated in the study. The questionnaire results indicated that 86.7% of patients considered the system feasible. Following the intervention, the mean MMAS score increased significantly to 6.65 ($p < 0.05$).

Conclusions
The smartphone-based intelligent medication assistance system demonstrated good feasibility and acceptability among glaucoma patients and effectively improved their medication adherence.

P-0448

SEVERE CORNEAL DISORDER INDUCED BY BRIMONIDINE TARTRATE OPHTHALMIC SOLUTION USE AND MIMICKING CASE WITH OTHER ANTIGLAUCOMA EYE DROPS USE

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Background

Brimonidine tartrate ophthalmic suspension (BT), an α2 adrenergic receptor agonist, is widely used in glaucoma treatment. Its primary side effects include allergicconjunctivitis, blepharitis, and conjunctival hyperemia. While cornea-related side effects are rare, recent reports have documented cases of severe corneal disorders associated with BT eye drops. This study describes three cases of deep corneal neovascularization, leading to corneal infiltration and residual opacity, causing significant visual impairment. Additionally, we report a similar case associated with other antiglaucoma solutions.

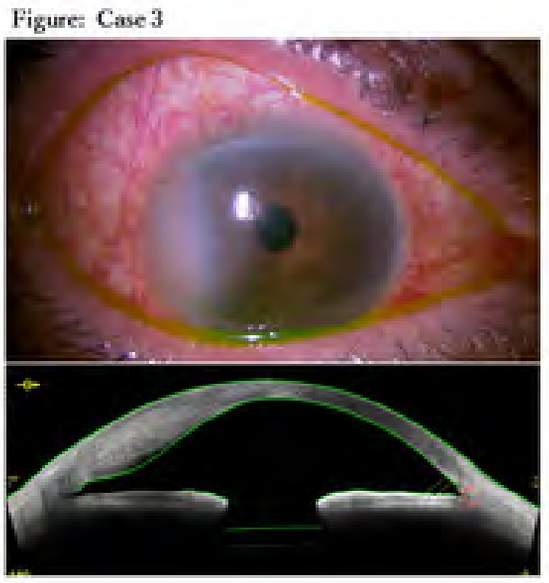
Methods

A retrospective analysis of three cases with corneal infiltration following BT eye-drop use and one case with similar findings caused by other antiglaucoma eye-drop.

Results

Case 1: A 69-year-old woman developed bilateral corneal neovascularization and infiltration after using BT and latanoprost. **Case 2**: A 71-year-old woman experienced similar symptoms after using BT, latanoprost, brinzolamide, and 0.1% fluorometholone. **Case 3**: A 63-year-old man developed unilateral corneal neovascularization and infiltration following BT, travoprost, and dorzolamide use. **(Figure). Case 4**: A 78-year-old woman presented with follicular conjunctivitis, corneal neovascularization, and infiltration in her right eye after using ripasudil, bimatoprost, and dorzolamide without BT. In the first three cases, BT was identified as the cause, and the eye drops were discontinued. Corticosteroid therapy with 0.1% betamethasone sodium phosphate resolved the complications, leaving residual corneal opacity. The fourth case was managed similarly, with the temporary cessation of eye drops and corticosteroid treatment, leading to resolution of symptoms but persistent opacity.

Image



Conclusions

These findings highlight the potential for severe corneal complications from BT and other antiglaucoma eye drops. Prompt discontinuation and corticosteroid intervention are essential to prevent irreversible vision loss.

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P-0449

CILIOCHOROIDAL DETACHMENT ON A PATIENT WITH MICROPHTHALMIA: A CASE REPORT

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Background
To present a case of ciliochoroidal detachment on a patient with microphthalmia.

Methods
A 25 year old female patient with bilateral microphthalmia who presented ciliochoroidal detachment in her right eye (OD)

Results
A 25 year old female with microphthalmia diagnosed at birth, with no other significant clinical diseases, visual acuity was hand movement on the OD, and counting fingers on the left eye (OS). Slit lamp examination showed in both eyes (OU) nistagmus, cataract and iris coloboma. Intraocular pressure (IOP) was 3mmHg on OU. Fundoscopic examination was not possible on OD due to lens opacity, and on OS showed optic disc coloboma, optic disk drusen and macular atrophy with choroidal folds. Ocular ultrasound showed chorioretinal thickening on OU. Ultra Biomicroscopy (UBM) showed an hypoechoic area between sclera and choroid compatible with ciliochoroidal detachment on OS. It was decided to perform conservative treatment with topical difluprednate, in order to prevent hypotonic maculopathy and further visual loss. 3 months later ciliochoroidal detachment persists but vision is stable.

Conclusions
Ciliochoroidal detachment is most commonly noted following intraocular surgery or trauma, but it also has been reported in patients with microphthalmia, pars planitis, Harada's syndrome and scleritis. It can be caused by ocular hypotonia, hemorrhage or inflammation, which causes fluid to accumulate in the suprachoroidal space. It can lead to hypotony and shallow anterior chamber with visual loss due to hypotonic maculopathy. These cases require treatment with cycloplegic mydriatics, topical anti-inflammatories and acetazolamide. Surgical intervention is indicated in persistent athalamia or extensive choroidal detachment (kissing choroidal sign) and involves drainage of the supraciliary fluid. Microphthalmia can also be associated with angle closure glaucoma, which was not found until today in our patient.

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P-0451

CAN SUPPLEMENTATION WITH A COCKTAIL OF ONE CARBON METABOLISM CO-FACTORS AND PRECURSORS SLOW THE RATE OF VISION LOSS IN GLAUCOMA?

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Background
Glaucoma is a leading cause of irreversible blindness, with current treatments primarily focused on intraocular pressure (IOP) reduction. However, many patients continue to experience progressive vision loss despite optimal IOP management. This study hypothesizes that supplementation with a cocktail of one carbon metabolism co-factors and precursors may slow the rate of vision loss in people with glaucoma over a 12-month period.

Methods
This open-label trial includes glaucoma patients with mild to moderate visual field (VF) defects, compared against age- and sex-matched controls receiving standard treatment. Inclusion criteria includes reproducible glaucomatous VF defects confirmed by standard automated perimetry, open-angle glaucoma or pseudoexfoliation glaucoma, and Snellen visual acuity ≥ 0.3. Patients with severe VF loss, high IOP, or coexisting retinal or neurological conditions are excluded. The supplementation cocktail includes B6, B9, B12, and choline, with safety and dosing guided by pre-clinical findings and established tolerable intake levels.

Results
The primary outcome measure is ganglion cell function via the photopic negative response (PhNR) of the electroretinogram. Secondary outcomes include visual field progression (VFI%, VF MD), and retinal nerve fiber layer thinning assessed by optical coherence tomography (OCT). Blood samples will be analyzed for metabolomic changes. Power calculations based on previous studies suggest that 58 eyes per arm are required to detect a significant difference in PhNR over a 12-month period, assuming a 20% dropout rate. The trial is conducted in partnership with major glaucoma clinics in Stockholm, with recruitment of 40 patients per arm.

Conclusions
If successful, this approach could offer a novel adjunctive therapy for glaucoma, addressing the unmet need for neuroprotective strategies in this patient population. Ethical considerations ensure that vision loss will be monitored closely, with early interventions provided if necessary. This study could significantly contribute to preserving functional vision, extending quality of life, and reducing healthcare burden for people living with glaucoma.

P-0452

RAPID RESOLUTION OF NAB-PACLITAXEL-RELATED CYSTOID MACULAR EDEMA WITH THE TOPICAL GLAUCOMA TREATMENT SIMBRINZA: A CASE REPORT

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Background

Paclitaxel, a widely used anti-microtubule agent, effectively treats various cancers but can cause rare complications like cystoid macular edema (CME). The mechanism behind Nab-paclitaxel-related CME is unclear but may involve Müller cell toxicity and microtubule disruption, leading to fluid accumulation. Treatment options remain inconclusive in their efficacy. This report reports a case of bilateral glaucoma managed with brinzolamide and brimonidine, complicated by Nab-paclitaxel-induced CME that resolved rapidly with continued glaucoma treatment and drug cessation.

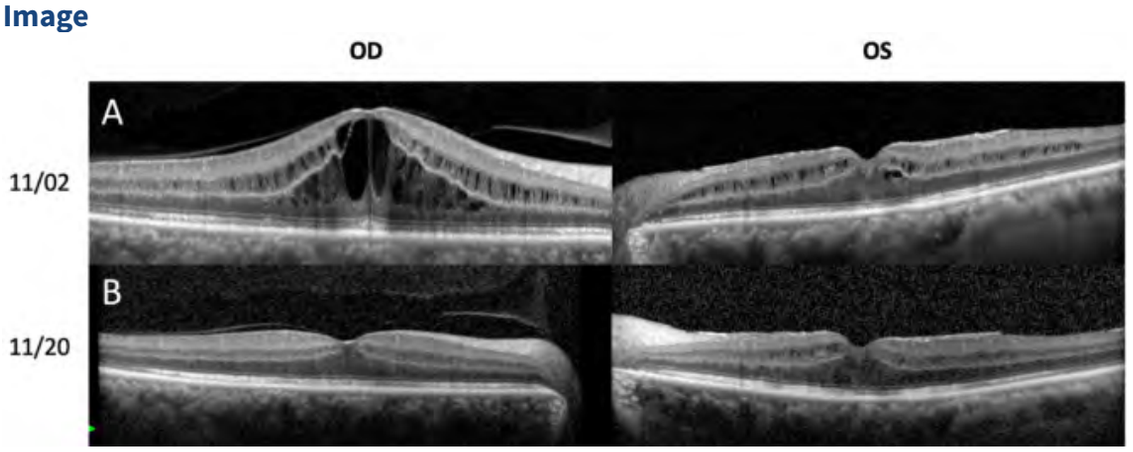
Methods

A case report.

Results

A 66-year-old patient with a history of metastatic pancreatic cancer presented with progressive blurred vision in both eyes 7 months after starting Nab-paclitaxel treatment for his pancreatic cancer. He had an ophthalmic history of dry age-related macular degeneration (AMD) and glaucoma in both eyes and was receiving regular topical compound treatment with Simbrinza, which contains brinzolamide and brimonidine. On examination, the patient's initial best-corrected visual acuity (BCVA) was 20/50 OD and 20/63 OS. Optical coherence tomography (OCT) showed bilateral cystoid macular edema with central retinal thickening. Fluorescein angiography showed hyperfluorescence in the macula. Cystoid macular edema resolved rapidly on OCT within two weeks after discontinuing Nab-paclitaxel, while maintaining treatment with the topical agent Simbrinza for glaucoma. His BCVA improved to 20/20 OD and 20/40 OS, aligning with his initial BCVA measurements before starting Nab-paclitaxel.

Image



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Conclusions

The pathogenesis of Nab-paclitaxel-related cystoid macular edema (CME) is unclear, and treatment lacks consensus. Options include drug discontinuation, intravitreal injections of antivascular endothelial growth factor antibodies, and topical alpha-2 agonists or carbonic anhydrase inhibitors. Recovery times range from two weeks to eleven months, with most cases resolving within one month. This report highlights rapid resolution of Nab-paclitaxel-induced CME with brinzolamide and brimonidine for glaucoma, combined with Nab-paclitaxel cessation.

P-0455

CORRERCTION OF NICOTINAMIDE LEVELS IN GLAUCOMATOUS OPTIC NEUROPATHY

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Background
Glaucoma is a progressive optic neuropathy characterized by the degeneration of retinal ganglion cells (RGCs) and their axons, leading to irreversible vision loss. While elevated intraocular pressure (IOP) remains the primary risk factor, recent studies suggest that metabolic dysfunction, particularly involving nicotinamide (NAM), plays a significant role in the pathophysiology of glaucomatous optic neuropathy. Nicotinamide, a precursor to nicotinamide adenine dinucleotide (NAD+), is crucial for cellular energy production and oxidative stress management. This study aims to explore the therapeutic potential of correcting nicotinamide levels in managing glaucomatous optic neuropathy.

Methods
The study was conducted on 61 patients diagnosed with primary open-angle glaucoma (POAG). Participants were divided into two groups: I group receiving oral nicotinamide supplementation (500 mg twice daily for six months) and II group receiving standard glaucoma treatment (IOP-lowering medication) without nicotinamide supplementation.

Results
I group Visus 0, 56 ± 0.01, IOP 13-14mmHg, visual field (VF) testing: MD - - 9, 35 dB, PSD - 12.01 dB, Optical coherence tomography (OCT) of the retinal nerve fiber layer (RNFL) in peripapillary zone was – 89 µm, NAD - 19 ng/ml. I group Visus 0, 58 ± 0.01, IOP 12-13 mmHg, visual field (VF) testing: MD - -9, 51 dB, PSD - 11.8 dB, optical coherence tomography (OCT) of the retinal nerve fiber layer (RNFL) in peripapillary zone was - 90 µm, NAD - 20 ng/ml. Data were analyzed using paired and independent t-tests, with significance set at $p<0.005$. Assessments were repeated at six months. I group Visus 0, 61 ± 0.01, IOP 13-14mmHg, visual field (VF) testing: MD - - 7, 81 dB, PSD - 10.2 dB, optical coherence tomography (OCT) of the retinal nerve fiber layer (RNFL) in peripapillary zone was – 89 µm, NAD - 19 ng/ml. I group Visus 0, 58 ± 0.01, IOP 12-13 mmHg, visual field (VF) testing: MD - - 9, 6 dB, PSD - 12.0 dB, optical coherence tomography (OCT) of the retinal nerve fiber layer (RNFL) in peripapillary zone was – 90 µm, NAD - 20 ng/ml. ($p<0.005$)

Conclusions
After six months, the treatment group exhibited a significant increase in blood NAD+ levels, while no change was observed in the control group. Retinal photosensitivity and RNFL thickness reduction was slower in the treatment group compared to the control group

P-0456
ADJUVANT TREATMENTS IN CONVENTIONAL THERAPY OF GLAUCOMA

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Background
Glaucoma is a multifactorial optic neuropathy that can lead to irreversible vision loss, significantly affecting patients' quality of life. Its causes include neuroinflammation, oxidative stress, vascular dysfunction, and elevated intraocular pressure (IOP). As the leading cause of irreversible blindness worldwide, glaucoma is expected to impact more people as the population ages, presenting a public health challenge. The primary treatment focuses on controlling IOP, but for this multifactorial disease, IOP reduction alone may not prevent vision loss. Some patients turn to non-conventional therapies, such as vitamin supplements, exercise, and meditation, to reduce the risk of impairment. However, the prevalence of these treatments in Brazil is unknown. This study aims to evaluate the prevalence and research of these alternative therapies alongside conventional treatments, and to analyze the sociodemographic and clinical profiles of patients using and researching them.

Methods
This is a cross-sectional and prospective study. One hundred patients with glaucoma and already undergoing conventional treatment will be included in this study.

Inclusion criteria: age between 18 and 80 years; glaucoma diagnosis confirmed by previous structural and functional examinations; absence of other ocular or systemic comorbidities that could compromise the visual field; voluntary participation with signed Informed Consent Form (ICF).

Exclusion criteria: age below 18 or above 80 years; other ophthalmological pathologies excluding glaucoma or cataracts; patients with cognitive deficits unable to understand the ICF; patients who refuse to voluntarily participate in the study.

After signing the consent form, patients will provide demographic and clinical data through a questionnaire. Non-conventional therapies assessed include vitamin supplementation, physical activity, meditation, and yoga.

Results
Of the 43 patients interviewed, 37 (86%) had never researched alternative therapies for glaucoma, while 6 (14%) had explored the topic. Research was more common among younger patients, those of White ethnicity, and individuals with higher education, with no significant differences observed based on gender or income. Clinically, patients who researched alternative therapies had lived with glaucoma longer, used fewer antiglaucoma eye drops, and had fewer comorbidities.

Nineteen patients (44%) reported engaging in adjunctive therapies such as vitamin supplementation, physical activity, meditation, or yoga, though not with the intention of preventing glaucoma progression.

The study will continue with the collection of visual field data and an expanded sample size.

Image

Demographic data		Researchers (n = 6)	Non-Researchers (n = 37)	Total (n = 43)
Age - Median and Range (years)		34,5 (20 - 59)	65 (18 - 80)	62 (18 - 80)
Biological Sex - Male (%)		3 (50)	18 (50)	22 (50)
Ethnicity (%)	White	4 (66)	11 (30)	15 (35)
	Black	1 (17)	6 (16)	7 (16)
	Mixed-Race	1 (17)	20 (54)	21 (49)
	Asian	0 (0)	0 (0)	0 (0)
	Indigenous	0 (0)	0 (0)	0 (0)
Educational Level (%)	Illiterate	0 (0)	1 (3)	1 (2)
	Incomplete Elementary School	0 (0)	13 (35)	13 (30)
	Completed Elementary School	2 (33)	13 (35)	15 (35)
	Incomplete High School	0 (0)	4 (11)	4 (9)
	Completed High School	2 (33)	3 (8)	5 (12)
	Incomplete Higher Education	1 (16)	1 (3)	2 (5)
	Completed Higher Education	1 (16)	2 (5)	3 (7)
Household Income - Median and Range (R$ Minimum Wage)		1,5 (1,3 - 14,16)	2,0 (0,4 - 7,79)	2,0 (0,4 - 14,16)
Per Capita Income - Median and Range (R$ Minimum Wage)		1,04 (0,33 - 5,06)	1,0 (0,14 - 3,54)	1,0 (0,4 - 4,72)

Clinical data		Researchers (n = 6)	Non-Researchers (n = 37)	Total (n = 43)
Time Since Glaucoma Diagnosis - Median and Range (years)		12,5 (4 - 30)	7,5 (0,08 - 70)	8,5 (0,08 - 70)
Underwent Procedure for Glaucoma Treatment - Yes (%)		4 (66)	27 (73)	31 (72)
Used Topical Antiglaucoma Medication at Any Point During Treatment - Yes (%)		6 (100)	36 (97)	42 (98)
Current Number of Antiglaucoma Eye Drops Used	0	0 (0)	3 (8)	3 (7)
	1	2 (33)	4 (11)	6 (14)
	2	0 (0)	4 (11)	4 (9)
	3	3 (50)	18 (48)	21 (49)
	4	1 (17)	8 (22)	9 (21)
Consulted a Doctor About Alternative Therapies for Glaucoma Treatment - Yes (%)		2 (33)	1 (3)	3 (7)
Engages in Alternative Treatment Practices Without Intention to Prevent Glaucoma Progression - Yes (%)	Vitamin Supplementation	1 (17)	8 (22)	9 (21)
	Physical Activity Practice	4 (66)	9 (24)	13 (30)
	Meditation	2 (33)	3 (8)	5 (11)
	Yoga	0 (0)	0 (0)	0 (0)
Presence of Clinical Comorbidities	Systemic Arterial Hypertension	1 (17)	25 (68)	26 (60)
	Diabetes Mellitus	0 (0)	10 (27)	10 (23)
	Dyslipidemia	0 (0)	7 (19)	7 (16)
	Hypothyroidism	1 (17)	5 (13)	6 (14)

Conclusions

This study highlights a limited but growing interest in alternative therapies for glaucoma. Given the multifactorial nature of glaucoma, adjuvant therapies may offer benefits, though further research is needed to clarify their role in glaucoma management.

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P-0457

BRINZOLAMIDE/TIMOLOL VS TRAVOPROST/TIMOLOL IN PSEUDOEXFOLIATIVE GLAUCOMA: A COMPARATIVE STUDY

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Background
This study compared the IOP-lowering efficacy and safety of two fixed-combination glaucoma therapies, brinzolamide 1%/timolol 0.5% and travoprost 0.004%/timolol 0.5%, in patients with pseudoexfoliation glaucoma.

Methods
A prospective, randomized study was conducted on 20 patients with unilateral pseudoexfoliative glaucoma, involving a total of 20 eyes. The patients were divided into two groups of 10 each. Group 1 received topical brinzolamide/ timolol fixed combination, while Group 2 received travoprost/ timolol fixed combination. The study evaluated the patients baseline intraocular pressure (IOP), mean IOP, and adverse effects at weeks 4, 12, and 20.

Results
97% patients in group 1 had a baseline IOP of 21.5+/-2.2 mmHg and 95% in group 2 had 21.3+/-2.5 mmHg. The mean IOP measurements at Week 20 were 18.1+/-2.7 mmHg for group 1 and 18.1+/-3.0 mmHg for group 2. No statistically significant difference was found between the two treatment groups in terms of IOP reduction from baseline. The most common adverse effects reported were conjunctival hyperaemia, sunken eye, periocular hyperpigmentation in group 2 .

Conclusions
The efficacy of brinzolamide/timolol and travoprost/timolol in lowering intraocular pressure was found to be similar. However, brinzolamide/timolol exhibited a more favourable safety profile compared to travoprost/timolol, highlighting its potential as a preferred treatment option.

P-0458
DELAYED BRINZOLAMIDE INDUCED CHORIDAL DETACHMENT

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Background
Choroidal detachment is often observed at an early period particularly after trabeculectomy and glaucoma drainage implant surgery.However, topical anti glaucoma eye drop induced choroidal detachment is a rare complication.Here,we report a case of topical brinzolamide induced late onset choroidal detachment after trabeculectomy

Methods
A 74 year old male patient whom primary angle closure glaucoma underwent combined trabeculectomy and phacoemulsification with Mitomycin C in the right eye.Before the surgery, his intraocular pressure was 22-26mmHg with maximal medical therapy and his best corrected visual acuity was 6/9(0.2). The mean deviation on Humphrey Field Analyser progrram was -27.83 db.

Post surgery IOP was 16-20mmHg without any medication.Two months after surgery, we started brimonidineand brinzolamide to achieve target IOP in the right eye considering one eyed.His IOP was controlled for 2 months and vision was stable over 2 months.Later he complained of dimunition of vision that persisted for 1 month;IOP decreased to 8 mmHg. BCVA dropped to hand movements and large multiple choroidal detachments were noted. We discontinued the anti glaucoma medications and started him on topical and oral steroids.

Results
After initating topical and oral steroids, BCVA improved to over finger counting 1metres. Over 3 weeks, the choroidal detachments were completely resolved and BCVA improved to 6/9 over 3 weeks .IOP was maintained in the range of 11-13mmHg subsequently.

Conclusions
Early withdrawl of the offending agent helped in resolution of choroidal detachment. A high level of suspicion in our case aided in the management and favourable outcome

P-0459

TRIPLENEX (TRIPLE FIXED COMBINATION) USE EVALUATION IN PATIENTS WITH GLAUCOMA: RANDOMIZED CLINICAL TRIAL

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Background

This project purpose is to evaluate the effectiveness, ocular surface quality, medication adherence and quality of life of triple combination eyedrop (Triplenex) comparing with same three separate drugs (Bimatoprost 0.3%, Timolol Maleate 0.5% and Brimonidine Tartrate 0.2%) in 45 glaucoma patients.

Methods

In this clinical trial approved by the Unifesp Etical and Research Comitte, volunteer glaucoma patients will be recruited from Unifesp Glaucoma Sector and VerMais Glaucoma Sector.

Individuals will be randomly divided em two groups, Group I is going to be treated with Triplenex (1 drop twice a day) and Group II with Brimonidine Tartarate 0.2% (1 drop twice a day), Timolol Maleate 0.5% (1 drop twice a day) and Bimatoprost 0.03%(1 drop at night). At baseline visit a complete ophthalmolgical exam will be performed along with three questionnaires (“Ocular Surface Disease Index”, “Glaucoma Treatment Compliance Assessment Tool” and “National Eye Institute Visual Function Questionnaire - VFQ25”),retinography, visual field, optic nerve OCT in all patients.This procedure will be repeated at baseline and within 4, 8, 12 weeks.

Results

Mean age, visual acuity, mean deviation (MD) and intraocular pressure (IOP) were similar between Group I and Group II. Surface parameters, MD, IOP, Ocular Surface and QoL questionnaires showed **no difference between groups** from baseline to 8 months of follow up. **Hiperemia increase** between washout and 3 months visit was **48-54% (Group I), 25.3-38.4%(Group II)**. Study’s **withdraw due to eyedrops intolerance** is **15.5%** (20%, Group I - 29%, Group II; p=0.865).

Image

	GROUP I	GROUP II
Patients	25	20
Age ± SD (years)	65.00 ±12.00	64.00 ±12.00
VA of better eye (logMar)	0.21 ±0.15	0.27 ±0.16
SAP MD of better eye	-11.00 ±9.00	-10.0 ±8.00
Mean IOP (mmHg)	16.1 ±4.80	14.8 ±3.70

Conclusions

Patients with glaucoma using separate drugs (Bimatoprost 0.3%, Timolol Maleate 0.5% and Brimonidine Tartrate 0.2%) comparing with triple combination, Triplenex had similar responses in IOP control,ocular surface index and QoL until this moment of evaluation. Both groups had significant lowering IOP and an increase of conjunctival hiperemia in 8 months of eyedrops use.

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P-0460

TWO CASES OF NEOVASCULAR GLAUCOMA WITH DISSOCIATION BETWEEN FUNDUS FINDINGS AND NONPERFUSION AREA

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Background

Neovascular glaucoma (NVG) is a secondary glaucoma with a high risk of blindness. NVG management requires early detection of retinal ischemia and early intervention to mitigate disease progression.

Methods

We present two challenging cases in which severe retinal ischemia was not apparent through fundus examination, including wide-field optical coherence tomography angiography (OCTA), but was identified as extensive of non-perfusion areas (NPA) on fluorescein angiography (FA), leading to a diagnosis of NVG.

Results

Case 1: An 82-year-old female with no prior ophthalmic history was referred to us with suspected acute primary angle closure (APAC) in the left eye. On initial examination, she had an edematous cornea, a shallow anterior chamber, intraocular pressure (IOP) rise to 42 mmHg, and moderate mydriasis in her left eye. After the infusion of acetazolamide, her cornea became clear, but we found neovascularization of the iris (NVI) in her left eye. Preoperative wide-field OCTA did not reveal any significant NPAs; however, the FA confirmed a large area of NPA. We diagnosed it as NVG. She subsequently underwent pars plana vitrectomy (PPV) and panretinal photocoagulation (PRP) combined with cataract surgery.

Case 2: A 63-year-old male with primary open angle glaucoma and diabetic retinopathy. His diabetes was well controlled with insulin. He was referred to our hospital for cataract surgery. We could not identify his severe retinal ischemia through preoperative fundus photography, including wide-field OCTA. Two months after surgery, NVI was observed in both eyes without increased intraocular pressure. FA identified multiple NPA. He was treated with PRP and intravitreal anti-VEGF agents. However, the patient developed elevated IOP two months after NVI was initially noted, with an IOP of 34 mmHg in the right eye and 26 mmHg in the left eye, resulting in a diagnosis of NVG in both eyes.

Conclusions

Although wide-field OCTA has been reported to detect NPAs at a rate comparable to FA, our cases demonstrate that FA can reveal ischemia even when fundus findings, including wide-field OCTA image, do not strongly suggest it. Factors such as cataracts or fixation instability may influence OCTA imaging quality. In cases with NVI, an FA examination is essential. In addition, if there is an ischemic background, early postoperative FA evaluation should be considered to guide the timely management of NVG.

P-0461

MANAGEMENT OF STEVEN JOHNSON SYNDROME ASSOCIATED WITH ACETAZOLAMIDE INTAKE FOLLOWING A COMPLICATED CATARACT SURGERY: A CASE REPORT

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Background

Steven Johnsons Syndrome (SJS) is a rare, and potentially fatal mucocutaneous hypersensitivity reaction to the intake of systemic drugs. Rarely has acetazolamide, a sulfonamide-derivative carbonic anhydrase inhibitor, been linked to SJS development. We report a unique case of a 66-year-old female who developed SJS four weeks after oral acetazolamide intake for the management of elevated intraocular pressure (IOP) following a complicated cataract surgery. Extensive research shows that this is the first reported case of SJS associated with acetazolamide in the Philippines.

Methods

A 66-year-old diabetic and hypertensive Filipino female presented with increased IOP of 32mmHg 1 day after a complicated cataract surgery with sulcus fixed intraocular lens (IOL) and dropped cortical material. Management consisted of oral acetazolamide, oral and topical steroids, topical anti-glaucoma medication, and topical antibiotic.

On the 4th post-operative week, the patient developed multiple bilateral hyperpigmented periocular lesions and difficulty of breathing. Multiple diffused erythematous papules and patches on the face and trunk along with oral mucosal blisters were noted. This was accompanied by dysphagia, and odynophagia. Biopsy of the mid-back patches was consistent with SJS.

Results

Oral acetazolamide was immediately discontinued followed by prompt initiation of oral and topical cyclosporine. Improvement of mucocutaneous lesions and resolution of respiratory symptoms was observed immediately, 2 days after interventions.

Conclusions

Post-surgical management of increased IOP following a complicated cataract surgery can include acetazolamide which may induce SJS in rare instances.

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Other

P-PW-0464

EVIDENCE-BASED PRACTICE: A COLLABORATION BETWEEN COCHRANE EYES AND VISION, THE AMERICAN ACADEMY OF OPHTHALMOLOGY, AND THE EUROPEAN GLAUCOMA SOCIETY

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Background
Trustworthy clinical practice guidelines should be informed by evidence from high-quality systematic reviews (SRs). Since 2014, Cochrane Eyes and Vision (CEV) has partnered with the American Academy of Ophthalmology (Academy) to provide pre-assessed, reliable reviews, for its Preferred Practice Patterns (PPPs). In 2019/2020, during the update of the Academy Glaucoma PPPs, the European Glaucoma Society (EGS) was enlisted to help assess the evidence to support their own glaucoma guidelines (Qureshi 2021). In 2024/2025, the three groups have again come together to assess the quality of the SRs in glaucoma and the scope of the literature on glaucoma interventions.

Methods
We used the CEV database of SRs as a source of literature. This database is updated annually and contains nearly 8,000 SRs related to ocular conditions. We screened the database for reviews relevant to glaucoma interventions within five-year periods (*i.e.*, time between PPP updates), and assessed their reliability using a tool developed by CEV. Reliability assessments and data extractions (*e.g.*, review characteristics) were completed by CEV and EGS clinicians (trained by RQ), and reliable reviews were shared with Academy and EGS to inform their guidelines.

Results
From 2014-2019 and 2019-2023 respectively, we identified 129 and 134 SRs of interventions for glaucoma, of which 49 (38%) and 42 (31%) were reliable. Most (65%) SRs were unreliable, primarily due to a limited literature search. Overall, most SRs focused on open angle glaucoma (58%) and ocular hypertension (29%) populations, and medical or surgical interventions (70%). In terms of outcomes, 89% of SRs assessed intraocular pressure and 82% harms. Reviews appeared to increase in size across the periods, with the median [IQR] number of studies increasing from 5 [2-12] to 13 [6-21] and participants/eyes increasing from 363 [104-1486] to 884 [360-2500]. From the 49 that were relevant in 2019, 21 (43%) were cited in each organization's guidelines, respectively.

Image

Table. Characteristics of reliable glaucoma intervention reviews published between 2014-2023

Characteristics	2014-2019 (n=49) n (%)	2019-2023 (n=42) n (%)
Type of glaucoma [a]		
Open angle (*primary, secondary, normal tension, pigmentary, pseudoexfoliation*)	22 (45%)	31 (74%)
Ocular hypertension	11 (22%)	15 (36%)
Angle closure (*primary or acute closure attack*)	6 (12%)	13 (31%)
Any type of glaucoma (*non-specific*)	10 (20%)	2 (5%)
Other	16 (33%)	10 (24%)
Type of intervention studied [b]		
Medical (*i.e., pharmacologic*)	17 (35%)	13 (31%)
Surgical	16 (33%)	18 (43%)
Laser	11 (22%)	3 (7%)
Devices and other [c]	5 (10%)	8 (19%)
Outcomes [d]		
Intraocular pressure	43 (88%)	38 (90%)
Harms (*e.g., adverse events*)	38 (76%)	37 (88%)
Visual field	19 (39%)	5 (12%)
Treatment burden	18 (37%)	20 (48%)
Treatment success/failure	17 (35%)	10 (24%)
Visual acuity	16 (33%)	11 (26%)
Need for reoperation	9 (18%)	9 (21%)
Morphologic measures	9 (18%)	2 (5%)
Quality of life	6 (12%)	4 (10%)
Visual function	2 (4%)	0 (0%)
Cost or cost-effectiveness	1 (2%)	2 (5%)
Other	10 (20%)	21 (50%)
Number of studies (median [IQR])	5 [2, 12]	13 [6, 21]
Number of participants or eyes (median [IQR])	363 [104, 1486]	884 [360, 2500]
Types of included studies		
Randomized Controlled Trials	44 (90%)	37 (88%)
Non-randomized Controlled Trials	14 (28%)	8 (19%)
Cohort studies	3 (6%)	7 (17%)
Case-series / case report	1 (2%)	5 (12%)
Case-control studies	0 (0%)	3 (7%)
Cross-sectional studies	0 (0%)	1 (2%)
Reviews	0 (0%)	1 (2%)
Not applicable [e]	4 (8%)	1 (2%)
Other	1 (2%)	1 (2%)

a – Reviews may look at multiple conditions

b – Reviews were assigned a primary intervention type based on their designated interventions and comparators

c – Other interventions included yoga, acupuncture, nutraceuticals, etc.

d – Reviews may look at multiple outcomes

e – Empty reviews with no included studies

Conclusions

We identified 91 reliable SRs to inform multiple versions of international guidelines. This collaboration between CEV, Academy, and EGS ensures the best evidence is used to guide glaucoma care around the world. The Academy and EGS have acknowledged the value of this partnership in their reports and it serves as a model for how guideline developers should work with researchers and methods experts to integrate the totality of evidence with the experience and expertise of clinicians.

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P-PW-0465

A DUAL-DRUG NANOHYBRID OF QUERCETIN AND CNTF TO RESCUE RETINAL GANGLION CELLS IN GLAUCOMATOUS NEURODEGENERATION

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Background

Glaucoma is a multifactorial neurodegenerative disease of the optic nerve, characterized by visual field defect and progressive loss of retinal ganglion cells (RGCs). It is the most prevalent neurodegenerative disease and a leading cause of blindness worldwide. However, few drugs are currently proven effective on neuroprotection in glaucomatous neurodegeneration.

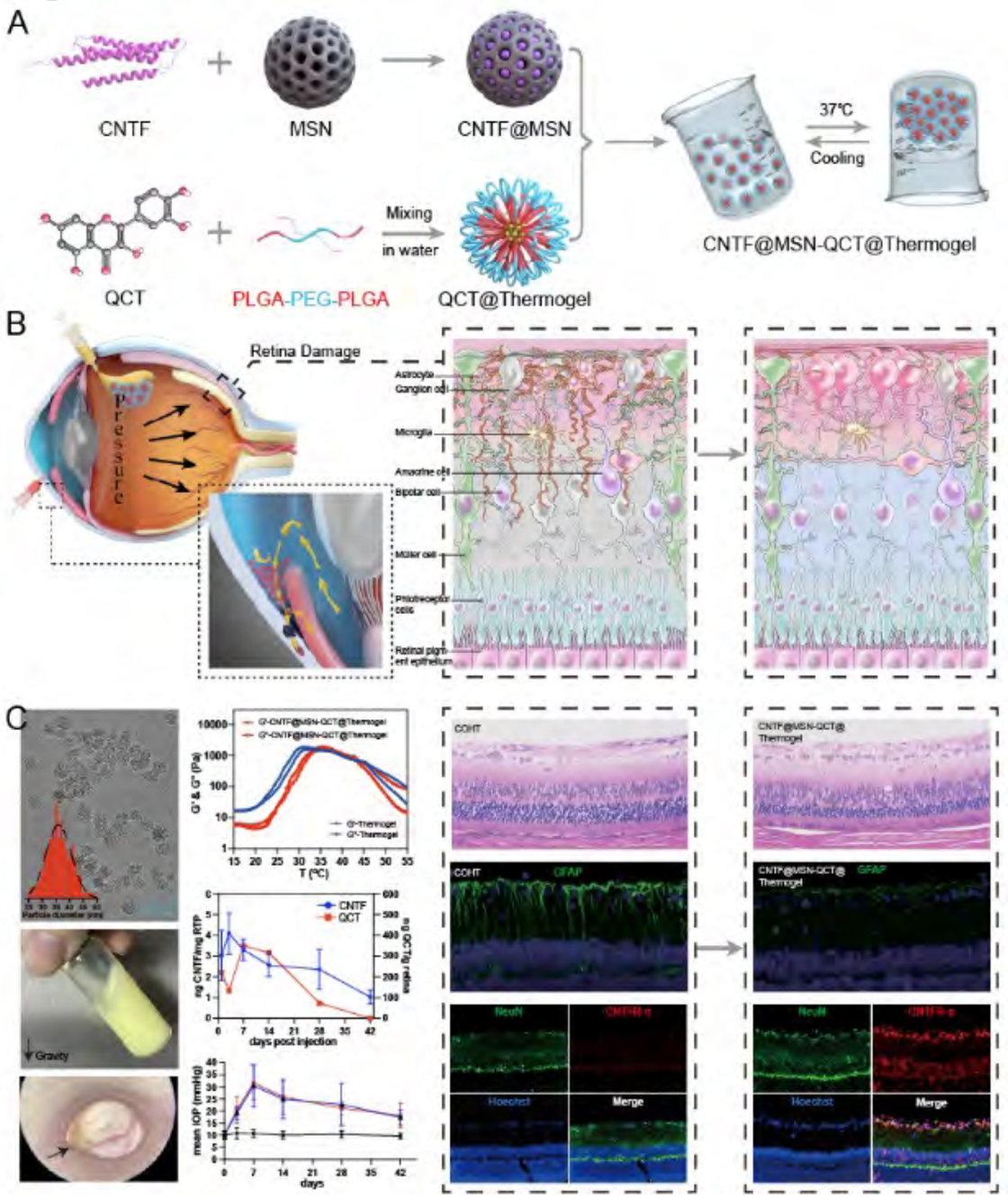
Methods

To effectively protect the nervous system in glaucomatous neurodegeneration, a novel nanohybrid has been developed by incorporating ciliary neurotrophic factor (CNTF)-loaded mesoporous silica nanoparticles (CNTF@MSN) into the thermogel matrix added with quercetin (QCT) (CNTF@MSN-QCT@Thermogel). Characterization of CNTF@MSN-QCT@Thermogel were determined by gel permeation chromatography (GPC), nuclear magnetic resonance spectrometer (NMR) and transmission electron microscope (TEM). The injectability was verified by sol-gel transition curve using a rheometer. In vitro and *in vivo* drug release were recorded using ELISA test for CNTF and high performance liquid chromatography (HPLC) for quercetin. In vitro cytotoxicity was determined by calcein/propidium iodide (PI) cell viability detection method. CNTF@MSN-QCT@Thermogel was intravitreally injected after the successful induction of chronic ocular hypertension (COHT) model in rats by injecting paramagnetic microspheres into their anterior chamber. Visual function was assessed by electroretinogram (ERG) and photopic negative response (PhNR). RGCs were counted in hematoxylin-eosin (HE) stained retinal cross-sections. Immunofluorescence and western-blot analysis were conducted to investigate the neuroprotective mechanism of CNTF@MSN-QCT@Thermogel.

Results

The sol-gel transition of CNTF@MSN-QCT@Thermogel was observed at 25 °C, indicating its free-flowing sol state and good injectability at a low temperature. This nanohybrid regulates the *in vitro* and *in vivo* release of CNTF and quercetin in a sustainable way for up to 28 days. The carrier materials (*i.e.* silica and thermogel) in the nanohybrid do not show any cytotoxicity to human lens epithelial cells nor rat retinal precursor cells. CNTF@MSN-QCT@Thermogel effectively protected retinal precursor cells from apoptosis in an *in vitro* hypoxic condition. An induction of chronic ocular hypertension in rats was used to mimic glaucomatous neurodegeneration. Intravitreal injection of CNTF@MSN-QCT@Thermogel significantly promoted retinal ganglion cells (RGCs) survival and restored visual function. The potential mechanism lied in the synergistic effect of CNTF and QUE on Stat-3 signaling pathway activation and attenuating the damage caused by astrogliosis.

Image



Conclusions

This nanohybrid is thus a promising alternative for effective neuroprotection treatment for Glaucomatous neurodegeneration.

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P-PW-0466

RELATIONSHIP BETWEEN LONG-TERM BLOOD PRESSURE FLUCTUATIONS AND VISUAL FIELD PROGRESSION IN NORMAL TENSION GLAUCOMA

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Background
Glaucoma is a leading cause of irreversible blindness worldwide and is primarily characterized by progressive optic neuropathy. While elevated intraocular pressure (IOP) has traditionally been considered the primary risk factor for the onset and progression of glaucoma, increasing evidence indicates that vascular factors also play a significant role, especially in normal-tension glaucoma (NTG). This study aims to evaluate the association between long-term blood pressure (BP) fluctuations and visual field (VF) progression in patients with NTG.

Methods
Linear mixed models were used to assess associations between BP metrics and VF progression rates. BP variability (BPVR) and intraocular pressure (IOP) variability during the follow-up period were calculated as the standard deviation (SD) divided by the mean value. Correlated non-fluctuating BP metrics (baseline, mean, maximum, and minimum BP) were combined using principal component analysis (PCA) for systolic BP (SBP) and diastolic BP (DBP), respectively. Principal component 1 (PC1) was included as a covariate. The interactions between covariates and time from baseline were modeled to determine their effects on VF progression rates.

Results
A total of 170 eyes from 170 NTG patients were included, with a mean age of 56.9 ± 13.4 years at baseline. VF progression was observed in 74 eyes (44%). These eyes exhibited significantly higher DBPVR (0.10 ± 0.02 vs. 0.09 ± 0.03 mmHg, $P = 0.009$) and slightly higher SBPVR (0.08 ± 0.02 vs. 0.07 ± 0.02 mmHg, $P = 0.077$), though the latter was not statistically significant. Notably, only SBPVR was significantly associated with VF progression rates (estimate: -12.57 dB/year [SE: 5.20 dB/year], $P = 0.0166$), while IOP and non-fluctuating BP metrics were not.

Conclusions
Blood pressure variability, particularly SBP variability, may be an independent risk factor for accelerated VF progression in NTG. Clinicians should carefully monitor BP variability in NTG patients to mitigate potential disease progression.

P-PW-0467

COMPARATIVE ANALYSIS OF MELBOURNE RAPID FIELDS WEB-BROWSER PERIMETER AND HUMPHREY FIELD ANALYZER IN CHINESE GLAUCOMA PATIENTS

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Background
Glaucoma affects a significant number of people worldwide, and its incidence is expected to rise. With the aging population, especially in East Asia where the proportion of people aged 65 and older is projected to increase significantly by 2050, the demand for glaucoma care and accurate visual field monitoring is growing. The need for home-based visual field monitoring is becoming more evident. It can help relieve the burden on healthcare facilities and enable more frequent and convenient testing for patients. The Humphrey Field Analyzer (HFA), while reliable, has several drawbacks. It is expensive to acquire and maintain, Its bulky design limits portability, and the testing process is time-consuming, Moreover, it requires trained personnel to operate, and communication between different healthcare providers and patients can be challenging. The Melbourne Rapid Fields (MRF) is a web-browser based perimeter that can be used on various digital devices, including tablets, laptops, and desktops. it has the potential to be a more accessible and patient-friendly alternative.This study aims to evaluate the efficacy and practicality of the MRF web-browser based perimeter software, compared to the conventional HFA 24-2 SITA Standard Protocol in a hospital environment in China.

Methods
The study was conducted in a clinical practice setting. A total of 103 Chinese speaking participants, contributing 164 eyes, were enrolled in the study. Participants underwent VF testing using both HFA and MRF. MRF was conducted with computer voice guidance in Chinese. Primary outcome measures include mean deviation (MD), pattern standard deviation (PSD), test duration and reliability indicators.

Results
MRF returned a significant correlation with HFA for MD (Pearson r = 0.93, $P < 0.001$) and PSD (Pearson r = 0.88, $P < 0.001$). The average test duration was notably shorter for MRF (265 ± 41 seconds) compared to HFA (382 ± 80 seconds, $P < 0.001$). Bland-Altman analysis revealed a mean bias of -1.5 decibels (dB) for MD and 0.4 dB for PSD. Additionally, MRF demonstrated high sensitivity and specificity, achieving an Area Under the Curve (AUC) of 0.922 for both MD and PSD. Furthermore, MRF found fewer false positives rates.

Conclusions
MRF offers a reliable, efficient, and patient-friendly alternative to traditional VF testing for Chinese patients. Its implementation could substantially improve access to glaucoma care, especially in underserved regions and for patients unable to attend regular clinic appointments.

P-PW-0468

THE EFFECTS OF 90-DAY HEAD-DOWN BED REST ON GCC AND RNFL THICKNESS: ASSOCIATIONS WITH SYSTEMIC AND OCULAR FACTORS AND VISUAL FUNCTION

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Background
SANS is a significant ocular condition induced by prolonged exposure to microgravity during spaceflight, critically impacting astronaut health and mission safety. The etiology of SANS is still unclear, and major hypotheses include increased intracranial pressure (ICP), decreased venous compliance, and changes in CSF dynamics. However, due to the lack of comprehensive monitoring before, during, and after flight, it is not yet possible to determine the patterns of change in eye structure and visual function or identify risk factors associated with SANS.

Methods
This investigation engaged 36 male participants in a 90-day head-down tilt (HDT) bed rest experiment to simulate microgravity effects. We employed optical coherence tomography to measure changes in Ganglion Cell Complex (GCC) and Retinal Nerve Fiber Layer (RNFL) thicknesses before, during, and up to 180 days post-HDT. We assessed visual functions including near and distance vision, and refractive status, to explore correlations with ocular structural changes. Additionally, systemic and ocular physiological parameters such as intraocular pressure (IOP), the area of the optic nerve subarachnoid space (ONSSA), axial length, body mass index (BMI), heart rate (HR), and blood pressures (systolic, diastolic, and mean arterial) were recorded. Ocular perfusion pressure (OPP) was calculated using established formulas.

Results
Significant increases in GCC thickness were observed by day 7 of HDT, averaging 5.57 µm (95% CI: 0.95-10.19, P = .008), correlating positively with BMI, IOP, and OPP, and inversely with HR, mean arterial blood pressure, and diastolic blood pressure. Although less significant, RNFL thickness peaked at day 7 of recovery by 2.44 µm (95% CI: -0.90 to 5.76, P = .38), showing positive correlations with BMI and ONSSA and negative correlations with HR and IOP. Visual acuity, particularly near vision, deteriorated significantly, correlating with GCC thickening (logMAR +0.17, 95% CI: 0.04-0.30, P = .003) by day 30 of HDT.

Conclusions
Our findings reveal early ocular changes due to simulated microgravity, with GCC thickness serving as a potential early biomarker for SANS. The observed correlations between ocular and systemic parameters highlight the intricate interactions involving body fluid distribution and cardiovascular adaptations. BMI may potentially serve as a risk indicator for screening susceptible populations for SANS.This study supports the necessity for integrated cardiovascular and ocular health monitoring to mitigate SANS risks in spaceflight and has implications for managing conditions like normotensive glaucoma and papilledema related to intracranial-ocular pressure.

P-PW-0469

FROM REGISTRY TO REALITY: PUBLICATION PATTERNS AND CHARACTERISTICS OF REGISTERED GLAUCOMA TRIALS FROM CLINICALTRIALS.GOV

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Background
Advancements in glaucoma treatment are driven by dissemination of rigorously designed clinical trials. While ClinicalTrials.gov was established in part to ensure transparency of all ongoing clinical trials, under-publication of studies has been reported among various ophthalmological subspecialities and the extent of this bias in the dissemination of glaucoma trials has not been explored. In this study, we examined the publication rates of registered glaucoma trials and identified factors associated with publication.

Methods
The National Institutes of Health ClinicalTrials.gov was queried in August 2024 for all registered glaucoma trials with the following keywords: Glaucoma, Primary Open Angle Glaucoma, Open Angle Glaucoma, Narrow Angle Glaucoma, Closed Angle Glaucoma, Congenital Glaucoma, Secondary Glaucoma, Neovascular Glaucoma, Refractory Glaucoma, Normal Tension Glaucoma, Pseudoexfoliation Glaucoma, Glaucoma Neuroprotection, Intraocular Pressure (IOP), as well as a primary study completion date of January 1, 2021 (to allow for at least 3 years from study completion date to potential publication). Study characteristics including category, intervention modality, phase, location of principal investigator, age focus, industry sponsorship, study type were collected. Time from study start date to both primary and overall completion date were extracted, and verification of publication in peer-reviewed journals was confirmed using PubMed.gov, ClinicalTrials.gov, and Google Scholar. Time from primary completion to publication was recorded for all published trials.

Results
A total of 969 trials were identified (Table 1), of which only 510 (53%) were published. The majority of trials were non-surgical (575, 59%), early phase or uncategorized (748, 77%), interventional (748, 77%), with an even split between international (518, 54%) and industry sponsored (512, 53%). The average time from study start date to primary completion date was 24 months, with a delay of primary completion date to publication date of another 34 months. Procedure trials, non-US based studies, and non-industry sponsorships were significantly associated with publication status ($p<0.05$ for all).

Image

Table 1. Study Characteristics and Comparison of Published and Nonpublished Glaucoma Trials

Study parameter	All, no. (%)	Published, no. (%)	Not published, no. (%)	*P* value
Total	969	510 (100)	459 (100)	
Category[a]				
Biologic	23 (2)	15 (3)	8 (2)	
Device	224 (23)	103 (20)	121 (26)	
Drug	497 (51)	257 (50)	240 (52)	**0.03**
Procedure	118 (12)	73 (14)	44 (10)	
Other/None	158 (16)	88 (17)	71 (15)	
Intervention Modality				
Surgery	276 (28)	155 (30)	121 (26)	
Medicine	575 (59)	296 (58)	279 (61)	0.37
Other/None	118 (12)	59 (12)	59 (13)	
Phase				
Early phase or uncategorized[b]	748 (77)	406 (80)	342 (75)	0.06
Late phase[c]	221 (23)	104 (20)	117 (25)	
PI location				
United States	451 (47)	208 (41)	243 (53)	**< 0.01**
Non-USA	518 (53)	302 (59)	216 (47)	
Age focus of trial				
Children only	16 (2)	9 (2)	7 (2)	
Children and adults	74 (8)	39 (8)	35 (8)	0.96
Adults only	879 (91)	462 (91)	417 (91)	
Industry sponsorship				
Yes	512 (53)	238 (47)	274 (60)	**< 0.01**
No	457 (47)	272 (53)	185 (40)	
Study type				
Interventional	748 (77)	406 (80)	342 (75)	0.06
Observational	221 (23)	104 (20)	117 (25)	
Published				
Yes	510 (53)			
No	459 (47)			
Time analysis				
Average months, study start date to				
Primary completion[d]	24	25	22	0.11
Overall completion[e]	27	28	25	0.07
If published, primary completion to publication	34			

PI, principal investigator.

[a]A given study may be classified in more than one category. Two-tailed χ^2 test was performed for categorical variables, two-tailed *t* test was performed for continuous variables. Statistical significance was defined as $P < 0.05$.
[b]Early phase or uncategorized: phase 1, phase 1/2, and uncategorized trials.
[c]Late phase: phase 2/3, phase 3, and phase 4 trials.
[d]Primary completion: last primary outcome datapoint collection completed.
[e]Overall completion: all datapoints collected.

Conclusions

Only near half of all registered glaucoma trials from clinicaltrials.gov were published, with a significant delay of nearly 3 years from study primary completion date to publication date. This low publication rate and significant delay suggests potential bias in information dissemination of glaucoma trials.

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P-0471

VALIDATION OF THE OCT GLAUCOMA RISK SCORE FOR THE GLAUCOMA MASS SCREENING

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Background

To enhance the diagnostic accuracy of glaucoma screening, the Glaucoma Screening Score (GlaSS), a diagnostic algorithm utilizing large-scale optical coherence tomography (OCT) data, was previously developed and demonstrated its high performance in a single Japanese institution.[1] By focusing on the logic ophthalmologists use to diagnose OCT images as glaucomatous, GlaSS successfully identified key parameters and refined detection accuracy. Subsequently, multiple studies have reported on the validation of this model's performance.[2,3] This study also aims to validate the GlaSS model's diagnostic accuracy in a different Japanese population.

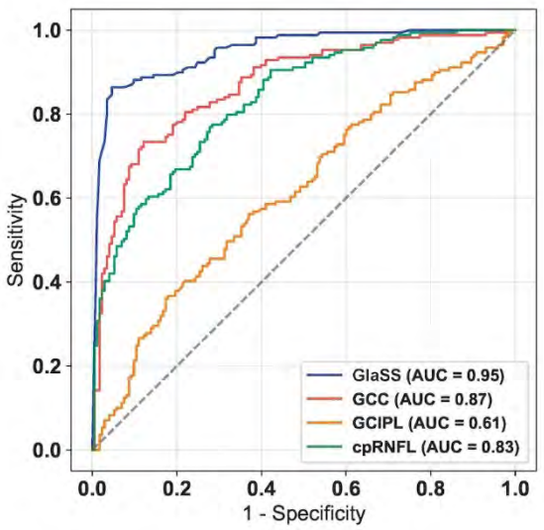
Methods

This cross-sectional study included participants with or without glaucoma who underwent OCT measurements (3D OCT-1 Maestro; Topcon) at the Jikei Hospital in Tokyo, Japan. Glaucoma was diagnosed by three glaucoma specialists using OCT and Humphry Field Analyzer (Carl Zeiss Meditec, Inc) without being informed of the GlaSS score values. The performance of the the GlaSS was assessed in a Japanese population of 342 eyes (198 primary open angle glaucoma and 144 normal) from 219 participants. Areas under the receiver operating characteristic curves (AUROCs), sensitivity, and specificity were calculated. The GlaSS model results were compared with the values obtained from the standard metrics of circumpapillary retinal nerve fiber layer (cpRNFL), ganglion cell inner plexiform layer (GCIPL), and ganglion cell complex (GCC) thickness.

Results

The GlaSS model exhibited an AUC of 0.95 for differentiating normal eyes from glaucoma eyes, surpassing the AUCs of 0.83, 0.61, and 0.87 for cpRNFL, GCIPL, and GCC, respectively. At a specificity of 95%, the sensitivity was 86.4 for GlaSS, compared to 42.0 for cpRNFL, 8.3 for GCIPL, and 50.9 for GCC.

Image



Conclusions

The AUC value derived from the GlaSS model in this study was slightly lower than the 0.97 reported in the original study; however, it demonstrated clear clinical utility. Compared to conventional parameters, the model exhibited superior performance in terms of AUC and sensitivity at 95% specificity, suggesting its potential applicability for glaucoma screening in a Japanese population distinct from the cohort used for model development. Further validation of the model's accuracy in other ethnic groups is warranted, along with additional research to enhance its diagnostic performance.

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P-0472

FROM X-Y PLANE TO X-Y-Z SPACE: TRANSFORMING VISUAL FIELD REPORTS INTO ENGAGING 3D LEARNING TOOLS

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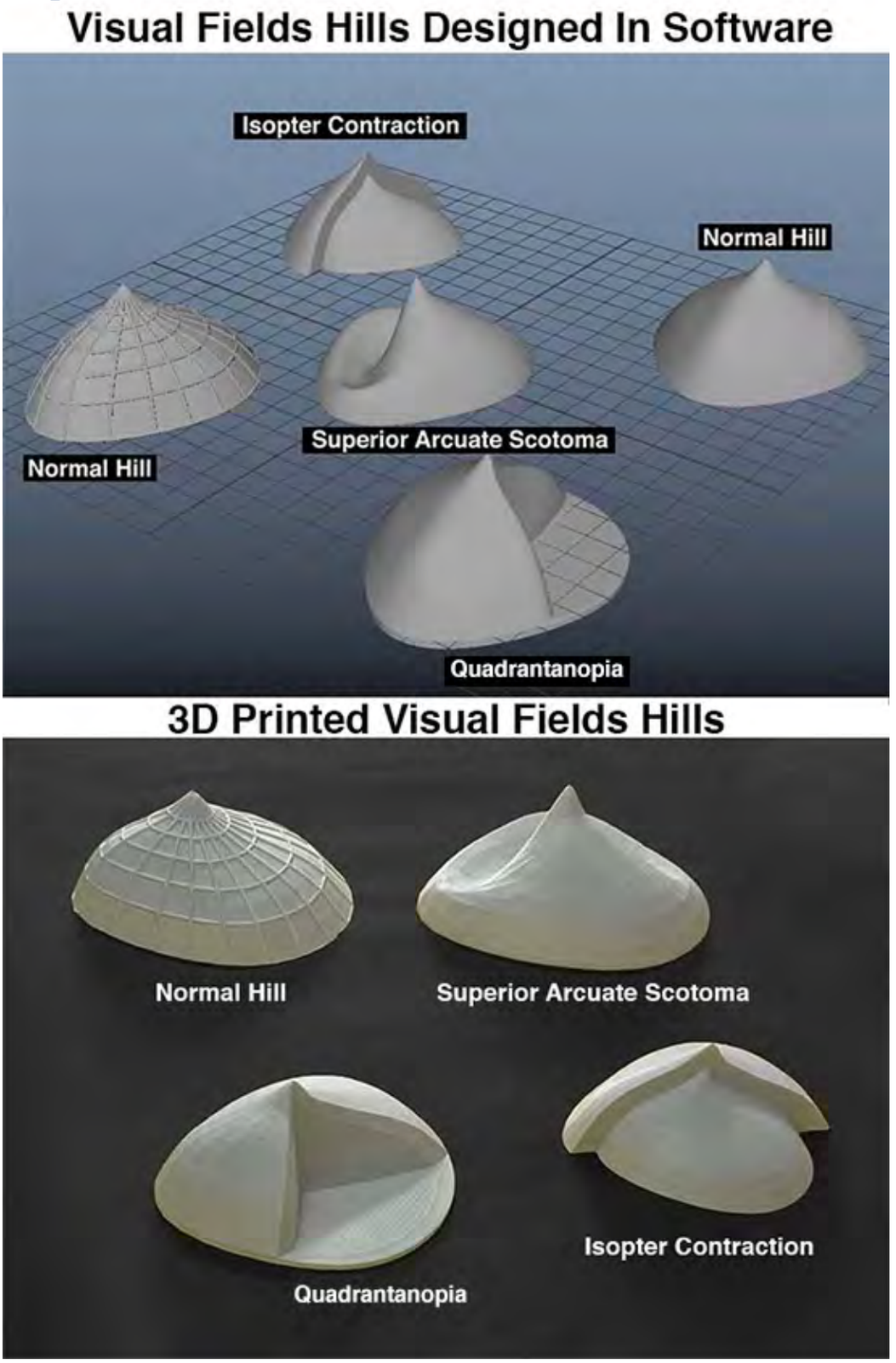
Background
Practical sessions enhance understanding of ophthalmic concepts and promote critical thinking, especially among medical students, glaucoma residents, and allied ophthalmic personnel. With the increasing use of virtual and augmented reality in ophthalmic education, this study explores the creation of three-dimensional (3D) printed models representing visual field reports for better comprehension of visual field defects.[1,2,3,4]

Methods
This project utilizes data from real patient perimetry reports to develop 3D-printed models of various visual field patterns. The models include both normal fields and complex defects such as isopter contraction, arcuate scotomas, and quadrantanopias. Through tactile interaction with these 3D puzzles, learners gain insights into neuro-ophthalmic conditions like glaucoma, optic neuropathies, and chiasmal syndromes, enhancing their understanding of both normal and pathological visual fields.

Results
3D printing offers precision and affordability, making it ideal for rapid prototyping of patient-specific models. Traditional ophthalmic learning tools rely on diagrams and digital platforms, but these tactile 3D models provide a hands-on experience that promotes active learning. By converting clinical data into physical models, students and trainees engage more effectively, and patients better understand visual field changes. This is the first known attempt to develop 3D-printed visual field report models directly from clinical data, filling a gap in ophthalmic education.

Image



Conclusions

This novel pedagogical approach offers valuable tools for ophthalmic education and patient care. The 3D-printed visual field models provide students with a multisensory learning experience and help ophthalmologists communicate more effectively with patients about disease progression, such as glaucomatous visual field loss. These models represent a step forward in ophthalmology education, offering both educational benefits and improved patient engagement.

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P-0475

RISK OF VISION LOSS AFTER DIFFERENT GLAUCOMA SURGERIES IN VERY ADVANCED FIXATION-INVOLVING DISEASE

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Background

Vision loss after glaucoma surgery in very advanced fixation-involving disease is a significant concern. The prevalence of such an adverse outcome remains largely indeterminate owing mainly to differences in the definitions of visual loss and variability in inclusion criteria across different studies. The object of this study was to evaluate the risk of vision loss in these glaucoma patients from all causes, and specifically from glaucoma progression.

Methods

Charts of patients with very advanced glaucoma who underwent Glaucoma surgery were included in the analysis. Visual field inclusion criteria were based on available tests. For a 24-2 field a mean deviation (MD) of less than -15 dB with involvement of at least two fixation points was required. For a 10-2 field involvement of both hemispheres or of one hemisphere with involvement of at least one fixation point was required. The main outcome measure was loss of 2 Snellen lines six months after surgery. Severe vision loss was defined as glaucoma-related irreversible vision loss to below 1.0 logMAR. Subgroup analysis was performed for risk factors related to vision loss.

Results

A total of 174 eyes of 150 patients were included in the analysis. Average age was 70 (SD = 11.8) and 67% were women. Average pre-operative mean deviations (MD) were -23.2 (SD=4.5) and -17.4 (SD=7.5) for 24-2 and 10-2 fields, respectively. The main glaucoma types were primary open angle (POAG), secondary open angle and angle closure (33.3%, 33.5% and 27% respectively). Forty six percent of patients underwent glaucoma surgery in combination with cataract extraction. The types of surgery performed were Gonioscopy-assisted transluminal trabeculotomy (GATT) (30.5%), Trabeculectomy (27.6%), PreserFlo microshunt (21.3%), Ahmed glaucoma valve (AGV) (14.4%), Xen 45 (5.7%) and iStent (0.6%). Average pre-operative best corrected visual acuity was logMAR 0.41 (SD = 0.37). At 6 months post-operatively, 20.1% of patients experienced vision loss of 2 lines or more. Glaucoma related vision loss was 6.3%, and severe vision loss occurred in 4.3%. A diagnosis of angle closure glaucoma and worse MD on 24-2 and 10-2 fields were associated with higher risk of vision loss at 6 months post-surgery. Worse mean deviation on 10-2 visual field was associated with severe vision loss.

Conclusions

The incidence of severe irreversible vision loss after glaucoma surgery in patients with very advanced disease is an uncommon but concerning phenomena. Worse mean deviation at baseline is associated with a higher risk of surgery related vision loss.

P-0477

ASSOCIATION OF VISION PARAMETERS WITH THE QUALITY OF LIFE IN GLAUCOMA

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Background
To analyze the association between multiple vision parameters and the glaucoma quality of Life. To explore the parameters that can better explain the quality of life impairment in glaucoma nursing and clinical management.

Methods
The cross-sectional study was conducted to enroll 101 subjects with primary open-angle glaucoma in the glaucoma clinic of Beijing Tongren Hospital between April 2022 and April 2024. Each subject was included in the eye with less severe disease. The quality of life of glaucoma patients was evaluated using the Glaucoma Quality of Life-15 item Questionnaire (GQL-15). Vision parameters included the visual field index (VFI) value of visual field, best corrected visual acuity and the area under log Contrast Sensitivity Function (AULCSF). The visual field measurement uses the Humphrey Visual Field Analyzer with the 24-2 standard mode. AULCSF of each eye evaluated by the novel quick contrast sensitivity function(qCSF) test based on intelligent algorithm. Spearman correlation analysis and regression analysis were used to calculate the correlation between GQL-15 score and each vision parameter.

Results
In 101 eyes of 101 patients included, the mean GQL-15 score was 5.920±7.432, the mean VFI value was 86.840±14.461, the mean best corrected visual acuity was 0.004±0.049, and the mean AULCSF was 1.066±0.254. The results of association analysis showed that GQL-15 score was significantly correlated not only with VFI value (r=-0.286, p=0.004) and best corrected visual acuity (r=0.280, p=0.005), but also with the AULCSF (r=-0.326, p=0.001). In further regression analysis, both the best corrected visual acuity (p=0.037) and the AULCSF (p=0.033) had significant predictive value for GQL-15 score, with a correction R^2 of 0.199.

Conclusions
In addition to the VFI value and best corrected visual acuity, impaired contrast sensitivity was also significantly associated with reduced quality of life in glaucoma patients. The clinical and nursing management of glaucoma should enhancing the interpretation of contrast sensitivity impairment in glaucoma patients, integrating patient education with various vision parameters to enhance their comprehension of the disease.

P-0478

STANDARDIZING GLAUCOMA FELLOWSHIP EVALUATION: ANALYSIS OF GOALS, OBJECTIVES, AND FELLOWSHIP EVALUATION CRITERIA ACROSS U.S. PROGRAMS

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Background
Glaucoma fellowships advance in glaucoma treatment, yet standardized evaluation rubrics are absent, challenging uniform fellow competency assessment. Disparities in program goals and evaluation criteria also hinder broader training benchmarking. Here, we identify themes, gaps and variations in fellow learning objectives and evaluation practices across U.S. glaucoma fellowship programs to move towards a standardized assessment rubric.

Methods
We surveyed US glaucoma fellowship program directors via the American Glaucoma Society listserv, requesting learning goals and fellow evaluation forms. A secure online platform was used to collect anonymized responses and uploaded documents. Respondents could indicate if documents were not available. Data were collected October-November 2024. Two coders independently analyzed documents for themes to identify key elements, gaps and variations among programs, with discrepancies adjudicated by a third reviewer. Findings will guide a follow-up survey to define essential topics for a standardized document, which will be shared with programs for optional use.

Results
Seventeen of 70 glaucoma fellowship programs (24.3%) responded. 6 programs had 1 fellow, 10 directors completed fellowship more than 15 years ago and 12 directors were male. 7 provided both learning objectives and evaluation forms, 1 provided learning objectives only, and 8 lacked both. 1 program indicated having an evaluation form but did not provide it. Qualitative analysis showed some programs outlining granular skills, while others offered general guidance. Frequent learning goals included proficiency in diagnosis and treatment planning, medical management, laser treatments, surgical competence, pediatric glaucoma care and research engagement. Fellow evaluation criteria followed ACGME core competencies: patient care, medical knowledge, practice-based learning, communication skills, professionalism, system-based learning, along with surgical judgment, surgical skill and research productivity. Lack of alignment between learning goals and evaluation forms was common.

Conclusions
Given the absence of learning goals and evaluation metrics at many programs, and the high variability in the content and level of detail in these forms, efforts to standardize goals and metrics may help ensure more consistent direction and evaluation of fellows.

P-0479

IDEAL TOOL FOR IOP SCREENING - ASSESSMENT OF IOP MEASUREMENT BETWEEN GAT, REBOUND TONOMETER, NCT AND ITS CORRELATION WITH CENTRAL CORNEAL THICKNESS

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Background

Measurement of intraocular pressure (IOP) is a routine investigation in the overall eye checkup. In spite of the various modalities available for detecting and managing glaucoma, IOP remains the only modifiable factor in its treatment. Its diagnostic value depends on the consistency and accuracy of its measurement by various instruments. Therefore, accurate and precise measurement of IOP is very important. This study compared the IOP readings taken with Goldman's Applanation Tonometer (GAT) with Non-Contact Tonometer (NCT) with Rebound Tonometer (RBT- iCare) and their correlation with Central Corneal Thickness (CCT) so as to have an ideal tool for mass IOP screening.

Methods

This is a cross sectional observational study where patients above 18 years of age coming to the eye OPD were enrolled. 400 eyes of 200 non glaucomatous patients underwent IOP recordings by GAT, NCT, RBT and CCT was also noted. Patients with any ocular surface disorder or any posterior segment pathology and patients who were not willing were excluded from the study. The IOP values of the three methods were compared and were correlated with CCT.

Results

Mean IOP measured by NCT was 15.65 ± 2.80, that measured by RBT was 14.23 ± 3.05 and that measured by GAT was 14.69 ± 2.97. The mean central corneal thickness was 510.61 ± 33.83. Difference between mean IOP recorded by NCT and RBT is 1.41± 2.39 and that between NCT and GAT is 0.95 ± 2.03 and between GAT and RBT is 0.45 ± 2.22. The difference between the IOP values is statistically significant [p value >0.005]. In our study it is seen that NCT values > GAT values > RBT values. It was observed that the RBT values of IOP were closer to those measured by GAT the difference being 0.45 ± 2.22. All Tonometers show a statistically significant correlation with CCT but it is observed that NCT has a stronger correlation [Pearson correlation 0.4037]

Conclusions

IOP readings by all the three methods are comparable however RBT values are closer to GAT. CCT does influence IOP. RBT can record IOP with small measurement errors and provide reliable readings in comparison with GAT and hence can be considered as an alternative to GAT where GAT is not possible or available. RBT is an ideal tool for mass screening of IOP.

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P-0480

LEVERAGING LLMS TO UNPACK THE BLACK BOX OF SHARED MEDICAL APPOINTMENTS AND PATIENT ENGAGEMENT

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Background

In shared medical appointments (SMAs), patients with the same non-urgent condition meet with a clinician as a group, each receiving 1:1 attention while others listen. In a prior clinical trial (Sonmez et al. PLOS glob. public health. 2023), 1,000 patients with glaucoma at the Aravind Eye Hospital Pondicherry were randomly assigned to receive either four standard 1:1s spaced four months apart or four SMAs (in groups of 2-6) spaced four months apart, for regular glaucoma follow-up. SMAs improved patients' knowledge and satisfaction, and reduced their non-compliance to medications by 40%. Every appointment was videotaped with consent using a wall-mounted camera. In this paper, we analyse the transcripts of 20,000 minutes of video to shed light on the potential mechanisms through which SMAs affect these outcomes.

Methods

We employed LLMs to identify themes that arise in each appointment. We extracted the embeddings for each topic, then used cosine similarity and entropy measures to identify how topics differ and evolve between SMAs and 1:1. Further, it helped us identify how the concerns brought up by patients within each treatment condition changed over time depending on the topics they were exposed to early in the appointment.

Results

We found significant differences in issues and conversations between the 2 groups. We also show evidence that there is a learning effect based on exposure to hard-hitting issues in the conversations. Further, we examined group dynamics, such as gender dynamics that appear in shared appointments, and how the nature of the conversations that patients have in shared appointments change over time depending on the initial group they are a part of. In doing so, we demonstrate peer-to-peer learning and the ability of doctors to use anecdotes in a group setting as teaching moments in shared medical appointments.

Conclusions

We identify potential mechanisms through which shared appointments improve patient outcomes. Further, we demonstrate how LLMs can be used to analyze large-scale data to provide specific insights on patient-related issues, which might otherwise be difficult to analyze at scale.

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P-0481

MATRIX METALLOPROTEINASE 9 POINT-OF-CARE IMMUNOASSAY FOR EVALUATING OCULAR SURFACE DISEASE OF GLAUCOMA PATIENTS

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Background
Matrix metalloproteinase-9 (MMP-9) Point-of-Care Immunoassay has become one of useful diagnostic toosl for ocular surface disease (OSD) by evaluating ocular surface inflammation. This study is to investigate the utility of MMP-9 grading in glaucoma patients for evaluating OSD and Meibomian gland dysfunction (MGD), and study its correlation with various dry eye and ocular surface parameters.

Methods
A total of 137 glaucoma patients (137 eyes) who were using anti-glaucoma eyedrops more than 6 month were included. To evaluate the severity of OSD and dry eye disease, MGD grading (grade 0 – 4), Schirmer test, oxford scale score, and tear break up time (TBUT) were measured. Moreover, subjective symptoms were recorded by SPEED and ocular surface disease index (OSDI) questionnaire. The Inflammadry® kit was used to evaluate MMP-9 levels in the tear film, with grading 0 to 4 (0: Negative, 1: trace, 2: Mild positive, 3: Moderate positive, 4: Strongly positive.Furthermore, subgroup analyses were performed to evaluate the effect of prostaglandin analogue (PG) or the preservative-free agent (PF) usage on MMP-9 levels of tear film as well as other ocular surface parameters.

Results
Overall, MMP-9 grade was significantly associated with severe MGD grade, as well as SPEED and OSDI index. When subjects were divided into PG (98 eyes, 71%) and non-PG user (39 eyes, 29%), PG users showed significantly higher MMP-9 levels compared to non-PG users ($p < 0.001$), as well as other OSD parameters such as oxford scale score, and TBUT. Also, in PG user group, MMP-9 levels showed significant correlation with MGD severity ($P < 0.001$). On the other hand, only oxford scale score showed significant differences between PF and non-PF users, with PF user showing higher oxford scale score ($p < 0.001$). MMP-9 was not significantly different between PF and non-PF users.

Conclusions
Semiquantitative MMP-9 grading showed significant association with MGD severity in glaucoma patients with OSD, and this was especially true in PG user group. In glaucoma patients, usage of PG eyedrops seem to have worse effects on MGD and ocular surface inflammation compared to the presence of preservatives. In conclusion, semiquantitative MMP-9 may aid clinicians to evaluate the ocular surface and Meibomian gland condition indirectly in glaucoma patients.

P-0483

WHITE MATTER HYPERINTENSITY ON BRAIN MAGNETIC RESONANCE IMAGING IN PSEUDOEXFOLIATION SYNDROME AND GLAUCOMA

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Background
Pseudoexfoliation(PEX) syndrome is a condition in which extracellular fibrillar materials accumulate in the anterior segment of the eyes. PEX accumulation in the trabecular meshwork can cause open-angle glaucoma, the most common complication of PEX syndrome. This is similar to the pathophysiology of white matter hyperintensity, as it shows systemic deterioration of cerebral blood flow and perfusion due to intravascular accumulation. This study investigate the relationship between PEX syndrom and the visual rating scale for cerebral white matter hyperintensity.

Methods
This is a retrospective cohort study that enrolled participants who performed an ophthalmic exam and brain MRI(n=276). We excluded participants with ophthalmic surgery history, ocular trauma, uveitis, diabetic retinopathy, age-related macular degeneration, or neurological disorder such as stroke or brain tumor. The 47 participants with PEX syndrome were available. The control group consisted of 47 age- and sex-matched subjects. We retrospectively reviewed 47 eyes that underwent PEX syndrome (34 PEX syndrome and 13 PEX glacoma) and 47 normal eyes that underwent ophthalmic examination and brain structural magnetic resonance imaging (MRI). All brain structural images were obtained using 3-Tesla brain MRI scanner. White matter lesions were evaluated using axial FLAIR images according to the Fazekas scale. The scale is divided into subcortical and periventricular lesions, each with a score of 0–3 grade. Factors influencing white matter changes were analyzed using ordinal logistic regression.

Results
The study included 94 participants, with 47 PEX and 47 control groups. The mean age was 77.7 years, and the sex distribution was 15 women and 32 men in each group. The mean baseline IOP was 14.3±2.9 mmHg in the PEX group and 12.7±2.2 mmHg in control group. The proportion of subcortical white matter lesions was 83% in the PEX group and 46.8% in the control group, and that of periventricular white matter lesions was 95.7% in the PEX group and 68.1% in the control group. White matter hyperintensity was significantly higher in the PEX group than in the control group for both subcortical and periventricular lesions (all $p<0.05$). The groups for PEX syndrome and PEX glaucoma showed no significant differences. Multivariable ordinal logistic regression results showed that PEX was associated with a 6.95-fold increase in subcortical hyperintensity and a 7.61-fold increase in periventricular hyperintensity.

Conclusions
Eyes treated with PEX were at a high risk of white matter changes. The degree of white matter changes concerning glaucoma remained the same. Even considering other major risk factors, PEX was a risk factor for increased white matter hyperintensity.

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P-0486

EVALUATION OF PLASMA CORTISOL IN PATIENTS OF GLAUCOMA AND ITS CORRELATION WITH DISEASE SEVERITY

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Background

To compare the levels of plasma cortisol levels in patients of primary angle closure glaucoma (PACG) and primary open angle glaucoma (POAG) with controls having cataract and its correlations with retinal nerve fibre layer (RNFL) thickness, vertical cup-disc-ratio (CDR) and Humphrey visual field (HVF), to assess potential implications of cortisol dysregulation in glaucoma pathophysiology.

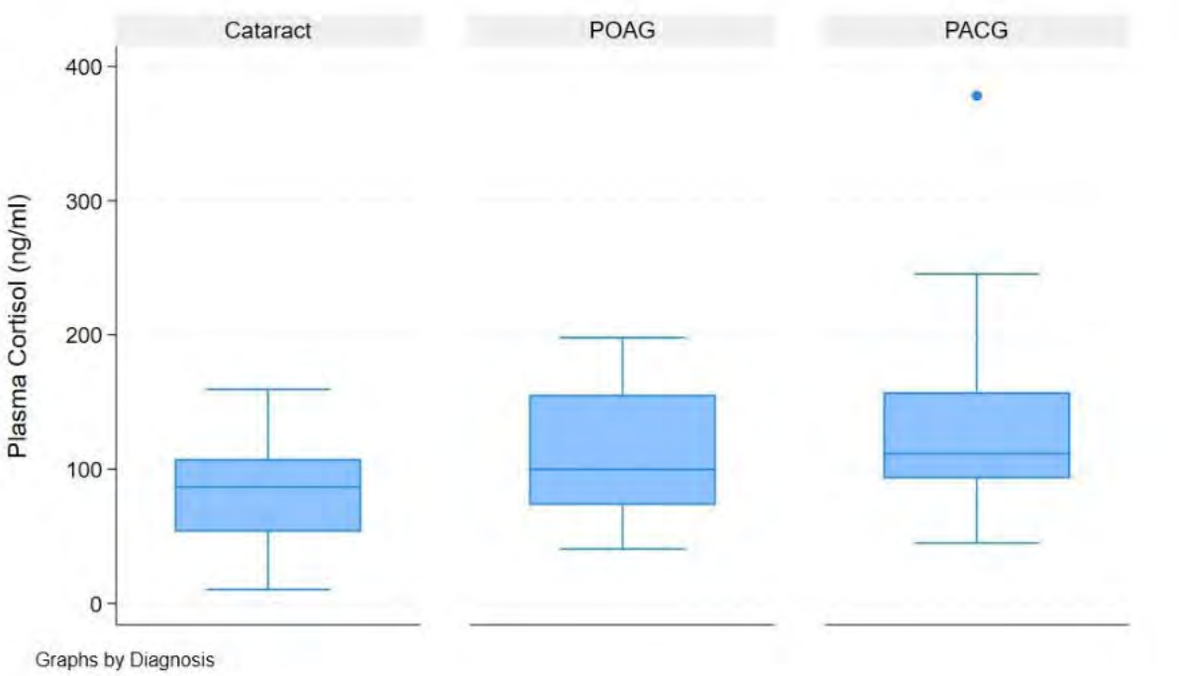
Methods

This was a cross-sectional study that included 16 POAG, 20 PACG and 16 cataract patients as controls (33 male and 24 females) aged more than 18 years. Participants underwent detailed ophthalmic evaluation including optic nerve head evaluation, RNFL-optical-coherence-tomography (RNFL-OCT) and HVF. Morning levels of plasma cortisol in each group were measured using enzyme-linked immunosorbent assay (ELISA). Plasma cortisol levels (ng/ml) were compared across groups and correlated with disease severity (RNFL thickness, mean deviation [MD], CDR).

Results

The three groups were comparable in terms of systemic comorbidities. Patients with PACG (mean 135.4, SD 76.7, median 111.5, IQR 64.4), POAG (mean 111.8, SD 50.8, median 99.8, IQR 82.2) and controls (mean 83.2, SD 39.3, median 86.9, IQR 54.2) differed in plasma cortisol levels on Kruskal–Wallis test (p=0.03) [Figure 1]. Post-hoc pairwise comparisons using Dunn's test with Bonferroni correction revealed significant differences across PACG and controls (p=0.01). Plasma cortisol was 57.3 ng/ml (p=0.01) higher in PACG and 50.4 ng/ml (p=0.05) higher in POAG groups compared to controls adjusting for age and sex (model R-square=0.23). Plasma cortisol had significant correlation with CDR (r=0.57, p=0.01) in PACG group but not in POAG group (r=-0.43, p=0.19). The association persisted after adjusting for age and sex (β=206.6, p=0.04). Plasma cortisol was also observed to be positively correlated with visual field loss in PACG group which increased by 2.75 ng/ml (p=0.05) for each decibel decline in MD but not in POAG group (p= 0.09). No correlation was noted between plasma cortisol levels and RNFL thickness.

Image



Conclusions

This study shows the association of raised plasma cortisol levels with POAG and PACG, with the highest levels observed in patients of PACG patients. Patients of glaucoma are known to be steroid responders. The positive correlation between CDR and visual field loss with cortisol levels in PACG patients suggests a potential causative role of systemic stress or neuroendocrine dysregulation. Further research is needed to elucidate the mechanisms underlying these findings, which may open avenues for novel therapeutic strategies targeting systemic or stress-related factors in glaucoma management.

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P-0487

INCIDENCE AND RISK FACTORS FOR SECONDARY OCULAR HYPERTENSION FOLLOWING PARS PLANA VITRECTOMY AND SILICON OIL INJECTION

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Background
To investigate the incidence and risk factors for secondary ocular hypertension (OHT) following pars plana vitrectomy (PPV) with silicone oil (SO) injection.

Methods
We performed a retrospective chart review of patients receiving PPV with SO injection. Patients with post-operative (OP) intraocular pressure (IOP) higher than 21 mmHg for more than twice who needed IOP-lowering medication were included. Main outcome measures were pre-OP and post-OP IOP, preexisting glaucoma, duration of SO, SO removal, SO in anterior chamber (AC), SO emulsification, endolaser photocoagulation during PPV, lens status, and diabetes. All eyes were divided into two subgroups (with and without OHT). Comparisons of the demographic and baseline characteristics between the two groups were performed using the independent t-test for continuous variables and Chi-Square test for categorical variables. Univariate and multivariate logistic regression analyses were performed to determine the association of various factors with OHT. Statistical analyses were performed using SPSS, version 20.0. A *P* value of less than 0.05 was considered statistically significant.

Results
We included 224 eyes of 220 patients receiving PPV with SO injection (Mean age at surgery: 55.89 ± 12.75 years with a range of 20–84 years; 151 men). The mean pre-OP IOP was 13.23 ± 4.58 mmHg and post-OP IOP was 22.83 ± 10.13 mmHg. The mean follow-up duration was 41.57 ± 33.86 months. One hundred and fifteen eyes (51.3%) showed OHT and the mean timing of OHT was 1.03 months (Range from 0.03-18 months) postoperatively. Forty-four eyes (19.6%) showed IOP between 21 to 30 mmHg and 60 eyes (26.8%) showed IOP over 30 mmHg. Fourteen eyes (6.3%) showed SO in AC and 11 eyes of them showed OHT. Five eyes (2.2%) showed emulsified SO in AC and 4 of them showed OHT. One hundred and twelve eyes (50%) did not receive SO removal during the follow-up period and 51 of them showed OHT. The parameters including pre-OP IOP, post-OP IOP, pre-OP spherical equivalence (SE), timing of OHT, following-up period, preexisting glaucoma, SO duration, and endolaser showed significant differences between the two subgroups (with and without OHT). Possible risk factors including pre-OP IOP, pre-OP SE, follow-up period, SO durations and endolaser were also found to be associated with secondary OHT by logistic regression analyses with significant differences.

Conclusions
Post-OP OHT is a common complication that occurs following PPV with SO injection. We found that 51.3% of eyes receiving PPV with SO injection showed secondary OHT. Pre-OP IOP, preexisting glaucoma and high myopia showed to be more susceptible to post-OP OHT. Prolonged SO endotamponade and endolaser during PPV were also risk factors of post-OP IOP. Meticulous monitoring of IOP is essential during silicone oil tamponade.

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P-0488

UNDETECTED GLAUCOMA AT A CATARACT SURGICAL OUTREACH PROGRAM IN ENUGU SOUTHEAST NIGERIA

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Background

Glaucoma is a leading cause of irreversible blindness affecting vision and quality of life. Undetected glaucoma in a population is a risk for blindness and visual impairment. Glaucoma screening for at risk population is an important strategy to improve early detection of glaucoma. Cataract surgical outreach programs provide platforms for comprehensive eye examinations and glaucoma screening of at risk populations in resource limited environments.

Methods

This was a cross sectional study conducted at a sponsored cataract surgical outreach program in Enugu, Southeast Nigeria. Invitation for the outreach was made through the social media platforms including Facebook, Instagram and WhatsApp. Participants who presented for the eye screening were examined and in addition screened for glaucoma. Data on demographic characteristics, visual acuity, intraocular pressure, anterior and posterior segment findings were documented. Proportion of persons with a glaucoma diagnosis was determined.

Results

Out of nine hundred and ninety nine persons who presented for eye screening, 24.7% had a glaucoma diagnosis, 48.2% were males while 51.8% were females with a mean age of 56.4yrs. A family history of glaucoma was reported in 19.4% of participants.

Conclusions

Sponsored cataract surgical outreach programs provide a veritable platform for comprehensive eye examinations and glaucoma detection in resource limited environments. Piggybacking glaucoma screening onto cataract surgical outreach programs can serve as an avenue for glaucoma detection among at risk population.

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P-0489

INNOVATIVE INTRAVITREAL HYDROGEL WITH NEUROPROTECTIVE AGENTS FOR GLAUCOMA THERAPY

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Background

To investigate the efficacy of an intravitreal (IV) neuroprotective hydrogel formulation in a chronic glaucoma animal model.

Methods

A longitudinal and interventional 24-weeks-study comparing three cohorts of Long-Evans rats: a cohort with glaucoma induced by a single anterior chamber injection of biodegradable microspheres loaded with fibronectin (n=20), another cohort of glaucomatous animals treated (n=20) with an IV hydrogel formulation containing the neuroprotective agents dexamethasone, ursodeoxycholic acid, and glial cell line-derived neurotrophic factor at 2 and 12 weeks since glaucoma induction, compared to a cohort of healthy animals (n=17). Intraocular pressure by rebound tonometer (Tonolab®, Tiolat Oy Helsinki, Finland), retinal functionality (scotopic and photopic negative response-PhNR-) using electroretinography (ERG) (Roland consult RETIanimal® ERG, Germany), and structure by optical coherence tomography (OCT) (Spectralis OCT®, Heidelberg Engineering, Germany) and histology, with the antibodies Brn3a, GFAP and Iba1 were analyzed up to 24 weeks.

Results

Animals treated with the IV neuroprotective hydrogel formulation showed a hypertensive peak one month after IV injection (20.82±3.07 mmHg) related to hydrogel swelling. Retinal nerve fiber layer thickness by OCT was higher in treated animals compared to untreated ones and healthy animals (47.80±10.10 vs 34.50±7.40 vs 41.40±3.21mm; p=0.035) at week 12. At the end of the study ERG analysis revealed shorter bipolar cell latencies in treated animals compared to untreated ones, though longer than healthy animals (65.20±6.13 vs. 69.15±5.02 vs. 56.38±5.05 ms; p=0.035) and retinal ganglion cells (RGCs) functionality increased from baseline to week 24 (PhNR: 19.24±13.61 to 28.64±22.98 µV). RGCs count was higher in treated animals compared to untreated ones but lower than in healthy controls (13 vs. 9 vs. 19 Brn3a+ cells/mm; p<0.05). However, there was a notable increase in immune response markers (GFAP and IBA1+; p<0.05).

Conclusions

The intravitreal neuroprotective hydrogel formulation improved retinal ganglion cell functionality and counts compared to untreated glaucomatous animals even though caused a post-injection hypertensive peak and significant retinal gliosis.

P-0490

INDEPENDENT EFFECTS OF AXIAL LENGTH AND INTRAOCULAR PRESSURE ON THE HIGHLY MYOPIC OPTIC NERVE HEAD

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Background
We investigated associations between intraocular pressure (IOP) profile and optic nerve head (ONH) features in high myopia (HM) eyes without glaucoma. Myopia is rising in prevalence and axial length (AXL) elongation is associated with structural changes, including ONH remodelling and deformation. Therefore, it is essential to understand whether these changes are simultaneously driven by IOP elevation or purely AXL elongation.

Methods
We conducted a retrospective cross-sectional study of 245 eyes from 175 HM subjects (spherical equivalent ≤-6.0 dioptres or AXL ≥26mm) without glaucomatous optic neuropathy. Historical IOP from the past 5 years were reviewed for maximum and median values. Fundus photographs assessed ONH ovality index (OI), disc-fovea distance (DFD), and disc torsion angle (TA). OCT measured Bruch's membrane opening (BMO) area, lamina cribrosa (LC) and prelaminar depth, ganglion cell complex thickness (GCCT), minimum rim width (MRW), retinal nerve fibre layer (RNFL) and choroidal thickness (CT).

Results
Mean AXL was 27.6±1.4mm, and mean IOP was 15.0±3.0mmHg. Maximum IOP ranged from 10-43mmHg (mean=16.62±3.71), while median IOP ranged from 9-21.5mmHg (mean=14.85±2.53). Longer AXL was significantly associated with increased OI and DFD, reduced LC depth, and thickened GCC and RNFL in the temporal and inferotemporal regions, even after adjustments. Higher maximum IOP correlated with decreased TA and increased LC depth, while higher median IOP was linked to reduced BMO area, consistent across adjustments. Additionally, longer AXL was associated with lower median IOP.

Conclusions
AXL and IOP are associated with distinct differences in ONH remodelling in HM which differs from those driven by elevated IOP. Longer AXL increases OI and DFD, while reducing LC depth, contrasting with decreasing TA and LC deepening seen with higher IOP. Temporal thickening of GCC and RNFL with longer AXL may reflect structural redistribution rather than glaucomatous damage. Glaucoma risk in HM appears primarily driven by IOP, with HM contributing minimally. This underscores the importance of IOP management in guiding glaucoma treatment in HM. However, aggressive IOP reduction is unlikely to prevent myopic ONH remodelling. Higher IOP was conversely associated with decreased disposition to myopic ONH characteristics. These results highlight the need for nuanced IOP management strategies in HM.

P-0491

USABILITY AND SATISFACTION ASSESSMENT OF VIRTUAL REALITY GLAUCOMA SIMULATIONS USING OCULUS QUEST

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Background
Computer simulations and virtual reality (VR) have been introduced as an interactive tool to experience virtual 3D imaging. In ophthalmology, VR application may be used to improve empathy and educate patients on the importance of long-term medical adherence and compliance by giving them a chance to experience more severe disease stages. The purpose is to assess the usability and satisfaction of the Oculus Quest Glaucoma Virtual Reality (VR) Simulations that were produced for educational purpose.

Methods
Glaucoma VR simulations (grocery store, kitchen setting, and driving) were developed using previous Humphrey visual field (HVF) imaging from diagnosed glaucoma patients to demonstrate mild-advanced stages of glaucoma. These simulations were piloted on 57 participants. Oculus Quest was used to display the simulations. User Satisfaction Evaluation Questionnaire (USEQ) and System Usability Scale (SUS) questionnaire were used to assess the system usability and satisfaction of the Oculus Quest and VR simulations.

Results
The average age of testers was 43.7±15.6 and ranged from 22-71 years of age. The USEQ had a total mean score of 16.9±4.86 showing moderate satisfaction where the total score ranges from 6 (poor satisfaction) to 30 (excellent satisfaction). Questions regarding whether “information was provided by the system was clear” (4.21±0.97) and will this “system be helpful in educating patients with glaucoma” (4.29±0.90) had the highest satisfaction scores. The SUS had a total mean score of 62.5±10.8 representing poor performance (score between 51-68). As age increases, the rating for usability ($r=0.314$; $p=0.017$) and satisfaction ($r=-0.465$; $p<0.01$) decreased. Limitations of the Oculus were learning new technology, limited movement, and caused motion sickness and dizziness. Individuals with decreased mobility were unable to use the Oculus. Overall, mean satisfaction of the experience with the system and simulations were 3.89±1.11 (Moderately-Very Satisfied). Open-ended comments received were “I feel sad for my family with glaucoma” after completing a grocery store simulation with Advanced Stage 3/4 of Glaucoma; or “I would not be able to drive a car if I had glaucoma” after completing driving simulation with Stage 3 visual field defects.

Conclusions
Regardless of the poor usability and moderate satisfaction rating of the Oculus Quest, participants did find the simulations were a great way to educate patients and families regrading the severity of glaucoma progression if left untreated. For educational purposes, virtual reality simulations must be displayed on devices that are easy to use, lightweight, and less restrictive on mobility. This will ease the discomfort of individuals with mobility limitations and promote accessibility.

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P-0493

ASSESSING SURGICAL AND CLINICAL WASTE PRODUCTION IN A GLAUCOMA PRACTICE, HAMILTON, ONTARIO

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Background
Glaucoma surgeries and clinic visits are a key component of ophthalmic procedures and contribute to the environmental waste generated within the healthcare sector. This study aimed to quantify and categorize waste from glaucoma surgeries and glaucoma visits performed at the Hamilton Regional Eye Institute (HREI) highlighting the environmental burden of these procedures.

Methods
This prospective observational study was conducted over one week at HREI, part of St. Joseph's Healthcare Hamilton. Waste generated from ophthalmic surgeries was categorized into preoperative, intraoperative, and postoperative stages and further classified as general waste or biohazardous waste. Surgical procedures analyzed included trabeculectomies with mitomycin c, Ahmed valve implants, other combined cataract-glaucoma and other surgeries. 241 glaucoma patients' visits were audited over one week. Data collection examined the waste generated during various stages of the ophthalmic care pathway, including materials used in consultations and administration offices. The waste generated was categorized on regular solid waste, recyclables, and biohazardous items. The amount of waste produced during each phase of patient care was recorded, weighed, and analyzed.

Results
During the one-week observation period, 9 glaucoma surgeries were performed, generating a total of 18.65 kgs of waste — 18.35 kg of general waste and 0.30312 kg of biohazardous waste. The average waste generation per glaucoma surgery was 2.07 kg. Extrapolating to a year, approximately 468 glaucoma surgeries would be performed, resulting in an estimated 429.52 kg of CO2 emissions annually from glaucoma procedures alone. Within the clinic, a significant amount of waste generated was with paper waste from patient records and administrative activities. On average, recyclable waste, such as cardboard, paper and labels, contributed to total of 30.59kg in one week. Garbage waste produced during clinic visits accounted for a total of 2.44kg (1.10 kgCO2e) for the week, which mostly consists of alcohol swabs, Kleenex, and tonopen covers. This totals to approximation of 1,590.68kg of recyclables and 126.88kg of garbage waste is produced per year.

Conclusions
These findings provide a comprehensive understanding of waste generation in glaucoma surgeries and clinic visits. It underscores the environmental cost of glaucoma surgeries, presenting a critical opportunity to adopt sustainable practices in ophthalmic care. These results show that the total waste generation and carbon footprint of consultations are greatly increased by clinic visits, especially by administrative operations. By transitioning towards more eco-friendly and sustainable solutions, healthcare facilities can significantly reduce their environmental burden.

P-0494

EXAM UNDER ANESTHESIA FOR PEDIATRIC GLAUCOMA: A SIMULATION-BASED TRAINING

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Background

Exam under anesthesia (EUA) is a valuable tool for ophthalmic examination when examination in another context, such as clinic, might be difficult. Pediatric patients, especially, may require EUA to evaluate for glaucoma. Pediatric glaucoma is a time-sensitive diagnosis therefore, early detection is key for superior pediatric outcomes and quality of life, which is why EUA should be more widely taught and utilized. Currently, there is an under-exposure of EUAs in ophthalmology training, thus creating an opportunity to equip ophthalmologists with the skill to detect pediatric glaucome via EUA.

Inadequate training in EUA can lead to challenges in the operation room. EUA must be done efficiently in the operating room to minimize potential complications from anesthesia. Exposure to basic knowledge and complex EUA techniques can be taught in a systematically efficient manner through simulation-based training.

The purpose of this study is to determine if a simulation-based training for EUA is feasible and beneficial to trainees. Efficiency, exposure, standardization and expertise will be assessed.

Methods

Specialized mannequins with 3-D printed eyes were used to simulate infants and the environment of an EUA in the operating room. A total of 18 residents at the Bascom Palmer Eye Institute from wide-ranging training levels were recruited to participate in the pilot study of this teaching module. Participants completed a pre-course survey assessing baseline exposure and knowledge. Participants also filled out a post-course survey to that was used to assess perceptions of the benefit of the proposed education model. Participants also reporting the simulated opthalmic findings that were simulated in each mannequin to measure their accuracy in performing the exam. The data from the surveys and data sheet were tabulated to assess for potential trends.

Results

Out of the 18 participants, 100% agreed that the session was a beneficial training tool for pediatric EUA. In addition, 89% agreed that the training session increased their basic knowledge and skills. Lastly, 83% of participants agreed that the session increased their efficiency, expertise and exposure. There were no trends identified between years of training and number of EUAs observed. There were also no trends between years of training and the ability to identify the components of an EUA.

Conclusions

The cohort for this pilot study consisted of 18 residents at the Bascom Palmer Eye Institute. Across the cohort there was no identifiable trend in exposure and knowledge of EUA, thus highlighting the potential need for a standardized model for teaching this technique at a broader scale. Despite the varied knowledge and exposure, participants self-reported that this model was beneficial and increased their basic knowledge and pediatric EUA skills. This suggests a potentially positive benefit to adapting this teaching model for the exposure and teaching of the EUA for ophthalmic trainees across all training levels.

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P-0495

IMPAIRMENT AND REMODELING OF VISUAL SENSORY PERCEPTION IN GLAUCOMA

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Background

Currently, most research on glaucoma focuses on visual field damage, with limited studies exploring the stereoscopic function of glaucoma patients. This study aims to analyze the impairment of stereoscopic vision in glaucoma and investigate whether appropriate stimuli, such as perceptual learning and visual training, can improve and repair this damage. The objective is to explore the remodeling and repair of visual function damage in glaucoma patients through binocular virtual reality visual training.

Methods

Fifty glaucoma patients with clear visual field defects, stable visual field for over 3 months, and intraocular pressure (IOP) ≤ 21mmHg were recruited. They underwent examinations using brain visual perception software, including perceptual eye position, fine stereopsis, coarse stereopsis, and motor stereopsis. Patients were then given visual training using a binocular virtual reality massage inhibition training model, with sessions twice daily, each lasting 20 minutes, conducted at home. The relevant indicators of corrected visual acuity and stereoscopic visual function impairment were reviewed at 1 month and 3 months after training. Patients in the control group were followed up at the same time points.

Results

After one month of visual training, no significant improvement was observed in the stereopsis function (horizontal perceptual eye position, perceptual eye position, fine stereopsis, coarse stereopsis, and motor stereopsis) of the patients in the training group. However, significant improvements were noted in all stereopsis indicators after three months of training. There was no significant change in stereoscopic function in the control group during the follow-up period.

Conclusions

Glaucoma patients exhibit impaired stereoscopic vision. Virtual reality visual training can improve advanced visual functions in glaucoma patients, such as perceptual eye position deviation, fine stereopsis, coarse stereopsis, and motor stereopsis.

P-0496

THE EFFECT OF VISUAL TRAINING ON REMOLDING STRUCTURES AND FUNCTIONS OF OPTIC NERVE AND RETINA IN GLAUCOMA PATIENTS

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Background
Glaucoma is a blinding eye disease characterized by retinal ganglion cell apoptosis and characteristic visual field defects. Glaucoma treatments could control the intraocular pressure of glaucoma patients within a safe range, but could not reverse the damages. Nerve cells can not regenerated under physiological conditions, but their function may compensate when damaged, and the plasticity of nerve cells could be increased byvisual training. This studty is To investigate the effect of virtual reality visual training on remodeling retinal and optic nerve structures, improving macular sensitivity in glaucoma patients.

Methods
Fifty-eight glaucoma patients(116 eyes) with well-controlled intraocular pressure were included, and eqaully divided into two groups. The visual training group received virtual reality visual training for 3 months, while the control group did not. All patients underwent OCT examination and visual field examination at enrollment and 3 months later. Parapapillary nerve fiber layer(pRNFL) thickness, macular retinal ganglion cell-internal plexiform layer(mGCIPL) thickness, disc edge area, optic cup volume, optic disc area, cup-to-disc ratio, and mean macular sensitivity(mMS) were statistically analyzed between the two groups.

Results
After three months, there was no statistically significant difference in all parameters between the training group and the control group($p>0.05$); however, compared with the control group, the visual training group had larger variations of mean pRNFL thickness($p=0.001$), disc area($p=0.025$), mean mGCIPL thickness($p<0.0005$) and minimum mGCIPL thickness($p=0.010$), and a smaller optic cup volume($p=0.003$) as well as a higher mMS($p=0.007$).

Conclusions
Visual training can increase pRNFL thickness and mGCIPL thickness and improve central visual sensitivity in glaucoma patients.

P-0497

CONTRAST SENSITIVITY RECOVERY IN EYES WITH GLAUCOMA AFTER BILATERAL IMPLANTATION OF J&J EDOF IOL WAS NON-INFERIOR TO A MONOFOCAL IOL

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Background
The aim of this prospective study was to establish whether the TECNIS intraocular lenses (IOL): the novel Extended Depth of Focus (EDOF) Eyhance IOL, Model ICB00/DIB00 provides the same level of contrast sensitivity recovery compared to the standard monofocal IOL, ZCB00/DCB00, or their Toric equivalent.

To date, there are no scientific reports on recovery of contrast sensitivity of the novel Extended Depth of Focus (EDOF) Eyhance IOL, in patients with ocular disease, including glaucoma. It is unknown in patients with glaucoma whether the TECNIS, Eyhance optic design mitigates the improvement in contrast sensitivity compared to the TECNIS monofocal.

Methods
According to routine patient selection from 2021-2024, participants with glaucoma with Mean Deviation (MD) values of MD ≤ -16dB on 24-2 test grid of the Swedish Interactive Threshold Algorithm standard program were selected to receive bilateral implantation of J&J EDOF (DIB00) IOL (n=26) or the J&J monofocal (DCB00) IOL (n=36), or their toric equivalent. Best corrected distance, intermediate and near visual acuity, and photopic SPARCS contrast sensitivity were measured three months after surgery.

Results
The 24-2 visual field mean MD of eyes in the EDOF IOL group (-2.08 dB) and monofocal IOL group (-1.15 dB) had no significant difference (p = 0.2). Best corrected distance, intermediate and near vision was similar between both groups but uncorrected near vision was significantly worse (p = 0.025) for EDOF (0.68) vs monofocal (0.54). The SPARCS contrast sensitivity scores were non-inferior for EDOF IOL and monofocal IOL, for all sectors and the total score. On linear regression analysis, pupil diameter was significantly larger for EDOF IOL (p = 0.038).

Conclusions
Contrast Sensitivity of EDOF IOL in eyes with mild glaucoma was not inferior to a monofocal IOL, for a larger pupil diameter >3 mm.

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P-0498

IMPACT OF GLAUCOMA ON IN DESCEMET MEMBRANE ENDOTHELIUM KERATOPLASTY USING A NOVEL WIDEFIELD ENDOTHELIAL IMAGING TECHNIQUE

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Background
Glaucoma has been shown to be a risk factor for endothelial graft failure following endothelial keratoplasty. However, the mechanisms are poorly understood. We used a novel widefield endothelial imaging technique to examine the impact of glaucoma on peripheral, paracentral and central regions of the endothelium following Descemet membrane endothelial keratoplasty (DMEK).

Methods
We conducted a prospective study of 50 consecutive DMEKs performed in Asian eyes with Fuchs' endothelial cell dystrophy (FECD) and pseudophakic bullous keratopathy (PBK). All eyes had serial non-contact widefield endothelial imaging specular microscopy (CEM-530, Nidek Co. Ltd, Japan) at 1, 3 and 6 months follow-up using a previously described technique. Fifteen images per scan are automatically captured and analysed in the central, paracentral (1-2mm) and peripheral (7-8mm) regions of the cornea endothelium, which corresponds to the approximate dimensons of the DMEK donor. Main outcome measure was effect of glaucoma on cornea endothelial cell (CEC) loss comparing central, paracentral and peripheral regions of the DMEK graft. Secondary outcome measures effect of glaucoma on intra-operative and post-operative complications including graft survival.

Results
Mean age was 69±9 years, 54% female, majority Chinese (88%) with 21/50 (42%) eyes with pre-existing glaucoma. Central and paracentral CEC loss was greater in eyes with glaucoma compared to those with no glaucoma (40.4 vs 27.0%, P=0.033) at 3-month follow-up; while peripheral endothelial cell density was not significantly different between groups (1600 vs 1697 cells/mm^2, P=0.526). Overall intra-operative complications such as hyphema, graft dislocation or tears were not significant between groups (P>0.05) and post-operative complications such as graft rejection, graft detachment requiring rebubble and persistent graft edema was not significant between groups (P>0.05). There was 1 primary graft failure in the glaucoma group though this did not lead to significant difference in the short-term cumulative graft survival (P=0.420).

Conclusions
Our pilot prospective study suggests that pre-existing glaucoma had a differential effect on early post-operative central CEC loss compared to peripheral CEC density in eyes undergoing DMEK, despite comparable intra-operative and post-operative complication incidence. This supports the need for future studies that use widefield endothelial imaging to examine potential interventions that could mitigate CEC loss that would lead to early graft failure.

P-0499

CHARACTERISTICS OF BETA PARAPAPILLARY ATROPHY IN PRIMARY ANGLE-CLOSURE SUSPECT

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Background

Glaucoma is the leading cause of irreversible blindness worldwide. It has been estimated that patients with primary angle-closure glaucoma (PACG) in China account for 48% of patients worldwide, and that 91% of bilateral glaucoma blindness cases in China are attributed to PACG. Primary angle-closure suspect (PACS) is considered to be in the early stage of PACG. Some cases of PACS progress to primary angle closure (PAC) or PACG during the follow-up, whereas others do not. Previous studies of PACS focused on anterior segment morphology, aiming to identify those who will develop PAC or PACG during follow-up; However, to date, such prognosis remains unclear.

Studies have reported that beta parapapillary atrophy (β-PPA) is associated with glaucomatous eyes. β-PPA was hypothesised to be the result of a slippery retinal pigment epithelium due to increasing intraocular pressure (IOP). In PACG, the increasing IOP is the only factor of damage to the optic nerve. Hence, β-PPA in PACS, PAC and PACG, as well as other changes in the optic nerve, should be considered important phenomena. Therefore, this study aimed to describe the characteristics of β-PPA and its associated factors in eyes with PACS.

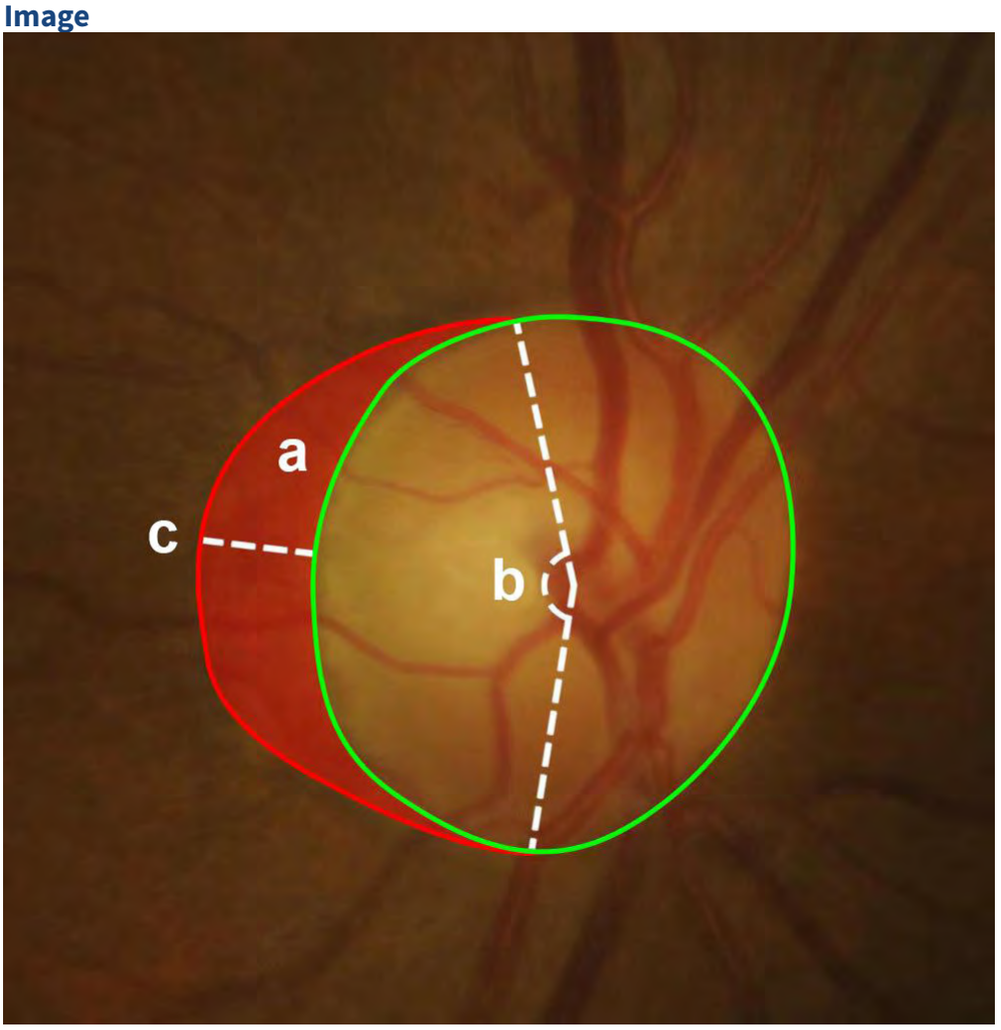
Methods

In total, 215 and 259 eyes with PACS and non-PACS (NPACS), respectively, were enrolled in this observational, cross-sectional study. Stereoscopic fundus and optical coherence tomography images were used to characterise β-PPA; the former was also used to measure the major β-PPA parameters. Univariate and multiple logistic regression analyses were used to identify the factors correlated with the presence of β-PPA and with β-PPA parameters.

Results

The β-PPA occurrence rates were 48.80% and 44.40% in the PACS and NPACS groups, respectively, with no significant difference between groups. Compared with that in the NPACS group, the β-PPA area was significantly larger (p=0.005) in the PACS group, but the angular extent and maximum radial length did not differ between groups (p=0.110 and 0.657, respectively) after adjusting for age and axial length. The presence of β-PPA was associated with older age (OR 1.057, 95% CI 1.028 to 1.088, p<0.001) and larger disc area (OR 1.716, 95% CI 1.170 to 2.517, p=0.006). A larger β-PPA area was associated with older age (p=0.014), greater vertical cup-to-disc ratio (p=0.028), larger disc area (p<0.001) and PACS diagnosis (p=0.035).

Image



Conclusions

48.80% of participants with PACS had β-PPA, which is slightly larger than NPACS. The area of β-PPA was larger in PACS, while the angular extent and maximum radial length did not differ between groups.

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P-0500

MEASUREMENT OF BIOLOGICAL DATA OF PRIMARY ACUTE ANGLE-CLOSURE GLAUCOMA UNDER DIFFERENT INTRAOCULAR PRESSURE CONDITIONS

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Background
To study the differences of ocular biological parameters in acute angle-closure glaucoma (AACG) under different intraocular pressures during acute attack, basic remission and complete remission, and the effects on the postoperative refractive status of patients.

Methods
Thirty-five patients with acute angle-closure glaucoma who were treated in our hospital from October 1, 2021 to December 31, 2023 were collected. Different ocular biological data, including anterior chamber depth, corneal curvature, axial length and intraocular lens degree, were measured in each eye during acute attack, basic remission and complete remission, respectively. The differences of ocular biological parameters under different intraocular pressures were observed and evaluated, and statistically analyzed.

Results
Under different intraocular pressures of acute angle-closure glaucoma, the axial length was the longest in the acute attack period, followed by the basic remission period, and the shortest in the complete remission period, showing a trend of gradually shortening. The depth of anterior chamber gradually becomes shallower, the deepest in acute attack, the second in basic remission and the shallowest in complete remission, showing a trend of gradual shallowing. The thickness of lens gradually increased from acute attack to complete remission, with the thinnest in acute attack, the second in basic remission and the thickest in complete remission, showing a trend of gradual thickening. Corneal curvature has not been found to change obviously from acute attack to complete remission. The calculation of intraocular lens power shows that the calculated value of intraocular lens power is the smallest in acute attack period, slightly larger in basic remission period and the largest in complete remission period. From the attack period to the remission period, the trend is gradually increasing. In different stages of the same eye, different formulas are used to calculate, whether it is acute attack period, basic remission period or complete remission period, the measured value of HofferQ RQ formula is relatively accurate, and the measured value of Holladay formula has the largest relative error.

Conclusions
The measurement of biological data such as axial length, anterior chamber depth and lens thickness will change with the progress of acute angle-closure glaucoma, which will lead to refractive errors such as hyperopia drift after glaucoma combined with cataract surgery. However, in the acute attack period, the measurement is relatively unreliable because of the heaviest inflammatory reaction, which is the most prone to hyperopia drift after operation, and the acute attack period is the least reliable as the operation opportunity or the choice of lens power.

P-0501

METFORMIN ENHANCES AUTOPHAGY IN A RETINAL ISCHEMIA/ REPERFUSION RODENT MODEL AND HELPS PRESERVE THE VISUAL FIELD IN GLAUCOMA PATIENTS

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Background

Elevated intraocular pressure (IOP) is the most relevant and the only modifiable risk factor in glaucoma. Not all patients with high IOP develop glaucoma, suggesting a multifactorial origin.(1)

Autophagy is crucial for neuronal health being a possible therapeutic target in ocular and neurodegenerative diseases.(2,3)

Sustaining autophagy by either starvation/fasting or mTOR inhibitors (*i.e.* rapamycin) helps RGCs cope with the ischemic/hypoxic insult (3) protecting them in experimental models of glaucoma.(3–7) Neither starvation nor rapamycin can be considered for clinical use in glaucoma patients as caloric restriction may not induce the same results in humans and rodents,(8,9) and concerns of adverse side effects have hampered rapamycin use.(10,11) Metformin is an mTOR inhibitor recognized as a caloric restriction mimetic leading to the positive effects of caloric reduction without challenging dietary restrictions.(10) A large-scale population study linked metformin use to a 25% reduced risk of glaucoma.(12)

This study aims to evaluate the neuroprotective effect of metformin in an mice model of retinal ischemia and the effect on glaucomatous diabetic patients' visual field (VF).(13–15)

Methods

Retinal ischemia was induced in the right eye of C57Bl/6J mice (8 in each group) by an acute increase of IOP.(3,16) Metformin (10 mg/kg or 50 mg/kg) or vehicle was injected intraperitoneally daily, starting 3 days before ischemia that was induced on the fourth day of treatment. Mice were killed by cervical dislocation after 24 h or 7 days of reperfusion. RGCs were retrogradely labelled to evaluate cell loss by stereotaxically injecting the fluorescent tracer FluoroGold into the superior colliculi.

A retrospective pilot study was then conducted on 15 type 2 diabetes glaucomatous patients, treated with metformin or insulin, who performed two 24-2 VF carried out 6 months apart.

Results

Metformin activated AMPK in the retina after 24 hours of reperfusion and promoted PINK1/Parkin-mediated mitophagy significantly increasing RGCs survival after 7 days of reperfusion ($p<0,01$).

In the clinical phase, MD did not change in the metformin group ($p=0,64$) while it worsened in the insulin group ($p<0.05$). No difference was found in PSD. The visual field Index did not change in the metformin group and worsened in the insulin group ($p=0,03$).

Conclusions

This study suggests for the first time a possible protective effect of metformin on RGCs and glaucomatous diabetic patients' VF.

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P-0503

EVALUATION OF A 'HANDS-ON' GLAUCOMA DISC ASSESSMENT WORKSHOP AMONGST UNDERGRADUATE ALLIED OPHTHALMIC PERSONNEL IN ZAMBIA

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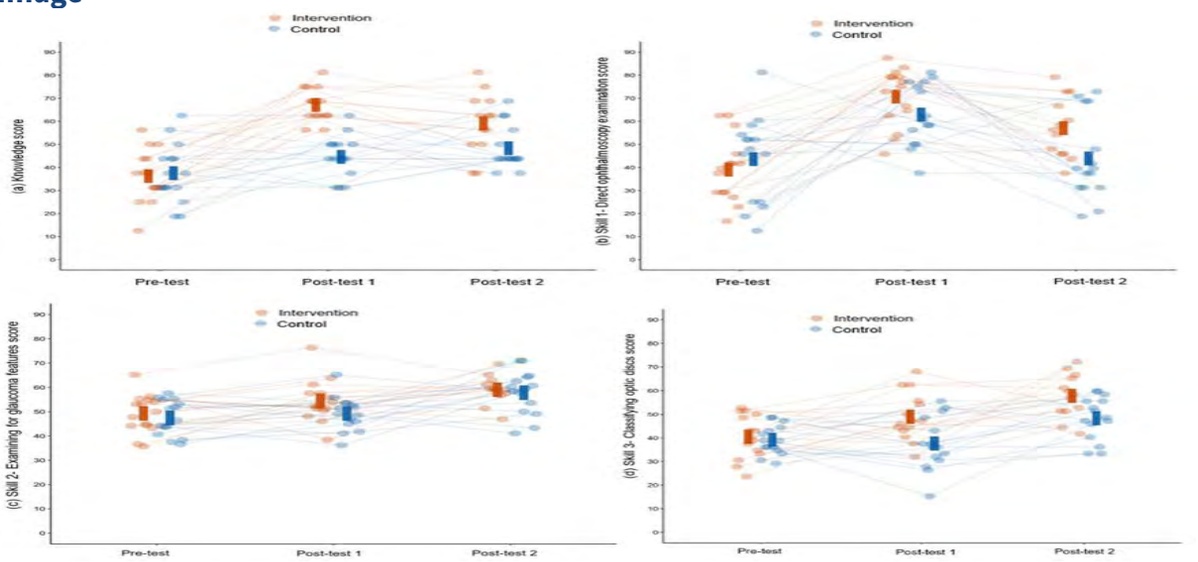
Background
Glaucoma is the leading cause of irreversible blindness in Zambia. Early detection including examination of the optic disc is important to prevent blindness. Allied ophthalmic personnel (AOP) are typically the first to examine patients presenting with eye disease in Zambia. This study evaluated the impact of a low cost Arclight direct ophthalmoscopy optic disc examination training workshop amongst undergraduate AOP.

Methods
An interventional trial with a controlled pre-post design was conducted among 30 final year medical licentiate-ophthalmology and ophthalmic nursing students (Bachelor of Science in Clinical Ophthalmology and Bachelor of Science in Ophthalmic nursing students, respectively) during external clinical rotation. All participants underwent a pre-test of knowledge and skills.15 participants were randomised to an intervention group receiving Arclight direct ophthalmoscopy training using simulation eyes while the other 15 participants (control group) had time for non-directed self-practice only. Post-tests were administered immediately and one month later. During the one month period, the intervention group were also equipped with Arclight ophthalmoscopes for use during their clinical rotation.

Results
Median age of participants was 23.5 years with 24 of the 30 having never performed direct ophthalmoscopy before. From pre-test to one month, there was an overall increase in knowledge and total skills. The differences between groups were 12.9% (p=0.03) in mean difference in knowledge score; 16.2% (p=0.046) in direct ophthalmoscopy examination skills; 7.1% (p=0.027) in optic disc classification (normal v abnormal); and 1.3% (p=0.67) in identifying glaucoma features on examination, all in favour of the intervention. Participant feedback matched performance and alluded to more practice time needed to improve ability to distinguish disc changes in glaucoma.

Image



Conclusions

Amongst undergraduate AOP a short, targeted training with low-cost tools was shown to improve knowledge and skill in direct ophthalmoscopy and the ability to distinguish normal from abnormal optic discs, both glaucomatous and non-glaucomatous. There was minimal effect on examining for specific glaucoma disc changes suggesting this skill requires a longer time to acquire with on-going mentorship. This has implications for programmes aimed at improving early detection of glaucoma and refreshment of AOP skills across settings similar to Zambia.

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P-0505

DISEASE-RELATED UNCERTAINTY AMONG PARENTS OF CHILDREN WITH GLAUCOMA: CURRENT STATUS AND INFLUENCING FACTORS

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Background

Children with glaucoma constitute a special and rare patient group. Compared with adult glaucoma patients, due to their incomplete physical and mental development and insufficient self-care ability, the diagnosis and treatment of glaucoma in children rely entirely on their parents. Parents' attitudes and perceptions regarding glaucoma can significantly influence the condition of the affected children. Unfortunately Parents of children with glaucoma often experience anxiety and uncertainty, both of which may adversely affect not only the parents themselves but also their children. Consequently, it is crucial to assess and effectively manage disease-related uncertainty.This study aimed to investigate the current level of disease-related uncertainty among parents of children with glaucoma and to identify the factors that influence it.

Methods

Using a convenience sampling approach, we recruited parents of children diagnosed with glaucoma who attended the glaucoma outpatient clinic at our hospital from May 2022 to May 2023. The Mishel Parents' Perception of Uncertainty in Illness Scale was employed to measure disease-related uncertainty. Demographic and clinical data were collected, and factors influencing uncertainty were analyzed.

Results

A total of 194 parents were included, with a mean uncertainty score of 67.95 ± 10.02. Using the mean score as a cutoff, 88 (45.4%) parents were categorized into the low-uncertainty group, and 106 (54.6%) into the high-uncertainty group. The primary sources of uncertainty were complexity and unpredictability of the child's illness. Parental sex emerged as an independent influencing factor ($P < 0.05$), with female parents reporting lower uncertainty levels than male parents.

Image

independent variable		*β*	*SE*	*P*	*Exp(B)*
fixed value		*1.584*	*1.260*	*0.209*	*4.874*
sex	male				
	female	-0.687	0.324	0.034	0.503
Educational Attainment	Primary school or below				
	Secondary School	0.368	0.488	0.451	1.444
	Undergraduate	0.064	0.549	0.907	1.066
	Postgraduate	-0.011	0.972	0.991	0.989
Average Family Annual Earnings (Unit:Yuan)	<80,000				
	80,000-300,000	0.547	0.403	0.175	1.728
	>300,000	2.098	1.128	0.063	8.153
economic burden	Mild				
	Moderate	-0.240	0.682	0.725	0.787
	Severe	-0.677	0.671	0.313	0.508

Conclusions

Healthcare professionals should recognize and address the disease-related uncertainty experienced by parents of children with glaucoma. Targeted interventions and supportive measures are needed to alleviate uncertainty, ultimately contributing to more effective disease management and better outcomes for the affected children.

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P-0507

CLINICAL CHARACTERISTICS AND OUTCOME OF CONSERVATIVE TREATMENT OF CHILDHOOD GLAUCOMA IN PATIENTS WITH FAMILIAL EXUDATIVE VITREORETINOPATHY

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Background

Familial exudative vitreoretinopathy (FEVR) is a rare hereditary eye disease characterized by abnormal growth of blood vessels in the retina[1]. One important complication is secondary glaucoma.[2-5] There were few evidences of treating glaucoma in FEVR with laser and surgery with minimal visual acuity improvement but guarded visual prognosis.[5-7] We study clinical characteristics and treatment outcome of the patients with childhood glaucoma secondary from FEVR who received conservative treatment for glaucoma.

Methods

This retrospective study included all patients <18 years of age diagnosed with glaucoma after or concurrently with a diagnosis of FEVR between 2001 and 2021 from Siriraj hospital, Thailand. We excluded the patient with glaucoma after cataract surgery. Primary outcome was visual outcome of conservative glaucoma treatment.

Results

Amomg FEVR patients, there were 8 eyes (6 patients, 66.7% were female) developed childhood glaucoma. All the patients had bilateral FEVR. The staging was 3A or greater. There were 6 patients with family history of FEVR. Clinical presentations were nystagmus, cloudy cornea, strabismus, leukocoria, and microphthalmia. Initial visual acuity (VA) was fix and follow in 3 eyes while the rest was not fix and follow. Mean age when FEVR diagnosis was 10.44 months (3-26 months). Most of the patients received conservative treatment for FEVR except 1 eye with FEVR stage 3A had laser photocoagulation. Mean age when glaucoma diagnosis was 28.33 months (6-52 months). All the cases presented with high intraocular pressure. Of 8 eyes, 2 eyes had shallow anterior chamber. There was no document of neovascular of the anterior segment of the eye. Average highest intraocular pressure (IOP) was 32.89 ± 10.386 mmHg (23-57 mmHg). Average follow-up time was 9.71 years (0.3 to 15.9 years). Average number of anti-glaucoma medication was 1.89 (1-4 medications). No laser or surgical procedure for glaucoma in these patients. Last visit LogMAR VA was 1.94 in 7 eyes and no light perception in 1 eye. Seven of 8 eyes have stable or better visual acuity. Last visit IOP was 18.88 ± 9.583 mmHg (6-36 mmHg) with 75% of the eyes with IOP ≤ 21 mmHg.

Conclusions

Glaucoma associated with FEVR is a rare complication with guarded prognosis. There is no guideline for glaucoma management yet. The outcome of conservative glaucoma management with anti-glaucoma drops result in fairly glaucoma control and can be an option for the patients who are not fit for surgery.

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P-0508

COMPARISON OF IOP MEASUREMENT BETWEEN REBOUND TONOMETER AND PULSAIR NON-CONTACT TONOMETER IN THE PAEDIATRIC POPULATION

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Background
Unlike adults, measuring Intraocular Pressure (IOP) in children is challenging due to poor cooperation. Several tonometers are currently used in paediatric eyes. The rebound iCare tonometer (RBT) offers a non-invasive approach using a small probe that gently bounces off the cornea. Conversely, the Pulsair Non-contact tonometer (NCT) employs a puff of air to measure IOP, providing quick readings and minimal patient cooperation.

Methods
The aim is to compare the agreements between the IOP recorded by RBT and NCT in children visiting the outpatient department of a tertiary eye care centre. A prospective comparative study was conducted on children aged between 5 and 15 in the paediatric ophthalmology clinic. Two masked observers measured the IOP initially by NCT, followed by RBT after a thirty-minute gap.

Results
IOP was recorded in 237 children by both the tonometers. The mean IOP recorded by RBT was 14.10±3.11, and that of NCT was 14.67±3.21 mmHg. Though NCT measurements were slightly higher than RBT, the two devices had an excellent correlation coefficient of 0.88 across the IOP ranges. Categorisation of eyes according to the refractive status also revealed significant differences between the two tonometer readings with $p<0.0001$ for emmetropia, $p=0.0009$ for myopia and $p=0.009$ for purely astigmatic errors. In both tonometers, IOP readings showed a statistically significant difference between children below and above ten years ($p <0.0001$).

Conclusions
RBT and Pulsair NCT are valuable tools for measuring IOP in children. They agree well at various IOP ranges and are simple, rapid, user-friendly, and child-friendly

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P-0509

CORNEAL HYSTERESIS AND THE RISK OF VISUAL FIELD PROGRESSION IN OPEN-ANGLE GLAUCOMA PATIENTS OF SOUTH INDIA

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Background
A few studies conducted in the United States of America have found that eyes with lower corneal hysteresis (CH) as measured on the ocular response analyser (ORA) have a greater risk of glaucoma progression. However, similar studies from other ethnic populations are lacking. Hence, the purpose of this study was to evaluate the association between baseline ocular response analyser (ORA) measurements and progressive visual field (VF) loss in patients with open-angle glaucoma (OAG) from South India.

Methods
This was a prospective, longitudinal study of OAG patients who had undergone a baseline ORA and were followed up for a minimum of 3 years with at least 5 reliable visual fields. Eyes with retinal pathology, neurological disorders and poor-quality ORA measurements (Waveform Score <4) were excluded from the analysis. Progression was determined by the rate of change of visual field index (VFI) over time (VFI slope). Effect of demographic (age, gender, etc), clinical (intraocular pressure IOP variables, corneal pachymetry, presence of disc haemorrhage, baseline visual field parameters), and baseline ORA parameters (CH, and corneal resistance factor CRF) on VFI slope was analysed using linear mixed models.

Results
80 eyes of 59 OAG patients were included in the analysis. The mean age of the participants was 62.57 ± 10.9 years. The mean follow-up duration was 6.6 ± 1.8 years. Mean baseline VFI was 78.2 ± 22% and final VFI was 73.7 ± 26% (VFI slope -0.93 ± 0.2 %/year, p=0.001). On univariate analysis, eyes with greater IOP fluctuation (co-efficient -0.27, SE=0.16) and higher baseline pattern standard deviation (PSD) on visual fields (-0.08, SE=0.05) showed faster VF progression. However, on multivariate analysis which included these variables and other factors shown previously to be associated with glaucoma progression such as mean IOP during follow-up, CH, and presence of disc haemorrhages, only greater baseline PSD was associated with a faster VFI decline (-0.1, SE=0.05, p=0.049).

Conclusions
This study in a cohort of OAG eyes from South India did not find any association between CH and glaucoma progression. Higher PSD on a baseline visual field is a risk factor for progression in open-angle glaucoma.

P-0510

CORRELATIONS BETWEEN ALZHEIMER'S AMYLOID-B PEPTIDES IN AQUEOUS HUMOR AND VISUAL FIELD LOSS IN PATIENTS WITH GLAUCOMA

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Background
Glaucoma is known to cause visual field loss due to increased intraocular pressure (IOP), however, some glaucoma patients develop progressive visual field loss even with normal IOP. The Amyloid hypothesis is a main hypothesis that the accumulation and deposition of amyloid-β (Aβ) peptides causes neurodegeneration and leads to Alzheimer's disease (AD). We hypothesized that glaucoma may be caused by Aβ accumulation in the eye, a similar mechanism to AD. The purpose of this study was to evaluate correlations between Aβ concentrations, retinal nerve fiber layer (RNFL) thickness and visual field loss.

Methods
In this prospective comparative study, about 0.1 ml of anterior aqueous humor was collected from 143 patients who underwent cataract (n=126) or glaucoma (n=17) surgery from Oct. 2022 to Nov. 2024 at our clinic. Aβ concentrations in the aqueous humor were measured by enzyme-linked immunosorbent assay (ELISA) and compared in four groups: cataract (Group Control (n=94)), glaucoma (Group GLA (n=17)), pseudoexfoliation syndrome (Group PEX (n=18)) and exfoliation glaucoma (Group Ex G (n=14)). Patients with systemic conditions such as diabetes mellitus and myopia -6 Diopter or higher were excluded. Glaucoma was diagnosed using Swept Source Optical Coherence Tomography (DRI OCT Triton, TOPCON CORPORATION, Tokyo, Japan) and Humphrey Field Analyzer (HFA, Carl Zeiss Meditec AG, Jena, Germany), and defined based on the optic nerve and visual field changes. Correlations between Aβ concentrations, RNFL thickness and visual field loss were evaluated.

Results
The mean Aβ1-42 and Aβ1-40 concentrations were significantly higher in Group Ex G (12.43±4.97, 141.71±49.37) ($p<0.001$) and Group PEX (8.59±2.51, 105.49±29.18) ($p<0.05$) than in Group Control (6.51±2.44, 80.26±26.03). Aβ1-42 concentrations weakly correlated with RNFL thickness in Group GLA ($r=-0.346$) and in Group Ex G ($r=-0.29$). Aβ1-40 concentrations moderately correlated with RNFL thickness in Group GLA ($r=-0.409$). In glaucoma eyes, Aβ1-42 and Aβ1-40 concentrations significantly correlated with visual field loss ($r=-0.526$; $p<0.05$, $r=-0.551$; $p<0.05$).

Conclusions
In glaucoma eyes, Aβ concentrations significantly negatively correlated with visual field loss and weakly correlated with RNFL thickness. In addition to high IOP, glaucoma in part may develop through a similar mechanism to AD.

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P-0513

DRY EYE AND GLAUCOMA: PATIENT DEMOGRAPHICS AND CHARACTERISTICS IN A DRY EYE CLINIC

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Background
Glaucoma is the second most common cause of blindness in developed countries. Worldwide, approximately 3% of the population aged between 40 and 80 years suffer from glaucoma. Up to 90% of these patients receive local anti-glaucomatous eye drops. Overall, dry eye is known to affect 8-30% of the general population, while its prevalence is higher in glaucoma patients reaching 40-59%. This study investigated patients from a specialized dry eye clinic and analyzed, if glaucoma patients show differences regarding dry eye signs and symptoms compared to patients without glaucoma.

Methods
We analyzed data from patients visiting a specialized dry eye clinic between December 2016 until December 2023. Parameters examined included Ocular Surface Disease Index (OSDI), Schirmer test without anesthesia, brake up time (BUT, sec.), tear meniscus height, bulbar redness and partial blinks. The right (R) and left (L) eye were examined independently. Glaucoma patients were defined as those receiving local anti-glaucomatous eye drops. Groups were compared using t-test for unrelated data with $p<0.05$ as level of significance.

Results
Eight hundred eighty-four patients were examinated. 25 patients (2,83%) applied anti-glaucomatous eye drops.

OSDI was 49±25 over all patients and 77±22 for glaucoma patients, which was significantly different (p=0.002). Glaucoma patients showed significantly fewer partial blinks (all patients R/L: 34±45/40±43 versus glaucoma patients: R/L: 9±7/9±5, p=0.0003/0.0004). Tear meniscus height was R/L: 0.47±1.6/0.45±1.6 for all patients versus R/L: 2.8±3.8/2.3±2.3 for glaucoma patients (p=0.08/0.03). The other parameters were not significantly different between the groups.

Conclusions
Interestingly, and in contrast to the high prevalence of dry eye in glaucoma, the number of glaucoma patients was small in our dry eye cohort. This may indicate that glaucoma patients are not referred to dry specialists often enough. However, the small glaucoma collective exhibited more severe symptoms although clinical signs were less severe or equal compared to other dry eye patients. These findings highlight the need for further investigation in larger „real life data" studies.

P-0514

SMARTPHONE APPLICATIONS FOR GLAUCOMA PATIENTS AND THE VISUALLY IMPAIRED

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Background

There is limited information in literature about the scope and usability of Smartphone Applications (Apps) for glaucoma patients and those that help the visually impaired. Our responsibility as doctors should not stop at providing treatment to the disease but also ensure good compliance to medications and provide accessibility support.

Methods

Our study summarizes the various Smartphone apps that can help glaucoma patients and the visually impaired or blind users. The App store (for iOS) and Google play store (for Android phones) were searched. The available apps can be broadly divided as 1) Eye drop reminders 2) Patient education 3) Testing apps 4) Apps for the visually disabled. Various apps that can be used by eye care professionals but not particular to glaucoma or visually impaired patients were excluded.

Results

Among the total of 108 apps which met the inclusion criteria, there were 6 (5%) apps exclusively for eye drop reminder, 47 (44%) other pill reminder apps in which eye drops and doctor appointments can be entered. 4 (4%) apps for glaucoma education to patients and to help them bond with other glaucoma patients. Among the testing apps most were for visual acuity screening (41; 38%) and 1 app (1%) for visual fields. 9 apps (8.3%) for visually impaired.

Conclusions

This study unveils a wide range of smartphone Apps that can help patients manage their disease better as they help as reminders, to manage doctor appointments and also to have better knowledge of glaucoma. The apps for blind people especially those incorporating Artificial Intelligence (AI) can help them not only in their day-to-day activities but also to achieve greater heights. Knowledge about these accessibility features and apps can help us educate our patients better.

P-0519

COMPARISON OF CORNEAL ABERRATION PROFILE BETWEEN GLAUCOMA PATIENTS ON MONOTHERAPY AND POLYTHERAPY

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Background
Ocular surface disease (OSD) in glaucoma patients can be a pre-existing condition that is exacerbated by topical therapy or a novel disease that manifests after initiation of topical therapy. The severity of OSD is directly proportional to the number of anti-glaucoma medications used. The chronic insult to the ocular surface in glaucoma patients on topical therapy does alter the corneal aberration profile which eventually causes impairment of the optical quality. This study aims to compare the corneal higher-order aberrations between primary open-angle glaucoma patients on monotherapy and polytherapy.

Methods
Primary open-angle glaucoma patients being medically treated with topical IOP lowering medications were divided into two groups viz. monotherapy and polytherapy. Patients in both groups underwent wavefront aberrometry. Coma-like, spherical-like, and total ocular higher-order aberrations were measured as root mean square values.

Results
A total of 40 eyes of 40 patients were examined (20 eyes in each group). A statistically significant increase in the coma-like, spherical-like and total ocular higher-order aberrations was observed for the polytherapy group as compared to the monotherapy group. ($p < 0.05$)

Conclusions
Ocular higher-order aberrations increase with the increase in number of IOP lowering medications thus impairing the quality of vision in the background of pre-existing visual impairment resulting from the disease itself

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P-0520

FACTORS ASSOCIATED WITH SEVERE CORNEAL ENDOTHELIAL DAMAGE FOLLOWING ACUTE PRIMARY ANGLE CLOSURE IN CHINESE SUBJECTS

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Background

Acute primary angle closure (APAC) is an ophthalmic emergency. Elevated IOP in APAC is not only imposed to the optic nerve head causing glaucomatous optic neuropathy, but also precipitates corneal oedema and loss of the endothelial cells. The corneal endothelium has no proliferative capacity, executing the function of a barrier and pump, so that cornea transparency can be preserved. Significant corneal dysfunction after APAC has been reported and a minimal endothelial cell density (ECD) is required to allow for cornea transparency and safe intraocular surgery.

The aim of this study is to investigate APAC-induced corneal endothelial damage and ascertain related risk factors for severe endothelial damage.

Methods

In this multicentre retrospective study, 160 Chinese patients (171 eyes) diagnosed with APAC were recruited. Endothelial cell density (ECD) and morphological changes short after APAC were studied. Univariate regression and multivariate regression were used to identify risk factors associated with the extent of ECD reduction, including age, gender, education level, patients' location, systemic diseases, APAC duration (hours), highest recorded intraocular pressure (IOP), and presenting IOP. Factors associated with the probability of severe corneal damage (ECD lower than 1000/mm2) were analysed based on a linear function.

Results

After one APAC episode, 12.28% eyes had ECD lower than 1000/mm2 , 30.41% had ECD between 1000 and 2000/mm2, and 57.31% had ECD more than 2000/mm2 . Attack duration was the only factor associated with severe endothelial damage ($p < 0.0001$). If the attack were to be subsided within 15.0 h, possibility of ECD lower than 1000/mm2 could be controlled under 1%.

Conclusions

Shortly after the abortion of APAC, 12.28% patients experienced severe endothelial cell damage with ECD less than 1000/mm2 . The only factor associated with severe ECD decrease was attack duration. Immediate and efective treatment is pivotal for preserving corneal endothelial function in APAC patients.

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P-0521

COMPARING THE CENTRAL CORNEAL THICKNESS AND INTRAOCULAR PRESSURE BETWEEN DIABETIC AND NON-DIABETIC PATIENTS

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Background
Diabetes Mellitus (DM) is a metabolic disorder characterized by hyper glycemia resulting from absolute or relative insulin deficiency with dysfunction in various organs. DM can cause morphological and physiological changes in the human cornea which can alter the corneal thickness. Correct central corneal measurement and intraocular pressure is important in the evaluation of diabetic patients with glaucoma and also in the assessment of their corneal endothelial function before cataract and refractive surgeries.

Methods
This is a comparative study in which one hundred and forty patients were recruited. Seventy diabetics and seventy non-diabetics participants who were age-matched and sex-matched were recruited. All patients had anterior and posterior segment examination, intraocular pressure and central corneal thickness measurement. Data was compared between the two groups and analyzed with the use of IBM-Statistical Package for Social Sciences 25 software.

Results
The mean age of the diabetic participants was 60.6 years (+12.4 SD) and the non-diabetic group was 59.8 years (+13.2 SD). There were more females (72.9%) than males (27.1%). There was no significant difference in the central corneal thickness measurement between diabetics (520.7± 48.8 µm) and non-diabetic (524.6± 28.7 µm) participants, p value = 0.572, however, a higher intraocular pressure was significantly associated with the diabetic study group (18.4+4.9 mmhg) than in the non-diabetic participants (16.8+ 3.9mmhg), p = 0.042.Among the Diabetic participants, Intraocular pressure was also noticed to be significantly higher in females (19.6 +4.9 mmhg) than males (15.2 + 3.0 mmhg), p= 0.001.

Conclusions
There is no difference in the central corneal thickness measurements between diabetic and non-diabetics, however, intraocular pressure was significantly higher in the diabetic participants.

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P-0522

ANALYSIS OF "RE-SURGERIES" FOLLOWING PRIMARY GLAUCOMA SURGICAL INTERVENTION IN A TERTIARY CARE CENTRE

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Background

Complications associated with both trabeculectomy and tube surgeries have been extensively documented,however fewer evidence is available on the analysis of "re-surgeries" following primary glaucoma surgical intervention .

Objective: To analyse the demographic characteristics, causes, risk factors, and outcomes of "re-surgeries," following primary glaucoma surgeryin a tertiary care centre

Methods

This retrospective observational study analysed medical records of patients who underwent re-surgeries following primary glaucoma surgeries conducted from January 1, 2018, to December 31, 2020. The investigation included an assessment of pre-operative risk factors, reasons prompting re-surgery, such as complications or failure, types of interventions, and their respective outcomes.

Results

Out of 1147 eyes subjected to primary surgeries, 30 eyes (2.6%) necessitated re-surgery within the first year, at a mean interval of 4.2 ± 3.4 months. Re-surgery rate for trabeculectomy was 3.3%(13/389), 1.5%(9/592) for Phaco-trabeculectomy and 4.8% (8/166) for tube surgeries. Multivariate analysis identified male gender and higher pre-operative intraocular pressure (IOP) as significant risk factors. Uveitic glaucoma (12.1%), traumatic glaucoma (11.1%), and eyes with prior vitreo-retinal surgeries (8.5%) exhibited the highest re-surgery rates. Early postoperative re-surgeries (1-3 months) were predominantly due to surgical complications, while late re-surgeries (>3 months) were attributed to primary surgery failure. Re-surgeries following trabeculectomy were primarily driven by surgical failure (61.5%), while complications played a major role in Phaco-trabeculectomy (66.6%) and Tube surgeries (87.5%).

Conclusions

We observed an overall re-surgery rate of 2.6%, with higher re-surgery rates in tube surgeries compared to filtering surgeries. Reasons for re-surgery in the early period was due to complications and those that occurred late was due to surgical failure. Male gender and elevated pre-operative IOP were significant risk factors for re-surgery

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P-0523

VISUAL FIELD PROGRESSION IN PATIENTS WITH PRIMARY ANGLE CLOSURE GLAUCOMA

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Background
To evaluate the rate of glaucomatous visual field (VF) loss in patients with primary angle closure glaucoma (PACG).

Methods
This was a clinic-based retrospective study. Patients with PACG who had ≥5 reliable VF tests and ≥4 years of follow-up were included. Zeiss Forum software (Carl Zeiss Meditec, Inc., Dublin, USA) was used to calculate the VF progression rate (dB/year). One eye per patient was analysed, and if both eyes of a single patient met the criteria for the evaluation of progression, the eye with the more severe disease at baseline was used in the analysis. VF progression rates were classified as slow (≥-0.25dB/year), intermediate (-0.25 to -1.0dB/year), and fast (≤-1.0dB/year). Disease severity was classified based on the VF mean deviation (MD) at baseline: mild (≥-6.0dB), moderate (-6.01 to -12.0dB) and severe (< -12.0dB). IOP fluctuation was calculated as the standard deviation of the mean IOP during follow-up.

Results
Of 630 patients evaluated, 480 eyes (76.2%) met the inclusion criteria for evaluation of progression. Among these 480 PACG eyes, 141 (29.4%) had mild, 162 (33.8%) had moderate, and 177 (36.9%) had severe PACG at baseline; 224 (46.7%) were male. Most showed slow progression (n=250, 52.1%), with 165 (34.4%) having moderate, and 65 (13.5%) showing fast progression. The mean rate of progression was highest in moderate PACG eyes (-0.45±0.79dB/y), followed by mild (-0.39±0.52dB/y) and severe PACG (-0.12±1.12dB/y) respectively (p=0.001). The proportion of fast progressers was highest in those with moderate VF loss (29/162, 19.9%), and lowest in patients with severe VF loss (18/177, 10.2%). Multivariable logistic regression analysis found that those who underwent fast progression were older (p=0.001), had higher IOP fluctuations (p<0.001), and moderate VF loss at baseline (p=0.03).

Conclusions
In patients with PACG managed in an eye hospital setting, fast VF progression was observed in 13.5% despite treatment. The rate of VF progression appears to have a U-shaped relationship with baseline disease severity, similar to primary open angle glaucoma.[1]

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P-0524

MULTI-NEUROPROTECTIVE INTRAVITREAL THERAPY IN AN ANIMAL MODEL OF CHRONIC GLAUCOMA

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Background

To evaluate the efficacy of a multi-neuroprotective intravitreal treatment in an animal model of induced chronic glaucoma.

Methods

A total of 87 Long-Evans rats of both sexes were analyzed: a healthy cohort (n=17), a cohort with glaucoma induced by intracameral injection of fibronectin-loaded biodegradable microspheres (n=30), a cohort with induced glaucoma and intravitreal injection blank (n=20), and a cohort with induced glaucoma and intravitreal injection with a multi-loaded neuroprotective formulation containing dexamethasone, ursodeoxycholic acid, and glial cell line-derived neurotrophic factor at 2 and 12 weeks (n=20). The animals were evaluated with measurements of intraocular pressure by rebound tonometry (Tonolab®), electroretinography (ERG Roland consulte RETIanimal®), optical coherence tomography (OCT, Heidelberg Spectralis®) and histological examination over 24 weeks.

Results

The glaucomatous cohort that received the multi-loaded neuroprotective intravitreal treatment showed a trend toward lower values of intraocular pressure in the treated right eye (week 24: 20.20±3.57 vs. 21.93±3.63 mmHg), better retinal ganglion cell functionality by electroretinography (amplitude increased from week 12 to 24: 16.60±21.72 vs. 20.97±10.13 µV), and greater ganglion cell layer thickness by optical coherence tomography (central sector $p<0.001$) at week 24, *in vivo*. Histological examination quantified a higher number of retinal ganglion cells in the treated cohort compared to the glaucomatous cohort (18±4 vs. 6±2 Brn3a-positive cells/mm of retina; $p<0.05$) and similar to the healthy cohort (16±5 Brn3a-positive cells/mm of retina) at the end of the study.

Conclusions

The multi-neuroprotective intravitreal therapy preserved neuroretinal functionality and structure compared to untreated glaucomatous cohorts and even achieved a similar retinal ganglion cell count to that of the healthy cohort after six months of study. Intravitreal multi-neuroprotective therapy could be a novel and potential minimally-invasive treatment for glaucoma.

P-0526
ELIGIBILITY CRITERIA OF CLINICAL TRIALS PUBLISHED IN GLAUCOMA

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Background
Well-designed clinical trials provide clinicians with unbiased measures of the efficacy of new drugs, interventions and devices. Selective patient inclusion is important for trial feasibility, reliability of results and a high degree of internal validity. However, this selectivity must be balanced against the clinical applicability of the results to individual patients. Unnecessary exclusion of certain patient populations may compromise the generalizability of the results. We therefore sought to determine the nature and extent of exclusion criteria in published glaucoma trials.

Methods
A retrospective review of completed phase 3 and phase 4 glaucoma interventional clinical trials was conducted on ClinicalTrials.gov. Based on the search results, a literature review was conducted to identify relevant publications for each clinical trial. Trial registries, protocols and subsequent publications were reviewed to identify relevant trial characteristics and eligibility criteria. Each exclusion criterion was examined by three independent reviewers and judged to be strongly justified, potentially justified or poorly justified.

Results
Of the 1,099 interventional clinical trials from our initial search, 526 (48%) met our inclusion criteria. Of these, 202 (38%) were published. 159 (79%) of the publications were randomized clinical trials, 43 (21%) observational studies and 20 (10%) crossover studies. Most of the published trials concerned drug interventions (73%), surgical procedures (25%) and implants (16%). Trial sizes ranged from 10 to 2298 patients, with a mean and median of 228 and 112, respectively. Primary open-angle glaucoma (73%) was the most frequently studied diagnosis, followed by ocular hypertension (49%) and pseudoexfoliative glaucoma (32%). Published trials reported an average of 20.7 ± 8.8 (SD) exclusion criteria. Most patients were excluded on the basis of ocular history (93%), glaucoma-related criteria (87%) and concomitant ocular disease (78%). Examination of the individual exclusion criteria using previous published criteria showed that 20.1% were strongly justified, 65.1% potentially justified and 14.9% poorly justified.

Conclusions
Published glaucoma interventional trials do not always clearly state exclusion criteria and many studies unnecessarily exclude potential patients. These findings underscore the need for transparent reporting and appropriate, justified eligibility criteria. Further analysis may reveal which types of trials would benefit from closer scrutiny of appropriate eligibility criteria.

P-0528

A CASE OF MALIGNANT GLAUCOMA REQUIRING MULTIPLE SURGERIES FOLLOWING MICROHOOK TRABECULOTOMY FOR EXFOLIATION GLAUCOMA

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Background

Exfoliation glaucoma (XFG), one of the causes of secondary open-angle glaucoma, often requiring surgical intervention to control intraocular pressure (IOP). Microhook ab interno trabeculotomy (µLOT) is a relatively new surgical approach used to treat XFG, yet complications such as malignant glaucoma, a rare but serious condition, can occur postoperatively. This case report presents a patient who developed malignant glaucoma following µLOT surgery, requiring multiple subsequent surgeries to achieve IOP control.

Methods

A 66-year-old male with a history of XFG in the left eye underwent trabectome surgery five years ago, which successfully reduced the IOP from 30 mmHg preoperatively to 14-17 mmHg postoperatively. However, after four and a half years, his IOP increased again to approximately 30 mmHg. To address this, an additional µLOT was performed, extending the initial trabeculotomy by 45 degrees above and below the initial incision. The IOP on the day after surgery was 17 mmHg, but it increased to between 25-38 mmHg with shallow anterior chamber starting from the second postoperative day. Diagnosis of malignant glaucoma was made, and a pars plana vitrectomy (PPV) was performed on the ninth postoperative day. After PPV, the anterior chamber deepened, and the trabeculotomy incisions were confirmed to be open. Despite this, the IOP remained elevated at around 30 mmHg. Subsequently, a PreserFlo MicroShunt(PFM) was implanted on the upper nasal side. Two months later, the IOP increased again, requiring a filtering bleb reconstruction surgery. However, the IOP increased once more two weeks postoperatively, leading to a trabeculectomy on the upper temporal side. Following these surgeries, the IOP stabilized at around 10 mmHg, and the patient has maintained this IOP level for the two months post-trabeculectomy.

Results

PPV was performed for malignant glaucoma that developed after µLOT, and the misdirection of aqueous humor was improved. However, PFM was insufficient for lowering intraocular pressure, and TLE had to be added.

Conclusions

This case highlights the potential for malignant glaucoma to develop even in patients with XFG undergoing µLOT. The condition requires prompt identification and appropriate surgical intervention. Postoperative care, including close monitoring of IOP and anterior chamber depth, is crucial in preventing complications and ensuring long-term IOP control.

P-0529

CLINICAL PROFILE AND OUTCOMES OF INTERVENTION IN PATIENTS WITH JUVENILE OPEN ANGLE GLAUCOMA (JOAG)

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Background
This was a restrospective analysis of case records of patients diagnosed with Juvenile Open Angle Glaucoma (JOAG) seen between January 2015 to December 2023 with follow up of 1-7 years.The purpose was to study the clinical presentation,management and long term outcome in these patients. JOAG presents with open angles, raised IOP and typical glaucomatous disc and field changes affecting one or both eyes. Secondary causes of raised IOP like trauma,intraocular surgery,steroid induced glaucoma and primary optic neuropathies were excluded.

Methods
Methods included collecting data of visual acuity, intra coular pressure (IOP), disc and visual field changes at presentation and follow up examinations.The patients were subjected to interventions, in the form of anti-glaucoma medications and/or surgery and the patients were followed up to look for long term IOP control, disc and visual field changes.

Results
104 eyes of 52 patients were included in the study.The male:female ratio was 17:9, suggesting a strong gender predisposition to the disease. The most common presenting symptom was diminution of vision (57.6%) and incidental findings of raised IOP and advanced disc damage by the referring physician in patients presenting for refractive correctionaccounted for 42.4 %. The mean age of the patients was 22.7 ± 7.07 years, the mean cup to disc ratio at presentation 0.79 ± 0.13. All eyes were initiated on medical therapy for control of intraocular pressure (IOP). 34.6 % eyes underwent surgical intervention. 27 eyes underwent trabeculectomy, 2 phaco- trabeculectomy,5 Glaucoma drainage devices. 2 eyes were subjected to Trans-scleral cyclophotocoagulation.Selective Laser Trabeculoplasty(SLT) was done in 2 eyes. Paired t test was used to calculate the statistical significance of the parameters being evaluated ,pre- and post-intervention. Parameters at presentation and the last follow up with their statistical significance are as follows: Visual acuity 0.63 ± 0.09/ 0.66 ± 0.14 (p=0.65), IOP 30.07 ± 14.29 / 18 ± 11.32 mm Hg (p<0.001), number of anti-glaucoma medications(AGM) 2.69 ± 1.32 / 1.84 ± 1.64 (p=0.0007), Visual fields mean deviation 12.38 ± 9.63 / 12.65 ± 9.77 (p=0.58). IOP control < 18 mmHg was achieved in 88.88% of eyes that underwent surgical intervention,compared to 75% on medical therapy alone. No major complications of surgery were noted. Our study showed that there was a statistically significant reduction in the IOP and the number of AGMs post surgery.Visual fields remained stable in 63 eyes, deteriorated in 12,out of which 4 had underwent surgical intervention and 8 had been treated medically. Perimetry couldn't be done in 16 eyes because of age less than 18 years and 13 eyes because of poor vision.

Conclusions
Aggressive intervention in the form of medications, and /or surgery can maintain IOP and visual field in patients with JOAG. Trabeculectomy has good success rate with low complications in these patients.

P-0532

IMPAIRED BLOOD FLOW OF OPTIC NERVE HEAD IN PATIENTS WITH SEVERE OBSTRUCTIVE SLEEP APNEA/HYPOPNEA SYNDROME

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Background

The repaeted upper airway collapse in patients with obstructive sleep apnea/hypopnea syndrome (OSA) can result in severe hypoxia and hypercapnia, which can decrease retinal vessel density and induce hemodynamic instability. Insufficient vascular supply to optic nerve and retina can further cause RNFL thinning and lead to glaucoma development and progression. We prospectively analyze the difference of blood flow of the optic nerve head (ONH) between OSA and control subjects by laser speckle flowgraphy (LSFG) and determine the correlations between LSFG variables and OSA severities.

Methods

Participants who had bothersome snoring and daytime sleepiness consecutively underwent overnight polysomnography to determine OSA occurrence and severity, and those who had no OSA were included as normal controls. All the participants subsequently received ophthalmologic exams and LSFG measurements. LSFG measurements were summarized as mean blur rate in all area of ONH (MA), in big vessel area of ONH (MV) and in tissue area of ONH (MT).

Results

A total of 100 participants were enrolled in the study, including 83 patients with OSA and 17 control subjects. Of the OSA patients, 17 patients were mild OSA, 25 patients were moderate OSA, and 41 patients were severe OSA. When control subjects and mild/moderate OSA patients with an apnea/hypopnea index (AHI, /hr.) less than 30 were grouped together and compared with severe OSA patients (AHI30), MA, MV, and MT significantly decreased in severe OSA patients as compared with control subjects and mild/moderate OSA patients ($p< 0.0001$, $p = 0.0001$, and $p = 0.0034$, respectively). Negative correlations were identified between AHI and MA ($\rho= -0.244$, $p = 0.0016$), between AHI and MV ($\rho= -0.263$, $p = 0.0006$), and between AHI and MT ($\rho= -0.198$, $p = 0.0105$). Positive correlations were identified between lowest saturation of oxygen ($LSaO_2$) and MA ($\rho= 0.332$, $p< 0.0001$), between $LSaO_2$ and MV ($\rho= 0.354$, $p< 0.0001$), and between $LSaO_2$ and MT ($\rho= 0.227$, $p= 0.0035$).

Conclusions

OSA could have a negative impact on microcirculation of ONH, including MA, MV, and MT measurements. Furthermore, decreased blood flow of ONH obviously correlated with OSA severity.

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P-0533

THE ANALYSIS OF ANGLE DYSGENESIS IN JUVENILE-ONSET OPEN-ANGLE GLAUCOMA

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Background
The purpose of this study was to evaluate different type of angle dysgenesis in juvenile-onset open angle glaucoma patients and its impact on treatment effect.

Methods
The study included 281 patients with JOAG. Patients had all the phenotypic characteristics required for the study and classified based on their iris and angle morphology. Age, age of onset, sex, highest untreated IOP, visual field defect (mean deviation), central retinal nerve fiber layer (RNFL) thickness and vertical cup disc ratio (C/D) were analyzed and correlated with the gonioscopic features among JOAG patients.

Results
Of 281 patients included in the study, 206 (73.31%) had a normal open angle (group 1), while 75 (26.69%) had developmental anomalies (group 2). Developmental anomalies of the angle were classified as: high iris insertion with or without prominent iris processes (n=40), a featureless angle (n=4), and those with prominent iris processes alone (n=31). There was significant difference in age (group 1, 32.91±9.90 years and group 2, 27.11±10.66 years; p<0.001) and age of onset (group 1, 32.15±7.99 years and group 2, 25.30±10.98 years; p=0.014) between the groups. There was no difference in sex of male (group 1, 72.82% and group 2, 68.00%; p=0.429), untreated IOP at presentation(group 1, 19.91±7.85mmHg and group 2, 20.44±5.97mmHg; p= 0.289), visual field defect (MD -10.41±9.26 vs -11.62±9.86 dB; p=0.137), C/D ratio (0.76±0.15 vs 0.78±0.15, p = 0.628), RNFL thickness (66.04±14.54 vs 66.41±15.11µm; p = 0.257) and anti-glaucoma medicines (2.14±1.26 vs 2.59±1.28; p = 0.490) between the groups.

Conclusions
Those patients with angle dysgenesis are more likely to present at early age of onset.

P-0535

COMPARISON OF GCL THICKNESS ON OCT AND P ERG AMONG HIGH RISK GLAUCOMA SUSPECTS AND HEALTHY CONTROLS

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Background

Glaucoma is characterized by chronic progressive optic neuropathy resulting in characteristic visual field loss. Standard Automated Perimetry (SAP) is gold standard, but to detect this visual field loss on SAP there should be at least 25% loss of retinal ganglion cell (RGC)[1]. Glaucoma cases can be assessed structurally by analyzing ganglion cell thickness at macula by Optical Coherence Tomography (OCT) and functionally by Pattern electroretinogram (PERG)[1,2] Our Research Question is Can GCL thickness in OCT and waveform in pattern ERG, be use to diagnose pre perimetric glaucoma? Our primary objective was to compare the thickness of macular GCL on OCT, Implicit time & amplitude of P50, N95 wave form on PERG among glaucoma suspects and healthy controls and Secondary objective was to evaluate the correlation between GCL thickness and Implicit time & amplitude of P50, N95 waveform among glaucoma suspects and healthy controls.

Methods

A hospital based Analytical cross-sectional study was planned. We included Patients age between 40 to 60 yeas having refractive error <4 Diopter. In **Glaucoma suspect group** included patients had Family history of glaucoma, Vertical CD ratio >= 0.5. Asymmetric CD ratio >0.2 between two eye, diffuse or focal narrowing or sloping of the disc rim, but Normal visual field. In **Control group included** Patient had apparently normal finding. Calculated Sample size was 50 in each group. After taking ethical approval from institute and written informed consent from patient, all subjects underwent comprehensive ocular examinations. In this study we used OCT of HRA+OCT SPECTRALIS (Heidelberg Engineering, Germany) and for P-ERG. RETI-port/scan 21 (ROLAND CONSULT, Germany).

Results

Demographic distribution were similar in both the group. in this study we have analyzed and compared macular GCL thickness in two zone that is central 3 mm circle and peripheral 6 mm circle zone. The mean GCL thickness at a 3 mm circle zone among the glaucoma suspect and control groups was not significant. The mean GCL thickness at a 6mm circle zone was significantly lower in glaucoma suspect group in all four quadrants. Wave form analysis in P ERG, the P50 implicit time was significantly higher and amplitude was significantly lower and in the glaucoma suspect group in comparison to control. The N95 implicit time was significantly higher in the glaucoma suspect group and the N95 amplitude was lower but non significant in comparison to control. We found a significant weak positive correlation between the amplitude of P50 and GCL thickness and weak negative correlation between implicit time of N95 and GCL thickness in glaucoma suspect group at 6 mm circle zone.

Conclusions

Structurally GCL thickness analysis at peripheral macular region (6mm circle zone) functionally PERG waveform can be used to diagnose pre-perimetric glaucoma

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P-0536

ASSESSING THE SOCIAL MEDIA PRESENCE OF GLAUCOMA SOCIETIES: OPPORTUNITIES FOR INCREASED OUTREACH AND EDUCATION

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Background

As social media has become ubiquitous, patients increasingly use online platforms to seek out health information. Some clinicians even encourage patients to use social media as a tool for learning more about their conditions (1). Glaucoma is the leading cause of irreversible blindness (2), but the availability of verified glaucoma-related content on social media platforms remains unclear.

Methods

This study examined the social media presence of glaucoma societies globally. Using the World Glaucoma Association's "Directory of Glaucoma Societies," we identified 90 member societies and recorded whether each had a publicly available Facebook profile.

Results

Out of the 90 glaucoma societies, 47 (52%) had a publicly available Facebook profile. These results confirm that the social media presence of glaucoma societies worldwide is limited.

Conclusions

This study highlights the need for greater social media engagement by professional societies to educate the public, promote screening, and reach at-risk populations. Patients in underserved regions, where barriers like remote location and reduced awareness of glaucoma limit diagnosis, could especially benefit from increased social media outreach. Health campaigns on social media could raise awareness about glaucoma signs and improve detection, diagnosis, and intervention.

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P-0537

RISK FACTORS ASSOCIATED WITH CORNEAL BIOMECHANICAL PARAMETERS AND VISUAL FIELD PROGRESSION IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA

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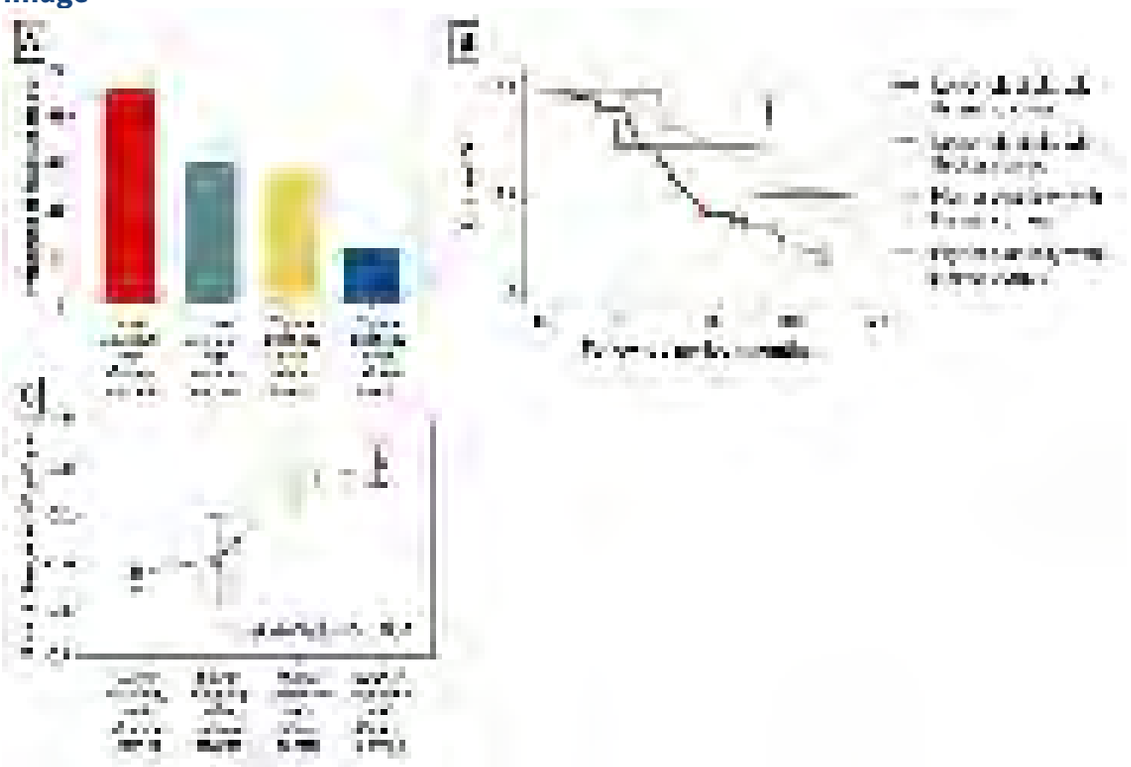
Background
There is limited research on the predictive role of corneal biomechanical characteristics in POAG progression. To address this gap, this study employed Corneal Visualization Scheimpflug Technology (Corvis-ST) to assess the corneal biomechanical properties of POAG patients, and evaluate their predictive value in the progression of visual field defects.

Methods
This prospective clinical cohort study included POAG patients diagnosed at the Eye Hospital of Wenzhou Medical University, with a follow-up period exceeding 24 months and at least six reliable visual field examinations. Data from one randomly selected eye per patient were analyzed. General patient information was collected, and corneal biomechanical parameters were measured using Corneal Visualization Scheimpflug Technology (Corvis-ST). Patients were categorized into visual field progression and non-progression groups.

Results
A total of 129 patients (73 males and 56 females) were included in the study. During the follow-up, 46.5% of eyes showed progression, with a median progression time of 45 months. Among non-corneal biomechanical factors, higher baseline intraocular pressure (IOP) (Hazard radio [HR]: 3.14; 95% confidence interval [CI]: 1.58-6.22; $P = 0.001$) was identified as a risk factor for progression, while longer axial length (HR: 0.43; 95% CI: 0.24-0.77; $P = 0.004$) was protective. Regarding corneal biomechanical factors, faster velocity of applanation 1 (A1V) (HR: 0.42; 95% CI: 0.21-0.83; $P = 0.012$), longer length of applanation 2 (A2L) (HR, 0.39; 95% CI, 0.22-0.68; $P < 0.001$), longer time of applanation 2 (A2T) (HR, 0.45; 95% CI, 0.27-0.76; $P = 0.002$), higher deformation amplitude at the highest concavity (CDA) (HR, 0.47; 95% CI, 0.28-0.80; $P = 0.006$) and thicker central corneal thickness (CCT) (HR, 0.34; 95% CI, 0.14-0.79; $P = 0.012$) were associated with a reduced risk of progression.

Image



Conclusions

Corneal biomechanical properties demonstrated predictive value for the progression of POAG visual field defect. Corneal elasticity and central corneal thickness (CCT) appeared to work synergistically, with softer and thicker corneas being associated with a lower risk of visual field progression

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P-0542

HOTSPOTS AND TRENDS OF STEM CELL THERAPY FOR OCULAR DISEASES FROM 2013 TO 2023: A BIBLIOMETRIC ANALYSIS

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Background
Stem cell therapy has therapeutic potential in treating ocular diseases and thus holds significant research importance. This study employs bibliometric analysis to explore research trends and hotspots in stem cell therapy for ocular diseases over the past decade.

Methods
The publications on stem cell therapy for ocular diseases were retrieved from the Web of Science Core Collection. The search strategy was (TS=(stem cell therapy) AND TS=(ocular diseases OR eye diseases) AND LA=(English) AND DT=(Article OR Review)). Following thorough manual scrutiny, a bibliometric analysis was conducted using Citespace and VOS Viewer.

Results
A comprehensive analysis of 612 publications revealed a collaboration among 3273 authors from 2202 institutions spanning 241 countries/regions. The United States and China emerged as the leading contributors. Sayan Basu was identified as the most prolific author, while Steven D Schwartz received the highest number of co-citations. Among journals, *International Journal of Molecular Sciences* published the most articles, and *Investigative Ophthalmology & Visual Science* garnered the highest co-citations. Analysis of keywords within nine generated keyword clusters unveiled three main research categories. The first focused extensively on stem cell therapy for retinal degeneration, particularly on the utilization of stem cell-derived retinal pigment epithelium cells. The second domain explored the application of stem cells, especially mesenchymal stem cells, in treating ocular surface diseases. The third area addressed ocular graft-versus-host disease. Additionally, keyword bursts highlighted emerging interests in extracellular vesicles and directed differentiation, suggesting these as promising areas for future research.

Conclusions
This bibliometric analysis underscores a decade of substantial global interest in stem cell therapy for ocular diseases, emphasizing the necessity for ongoing research and enhanced collaborative efforts. The study provides insights into the current landscape and anticipates future trends in the application of stem cell therapy in ophthalmology. Future research should explore the potential of stem cells in less-studied ocular conditions, with an emphasis on long-term efficacy and safety.

P-0544

UNRAVELING ICE SYNDROME WITH SECONDARY GLAUCOMA: A DIAGNOSTIC AND SURGICAL CHALLENGE

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Background

To present a rare case of Essential Progressive Iris Atrophy (a subtype of Iridocorneal Endothelial Syndrome, ICE Syndrome) with secondary glaucoma.

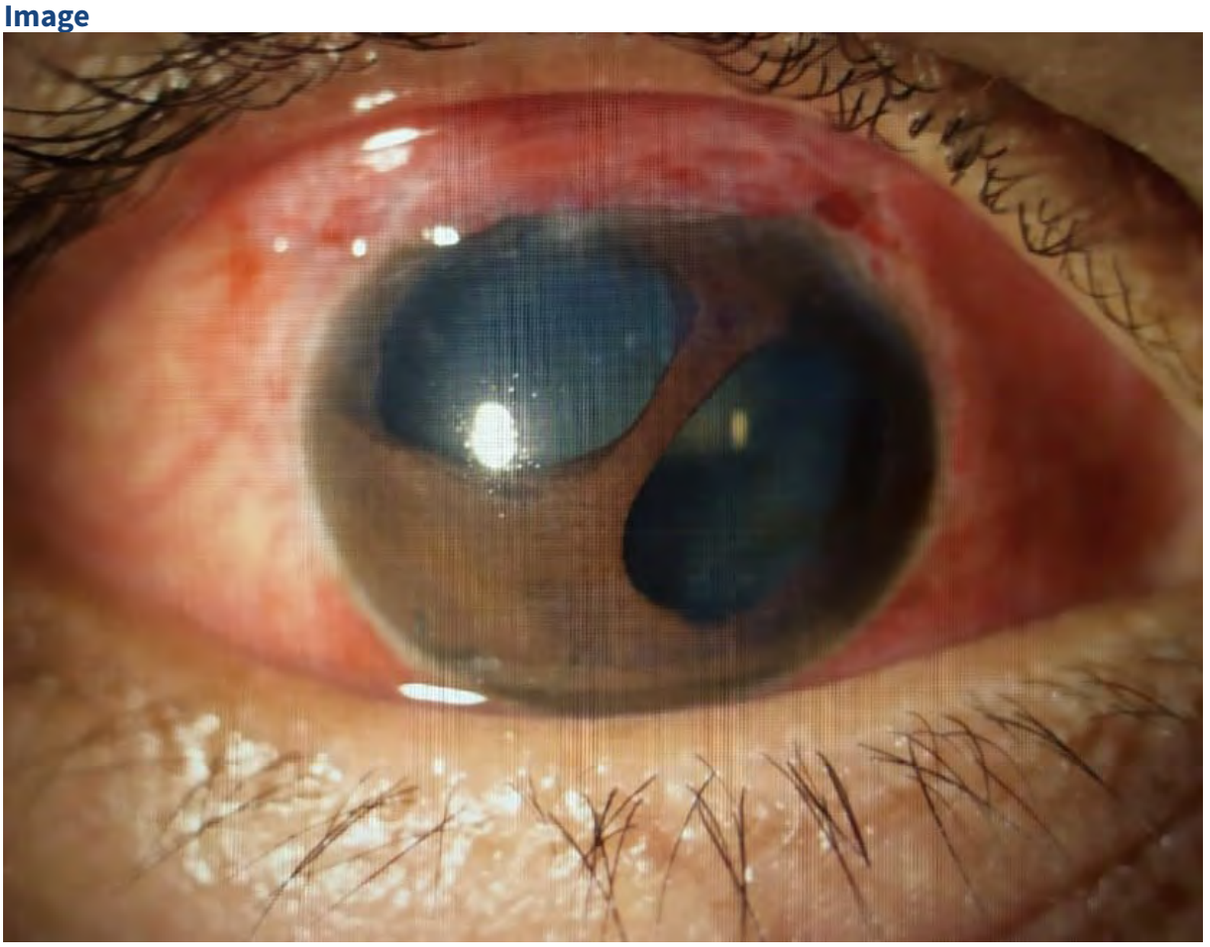
Methods

A 46-year-old male presented with progressive blurred vision and intermittent pain in the right eye (OD) for one year. Examination revealed reduced visual acuity (1/300 in OD, 6/20 in OS) and significantly elevated intraocular pressure (IOP) in OD (48 mmHg). Anterior segment findings included policoria, synechial angle closure (on gonioscopy). Specular microscopy showed increased coefficient of variation (50) and decreased hexagonal cell percentage (52%). Optical coherence tomography (OCT) revealed thinning of the retinal nerve fiber layer (RNFL) in OD and a cup-to-disc (CD) ratio of 0.9, indicative of glaucomatous optic neuropathy. Laboratory findings indicated borderline IgM anti-HSV-1/HSV-2 positivity. Despite medical therapy with timolol, brinzolamide, and systemic acetazolamide, IOP remained uncontrolled, prompting surgical intervention with glaucoma drainage device (GDD) implantation.

Results

Initial medical therapy was insufficient for IOP control. Following GDD implantation, postoperative IOP in OD improved to 23 mmHg. However, there was no improvement in visual acuity due to preexisting glaucomatous optic nerve damage. The combination of clinical, imaging, and laboratory findings confirmed the diagnosis of Essential Progressive Iris Atrophy with secondary glaucoma. The surgical approach provided partial IOP control, highlighting its role in managing refractory cases, although irreversible optic neuropathy limited functional outcomes.

Image



Conclusions

This case underscores the challenges of diagnosing and managing ICE Syndrome with secondary glaucoma. Advanced diagnostic modalities, including OCT and specular microscopy, were instrumental in establishing the diagnosis and assessing disease severity. While GDD implantation effectively reduced IOP, the importance of early diagnosis and intervention to preserve vision cannot be overstated.

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P-0545

SECONDARY ANGLE CLOSURE SECONDARY TO A POSTERIOR POLE MASS WITH EXTENSION TOWARDS CILIARY SULCUS

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Background

Secondary angle closure or secondary angle closure glaucoma may develop from intraocular masses via direct invasion, compressive angle closure, and anterior segment neovascularization.[1] Management usually includes topical and/or oral aqueous suppressants. Seeding, even in benign tumors, makes filtering and/or tube surgery less ideal.

Methods

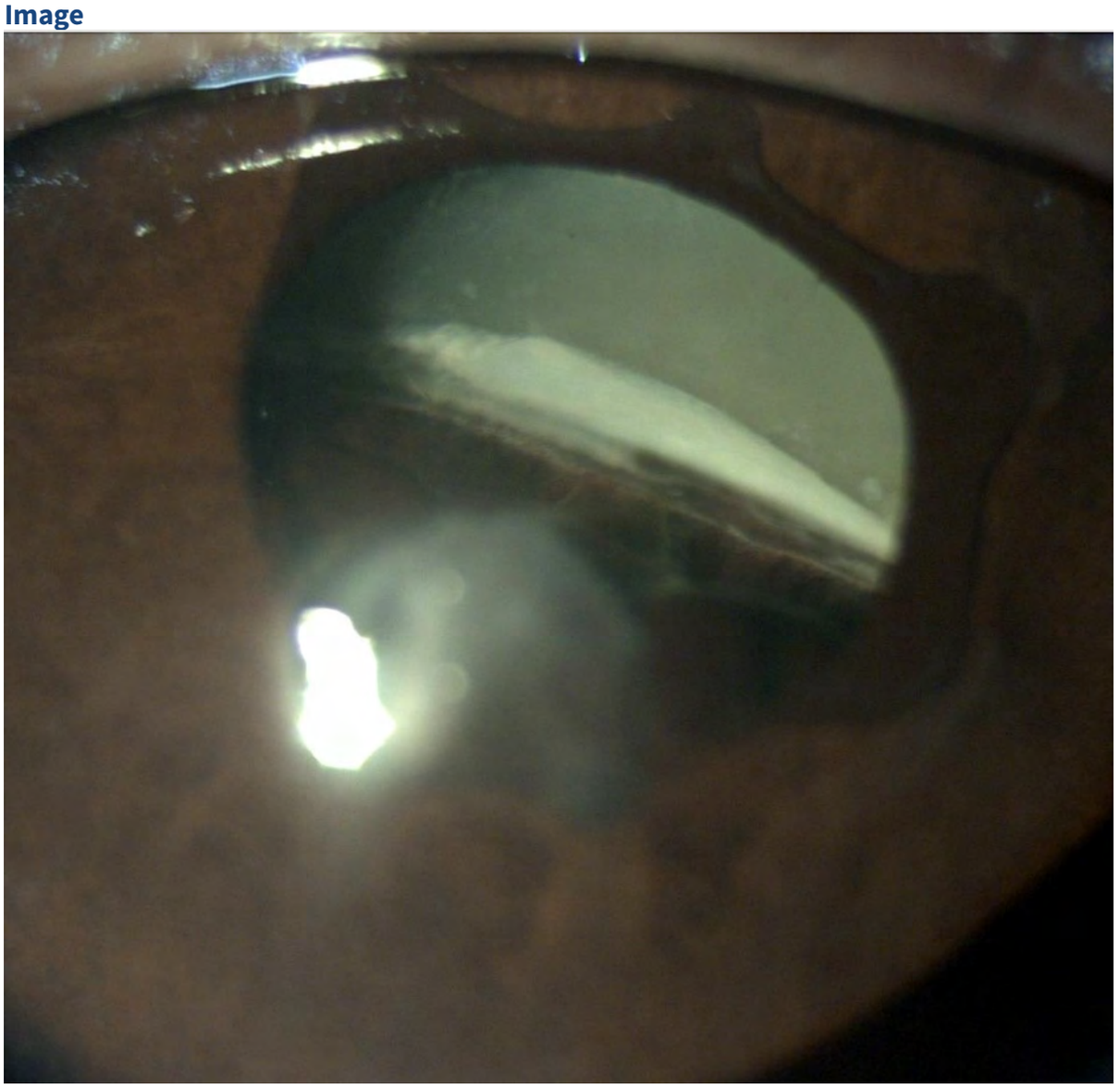
Case of a 19 year-old female with secondary angle closure or secondary angle closure glaucoma from an intraocular leiomyoma that was managed with transscleral cyclophotocoagulation (TSCPC)

Results

A 19 year-old female presented with right eye (OD) blurred vision and pain. Exam of OD revealed hand movement; 4-5mm non-reactive pupil, with reverse relative afferent pupillary defect; IOP of 32 mmHg, on acetazolamide (250mg 3x/day daily) and timolol drops, prescribed by her previous ophthalmologist; shallow anterior chamber with iridocorneal touch (3 to 9 o'clock) with focal touch (11, 12, 2 o'clock); 360 degrees of closed angles on gonioscopy; intraocular mass behind the iris, ectropion uvea, and superiorly dislocated cataractous lens; There was no view of the posterior pole. UBM confirmed a well-defined intraocular mass (3 to 9 o'clock), pushing the iris anteriorly. B-scan showed a large (15.9mm) moderately echoic mass extending from the ciliary body to the posterior pole. Orbital MRI showed no extraocular extension. Chest CT and abdominal MRI with contrast were unremarkable for metastasis. The left eye vision was 20/20. The rest of the exam was normal.

Incisional biopsy with histopathology and immunohistochemistry staining confirmed benign leiomyoma. A month after biopsy, the vision remained the same, but she developed eye pain with elevated IOP (50mmHg). She was prescribed medications that decrease the aqueous production: acetazolamide 250mg 4x/day daily and timolol+brimonidine drops twice daily, with subsequent decrease in IOP (30mmHg) and pain. To control the IOP (remove the oral and possibly topical medication) and pain, TSCPC (20 shots, 1500ms, 1500mw) was performed to decrease the aqueous humor production by destruction of the pigmented ciliary body epithelium.2 Six weeks post TSCPC, IOP decreased to 30mmHg while on timolol+brimonidine drops, but off oral acetazolamide.

Image



Conclusions

Secondary angle closure or secondary angle closure glaucoma can result from an intraocular mass such as leiomyoma. Aqueous suppressants may control the IOP. With poor vision, TSCPC may help on the IOP control.

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P-0548

A CASE OF BILATERAL ACUTE DEPIGMENTATION OF IRIS AND ITS CLINICAL IMPLICATIONS

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Background

Bilateral Acute Depigmentation of the Iris (BADI) is a rare and recently described clinical entity characterized by sudden onset bilateral iris depigmentation. It is typically associated with minimal or no anterior chamber inflammation and may present with photophobia or mild discomfort. The condition often occurs in young to middle-aged individuals and is hypothesized to be triggered by systemic or local factors, including drug use or viral infections. Although its exact etiology remains uncertain, BADI is distinct from other conditions causing iris depigmentation, such as Fuchs' heterochromic iridocyclitis or pigment dispersion syndrome, by its acute onset and bilateral presentation. Recognizing and differentiating this condition is critical for ophthalmologists, particularly to prevent unnecessary interventions and to monitor for potential complications, such as secondary glaucoma. This case report highlights a unique presentation of BADI, emphasizing diagnostic challenges, clinical progression, and management, with implications for advancing understanding and improving outcomes in such cases.

Methods

A case report

Results

An 18-year-old male presented with complaints of redness and photophobia in both eyes for 3 weeks. The symptoms began shortly after an upper respiratory tract infection. On slit lamp biomicroscopy ciliary congestion was noted in both eyes and iris pigments were noted on the corneal endothelium and in the anterior chamber. No anterior chamber cells or flare was detected. Strikingly, depigmented patches were evident in the peripheral iris of both eyes, however no transillumination defects were seen. Gonioscopy was done in both eyes which showed increased trabecular meshwork pigmentation especially inferiorly. The intraocular pressure with Goldmann applanation tonometry was 17 and 18 mm of hg in right and left eye respectively and posterior segment examination revealed normal optic disc and retina. Based on the clinical findings, a diagnosis of Bilateral Acute Depigmentation of the Iris (BADI) was made.

He was treated with topical prednisolone eye drops in tapering dosage and over 4 weeks was completely resolved.

Conclusions

This case underscores the importance of recognizing BADI as a potential sequela of viral illnesses, particularly in young patients with bilateral photophobia and iris changes. Early diagnosis and treatment with corticosteroids can lead to resolution of symptoms and prevent misdiagnosis or unnecessary interventions.

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P-0549

LINEZOLID-INDUCED OPTIC NEUROPATHY AFTER 30 MONTHS: A CASE REPORT

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Background
Linezolid is an oxazolidinone-class antibiotic that is useful for treating drug-resistant gram-positive bacterial infections, including MRSA. While effective within the approved 28-day usage, prolonged treatment has been reported to cause optic neuropathy potentially due to mitochondrial toxicity, typically within the first year of treatment.

Methods
This is a case report incorporating patient history, clinical presentation, ocular exam findings, laboratory evaluation, and optical coherence tomography.

Results
Here, we report a case of a 62-year-old male treated with linezolid for chronic MRSA osteomyelitis who developed progressive visual acuity loss after 30 months of linezolid usage. Upon discontinuation of linezolid, the patient's visual acuity improved significantly and returned to near baseline after 5 months.

Conclusions
While most reported cases of linezolid-induced optic neuropathy occur within 12 months of linezolid usage, this case demonstrates a rare occurrence of linezolid-induced optic neuropathy presenting after 30 months. We highlight the importance for providers to consider linezolid as a cause of optic neuropathy well past the first year of treatment.

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P-0551

CHARACTERIZATION OF PATIENTS WITH NEOVASCULAR GLAUCOMA AT SÓTERO DEL RÍO HOSPITAL

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Background

Neovascular glaucoma (NVG) is a secondary glaucoma with a poor visual prognosis. It is characterized by the appearance of neovascularization on the iris and the iridocorneal angle, as a result of multiple ischemic retinal diseases.Bevacizumab reducing ocular ischemia and inhibiting angiogenesis.

Objective: To describe the epidemiological characteristics, clinical progression, and complications of patients diagnosed with neovascular glaucoma at Sótero del Río Hospital. To evaluate whether panphotocoagulation and intravitreal bevacizumab administration after the onset of GNV were associated with better visual outcomes.

Methods

A retrospective descriptive study was conducted based on the review of clinical records from Sótero del Río Hospital.The total number of patient records from the glaucoma outpatient clinic who received intravitreal bevacizumab between 2022 and 2024 was reviewed. Additionally, records of those who underwent filtering surgery or cyclophotocoagulation during this period were also reviewed.The study included all patients diagnosed with neovascular glaucoma at the centre. Demographic history, clinical data such as visual acuity, intraocular pressure, treatments received, and complications were recorded.

Results

A total of 194 cases were identified. Of them, 48.5% were women with a mean age of diagnosis of 61 years (sd 11.4 years). Diabetic retinopathy was the underlying cause in 70% of patients. The mean intraocular pressure at presentation was 35.8 mmHg (sd 10.4). 80% of the patients had a visual acuity at presentation worse than 1.3 LogMAR. 46.0% had received panphotocoagulation prior to the onset of NVG. From those with remaining visual acuity at presentation (n=168), 57 (33.9%) received intravitreal bevacizumab, 51 (30.4%) panphotocoagulation and 93 (55.4%) needed a filtering surgery. At 6-month follow-up, 28 (16.7%) patients had lost their vision. Panphotocoagulation after GNV onset was associated with better visual outcome in our series. However, intravitreal bevacizumab administration was not.

Conclusions

NVG had a poor visual prognosis. Better outcomes were seen in patients receiving panphotocoagulation after GNV onset. In our series, administration of bevacizumab did not reduce the proportion of visual loss at 6-month follow up. In resource-limited setting, the use of bevacizumab after GNV onset may not be cost-effective.

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P-0552

CLINICAL CHARACTERISTICS OF SECONDARY OCULAR HYPERTENSION AND GLAUCOMA FOLLOWING VITREORETINAL SURGERY: A DESCRIPTIVE STUDY

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Background

Elevated intraocular pressure (IOP) following vitreoretinal surgery occurs in 19–28% of cases, with mechanisms depending on surgical technique, tamponade type, and patient-specific factors. Despite its frequency, the clinical features and management of secondary glaucoma in these cases are not well-defined. This study aimed to describe the risk factors, clinical characteristics, and management strategies for secondary ocular hypertension (OH) and glaucoma following vitreoretinal surgery (VS).

Methods

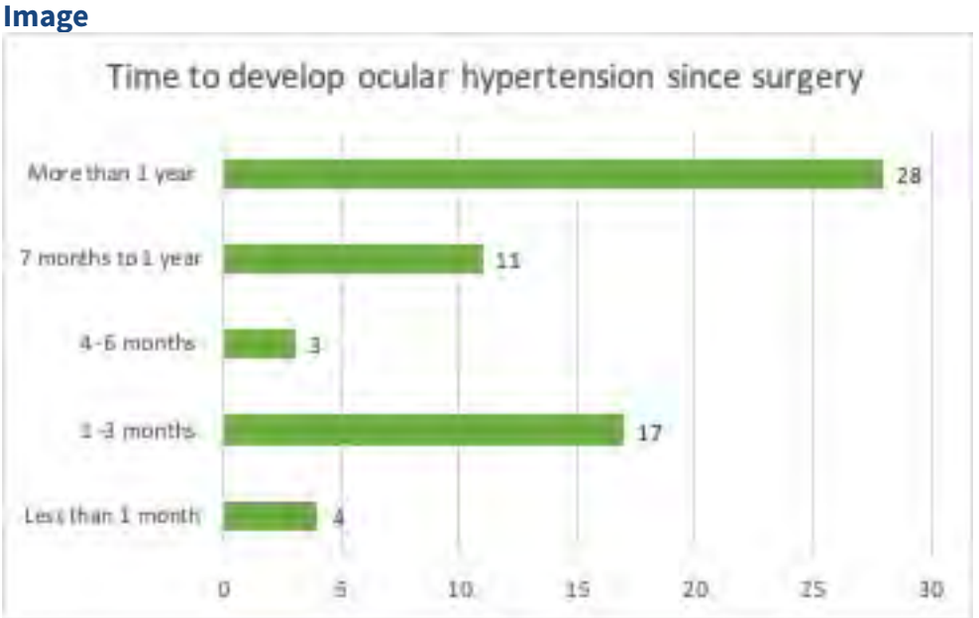
A descriptive, observational study was conducted at the Glaucoma Department at the Conde de Valenciana Hospital Mexico. Sixty-three eyes from 59 patients were included, all referred from the Retina Department with a diagnosis of OH or glaucoma following VS. Data on demographics, pre- and post-surgical clinical parameters, tamponade type, and therapeutic interventions were analyzed.

Results

The most frequent surgeries were phacovitrectomy (46%) and vitrectomy with scleral buckling (24%). Silicone oil (SO) was the most common tamponade (56%), associated with the highest incidence of secondary glaucoma (49 %) and 11% with gas C3F8. Glaucoma developed in 89% of patients while OH occurred in only 11%. 78% of the subjects presented with open-angle glaucoma, and 22% had angle-closure mechanisms, laser iridotomy was indicated in 6% and did not resolve the angle closure. Ahmed valve (AV) implantation was the most common surgery. Selective laser trabeculoplasty demonstrated efficacy in managing SO induced glaucoma (16%).

AV surgery was needed in 36% subjects, of which 13% achieved IOP control without topical medication, compared to 3% of subjects who did not undergo surgery. In 44% patients the cause of vision loss was due to inadecuate follow up. Most patients presented with ocular hypertension after 1 year following VS.

Image



Conclusions

Secondary glaucoma following vitreoretinal surgery should be recognized as a vision threatening entity. SO was the most common cause of ocular hypertension and glaucoma. Long term follow-up is mandatory in these patients since patients are not aware that vision loss can be some time after the surgery. This study highlights the importance of early detection of ocular hypertension and collaborative management between retina and glaucoma specialists.

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P-0554
GLAUCOMA IN PHAKOMATOSIS: CLINICAL CHARACTERISTICS AND MANAGEMENT

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Background
Sturge-Weber syndrome, Klippel-Trenaunay, Phakomatosis pigmentovascularis and Neurofibromatosis are more common syndromes in phakomatosis group. These syndromes involved to the eyes causing secondary glaucoma..

Purpose: To describe the clinicopathologic features and outcomes of treatment in Phakomatosis patients with glaucoma.

Methods
It was a retrospective, observational case series. Seventeen glaucoma patients (12 cases with Sturge-Weber, 2 cases with Phakomatosis pigmentovascularis, 2 cases with Klippel-Trenaunay and 1 case with Neurofibromatosis) were included

Results
Sixteen cases had nevus flammeus followed trigeminal nerve pathway V1, V2; eleven cases had nevus flammeus follow both V1,V2 and V3. Intraocular pressure was control with glaucoma medications in 9 cases and 8 cases had glaucoma surgery. The neurofibromatosis patient with glaucoma had orbital neurofibroma and uveal ectropion.

Image


Figure 1: Nevus flammeus follow

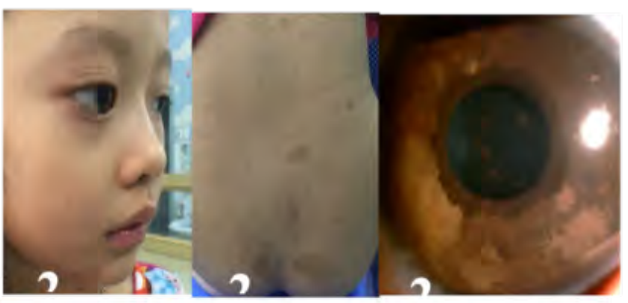

Figure 2: (a) neurofibroma on right face. (b)

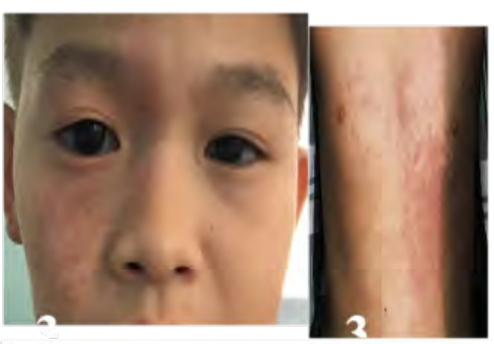

Figure 3: (a) Nevus flammeus follow V1, V2, both eyes ocular

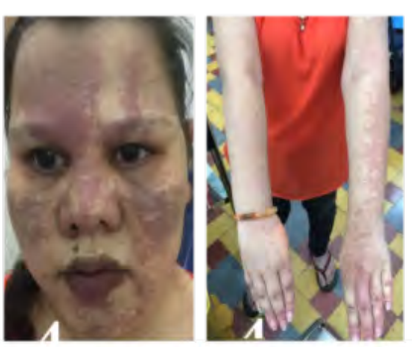

Figure 4: (a) Nevus flammeus and varicosities on face . (b)

RF

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Conclusions

Prevalence of the Sturge-Weber syndrome is highest in the phakomatosis group. Nevus flammeus follow V1 and V2 is a predictor for glaucoma. Orbital and facial neurofibroma are also a predictor for glaucoma in the Neurofibromatosis syndrome type 1. Late-onset glaucoma responds to medical therapy and early-onset glaucoma usually needs surgery.

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P-0555
THE INFLUENCE OF OPHTHALMOTONUS ON EYE BIOMETRY

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Background
One of the main requirements of modern cataract surgery is to achieve target refraction without the need for additional optical correction. However, with concomitant glaucoma, achieving the expected visual results is often difficult. This is largely due to the influence of IOP fluctuations on the main biometric parameters of the eye, which makes more problematic the accurate calculation of the optical power of the IOL.

Purpose: To evaluate the effect of IOP level on the axial length (AL) of the eye.

Methods
The study included 37 eyes (37 patients) with POAG aged 46 to 77 years (the average age was 67,75±9,78): 19 men and 18 women. All patients underwent trabeculectomy. Exclusion criteria: low visual acuity, changes in the anterior segment of the eye, cataract, severe intra- and postoperative complications, difficult cooperation.

In addition to standard ophthalmological examinations, all patients underwent optical biometry (IOL Master 500, Carl Zeiss Meditec AG, Germany) before and at various times after achieving the hypotensive effect (1 week, 1 month, 3 months).

Results
Preoperative IOP values averaged 40,39±6,07 mm Hg (from 32 mm Hg to 50 mm Hg). The values of AL varied between 22,24 mm and 24,34 mm (23,52±0,69 mm). Postoperative ophthalmotonus values ranged from 14 mm Hg to 19 mm Hg (16,69±2,09 mm Hg), with the shortening of the AL being 23,28±0,71 mm (from 22,04 to 24,18 mm). Thus, the biometric difference before and after stabilization of IOP was on average 0,24±0,07 mm (maximum value – 0,39 mm, minimum value – 0,16 mm). Analysis of our results revealed a direct correlation between shortening of axial length and decreased ophthalmotonus (r=0,46).

Conclusions
Thus, fluctuations in the axial length of the eye, as a result of hypotensive surgery, don't exclude the possibility of deviation from the target refraction during subsequent phacoemulsification. In this regard, cataract extraction in patients with glaucoma should be recommended after stabilization of IOP. It can be assumed that combined surgery further increase the risk of postoperative refractive errors.

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P-0558
IRIDOSCHISIS AND ANGLE-CLOSURE GLAUCOMA: A CASE REPORT

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Background
Iridoschisis is a rare disease characterized by the separation of anterior and posterior stromal fibers[1]. It predominantly affects women between the 5th and 7th decades of life. The pathophysiology remains controversial, with reports suggesting autosomal dominant inheritance, sporadic origin, or secondary causes such as trauma, glaucoma, or syphilis[2]. Initially unilateral, it often progresses to bilateral involvement[4], most commonly affecting inferior quadrants and, less frequently, diffuse areas. Endothelial changes may occur due to stromal fiber contact[3].

Key differential diagnoses include iridocorneal endothelial syndromes and Axenfeld-Rieger syndrome[5]. Two-thirds of cases are associated with glaucoma, primarily angle-closure glaucoma[6], which presents as intermittent and acute intraocular pressure spikes. Treatment options include peripheral iridotomy, phacoemulsification, and glaucoma surgery[7].

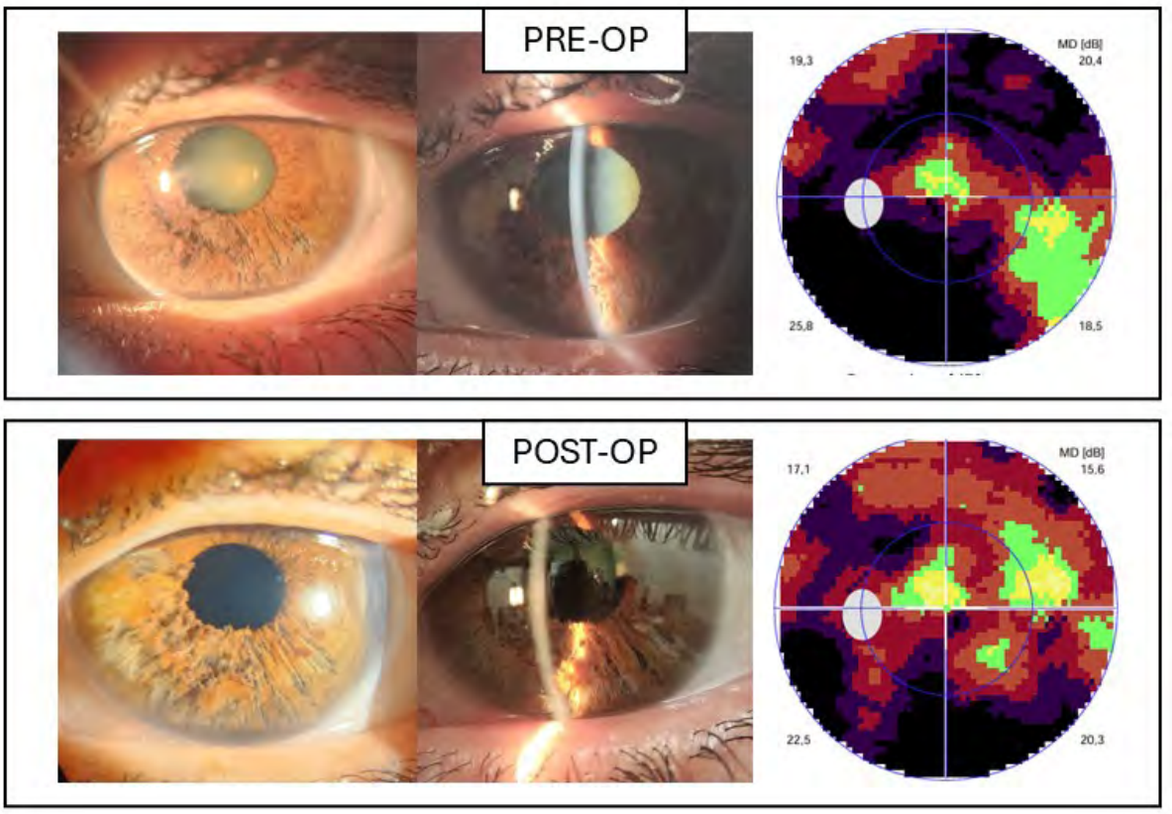
Methods
Presentation of a clinical case involving iridoschisis and angle-closure glaucoma, highlighting the diagnostic process, clinical findings, and therapeutic approach

Results
A 69-year-old female patient presented with three days of left-eye pain. She had a history of cataract surgery in the right eye, and glaucoma treated with timolol twice daily.

Examination findings:
Visual acuity: OD: 20/20; OS: 20/200
Slit-lamp biomicroscopy:
OD: iridoschisis and pseudophakia.
OS: corneal edema, shallow anterior chamber, iridoschisis, and cataract.
Intraocular pressure (IOP): OD: 16 mmHg; OS: 55 mmHg.
Treatment with acetazolamide and a combination of dorzolamide, brimonidine and timolol reduced IOP in OS to 25 mmHg. Gonioscopy revealed 360° iridocorneal apposition, and a peripheral iridotomy was performed.

Additional findings:
Optical coherence tomography: OD: Normal; OS: Retinal nerve fiber layer thinning.
Visual fields: OD: normal; OS: Central remnant.
Optic nerve cupping: OD: 0.6; OS: 0.9.
Due to persistently elevated IOP in OS, cataract extraction was performed, resulting in an IOP of 10 mmHg without medication.

Image



Conclusions

The diagnosis of iridoschisis is clinical, requiring careful evaluation for glaucoma, particularly angle-closure glaucoma. Cataract extraction in patients with iridoschisis is inherently more complex due to disruptions in the anterior stromal architecture of the iris.

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P-0561

CHALLENGES AND MANAGEMENT OF A CASE OF CHRONIC ANGLE CLOSURE GLAUCOMA IN A YOUNG PATIENT

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Background

This is a case report of chronic angle closure in a 28 year old female patient who presented with high intra ocular pressure and advanced disc damage in both eyes. IOP remained uncontrolled after laser peripheral iridotomy and maximal medical therapy. The surgical options in this case were trabeculectomy, lens extraction or combined phacotrabeculectomy.We would be discussing the difficulties and challenges faced in this case.

Methods

28 year old female patient presented to us with complaints of severe headache for the past 6 months. Snellens visual acuity was 6/24 in right eye and 6/6 in left eye. Intra ocular pressure measured with Goldmann applanation tomomtery at presentation was 48 mm Hg in right eye, 38 mm Hg in left eye. Indentation gonioscopy with Sussman 4 mirror lens revealed 360 degrees of synechial angle closure in both eyes.The disc showed advanced damage (0.9 :1 C:D ratio) in the right eye, moderate damage (0.7:1 C:D ratio) in the left eye . Humprey's visual fields in right showed advanced damage with MD of -26.17 dB, left showed early field damage (MD -2.78 dB). The axial length was 22.27 mm in right eye and 21.76 in left eye. Lens thickness was 4.32 mm in right eye and 4.47 mm in left eye. YAG laser PI was done in both eyes, and medical therapy instituted. The patient was young and had a clear lens. The possible surgical options in this case were trabculectomy or combined trabeculectomy with lens extraction. Our patient was young with clear lens and synechial angle closure in both eyes. Clear lens extraction alone was not an option as the angles were completely closed. Right eye underwent trabeculectomy with mitomycin C.

Left eye had uncontrolled IOP with maximum medical therapy ,progressed over 6 months and underwent combined trabeculectomy with lens extraction.

Results

The right had good IOP control post-surgery , but anterior chamber was extremely shallow. There was no wound leak or choroidal detachment .The lens was clear at 1 year of follow up. The disc and visual fields were stable. The left eye underwent lens extraction with trabeculectomy. The IOP was well controlled, anterior chamber was deep , disc and fields were stable till 6 months of follow up.

The challenge in this case was risk of wipe-out in the right eye given the advanced stage of the disease. There was a dilemma whether to perform clear lens extraction in a young patient. Hence trabeculectomy was done in the right eye. IOP was well maintained post surgery, however the anterior chamber remained very shallow posing a risk of cataract formation.

With this background,it was decided to perform trabeculectomy with lens extraction in the left eye which resulted in good IOP control and a well formed anterior chamber.

Conclusions

Combined trabeculectomy with lens extraction appears to have better post operative course in young patients with chronic angle closure galucoma, especially with a increased lens thickness.

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P-0565
CHILDREN'S GLAUCOMA: DIVERSITY AND REDEFINITION

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Background
Children's glaucoma, characterized by a complex array of heterogeneous disorders, has been subject to international debate regarding classification. Historically, the paradigm categorized these conditions into primary infantile glaucoma (PIG), juvenile glaucoma (JG), and glaucoma associated with other congenital anomalies. Using age three as a demarcation, cases diagnosed before this threshold were labeled as PIG, while those between ages three and sixteen fell under JG. However, this traditional concept has constrained understanding of the spectrum of diseases it encompasses.

Methods
The conventional framework of congenital glaucoma, or developmental glaucoma, inadequately captured the full scope of these conditions, presenting shortcomings in categorization:

Diverging from primary congenital glaucoma (PCG), certain types of secondary childhood glaucoma exhibit distinct etiologies. For instance, Axenfeld-Rieger syndrome reveals more severe causal mechanisms than PCG. Genetic studies pinpoint two major genes, PITX2 and FOXC1, central to developmental blockages in anterior segment tissues derived from neural crest cells during late embryonic stages, leading to abnormal and variant aqueous humor drainage systems, extensive peripheral anterior synechiae, and deficiencies in trabecular meshwork and Schlemm's canal.

Similarly, Sturge-Weber syndrome introduces the hypothesis that elevated episcleral venous pressure might play a contributory role in glaucoma causation.

Due to varying classifications, pathophysiology, pathogenetic mechanisms, and treatment protocols, outcomes vary across different types of childhood glaucoma. While primary congenital glaucoma (PCG) and juvenile open-angle glaucoma (JOAG) commonly involve goniotomy, trabeculotomy, trabeculectomy, glaucoma drainage device (GDD) implantation, and minimally invasive glaucoma surgeries (GATT, KDB, TMH, XEN), the response to such interventions is markedly less effective in secondary childhood glaucomas like Axenfeld-Rieger syndrome or Sturge-Weber syndrome given fundamental differences in etiology compared to PCG.

Results
Following years of dedicated investigation and exploration, definitions and categorizations of children's glaucoma are increasingly refined, aiming to standardize clinical practices in diagnosis and management.

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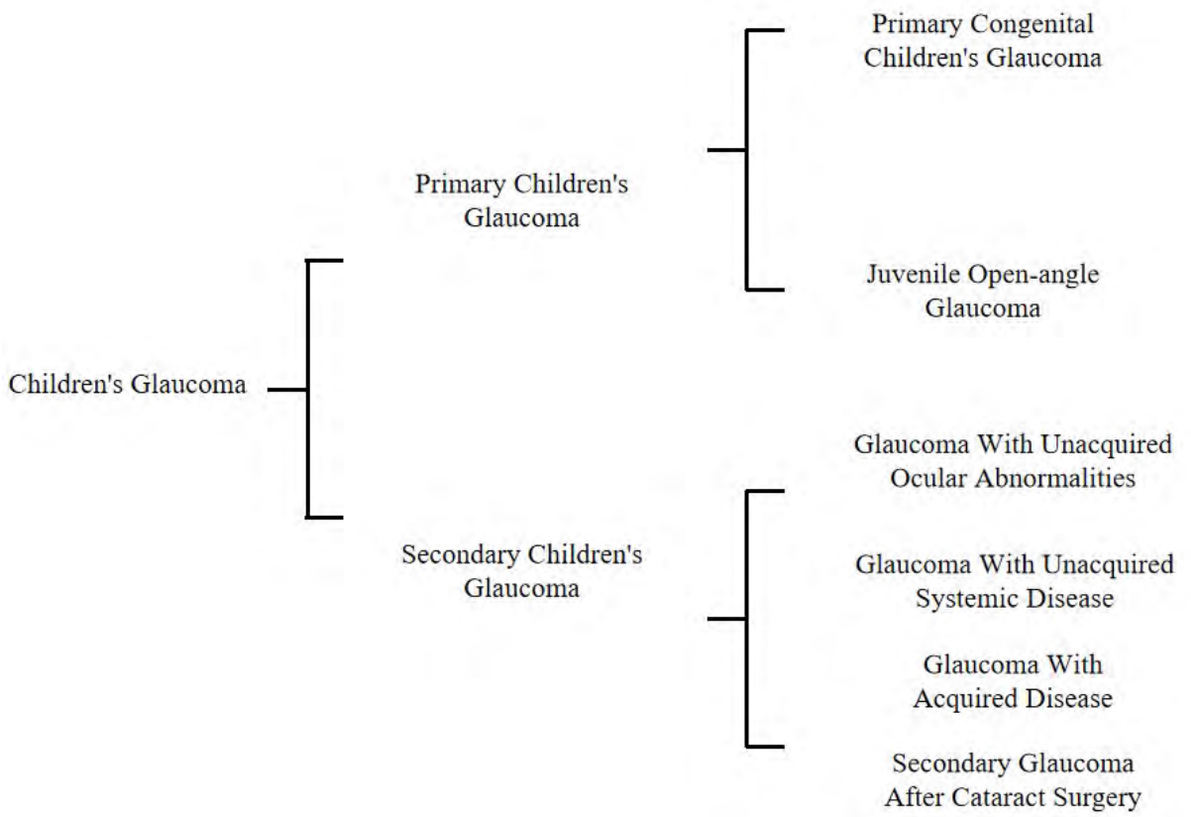

Conclusions

This redefinition acknowledges the heterogeneity of childhood glaucomas, underscoring the need for tailored therapeutic approaches based on specific disease characteristics and patient profiles, thereby optimizing outcomes for children afflicted by these sight-threatening conditions.

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P-0567

DETERMINANTS AND CHARACTERISTICS OF BRUCH'S MEMBRANE OPENING AND BRUCH'S MEMBRANE OPENING–MINIMUM RIM WIDTH IN NORMAL INDIAN POPULATION

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Background
To investigate the determinants of Bruch's membrane opening (BMO), Bruch's membrane opening-minimum rim width (BMO-MRW), and circumpapillary retinal nerve fibre layer (RNFL) thickness in the healthy Indian population.

Methods
A total of 267 eyes, each subjected to a comprehensive ophthalmic examination, were included in the study. The assessment encompassed spectral-domain optical coherence tomography images focusing on the RNFL, BMO-MRW, Fovea to BMO (FoBMO) angle, and optic nerve head evaluations.

Results
The mean values for global BMO-MRW and RNFL were 318.44 ± 50.72 and 104.15 ± 10.70, respectively. The mean BMO area was 2.98 ± 0.41mm^2. BMO-MRW demonstrated increased thickness in the nasal inferior sector (385, $p < 0.462$) and decreased thickness in the temporal sector (67.80, $p < 0.501$). Conversely, RNFL exhibited maximum thickness in the temporal inferior sector (152.54, $p < 0.573$) and minimum thickness in the temporal sector (67.80, $p < 0.501$). The mean FoBMO angle was -3.89 ± 3.37. Global BMO-MRW and RNFL values exhibited a negative correlation with age, resulting in a decrease ($p < 0.005$). Furthermore, an increase in BMO area demonstrated a negative correlation with global BMO-MRW and global RNFL.

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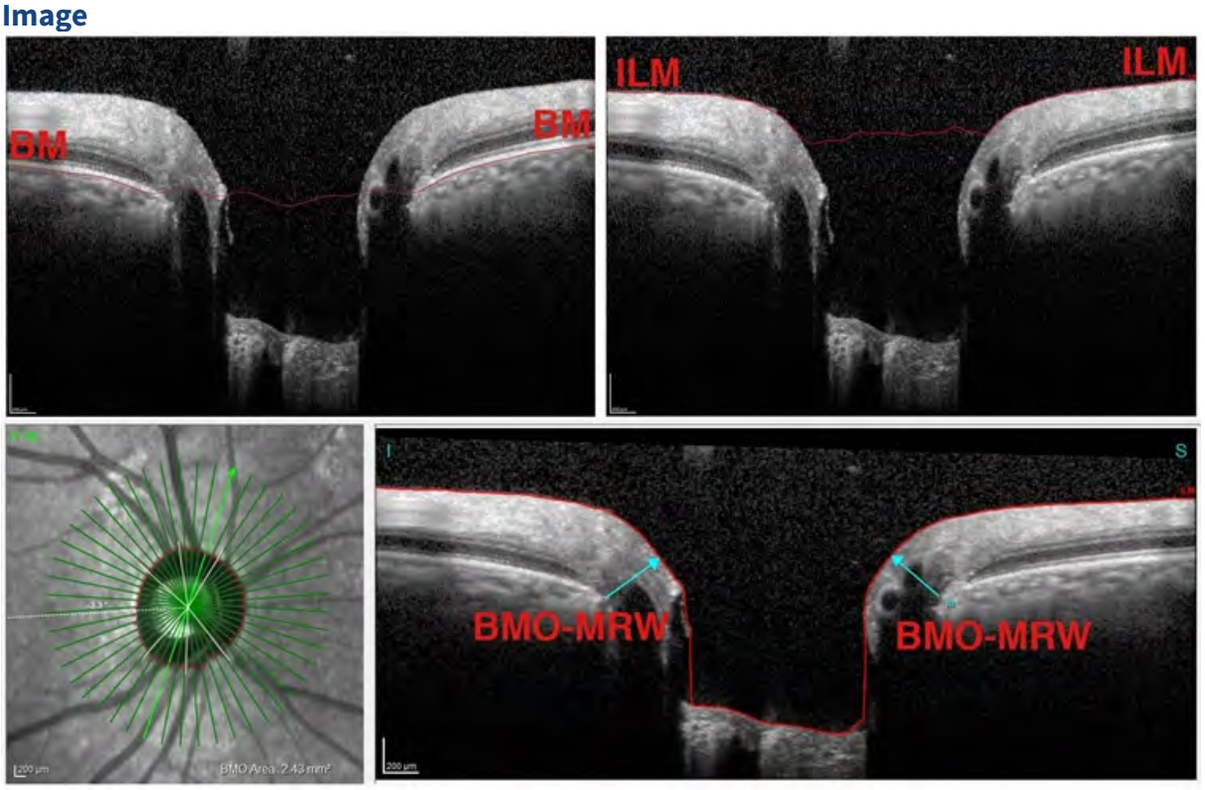

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Conclusions

BMO-MRW and RNFL thickness declined with age. The BMO area showed a significant correlation with both RNFL and BMO-MRW. Furthermore, BMO-MRW was notably associated with RNFL, the CD ratio, and age.

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P-0568

EFFECT OF A LENS-CROWDED ANTERIOR SEGMENT ON REFRACTIVE OUTCOMES AFTER CATARACT SURGERY

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Background
Effective lens position (ELP) is a critical factor in predicting refractive outcomes following cataract surgery. Eyes with a lens-crowded anterior segment, characterized by increased lens thickness or a high lens-axial length factor (LAF), may influence the accuracy of ELP prediction and refractive outcomes. This study aimed to evaluate the impact of a lens-crowded anterior segment, defined as a thick lens or high LAF, on postoperative refraction after cataract surgery.

Methods
This was a prospective study involving consecutive cataract patients who underwent phacoemulsification with intraocular lens (IOL) implantation performed by a single surgeon. Patients with high astigmatism or those with intraoperative complications were excluded. The predicted refraction and one-month postoperative refraction were recorded, and the mean refractive error (ME) and mean absolute error (MAE) were calculated. Lens thickness and axial length were obtained from preoperative biometry (IOLMaster 700, Carl Zeiss Meditec AG, Germany). Analyses were performed for two conditions indicative of a lens-crowded anterior segment: (1) thick lens (lens thickness > 5 mm) vs. normal lens thickness, and (2) high LAF (LAF > 2.3) vs. normal LAF. LAF was calculated as *10×lens thickness/axial length*. Multivariate regression analysis was conducted with adjustments for age, gender, and IOL formula.

Results
A total of 317 eyes from 317 patients were included. The mean age of participants was 66.7 ± 11.3 years. All eyes were implanted with an in-the-bag IOL (TECNIS® IOLs, model ZCB00V). Fifty-two percent of cases used the SRK/T formula, while others utilized the Barrett Universal II (BU2) formula. Preoperative biometry revealed an average lens thickness of 4.54 ± 0.46 mm, with 52 eyes (16%) classified as having a thick lens. The average LAF was 1.96 ± 0.22, with 21 eyes (6.6%) in the high LAF group. At one month postoperatively, the mean refractive error (ME) was -0.09 ± 0.58 diopters, (D) and the mean absolute error (MAE) was 0.46 ± 0.37 D. Eyes with a thick lens demonstrated significantly more hyperopic ME (0.13 ± 0.61 D) compared to eyes without a thick lens (-0.13 ± 0.57 D), with a mean difference of 0.27 D (95% CI: 0.10–0.45 D, p = 0.002). Eyes with high LAF also exhibited a trend toward hyperopic ME (0.07 ± 0.67 D) compared to eyes without high LAF (-0.10 ± 0.58 D), though this difference was borderline statistically significant (p = 0.067). No significant differences in MAE were observed for either thick lens vs. normal lens thickness or high LAF vs. normal LAF groups.

Conclusions
A lens-crowded anterior segment, particularly a thick lens, is associated with a significant hyperopic shift in refractive error after cataract surgery. These findings highlight the importance of considering lens-related anterior segment morphology in refractive predictions.

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P-0571

A CASE OF VOGT-KOYANAGI-HARADA DISEASE PRESENTING AS BILATERAL ACUTE ANGLE CLOSURE GLAUCOMA

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Background

Vogt-Koyanagi-Harada disease (VKH) is a bilateral granulomatous panuveitis with autoimmunity to melanin-containing tissues as its underlying pathogenesis. VKH is often associated with ciliary body edema, which can lead to angle closure. Consequently, increased intraocular pressure (IOP) resulting from VKH is frequently misdiagnosed as acute angle closure glaucoma (AACG).

Methods

A case of Vogt-Koyanagi-Harada disease was studied through clinical observation and treatment.

Results

A 27-year-old female presented with bilateral decreased vision, headache, and nausea. She was referred from another hospital where she had been treated with mannitol, acetazolamide, and pilocarpine eye drops under the impression of AACG caused by plateau iris. On presentation, IOP was 12 mmHg, best corrected visual acuities (BCVA) was 0.15 in right eye; IOP was 20 mmHg, BCVA was 0.5 in left eye. On examination, both eyes showed mild ciliary hyperemia, shallow anterior chamber, grade-1 cell of right eye, and grade-2 cell of left eye. Both optic discs appeared pale, and choroidal thickening was observed. Suspecting VKH, fluorescein fundus angiography and indocyanine green test were performed, which revealed dark spots consistent with the diagnosis of VKH disease. Corticosteroid pulse therapy was initiated, followed by a tapering schedule of oral corticosteroid. Two months later, the patient regained her visual acuity and maintained a stable IOP upon follow up.

Conclusions

Bilateral elevated IOP in VKH is often misdiagnosed due to the mimicking of AACG. Moreover, the use of mydriatic agent is contraindicated in patients with shallow anterior chambers, a characteristic of VKH, often resulting in diagnostic delays. It is important for ophthalmologists to acknowledge the unique presentation of VKH in daily clinical practice.

P-0573
TRAUMA- A BLESSING IN DISGUISE!

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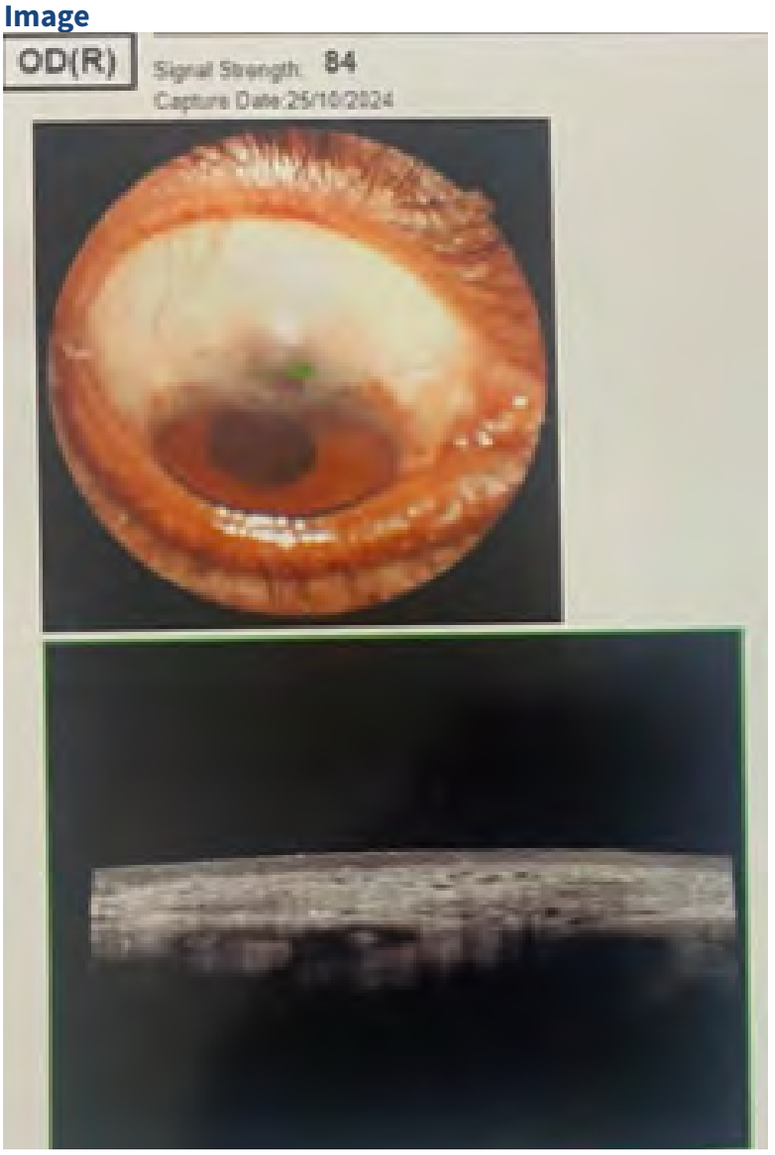
Background
Traumatic glaucoma is a type of secondary glaucoma occurring because of multiple factors after eye trauma[1]. The development of glaucoma can occur months to years later after trauma. Studies have demonstrated 3-10 % incidence of glaucoma following blunt globe trauma[2]. Elevated IOP after repair of open-globe injuries is not uncommon[3], with one case series showing 23.3% of patients developed raised IOP and 6.2% developed glaucoma. . On the other hand, trauma can also lead to the formation of a cyclodialysis cleft that causes hypotony by forming a direct connection between the anterior chamber and the suprachoroidal space[4].

Methods
A 53 year old male presented with dimunition of vision in the left eye with slight pain for 3-4 months. He also had a history of blunt ocular trauma leading to scleral rupture and traumatic cataract in the right eye 15 years back, for which he underwent perforation repair and subsequently cataract surgery. He had best corrected visual acuity of 6/9 in his right eye (RE) and 6/60 in the left eye (LE). On applanation tonometry, IOP in the right eye was 14 mm Hg and left eye was 56 mm Hg. The examination of the right eye revealed a scar at the superior cornea and limbus, irregular pupil, pseudophakia and a healthy appearing optic disc. The left eye pupil had loss of peripupillary ruff, early cataract, high IOP with a near total glaucomatous damage. On gonioscopy, the right eye showed a traumatic cyclodialysis cleft superiorly with open angles in the rest of the quadrants. The left eye had open angles in all quadrants.

Results
The patient subsequently underwent further diagnostic tests for glaucoma. The visual field analysis of the right eye which had history of trauma revealed VFI- 97% with MD of -2.21 dB, whereas, the left eye showed severe glaucomatous damage with VFI-6%. Right eye anterior segment OCT revealed a scleral cleft.The diagnosis of end stage glaucomatous damage due to primary open angle glaucoma was made in the left eye. The patient was started on maximal medical therapy in the left eye to control IOP and was advised to undergo Trabeculectomy with augmentation under guarded visual prognosis after IOP control.

Image



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Conclusions

Trauma, that is commonly known to cause glaucoma in the affected eye turned out to be protective due to formation of a traumatic inadvertent cyclodialysis cleft in the patient's right eye. The left eye underwent the natural course of primary open angle glaucoma, which would have equally affected the right eye as well in the absence of the inadvertent cyclodialysis cleft. The age old trauma in actuality turned out to be a saviour of vision in this patient. Such an intriguing scenario is seen very rarely, therefore we are excited to share the story of this luckiest glaucoma pateint.

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P-0574

ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY (ASOCT) FOR DETECTING ANGLE CLOSURE DIAGNOSED BY GONIOSCOPY

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Background

Angle closure is a significant risk factor for glaucoma, and accurate detection is crucial for timely intervention.

Methods

This is a prospective observational study to correlate angle structures on gonioscopy with ASOCT measurements and identify ASOCT parameters associated with angle closure. 100 eyes of patients aged between 40-80 years underwent gonioscopy and ASOCT(Carl Zeiss Meditec,USA, Cirrus HD-OCT Model 500) imaging in dark conditions.Gonioscopy grades 0-2 (Schaffer's system) were compared with ASOCT parameters: Angle Opening Distance (AOD 500,AOD 750), Trabecular-Iris Space Area (TISA 500,TISA750), Anterior Chamber Depth (ACD),Anterior Chamber Area (ACA),and Lens Vault (LV).

Main Outcome Measures: As per Schaffer's grading, eyes with gonioscopy grade 0 and 1 where structures upto Schwalbe's line were seen were taken as having angle width of 0-10 degrees on ASOCT, and eyes with grade 2 angle where anterior trabecular meshwork was visible was taken as having angle width 11-20 degrees on ASOCT.

ASOCT parameters of nasal and temporal angles were calculated and compared with gonioscopy grades.

Results

68 eyes with good images were available for analysis. ASOCT parameters showed significant correlation with gonioscopy grades.

1. 81.3% and 76.1% eyes with gonioscopy grades 0/1 had angle width 0-10 degrees on ASOCT(nasal and temporal angles respectively)($p<0.001$).
2. 80% and 72 .7% eyes with gonioscopy grade 2 had angle width 11-20 degrees on ASOCT (nasal and temporal angles respectively)($p<0.001$).
1. 3.AOD 500 and TISA 500 values were significantly lower for gonioscopy grade 0/1 vs grade 2($p<0.001$,unpaired t-test).
2. 4.Maximum area under the curve was found for AOD 500 in the nasal angle and TISA 500 in the temporal angle for the corresponding gonioscopy grades.

Nasal angle

1. 1.Gonioscopy grade 0/1: AUC=0.80 (AOD500), sensitivity=81.25,specificity=80.0; 95%CI 0.68-0.88
2. 2.Gonioscopy grade 2 :AUC=0.80 (AOD 500), sensitivity=80.0,specificity=81.2; 95%CI 0.68-0.88

Temporal angle

1. 1.Gonioscopy grade 0/1: AUC=0.72 (TISA 500), sensitivity=69.6,specificity=68.9; 95%CI 0.60-0.82
2. 2.Gonioscopy grade 2 :AUC=0.72 (TISA 500), sensitivity=68.2,specificity=69.6; 95%CI 0.60-0.82

The diagnostic performance of ASOCT parameters in detecting eyes with closed angles on gonioscopy in nasal and temporal angles was found statistically significant.

Conclusions

ASOCT parameters demonstrate diagnostic value in detecting angle closure diagnosed by gonioscopy, particularly in nasal and temporal angles. These findings support use of ASOCT as a complimentary tool for glaucoma diagnosis and monitoring.

P-0575
SECONDARY OCULAR HYPERTENSION AND GLAUCOMA FROM ARTERIOVENOUS FISTULA: TWO CASE REPORTS

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Background
High intraocular pressure (IOP) is a complication of arteriovenous fistulas, resulting from increased scleral venous pressure. These malformations usually occur between the carotid artery and the cavernous sinus. They manifest with chemosis, dilation and tortuosity of the conjunctival vessels, exophthalmos, and limited extraocular motility. We present two cases of elevated IOP due to arteriovenous malformations; the first was spontaneous, and the second was traumatic, both developing glaucoma.

Methods
Presentation of two clinical cases involving ocular hypertension and secondary glaucoma from arteriovenous fistula.

Results
A 49-year-old female patient underwent embolization for a left carotid-cavernous fistula and subsequently developed ocular hypertension. The second patient, an 80-year-old female, presented with a bilateral arteriovenous fistula involving both ophthalmic arteries (ethmoidal branches) following trauma. The latter developed secondary glaucoma due to the fistula.
First case: Best Corrected Visual Acuity (BCVA):RE: 20/20LE: 20/20 (+1.75)

Intraocular Pressure (IOP):RE: 17 mmHgLE: 26 mmHg (timolol b.i.d)
Slit-Lamp Examination:RE: normalLE: corkscrew vessels, dilated veins in the upper eyelid, mass in the upper nasal eyelid, deviation of the eyeball toward temporal and inferior, moderate exophthalmos
Gonioscopy:OU: Open angle Shaffer IV, pigment +
Fundus Examination:OU: Pink optic disc with excavation 0.2/1.0
Evolution: Normalization of IOP after successful technical embolization of the left orbital arteriovenous malformation with complete closure.
Second case: Best Corrected Visual Acuity (BCVA):RE: 20/50 (-0.50 x 115)LE: 20/25 (+3.00 -0.50 x 90)
Intraocular Pressure (IOP):RE: 24 mmHgLE: 22 mmHg
Slit-Lamp Examination:OU: dilated episcleral veins, exophthalmos
Gonioscopy:OU: Open angle Shaffer III, pigment +
Fundus Examination:RE: Optic disc with excavation 0.5/1.0LE: Optic disc with excavation 0.4/1.0
Additional findings:Optic Disc OCT: RE: normal LE: normal.Visual field: RE: normal LE: normal.
Evolution: This patient was under anticoagulant treatment for a period. Currently, her IOP is 13/17 mmHg with four antiglaucomatous medications and selective laser trabeculoplasty in both eyes.

Conclusions

These cases demonstrate the elevation of intraocular pressure due to arteriovenous fistulas. The IOP may decrease with treatment of the fistula, but sometimes complete treatment is not possible, or even after embolization, these patients will require close monitoring for the detection of recurrences, early detection of neovascular glaucoma, and antiglaucomatous treatment.

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P-0577

COMPARISON OF 360-DEGREE TRABECULOTOMY VERSUS TRADITIONAL ANGLE SURGERY IN PRIMARY CONGENITAL GLAUCOMA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background

The aim of the study is to compare the effectiveness of traditional angle surgery and 360° trabeculotomy in treating children with primary congenital glaucoma. While both procedures open the trabecular meshwork to improve aqueous outflow, there exists conflicting data on whether 360-degree circumferential opening offers a significant advantage over traditional angle surgery (such as goniotomy or trabeculotomy), which results in partial opening of the trabecular meshwork.

Methods

A comprehensive search was conducted across PubMed, EMBASE, Scopus, Cochrane (CENTRAL), Science Direct and Clinicaltrials.gov. A total of 1470 studies were obtained from databases, and 1231 articles were initially screened after deduplication. Following full-text screening using Rayyan, 12 studies met the inclusion criteria. The risk of bias was assessed using the Newcastle-Ottawa Scale and Cochrane Risk of Bias tool. Mean Differences (MD) for continuous outcomes and Odds Ratios (OR) for dichotomous outcomes, along with their 95% confidence intervals (CIs), were combined using the Inverse Variance method within a Random Effects model. Various outcomes including the reduction in intraocular pressure (IOP), reduction in anti-glaucoma medication, surgical success rates, adverse events, and overall efficacy were assessed.

Results

12 studies, 3 RCTs and 9 Retrospective studies, with a total of 562 patients were included for analysis. Pooled analysis demonstrated that 360° trabeculotomy showed significant reduction in IOP at 12 months and number of anti-glaucoma medications postoperatively than traditional angle surgery by -2.10 mmHg (95% CI: -3.26 to -0.94; p=0.0004, I^2 = 55%) and -0.47 drops (95% CI: -0.69 to -0.25; p<0.0001, I^2 = 55%), respectively. Compared to traditional angle surgery group, the 360° trabeculotomy group showed higher complete and qualified success rates with OR of 5.07 (95% CI: 3.43-7.50; p<0.00001, I^2=4%) and 3.00 (95% CI: 1.47-6.12; p=0.003, I^2 = 46%) respectively, and as well as, reduction in failure rate with OR of 0.18 (95%CI: 0.11-0.31; p<0.00001, I^2 = 14%). Moreover, a significant reduction in postoperative axial length was observed in the 360° trabeculotomy group compared to traditional angle group surgery, with a mean difference of -0.48 (95%CI: -0.79 to -0.16; p=0.003, I^2 = 87%). No statistically significant differences were observed for overall adverse events, change in cup/disc ratio and change in horizontal corneal diameter.

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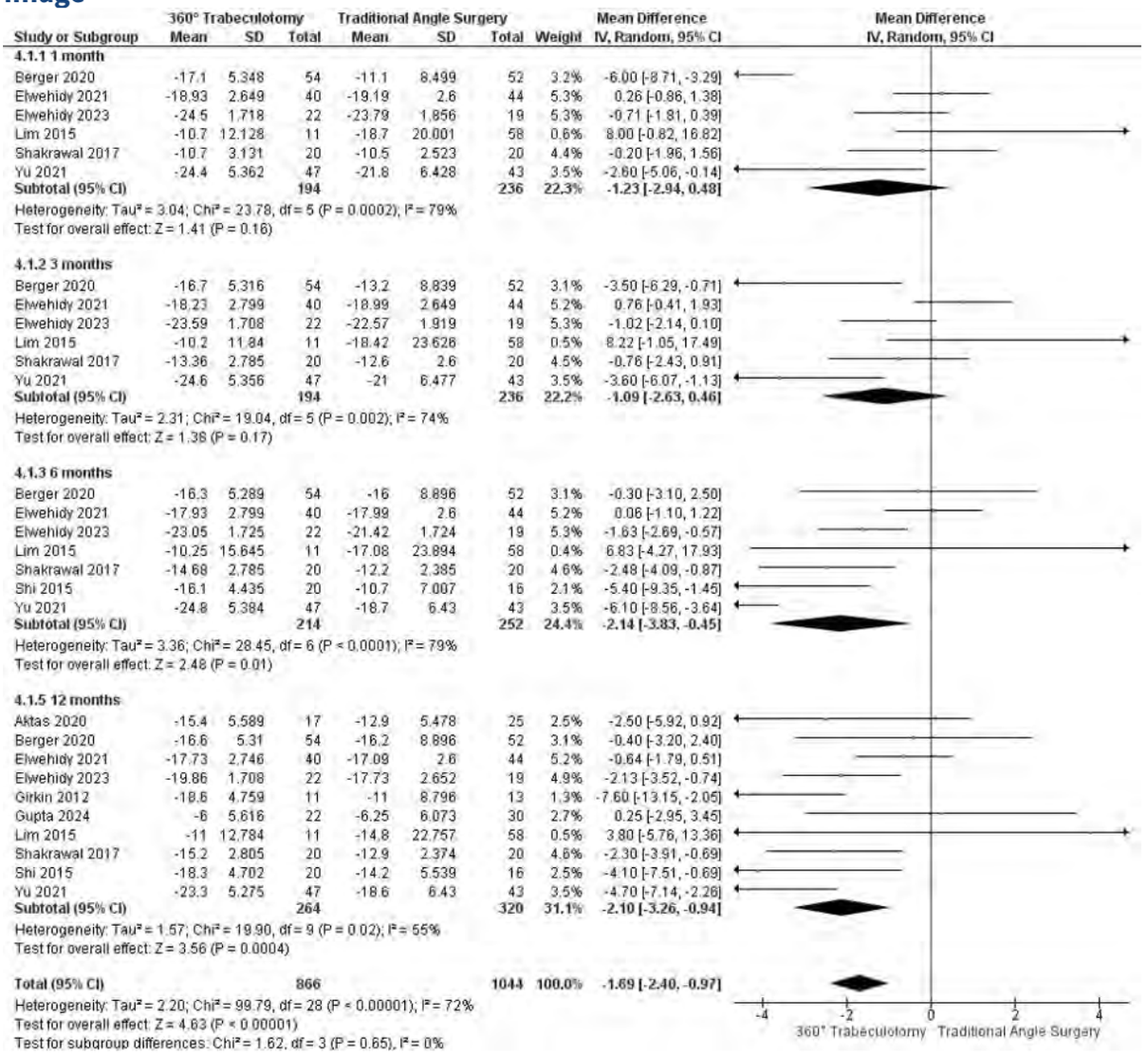

Conclusions

360° trabeculotomy showed greater reduction in IOP and number of anti-glaucoma medications postoperatively than traditional angle surgery with improved success and reduced failure rates when performed in children with primary congenital glaucoma patients. However, the high heterogeneity across studies underlines the potential need for a larger scale RCT to assess the performance of these surgeries.

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P-0578

GONIOTOMY AND GONIOSYNECHIALYSIS IN THE MANAGEMENT OF PRIMARY ANGLE CLOSURE GLAUCOMA – A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background
Primary angle closure glaucoma (PACG) may be surgically managed with techniques such as goniotomy (GT) and goniosynechialysis (GSL), which both aim to restore aqueous outflow by resolving angle obstruction. While several studies have reported outcomes of combined GT and GSL (GT+GSL) in eyes with PACG, there has yet to be a conclusive synthesis. This systematic review and meta-analysis aims to quantitatively evaluate the efficacy and safety of GT+GSL, with or without phacoemulsification, in eyes with PACG, up to 12 months post-operatively.

Methods
A literature search of PubMed and Embase was conducted up to 10 October 2024. All cohort, observational studies and randomized controlled trials including eyes undergoing combined GT+GSL, with or without phacoemulsification for PACG were included. Primary outcomes included change in post-operative intraocular pressure (IOP) and number of IOP-lowering medications, from baseline. Secondary outcomes included post-operative complications. A random effects meta-analysis of continuous outcomes was performed in R version 4.4.2.

Results
7 studies involving a pooled total of 384 eyes from 309 subjects were included in final meta-analysis. Mean age was 62.6±5.6 years, 38.5% of subjects were male, pre-operative mean medicated IOP was 24.7±7.6 mmHg and pre-operative mean number of medications was 2.4±1.1. There was a significant reduction in medicated IOP at post-operative month (POM) 1, POM3, POM6, and POM12, with mean reductions of 11.0±6.3 (95% CI 10.7-11.2) mmHg, 10.3±5.8 (95% CI 10.1-10.6) mmHg, 10.5±6.2 (95% CI 10.3-10.8) mmHg and 10.4±6.3 (95% CI 10.1-10.6) mmHg, respectively (all $p<0.01$). There was a significant reduction in the number of medications by 1.9±0.9 (95% CI 1.6-2.1) at POM12 ($p<0.01$). 4 studies (including 262 eyes) reported post-operative complications. The pooled complication rate was 31.7% (83 eyes), however, majority were not sight-threatening. Post-operative hyphema (13.0%) was most common, followed by post-operative IOP spikes (9.9%). 1 case of post-operative malignant glaucoma (1.2%) was reported.

Conclusions
Combined GT+GSL with or without phacoemulsification, as a minimally invasive option in the management of PACG, demonstrates good safety and efficacy up to 12 months post-operatively.

P-0579

ROLE FOR VASCULAR ENDOTHELIAL GROWTH FACTOR IN AQUEOUS OUTFLOW

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Background

Intravitreal injections with agents targeting the angiogenic mediator, vascular endothelial growth factor (VEGF) is the standard of care for patients with neovascular age-related macular degeneration (NV AMD). Emerging evidence suggests that use of “anti-VEGF” agents is associated with sustained increase in intraocular pressure (IOP) in a subset of treated patients, often necessitating medical and/or surgical IOP-lowering therapy. This raises concerns regarding the long-term effects of chronic anti-VEGF therapy, and highlights the need to better understand the mechanism whereby therapies targeting VEGF lead to ocular hypertension.

Methods

Expression of VEGF was compared in the aqueous and vitreous of control patients (n=40) using enzyme-linked immunosorbent assays (ELISA) for VEGF. Aqueous VEGF levels in NV AMD patients before and after anti-VEGF therapy (n=45), as well as in glaucoma patients (n=48), were compared to control patients (n=50). The expression and potential function of VEGF was evaluated in an immortalized human trabecular meshwork (ihTM) cell line.

Results

We demonstrate higher levels of VEGF in aqueous compared to vitreous of control patients, suggesting local production of VEGF in the anterior chamber. In response to hypoxic or pharmacologic stabilization of the transcription factor, hypoxia-inducible factor (HIF)-1a, VEGF and VEGF receptor expression were increased. Treatment of ihTM cells with VEGF, in turn, results in phosphorylation of AKT, a protein kinase involved in cellular survival pathways. Administration of intravitreal anti-VEGF therapies in NV AMD patients resulted in a marked reduction in the levels of aqueous VEGF, to levels below those observed in control patients. Analysis of aqueous samples from patients with glaucoma also demonstrated reduced levels of VEGF compared to normal controls, similar to patients receiving anti-VEGF therapy.

Conclusions

Our results suggest that therapies reducing the levels of VEGF may negatively influence the aqueous outflow system in treated patients, and further implicate low aqueous VEGF levels in the development of glaucoma.

Structural & Functional Testing

P-PW-0580

INTRA SUBJECT VARIABILITY OF SUPERVISED (CLINIC) AND UNSUPERVISED (HOME) PERIMETRY

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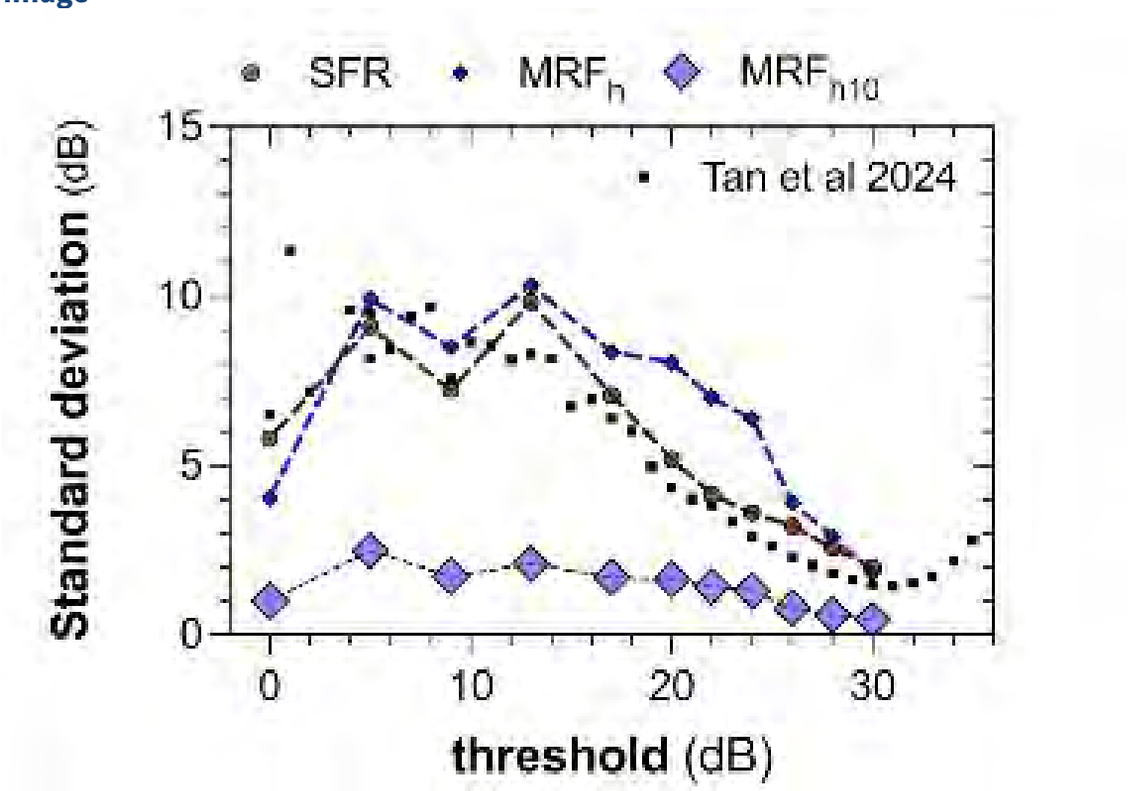
Background
High test-retest variability reduces the capacity to detect early change. The role that self-monitoring has for variability is not known. We evaluate this for unsupervised testing at home.

Methods
We calculate the within subject standard deviation on repeat testing (4 times) for 287 patients using 5 different algorithms, In clinic: 1.Humphrey (HFA) SITA standard (SS n=39), 2. SITA fast (SF n=21), 3.

SITA faster (SFr n=93), 4. Melbourne Rapid Fields (MRF n=97) and, 5. unsupervised at home, MRF-web (MRFh n=37)). We calculate the within subject pointwise standard deviations for data derived from different clinical cohorts aged 66±16 yrs (15-92) comprising glaucoma and glaucoma suspects (HFA classification; Mild=95; Mod=54; Adv/Sev=41). We compared this to the variability found with MRF using supervised in clinic retest (n=93) and unsupervised retest of MRF-web at home. All self-test patients were experienced perimetry takers and were taught how to log in online, calibrate their equipment and perform and save MRF-web tests. All provided informed consent to participate. We model the benefit that multiple home tests (either in clusters or weekly) have on reducing test variability. Statistical differences between variances were established by ANOVA and F-ratios.

Results
We find stable thresholds (< ±2.86 dB) in 81% of people undertaking 4 unsupervised tests at home. Some 19% show improvement at home between run 1 and run 2 (learning effect > 2.86 dB) which we feel arises from the computer interface. The SITA algorithms return increasing retest variability from 1.30 dB SS, to 1.56 dB SF (ns vs SS), to 2.32 dB for SFr (P=0.002, SFr v SS). Supervised MRF testing in clinic had a standard deviation of 1.24 dB whereas unsupervised testing at home returned an average standard deviation of 2.46 dB. If those who show learning are excluded, the SD decreases to 1.43 dB. Modelling finds that 10 repeat tests will reduce variability to that of SS and MRF when done in clinic.

Image



Conclusions

Devices that use large, uninformed steps (e.g SITA fast and SITA faster) produce higher retest variability than SITA standard. SITA faster gives high variability similar to that of unsupervised MRF testing at home. Patients with stable thresholds give low variability from self-test (1.43 dB) adequate for monitoring progression. SITA faster and MRF home-testing variability can be reduced by repeat testing either with clusters (5 tests) or by self-testing on a weekly basis.

P-PW-0582

COMPARISON OF RETINAL GANGLION CELL SOMA COUNT IN HEALTHY SUBJECTS AND GLAUCOMA PATIENTS OBSERVED WITH ADAPTIVE OPTICS OPTICAL COHERENCE TOMOGRAPHY

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Background

Recent advances in adaptive optics optical coherence tomography (AO-OCT) have enabled visualization of retinal ganglion cell (RGC) somas in the ganglion cell layer (GCL), which were previously difficult to observe due to their high transparency. To date, only one study has investigated glaucomatous eyes using AO-OCT, conducted by Liu Z et al (*IOVS*, 2021). However, no reports focusing on Asian populations are currently available.

Methods

The purpose of this study is to compare the number of RGC somas in healthy and glaucomatous eyes on Japanese participants visualized using AO-OCT. This study recruited 6 eyes from 6 healthy subjects and 33 eyes from 33 open-angle glaucoma patients with visual field defects in either superior or inferior hemifield. Participants were recruited from the Department of Ophthalmology at Kyoto University Hospital between August 2022 and May 2023. AO-OCT imaging (0.7 mm in length) was performed in parafoveal regions located 0.75 mm superior and inferior to the temporal axis at a distance of 0.75 mm from the central fovea. The number of RGC somas was quantified using ImageJ, and comparisons were made between healthy and glaucomatous eyes.

Results

The number of RGC somas in AO-OCT images was 181 ± 18 in healthy eyes and 113 ± 49 in glaucomatous eyes, showing a significant difference ($P < 0.01$). In glaucomatous eyes, significantly fewer RGC somas were observed in the hemifield with visual field defects (88 ± 56) compared to the unaffected hemifield (138 ± 23, $P < 0.01$). Additionally, significant differences were observed between the number of RGC somas in healthy eyes and those in the unaffected hemifield of glaucomatous eyes ($P < 0.01$).

Conclusions

RGC somas in glaucomatous eyes were reduced even in regions without affected visual field defects compared to healthy eyes. This suggests that AO-OCT may allow for the early detection of glaucomatous changes and provide valuable insights into early structural alterations in glaucoma.

P-PW-0583

COMPARATIVE EVALUATION OF FUNCTIONAL AQUEOUS OUTFLOW IN PRIMARY OPEN ANGLE GLAUCOMA VERSUS PRIMARY ANGLE CLOSURE GLAUCOMA USING AQUEOUS ANGIOGRAPHY

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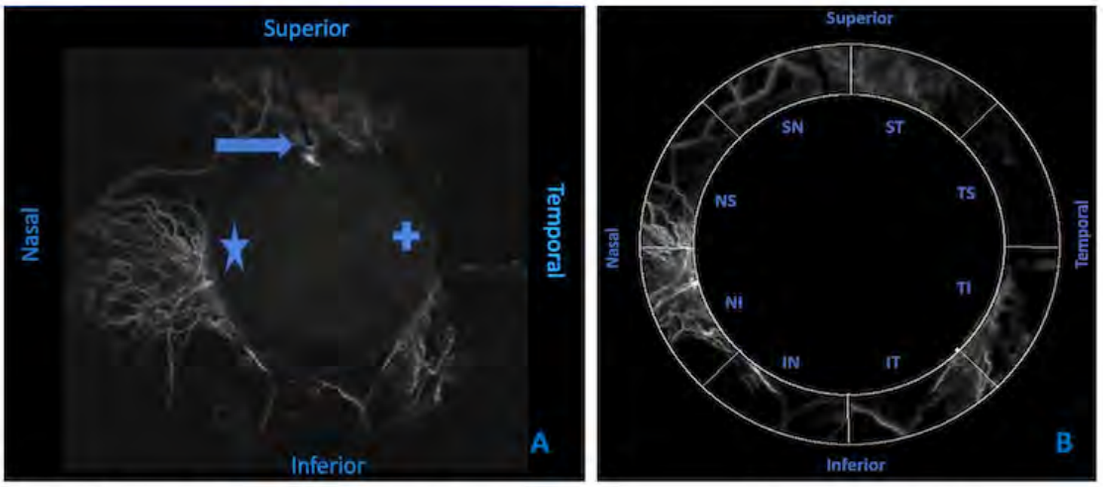
Background
Aqueous angiography(AA) utilises tracer dyes to image *in vivo* functional aqueous outflow channels(AOC), including trabecular meshwork under physiological conditions. With differences in pathophysiological mechanisms between PACG and POAG, requiring distinct management approaches to both, variations in functional AOC are expected. This is the first clinical study to evaluate and compare AOC in POAG and PACG quantitatively using AA.

Methods
Cross-sectional study included age and severity matched PACG & POAG (N=16 each) with visually significant age related cataract who underwent AA with ICG dye 0.1% prior to commencing phacoemulsification using a flex OCT machine. Images of AOC at 60 seconds from the injection of ICG dye were exported to Image J software and angiographic signal intensity(ASI) (mean gray value) circumferentially(360°), 2mm from the limbus(overall flow), along 8 divided sectors of 45°each and 4 quadrants (combination of 2 sectors) were evaluated. Correlation of overall ASI with age,MD & VFI for POAG & PACG were also assessed.

Results
The mean age(years) of 59.8± 8.6(PACG), and 58.8 ± 5.8(POAG)[P=0.704] was noted. MD(dB) [-12.94(-25.79 to -9.09) in PACG, -17.72(-23.22 to -9.28) in POAG;P value=1] & VFI(%)[50(17-78.5)in PACG, 34(25-79.75) in POAG;P=0.777] were documented. Segmental AOC were seen and a pattern of maximum ASI in nasal>superior>inferior>temporal were documented in both groups. Among sector analysis, nasosuperior had maximum ASI in both groups. Comparative analysis revealed overall flow to be lower in PACG[123.72(105.18-205.68)] versus POAG[188.32(163.58-234.40)];P=0.029. On further quadrant analysis, superior quadrants [PACG: 30.55(25.861-52.416),POAG:57.41(37.333-68.096);P= 0.016] and inferior quadrants[-PACG: 26.9(23.29-28.96),POAG: 35.25(27.68-44.47); P=0.022] also showed lower flow in PACG compared to POAG. Positive correlation of MD(r=0.515,P=0.044) & VFI(r=0.581,P=0.020) with overall flow was seen in PACG only.

Image



A: AA image with arrow (injection of ICG dye)

B:Quantitative analysis
(SN:superonasal, ST:superotemporal, TS:Temporosuperior, TI:Temporoinferior, IT:Inferotemporal, IN: Inferonasal, NI: Nasoinferior, NS: Nasosuperior)

Conclusions

PACG eyes had lower functional aqueous outflow compared to POAG which was correlated with disease severity. This study has implications for trabecular MIGS in PACG and may predict worse outcomes in PACG as compared to POAG.

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P-PW-0584

OPTICAL COHERENCE TOMOGRAPHY-BASED SCORE AS A PREDICTOR OF VISUAL FIELD PROGRESSION IN GLAUCOMA

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Background

Predicting visual field (VF) progression from baseline structural information enables timely interventions, potentially preventing significant deterioration and preserve quality of life. This study aimed to evaluate the predictive value of baseline optical coherence tomography (OCT)-based Fukai scores in monitoring VF progression in primary open angle glaucoma.

Methods

This retrospective cohort study included glaucoma patients from the Diagnostic Innovations in Glaucoma Study[1], each with a baseline OCT scan conducted within 6 months of the beginning semiannual VF follow-up. Patients had a minimum follow-up period of 2 years and at least 5 visits. Fukai scores were generated for each eye based on measurement segments and grids from wide-field swept source OCT reports from Triton (Topcon Corporation, Tokyo, Japan) using three different models,[2] and subsequently transformed using the Box-Cox method. VF progression was evaluated using trend analysis of VF mean deviation (MD) slopes. Linear mixed-effects models were used to examine the relationship between baseline Fukai scores and longitudinal VF MD changes, incorporating interaction terms with follow-up duration. Fast progressors were defined as those with an annual decline in VF MD greater than 1 dB, otherwise, eyes were categorized as slow progressors.[3–5]

Results

A total of 78 eyes from 55 subjects were included (Table 1), with 72 eyes classified as slow progressors. The mean follow-up period was 5.3 years. Following Box-Cox transformation, the baseline Fukai score for the three models were 4586, 4507, and 4754, respectively, and were significantly associated with both baseline MD and the rate of VF progression (Table 2). For each 100-unit increase in the baseline transformed Fukai score, there was a 0.01 dB/year faster decline in VF MD (all $p<0.05$). Among slow progressors, Model 2 demonstrated a significant predictive effect on VF progression ($p < 0.05$), while Model 1 and Model 3 were marginally significant (both $p < 0.07$). In fast progressors, none of the models showed a significant association with the rate of MD decline.

Image

Table 1. Demographics and Baseline Ocular Characteristics of Study Eyes

	Slow Progressor (n= 49 subjects; 72 eyes)	Fast Progressor (n= 6 subjects; 6 eyes)	Overall (n= 55 subjects; 78 eyes)	p-value
Patient-Level Characteristics				
Age	70.9 (67.9, 73.8)	67.9 (50.8, 85.0)	70.5 (67.6, 73.5)	0.529
Sex				
Female	24 (49.0%)	3 (50.0%)	27 (49.1%)	> 0.999
Male	25 (51.0%)	3 (50.0%)	28 (50.9%)	
Race				
White	28 (57.1%)	5 (83.3%)	33 (60.0%)	0.873
Asian	9 (18.4%)	1 (16.7%)	10 (18.2%)	
Black or African American	9 (18.4%)	0 (0.0%)	9 (16.4%)	
Others	3 (6.0%)	0 (0.0%)	3 (5.4%)	
Eye-Level Characteristics				
Baseline 24-2 VF MD (dB)	-6.02 (-7.52, -4.52)	-6.02 (-10.36, -1.68)	-6.02 (-7.49, -4.56)	> 0.999
Baseline 24-2 VF PSD (dB)	6.81 (5.77, 7.85)	6.93 (3.75, 10.10)	6.82 (5.80, 7.83)	0.944
Model 1 Fukai Score (Box-Cox)	4555.0 (4347.9, 4762.1)	4930.1 (4227.8, 5632.3)	4585.7 (4385.7, 4785.7)	0.319
Model 2 Fukai Score (Box-Cox)	4473.8 (4232.7, 4714.9)	4891.1 (4073.5, 5708.6)	4507.2 (4276.0, 4738.3)	0.340
Model 3 Fukai Score (Box-Cox)	4744.2 (4546.1, 4942.2)	4870.4 (4274.6, 5466.1)	4753.7 (4560.9, 4946.4)	0.685
Mean follow-up time (years)	5.27 (4.92, 5.61)	5.19 (4.65, 5.74)	5.26 (4.92, 5.61)	0.759
Number of OCT Images	6.3 (6.0, 6.6)	6.3 (5.7, 6.9)	6.3 (6.0, 6.6)	0.939

Patient-level characteristics were compared between slow and fast progressors using t-tests and Fisher's Exact Test for continuous and categorical parameters, respectively. Eye-level measurements were compared using linear mixed-effects models. All mixed-effects models were fitted with a random intercept to adjust for between-patient variability at baseline.

Table 2: Relationship between Box-Cox Transformed Baseline Fukai Score and Longitudinal 24-2 Visual Field Mean Deviation Decline Rate (dB/year)

	Model 1			Model 2			Model 3		
	Estimate	95% CI	p-value	Estimate	95% CI	p-value	Estimate	95% CI	p-value
tercept)	−6.312	(−7.785, −4.838)	**<0.001**	−6.306	(−7.787, −4.825)	**<0.001**	−6.205	(−7.726, −4.684)	**<0.001**
llow-up Time ars)	−0.248	(−0.311, −0.185)	**<0.001**	−0.247	(−0.310, −0.184)	**<0.001**	−0.241	(−0.302, −0.180)	**<0.001**
seline Fukai ore, per 100-it higher	−0.188	(−0.337, −0.044)	**0.012**	−0.168	(−0.292, −0.048)	**0.008**	−0.153	(−0.321, 0.016)	0.080
eraction tween Follow-Time and kai Score	−0.009	(−0.016, −0.002)	**0.017**	−0.009	(−0.015, −0.002)	**0.010**	−0.008	(−0.015, −0.001)	**0.019**

Values with statistical significance are shown in bold. Abbreviations: CI, confidence interval.

Conclusions

The baseline Fukai score proves to be a valuable predictor of VF progression in glaucoma, with higher scores correlating with faster MD decline. The suitability of different models may vary depending on progression status, which requires a larger sample size for further assessment. These findings underscore the potential of the Fukai score as a practical tool for guiding tailored glaucoma management.

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P-PW-0585

DETECTING GLAUCOMA PROGRESSION USING OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY: THE VASCULAR IMAGING IN GLAUCOMA STUDY (VIGS)

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Background
Glaucomatous eyes that progress rapidly are at high risk of visual disability, therefore early detection of glaucoma progression is essential. In this study, we compared the detection of glaucoma progression by standard automated perimetry (SAP), optical coherence tomography (OCT), and OCT angiography (OCTA) in eyes with glaucoma and suspected glaucoma enrolled in the Vascular Imaging in Glaucoma Study (VIGS).

Methods
Prospective cohort study with 122 eyes (90 glaucoma, 32 glaucoma suspects) of 62 subjects (mean age 68.3±7.8 years) followed at the Bascom Palmer Eye Institute, Palm Beach Gardens, FL. Participants underwent SAP, OCT and OCTA (Cirrus HD-OCT, Carl Zeiss Meditech, CA) evaluation of the optic nerve head (ONH) and macula regions at 4-month intervals. OCTA scans were acquired with a 4.5×4.5-mm optic disc map and a 3×3-mm macular map and the vessel density (VD) was calculated using a custom-developed algorithm for fractal analysis. Progression was defined as a statistically significant (P<0.05) negative rate of change over time calculated from ordinary least squares regression. The number of events and time to progression in SAP mean deviation (MD), central and peripheral mean sensitivity (MS), OCT peripapillary retinal nerve fiber layer (RNFL) and macula ganglion cell layer (GCL) thicknesses, and VD in the ONH (full retina and radial peripapillary capillary) and macula (deep, superficial, and full retina) from OCTA were compared among test modalities with the log-rank test.

Results
Eyes had an average of 8.2±1.7 test visits over 2.9±0.6 years of follow-up. The mean intraocular pressure during follow-up was 14±2.8mmHg. A total of 87 eyes (71%) of 56 subjects were identified as progressors by at least one of the 10 parameters studied during follow-up and 37 (30%) by at least two of the testing modalities (SAP, OCT, and OCTA). OCTA detected a significantly greater number of progressing eyes (64, 53%) with the shortest average time (1.27±0.65 years), compared with OCT (45 eyes, 37%, P=0.004) at 1.62±0.63 years, and SAP (16 eyes,13%; P<0.001) at 1.37±0.80 years. When a consecutive test visit was required to confirm progression, only 24 eyes (20%) were identified as progressing by OCTA parameters.

Conclusions
OCTA detected the largest number of progressors in this cohort. However, progression by OCTA was frequently not confirmed by a different testing modality (SAP or OCT) or consecutive test, which suggests a high proportion of false positives.

P-PW-0586

SYSTEMIC VASCULAR DYSREGULATION AND PARAPAPILLARY CHOROIDAL MICROVASCULATURE DROPOUT IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background

To determine whether parapapillary choroidal microvasculature dropout(MvD) is associated with severe systemic vascular dysregulation (SSVD) in primary open-angle glaucoma(POAG) and to document the characteristics of MvDs in POAG patients with and without SSVD.

Methods

This is a prospective cross-sectional study. A total of 141 participants were included in this study. 34 of 80 POAG patients and 14 of 61 non-glaucomatous healthy subjects were identified as with SSVD by nailfold capillary cold provocation test (CPT) and Flammer syndrome (FS) questionnaire.Peripapillary circulation was evaluated on en-face imagesobtained by optical coherence tomography angiography (OCTA). Sectoral peripapillaryretinal nerve fiber layer thickness (cpRNFLT) and radial peripapillary capillary (RPC) retinal vessel density (rVD) were measured. A choroidal MvD was defined as a focal sectoral capillary dropout without any visible microvascular network observed in the choroidal layer on OCTA. The angular width of MvD in each sector was measured.

Results

MvD was found in 28 of 34 (82.35%) POAG patients with SSVD (SSVD (+)) while 16 of 46 (34.78%) in patients without SSVD (SSVD (-)) (P<0.001), however, no MvD was found in the non-glaucomatous healthy eyes. The multiple logistic regression analysis showed the presence of MvD was associated with SSVD (P = 0.009), IOP (P = 0.016), rVD in the temporal-superior sector (P = 0.005) and visual field mean deviation (MD) (P = 0.013).In temporal-inferior (TI) sector, the angular width of MvDs was larger in the SSVD (+) than in the SSVD (-).

Conclusions

SSVD is an important risk factor of the presence of MvD in POAG. The characteristics of MvD in eyes with and without SSVD differed, implying multiple mechanisms of the formation of MvD.

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P-PW-0588

PATTERNS OF GLAUCOMATOUS VISUAL FIELD DETERIORATION IN AN INDIAN POPULATION

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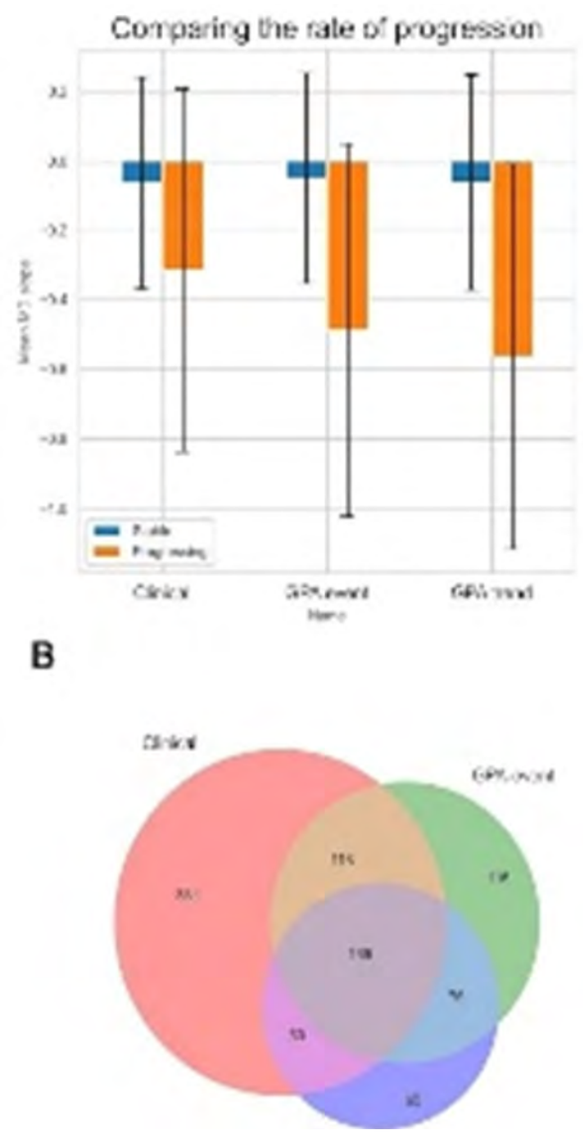
Background
To assess the rate of visual field progression in an Indian cohort using the Guided Progression Analysis (GPA) and to compare these findings with the judgments of glaucoma specialists.

Methods
A retrospective analysis was conducted on 24-2 visual field (VF) data from 1,056 glaucoma patients (2,914 eyes), each with at least five VF assessments performed using the HFA™ II-i and HFA3. Clinical evaluations were also gathered from the hospital's electronic medical records, where glaucoma specialists classified each visual field as stable, progressing, unreliable, fluctuating, or improved. VF progression was assessed using two criteria: the GPA trend (VFI slope < 0, P < 0.05), and the GPA event ("Possible Progression" or "Likely Progression" alert). To facilitate sub-cohort analysis, the eyes were categorized based on baseline Mean Deviation (MD) into three groups: mild (≥ -6 dB), moderate (< -6 dB and > -12 dB), and severe (< -12 dB).

Results
At baseline, the patients had a mean age of 62 ± 11 years, a Mean Deviation (MD) of -4.48 ± 5.36 dB, and a Visual Field Index (VFI) of 90.13 ± 15.38%. The cohort consisted of 1,443 eyes with mild glaucoma, 289 eyes with moderate glaucoma, and 182 eyes with severe glaucoma. The mean MD slope was lower in the progressing groups in all three cohorts. Clinical assessments identified a higher percentage of eyes as progressing compared to GPA events and GPA trends (progressing eyes: 39 % for clinical, 25 % for GPA event, and 20 % for GPA trend). Among the algorithms, the GPA trend exhibited the largest negative mean MD slope, followed by the GPA event and clinically defined progression. This indicates that GPA algorithms may overlook mild cases. Although there was moderate overlap in the eyes identified as progressing across the algorithms, 381 cases were uniquely recognized as progressing by clinical assessment.

Image



Conclusions

A significant proportion of patients with glaucoma in this large dataset showed visual field progression over time. GPA progression algorithms are effective in identifying glaucoma progression, but may miss mild cases compared to clinical assessments.

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P-0589

A COMPARATIVE EVALUATION OF TWO RAPID STRATEGIES FOR VISUAL FIELD TESTING: SITA FASTER AND SPARK QUICK

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Background
This study compares the diagnostic performance of two rapid visual field testing strategies, SITA Faster (SF) and SPARK Quick (SQ), against the gold standard SITA Standard (SS). The measurement accuracy, agreement, and repeatability were evaluated.

Methods
In this prospective, cross-sectional study, 118 participants from a glaucoma clinic underwent multiple visual field tests. All subjects were naïve to SF and SQ, with SS 24-2 serving as the initial test. SF and SQ were then administered in random order. Among the 71 participants with visual field defects detected by SS, 49 underwent testing twice with both rapid strategies. Parameters were compared using one-way ANOVA with Bonferroni post hoc tests, and repeatability was assessed using intraclass correlation coefficients (ICC). A bootstrap method (5000 samples) evaluated the differences in repeatability. Agreement was analyzed using Bland-Altman plots, and diagnostic performance was assessed via receiver operating characteristic (ROC) curves.

Results
No significant differences in mean deviation (MD) and pattern standard deviation (PSD) were found between SS and SF; however, SQ demonstrated significantly better MD and PSD ($p<0.001$). Test duration was reduced by 57.6% for SF and 73.9% for SQ compared to SS ($p<0.001$). Bland-Altman analysis revealed that the mean difference in MD between SS and SF was not significantly different from zero ($p=0.1775$), while SQ's difference was significant ($p<0.001$). ICC values indicated excellent repeatability for SF, whereas SQ exhibited significantly lower ICCs ($p<0.001$). Among the 118 participants, 71 (60.2%) had visual field defects identified by SS, 70 (59.3%) by SF, and 30 (25.4%) by SQ. Sensitivity and specificity for SF were 83.1% and 76.6%, respectively, compared to 40.8% and 97.9% for SQ. ROC analysis yielded AUCs for MD of 0.89 for SF and 0.87 for SQ ($p=0.385$); for PSD, AUCs were 0.92 and 0.72 ($p=0.004$). The Conger's Kappa coefficient indicated substantial agreement among the strategies.

Conclusions
Both SF and SQ significantly shorten testing duration. SF yields results comparable to SS, while SQ may underestimate defects. Each strategy offers distinct advantages for different clinical applications.

P-0590

BASELINE CHOROIDAL MICROVASCULATURE DROPOUT AS A PREDICTOR OF RAPID GLOBAL STRUCTURAL LOSS IN OPEN-ANGLE GLAUCOMA

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Background
To investigate whether a localized choroidal microvasculature dropout (CMvD) in open-angle glaucoma (OAG) is associated with a globally faster rate of structural loss.

Methods
This study included 102 OAG eyes with or without a localized CMvD at the inferior hemiretina, matched for age (≤ 10 years), axial length (≤ 1mm), and visual field severity (≤ 1dB), and with a minimum 2-year follow-up. Serial thickness [circumpapillary retinal nerve fiber layer (cpRNFLT) and macular ganglion cell-inner plexiform layer thickness (mGCIPLT)], and vessel density (VD) [circumpapillary (cpVD) and macular VD (mVD)] parameters were obtained using optical coherence tomography (OCT) and OCT angiography. The rates of change in cpRNFLT, mGCIPLT, cpVD, and mVD at both the superior (CMvD-unaffected) and inferior (CMvD-affected) hemiretina were compared between matched eyes with (CMvD+) and without CMvD (CMvD-) using linear mixed effects models. Linear regression analyses were performed to evaluate clinical factors associated with the rate of structural loss both globally and at the CMvD-unaffected hemiretina.

Results
CMvD+ eyes showed significantly faster rates of VD and thickness loss at both the CMvD-affected and -unaffected hemiretina ($P < 0.05$). Linear regression analyses revealed that CMvD was significantly associated with a rapid loss of both VD and thickness parameters globally and at the CMvD-unaffected superior hemiretina ($P < 0.05$).

Conclusions
OAG eyes with CMvD show significantly faster rates of VD and thickness loss at both the CMvD-affected and unaffected hemiretina. A localized CMvD is an independent predictor of globally rapid structural loss in OAG eyes.

P-0591

MULTICENTER EVALUATION OF GLAUCOMA SCREENING ACCURACY OF MELBOURNE RAPID FIELDS ONLINE PERIMETER WITH SITA-FASTER FOR DETECTING MANIFEST GLAUCOMA

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Background
Visual field testing is important for glaucoma screening and ongoing management, but access to standard automated perimetry can be limited in many areas due to cost and locality. Melbourne Rapid Fields (MRF) online perimeter is designed to address this by allowing white-on-white threshold perimetry testing on any digital-screen device (including laptop or desktop computer).

Methods
This study is a retrospective, cross-sectional study involving two locations in Australia, one in metropolitan Melbourne and one in rural Dubbo NSW. 232 patients with stable glaucoma, glaucoma suspect or normal eyes were extracted and analysed. Results were compared to Humphrey Field Analyzer (HFA) 24-2 SITA Faster algorithm. Outcomes were compared by regression and Bland-Altman methods.

Results
Patient age ranged from 21 to 92 (average 66.3, SD 16.1). Bland-Altman found a bias of -0.50 dB for Mean Deviation (MD) between the two tests, with 95% Limits of Agreement (LoA) of -6.80 dB to 5.80 dB. Pattern Deviation (PD) had a bias of -0.58 dB with 95% LoA of -5.60 dB to 4.40 dB. High concordance was reported for MD and PD, with an intraclass correlation coefficient of 0.87, and 0.73. There were no significant differences for false positive and fixation loss. Receiver-Operator Characteristic showed Area Under Curve for manifest glaucoma diagnosis was the same between MRF and HFA (0.84 for both, using MD criteria).

Conclusions
MRF online perimeter has the same screening diagnostic capacity comparable to HFA SITA-Faster for manifest glaucoma. Its portability and cost-effectiveness suggests suitability as an alternative method for field testing where the standard perimeter is not easily accessible.

P-0592
PERIQUEST: "HUMAN FACTORS" IN PERIMETRY

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Background
Visual field tests are not universally popular with patients.[1,2] At least in part, this may be due to deficient "human factors" – a domain that has received less attention than threshold estimation and stimulus design. To overcome visual field limitations, we developed PeriQuest, a questionnaire that captures patients' opinions and perceptions on various aspects of perimetry.

Methods
Through informal consultations with colleagues, we drafted an exhaustive list of 45 questions to capture patients' attitudes and experiences with visual field testing, including the testing environment, perimetry technicians, and the instructions they provided. These questions were administered in Spanish to 110 patients aged between 26 and 68 years) attending an ophthalmology clinic, and had previous experience with visual field tests. Rasch model (using Andrich Rating Scale Model) was applied to investigate the category probability curves and Andrich thresholds, infit and outfit mean square, local dependency using Yen's Q3 statistic, Differential item functioning (DIF) for gender and presbyopia, person and item reliability, unidimensionality, targeting and ordinal to interval conversion table.

Results
The most important topics identified by Principal Component Analysis included worry about the test results, long periods of not seeing any stimuli, distraction by the eye patch, and pacing of stimulus presentations. Surprisingly, most patients (90/110, 82%) indicated that they would tolerate a longer test duration if this would improve the test results. Category probability curves suggested to collapse a response category. Rasch analysis reduced the questionnaire from 45 to 11 items. The final version of the questionnaire showed that 11 items fit the model without local dependency and no significant DIF for sex. Person reliability was satisfactory (0.81). The first contrast of the residual was 1.921 eigenvalue, showing unidimensionality and targeting was 1.63 logits.

Conclusions
Our findings challenge widely held but arguably simplistic beliefs ("visual field tests are too long"). We hope that the questionnaire will evolve into a tool that can support the development of more "patient friendly" perimetry and ultimately help reduce negative attitudes to visual field testing.

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P-0594

CHANGES IN OPTIC NERVE HEAD MICROVASCULATURE FOLLOWING DISC HEMORRHAGE ABSORPTION IN GLAUCOMATOUS EYES

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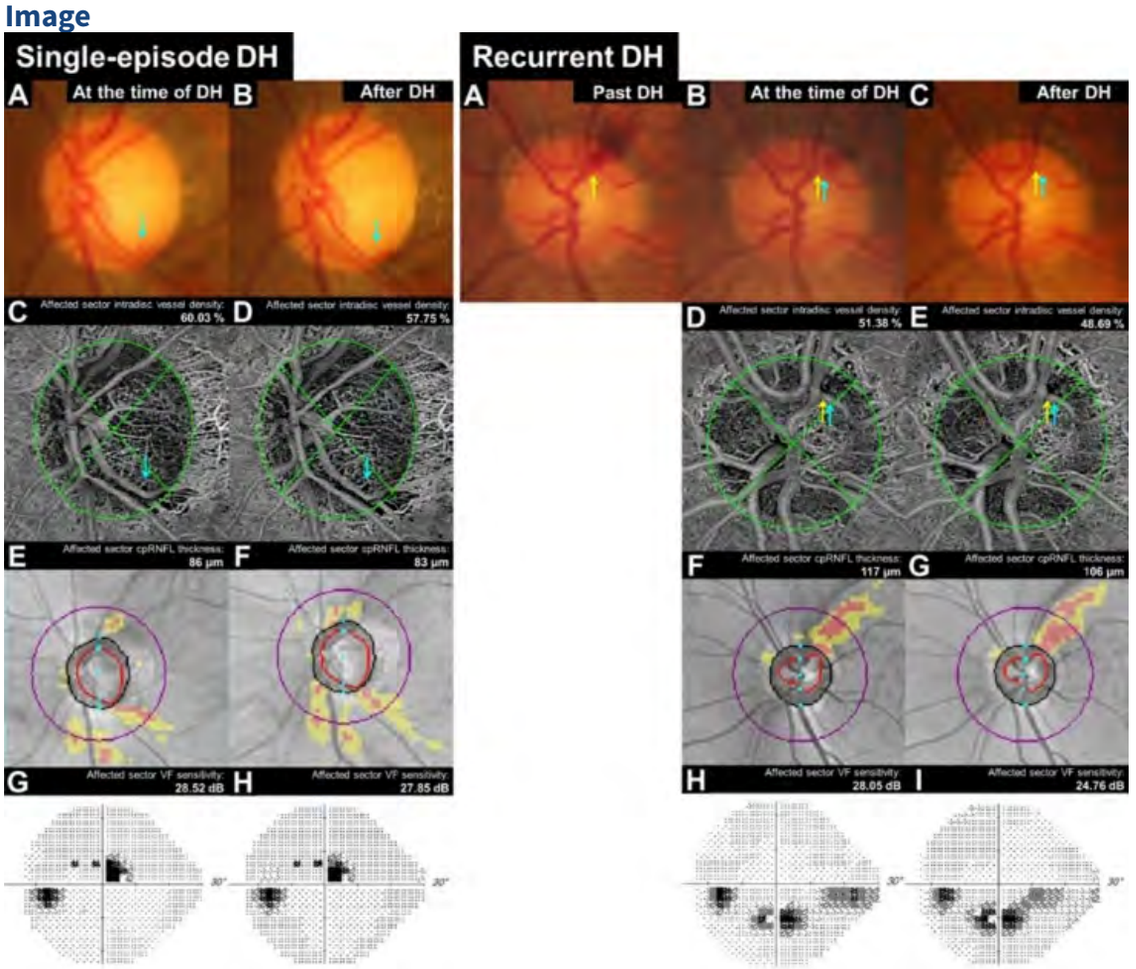
Background
This study investigated the changes in optic nerve head (ONH) microvasculature, circumpapillary retinal nerve fiber layer (cpRNFL) thickness, and visual field (VF) sensitivity following the absorption of optic disc hemorrhage (DH) in eyes with primary open-angle glaucoma (POAG).

Methods
Intradisc vessel density (dVD) was calculated using a 3 × 3 mm optic disc scan in 60 eyes of 60 patients with POAG and DH who had undergone two or more swept-source optical coherence tomography angiography exams. Clinical parameters at the time of DH occurrence and after absorption, as well as those between the subgroups based on DH recurrence and location, were compared. Linear regression analysis was performed to identify factors associated with changes in cpRNFL thickness in the DH-affected quadrant.

Results
Mean dVD, cpRNFL thickness, and VF sensitivity significantly decreased after DH absorption (all $P < 0.05$). The reduction in dVD was more pronounced in eyes with recurrent DH compared to those with a single episode ($P = 0.032$). Eyes with DH occurring within or at the margin of the disc cup showed a greater dVD reduction than those with DH occurring outside the disc cup ($P = 0.049$). The reduction in cpRNFL thickness in the DH-affected quadrant correlated with dVD reduction in the same quadrant ($\beta = 0.370$, $P = 0.013$) and DH recurrence ($\beta = -2.617$, $P = 0.033$).

Image



Conclusions

The ONH microvasculature and cpRNFL thickness in the DH-affected sector significantly decreased following DH absorption. This finding suggests that disc hemorrhage pathogenesis may be associated with changes in optic disc vasculature, contributing to glaucomatous progression.

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P-0595

ON THE FEASIBILITY OF SPEEDING UP GLAUCOMA CLINICAL TRIALS USING PORTABLE PERIMETRY

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Background
Home monitoring ("telemedicine") may be one way of reducing the financial costs and high patient burden associated with glaucoma trials. In this study we model whether more frequent (weekly, monthly) visual field (VF) assessments using a portable, "home" perimeter (Eyecatcher version 3.0; EC3), can more quickly detect glaucoma progression in a clinical trial context.

Methods
First, test-retest variability was quantified empirically by asking N=40 patients (80 eyes; (n=21 healthy, n=16 glaucoma suspects, n=43 to manifest glaucoma)) to perform an interleaved sequence of two EC3 and two Humphrey Field Analyzer (HFA SITA-Fast) VF tests (four tests total per eye). Second, we combined these empirical test-retest data with linear mixed modelling to mathematically predict the expected proportion of progressors detected by EC3/HFA over a three year period, given different testing regimens (from weekly to every four months), and given different underlying rates of true progression.

Results
Results from EC3 and HFA were positively correlated (MD; r_{158} = 0.76, CI 0.69-0.83, P < 0.001); but the portable perimeter was significantly less reliable; Bland-Altman 95% coefficient of repeatability () was 6.4 dB (CI 5.2-8.2) for EC3, and 3.8 dB (CI 2.8-4.4) for the HFA. Statistical simulations, however, indicated that this lower reliability could be offset by more frequent testing. Thus, modelling indicated one EC3 test per month would detect a higher proportion of slow (-0.5 dB/year), moderate (-1dB/year) and fast (-2dB/year) progressors compared to one HFA test every four months. There was no significant difference in mean test duration between the EC3 and HFA (226 vs 225 seconds, P = 0.78), and participants rated the EC3 as somewhat easier to use (system Usability Scale; P = 0.004).

Image

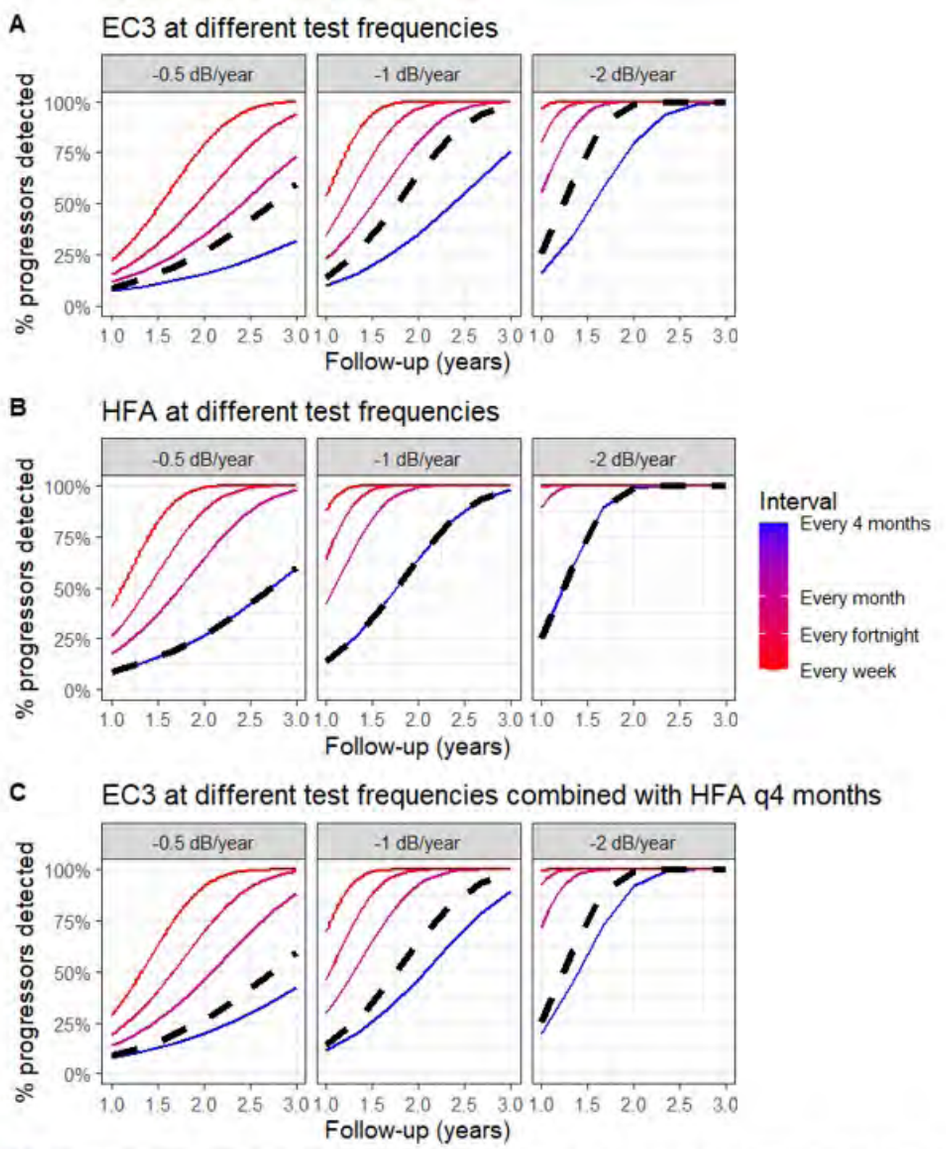

Figure 1: The cumulative proportion of simulated progressors detected at different underlying rates of progression (RoP; -0.5, -1.0 and -2.0 dB/year), when assessed using EC3 (*A*), HFA (*B*), and EC3 combined with HFA q4monthly (C). The bold black dash line show HFA q4monthly for reference. In each case, we show that a greater proportion of progressors are detected with increased test frequency, due to the associated decrease in test variability, and with more rapid underlying rates of progression. In panel A, performing EC3 (solid lines) once per month detects a higher proportion of progressors as HFA (dashed line) every 4 months.

Conclusions

Home VF assessments, despite poorer performance than current reference standard ("in-clinic") devices, would in principle allow greater detection of glaucoma progression via an increased frequency of testing. This can reduce the sample size requirements of future clinical trials, with implications on study duration, access and overall cost.

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P-0596

NEUROIMAGING FINDINGS IN PATIENTS WITH PRESUMED NORMAL TENSION GLAUCOMA: A RETROSPECTIVE REVIEW

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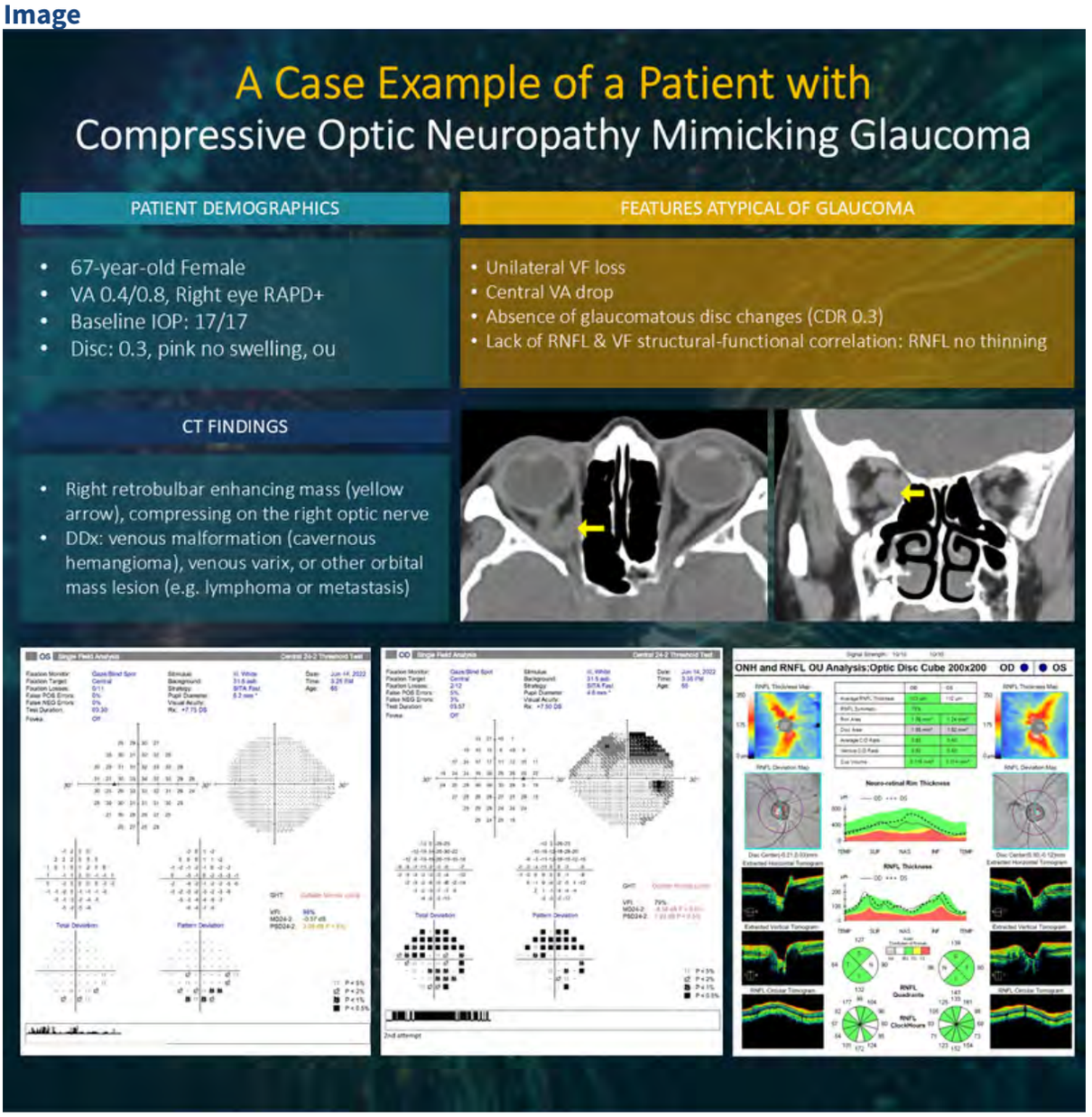
Background
Neuroimaging is often performed for patients with normal tension glaucoma (NTG) to exclude compressive optic neuropathy. In low-resource settings such as the public healthcare system in Hong Kong, computed tomography (CT) of the brain and orbit is often the only neuroimaging modality available. This retrospective study aims to evaluate the prevalence of pathologies identified on CT scans in NTG patients, and to identify the atypical features identified on glaucoma investigations to inform our approach to neuroimaging in the management of NTG.

Methods
A retrospective review of CT in 1975 consecutive patients performed at a tertiary eye institute in Hong Kong from April 2021 to March 2024.

Results
Among the 1,975 patients, 977 (49.5%) had presumed NTG and underwent CT scans to exclude compressive optic neuropathy. In this group, 179 patients (18.3%) had positive findings. Notably, 9 patients (0.92%) had SOLs that directly compromised the optic pathway, including 5 retrobulbar masses, 2 suprasellar masses, and 2 cavernous sinus masses. Other significant findings included small vessel disease in 106 patients (10.8%) and incidental SOLs, such as meningiomas, subarachnoid cysts and osteomas, in 70 patients (7.16%). Among the 9 patients with SOLs impacting the optic pathway, their average intraocular pressure (IOP) at presentation was 15.9 mmHg (standard deviation 2.58). Clinical features that point against the diagnosis of glaucoma included atypical visual field (VF) loss, unilateral or highly asymmetrical presentation, lack of structural-function correlation, absence of neuroretinal rim thinning or presence of optic disc pallor, and drop in central visual acuity.

Image



Conclusions

The low incidence of optic pathway SOLs in NTG (<1% in our cohort) suggests that neuroimaging should be prioritized for patients with clinical presentations atypical of glaucoma. These include unilateral presentation, visual field damage inconsistent with optic disc appearance such as absence of neuroretinal rim thinning, rapid visual field progression, worsening visual acuity, excessive pallor of neuroretinal rim, age under 50, specific visual field defects atypical of glaucoma, such as vertically aligned visual field defects or central scotomas, and presence of other neurological symptoms. Our study provides insights into how we can better utilize neuroimaging to optimize resources and reduce costs in this resource-constrained era.

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P-0597

ANALYSIS OF THE DIAGNOSTIC PERFORMANCE OF AN ONLINE PERIMETER SUPRA-THRESHOLD SCREENING PROGRAM IN GLAUCOMA PATIENTS

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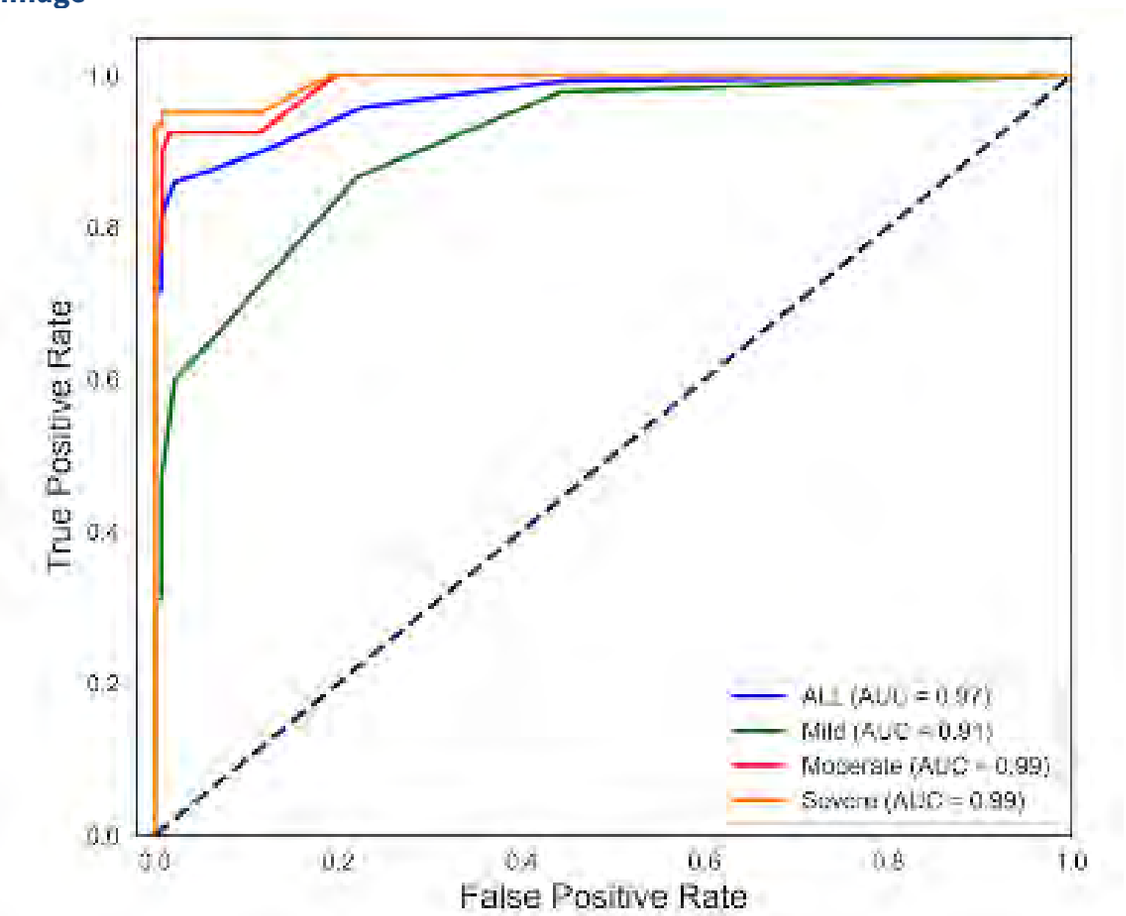
Background
Visual field testing, as a critical tool for assessing visual field damage, plays an essential role in the early diagnosis and management of glaucoma. Portable perimeters offer convenience and feasibility for remote screening of glaucoma-related visual field defects. This study aims to evaluate the application value and potential advantages of a web-based remote perimeter (Perimouse) using its supra-threshold screening program for glaucoma screening. By comparing it with the Humphrey Field Analyzer (HFA), the study analyzes the consistency and diagnostic accuracy of the Perimouse supra-threshold screening program relative to conventional visual field testing, further emphasizing the significance of early screening in glaucoma management.

Methods
This study recruited both normal subjects and glaucoma patients. All participants underwent the Perimouse supra-threshold screening program and HFA for visual field testing. The abnormal points detected by Perimouse were compared with the points with a probability of P<0.5% on the total deviation probability map of the HFA for correlation and consistency analysis. The receiver operating characteristic curve (ROC) was constructed to determine the cutoff value.

Results
A total of 69 normal subjects (123 eyes) and 105 glaucoma patients (160 eyes) were included. The Spearman correlation coefficient between the abnormal points identified by the Perimouse program and HFA was 0.88 (P < 0.001). The Spearman correlation coefficient between the number of abnormal points detected by Perimouse and the HFA MD values was -0.79 (P < 0.001). Regarding consistency, the intraclass correlation coefficient (ICC) between the two testing methods was 0.87 (P < 0.001). Bland-Altman plots and the allowable total error and limits for erroneous results zones (ATE/LER) demonstrated that most points fell within the limits of agreement, with only a few outside. In terms of accuracy, the overall AUC for identifying the presence or absence of visual field defects was 0.97(Figure). When the Perimouse cutoff value was set at 5, the sensitivity was 85.9%, specificity was 97.9%, accuracy was 91.9%, precision was 97.6%, recall was 85.9%, F1 score was 91.4%, and the area under the precision-recall curve was 0.97.

Image



Conclusions

The Perimouse supra-threshold program is a time-efficient, convenient, and reliable method for visual field testing. It exhibits high diagnostic performance and has the potential to become an effective tool for glaucoma screening in community settings.

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P-0598

DIFFERENT RETINAL MICROVASCULAR RESPONSE TO FLICKER LIGHT BETWEEN NORMAL-TENSION GLAUCOMA AND HIGH-TENSION PRIMARY OPEN-ANGLE GLAUCOMA: AN OCTA STUDY

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Background
To compare the visual task-evoked microvascular reactivity in the macula between normal-tension glaucoma (NTG) and high-tension primary open-angle glaucoma [*i.e.*, high-tension glaucoma (HTG)] by using optical coherence tomography angiography (OCTA).

Methods
In this case-control observational study, ten eyes of 10 patients with HTG and twelve eyes of 12 patients with NTG were included. All enrolled eyes must have a preserved central visual field of at least 10°and best corrected visual acuity of 20/40 and better. Eleven eyes from 11 age- and gender-matched healthy participants were recruited as the controls. OCTA images at the macular region were acquired at baseline and subsequently and immediately after a 8Hz flicker white light stimulation. Macular vessel density (VD) was compared between the groups.

Results
The baseline VD at the macula was significantly lower in eyes with NTG (37.98%±5.99%) and HTG (35.31%±4.31%) compared with that in the control eyes (46.21%±2.94%, p<0.001). No difference in the baseline VD was observed between two glaucoma groups. Flicker light stimulation evoked significant increase in VD in the superficial macula of HTG (36.07%±4.35%; *P* = 0.048) and control eyes (47.09%±2.68%; *P* = 0.028) but not the eyes with NTG (37.44%±5.69%; *P* = 0.622). The absolute change in VD (ΔVD) was significantly lower in eyes with NTG than that of controls (-0.54%±1.40% vs. 0.88±1.14%; *P* = 0.026). Eyes with NTG also had a lower VD change percentage in the temporal macula than that in eyes with HTG (-1.17%±5.53% vs. 4.01%±4.73%; *P* = 0.042).

Conclusions
Visual task-evoked vasoreactivity (VR) changes provide additional information in the understanding and assessment of the pathophysiological mechanisms of glaucoma. Discrepancies in the retinal VR between HTG and NTG imply that vascular factors may play different roles in the onset and progression of these diseases.

P-0599

QUANTITATIVE ANALYSIS OF AQUEOUS OUTFLOW IN PRIMARY OPEN ANGLE GLAUCOMA USING AQUEOUS ANGIOGRAPHY

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Background
Aqueous angiography (AA) allows for *in vivo* real-time, functional assessment of AHO pathways including the evaluation of TM. Non-uniform AHO pathways along the limbus have been reported by AA in enucleated human eyes. Segmental variations of AHO channels along the limbus maybe a cause for the limited efficacy of minimally invasive glaucoma surgeries (MIGS) which mainly target the TM and the conventional AHO pathways. For a better understanding of these variations in AHO channels in Primary open angle glaucoma(POAG), this study was conducted to evaluate the circumferential AHO pathways in POAG subjects using AA.

Methods
It was a prospective study done on POAG patients with visually significant cataract. Eyes with primary angle closure glaucoma (PACG) and secondary glaucoma were excluded from the study. Indocyanine green (ICG) dye (0.1 ml of 0.1%) was used as a tracer dye for aqueous angiography and injected into the anterior chamber using a 30 gauge needle, prior to phacoemulsification. Image acquisition was done using a commercially available fluorescence camera that is Spectralis HRA + OCT Flex module; in infra-red mode to bring the limbus to focus. The image scan was initiated immediately after the injection of ICG dye up to 60 seconds in ICG angiography mode. The image at 60 seconds was used for quantitative analysis. The quantitative analysis of the aqueous outflow was performed by dividing the aqueous outflow pathways in 8 equal sectors concentric to the limbus. The mean pixel density was calculated using ImageJ software. The mean pixel density values calculated in each sector were analysed further between patients of mild and moderate versus severe POAG.

Results
We performed aqueous angiography in 18 eyes of 18 POAG patients. Six eyes were excluded from the analysis due to ICG dye leak at the site of dye injection during aqueous angiography. Final analysis was done with 12 eyes of 12 POAG patients (9 males and 3 females) with a mean age of 60.08 ± 10.79 years. Among 12 eyes, 1 eye was mild POAG, 4 eyes were moderate POAG and 7 eyes were severe POAG. The highest mean pixel density in mild and moderate POAG eyes was noted in naso-inferior sector (31.68±15.33) and the least pixel density was in infero-nasal sector (24.23±15.85). The highest mean pixel density in severe POAG eyes was observed in naso-superior sector (41.96 ±16.02) and the least mean pixel density was observed in the infero-temporal sector (18.90±4.58).

Conclusions
The aqueous outflow varies between different sectors in POAG eyes. The maximum aqueous outflow signal in mild and moderate POAG eyes was observed in naso-inferior sector and in naso-superior sector in severe POAG eyes, whereas, the least aqueous flow was observed in infero-nasal sector in mild and moderate POAG eyes and in infero-temporal sector in severe POAG eyes suggesting that targeted minimally invasive glaucoma surgery (MIGS) can be performed in high flow or low flow quadrants can improve its outcome.

P-0600
RELATIONSHIP BETWEEN OPHTHALMOLOGIC PARAMETERS AND HIPPOCAMPAL VOLUME IN GLAUCOMA PATIENTS

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Background
Glaucoma and dementia are both age-related diseases, and the number of cases of both occurring together has increased in recent years. In addition, the decrease in adherence to glaucoma eye drops due to dementia is becoming a treatment issue. The hippocampus is responsible for memory and becomes atrophied in patients with dementia. Hippocampal volume is considered to be an indicator of cognitive function. In this study, we aimed to investigate the significance of ophthalmologic parameters in the pathogenesis of dementia by examining the relationship between ophthalmologic parameters and hippocampal volume in patients with glaucoma.

Methods
The study included 17 normal subjects (58.8 ± 8.4 years old, male: female = 8:9, MD value 0.4 ± 0.8 dB) and 22 patients with bilateral open-angle glaucoma (59.4 ± 8.6 years old, male: female = 8:14, MD value -11.3 ± 8.0 dB). Using 3D T1-weighted images of the brain obtained by MRI, we calculated the intracranial-hippocampal volume ratio from the cranial volume and the hippocampal volume. First, we compared the two groups of normal subjects and glaucoma patients using the Wilcoxon rank-sum test. Then, we examined the relationship between various ophthalmologic parameters averaged for the left and right eyes and the intracranial-hippocampal volume ratio using partial correlation analysis adjusted for age and sex.

Results
There was no significant difference in the intracranial-hippocampal volume ratio between glaucoma and normal subjects. In the analysis of ophthalmologic parameters, a significant correlation was found between spherical equivalent and intracranial-hippocampal volume ratio in all cases (r=-0.37, p=0.006). When comparing the normal and glaucoma groups, spherical equivalent did not correlate with intracranial-hippocampal volume ratio in the normal group (r=-0.33, p=0.18), but did correlate significantly in the glaucoma group (r=-0.42, p=0.03).

Conclusions
In this study, we found that the intracranial-hippocampal volume ratio was larger in patients with myopia and that this was more significant in glaucoma patients. This suggests that myopia is related to cognitive function in glaucoma patients.

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P-0601

ASSOCIATION OF DEEP OPTIC NERVE HEAD STRUCTURAL REMODELING WITH CHORIOCAPILLARIS MICROVASCULAR DROPOUT IN GLAUCOMA WITH AND WITHOUT MYOPIA

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Background

To evaluate the association between choriocapillaris microvascular dropout (MvD) and optical coherence tomography(OCT)-detected deep optic nerve head (ONH) structures in glaucomatous eyes with and without myopia.

Methods

394 eyes from 262 primary open-angle glaucoma (POAG) and glaucoma suspect patients from the Diagnostics Innovations in Glaucoma Study were stratified into no myopia (axial length (AL) ≤ 24 mm; n=144 eyes), mild myopia (24 mm< AL ≤26 mm; n=174 eyes), and high myopia (AL > 26 mm, n=76 eyes). Spectralis ONH OCT radial B-scans were acquired relative to the Foveal-Bruch's Membrane Opening (BMO) (FoBMO) axis. BMO and anterior scleral canal opening (ASCO) were manually segmented, and their size and shape were calculated. ASCO/BMO offset magnitude, neural canal axis obliqueness, and neural canal minimum cross-sectional area (NCMCA) were also measured. Presence, area and angular circumference of juxtapapillary MvD were evaluated on OCT-angiography (OCT-A) *en face* choroidal images and B-scans.

Results

Among the three groups, the mean MvD area (95% CI) was significantly greater in the high myopia group [0.38 (0.30, 0.47) mm^2], followed by the mild myopia group [0.33 (0.27, 0.39) mm^2] and the no myopia group [0.21 (0.14, 0.27) mm^2] (p=0.002). The mean MvD angular circumference (95% CI) was significantly greater in the mild myopia group [75.4 (64.0, 86.9)°], followed by the high myopia group [74.5 (58.0, 90.9)°] and the no-myopia group [52.6 (39.9, 65.3)°] (p=0.017). While the BMO area, NCMCA ovality index, BMO/ASCO offset magnitude, and neural canal obliqueness were significantly greater in the high myopia group, the NCMCA was significantly smaller compared to the mild and no myopia groups (all p≤0.01). In the multivariable analysis, both MvD area and MvD angular circumference were significantly associated with axial length (coefficients [95% CI]: 0.04 [0.01, 0.07] per 1 mm longer, *p*=0.01, and 6.22 [1.06, 11.39] per 1 mm longer, *p*=0.019, for MvD area and MvD angular circumference, respectively). Additionally, MvD area was significantly associated with BMO/ASCO offset magnitude (coefficient [95% CI]: 0.001 [0.000, 0.001] per 1 µm higher, *p*=0.013).

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Conclusions

Both MvD area and angular circumference were associated with axial length, whereas only MvD area was associated with BMO/ASCO offset magnitude in POAG eyes. Evaluating chorio-capillaris MvD alongside deep ONH structural alterations may offer clinical insights into the pathogenesis of glaucoma in myopic eyes.

P-0602

COMPARATIVE ANALYSIS OF GLAUCOMA PROGRESSION USING VBLR-VF ALGORITHMS AND SITA-STANDARD

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Background

We previously reported that the Variational Bayes Linear Regression Visual Field Test algorithm (VBLR-VF, 4-2 dB double-cross method) and its accelerated version, VBLR-VF Fast (3 dB single-cross method), exhibit reproducibility comparable to the Swedish Interactive Threshold Algorithm Standard (SITA-Standard). This study aimed to report the interim results of comparing glaucoma progression assessments using these algorithms with longitudinal data.

Methods

This multicenter prospective cohort study recruited 135 eyes from 135 glaucoma patients. Of these, 31 patients who underwent at least four visual field (VF) tests using both the VBLR-VF and SITA-Standard algorithms, and 16 patients who had at least four VF tests using both the VBLR-VF Fast and SITA-Standard algorithms, were included in the analysis. Glaucoma progression was defined as a negative slope with a p-value < 0.05 in the mean deviation (MD) slope. The test durations of the algorithms were also compared.

Results

The MD slopes for VBLR-VF and SITA-Standard (-0.10 vs. -0.02 dB/year) and for VBLR-VF Fast and SITA-Standard (-1.0 vs. -0.5 dB/year) showed no significant differences. One case demonstrated significant progression with VBLR-VF, whereas no cases were identified with SITA-Standard. Similarly, no significant progression was observed with VBLR-VF Fast, while one case was identified with SITA-Standard. There were no significant differences in the proportions of progression between the algorithms. Test durations were significantly shorter with VBLR-VF (360.6 seconds; $p < 0.01$) and VBLR-VF Fast (194.8 seconds; $p < 0.01$) compared to SITA-Standard (404.3 seconds).

Conclusions

VBLR-VF and VBLR-VF Fast provided glaucoma progression assessments comparable to SITA-Standard while significantly reducing test durations.

P-0604
APPLICATION OF INTRA-OPERATIVE OCT DURING GLAUCOMA SURGERIES

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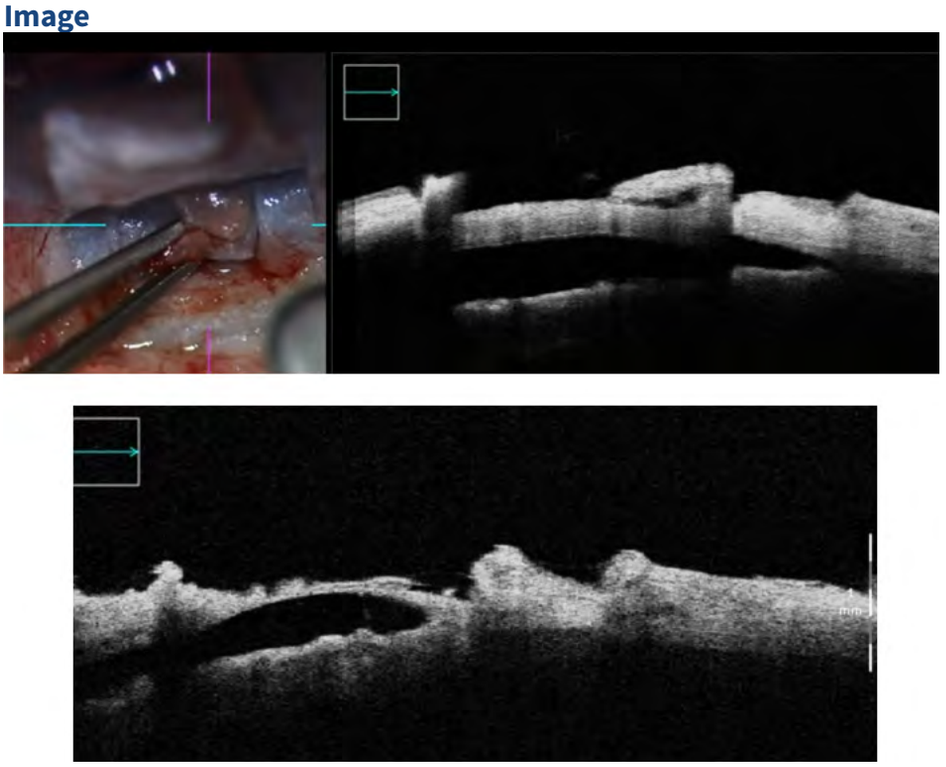
Background
OCT has transformed Ophthalmology diagnosis (1), and intra-operative OCT (iOCT) could remodel Ophthalmology surgery. iOCT is regularly used in cornea and retinal surgeries (3), but not in glaucoma. We intended to explore the utility of iOCT during glaucoma surgeries.

Methods
We performed an observational retrospective single-center study. We obtained the surgical videos of all iOCT performed during glaucoma surgeries from November 2023 to December 2024, including deep sclerectomy, trabeculectomy, tubes, micro-invasive glaucoma surgeries (MIGS) and less-invasive glaucoma surgeries (LIGS). We assessed their utility helping the surgeon performing the surgery and on anatomical detail provided by iOCT.

Results
From over 400 glaucoma surgeries, 47 were performed using iOCT during the study, namely glaucoma drainage devices, trabeculectomy, deep sclerectomy, less invasive surgeries (LIGS) and microinvasive surgeries (MIGS). iOCT allowed precise measurement and correction of the trabeculodescemetic window thickness in deep sclerectomy (figure 1, up: beginning of the deep flap dissection, which is too thick; below: trabeculodescemetic window sufficiently thin). LIGS surgeries (including XEN, Preserflo and MIMS) were also performed with iOCT, being useful in Preserflo to identify distance to the endothelium. In MIGS, iOCT identified of the trabeculotomy of GATT surgery (gonioscopy-assisted transluminal trabeculotomy), the correct intra-canalicular positioning of an Hydrus (and supra-choroidal traject), and the identification of the iStents. Nevertheless, iOCT did not allow systematically the identification of all the 210 µm trabeculostomies of ELIOS, nor the 240 µm microsclerostomy from MIMS.

Image



Conclusions

iOCT was performed in a minority of glaucoma surgeries due to time constraints. iOCT was useful for residents and novice surgeons, and for all surgeons in deep sclerectomy, tubes, XEN, and Preserflo. Multicentered studies about iOCT are welcome to better assess its utility in glaucoma surgeries.

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P-0605

IMPACT OF AUTOIMMUNE DISEASE ON STRUCTURAL AND FUNCTIONAL DEFICIT IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background

Our prior work demonstrated higher prevalence of autoimmune disease (AiD) in primary open angle glaucoma (POAG) patients compared to controls.[1] In a separate pilot study we showed that elevated autoimmune biomarkers in the blood of POAG patients without AiD are associated with paracentral visual field defects.[2] This study further investigates the impact of AiDs on visual field and structural deficit in POAG.

Methods

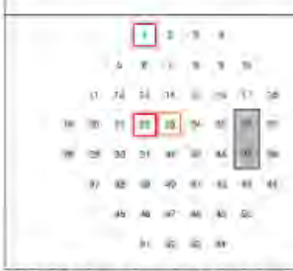
This retrospective study included all adult patients undergoing ophthalmic surgery at Massachusetts Eye and Ear from March 2019 to April 2020. Surgical patients were chosen due to more complete medical records to identify AiD. Inclusion criteria for POAG were open angle and glaucomatous optic neuropathy with visual field loss. Autoimmune status was verified using the American Autoimmune Related Diseases Association's criteria. The study analyzed structural and functional loss patterns of the right eye based on optical coherence tomography and Humphrey visual field (VF), respectively.

Results

Of 172 POAG patients, 30 patients had at least one AiD. Age and gender were similar between those with and without AiD (p≥0.06), while more patients were White in the non-AiD group (52.1% vs. 26.7%, p=0.01). The AiD group had higher steroid use (p=0.04), but the groups did not differ in intraocular pressure (p=0.42). Structurally, overall retinal nerve fiber layer (RNFL) thickness (p=0.64) and the pattern of damage within the four RNFL quadrants did not differ between the groups (all p≥0.37). For functional parameters, no significant differences were noted in VF mean deviation (-9.5 dB AiD vs -11.2 dB non-AiD, p=0.35) or pattern standard deviation (5.7 dB AiD vs. 6.2 dB non-AiD, p=0.49). Compared to non-AiD group, the AiD group had better VF pattern deviation (PD) values at PD1 (p= 0.02) and paracentral PD22 (p=0.048), while paracentral point PD23 (p=0.054) reached near significance (**Table**).

Image

Table: Comparison of baseline, functional and structural characteristics of primary open-angle glaucoma patients with and without autoimmune disease.

Variables		Autoimmune Disease (n=30)	No Autoimmune Disease (n=142)	P-value
Age (years)		72.3 ± 9.1	73.1 ± 9.0	0.65
Gender (male %)		30.0	48.6	0.06
Race (White %)		26.7	52.1	**0.01**
Intraocular pressure (mm Hg)		15.0 ± 3.8	16.0 ± 6.7	0.42
Any history of steroid use (%)		26.7	11.9	**0.04**
Optical Coherence Tomography of Right Eye		**Autoimmune Disease (n=20)**	**No Autoimmune Disease (n=98)**	
Average retinal nerve fiber layer (μm)		67.3 ± 9.5	69.0 ± 15.5	0.64
Superior quadrant retinal fiber layer (μm)		81.4 ± 16.8	79.0 ± 21.4	0.63
Inferior quadrant retinal fiber layer (μm)		72.6 ± 18.4	77.9 ± 25.4	0.37
Temporal quadrant retinal fiber layer (μm)		52.4 ± 9.8	55.5 ± 17.9	0.45
Nasal quadrant retinal fiber layer (μm)		62.9 ± 11.8	63.5 ± 14.2	0.84
Humphrey Visual Field of Right Eye		**Autoimmune Disease (n=30)**	**No Autoimmune Disease (n=137)**	
Average mean deviation (dB)		-9.5 ± 8.3	-11.2 ± 9.2	0.35
Average pattern standard deviation (dB)		5.7 ± 3.6	6.2 ± 4.0	0.49
52 pattern deviation points (dB)		Autoimmune Disease (n=26)	No Autoimmune Disease (n=116)	
	PD1	-3.6 ± 6.1	-7.7 ± 8.7	**0.02**
	PD22	-4.19 ± 6.5	-8.5 ± 10.6	**0.048**
	PD23	-3.3 ± 5.9	-7.3 ± 10.1	0.054

All data are presented as mean ± standard deviation unless otherwise specified.

Significantly different pattern deviation points between the primary open-angle glaucoma patients with and without autoimmune disease are highlighted with red boxes.

Conclusions

Autoimmunity in POAG appears to impact paracentral visual field. Our previous work demonstrated worse paracentral VF loss in POAG patients without AiD but with high inflammatory biomarkers, while in the present study having an AiD was protective of paracentral loss in POAG.[2] These seemingly contradictory findings may suggest the benefit of treating autoimmunity in POAG, which will be explored in further studies.

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P-0609

EVALUATION OF ROLE OF ORAL VITAMIN B12 AND FOLATE SUPPLEMENTATION IN OPEN ANGLE GLAUCOMA

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Background
In glaucoma patients where IOP well maintained on conservative treatment still progress as documented with structural and functional tools. So, the non IOP dependant factors play a role and need reassessment. We evaluated the role of vitamins supplementation in addition to conservative management in open angle glaucoma.

Methods
A randomized control prospective trial in which 287 eyes of 144 patients with primary open angle glaucoma, normal tension glaucoma and pseudoexfoliative glaucoma on medical management were recruited. After baseline investigations of Visual field 24-2C ,Optical Coherence Tomography based Retinal Nerve Fiber Layer(RNFL) and Ganglion Cell Analysis (GCA), intervention group was prescribed Vitamin B12 1000 mcg and Folic acid 5 mg in addition to conservative antiglaucoma treatment and only conservative treatment in control group for 6 months. They were reassessed after 6 months on similar parameters.

Results
The RNFL and GCA loss was less in intervention group compared to control group. The percentage loss in RNFL thickness was 1.14% and 2.89% in intervention and control group respectively and GCA loss was 2.56 % and 3.20% respectively

Conclusions
Our standalone study showed that oral supplementation of neuroprotective vitamins such as Vitamin B12 and Folate may be helpful as an adjuvant along with conventional AGMs in treatment of open angle glaucoma. It may help us to answer why patients with target IOP achievement still progress thereby indicating presence of non IOP dependent factors.

P-0610

EVALUATING CUP-TO-DISC RATIO BETWEEN AUTOMATED OPTICAL COHERENCE TOMOGRAPHY AND COLOR FUNDUS PHOTOGRAPHY SEGMENTATION

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Background

Assessment of the cup-to-disc ratio (CDR) is a key clinical finding in the evaluation of glaucoma. However, clinician-derived CDR measurements are prone to inter-reader variability. Automated measurements using optical coherence tomography (OCT) and color fundus photography (CFP) offer a potentially more reproducible alternative by leveraging advanced image segmentation techniques. This study examines the relationship between these methods to support their reliable use in both clinical and research settings.

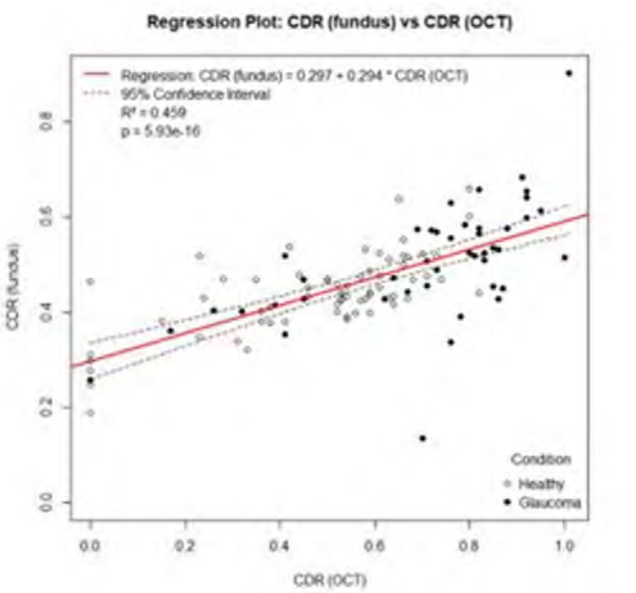
Methods

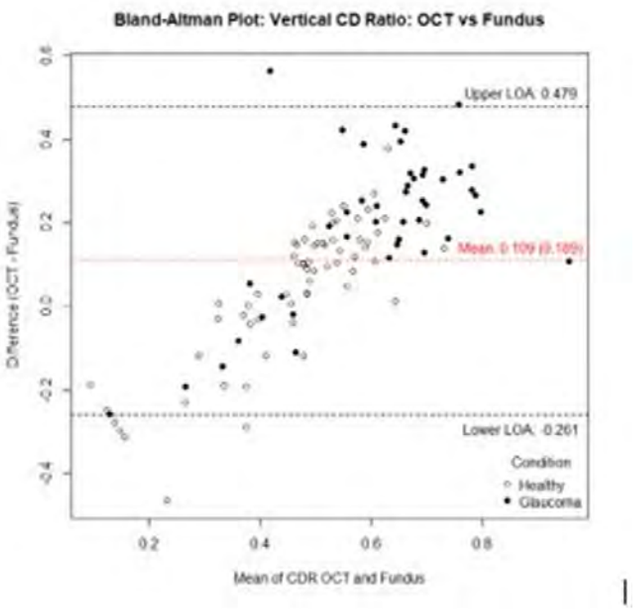
Paired OCT and CFP using the Maestro2 (Topcon Corporation, Tokyo, Japan) were obtained in a cohort of healthy and glaucoma subjects aged 40 or older, recruited from a primary eye-care practice. Glaucoma status was determined by clinical diagnosis and the study eye was randomly selected. AutoMorph, an open-source deep learning model was applied to all CFPs to predict image quality. CFPs rated good or usable were subsequently input into its disc analysis module. CDR was derived from OCT by automated detection of the retinal pigment epithelium (RPE) boundary and the width of the cup determined a height of 120µm from the RPE. Pearson correlation, t-tests, linear regression, and Bland-Altman plots were used to evaluate the relationship between CDR using OCT and CFP.

Results

A total of 43 glaucoma eyes and 65 healthy eyes were included for analysis. The correlation between CFP and OCT was 0.61 and 0.69 for glaucoma and healthy eyes, respectively. The mean (SD) CDR for glaucoma eyes was 0.71 (0.23) and 0.51 (0.13) using OCT and CFP, respectively. For healthy eyes, mean (SD) CDR was 0.49 (0.21) for OCT and 0.44 (0.08) for CFP. CDR measured by OCT was significantly higher than CFP in both glaucoma (mean difference = 0.20, P<0.001) and healthy eyes (mean difference = 0.05, P=0.03). Regression analysis confirmed a moderate relationship between OCT and CFP measurements (R^2 = 0.46, P < 0.001), with glaucoma cases exhibiting higher CDR values as expected. However, the slope (0.294) and Bland-Altman results indicate a systematic tendency for OCT to overestimate CDR compared to CFP, particularly in glaucoma eyes.

Image





Conclusions

A strong correlation was observed between the two methods; however, OCT tends to slightly overestimate CDR relative to CFP, particularly at higher values. This discrepancy underscores the importance of contextual interpretation when using these methods interchangeably, especially in glaucoma management and diagnosis.

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P-0611

24-2C GRIDS TO DETECT CENTRAL VISUAL FIELD FUNCTION IN EARLY-STAGE OF PRIMARY OPEN ANGLE GLAUCOMA

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Background
The recently introduced 24-2C SITA-Faster incorporates 10 testing points derived from 10-2 grid into the 24-2 grid, potentially increasing the sensitivity for initial central field evaluation in glaucoma. However, few studies have compared the visual field defects (VFDs)newly identified by 24-2C with 24-2 in early-stage of primary open-angle glaucoma (POAG) and newly defected “clusters” with their structure–function concordance.

Methods
This prospective, cross-sectional study enrolled 72 patients with POAG. Sixty-three eyes from 40 patients with mean deviation (MD)<6 dB by Humphrey 24-2 were subjected to 24-2C and 10-2. The consistencies between 24-2C and 24-2, or 10-2 were evaluated using Bland–Altman figures. 24-2C newly discovered defects compared with10-2 point-by-point. Patients were divided into group I and II on whether newly defective points met “cluster” criterion. (at least three continuous points at $P < 0.05$, including a minimum of one point at $P < 0.01$) (Figure 1). Both groups underwent optical coherence tomography Optovue RTVue-100 to determine if there were corresponding structural differences.

Results
There were good consistencies between either 24-2C with 24-2, or 10-2. Bland–Altman plots demonstrated most eyes fell within the 95% limits of agreement in MD, pattern standard deviation (PSD) and central mean sensitivity (CMS). Meanwhile higher consistency was detected between 24-2C and 10-2, as regression analysis revealed there were no significant trends in bias changing along with the above three index values variation between 24-2C and 10-2 ($P > 0.05$) .

Test duration was significantly shorter in 24-2C than 24-2 (24-2C, 157[139, 178] seconds; 24-2, 166[139, 202] seconds, respectively, $P < 0.05$).

96 defective points were newly detected by 24-2C. 57 (57/96, 59.38%) points were consistent with 10-2 through point-by-point comparison(Figure 2). It indicated high reliability of 24-2C results in early stage of POAG .

Average Ganglion Cell Complex (GCC) thickness of Group I (with “clusters”) was significantly thinner than Group II (without “clusters”). GLV and FLV of Group I were also significantly greater than Group II ($P<0.05$). Our study was first to apply a more stringent “cluster” criterion in comparison newly detected defective points by 24-2C. It indicated VFDs newly discovered correlated well with GCC(Table, Figure 3).

Conclusions

24-2C had good consistency with both 24-2 and 10-2, especially highly consistent with 10-2. The additional central VFDs identified by 24-2C correlated well with 10-2. Newly identified VFDs meeting with “cluster” criterion also corresponded well with GCC in early-stage of POAG. It suggests that 24-2C could assist in detecting central VFDs in 10 degrees as same as 24 degrees in early-stage of glaucoma with a shorter test duration. 24-2C may detect central VFDs to improve patients’ life quality much earlier.

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P-0612

ASSOCIATION OF DEEP OPTIC NERVE HEAD STRUCTURES WITH VISUAL FIELD IN EYES WITH PERIPAPILLARY INTRACHOROIDAL CAVITATION

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Background
Peripapillary intrachoroidal cavitation (PICC) is an ophthalmologic finding observed in highly myopic (HM) eyes and has been reported to accompany glaucomatous-like visual field defect (VFD). However, there has been no location-specific or quantitative analysis, and factors associated with visual field (VF) have yet to be determined. This study aimed to evaluate the location-specific association of deep optic nerve head (ONH) structures and background characteristics with VF in eyes with PICC.

Methods
Subjects were 129 eyes of 93 consecutive cases with PICC determined on fundus photographs and confirmed on optical coherence tomography (OCT). PICC location was determined on ONH-centered OCT radial slices according to Garway-Heath sectors. VFD corresponding to the location of PICC sector was considered absent when the pattern deviation probability plot showed no point with a probability less than 1% within the corresponding 24-2 Humphrey VF sector. A best-fit multivariable linear mixed model was used to evaluate the association of deep ONH structural changes and background characteristics with the corresponding sectoral mean total deviation (TD) of PICC sectors. Considered explanatory variables were age, sex, axial length, intraocular pressure, presence of full thickness retinal defect, circumpapillary retinal nerve fiber layer thickness (cpRNFLT), PICC depth, Bruch's membrane opening (BMO) area, scleral flange opening (SFO) area and BMO/SFO magnitude.

Results
Among 254 sectors with PICC, 136 sectors (54%) did not present corresponding VFD. Percentage of suspected VFD was highest in the temporal (34/50, 68%) and inferior temporal (67/104, 64%) sectors. In the best-fit multivariable analysis, worse sectoral TD was associated with the presence of full thickness retinal defect ($p<0.001$) and thinner cpRNFLT ($p<0.001$) but was not significantly associated with PICC depth ($p=0.061$) or other deep ONH parameters.

Conclusions
Although PICC alone did not necessarily cause corresponding VFD, PICC in the temporal and inferior temporal sectors should be carefully examined for VF abnormality. The presence of full thickness retinal defect, a myopia-induced tissue disruption, as well as cpRNFL thinning at the location of PICC was significantly associated with worse VF while PICC size or other myopia-related deep ONH structural changes were not. Identification of these factors provides a foundation for understanding VF sensitivity reduction in eyes with characteristic highly myopic ONH changes.

P-0613

DIAGNOSTIC ABILITY OF SD-OCT AND VFT PARAMETERS FOR GLAUCOMA DETECTION AND DISCRIMINATION IN AN AFRICAN POPULATION

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Background
Glaucoma remains a leading cause of irreversible blindness globally. Accurate diagnostic tools are critical for early detection and management, yet studies on this subject among African populations are limited despite the high prevalence in the region. This study evaluates the diagnostic ability of optical coherence tomography (OCT), visual field testing (VFT), and clinical parameters in detecting primary open-angle glaucoma (POAG) across severity stages in an African population.

Methods
A retrospective cross-sectional study was employed to select healthy and POAG eyes diagnosed by an ophthalmologist from a tertiary eye center between June 2022 and July 2024. Data from OptoVue OCT, Humphrey Visual Field Analyzer, and clinical parameters were retrieved from patient records. Disease severity was graded using the Hodapp-Parrish-Anderson (HPA) staging system. The diagnostic performance of each parameter was assessed using the Area Under the Receiver Operating Characteristic (AUROC) curve.

Results
Data were analyzed from 605 eyes (361 glaucomatous, 244 healthy) of 367 males (60.7%) and 238 females (39.3%). Significant differences were found in GCC, RNFL, MD, and PSD between glaucoma and healthy groups ($p<0.001$), although no sex-based differences in glaucoma prevalence were observed ($p=0.954$). CDR and IOP had low to moderate diagnostic abilities (AUC 0.65 and 0.69, respectively). Age was significantly associated with glaucoma ($p<0.001$) and had a moderate AUC for glaucoma detection (0.65). VFT parameters showed moderate diagnostic ability, with MD (AUC 0.73) outperforming PSD (AUC 0.64). Among the OCT parameters, the Average RNFL had the highest diagnostic ability (AUC, 0.88), followed by GLV (AUC, 0.87). GCC parameters had AUCs from 0.85 to 0.87, indicating a superior performance to RNFL parameters (AUC, 0.78–0.88). OCT ONH parameters showed low to moderate ability (AUC 0.55–0.72). GLV had the highest performance in discriminating early glaucoma from normal, with an AUC value of 0.67. The temporal RNFL (AUC-0.61) was the highest performer among the RNFL parameters in detecting early glaucoma from normal. GLV had the highest diagnostic ability for discriminating early from moderate glaucoma (AUC 0.80), and for moderate and severe stages, all GCC and RNFL parameters achieved AUCs from 0.85 to 0.92. Average RNFL, Inferior GCC, Average GCC, and GLV showed the highest diagnostic ability for severe glaucoma (AUC 0.92, 0.91, 0.90, and 0.90, respectively).

Conclusions
OCT parameters generally showed greater glaucoma diagnostic ability over VFT parameters. GCC parameters exhibited superior diagnostic capabilities across glaucoma severity stages compared with RNFL and clinical measures in the African population studied. The GLV parameter may be useful for detecting or confirming early glaucoma diagnosis. These findings emphasize the value of OCT metrics, particularly GCC and RNFL, as robust tools for glaucoma diagnosis in diverse clinical contexts.

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P-0614

ASSESSING DEFECT DETECTABILITY IN THE CENTRAL VISUAL FIELD WITH A REDUCED DENSITY TEST PATTERN AND SIZE V STIMULUS

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Background

The 10-2 test pattern is the current clinical standard when evaluating the central visual field. However, it can be relatively time consuming with 68 locations being sampled across the central 10 degrees. Therefore, we aimed to investigate how the diagnostic performance of a test pattern comprising of a reduced number of test locations (32 locations spaced 3 degrees apart) compares with the standard 10-2 size III test pattern as reference. We also investigated performance of the size V stimulus.

Methods

Twenty-four participants with glaucoma (mean MD = -5.92 dB, SD = 4.69 dB) and 32 healthy participants (mean MD = +0.92 dB, SD = 0.98 dB) were included in the study. The mean age of the study sample was 60 years (SD = 18.15, range = 25 to 85). Visual fields were acquired using a HFA3 Model 840 (ZEISS, Dublin, CA) perimeter using the Full Threshold test strategy for three combinations of stimulus size and test pattern: (1) size III 10-2 reference, (2) size III reduced test pattern and (3) size V reduced test pattern. Whilst each test strategy was undertaken twice on two separate visits, data from visit 2 were used for statistical analysis to minimise learning effects. Test order was randomised at each visit. Size III and V reference limits were interpolated from a previous study [1]. Topographic plots were utilised to explore total number of flagged locations at the 5% level for total deviation with respect to spatial location. Pearson correlation and agreement using Bland-Altman analysis of fraction of abnormal total deviation locations flagged at the 5% level between the three test combinations were also investigated.

Results

All three test combinations displayed strong correlation and agreement when compared against each other. The size III 10-2 reference pattern vs size III reduced pattern demonstrated the highest correlation and agreement (r^2 = 0.93 , mean difference = -0.03, limits of agreement [LOA] = -0.17, 0.11), followed by size III reduced vs size V reduced (r^2 = 0.89, mean difference = 0.02, LOA = -0.17, 0.21) and size III 10-2 reference vs size V reduced (r^2 = 0.88), mean difference = -0.01, LOA = -0.21, 0.19).

Image

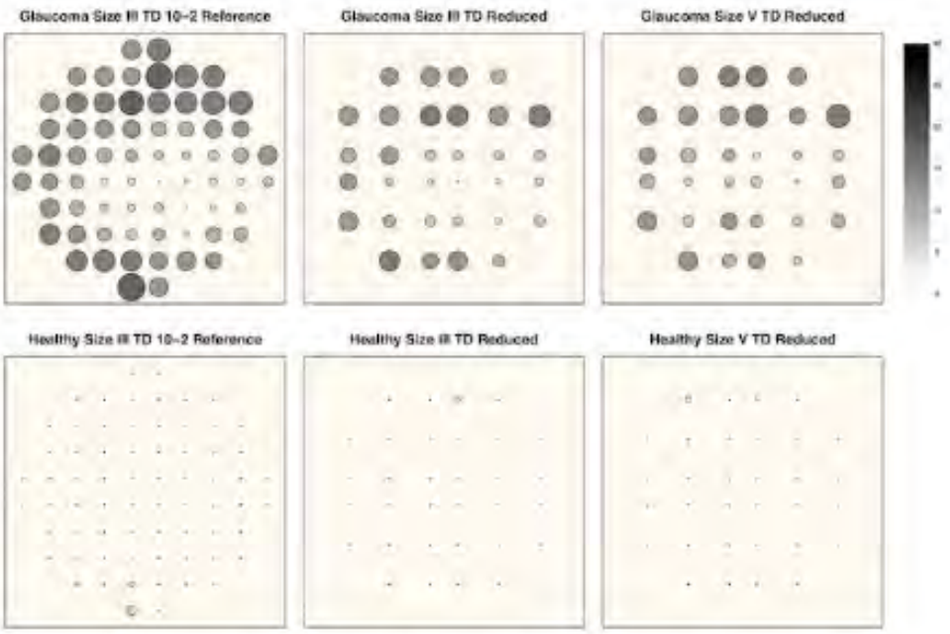

Figure 1. Topographic plots illustrating the total number of abnormal total deviation locations flagged at the 5% level across all 24 glaucomatous eyes (top row) and 32 healthy eyes (bottom row) for size III reference, size III reduced and size V reduced test patterns. Darker and larger circles indicate more flagged locations.

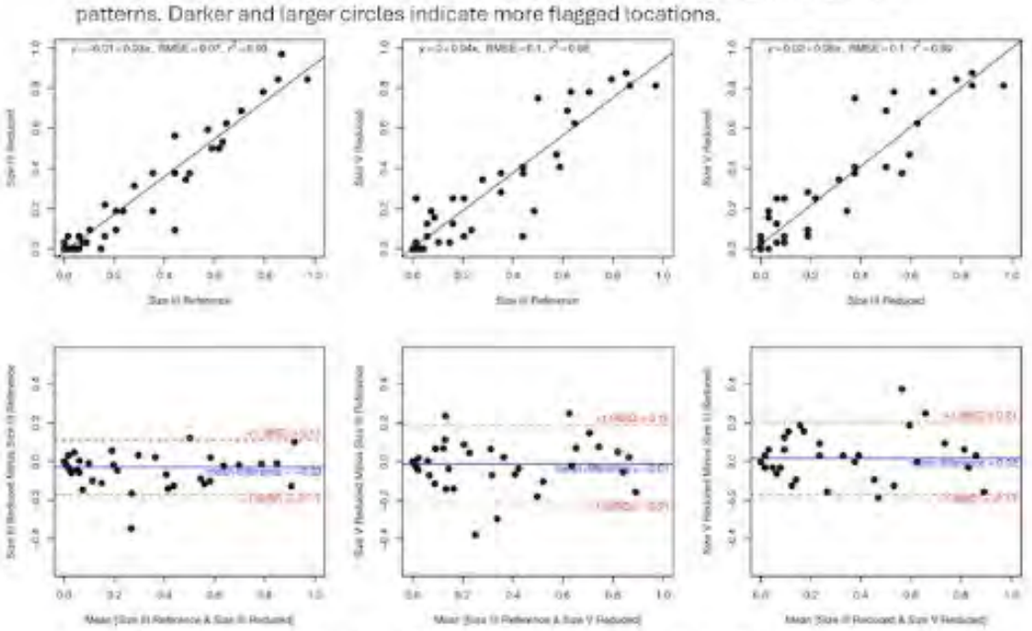

Figure 2. Correlation (top row) and Bland-Altman (bottom row) plots illustrating the fraction of flagged total deviation test locations at the 5% level.

Conclusions

Despite the understanding that size III may perform better in the central 10 degrees based on spatial summation properties, the preliminary results from this study suggest that there may be comparable diagnostic performance between the size III 10-2 reference pattern and size III and V reduced test patterns.

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P-0618

COMPARISON OF DIAGNOSTIC CAPABILITY OF SPECTRALIS AND CIRRUS OPTICAL COHERENCE TOMOGRAPHY IN GLAUCOMA IN A TAIWAN CHINESE POPULATION

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Background
To compare the diagnostic ability of Spectralis optical coherence tomography (OCT) and Cirrus OCT in glaucoma.

Methods
This retrospective cross-sectional study included 183 glaucomatous eyes (mean deviation [MD]: -7.249 ± 7.312 dB) (135 primary open angle glaucoma, 24 normal tension glaucoma, and 24 primary angle closure glaucoma) and 150 normal (MD: -1.866 ± 3.136 dB) eyes. The diagnostic performance of OCT parameters, including optic nerve head (ONH) and macular parameters, were compared between the two OCT units. The area under the receiver operating characteristic curve (AUC) of each parameter signified its power to differentiate between normal and glaucomatous eyes.

Results
In Spectralis OCT, the best AUC was 0.903 with a combination of 9 parameters, including temporal inferior peripapillary retinal nerve fiber layer (ppRNFL), nasal inferior ppRNFL, superior outer macular full thickness, inner temporal macular inner plexiform layer (mIPL), inner nasal mIPL, outer nasal mIPL, outer superior mIPL, central mIPL, and inner nasal macular ganglion cell-inner plexiform layer. In Cirrus OCT, the best AUC was 0.913 with a combination of 8 parameters, including inner temporal internal limited membrane to retinal pigment epithelium thickness (ILM-RPE), outer temporal ILM-RPE, inner nasal ILM-RPE, outer superior ILM-RPE, average ppRNFL, superior ppRNFL, nasal ppRNFL, and inferior ppRNFL. There is no significant difference between the two OCT units in AUC.

Conclusions
Both Spectralis OCT and Cirrus OCT show good and equal diagnostic capability in glaucoma detection in Chinese population from Taiwan. However, clinicians should still be cautious in interpreting the data in real practice.

P-0619

COMPARISON OF THE 24-2C, 24-2, AND 10-2 HUMPHREY VISUAL FIELD TESTS – A SYSTEMATIC REVIEW

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Background
The Humphrey Visual Field (HVF) 24-2C is a novel visual field testing protocol aimed to enhance central visual field defect (CVFD) detection in the traditional HVF 24-2 protocol without requiring a separate HVF 10-2 test in a time-efficient manner. This study aims to compare the performance of the HVF 24-2C protocol with the HVF 24-2 and 10-2 protocols among glaucoma patients.

Methods
A systematic review was performed for studies published from inception up to 30 August 2024. Studies that compared conventional visual field (VF) indices such as mean deviation (MD), pattern standard deviation (PSD), ability to defect CVFDs, structure-function (S-F) concordance, and test characteristics between the HVF 24-2C SITA-Faster, 24-2 SITA-Standard or Faster, and 10-2 SITA-Standard or Fast protocols were included.

Results
8 studies including 1241 patients (49.0% male; mean age 54.8-66.9 years) were analysed. The 24-2C Faster produced similar global VF indices (MD, PSD and central mean sensitivity) when compared to the 10-2 and 24-2 Standard and Faster protocols. While the 24-2 Standard and 10-2 Standard protocols tended to measure lower MD and higher PSD values compared to the 24-2C Faster, intraclass correlation analysis (ICC = 0.95 and 0.80, p<0.001) and Bland-Altman plots showed no systematic difference in values, suggesting substantial agreement in MD and PSD between the 24-2C Faster compared to the 24-2 and 10-2 Standard. The 24-2C Faster tended to identify more VF defects and CVFD clusters than the 24-2 Standard and Faster on total deviation, pattern deviation, and total probability plots, even in mild glaucoma. The 24-2C Faster had higher S-F concordance than the 24-2 Standard and Faster, identifying more significant defects than the 24-2 Faster in areas with structural loss, and a higher ratio of functional defects than structural defects than the 24-2 Standard and Faster protocols. While the 10-2 Standard and Fast detected a significantly higher number of CVFDs and had a higher degree of S-F concordance than the 24-2C Faster, there was high degree of agreement (k=0.488 to 0.708) between the protocols. The 24-2C Faster had a significantly shorter median test duration compared to the 24-2 Standard and both the 10-2 Standard and Fast protocols. The 24-2C Faster had comparable false positive rates, higher false negative rates, and less fixation losses compared to the 24-2 Standard.

Conclusions
The HVF 24-2C Faster identifies more CVFDs than the 24-2 Standard or Faster protocols within a shorter testing period, without compromising on other indices assessing peripheral VF defects, even in mild glaucoma. It demonstrates high agreement with the HVF 10-2 Standard and Fast protocols and may be a good alternative to screen for CVFDs in pre-perimetric or mild glaucoma.

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P-0620

EVALUATING THE CLINICAL UTILITY OF GLAUCOMA PREDICTION MODELS USING DECISION CURVE ANALYSIS

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Background

Decision curve analysis[1] (DCA) was introduced to facilitate comparison of prediction models in situations such as cancer screening, but may offer promise in evaluating diagnostic tests for glaucoma. We recently used DCA to demonstrate the net benefit of a prediction score for glaucoma.[2] Here we use DCA to compare several potential prediction scores for glaucoma.

Methods

This was a retrospective analysis of data collected at 3 clinical sites, where the factors required for all 3 models were obtained: a 3D Wide OCT scan from Maestro2TM (Topcon Corporation, Tokyo, Japan), central corneal thickness (CCT), intra-ocular pressure (IOP), and pattern standard deviation from 24-2 threshold visual fields. OCT reports were graded independently by 2 clinicians using the Columbia University method (CU).3 Scans labeled as suspects or other pathologies were excluded. If graders disagreed, an adjudication meeting was held, reassessing the case with additional clinical data, including IOP, CCT, visual fields, and OCT reports from the patient record, including previous visits. Healthy subjects had both eyes labeled as healthy. Glaucoma subjects required only one glaucomatous eye. The dataset comprised an equal number of normal and glaucomatous eyes, matched for sex and age.

Three scores were evaluated: a multi-factorial OCT score (MOS) derived from imaging metrics4, a glaucoma health score (GHS) combining clinical and imaging parameters,2 and a Tension Score (TS), which integrated MOS, IOP, and age to address the influence of ocular hypertension tension(TS), Receiver operating characteristics (ROC) and Decision Curve Analysis (DCA) were performed, and sensitivity and specificity corresponding to the optimal Youden index thresholds for each method were assessed.

Results

Figure 1 shows the ROC (A) and DCA (B) curves for all three models. AUC (95% CI) for MOS was 0.97 (0.94, 1.00), for GHS 0.96 (0.91, 1.00), and for TS 0.94 (0.88, 0.99). Table 1 shows the sensitivity and specificity of each model at the threshold using Youden's J statistic. TS had the best specificity, while MOS had the best sensitivity. Although confidence intervals for AUC overlapped, the DCA demonstrates that when all data is available, GHS has the highest net benefit.

Image

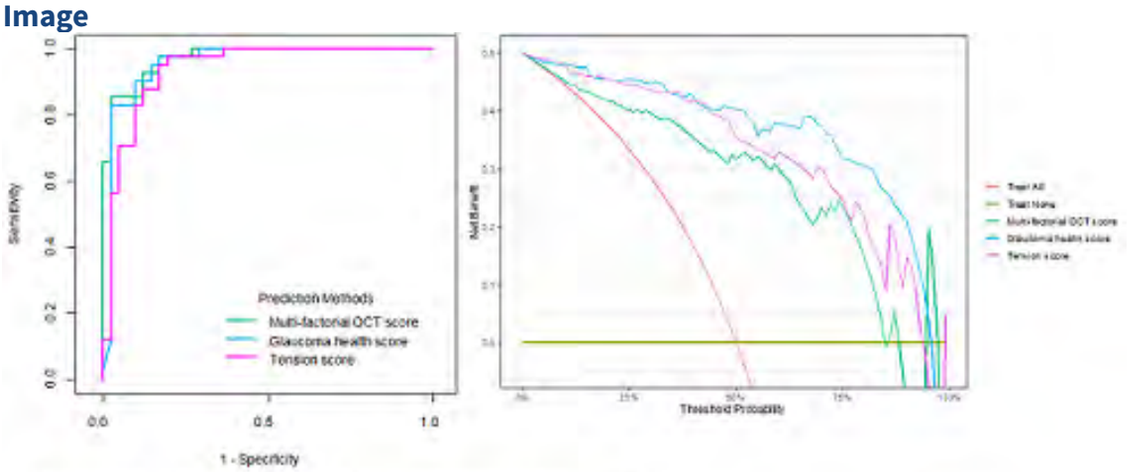

Table 1 Diagnostic efficacy values for each of the three glaucoma prediction models

Method	AUC (95% CI)	Youden's J statistic	Specificity (95% CI)	Sensitivity (95% CI)
Multi-factorial OCT score	0.97 (0.94, 1.00)	0.83	0.85 (0.72, 0.93)	0.98 (0.87, 1.00)
Glaucoma health score	0.96 (0.91, 1.00)	0.80	0.90 (0.77, 0.96)	0.90 (0.77, 0.96)
TS	0.94 (0.88, 0.99)	0.78	0.98 (0.87, 1.00)	0.80 (0.66, 0.90)

Conclusions

While all three risk scores exhibited comparable performance for distinguishing glaucoma from healthy, GHS and TS outperformed MOS in clinical utility as demonstrated by DCA. The higher net benefit for GHS and TS at all thresholds suggests that incorporating clinical information improves the overall net benefit of glaucoma prediction. Future studies should validate these findings in larger, more diverse populations to ensure generalizability.

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P-0621

THE DIAGNOSTIC ACCURACY OF OPTIC NERVE HEAD AND MACULA OCT-ANGIOGRAPHY VASCULAR DENSITY AND OCT THICKNESS FOR DETECTING GLAUCOMA IN HIGH MYOPIC EYES

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Background

To characterize OCT-Angiography (OCTA) vascular differences in axial myopic and non-myopic eyes with and without glaucoma and to compare the diagnostic accuracy of optic nerve head (ONH) and macula vascular OCTA and OCT-parameters to detect glaucoma in eyes with high myopia.

Methods

323 eyes of 205 glaucoma patients participating in the Diagnostic Innovations in Glaucoma Study (DIGS) representing non (n=111 eyes), mild (24mm < axial length [AL] < 26mm, n=161 eyes), and high myopia (AL > 26 mm, n=51 eyes) and 212 eyes of 117 healthy subjects representing non (n=88 eyes), mild (n=68 eyes), and high myopia (n=56 eyes) were included. ONH (peripapillary) and macular superficial vessel density (sVD) were measured with the Avanti AngioVue OCT (Optovue) and peripapillary retinal nerve fiber layer (pRNFL) and ganglion cell inner plexiform layer (GCIPL) were measured with the Spectralis OCT (24 radial scans, 3.5mm diameter circle scan for pRNFL and posterior Pole scans for GCIPL) and compared between the groups. The diagnostic accuracy for glaucoma detection was evaluated using the area under the receiver operating characteristic curve (AUC) adjusted for age, visual field MD and scan quality.

Results

In healthy eyes both ONH sVD and macular sVD were significantly lower in high myopic eyes compared to non- and mild myopic eyes (ONH sVD mean; [95% CI], 47.7 [46.8, 48.6], 49.1 [48.3, 49.8] and 49.0 [48.1, 49.8], respectively, p=0.022 and mean macular sVD; [95% CI], 46.9 [45.3, 48.4], 49.2 [47.9, 50.5] and 47.1 (45.8, 48.3), p=0.036 respectively). In glaucoma eyes both, ONH and macular sVD, were lower in high myopic eyes compared to non- and mild myopic eyes but did both not reach statistical significance (p=0.104 and p=0.086, respectively). ONH and macular sVD were significantly higher in healthy than glaucoma eyes, regardless of myopic status (all p<0.004).

The adjusted AUC was higher for ONH sVD compared to macular sVD and ranging between 0.79, 0.89 and 0.88, respectively for non- mild and high-myopic eyes. The adjusted AUC for macular sVD was 0.73, 0.77 and 0.79 respectively for non-, mild and high myopic eyes.

Adjusted AUCs for pRNFL were 0.90, 0.85 and 0.95 for non-, mild and high myopic eyes respectively and AUCs for GCIPL were 0.83, 0.78 and 0.91, respectively.

Conclusions

The diagnostic accuracy of ONH sVD was higher compared to macular sVD in high myopic eyes but lower compared to OCT-parameters, implying OCT parameters are superior to Optovue AngioVue-OCTA parameters to differentiate between healthy and glaucoma eyes with high myopia.

P-0622

ONLINE CIRCULAR CONTRAST PERIMETRY FOR DRIVING ASSESSMENT: COMPUTER-BASED BINOCULAR PERIMETRY COMPARED TO THE ESTERMAN TEST IN GLAUCOMA PATIENTS

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Background
To assess the feasibility of an online computer-based binocular driving perimetry assessment (OBDP) based on online circular contrast perimetry, and agreement with binocular static Esterman visual field testing (EVFT).

Methods
A prospective comparative cohort study was conducted on patients with or without open-angle glaucoma, recruited from a single site glaucoma subspecialty practice. Eligible subjects underwent two visual field tests using OBDP and this was compared to the results of a single EVFT.

Results
80 patients were enrolled in the study, with a mean age of 69 years (+/- 13.4 SD). Of these, 49% were female, 18 were healthy controls, while 20, 18 and 24 had mild, moderate and severe glaucoma respectively. Pearson and intraclass correlation between the two perimetry methods for percentage of points not seen was 0.85 and 0.86 (95% confidence interval (CI) 0.78-0.9) respectively for the overall binocular visual field. When the binocular field was subdivided into 8 sectors, intra-class coefficients (ICCs) ranged from 0.76 to 0.93 for each sector. Bland-Altman analysis revealed a difference of 1.24% (95%CI -16.93 to 19.30%) between the two methods for the overall field, ranging from 0.04% to 4.17% for each sector. Using different cutoffs of the EVFT (0 to 4 points not seen) as the clinical standard, the OBDP had AUCs ranging from 0.75 (standard error (SE) 0.25) to 0.84 (SE 0.17) for predicting EVFT results.

Conclusions
OBDP showed moderate to strong agreement with EVFT. As an online application that easily runs on any computer, it could expand the scope of binocular perimetry screening for licence assessment. With modifications, integration into modern clinical licencing procedures could be considered.

P-0623

ORBITAL VOLUME IN PRIMARY ANGLE-CLOSURE GLAUCOMA: A COMPUTED TOMOGRAPHY STUDY

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Background
Primary angle-closure glaucoma (PACG) is a leading cause of irreversible vision loss and is projected to impact 32 million individuals worldwide by 2040. This study aims to evaluate the orbital volume of primary angle-closure glaucoma (PACG) eyes and normal eyes by computed tomography (CT) scans.

Methods
This observational case-control study involved PACG patients who underwent laser peripheral iridotomy (LPI) without any surgery history and age-matched healthy volunteers. All participants underwent full ophthalmological examination and CT scans. Orbital volume was measured using a manual segmentation technique on CT scans with the Mimics (Materialise) software. Intraclass correlation coefficients (ICCs) were computed to evaluate measurement repeatability. The mixed effect linear model was used to compare orbital volume differences between groups.

Results
Nineteen patients (6 males and 13 females, 37 eyes) and 10 (3 males and 7 females, 20 eyes) healthy volunteers were included in the study. The mean orbital volume values in PACG patients (20.98 ± 1.93 ml) were lower than controls (21.54 ± 1.94 ml), but this difference was not statistically significant ($p = 0.30$). Additionally, ICC values demonstrated excellent reliability (ICC > 0.75) for all measurements.

Conclusions
We did not find significant differences in orbital volume between PACG eyes and normal eyes.

P-0626

EVALUATING RETINAL GANGLION CELL FUNCTION IN GLAUCOMA SUSPECTS WITH MYOPIA USING STEADY STATE PATTERN ELECTRORETINOGRAM

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Background

Myopia is a documented risk factor for glaucoma, however, this relationship remains unclear. Studies have reported direct associations between primary open angle glaucoma prevalence and myopia severity, strongest in high myopia. Others have found no effect of myopia on glaucoma progression. There is limited research on the effect of myopia on retinal ganglion cell (RGC) activity. Steady state pattern electroretinogram (ss-PERG) provides an objective measure of RGC function and has been used to identify early glaucomatous RGC dysfunction. This study aims to utilize ss-PERG to observe whether there is a difference in RGC function among glaucoma suspects (GS) with mild myopia (MildM), moderate myopia (ModM), and emmetropia (EM).

Methods

23 participants, 41 eyes, recruited from the Manhattan Eye, Ear, and Throat Hospital were used in this cross-sectional study. All participants underwent comprehensive eye examination, Humphrey field analyzer (HFA) 24-2 and 10-2, optical coherence tomography, and ss-PERG. GS were categorized into the following groups based on spherical equivalent: EM (+1D to -1D), MildM (-1D to -3D), and ModM (-3D to -7D). T-tests were used to assess the mean differences between groups.

Results

Groups were well matched by their GS status and did not differ by age, intraocular pressure, 10-2 mean deviation (MD), rim area, or rim area residualized by disc area. Of the 23 participants, there were 13 females and 10 males. Comparing EM to MildM, no differences were found. There were decreased ss-PERG parameters in ModM compared to EM but was not statistically significant. A similar decrease in ss-PERG parameters was found in ModM compared to MildM but was not statistically significant. 24-2 MD was significantly decreased in ModM compared to both MildM and EM.

Conclusions

Decreased ModM ss-PERG parameters, albeit statistically insignificant, may indicate that more severe myopic states predispose RGCs to inadequate electrical responses. Fewer RGCs per area due to an increased anterior posterior axial length could contribute to this finding. Additionally, MildM may not affect ss-PERG parameters. 24-2 MD findings suggest that myopia may masquerade as glaucoma, presenting with classic glaucomatous visual patterns of global depressed RGC function, potentially due to coexisting chronic vascular or mechanical abnormalities. Further studies are needed to appreciate the effect of myopia on RGC health.

P-0627

DETECTION OF GLAUCOMATOUS VISUAL FIELDS USING A NEWLY DEVELOPED DEVICE WITH RETINAL PROJECTION TECHNOLOGY

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Background

We aimed to investigate the glaucoma-detecting ability of MEOCHECK, a novel and simple visual field measurement device based on retinal projection technology.

Methods

This retrospective observational study evaluated 94 glaucomatous eyes of 51 subjects and 31 non-glaucomatous eyes of 23 healthy subjects. We compared MEOCHECK's main output, Score 100, to visual acuity, intraocular pressure, and optical coherence tomography–measured parameters (circumpapillary retinal nerve fiber layer thickness [cpRNFLT] and ganglion cell complex thickness [GCCT]), as well as automated perimetry–measured mean deviation (MD) and total deviation (TD) in glaucomatous eyes. TD, cpRNFLT, and Score 100 were measured separately in the upper and lower sectors to evaluate the correlation between corresponding regions. Furthermore, after using propensity matching to match the control and glaucoma groups for age, best-corrected visual acuity, and lens condition, we evaluated the diagnostic ability of Score 100 for glaucoma by comparing the groups.

Results

Score 100 showed significant correlations with age, visual acuity, cpRNFLT, GCCT, and MD ($r = -0.38$, $p < 0.001$; $r = -0.42$, $p < 0.001$; $r = 0.65$, $p < 0.001$; $r = 0.59$, $p < 0.001$; and $r = 0.62$, $p < 0.001$, respectively). Score 100 in the upper and lower sectors was significantly correlated with TD in the corresponding sectors ($r = 0.56$, $p < 0.001$; $r = 0.51$, $p < 0.001$) and cpRNFLT ($r = 0.65$, $p < 0.001$; $r = 0.50$, $p < 0.001$). Score 100 was significantly lower in patients with early glaucoma than those with moderate glaucoma ($p = 0.03$) and lower in those with moderate glaucoma than those with severe glaucoma ($p = 0.002$). A logistic regression analysis indicated that Score 100 could predict the presence of glaucoma, with an area under the receiver operating characteristic curve of 0.89 ($p < 0.001$).

Conclusions

MEOCHECK, a novel device that uses retinal projection technology, effectively detected glaucomatous visual fields, demonstrating its potential as a reliable tool for glaucoma detection.

P-0628

COMPARISON OF CHOROID THICKNESS IN MACULAR AREA OF PRIMARY OPEN-ANGLE GLAUCOMA AND PRIMARY CHRONIC ANGLE-CLOSURE GLAUCOMA

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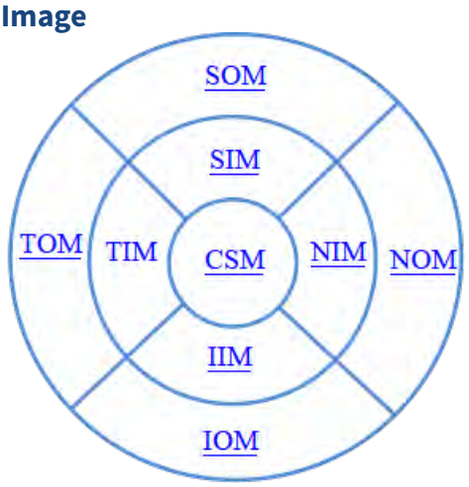
Background
An increasing number of studies suggest that the choroid and systemic blood flow parameters may play a significant role in the progression of glaucoma . Choroidal thickness can reflect the status of choroidal blood flow . In this study, we used EDI-OCT to measure the average choroidal thickness and volume in nine areas of the macula in eyes with POAG, PACG, and normal eyes,investigating differences in macular choroid thickness and volume between patients with primary open-angle glaucoma (POAG), primary chronic angle-closure glaucoma (CPACG) and normal controls.

Methods
This was a case-controlled study. Patients admitted to Shijiazhuang People's Hospital from October 2018 to October 2021 were selected.A total of 77 patients (77 eyes) with POAG were selected as the POAG group, 80 patients (80 eyes) with CPACG were selected as the PACG group, and 79 normal subjects (79 eyes) with matched age, intraocular pressure and axial length axis were selected as the control group.Using Enhanced depth imaging optical coherence tomography (EDI-OCT), the thickness and volume of choroid in 9 macular regions of all subjects was analyzed by one-way variance measurement.Pearson correlation analysis was used to analyze the correlation between choroidal thickness in macular choroid thickness and visual field mean defect (MD) in glaucoma patients.

Results
The choroidal thicknesses of the average macula, central subfield macula, nasal inner macula, superior inner macula, temporal inner macula, inferior inner macula, nasal outer macula, superior outer macula and temporal outer macula regions between the POAG group, CPACG group and the normal control group were statistically significant(P<0.05)The choroidal volume of the average macula, central subfield macula, nasal inner macula, superior inner macula, temp oral inner macula, inferior inner macula, nasal outer macula, superior outer macula and temporal outer macula regions in three groups were statistically significant(P<0.05).Compared with POAG group and control group, the thickness and volume of choroid in 9 macular regions and average choroidal thickness or volume in CPACG group were thicker and larger, and the differences were statistically significant. (P<0.05).The macular choroidal thickness of various macular regions was not correlated with MD in POAG group and CPACG group.(P > 0.05)

Image



Conclusions

The macular choroid of primary angle-closure disease eyes is thicker than that of healthy eyes. The choroidal thickness and volume of macular area in CPACG patients were thicker and larger than those in POAG patients and normal controls. The choroid may play an important role in the pathogenesis of CPACG patients.

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P-0629

ANALYSIS OF CONJUNCTIVAL AND SCLERAL VESSEL DENSITY IN NON-GLAUCOMATOUS AND GLAUCOMATOUS EYES USING ANTERIOR SEGMENT OCTA

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Background

This study investigates scleral vessels in the limbal region. Aqueous humor flows from the ciliary body through the trabecular meshwork, Schlemm's canal, and collector channels, draining into episcleral veins via deep scleral veins in the limbus.[1] In primary open-angle glaucoma (POAG), resistance beyond Schlemm's canal and within the trabecular meshwork contributes to elevated intraocular pressure (IOP).[2] Nasally located collector channels and episcleral veins are reportedly more abundant.[3] Optical coherence tomography angiography (OCTA) is a non-invasive imaging method detecting red blood cell motion to visualize vessels.[4] Recent studies suggest OCTA's potential for imaging conjunctival and scleral vessels.[5] Compared to fluorescein angiography, OCTA is less invasive and allows depth-specific evaluation. This study explores OCTA's potential to visualize deep scleral veins. Studies comparing limbal scleral vessels between glaucomatous and non-glaucomatous eyes are limited, necessitating further research.

Methods

This study included non-glaucomatous eyes (15 cases, 30 eyes) and glaucomatous eyes (22 cases, 44 eyes) examined from October 2023 to March 2024. Using OCTA (Mirante, Nidek Co.), vessel density (%) in conjunctiva and sclera adjacent to temporal and nasal limbus was measured. Layers were defined as superficial (from the conjunctival epithelium to 200 µm below) and deep (from 200 µm below the conjunctival epithelium to the posterior sclera). Statistical analyses, including paired t-tests and Welch's t-tests, were conducted with a significance level of $P < 0.05$.

Results

Mean ages of non-glaucomatous and glaucomatous eyes were 58.47 ± 18.36 and 61.77 ± 13.70 years, respectively. Mean IOPs were 16.21 ± 5.50 mmHg and 14.72 ± 4.56 mmHg. The mean number of glaucoma medications for glaucomatous eyes was 2.23 ± 1.25. In non-glaucomatous eyes, temporal vessel densities for superficial and deep layers were 26 ± 11.87% and 29.62 ± 9.52%, respectively; nasal densities were 41.52 ± 7.75% and 31.25 ± 8.08%. For glaucomatous eyes, temporal densities were 36.25 ± 9.63% (superficial) and 30.51 ± 10.19% (deep), and nasal densities were 40.90 ± 9.17% (superficial) and 28.98 ± 8.06% (deep). In non-glaucomatous eyes, no significant differences between temporal and nasal regions were observed. In glaucomatous eyes, a significant difference was found in the superficial layer ($P = 0.014$). No significant intergroup differences in vessel density were observed in either region.

Conclusions

Anterior segment OCTA revealed a tendency for higher nasal vessel density compared to the temporal region. Although no significant differences in vessel density were observed between glaucomatous and non-glaucomatous eyes, all glaucomatous eyes were under anti-glaucoma medication treatment, suggesting a possible influence on the results that cannot be ruled out.

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P-0630

COMPARISON BETWEEN THE FAST STRATEGIES OF A VIRTUAL REALITY PERIMETRY AND THE HUMPHREY FIELD ANALYZER IN PATIENTS WITH GLAUCOMA

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Background

Standard Automated Perimetry has long been a reliable, reproducible, and accurate measure of visual field dysfunction. Despite its widespread use, it may not be performed often enough due to its significant limitations. (1,2) Innovations to improve visual field testing, such as faster testing algorithms and virtual reality field monitoring, could make more frequent visual field testing feasible and less burdensome for patients. (3,4) In general, portable or online perimeters have shown to be reliable and accurate in assessing visual fields. (5,6) This study compared the agreement between the Humphrey Field Analyzer (HFA) SITA Fast strategy and a novel virtual reality head-mounted visual perimetry device (VisuALL) in glaucoma patients.

Methods

All participants had visual field testing with the VisuALL AVAFAST strategy and the HFA (24-2, Swedish Interactive Threshold Algorithm FAST). The mean sensitivity of the whole visual field (VF) and each quadrant was compared between both machines. Additionally, the pattern deviation (PD) plot was analyzed to compare the agreement of both devices to detect localized VF defects.

Results

The global mean sensitivity of the VisuALL and the HFA correlated significantly ($r = 0.60$, $P < 0.001$) and was in agreement. The ICC showed moderate agreement between VisuALL and HVF ($r= 0.73$, $P < 0.001$). While the agreement was good for nasal quadrants, 0.75 for superior and 0.79 for inferior, it was only moderate for temporal quadrants, 0.58 for superior, and 0.59 for inferior. The detection of visual field defects in all quadrants was also moderately correlated and in agreement. Participants overwhelmingly preferred the VisuALL over the conventional SAP (80%).

Image

TABLE 1. Visual field characteristics.

	VisuALL	HVF	GEE Model			
			Beta	Stde	Z	P
FALSE POSITIVE	3.15 (4.89)	1.03 (2.26)	2.17	0.80	-2.62	0.008
FALSE NEGATIVE	7.48 (7.29)	4.76 (9.38)	-2.72	1.94	-1.4	0.159
FIXATION LOSSES	5.84 (7.51)	0.94 (2.23)	-4.9	0.95	-5.14	<0.001
MD	-5.18 (5.96)	-4.90 (5.23)	0.28	0.51	0.55	0.58
PSD	4.57 (3.50)	5.65 (3.04)	1.07	0.45	2.36	0.018
DURATION	271.24 (83.21)	121.52 (7.76)	-149.7	13.12	-11.4	<0.001
VFI	87.44 (15.29)	91.25 (9.60)	3.81	1.97	1.82	0.053
SUPERONASAL	24.37 (4.77)	23.85 (5.63)	0.74	0.68	1.18	0.23
SUPEROTEMPORAL	24.30 (4.58)	23.09 (7.08)	1.49	0.75	1.97	0.048
INFERONASAL	23.93 (7.83)	26.24 (5.57)	1.22	0.62	1.99	0.046
INFEROTEMPORAL	23.97 (6.19)	24.71 (6.06)	0.91	0.64	1.44	0.149
GLOBAL	24.11 (5.17)	24.49 (5.21)	1.15	0.56	2.05	0.039
SUPERIOR	24.28 (4.32)	23.49 (5.55)	1211	0.649	1.85	0.062
INFERIOR	26.30 (4.39)	25.50 (5.41)	-3.51×10^{3}	3.5×10^{3}	-1	0.316

Conclusions

Although the mean sensitivity and ability to detect localized visual field defects of the VisuALL were correlated and in agreement with the HFA, this was only moderate. This indicates that the VisuALL AVAFast strategy needs some refinement to fully realize its capabilities and should be used cautiously.

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P-0631

QUANTITATIVE DIFFERENCES IN MICROVASCULATURE DROPOUT ON OCTA IMAGES OF GLAUCOMA PATIENTS DUE TO ANALYZING SLAB AND SEGMENTATION METHODS

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Background

Microvasculature dropout (MvD), a finding on OCTA, has been highlighted due to its association with retinal nerve fiber layer thinning and visual field progression in glaucoma patients.1)-4) However, the confirmation of MvD is rarely performed in routine practice. One reason for this is the time burden associated with verifying segmentation errors in OCTA images and the subsequent manual correction process required in previous MvD evaluations.

The purpose of this study is to investigate the differences in the presence rates and quantitative evaluation results of MvD using three types of OCTA images: 1)whole layer (WL) images that do not require segmentation error verification, manual correction or custom segmentation layer settings, 2)auto-segmented (AS) images based on automatic segmentation by OCTA viewer with retinal pigment epithelium (RPE) as the upper boundary at 390µm, and 3) manual-segmented (MS) images based on manually-corrected segmentation with the RPE as the upper boundary at 390µm.

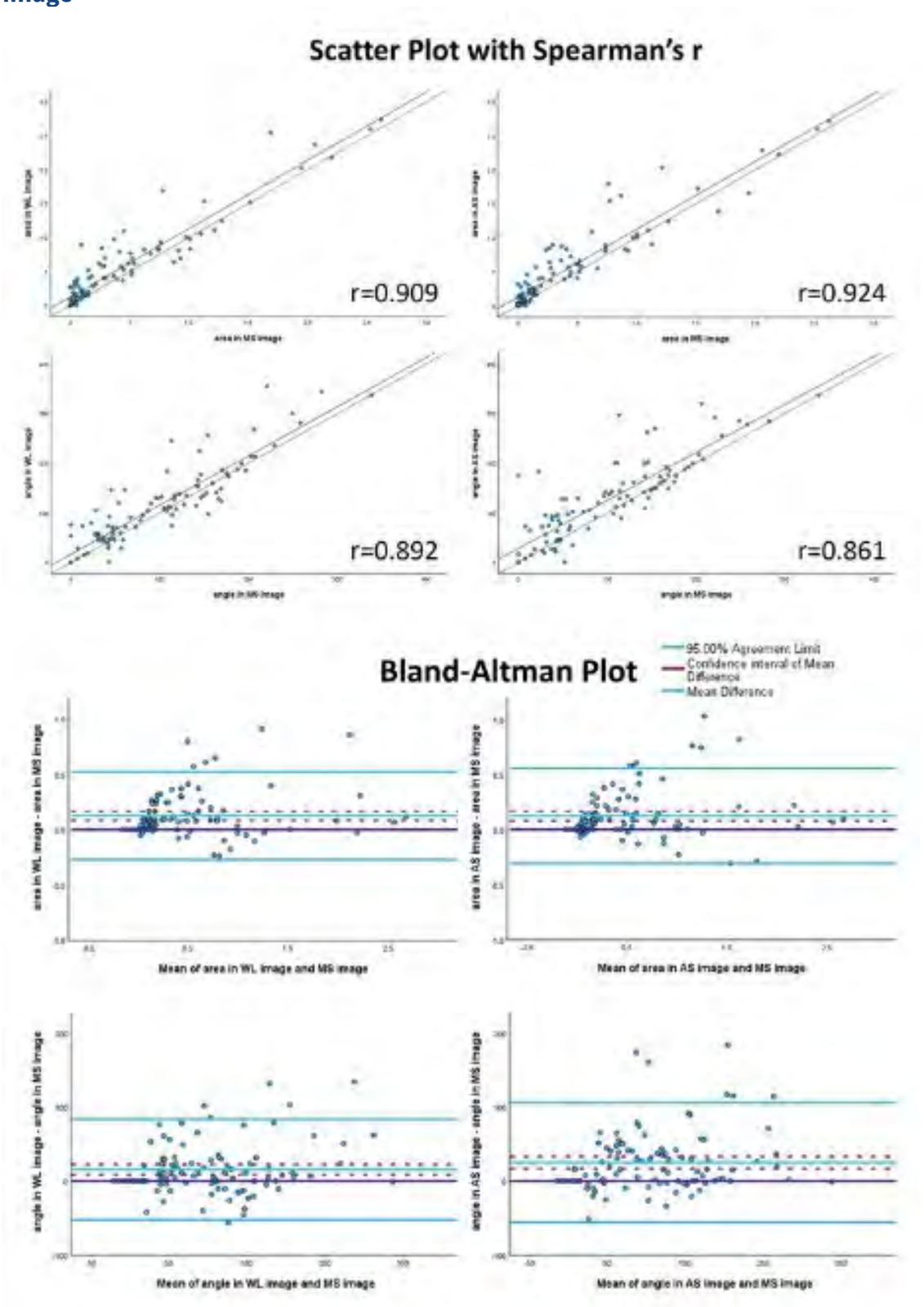
Methods

The study included 100 eyes from 100 patients with primary open-angle glaucoma. OCTA imaging of the 3×3 mm area around the optic disc was performed using the PLEX Elite 9000. Using ImageJ, we measured the area and angle of MvD in MS, AS, and WL images, and corrected the area for axial length using the Littmann formula. To examine the measurement errors and correlations between MS images and AS or WL images, we conducted Bland-Altman analysis and calculated Spearman's correlation coefficient (r) and the concordance correlation coefficient (ccc).

Results

The mean age of the 100 subjects was 67.2 (standard deviation(SD) 11.2) years and the mean MD value of HFA 24-2 was -11.2 (SD 6.2) dB. MvD was confirmed in 90%, 93%, and 91% of MS, AS, and WL images, respectively, with mean MvD areas of 0.419 mm^2, 0.543 mm^2, and 0.545 mm^2, and mean MvD angles of 96°, 121°, and 112°, respectively. The concordance rates of MvD presence with MS images were 95% for AS images and 97% for WL images. Scatter plots and Bland-Altman plots are shown in Figure. For MvD area and angle, using MS images as the reference, WL images had a mean error of 0.126 mm^2 and 15.5 degrees, while AS images had a mean error of 0.123 mm^2 and 24.9 degrees. Spearman's r and ccc for WL images compared to MS images were r=0.909 and ccc=0.920 for area, and r=0.892 and ccc=0.882 for angle. For AS images compared to MS images, Spearman's r and ccc were r=0.924 and ccc=0.911 for area, and r=0.861 and ccc=0.819 for angle.

Image



Conclusions

The concordance of MvD presence between MS images and both AS and WL images was very high. Although the area and angle of MvD in AS and WL images tended to be overestimated compared to the reference MS images, both the Spearman's r and ccc were very high. Recognizing these characteristics, it may be acceptable to use WL images for MvD evaluation without the need for segmentation error verification or manual correction.

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P-0632

COMPARISON OF 30-2 VISUAL FIELD USING MELBOURNE RAPID FIELDS ONLINE PERIMETRY AND HUMPHREY FIELD ANALYZER

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Background

Melbourne Rapid Fields (MRF) online computer perimetry is a web-browser based software that allows white-on-white threshold perimetry to be conducted using any computer. Previous study of MRF examined the validation of its 24-2 protocol[1]. This study evaluates the perimetric results of the wider 30-2 protocol from MRF online perimetry performed using a laptop computer in comparison to Humphrey Field Analyzer (HFA).

Methods

A prospective and cross-sectional study of 87 eyes from 87 Japanese glaucoma patients. The MRF software includes features such as computer vision gaze monitoring and thresholding using Bayes logic. The 30-2 VF results from MRF were compared to HFA 30-2 SITA-Fast, including Mean Deviation (MD), Pattern Deviation (PD), and reliability indices. Patients underwent 2 assessments on the MRF to establish test-retest reliability.

Results

Of the 87 eyes, 43 eyes had mild field defect (MD>-6dB), 24 had moderate field defect (-12dB≤MD≤-6dB), and 20 had advanced field defects (MD<-12dB). MRF demonstrated a significant correlation with HFA in evaluating MD ($P < 0.001$, correlation coefficient $(r) = 0.946$) and PSD ($P < 0.001$, $r = 0.849$). Bland-Altman analysis revealed a mean bias of -0.76 decibels (dB) (95% Limits of Agreement LoA -5.82 dB, +4.30 dB) for MD and 0.79 dB (LoA -4.24 dB, +5.82 dB) for PSD. In terms of the test-retest of MRF, Bland-Altman analysis demonstrated a mean bias of 0.25 dB (LoA – 2.48 dB, +2.99 dB) for MD and -0.21 dB (LoA -3.22 dB, +2.79 dB) for PSD. There were no statistically significant differences between the false positive, false negative or testing times between the two devices.

Image

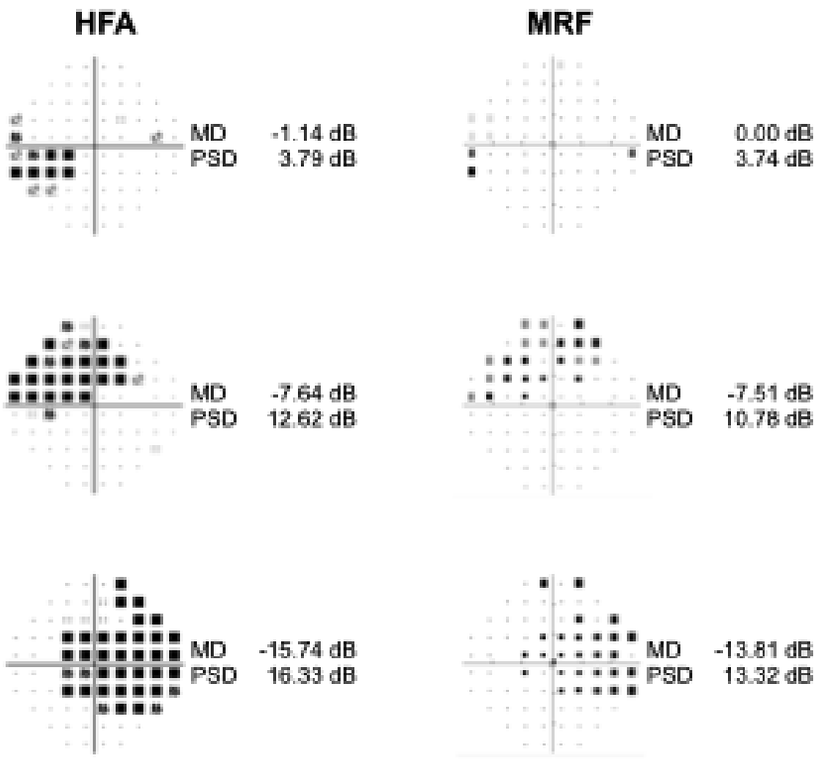

Figure 1. Representative visual fields from eyes with mild, moderate, and severe visual field defects. Total deviation probability plots from HFA are on the left, and outputs from MRF are on the right.

Conclusions

MRF provides a portable, reliable and patient-friendly alternative to HFA for Japanese glaucoma patients.

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P-0633

COMPARISON OF 10-2 VISUAL FIELD USING MELBOURNE RAPID FIELDS ONLINE PERIMETRY AND HUMPHREY FIELD ANALYZER

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Background

Melbourne Rapid Fields (MRF) online computer perimetry is a web-browser based software that allows white-on-white threshold perimetry to be conducted using any computer. Previous study of MRF examined the validation of its 24-2 protocol[1]. This study evaluates the perimetric results of the 10-2 protocol from MRF online perimetry performed using a laptop computer in comparison to Humphrey Field Analyzer (HFA).

Methods

A prospective and cross-sectional study of 91 eyes from 91 Japanese glaucoma patients. The MRF software includes features such as computer vision gaze monitoring and thresholding using Bayes logic. The 10-2 VF results from MRF were compared to HFA 10-2 SITA-Standard, including Mean Deviation (MD), Pattern Deviation (PD), and reliability indices. Patients underwent 2 assessments on the MRF to establish test-retest reliability.

Results

Of the 91 eyes, 36 eyes had mild field defect (MD>-6dB), 25 had moderate field defect (-12dB≤MD≤-6dB), and 30 had advanced field defects (MD<-12dB). MRF demonstrated a significant correlation with HFA in evaluating MD ($P < 0.001$, correlation coefficient $(r) = 0.939$) and PSD ($P < 0.001$, $r = 0.896$). Bland-Altman analysis revealed a mean bias of -3.07 decibels (dB) (95% Limits of Agreement LoA -8.92 dB, +2.78 dB) for MD and +0.71 dB (LoA -3.55 dB, +4.97 dB) for PSD. In terms of the test-retest of MRF, Bland-Altman analysis demonstrated a mean bias of +0.33 dB (LoA – 2.34 dB, +3.00 dB) for MD and -0.21 dB (LoA -2.36 dB, +1.93 dB) for PSD. There were no statistically significant differences between the false positive, false negative or testing times between the two devices.

Image

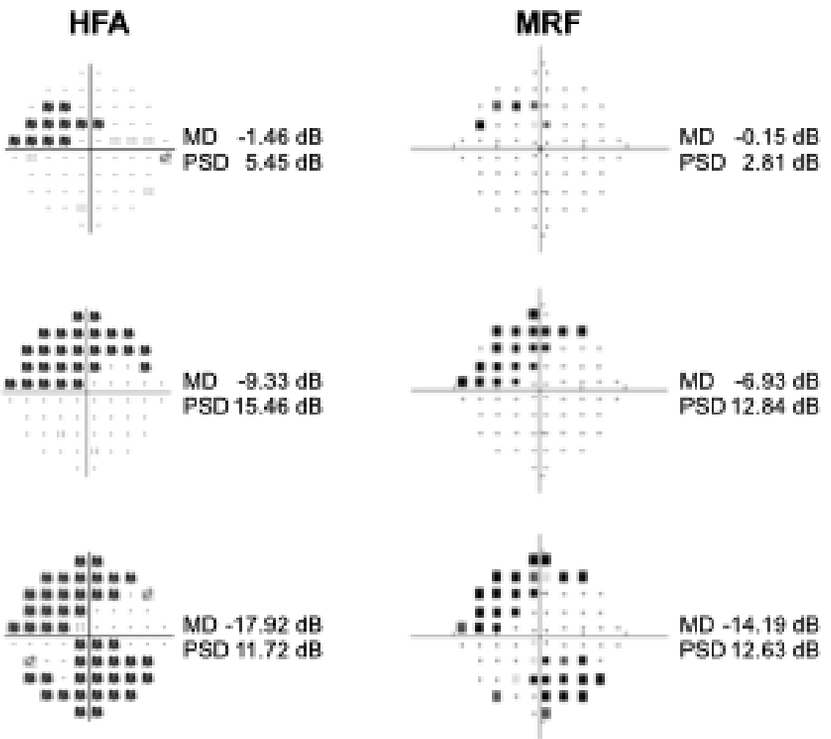

Figure 1. Representative visual fields from eyes with mild, moderate, and severe visual field defects. Total deviation probability plots from HFA are on the left, and outputs from MRF are on the right.

Conclusions

MRF provides a portable, reliable and patient-friendly alternative to HFA for Japanese glaucoma patients. An overall difference of 3dB in MD is likely due to differences in maximum sensitivity values at the central macular region between the two devices.

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P-0634

EVALUATING PREFRONTAL CORTICAL ACTIVITY FOR COGNITIVE FUNCTIONING IN PRIMARY OPEN ANGLE GLAUCOMA VIA FUNCTIONAL NEAR-INFRARED SPECTROSCOPY (FNIRS)

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Background

Primary Open Angle Glaucoma (POAG) is an optic neuropathy which develops as retinal ganglion cell (RGC) damage and optic nerve degeneration with subsequent progressive, irreversible vision loss. Growing evidence support the existence of a strong morphofunctional interconnection between eye and brain, allowing to share common pathogenic neurodegenerative pathways and manifestations .The current view is no longer limited to the progressive optic nerve injury, since growing evidence strongly support the interpretation of glaucoma as a complex multifaceted chronic neurodegenerative disease, widely affecting the central nervous system (CNS).

Purpose: To evaluate changes in prefrontal cortex for cognitive functioning in POAG by using functional near infrared spectroscopy (fNIRS) for a behavioral inhibition test (Go/No-Go task).

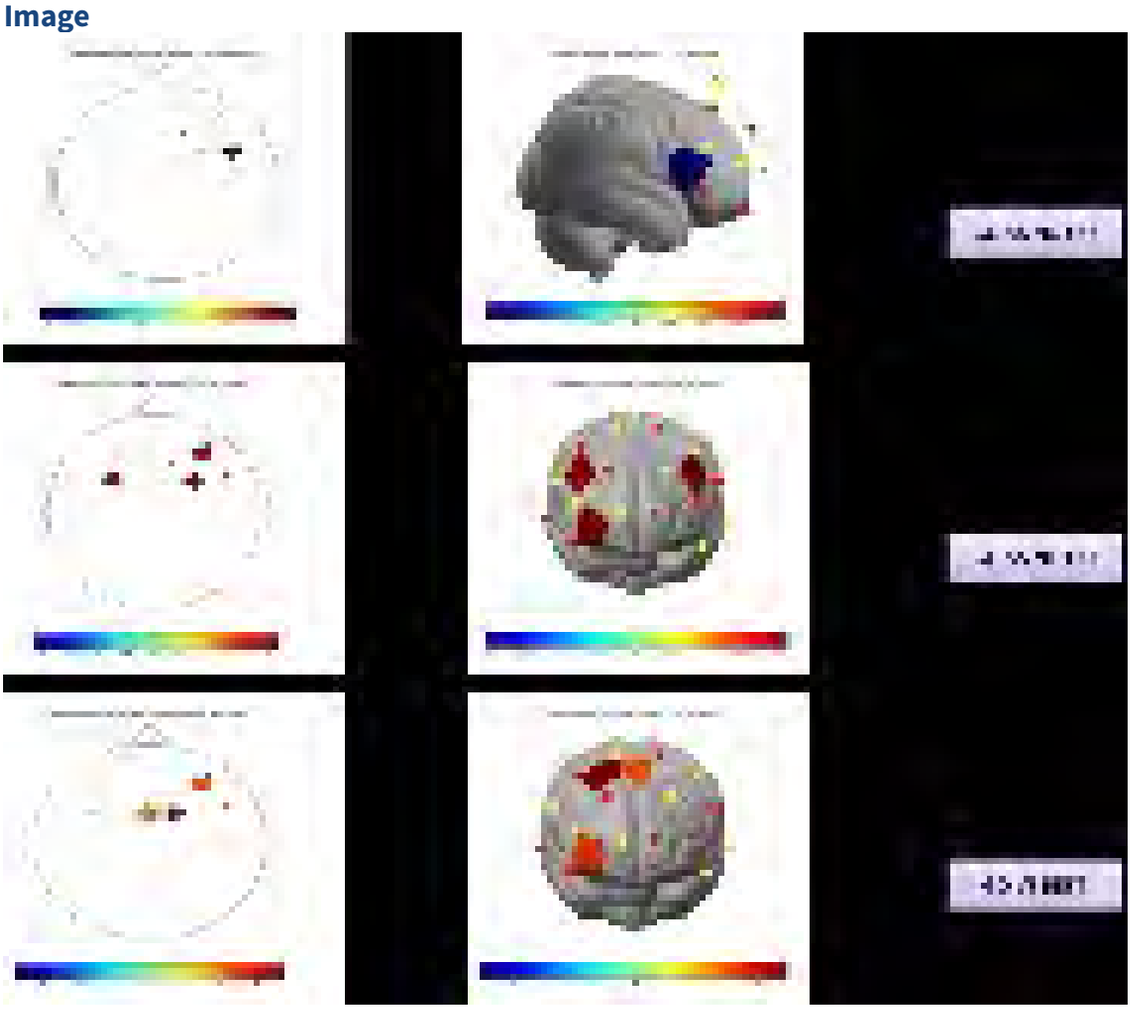
Methods

15 individuals with mild to moderate POAG and 15 healthy individuals educated up to primary school, age>40 years with best-corrected visual acuity(BCVA) >= 6/12 in both eyes were included in this study. Both groups performed an experiment assessing cognitive functioning by utilizing a Go/No-Go task. Prefrontal hemodynamic responses were measured in the frontal cortex using a 17-channel fNIRS system. Using statistical parametric mapping (SPM) with general linear model (GLM) analysis, the study observed activation/deactivation (p<0.05) in certain prefrontal cortical regions while performing the task for various stimuli contrasts.

Results

Mean age and gender ratio were comparable amongst both groups. In POAG group, there was hyperactivation in middle frontal sulcus (t=2.34) between left superior frontal and middle anterior cingulate gyrus (t=2.21) and between superior frontal sulcus and middle anterior cingulate gyrus (t=3.75) for the Go vs. rest contrast. For No-Go vs. rest contrast, there was hyperactivation in middle frontal sulcus (t=2.13) between inferior and superior frontal sulcus (t=2.16) and between superior and middle frontal sulcus (t=2.06). There was deactivation in the region between vertical ramus of anterior segment of lateral sulcus and middle frontal gyrus (t = -2.16) for the Go vs. No-Go contrast. While in healthy individuals group no such significant response was seen for any contrast.

Image



Conclusions

There is significant stimulus evoked prefrontal cortical hyperactivity during the performance of Go or No-Go stimuli with more cortical activity for No-Go stimuli than Go stimuli in POAG individuals. This suggests that for performing the same cognitive function, there is prefrontal hyperactivity required in POAG individuals while not in healthy individuals reflecting poor cognitive functioning in POAG individuals.

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P-0635

RACIAL DIFFERENCES IN SHORT TERM STANDARD AUTOMATED PERIMETRY TEST-RETEST VARIABILITY

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Background

Test-retest variability in Standard Automated Perimetry (SAP) impacts the accurate detection of glaucomatous damage.[1] Previous longitudinal studies demonstrated increased long-term SAP variability in Black individuals compared to White ones, possibly contributing to delayed detection and treatment of glaucomatous progression in the former group.[2,3] In this study, we investigate short term SAP variability between Black and White individuals in the Fast Progression Assessment through Clustered Evaluation (Fast-PACE) Study.[4]

Methods

In this prospective cohort study, patients underwent weekly SAP 24-2 and 10-2 testing over five visits. Visual fields with a fixation loss ≥33% or false-positives15% were excluded. All testing was conducted by a single examiner. Test-retest variability was defined as the standard deviation (SD) of SAP mean deviation (MD) for each eye across visits. Multivariable ordinary least squares regression models were used to evaluate the association between test-retest variability (SD) and race, while controlling for potential confounders including age, gender, diagnosis, and average SAP MD. The nonlinear association between MD variability and average SAP MD, an indicator of disease severity, was modeled using restricted cubic splines.[5,6]

Results

A total of 1,117 SAP visual fields from 119 eyes and 65 patients were included in this analysis. Patients had a mean age of 67.7 ± 7.5 years, with 58% identifying as female and 25% as Black. On average, completed 4.8 ± 0.49 24-2 SAP tests and 4.7 ± 0.59 10-2 SAP tests. For SAP 24-2, average test-retest variability (SD) was 0.97 ± 0.51 in eyes of black individuals versus 1.03 ± 1.03 in those of white participants (P = 0.75). Corresponding numbers for SAP 10-2 MD were 0.78 ± 0.49 and 0.75 ± 0.73, respectively (P = 0.82). In the multivariable models adjusting for confounding variables, there was no statistically significant relationship between test-retest variability and race for SAP 24-2 MD (P=0.80) or SAP 10-2 MD (P=0.41).

Conclusions

In contrast to previous long-term clinic-based retrospective studies, this prospective short-term study was not able to find statistically significant differences in SAP 24-2 or 10-2 test-retest variability. These findings suggest that previously observed racial disparities in test-retest variability may not reflect inherent differences in test performance but could instead be influenced by factors such as systematic bias or disparities in the delivery of clinical care. Further research is needed to investigate how clinical and systemic factors contribute to these disparities and their impact on the detection and management of glaucomatous progression.

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P-0636

IN VITRO FLOW PROPERTIES OF PRESERFLO MICHROSHUNT WITH INTRALUMINAL STENT

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Background
The use of intraluminal stents in the Preserflo MicroShunt (PMS) is increasingly recognized as a strategy to increase the device's resistance and reduce postoperative hypotony (1-3). Although intraluminal stenting has been proposed as a method to regulate outflow (4), evidence regarding the optimal stent size and material remains limited. This study aims to address this gap by evaluating the effects of different stent sizes and materials on PMS outflow through both theoretical modeling and *in vitro* experiments

Methods
Theoretical flow resistance through the PMS was calculated using the Hagen-Poiseuille equation, incorporating the dynamic viscosities of balanced salt solution (BSS) (1.002 cP) and aqueous humor (AQH) (0.7185 cP). For the experimental flow study, Nylon and Prolene sutures (sizes 10-0 and 9-0) were used as stents. Outflow of BSS was collected from five different PMS devices, both stented and non-stented, over a one-hour period. For each suture material and size, five separate flow measurements were obtained, with flow rates calculated from weight measurements taken at five-minute intervals. Theoretical and experimental resistance values were compared, and experimental data were adjusted for AQH viscosity. Finally, intraocular pressure was estimated by considering the physiological range of aqueous humor production (1.5–3 µL/min) and assuming an external pressure of 0 mmHg, to evaluate the performance of each suture material and size under physiological conditions.

Results
The experimental measurement of the internal resistance to outflow of the PMS without a stent aligned with our theoretical calculations: 1.81 mmHg/µL/min theoretically, and 1.97–2.26 mmHg/µL/min experimentally with BSS viscosity. This confirms the accuracy of the theoretical model based on the Hagen-Poiseuille law. The Nylon material generally showed lower resistance to outflow compared to Prolene, with resistance ranging from 10.35–5.41 mmHg/µL/min for the 10-0 and 31.72–10.24 mmHg/µL/min for the 9-0 Nylon, while Prolene exhibited values of 19.12–9.87 mmHg/µL/min for the 10-0 and 53.57–50.93 mmHg/µL/min for the 9-0. Additionally, the Nylon measurements aligned with our theoretical calculations, which ranged from 9.42–5.64 mmHg/µL/min for the 10-0 and 19.92–10.05 mmHg/µL/min for the 9-0 stent. Finally, the 10-0 Nylon stent was the only suture that maintained intraocular pressure within an approximate physiological range of 22.26–5.82 mmHg.

Conclusions

In conclusion, this study offers valuable insights into the effects of different suture materials and sizes on the fluid dynamics within the PMS, providing glaucoma surgeons with additional evidence to inform their choice of suture during PMS implantation. By aligning clinical decisions more closely with these observed flow characteristics, surgeons may improve postoperative outcomes and further tailor the PMS to individual patient needs.

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P-0637

DO YOU SNORE? HAVE YOU BEEN DIAGNOSED WITH OBSTRUCTIVE SLEEP APNEA? YOU MIGHT BE AT RISK OF LOSING YOUR SIGHT TO GLAUCOMA

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Background
Normal tension glaucoma (NTG) is a progressive glaucomatous optic neuropathy in which intraocular pressure (IOP) is within normal range, and it has been associated with obstructive sleep apnea (OSA). Pattern electroretinogram (PERG) can detect retinal ganglion cell (RGC) dysfunction in open angle glaucoma 8 years before the visual field tests, but no data is available on the NTG. The purpose of this study was to investigate the presence of RGC dysfunction in NTG suspects with OSA compared to controls, using PERG.

Methods
Nine glaucoma suspects (18 eyes) were enrolled in the cross-sectional study conducted at Manhattan Eye Ear & Throat hospital as part of a longitudinal glaucoma study. Four participants (8 eyes) with OSA and five (10 eyes) well matched controls without OSA received comprehensive ophthalmic examination, PERG and Optical coherence Tomography tests. Independent samples t-test and linear stepwise regression analyses were used in the analyses. To predict each PERG parameter [Magnitude (Mag), MagnitudeD (MagD), and MagD/Mag ratio], we controlled for age and sex in the step 1, IOP was entered in the step 2, and OSA in the step 3.

Results
Independent samples t-tests revealed no significant differences between the 2 groups by age, IOP, central corneal thickness, spherical equivalent, macular thickness average cube, average retinal nerve fiber layer, average ganglion cell layer (avGCL+ IPL) thicknesses. When compared to controls, participants with OSA showed significantly decreased Mag (1.33 ± 0.32 vs 2.58 ± 0.61), MagD (1.09 ± 0.39 vs 2.39 ± 0.52) and MagD/Mag Ratio (0.81 ± 0.14 vs 0.93 ± 0.04). In the prediction of Mag, after controlling for age and sex (step 1), and IOP (step 2), OSA (step 3) explained an additional 19.8 % of the variance in Mag (B=-0.87 (95% CI: -1.44, -0.30), p= 0.005). In the prediction of MagD, after controlling for age and sex, and IOP, OSA explained an additional 21.8% of the variance in MagD (B=-0.91 (95% CI: -1.42, -0.40), p=0.002). IOP did not explain any variance.

Conclusions
PERG demonstrates early RGC dysfunction in NTG suspects with OSA when compared to controls. OSA contributes to RGC dysfunction above and beyond the effects of IOP. These findings highlight the importance of PERG testing in NTG subjects. Future studies are needed in assessing the effects of OSA treatment in NTG suspects on RGC dysfunction, using PERG. If OSA and NTG are left undiagnosed and untreated, it will lead to a silent, progressive, and irreversible vision loss.

P-0638

EFFECT OF OPTIC NERVE HEAD VESSEL DENSITY AND AGE ON ESTIMATED RETINAL GANGLION CELL COUNT USING STRUCTURE-FUNCTION INDEX IN GLAUCOMA SUSPECTS

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Background

Glaucoma is a neurodegenerative eye disease characterized by retinal ganglion cell (RGC) loss and optic nerve damage, leading to visual field (VF) loss. While VF testing is a key marker of disease progression in glaucoma suspects (GS), assessing estimated RGC count (eRGCC) can detect early signs of glaucoma before VF changes occur. As the disease progresses, the loss of RGCs is often reflected by a reduction in the optic nerve head (ONH) vessel density (VD). Additionally, as individuals age, there is a natural decline in RGC count and decrease in ONH VD. Given these findings, we investigated the effect of ONH VD and age on eRGCC in GS.

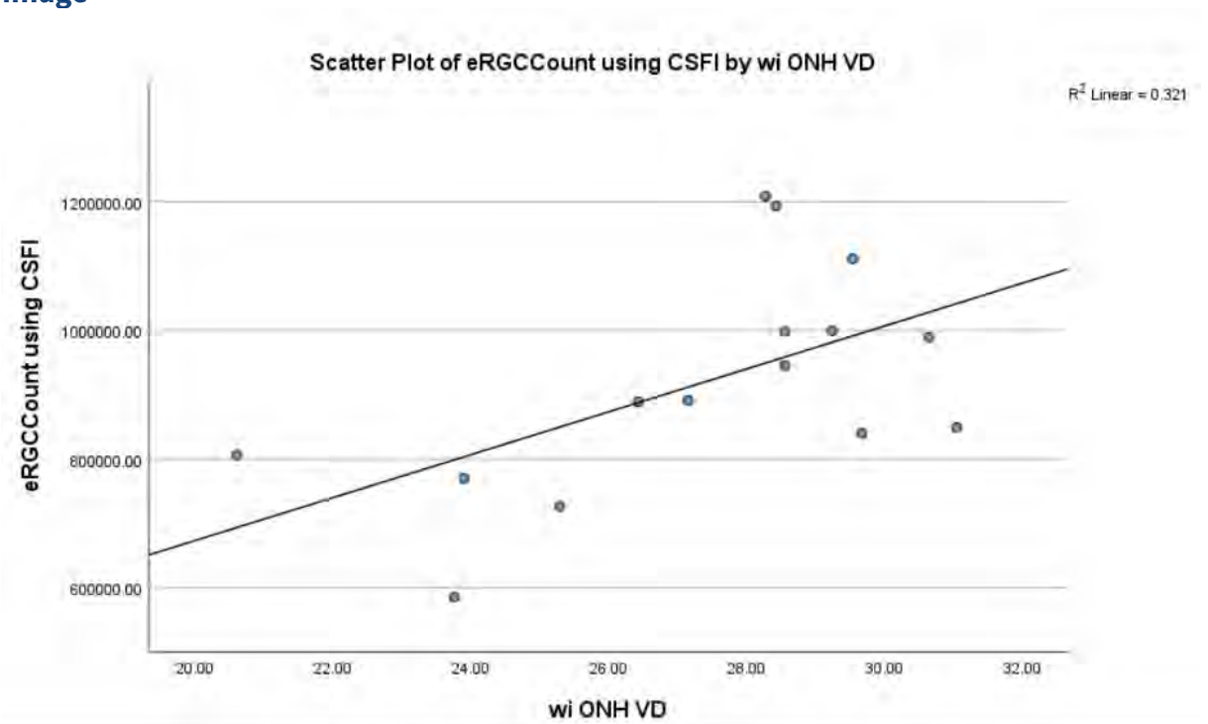
Methods

The study group included 12 GS subjects (15 eyes) who were enrolled in a prospective study at Manhattan Eye, Ear and Throat hospital. All GS underwent a comprehensive ophthalmologic exam, OCT, OCT-angiography, and Humphrey Field Analyzer (HFA) testing. We measured ONH whole image VD (wiVD) using OCT-A. Additionally, we measured eRGCC using a combined structure-function index (CSFI), where structure was defined as average retinal nerve fiber layer (avRNFL), and function was defined as the median deviation (MD) from HFA 24-2. We performed bivariate correlation analysis and linear regression model to assess the relationship between wiVD (block 1) and age (block 2) with eRGCC (dependent variable). Results of bivariate analysis are reported in the scatter plot in Figure 1.

Results

The mean age of subjects was 59.89±14.20 years. The average eRGCC of the eyes was 965,281.48±190,157.35. There was a significant positive correlation between wiVD and eRGCC, r(13)=0.567, p=0.014 (one-tailed). Using the linear regression model, wiVD alone explained 31.9% of variance in eRGCC [F (1,12)=5.627, p=0.035], and age accounted for 51.5% of variance in eRGCC [F (1,11)=34.230, p=<0.001]. Every 10 years of aging was associated with an estimated loss of 94,850±12,271 RGCs, while a 10% decrease in wiVD was associated with an estimated loss of an additional 33,366±13,460 RGCs.

Image



Conclusions

This study demonstrates a strong association between a decline in wiVD and the loss of eRGCC, highlighting an additional factor—beyond eRGCC age-related loss—that may aid in the early diagnosis of disease and in tracking its progression in glaucoma suspects.

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P-0639

STRUCTURE-FUNCTION CORRELATION OF VIRTUAL REALITY AND STANDARD PERIMETRY WITH PERIPAPILLARY AND MACULAR OCT IN GLAUCOMA PATIENTS

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Background

Virtual reality perimetry (VRP) offers advantages like portability, ease of use, and patient comfort, but most comparisons with Humphrey Field Analyzer (HFA) focus on functional outcomes1,2. This study compares the structure-function (SF) relationships of Radius VRP (RATA Fast) and HFA SITA Fast/Faster by correlating visual field (VF) sensitivities with peripapillary RNFL and macular GCC thicknesses measured by SD-OCT in glaucoma patients.

Methods

This cross-sectional study included 71 glaucoma patients who underwent 24-2 VF testing with RATA Fast and HFA (SITA Fast or Faster) in a randomized order. p-RNFL and macular layer measurements were obtained using SD-OCT within six months of VF testing. VF threshold sensitivities were mapped to p-RNFL sectors using the Garway-Heath map. An 8×8 grid of macular superpixels were matched to corresponding central 16 locations of 24-2 VF (every four superpixels matched to one VF location). Six macular layers—inner plexiform layer (IPL), ganglion cell layer (GCL), macular retinal nerve fiber layer (mRNFL), combined GCIPL, GCC, and total retinal thickness—were analyzed. Spearman's rank correlation coefficients were calculated to assess SF relationships for both Radius and HFA.

Results

A total of 116 eyes of 71 glaucoma patients underwent testing with Radius, 66 with SITA Fast, and 50 with SITA Faster. Global p-RNFL thickness correlated most strongly with Mean Deviation (MD) for SITA Fast ($r = 0.723$, $P < 0.01$), followed by Radius ($r = 0.630$, $P < 0.01$) and SITA Faster ($r = 0.566$, $P < 0.01$). The p-RNFL supratemporal quadrant consistently showed the highest correlations across all perimeters: SITA Fast ($r = 0.817$, $P < 0.01$), Radius ($r = 0.751$, $P < 0.01$), and SITA Faster ($r = 0.691$, $P < 0.01$). For macular analysis, the central 16 VF points demonstrated the strongest association with GCC thickness: SITA Fast ($r = 0.56$, $P < 0.01$), Radius ($r = 0.46$, $P < 0.01$), and SITA Faster ($r = 0.41$, $P < 0.01$). Among quadrants, the supranasal region exhibited the highest GCC correlations: SITA Fast ($r = 0.73$, $P < 0.01$), Radius ($r = 0.68$, $P < 0.01$), and SITA Faster ($r = 0.64$, $P < 0.01$).Figure 1 demonstrates heat maps of superpixel-wise SF correlation between RATA, HFA, and GCC.

Image

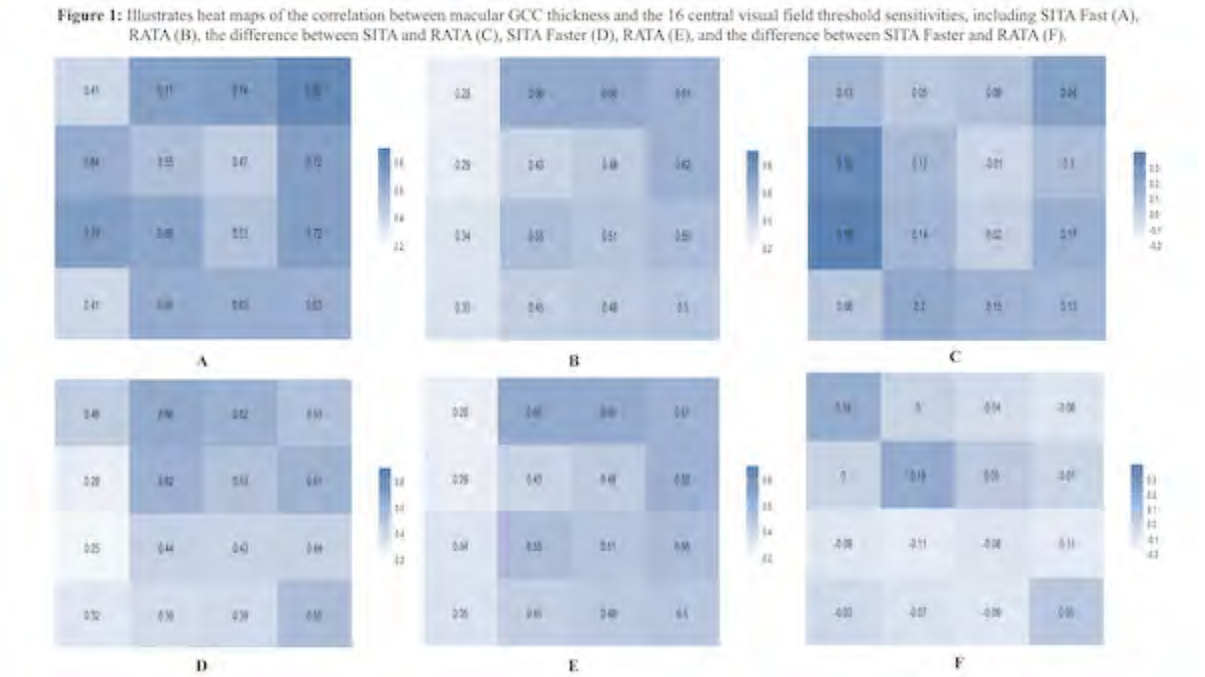

Figure 1: Illustrates heat maps of the correlation between macular GCC thickness and the 16 central visual field threshold sensitivities, including SITA Fast (A), RATA (B), the difference between SITA and RATA (C), SITA Faster (D), RATA (E), and the difference between SITA Faster and RATA (F).

Conclusions

Radius VR perimetry shows potential as an alternative to traditional Humphrey testing, but further studies are needed to confirm its diagnostic accuracy and clinical use.

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P-0640

A NOVEL HIGH-SENSITIVITY NONINVASIVE STRAIN SENSOR FOR MONITORING OCULAR PULSE AND EYE MOVEMENT

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Background
Ocular pulse has been shown to impact the optic nerve head and contribute to glaucomatous progression. Studies also indicated that optic nerve tortuosity and deformations of the optic nerve head during eye movements are more pronounced in glaucomatous eyes. However, a noninvasive sensor for monitoring ocular pulse during eye movements is currently lacking in the market. This study aims to develop a novel high-sensitivity noninvasive strain sensor for monitoring both ocular pulse and eye movement.

Methods
A high-sensitivity, multidirectional pen-on-paper (PoP) strain sensor was created using graphene oxide (GO) ink which exhibits excellent dispersion properties. The sensor demonstrated the ability to capture tensile, compressive, and pressure signals. The gauge factors are 87.1 and 77.4 in sensing tensile and compressive deformations within the range of 1%, and 3.6×10^{-3} κPa^{-1} in sensing pressure deformation within the range of 2 kPa to 5.5 kPa. The sensor maintained consistent sensitivity across different surfaces, indicating its reliability.

Results
By affixing the GO-based PoP strain sensor to the upper eyelid with removable adhesive tape, resistance signals were captured using a digital multimeter. The findings revealed a signal frequency similar to the respiratory rate, approximately between 0.1 Hz and 1 Hz. Subjects were instructed to rotate their eyes every 30 seconds, resulting in noticeable deviations in the signal from the baseline curve at the 30-second mark. Under static conditions, the signals exhibited a consistent pattern, while eye rotation induced observable perturbations in the original signal curves, indicative of rotational responses.

Conclusions
These findings highlight the capability of the straightforward GO-based PoP strain sensor to simultaneously monitor intrinsic ocular signals and ocular rotation dynamics. With further refinement in sensor deployment, there is potential to accurately determine the direction of ocular rotations.

P-0641

ASSOCIATION OF MYOPIA STATUS AND DISC SIZE ON LONGITUDINAL RNFL AND GCIPL PROGRESSION IN EARLY GLAUCOMA

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Background

To characterize the association of myopia status and disc size on longitudinal spectral-domain optical coherence tomography (SD-OCT) with RNFL and GCIPL progression rates in the early glaucoma (MD better than-6dB) cohort.

Methods

This longitudinal study included 241 glaucoma eyes (198 patients, mean age, 69.5 ± 10.5 yrs) with SD-OCT examination with a minimum follow-up of 1.5 years having at least 3 high-quality OCT and visual field (VF) tests. All included patients were clinically diagnosed with open-angle glaucoma, based on reliable and repeatable glaucomatous VF defects and having evidence of glaucomatous optic neuropathy. Patients were grouped by myopia status: eyes with axial length (AL)< 24 mm were classified as No Myopia and AL>24 mm as Any Myopia. Categorical disc size was defined based on above vs.below the median value: Disc size lesser (D1) or greater (D2) than 1.94mm^2. Based on the AL,100 patients were included in the no-myopia group and 98 in the any-myopia group. By disc size,105 patients were included in the D1 group and 93 in the D2 group. Progression was defined by an eye having an RNFL or GCIPL thinning rate ≤ -1 µm/yr with p-value< 0.05, as estimated using OLS linear regression separately per eye.The main outcome measure was to quantify the impact of myopia status and disc size on structural changes in early glaucoma.

Results

Eyes in any myopia group had thinner average RNFL and GCIPL thickness; both globally and in all quadrants except the Temporal RNFL and Temporal Superior GCIPL. Compared to the no myopia group, average GCIPL was significantly thinner among myopic eyes in the inferior (p=0.042) and temporal inferior sectors (p=0.038). Mean global RNFL and RNFL thickness of all quadrants were thicker in the D2 group (except the temporal quadrant) compared to the D1 group, and significantly thicker in the nasal (p=0.034) and inferior quadrant (p=0.019). There was no significant change of average GCIPL thickness in the D2 group except a significant thinning (p=0.003) in the superior quadrant than D1. In early glaucoma, myopic eyes with disc size above the median showed a significantly (p=0.011) faster rate of global RNFL thinning (-0.36 µm/year) than non-myopic eyes with disc size below the median; and the rate was -0.32 µm/year faster, p=0.026 after adjusting for baseline VF MD and mean IOP across follow-up. Myopic eyes with disc size above the median showed a faster rate of global GCIPL thinning than non-myopic eyes with disc size below the median (-0.14 µm/year with and without ad-

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justing for baseline VF MD and mean IOP across follow-up), though this was not significant.

Conclusions

For evaluating glaucoma progression by OCT parameters, interpretation should always be made concerning the refractive status and optic disc size of an individual eye. GCIPL measurement yields a relatively constant value irrespective of optic disc size variability. In early glaucoma, RNFL thickness might be useful in tracking progression in myopic eyes with variable disc size.

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P-0642

OCULAR BIOMETRY IN GLAUCOMA CASES AND NON-GLAUCOMA CONTROLS: THE EYES OF AFRICA STUDY

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Background

Ocular biometry parameters differ in glaucoma and non-glaucoma patients. This study aims to determine ocular biometric parameters in a large African cohort of glaucoma patients and controls and explore the relationship of these parameters with glaucoma severity

Methods

This was a comparative case-control study of primary open-angle glaucoma cases and non-glaucoma controls recruited through 16 participating centres in the Eyes of Africa: Genetics of Blindness study. Participants' sociodemographic characteristics, visual acuity, optic nerve head assessment, and visual field test were recorded. Ocular biometry parameters, including central corneal thickness (CCT), Axial length (AL), Anterior Chamber Depth (ACD), Lens diameter (LD), and keratometry, were recorded. Glaucoma severity was assessed using the optic nerve and or visual field data.

Results

9435 participants, 5202 cases, and 4233 controls were recruited. The mean age of cases (63.4 [10.8] years) was slightly higher than controls (60.4 [10.8] years). Males represented 57.4% of cases but only 45.2% of controls. The mean CCT among cases [0.517µm (0.037)] was thinner compared to the controls [0.523µm (0.039), P<0.001]. The AL in cases was slightly longer [23.8(3.0) mm] compared to controls [23.5(3.3) mm, P=0.002]. The ACD in cases [3.1mm(0.6)] and controls [3.1(0.4)] were similar (P>0.05). The keratometry values were slightly less in cases [43.1D(1.7)] compared with controls [43.4D(1.6), P<0.01]. As expected, the mean vertical cup-to-disc ratio (CDR) of cases [0.85 (0.17)] was larger than that of controls [0.35 (0.14), P<0.001]. The relationship between CCT and glaucoma severity was inverse. Mean CCT reduced as the severity of glaucoma increased [mild glaucoma CCT: 0.522 µm (0.040), moderate glaucoma, 0.517 µm (0.040), severe glaucoma 0.513 µm (0.040), P=0.04]. Mean AL also reduced with increasing severity of glaucoma. [mild 23.9mm (3.5), moderate 23.8mm (2.6), severe glaucoma 23.6mm (2.5), P=0.008]. The mean lens diameter was [4.0 mm (0.6) in mild, 3.9 mm (0.7) in moderate and 3.8mm (0.6) in severe glaucoma (P<0.001)]. Mean ACD was lower in moderate [3.03 mm (0.41)] and severe glaucoma [3.04mm(0.41)] compared to mild glaucoma [3.12 mm (0.96), P<0.001].

Conclusions

Our study shows that CCT is thinner, axial length is longer, and keratometry values are lower in cases than controls. Mean CCT is thinner, axial length is shorter, and lens diameter is shorter with increasing glaucoma severity. These parameters should be considered in the diagnosis and management of glaucoma.

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P-0643

COMPARISON OF THE DIAGNOSTIC PERFORMANCE OF TWO SPECTRAL-DOMAIN OCT MACHINES IN DETECTING GLAUCOMA IN HIGH AND NON-HIGH MYOPIC EYES

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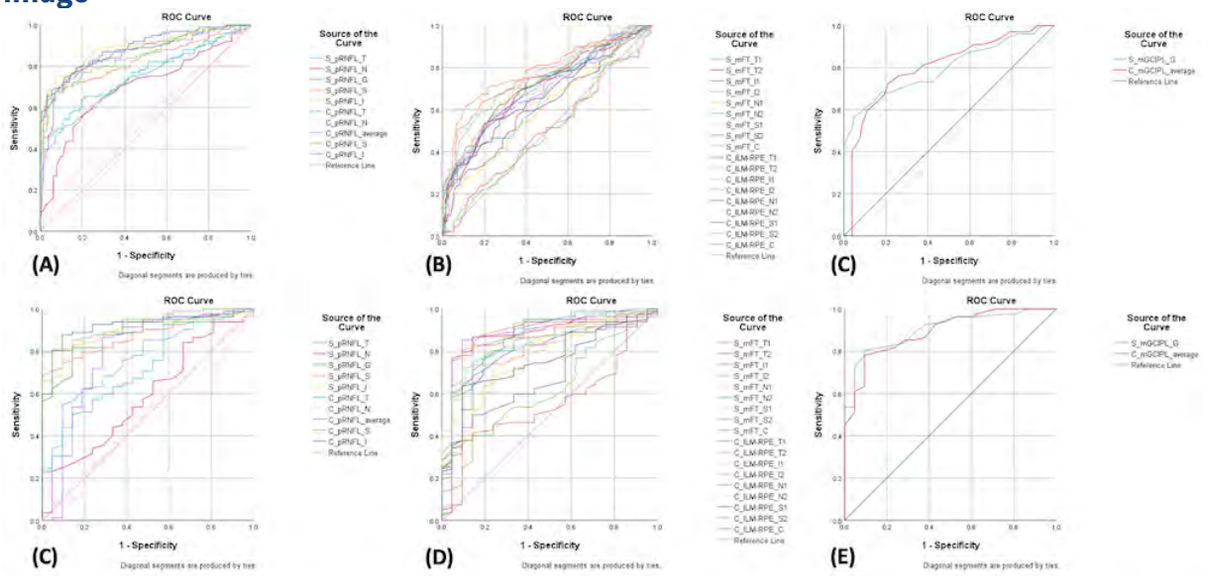
Background
This prospective case-controlled study evaluates the diagnostic performance of parameters derived from Spectralis and Cirrus spectral-domain optical coherence tomography (SD-OCT) systems in distinguishing glaucoma in patients with high myopia (HM) and non-high myopia (NHM). Focusing on key parameters, including peripapillary retinal nerve fiber layer (pRNFL), macular full thickness (MFT), and macular ganglion cell-inner plexiform layer (GCIPL) thickness, the study aims to identify glaucomatous damage across these myopic subgroups.

Methods
The study included 333 eyes from 333 participants, categorized into four groups: NHM normals (n=130), NHM glaucoma (n=101), HM normals (n=20), and HM glaucoma (n=82). OCT measurements of pRNFL, MFT, and GCIPL were obtained using Spectralis and Cirrus SD-OCT systems. Diagnostic performance was evaluated through thickness comparisons and receiver operating characteristic (ROC) analysis. The area under the curve (AUC) was calculated for each parameter, and inter-device comparisons were conducted.

Results
Both Spectralis and Cirrus SD-OCT systems demonstrated significant thinning in most pRNFL, MFT, and GCIPL parameters in glaucoma patients compared to normals, irrespective of myopic status. For NHM eyes, there was no significant difference in diagnostic performance between the two OCT systems, except that Spectralis demonstrated superior performance in the nasal quadrant ($p < 0.001$). For HM eyes, Spectralis OCT exhibited slightly superior diagnostic accuracy in most MFT parameters, while Cirrus OCT achieved better performance for the superior pRNFL (AUC = 0.937, $p = 0.027$). GCIPL parameters showed similarly high diagnostic performance between the two systems, with AUC values exceeding 0.89 in HM groups.

Image



The receiver operating characteristic (ROC) curves of peripapillary nerve fiber layer, macular full-thickness and ganglion cell-inner plexiform layer parameters measured by Spectralis and Cirrus optical coherence tomography in non-high myopic eyes (**A, B, C**) and high myopic eyes (**D, E, F**).

Conclusions

Spectralis and Cirrus SD-OCT systems provide reliable diagnostic performance in detecting glaucoma across HM and NHM populations. Spectralis slightly outperformed Cirrus in certain MFT parameters in HM eyes, while GCIPL metrics were similarly effective in both systems. These findings highlight the strengths of SD-OCT systems in managing glaucoma in patients with diverse myopic profiles.

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COMPARISON OF EVENT AND TREND ANALYSIS BETWEEN COMPASS AND HUMPHREY FIELD ANALYZER: PRELIMINARY RESULTS OF A MULTICENTRIC LONGITUDINAL STUDY

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Background

Detection of visual field progression plays a central role in the management of glaucoma. Several algorithms implemented by each manufacturer have been proposed to identify visual field progression over time. The purpose of this study is to evaluate the agreement of progression estimated by Compass (CMP) and Humphrey Field Analyzer (HFA) on event and trend analysis in a glaucoma cohort of patients

Methods

45 eyes of 32 glaucoma patients were enrolled between 2022 and 2024 in two sites in Italy. Each Visual Field (VF) series consisted of 5 perimetric exams (CMP 24-2M ZEST and HFA 24-2 SITA Standard) collected every 4 months with both machines. 24-2M grid consisted of 24-2 loci plus 12 macular points. For event analysis (EA), the average of the first two VF examinations were considered as baseline and the agreement between CMP and HFA was evaluated both on pointwise sensitivity (PWS) and globally with event assessment string (EAS) for the last 3 follow-up (FU). HFA EAS was based on a fixed number of loci confirming deterioration (events in consecutive exams). CMP EAS was based on an adaptive rule (non-fixed number of loci) relying only on the points for which EA is possible. CMP provided an additional category ("suspect progression") based on single, non-consecutive events. Unlike CMP, HFA did not provide EA when MD<-20dB. For trend analysis, Mean Sensitivity (MS) and Mean Deviation (MD) were considered to evaluate VFs progression. For 24-2M, adjunctive event and trend analysis was performed with and without the additional macular locations.

Results

For 24-2, CMP and HFA showed good agreement based on PWS in all FUs (>78% perfect match). In 24% of cases, single or consecutive events were observed with CMP 24-2M additional macular points. The agreement for EAS, based on the identification of "no progression", "possible progression" and "likely progression", varied from 80% (FU1) to 69% (FU3). CMP was more likely to classify events as progression for both 24-2 and 24-2M, when compared to HFA. For EA, CMP provided an additional category ("suspect progression") based on single, non-consecutive event. CMP identified "suspect progression" (vs HFA no progression) in 12.2% of eyes in FU1 (both grids), in 12.5% (24-2) and 15.0% (24-2M) of eyes in FU2, and 7.7% (both grids) of eyes in FU3. Differences in proportion of moderate, fast and catastrophic progressors between CMP and HFA are reported in Fig1. Significant differences were found in proportions of fast and catastrophic progressors between CMP (both 24-2M and 24-2) and HFA 24-2.

Image

Progressor categories	CMP 24-2M		CMP 24-2		HFA 24-2	
	slope MS	slope MD	slope MS	slope MD	slope MS	slope MD
moderate progressor	64%	69%	60%	69%	64%	67%
fast progressor	22%	20%	22%	16%	13%	13%
catastrophic progressor	13%	11%	18%	16%	22%	20%

MD and MS slope classification

moderate progressor: -1 ≤ slope < -0.5 dB/year

fast progressor: -2 ≤ slope <-1dB/year

catastrophic progressor: slope < -2dB/year

Conclusions

The agreement in event and trend analysis for CMP and HFA was globally good, with an almost perfect match in the short-term follow-up. CMP showed and higher tendency to classify progression, especially with the additional macular locations.

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THE RELIABILITY AND PERFORMANCE OF A VIRTUAL REALITY HEADSET IN BRAZILIAN PEDIATRIC PATIENTS

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Background

To assess the reliability and agreement between Humphrey Visual Field (HVF) and Virtual Reality Headset (VRH) results.

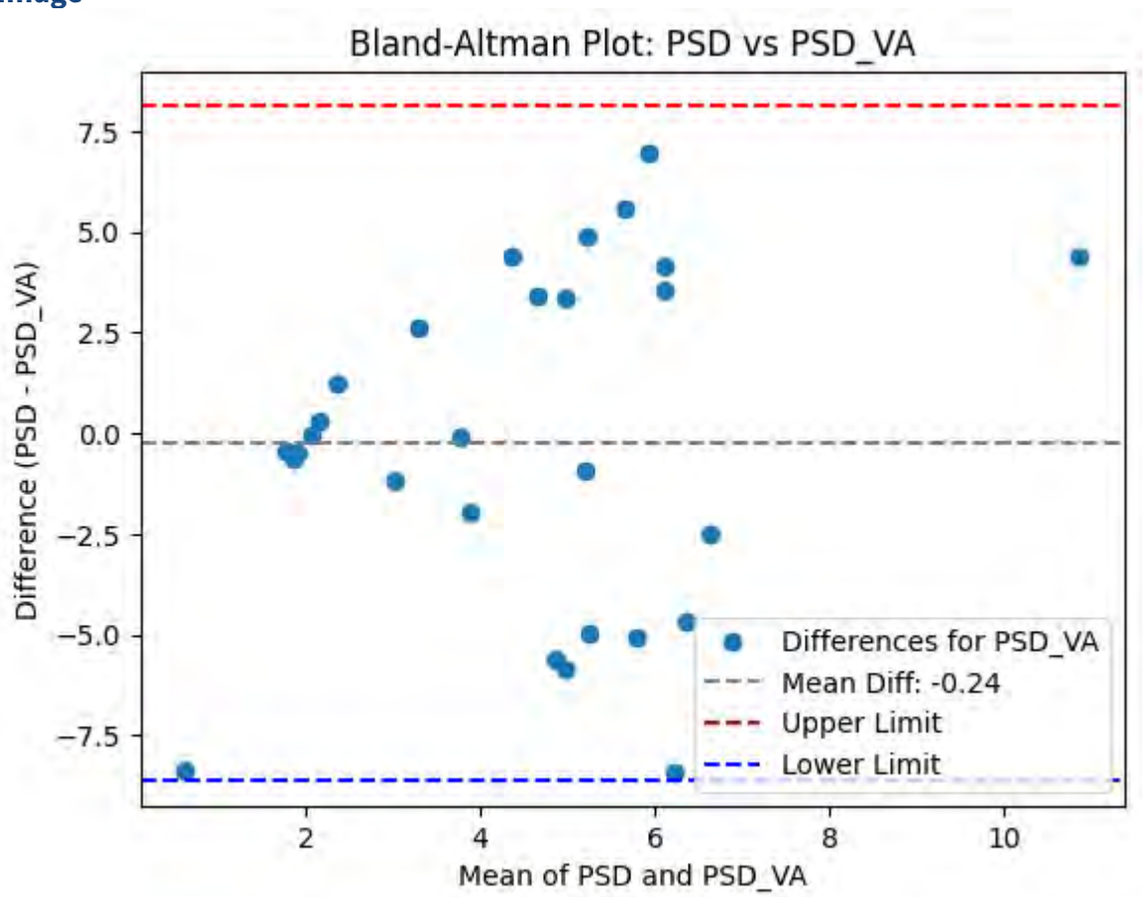
Methods

A pilot cross-sectional study was conducted. Twenty-eight patients aged 4-18 years, without ophthalmological comorbidities, were enrolled. One eye of each participant was randomly assigned to undergo either HVF or VRH (Olleyes, Visuall) for the initial examination, followed by a crossover to the alternate test within one month. Group 1 started with HVF, while Group 2 began with VRH. Patients had no prior experience with visual field exams, and all exams were performed by trained technicians. Additionally, all patients underwent a complete ophthalmological evaluation prior to the exams, including dynamic and static refraction, biometry, anterior biomicroscopy, and fundoscopy.

Results

The mean age was 10.6 ± 4.6 years; 51.7% female and 48.3% of mixed race. There were no statistically significant differences in age (p=0.479), gender (p=0.885), or race (p=0.199) between groups. No significant differences were found in MD (mean difference: 3.44; 95% CI: -1.52 to 10.48; p=0.613) or PSD (mean difference: -0.24; 95% CI: -1.84 to 1.33; p=0.711) between HVF and VRH in both groups. However, significant differences were observed in the percentage of fixation loss (none on VRH vs. 0.4 ± 0.3 on HVF; p = 0.0001) and overall reliability (96% for VRH vs. 31% for HVF; p < 0.05) in both groups. Group 1 had significantly fewer reliable exams on HVF, but not on VRH. Bland-Altman analysis, without considering the groups, showed a tendency for higher MD values (3.44 ± 16.84) with high variability, which was also observed for PSD (0.24 ± 4.27).

Image



Conclusions

Our findings indicate significantly better reliability of VRH compared to HVF, while maintaining overall agreement across global parameters. VRH may represent a promising and valuable examination for obtaining more reliable and accurate results in pediatric assessments.

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P-0648

NEW MODEL FOR ESTIMATING RETINAL GANGLION CELL COUNT USING PATTERN ELECTRORETINOGRAPHY IN GLAUCOMA SUSPECTS

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Background

The purpose of this study was to ascertain the associations between the new steady state Pattern electroretinogram (ssPERG) based models for estimating retinal ganglion cell count (eRGCC) with combined structure-function Index (CSFI) and to compare their abilities in predicting average retinal nerve fiber layer (AvRNFL), average ganglion cell layer-inner plexiform layer (AvGCL-IPL) and optic nerve head morphology (ONH) in GS.

Methods

Twenty-five consecutive GS (50 eyes) were enrolled in this prospective cross-sectional study at the Manhattan Eye, Ear, and Throat Hospital, and underwent a complete comprehensive ophthalmologic examination, Humphrey Field Analyzer 24-2, optical coherence tomography (OCT) and ssPERG. eRGCC based on CSFi ($eRGCC_{CSFI}$), on PERG magnitude ($eRGCC_{Mag}$) and PERG MagnitudeD ($eRGCC_{MagD}$) were calculated

Results

eRGCCcsfi was significantly correlated with eRGCCMag and with eRGCCMagD, even after controlling for age and sex ($p< 0.001$, $r=0.879$) and ($p< 0.001$, $r=0.876$), respectively. Regression analysis was used to better understand the relationships between eRGCC models and AvRNFLT, where AvRNFLT was entered as the dependent variable, and after controlling for age and sex and CCT (Step 1), eRGCCCSFI (step 2) explained 49.6% of variance in AvRNFLT ($F 1,41) = 108.924$, $p<0.001$), whereas eRGCCMag and eRGCCMagD explained 63.7% and 63.9% of the variance ($F 1,41) = 574.474$, $p<0.001$) and ($F 1, 41) =593.742$, $p< 0.001$, respectively. When AvGCL-IPLT was entered as the dependent variable, eRGCCCSFI (step 2) explained 18.9% of variance in AvGCL-IPLT ($F 1,41) = 16.172$, $p<0.001$), whereas eRGCCMag and eRGCCMagD explained 22.9% and 24.0% of the variance, ($F 1,41) = 21.396$, $p<0.001$) and ($F 1, 41) =22.958$, $p< 0.001$, respectively.

When rim area was entered as the dependent variable, and after controlling for age and sex and spherical equivalent (SE) (Step 1), eRGCCCSFI (step 2) explained 16.8% of variance in rim area ($F 1,21) = 6.732$, $p=0.017$), whereas eRGCCMag and eRGCCMagD explained 15.8% and 13.1% of the variance in rim area, ($F 1,21) = 6.230$, $p=0.021$) and ($F 1, 21) =4.908$, $p< 0.038$, respectively.

Conclusions

The new model for estimating RGCC using ssPERG performed better than $eRGCC_{CSFI}$ in predicting AvRNFL and AvGCL-IPL in GS, highlighting the importance of the integrity of RGC morphology. When predicting the rim area, $eRGCC_{CSFI}$ and $eRGCC_{Mag}$ were stronger predictors, suggesting that the ONH morphology was possibly related to RGC death.

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P-0649

CONFOCAL CORNEAL MICROSCOPY IN GLAUCOMA AND DRY EYE – A PILOT STUDY

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Background

Glaucoma is a chronic neurodegenerative disease that causes visual field defects and blindness if untreated. By 2040, an estimated 120 million people will have glaucoma. The primary therapeutic goal is reducing intraocular pressure. However, anti-glaucoma eye drops can cause significant side effects, with up to 50% of patients experiencing dry eye. Filtering surgery can also worsen dry eye by disrupting normal ocular lubrication. Both, dry eye and glaucoma contribute to changes in the corneal subbasal nerve plexus, exacerbating dry eye severity.

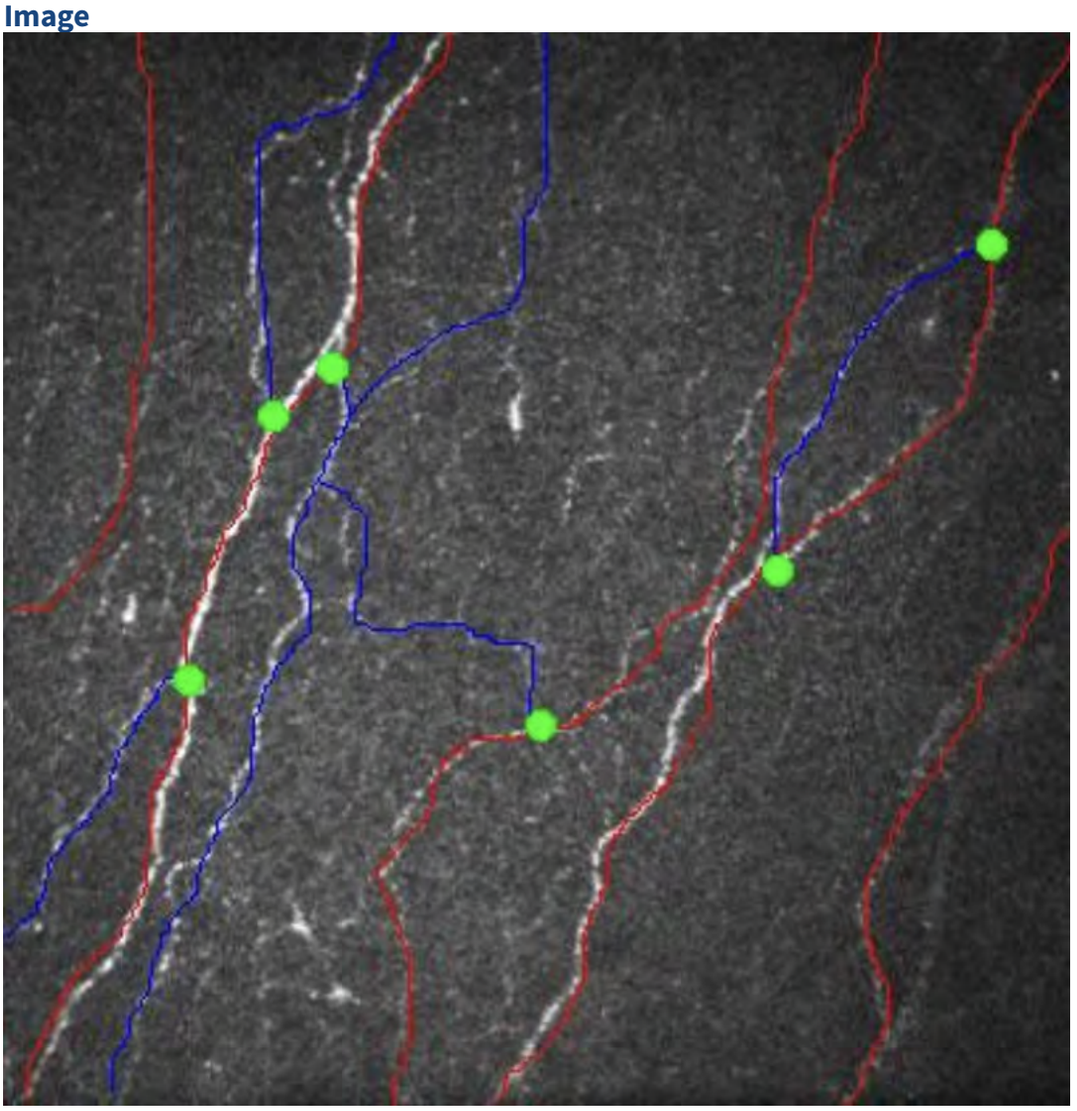
Methods

We compared 10 eyes from glaucoma patients (GP) using anti-glaucoma eye drop with 10 eyes from dry eye patients (DP) and 10 control eyes (CP). Dry eye was assessed using Schirmer Test I and *in vivo* confocal microscopy (IVCM). Optical coherence tomography (OCT) measurements of the optic disc (global and temporal inferior segment) were recorded. Five IVCM images per eye (CNFD, CNBD, CNFL) were manually evaluated using CCMetrics (Weill Cornell University Qatar). Further, data on age, sex, visual acuity, intraocular pressure, and lubricating and anti-glaucoma eye drop usage were collected, along with Ocular Surface Disease Index (OSDI) scores and ganglion cell layer divided into five zones. Groups were compared by Kruskal-Wallis-, Mann-Whitney-, and Welch's ANOVA-test with $p<0.05$ as level of significance.

Results

Patients' average ages were 61.3±21.7 (GP), 46.8±10.8 (DP), and 62.5±12.5 (CP) years ($p=0.03$), with a predominance of females (GP: 50%; DP: 90%; CP: 100%). Schirmer Test I scores were significantly lower in the GP group (13.9±11.0mm) compared to the CP group (15.9±8.9mm) ($p=0.04$). OCT measurements for the global and temporal inferior segments were: 64±28.1µm, 83.8±36.8µm for GP; 94.0±7.23µm, 140±9.86µm for DP; and 96.3±12.0µm, 138±35.5µm for CP. CNFD, measured by CCM, was significantly lower for GP (15.2±7.09 [no/mm^2]) compared to DP (23.2±2.70 [no/mm^2]) ($p<0.01$). CNBD (no/mm^2) and CNFL (mm/mm^2) values for GP, DP, and CP were: 33.10±25.50, 10.80±6.19 for GP; 56.3±29.6, 16.20±2.97 for DP; and 49.2±35.0, 14.00±4.60 for CP.

Image



Conclusions

Our pilot study found that glaucoma patients exhibit a reduction in corneal nerve fiber density compared to DP. Furthermore, these patients had a lower tear film production compared healthy eyes. These findings strongly suggest that glaucoma itself and/or anti-glaucoma eye drops may contribute to dry eye symptoms as a side effect. However, further studies with larger patient populations are needed to validate these findings.

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P-0650

# UNEQUAL CONTRIBUTIONS OF THE SUPERIOR AND INFERIOR HEMI-RETINA TO THE ESTIMATED GANGLION CELL COUNT INDEX IN GLAUCOMA SUSPECTS

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Background
Posterior pole asymmetry analysis (PPAA) is an optical coherence tomography (OCT) software that assesses variations in retinal thickness between the superior and inferior hemi-retina of the posterior pole. This research aimed to explore the relationship between structural irregularities identified by PPAA and estimated retinal ganglion cell count (eRGCC) based on the combined structure/function index (CSFI) in individuals classified as glaucoma suspects (GS).

Methods
Forty-eight eyes belonging to GS were enrolled in a prospective study at the Manhattan Eye, Ear and Throat Hospital (MEETH) in New York City. All participants underwent a thorough ophthalmological evaluation, which included Humphrey visual field (HVF) testing and OCT PPAA imaging (Spectralis, Glaucoma Module Premium Edition). eGRCCs were calculated using CSFI. Partial correlation analysis was used to determine the magnitude of the correlation between eGRCC and PPAA measurements of each hemi-retina. Multivariate linear regression analysis was used to examine the variance in eGRCC by using PPAA thickness measurements in the superior and inferior retinal hemi-retinas. All models controlled for age and sex. Statistical Package for the Social Sciences (SPSS), Version 30.0 (IBM Inc.), was utilized for all statistical analyses and a P-value <0.05 was considered statistically significant.

Results
After controlling for sex and age, partial correlation analysis revealed a significant positive correlation between eGRCC and superior and inferior PPAA measurements ($r>0.596$, $p<0.001$). After controlling for age and sex, we found that PPAA superior thickness explained 12.2% of variance ($F(1,32) = 26.991$, $B = 7132.75$, 95% CI: 4336.19-9929.31, $p<0.001$) in eGRCC while PPAA inferior thickness explained 8.1% of variance ($F(1,32) = 13.961$, $B = 6299.57$, 95% CI: 2865.31-9733.84, $p<0.001$) in eGRCC.

Conclusions
We report that in glaucoma suspects, the superior hemi-retina contributes more significantly to the eGRCC, thereby indicating a weaker contribution of the inferior hemi-retina. These findings highlight the characteristic pattern of glaucomatous damage, with ganglion cell loss being more pronounced in the inferior hemi-retina. This may be due to structural and vascular vulnerabilities in the inferior retina, such as mechanical stress at the lamina cribrosa and reduced perfusion to the optic nerve head. These findings emphasize the utility of PPAA in detecting early glaucomatous changes and suggest that inferior retinal thinning should be closely monitored in glaucoma suspects to guide targeted interventions.

P-0651

AGE RELATED CHANGES IN SEGMENTED INNER RETINAL LAYERS IN HEALTHY CONTROLS

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Background
To investigate the age-related changes in the spectral domain optical coherence tomography (SD-OCT) measurements of the segmented macular inner retinal layers in healthy individuals.

Methods
This observational study included 130 healthy controls. Thicknesses of the inner retinal layers, including retinal nerve fiber layer (RNFL), ganglion cell layer (GCL), and inner plexiform layer (IPL) were obtained from the horizontal SD-OCT scans. The correlation of the thicknesses of the retinal layers with age, sex, axial length and spherical equivalent (SE) refractive error was analyzed.

Results
The mean age of the 130 healthy individuals was 68.2±6.7 years (range: 54-90 years). The mean segmented retinal nerve fiber layer thickness did not correlate with age (r=0.049, p=0.58) while both the mean segmented ganglion cell layer thickness and the mean segmented inner plexiform layer (IPL) thickness significantly correlated with age (r=-0.303, p=0.0005), (r= -0.370, p=0.000019).

Conclusions
The age-related decline in segmented macula layers may be an important point in study of glaucoma-related alterations. The segmented IPL thickness demonstrated the strongest correlation with aging in the present study, which encourages further research for its significance in early glaucoma versus aging.

P-0652

DIAGNOSTIC PERFORMANCE OF WIDE-FIELD OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY IN DETECTING OPEN-ANGLE GLAUCOMA IN HIGH MYOPIA

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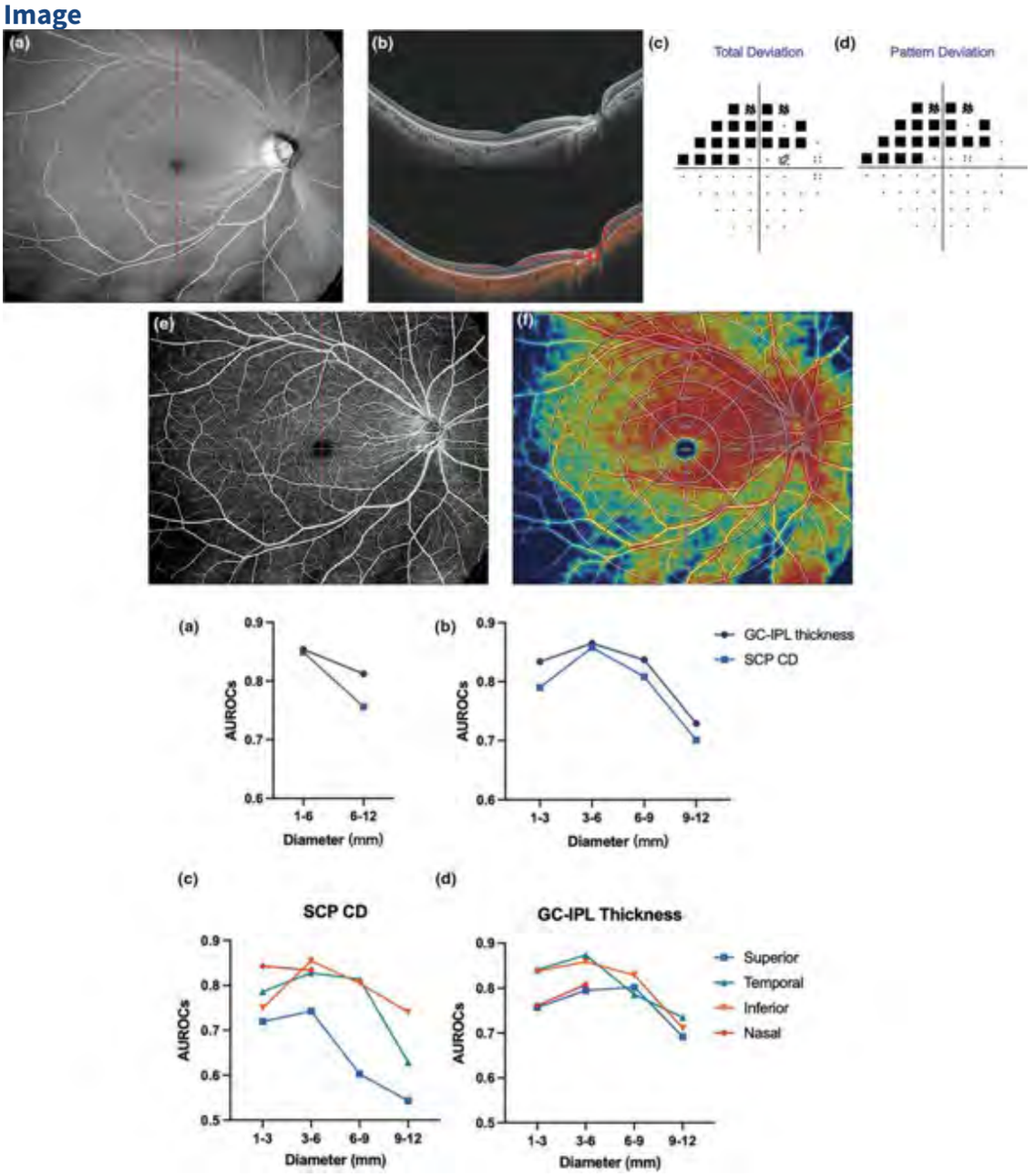
Background
To compare the diagnostic performance of the capillary density (CD) of the central 1-6 mm and peripheral 6-12 mm annular regions in detecting open-angle glaucoma in high myopia (HM) using 15 × 12 mm wide-field swept-source optical coherence tomography angiography (WF SS-OCTA).

Methods
The study enrolled 206 and 103 eyes with HM and highly myopic open-angle glaucoma (HM-OAG), respectively. WF SS-OCTA images centered on the fovea were obtained to analyze the changes in the CD in the 1-3 mm, 3-6 mm, 6-9 mm, and 9-12 mm annular regions. CD of the superficial capillary plexus (SCP) was measured with the built-in software. The area under the receiver operating characteristic curve (AUROC) of each region was compared.

Results
The diagnostic performance of the SCP CD in the central 1-6 mm annular region (AUROC = 0.849) was better than that in the peripheral 6-12 mm annular region (AUROC = 0.756, p = 0.001). The annular AUROCs of SCP CD peaked in the 3-6 mm annular region (AUROC = 0.858) and gradually decreased with increasing diameter and were lower than the corresponding AUROCs of the ganglion cell-inner plexiform layer thickness ($p < 0.05$ for all comparisons). SCP CD of the inferior quadrant in the 3-6 mm annular region had the best diagnostic performance (AUROC = 0.859).

Image



Conclusions

The SCP CD in the central 1-6 mm annular region exhibited better diagnostic performance for the detection of HM-OAG in HM. The assessment of more peripheral regions has no added value in detecting glaucoma in HM.

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P-0654

VISUAL FIELD ABNORMALITIES IN STURGE-WEBER SYNDROME AND PHAKOMATOSIS PIGMENTOVASCULARIS: CLINICAL IMPLICATIONS

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Background
The purpose of our study is to evaluate visual outcomes and visual field defects seen in the rare phakomatoses, Sturge-Weber syndrome (SWS) and phakomatosis pigmentovascularis (PPV) and discuss the various factors that need to be considered when interpreting visual field reports for these patients.

Methods
This retrospective study included all patients with SWS and PPV who were receiving treatment for glaucoma and had a visual field test done on standard automated perimetry (SAP). The electronic medical records of all eligible patients were reviewed to analyse the demographic parameters, systemic factors, ocular parameters, treatment received, details of perimetry report, and clinical outcomes. Statistical analysis was performed to evaluate various factors affecting the reliability of test, associations and different patterns of visual field defects in the two cohorts.

Results
Among the 86 patients, 62 (72%) had SWS and 24 (28%) had PPV. 48.4% (n = 60/124) SWS eyes and 91.6% (n = 44/48) PPV eyes had glaucoma. 68.2% (n = 30/44) eyes with glaucoma due to PPV demonstrated moderate to severe impairment in best-corrected visual acuity (BCVA) compared to 43.33% (n = 26/60) eyes with SWS glaucoma (p = 0.02). Patients with SWS also performed more reliable visual field tests (p = 0.02). The reliability of visual field tests decreased in eyes affected by glaucoma due to PPV, younger age at testing, and poorer BCVA (p<0.001, n = 152). Of the 155 eyes whose visual field reports were analysed, 60 (34.9%) had normal fields, 61 (35.5%) showed glaucomatous defects, 12 (7.8%) exhibited homonymous hemianopia (HH), 7 (4.1%) had a combined glaucomatous and neurological field defect, and 16 (9.3%) had unclassifiable patterns. Visual fields in eyes treated with external beam radiotherapy (EBRT), for diffuse choroidal hemangioma (DCH), had central and paracentral scotomas at the treated region, unlike the eyes treated with photodynamic therapy. Epilepsy (p = 0.02) and leptomeningeal angioma on MRI (p = 0.005) were associated with neurological field defects. Additionally, we found that the SWS group predominantly exhibited unilateral glaucoma, whereas the PPV group showed bilateral involvement (p<0.001). Medical management effectively controlled glaucoma in a significant number of SWS patients (p = 0.01).

Conclusions
More than a third of all eyes had a glaucomatous field defect, followed by neurological and combined pathologies. Visual field defects in phakomatoses are also affected by the presence of associated neurological condition, diffuse choroidal hemangioma, and treatment of DCH with EBRT. Consideration of these factors is critical before documenting the progression of glaucoma on perimetry.

P-0655

QUANTITATIVE ANALYSIS OF SCLERAL FIBER ORIENTATION AROUND THE OPTIC NERVE HEAD IN MYOPIA WITH AND WITHOUT GLAUCOMA

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Background

Peripapillary scleral structure may play a key role in the pathogenesis of glaucoma in myopic eyes[1]. This study aimed to compare peripapillary scleral fiber orientation, visualized by polarization-sensitive OCT (PS-OCT)[2], between primary open-angle glaucomatous and non-glaucomatous eyes and to examine its relationship with axial length (AXL).

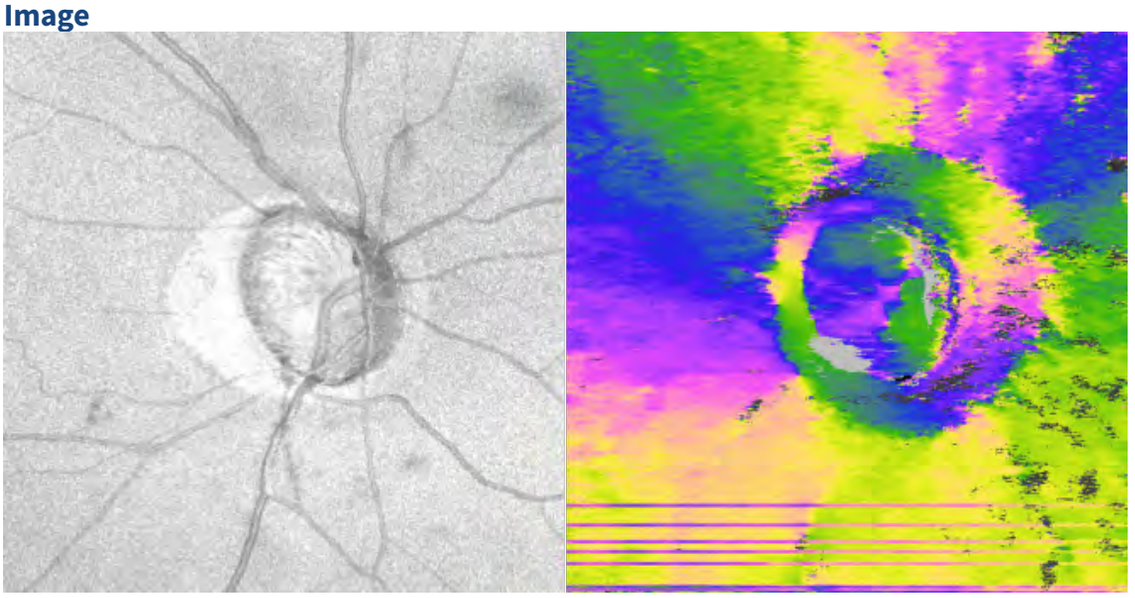
Methods

This retrospective study included myopic eyes (the spherical equivalent of refractive error ≤ -0.50 D) evaluated for the optic nerve head at the Department of Ophthalmology, The University of Tokyo Hospital, between October 2023 and September 2024. Birefringence optical axis (OA) data were derived from volume scan images of the optic nerve head obtained by PS-OCT. Key structural parameters analyzed included the width of the peripapillary central circumferential OA ring (CCR), the thickness of the inner radial OA layer (IRL) thickness, and choroidal thickness on the temporal side of the optic nerve head. Group comparisons were conducted between glaucomatous and non-glaucomatous eyes, and correlations between scleral structure and AXL were analyzed.

Results

A total of 25 glaucomatous eyes and 20 non-glaucomatous eyes (AXL: 27.33 ± 1.41 mm vs. 27.35 ± 1.92 mm; p = 0.31) were included. No significant differences were observed between the glaucomatous and non-glaucomatous eyes in CCR width (289.7 ± 67.6 µm vs. 307.0 ± 65.2 µm; p = 0.48) or IRL thickness (89.3 ± 35.7 µm vs. 93.0 ± 36.9 µm; p = 0.73) (t-test). IRL thickness was negatively correlated with AXL (R^2 = 0.46) and positively correlated with choroidal thickness (R^2 = 0.46) (both p < 0.001, linear regression).

Image



Conclusions

Temporal peripapillary scleral structures were comparable between glaucomatous and non-glaucomatous myopic eyes. Correlation of IRL thickness, representing the inner scleral layer, with AXL and choroidal thickness suggests its potential as a marker of posterior eye wall extension and scleral thinning in myopic eyes.

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P-0656

ONLINE CIRCULAR CONTRAST PERIMETRY: VALIDITY AND REPEATABILITY OF HOME PERFORMANCE

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Background

Visual field testing with a standard automated perimeter (SAP) is the current clinical standard for diagnosis and monitoring of glaucoma.[1] However, SAP has several disadvantages including the high costs of perimetry machines, their specific calibration requirements and the limited availability of trained staff, contributing to the lower rates of glaucoma detection, particularly in low-resource and remote areas.[2-4]

Online circular contrast perimetry (OCCP, Eyeonic, Melbourne), has been developed to provide perimetry services on any computer or tablet without additional hardware. This has many potential advantages, including improved access to perimetry in rural or resource-limited areas, home-based perimetry, significant cost-saving benefits in perimetric hardware, a more enjoyable user experience and potentially lower costs and environmental impact.[5-7] Studies comparing OCCP to SAP have shown similar perimetric outcomes and diagnostic accuracy in distinguishing glaucoma patients from controls, as well as an improved user experience.[8,9] This study aimed to assess the repeatability and reliability of OCCP when performed at home in unsupervised conditions, assessing its potential utility as a tool for remote monitoring and early detection of glaucoma through at-home use.

Methods

55 participants (20 control and 35 open-angle glaucoma patients) were included. Participants underwent baseline visual field testing using OCCP in a clinical setting, followed by weekly unsupervised home tests over six weeks on their personal computers. An online survey was completed afterwards. Global perimetric indices and reliability indices were compared between clinic-based and home-based tests and analyzed to assess the repeatability and reliability of OCCP at home. Rasch analysis assessed the psychometric properties of the survey and intergroup variability.

Results

No statistically significant differences were found in mean deviation (MD), pattern standard deviation (PSD), or visual index (VI) values between home and clinic tests (P>0.05), and these values did not significantly alter over the 6 weekly at-home tests. OCCP false positive (FP) and fixation loss (FL) responses were statistically higher at home compared to baseline (P=0.002 & P=0.001). Test-retest intraclass correlation coefficients (ICCs) for OCCP home use compared to in clinic for MD ranged from 0.90 to 0.93, and for PSD ranged from 0.81 to 0.85. Bland-Altman analysis for MD revealed zero test-retest bias with limits of agreement ranging from ±5.28 to ±5.83 dB across the six weeks. The survey indicated high user satisfaction, however Rasch analysis revealed suboptimal precision and targeting.

Conclusions

OCCP retains a similar diagnostic accuracy and repeatability in home environments on personal devices compared to clinic-based environments and has the potential to be utilized as a remote tool for glaucoma screening and surveillance.

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P-0657

ANALYSIS OF THE OPTIC DISC AND MACULAR CHOROIDAL THICKNESS IN ACUTE ANGLE-CLOSURE GLAUCOMA

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Background
In the 2020 Chinese glaucoma guideline , atrial angle closure mechanism typing in angle-closure glaucoma increased the choroidal swelling type,which highlights the importance of the choroid in the pathogenesis of acute angle-closure glaucoma (APACG). Therefore, the analysis of the choroidal thickness changes in APACG patients is important for deeply understanding the pathogenesis of the disease, assessing the disease severity and guiding clinical treatment. In this study, we analyze the differences in choroidal thickness at the optic disc and macular area among the affected eyes of acute primary angle-closure glaucoma (APACG), the contralateral preclinical eyes, and normal eyes.

Methods
Forty-four patients with APACG (44 patients with acute attack eyes and 44 patients with contralateral preclinical eyes)were sequentially selected for this case-control study who were admitted to the Department of Ophthalmology of Shijiazhuang Hospital from September 2018 to September 2021 and 51 normal subjects (51 eyes) who matched the age, intraocular pressure and eye axis were selected as the control group. Enhanced depth imaging optical coherence tomography (EDI-OCT) was used to measure the optic disc and choroidal thickness in the macular region , and the measured data were analyzed and studied through one-way analysis of variance.

Results
The choroidal thickness (supranasal, nasal, temporal, temporal, mean thickness) in the optic disc area of the acute attack eye group was significantly thicker than that of the contralateral preclinical eye group and the normal control group ($P < 0.05$); No significant differences were found between contralateral pre-clinical eye group and normal control group ($P > 0.05$). The choroidal thicknesses of macular area (central subfield macula, nasal inner macula ,superior inner macula, inferior inner macula,temporal inner macula, nasal outer macula,superior outer macula,inferior outer macula,temporal outer macula) in acute attack eye group and contralateral preclinical eye group were thicker than those in normal control group, the difference was statistically significant ($P < 0.05$); There was no significant difference between acute attack eye group and contralateral preclinical eye group ($P > 0.05$).

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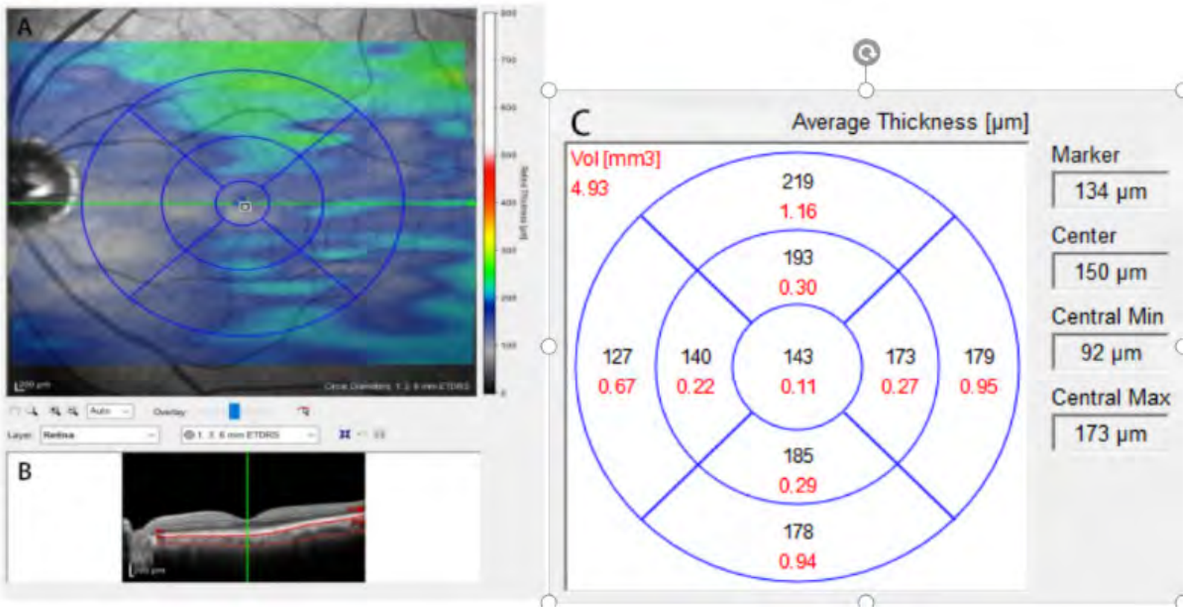
Image



Conclusions

The choroidal thickness in the optic disc region of acute attack eyes is thicker than that in the contralateral eyes and normal subjects, and the choroidal thickness in the macular region of acute attack eyes and contralateral eyes is thicker than that in normal subjects. It is presumed that the blood supply of the optic disc is more affected by ocular hypertension than that in the macular region. It is suggested that choroidal thickening plays an important role in APACG.

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P-0658

THE STUDY ON THE LONG-TERM IMAGE REGISTRATION OF 45 ° FUNDUS PHOTOGRAPHS FOR THE DIAGNOSIS OF PREPERIMETRIC GLAUCOMA

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Background
To report the preliminary results of using long-term image registration of 45 ° fundus photographs for the diagnosis of preperimetric glaucoma in patients with ocular hypertension.

Methods
The data of PACS and electronic medical records of patients with ocular hypertension treated by the corresponding author at Beijing Tongren Hospital from January 1, 2015 to December 31, 2023 were reviewed. 330 patients with initial diagnosis of ocular hypertension, follow-up for more than six months, and with 45 ° fundus photography data were included. All patients were first subjected to baseline 45 ° fundus photography and regularly (every 3-6 months) followed up with fundus photography. We use image registration software developed in collaboration between Beijing Institute of Ophthalmology and Beijing Daheng Imaging Company to perform multiple fundus image registrations, and observe with flickering. The interpretation of all results was completed by the corresponding author. Focus on observing local or overall changes in the optic cup and rim, as well as changes in the position of small blood vessels near the boundary of optic cup.

Results
Among 330 patients with ocular hypertension, the age was 34.38 ± 16.25 years (10-81 years). Follow up period was 48.73 ± 40.79 months (6-292 months), with a follow-up frequency of 8.15 ± 7.17 times (2-54 times). There were 140 males (42.4%) and 190 females (57.6%). 126 cases (38.18%, 126/330) were ultimately diagnosed with primary open-angle glaucoma (POAG) or juvenile glaucoma (JOAG) through follow-up. Among them, there were 109 cases (86.5%) with varying degrees of enlargement of the optic cup in one or both eyes (displacement of small blood vessels within the optic disc or narrowing of the upper and lower disc rim), 19 cases (15.1%) with varying degrees of reduction in the optic cup in one or both eyes, 5 cases (4.0%) with localized RNLFD in the superior-temporal or inferior-temporal regions in one eye, and 7 cases (5.6%) with first-degree relatives diagnosed with POAG or JOAG previously or during the patient's follow-up period.When diagnosing glaucoma, all patients (100%) had normal Humphrey field with 24-SITA FAST program testing.

Conclusions
In this retrospective case series, one-third of patients with ocular hypertension were diagnosed as glaucoma after long-term follow-up. The early diagnosis of preperimetric glaucoma is a long-term follow-up and dynamic assessment process.Registration and follow-up with 45 ° fundus images is a very useful diagnostic tool. The displacement of small blood vessels within the optic disc due to ocular hypertension is an important diagnostic criterion, but should be paid to distinguishing it from the progression of myopia.

P-0659

VISUAL FIELD TEST WITH 24PLUS(1-2) TEST LOCATION FOR GLAUCOMA PATIENTS

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Background

The visual field (VF) test with the imo perimeter 24plus allows for the selection between examining all measurement points with 24plus(1-2) or using a reduced number of measurement points with 24plus(1). In this study, we compared the results of these two testing methods.

Methods

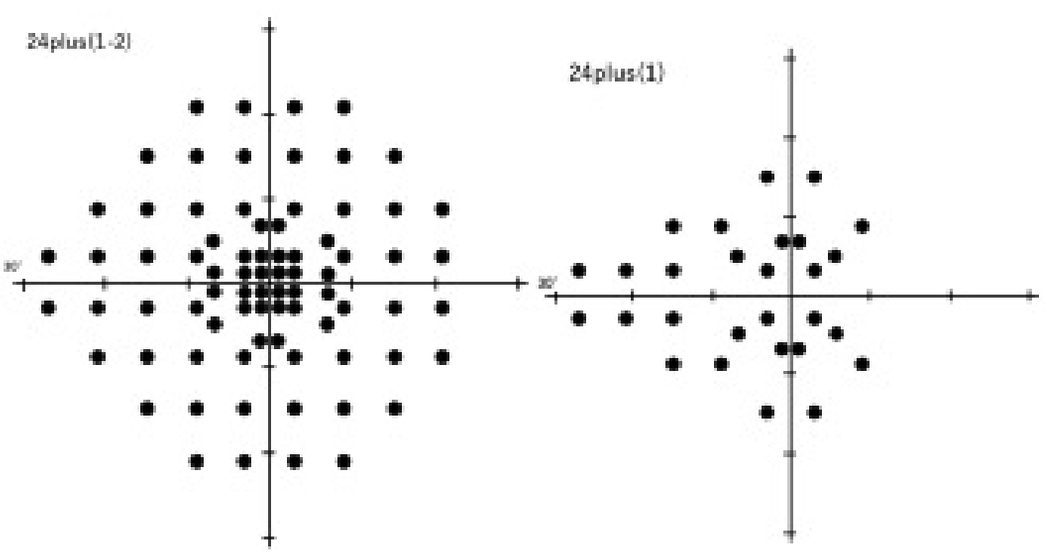
Glaucoma patients were enrolled from the glaucoma clinic at the Kindai university hospital. All patients underwent a VF test with the 24plus(1-2) test location using the imo perimeter. Mean deviations (MD) for both 24plus(1-2) and 24plus(1) were calculated. The MD values were compared using the Wilcoxon Signed-Rank Test, and correlation coefficients were calculated to evaluate their relationship.

Results

In three hundred fifty-eight eyes of 187 glaucoma patients,

the MD for 24 plus(1-2) and 24plus(1) were -4.3 dB and -4.7 dB, respectively ($p = 0.43$), showing no significant difference. The correlation coefficient was 0.99 ($R^2 = 0.97$), indicating a strong correlation. When comparing MD by disease stage, there was no significant difference in the early stage ($p = 0.42$). However, in the moderate stage ($p = 0.02$) and advanced stage ($p = 0.05$), the MD for 24plus(1) was significantly lower.

Image



Conclusions

No difference was found in the test results between the two measurement points in the early and moderate stages. However, in cases beyond the moderate stage, it was suggested that the lower number of measurement points in 24plus(1) could lead to a lower MD compared to 24plus(1-2) due to a floor effect.

P-0660

ASSESSMENT OF THE CORNEAL BIOMECHANICAL FEATURES OF STURGE-WEBER SYNDROME USING DYNAMIC ULTRAHIGH-SPEED SCHEIMPFLUG IMAGING

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Background
To evaluate the corneal biomechanical characteristics of eyes with Sturge–Weber syndrome (SWS) secondary glaucoma (SSG) by analyzing corneal biomechanical parameters obtained using the Corneal Visualization Scheimpflug Technology instrument (Corvis ST).

Methods
In patients with SWS, eyes affected by SSG were designated as the SSG group while the contralateral eyes were designated as the SWS contralateral group (SC group). Patients from the myopia clinic served as the control group. Dynamic corneal response parameters (DCRs) including the stress–strain index (SSI) —a critical material stiffness parameter that excludes interference from IOP and central corneal thickness (CCT)—were analyzed.

Results
For CCT, no significant difference was observed between the SSG and SC groups. However, significant differences were found between the SSG and control groups and between the SC and control groups. Parameters such as HC Time, A1 Deformation Amp., A2 Deformation Amp., length of Whole Eye Movement (WEM), DA Ratio Max (2 mm), PachySlope, DA Ratio Max (1 mm), and ARTh showed significant differences between the SSG group and control group. In the SSG group, 4 of night eyes had an SSI of less than 0.85.

Conclusions
Some DCRs indicated a stiffer cornea in the SSG group, possibly due to a thicker cornea in this group. On analyzing SSI, it was found that corneal material properties change, becoming less stiff in some of the patients with SSG. In conclusion, our study provides a preliminary exploration of the biomechanical properties of SWS secondary glaucoma.

P-0662

RETINAL NERVE FIBER LAYER AND RETINAL GANGLION CELL COMPLEX THICKNESS IN MYOPIC CHILDREN

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Background
It is widely acknowledged that myopia increases the risk of developing optic neuropathies including glaucoma, but the precise mechanism remains elusive. The purpose of this study was to investigate the distribution and associated factors of parapapillary retinal nerve fiber layer (ppRNFL) thickness and macular ganglion cell complex (mGCC) thickness in myopic children.

Methods
Sixty-two eyes of 31 children were enrolled to this study from the participants of the longitudinal clinical study to evaluate ocular morphological changes associated with myopia in Japanese children. Correlations between the ppRNFL and the mGCC thicknesses and baseline factors such as age, gender, eye laterality, best corrected visual acuity, axial length, and intraocular pressure (IOP) were examined using multivariate linear regression analysis.

Results
Nineteen participants were female. The age of the participants was 9.4 ± 0.8 years (mean ± standard deviation). Mean axial length, logMAR visual acuity, and IOP were 24.4 ± 0.6mm, -0.10 ± 0.07 15.8 ± 2.5mmHg, respectively. Mean ppRNFL and GCC thickness were 108.2 ± 9.8 (range: 87.5 – 136.7) µm and 108.1 ± 6.3 (87.5 – 136.7) µm, respectively. Multivariate regression analyses showed significant negative correlation between IOP and both ppRNFL and mGCC thickness (β = -0.8154, P = 0.0143, and β = -1.145, P = 0.0206, respectively). Other factors showed significant correlation with neither ppRNFL nor mGCC thickness.

Conclusions
In children with myopia, higher IOP was associated with thinner ppRNFL and mGCC thickness. This may be an early sign of glaucomatous optic neuropathy. Knowledge of the distributions and the associated factors of ppRNFL and mGCC thickness in myopic children may improve our understanding of the mechanisms of developing myopic or glaucomatous optic neuropathies in myopes.

P-0663

FACTORS ASSOCIATED WITH GLAUCOMA-LIKE VISUAL FIELD DEFECT IN MYOPIC EYES WITH PERIPAPILLARY INTRACHOROIDAL CAVITATION

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Background
Peripapillary intrachoroidal cavitation (PICC) was acquired in 3.6% of highly myopic eyes. PICC could be associated with glaucoma-like visual field (VF) defect. High myopia has been demonstrated to be a risk factor for the onset and progression of glaucoma. The highly myopic eyes with PICCs may present with VF defects that mimic glaucoma. The co-occurrence of PICC and glaucoma in myopic eyes could be a major cause of diagnostic uncertainty. Therefore, we designed this study to investigate factors associated with glaucomatous VF defect in myopic eyes with PICC.

Methods
Design: Retrospective study. Participants: Forty-seven eyes of 47 myopic subjects (mean age 50.7 ± 8.6 years, 20 men [42.6%]) with PICCs were included. Evaluation of PICCs: A PICC appears as a yellowish-orange lesion located adjacent to the optic disc in color fundus photograph. The optic discs were scanned using swept-source OCTA (DRI-OCT Triton; Topcon, Tokyo, Japan). A PICC was defined as a hypovascular space in the choroidal layer on B-scan images, corresponding to yellowish-orange lesions on color fundus images.

Assessment of visual field: The VF exams were performed using a SITA fast 24-2 program with Humphrey Field Analyzer II 750 (Carl Zeiss Meditec). Statistical analysis: (1) All subjects were divided into two subgroups according to the presence of glaucomatous VF defect. Comparisons between the two groups were performed using the independent t-test for continuous variables and Chi-Square test for categorical variables. (2) Logistic regression analyses were performed to determine the association of various factors with the presence of glaucomatous VF defect. Statistical analyses were performed using SPSS, version 19.0. A P value of less than 0.05 was considered statistically significant.

Results
The mean SE was -8.41 ± 2.84 D and the mean intraocular pressure at baseline was 17.6 ± 3.3 mmHg. The mean MD was -2.03 ± 1.97 dB. All PICCs were observed in the inferior hemisphere. Among 47 eyes, 19 (40.4%) showed glaucomatous VF defects. (Table 1) The VF defects were observed in the superior hemifield (12 eyes), inferior hemifield (4 eyes), or both hemifields (3 eyes). The eyes with VF defects had significantly greater vertical cup-to-disc ratio (P = 0.025), lesser MD (P = 0.003), greater PSD (P = 0.001), and thinner inferior and temporal RNFL (P = 0.017 and 0.034). Univariate logistic regression showed that the lesser MD (P = 0.005), greater PSD (P = 0.002), and thinner inferior RNFL and temporal RNFL (P =0.026 and 0.048) were significantly associated with the presence of VF defect. The associations were not statistically significant in multivariate logistic regression. (Table 2)

Conclusions
In myopic eyes with PICC, the factors associated with glaucomatous VF defect included lesser MD, greater PSD, and thinner inferior RNFL and temporal RNFL. Future studies with long-term follow-up are needed to distinguish PICC and glaucomatous optic neuropathy in myopic eyes with PICC and glaucomatous VF defect.

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P-0664

APPLICATION VALUE OF APS IN OCT DETECTION OF OPTIC DISC IN OPEN-ANGLE GLAUCOMA

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Background
To observe the correlation between optic disc changes and retinal nerve fibers (RNFL) in patients with open-angle glaucoma (POAG).

Methods
The structure of optic cup and optic disc was determined by OCT Anatomical Positioning System (APS) of HeidelbergEngineering software module, and the minimum disc edge width (BMO-MRW) was determined. The changes of RNFL thickness along and around the disc and their correlation were analyzed.

Results
In 22 patients (31 eyes) with POAG, there was consistency between the changes of disk rim and RNFL thickness around the disk, and the AUC values of BMO-MRW and RNFL thickness were similar. The thickness variation of RNFL around the disk was analyzed with APS positioning system to improve the sensitivity of RNFL detection around the disk.

Conclusions
APS can automatically locate the macular fovea and Bruch membrane opening center (BMOC), and automatically acquire and analyze OCT images related to the macular fovea to the central axis of BMO. BMO-MRW is a relatively stable and objective measurement method, which can more truly reflect the state of the nerve fiber layer, and has higher sensitivity and specificity for the diagnosis of early glaucoma.

P-0665

PERIPAPILLARY AND PARAFOVEAL VESSEL DENSITY MEASURED BY OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY IS ASSOCIATED WITH VISUAL FIELD PROGRESSION OF POAG

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Background
To explore the association between the retinal microvasculature and visual field (VF) progression in patients with primary open-angle glaucoma (POAG) using optical coherence tomography angiography (OCTA).

Methods
Sixty-one patients with POAG had prior VF tests for ≥ 5 years with ≥ 9 VFs were included. All patients underwent comprehensive ocular examinations. VF tests were performed by Octopus perimetry. The superficial radial peripapillary capillary (RPC) and parafoveal vessel densities were measured by OCTA. Logistic regression analyses were performed to determine the associated factors for VF progression.

Results
Twenty-four (39.3%) of the 61 patients showed progression. Reduced peripapillary and parafoveal vessel density were detected in the progressive patients, as compared to the non-progressive ones. In the univariate analysis, all sectors of RPC and superficial parafoveal region showed reduced vessel density in patients with progression (all $P < 0.05$). Multivariate analysis showed that the nasal ($P = 0.012$), inferior temporal ($P = 0.004$), superior temporal ($P = 0.047$), superior nasal ($P = 0.027$), and temporal ($P < 0.001$) sectors of the RPC, and the temporal ($P = 0.006$), superior ($P = 0.022$), and inferior ($P = 0.025$) sectors of the parafovea were significantly associated with VF progression, after adjusting for age, gender, initial MD, and mean follow-up IOP.

Conclusions
Focal sector perfusion may be a sensitive biomarker for VF progression. The patients with lower peripapillary and parafoveal retinal perfusion may require careful monitoring and more efficient IOP-lowering therapy.

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P-0666

CUP-DISC-RATIO OPTIMIZED VERTICAL EVALUATION (COVE): RELIABILITY OF A PROPOSED UNIVERSAL PHYSICIAN METHOD IN MEASURING CUP-DISC-RATIO

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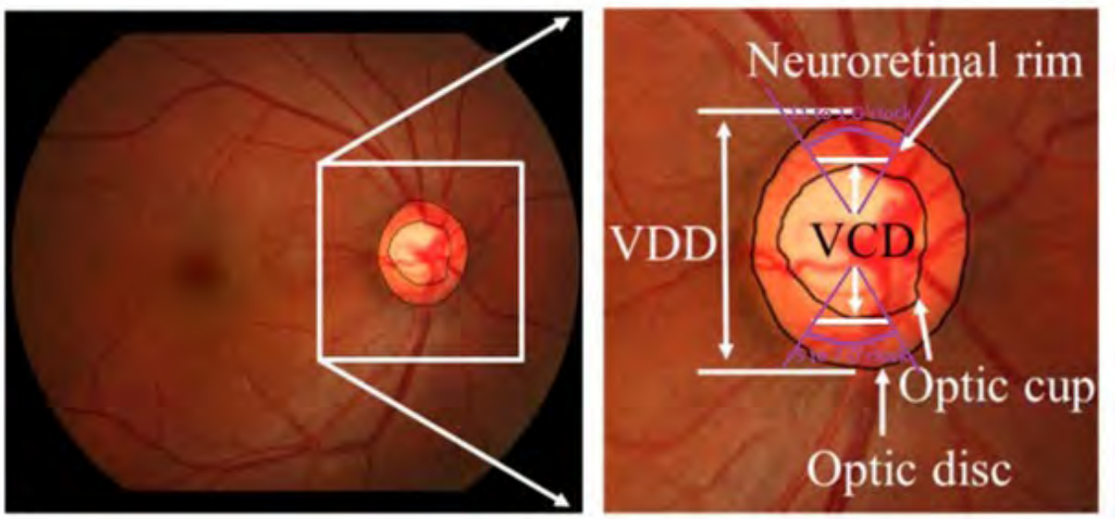
Background
Reliable assessment of the cup-disc ratio (CDR) is essential in the clinical diagnosis of glaucoma. There is no universally accepted protocol in grading Cup-Disc-Ratio (CDR) in fundus photographs. Cup-Disc-Ratio Optimized Vertical Evaluation (COVE) is a technique developed to grade CDR in fundus photos.

Methods
Using COVE, the optic cup and disc were outlined using Paint (Microsoft Windows®, Washington, U.S.). The CDR was measured as a ratio of the vertical diameter of the optic cup (VCD) and vertical diameter of the optic disc (VDD) using ImageJ® (National Institute of Health, Maryland, U.S.). The margin of the optic cup was outlined as the point of maximal inflection of vessels crossing the neuroretinal rim. The margin of the optic disc was outlined as the inner edge of the scleral crescent. The VCD was measured as the distance of a straight line drawn between the points of maximal centrifugal extension of the optic cup between 11 to 1 O'clock and 5 to 7 O'clock. The VDD was measured as the distance of a straight line drawn between the points of maximal centrifugal extension of the optic disc between 11 to 1 O'clock and 5 to 7 O'clock. A pilot study was conducted to evaluate the inter-observer variability of COVE. 6 graders (2 fellowship-trained glaucoma specialists, 2 ophthalmology residents and 2 medical students) utilised COVE to grade the CDR of fundus photos. Statistical analysis was carried out using SPSS (version 25). Intraclass correlation coefficient and bland altman analysis was carried out.

Results
160 fundus photos were randomly selected from a database of 3600 fundus photos obtained from the Health for Life in Singapore study and graded independently by 6 graders. The intraclass correlation coefficient was 0.82 (CI 0.77 - 0.86, P<0.05) for the CDR, 0.86 (0.82 - 0.89, P<0.05) for VCD and 0.57 (0.46 - 0.67, P<0.05) for VDD. Bland Altman plots demonstrated good agreement between the consultants, residents and students. The mean bias calculated was -0.063, -0.027 and -0.15 for the glaucoma specialists, residents and students respectively.

Image

Fig 1. Example of measurement of VCD and VDD.



Conclusions

Utilizing COVE, the ICC for vertical CDR was 0.82 across graders of various levels of training and experience. This demonstrates COVE as a reproducible technique with low inter-observer variability for CDR grading in fundus photographs, with potential application in both research and clinical settings.

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P-0667

COMPARATIVE STUDY OF SITA FASTER VERSUS ZETA FASTER PERIMETRIC STRATEGIES IN HEALTHY AND GLAUCOMATOUS SUBJECTS

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Background

Visual fields are crucial for detecting and monitoring glaucoma, classified by the modified Hodapp-Parrish-Anderson scale. Various visual field testing strategies, including SITA Standard, SITA Fast, and newer SITA Faster (SFR) and ZETA Faster (ZFR), improve stimulus intensity, reduce testing time, and increase reliability.

Methods

This observational, cross-sectional, analytical, and prospective study included subjects over 18 years old, divided into three groups: healthy subjects, mild glaucoma, and moderate glaucoma, based on the Hodapp-Parrish-Anderson classification. Both strategies (SFR and ZFR) considered parameters like refractive error correction, white stimulus with size III, foveal fixation, false positives < 20%, gaze monitoring with no deviation or excessive blinking, and proper blind spot localization. Perimetry tests were conducted sequentially and randomly, with a 10-minute break between each test.

Results

A total of 108 eyes from 78 subjects (36 eyes per group) were included. Testing duration was significantly longer with the ZFR strategy (2.6 ± 0.56 vs. 3.6 ± 0.63 min; p<0.001), both in the overall population and within groups. The mean deviation (MD) was statistically different across the population (-3.36dB SFR vs. -4.2dB ZFR; p<0.05) and in glaucoma groups (mild -2.75 dB vs. -3.56 dB; p<0.05, moderate -7.7dB vs. -8.9dB; p<0.05), but similar in the control group (-1.08dB SFR vs. -1.12dB ZFR; p=0.85). No differences were found between strategies in healthy subjects for other parameters. A satisfactory level of concordance was found for the mean deviation between the two strategies across all study groups. The mean difference in MD (DMSFR - DMZFR) was -0.025 (95% CI -0.747 – 0.697) in healthy subjects, 1.0 (95% CI 0.250 – 1.751) in mild glaucoma, and 1.397 (95% CI 0.347 – 2.447) in moderate glaucoma.

Image

Comparison of the evaluated parameters in each study group

	SITA-Faster	ZETA-Faster	p*
Healthy subjects			
Foveal Stimulus (dB)	35 (34.5 – 37)	35 (33 – 35)	0.054
Mean deviation (dB)	-1.08 (-3.1 – -0.23)	-1.12 (-2.72 – -0.05)	0.850
Visual field index (%)	98 (96 – 99)	98.5 (95 – 100)	0.557
Pattern standard deviation (dB)	2.14 (1.57 – 3.14)	1.86 (1.25 – 3.63)	0.706
Mild glaucoma			
Foveal Stimulus (dB)	35 (33 – 36.5)	34 (32 – 35)	0.065
Mean deviation (dB)	-2.75 (-3.9 – -1.9)	-3.56 (-6 – -1.7)	**0.017**
Visual field index (%)	95 (93 – 97)	94.5 (90 – 98.5)	0.365
Pattern standard deviation (dB)	2.86 (2.1 – 4.1)	3.69 (2.85 – 5.54)	**<0.001**
Moderate glaucoma			
Foveal Stimulus (dB)	32 (31 – 34.5)	32 (29 – 34)	**0.009**
Mean deviation (dB)	-7.7 (-8.9 – -6.3)	-8.9 (-10.3– -6.8)	**0.021**
Visual field index (%)	84.5 (76 – 88)	80.5 (74.5 – 87)	0.386
Pattern standard deviation (dB)	6.3 (5.3 – 8.9)	7.4 (4.9 – 10)	0.066

Mean difference and limits of agreement from Bland-Altman analysis

	Healthy subjects	Mild Glaucoma	Moderate glaucoma
Mean difference (IC 95%)			
Foveal Stimulus (dB)	1.083 (-0.144 – 2.311)	1.083 (-0.261 – 2.428)	1.778 (0.532 – 3.023)
Mean deviation (dB)	-0.025 (-0.747 – 0.697)	1.0 (0.250 – 1.751)	1.397 (0.347 – 2.447)
Visual field index (%)	-0.139 (-1.635 – 1.357)	1.111 (-0.556 – 2.778)	1.861 (-0.174 – 4.896)
Pattern standard deviation (dB)	-0.207 (-0.953 –0.539)	-1.198 (-1.827 – -0.570)	-0.724 (-1.478 – 0.030)

Conclusions

Comparing the 24-2 SFR and ZFR strategies, ZFR showed longer testing times due to the preservation of checkpoints for blind spot and false negatives. A significant difference was found in global indices, with moderate consistency in glaucoma groups. In contrast, the control group showed a higher level of concordance compared to both strategies. These findings suggest ZFR could be suitable for glaucoma screening and other diseases, offering improved glaucoma discrimination. Additionally, the checkpoints in ZFR make it a better tool for detecting glaucoma at various stages.

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P-0668

IMPACT OF POST-SURGICAL HYPOTONY ON OPTIC DISC AND MACULAR PERFUSION: A STUDY USING OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY

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Background
The aim of this study is to investigate the effects of post-surgical hypotony (intraocular pressure (IOP) < 6 mm of Hg) following Trabeculectomy, either alone or combined with cataract surgery, on optic disc and macular perfusion measured using Optical Coherence Tomography Angiography (OCT-A).

Methods
We included patients ≥ 18 years of age who presented with IOP < 6 mm of Hg at least 6 weeks post glaucoma surgery. Eyes with hypotony maculopathy were excluded.

All patients underwent OCT angiographic scans of both the optic disc (4.5 x 4.5 mm scan centred around optic nerve head (ONH)) and macula (6 x 6 mm scan centred around the fovea of superficial capillary plexus (SCP)). For comparison we included eyes matched to VFI (± 5 %) and age (± 5 year) with IOP between 10 and 21 mm of Hg. Only eyes with good quality scans (>7/10) were included.

Results
We included 19 eyes (17 patients) as cases and 19 eyes (19 patients) as controls. Study group (mean IOP = 4.37 ± 0.83 mm of Hg) had mean age 52.53 ± 17.64 year with 84.2% female participants were compared with control group (mean IOP = 15.05 ± 2.88 mm of Hg, p=0.001) having mean age 52.53 ± 16.96 (p=0.995), 68.4% females(p=0.252).

The mean VFI of 17 eyes was 42.35 ± 30.75 % , in 2 eyes VFI could not be calculated due to advanced glaucomatous damage , which were compared with age matched controls having VFI < 10 %. The mean VFI for controls (19 eyes) 38.95 ± 31.13% (p value = 0.74)

We found that on ONH scan (4.5 x 4.5 mm): No statistically significant differences were observed in sectoral and whole image perfusion (37.54 ± 2.42% v/s 38.56 ± 2.81% of controls, p= 0.24) or flux index (0.35 ± 0.48 v/s 0.35 ± 0.48 controls, p= 0.89) parameters between the two groups.

In macular SCP (6 x 6 mm) scan: Vessel Density (VD) central: Cases (11.01 ± 7.30 %) had significantly (p<0.001) higher VD than controls (7.04 ± 5.54%) and cases (1.7 ± 0.59 mm) had a smaller FAZ perimeter than controls (2.2 ± 0.82 mm), p=0.056.

Conclusions
This study found that reducing IOP to very low levels following glaucoma surgery had a beneficial effect on macular perfusion, particularly in the SCP as evidenced by increased central VD and a smaller FAZ perimeter.

P-0671

THE IMPACT OF FLASH PHOTOPIC PANRETINAL RESPONSES ON THE PHOTPIC NEGATIVE RESPONSE WAVE AND ITS CORRELATION WITH RETINAL GANGLION CELLS FUNCTION

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Background
The purpose of the study was too characterize relation between the panretinal photopic responses, photopic negative responses, visual fields parameters and morphological OCT parameters of retinal ganglion cells. The study was performed as evaluation of PhNR as the future gold standard in diagnostic of RGC's pathologies and to assess the impact of low photpic panretinal responses on PhNR's sensitivity and specificity.

Methods
The results of 475 eyes that were underwent static 24-2 Humphrey visual field (Optopol), OCT (Optopol) and PhNR (RETeval) were analyzed. From perymetry, the mean deviation (MD) and pattern standard deviation (PSD) were analyzed. From OCT, retinal nerve fibre layer (RNFL) thickness and ganglion cell complex (GCC) thickness were considered. From the PhNR test, the amplitudes of a-wave, b-wave, PhNR-wave and W-ratio were analyzed. W-ratio was designated as the ratio of the b-wave peak voltage to the PhNR trough voltage to b-wave amplitude. For the correlation calculations, Spearman's test was used.

Results
We described following settings of electrophysiology results, photopic responses normal and PhNR wave normal (n=269 tests), photopic responses normal and PhNR wave abnormal (n=31 tests), photopic responses abnormal and PhNR wave normal (n=110 tests), photopic responses abnormal and PhNR abnormal (n=65 tests). There was a significant correlation between PhNR wave and a, b waves (r=0.21, p<0.0001 and r=-0.43, p<0.0001). In overall group, there was a weak correlation between MD, PSD from visual fields (r=-0.1, p=0.03 and r=0.16, p=0.0017) and RNFL, GCC from OCT (r=-0.2, p<0.0001 and r=-0.16, p<0.0001). The correlation became stronger (except RNFL) in cases with impaired PhNR responses (r=-0.31, p=0.01; r=0.5, p<0.0001; r=-0.1, p=0.2; r=-0.3, p=0.01; respectively). Abnormalities in a or b wave did not affect correlation between PhNR and MD, PSD and GCC.

Conclusions
Based on our analysis, it would be important to highlight that PhNR is more sensitive marker of RGC dysfunction than their function in healthy conditions and that photopic panretinal responses, if decreased due to other diseases, *i.e.*, retinal dystrophies, do not reduce sensitivity of PhNRs as RGC representation in ERG. Photopic negative responses are sensitive marker of retinal ganglion cells dysfunction and the diagnostic significance and utility of PhNRs is independent from panretinal photpic responses and can be used even if panretinal responses are diminished.

P-0676

FACTORS AFFECTING PERIMETRIC PERFORMANCE IN YOUNG GLAUCOMA AND GLAUCOMA SUSPECT PATIENTS AGED 6-16

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Background

Pediatric perimetry remains a challenge to date. It is one of the most crucial test document progression.[1] The ability of the child to sit and maintain steady fixation is the major obstacle.[2] The difficulty in understanding the visual field test, the capability of a child to respond and poor concentration can result in a higher chance of false positive and false negative responses. This increased risk variability in the field test needs to be addressed. Our study investigated the factors affecting perimetry performance in glaucoma patients and suspect patients aged 6-16.

Methods

A retrospective study was done at a tertiary eye care center where Humphrey visual fields of glaucoma and suspect patients (6 to 16 years) who underwent 24-2 SITA Standard from January 2014 to January 2024 were included. Patients with visual acuity worse than 6/60 were excluded. Low test reliability (LTR) was based on manufacturer criteria fixation loss **(FL) >** 20%, false positive (FP), >33% and false negative (FN) > 33%. The reliability indices and test duration were compared based on age group and LogMAR visual acuity.

Results

800 eyes of 457 patients were included. The mean age was 12.6 years (SD± 2.4), the mean fovea threshold was 33.3 dB (SD± 5), and the mean test duration was 6.21 ±1.4 minutes. The mean visual field index was 84.9 ± 24.1 %, and the mean deviation was - 7.9 ± 8.2 dB. LTR was seen in 30.3% of eyes (243/800). Among these, 95.9 % (233 /243) had high fixation loss, and 4.1 % (10/243) eyes had excessive false positives. LTR was 44.9% for the 6-9 years age group,37% for 10-13 years and 22.9% for 14-16 years($p < 0.001$). For LTR, based on LogMAR, visual acuity was 25% (visual acuity 0-0.2), 44.1% (0.3-0.6), and 60.9%(0.7-1 $p < 0.001$). The number of FL (4.7 vs 4.03 vs 2.6 $p=0.001$) and test duration (6.9 vs 6.4 vs 6 minutes $p =0.001$) were the least in the 14-16 years group. LogMAR visual acuity 0-0.2 group has the least fixation loss number(2.4 vs 5.5 vs 6.7 $p=0.001$), test duration (6 vs 6.8 vs 6.8 minutes $p =0.001$), foveal threshold (33.7 vs 28.4 vs 26.4 dB $p=0.001$. The foveal threshold showed a negative correlation with visual acuity.(Correlation coefficient 00.526 $p<0.01$)

Conclusions

Low test reliability was seen in almost one-third of young patients (6-16 years). Younger age and poor visual acuity affect the test reliability.

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P-0677

INTEROCULAR COMPARISON USING OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY IN NORMAL TENSION GLAUCOMA WITH UNILATERAL FIELD LOSS

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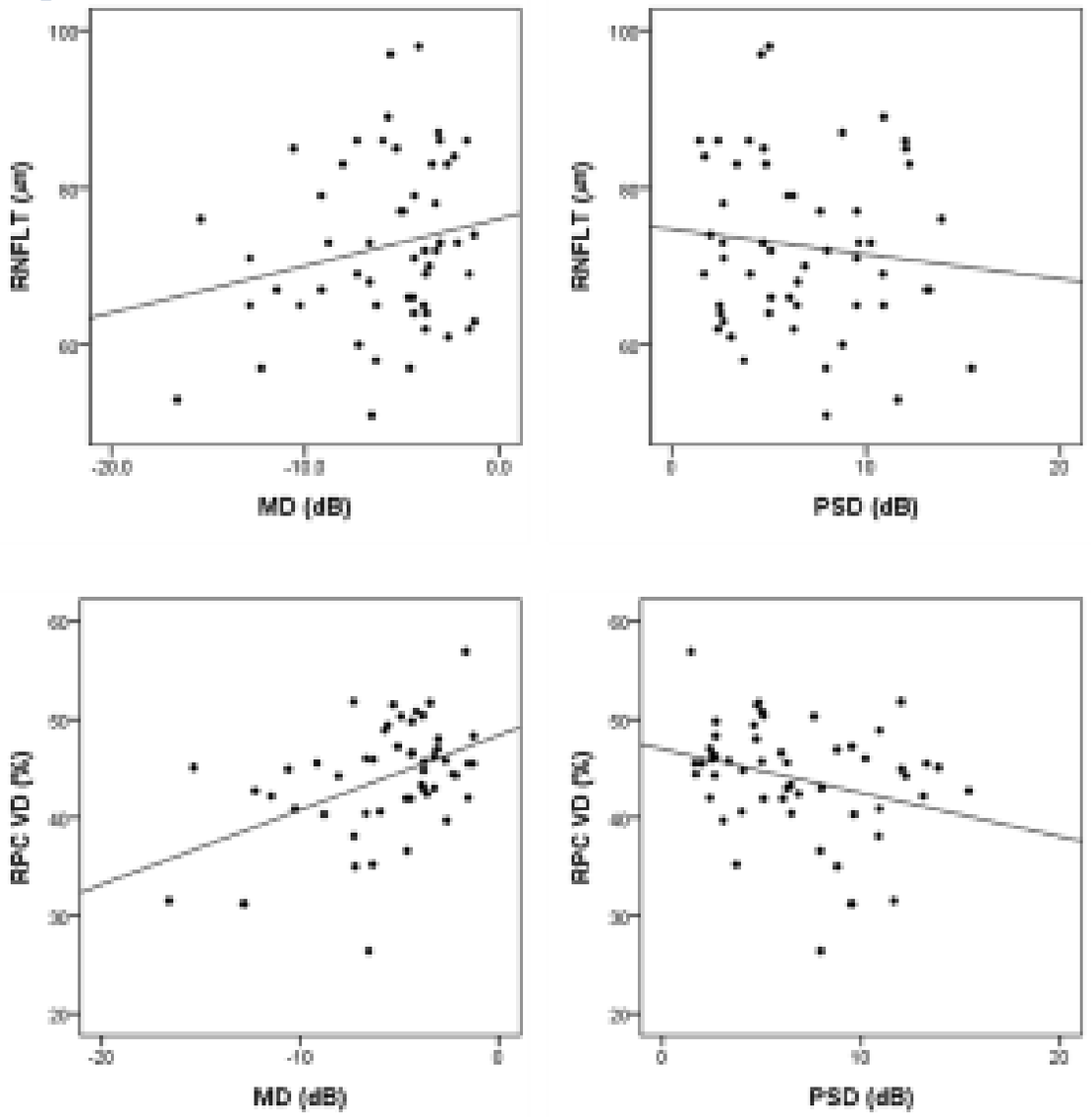
Background
To investigate the relationship between peripapillary vessel density and visual field loss in patients with unilateral perimetric normal tension glaucoma (NTG).

Methods
Fifty-five patients with unilateral perimetric NTG and fellow preperimetric NTG, showing localized RNFL defect within 1 clock hour, were included. Inter-eye retinal nerve fiber layer (RNFL) thickness and radial peripapillary capillary (RPC) densities were compared, and factors associated with the severity of visual field defects were analyzed.

Results
RPC densities in the whole peripapillary region and the damaged clock hour sector in the NTG eyes (PG) were significantly lower than those in the fellow eyes (PPG) ($p<0.01$). Vessel densities in the whole peripapillary region and the damaged clock hour sector in PG eyes were significantly associated with the severity of visual field defects ($p<0.01$), whereas RNFL thickness did not show a statistically significant association.

Image



Conclusions

Thinner RPC densities were significantly associated with visual field defect severity in patients with unilateral perimetric NTG, suggesting that microvascular compromise may be a secondary change to RNFL degeneration in the pathogenesis of NTG.

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P-0678

SUPERFICIAL MACULAR MICROCIRCULATION IN BOTH EYES OF PATIENTS WITH UNILATERAL POAG

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Background
To investigate and compare superficial macular microcirculation in both eyes of patients of unilateral primary open angle glaucoma (POAG) with controls.

Methods
Cross-sectional study. Patients with unilateral POAG glaucoma and health controls (right eyes) were recruited from September 2023 to September 2024 in the Beijing Tongren Hospital. All subjects underwent optical coherence tomography angiography scan at 6 × 6 mm macular area. Macular vessel density (VD) and perfusion density (PD) and 9 sectors were compared between POAG and health controls. Paired *t* test was conducted to compare macular vascular parameters between affected POAG eyes and unaffected fellow eyes. Analysis of covariance was conducted to compare macular vascular parameters between POAG eyes and controls.

Results
Both eyes of 50 patients with unilateral POAG (mean age 40 years, male 31 eyes, female 19 eyes) and 50 health controls (45 eyes, mean age 41 years, male 30 eyes, female 20 eyes) were included in this study. The mean total macular VD and PD of POAG eyes were significant different from their unaffected fellow eyes (both $P<0.01$) and controls (both $P<0.01$). Macular VD at inner average was significantly decreased in affected glaucoma eyes (17.52±1.61) µm compared with unaffected fellow eyes (17.93±1.32µm, $P=0.031$), but showed no significant difference compared with that of health controls (17.83±0.97µm, $P>0.05$). The outer average VD and of POAG eyes was (16.52±1.82)µm, which were significant different from their unaffected fellow eyes (18.06±1.27µm, $P<0.05$) and controls (18.11±0.81µm, $P<0.05$). Macular PD at inner average showed no significant difference compared with unaffected fellow eyes and health controls ($P=0.148$ and $P=0.355$). The outer average PD of POAG eyes were significant lower than unaffected fellow eyes and health controls (both $P<0.01$).

Conclusions
Macular microcirculation declined significantly in unilateral POAG eyes compared with unaffected fellow eyes and health controls. Compared with unaffected fellow eyes, macular microcirculation loss in unilateral POAG eyes was more central compared with that in the health controls. This may suggest a contributing role of the perfusion of the macular superficial vessel in the pathogenesis of glaucoma.

P-0679

OPTICAL COHERENCE TOMOGRAPHY-BASED RISK SCORE ADDS VALUE OVER SUPRATHRESHOLD VISUAL FIELD TESTING IN GLAUCOMA SCREENING

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Background
Suprathreshold visual field testing is commonly utilized for glaucoma screening in primary eyecare. This study aimed to compare the performance of a multi-modal risk score that includes optical coherence tomography (OCT) with that of suprathreshold visual field testing in identifying eyes with glaucoma.

Methods
Healthy and glaucoma subjects 40 years or older were recruited from a primary eyecare practice. Glaucoma status was determined by clinical diagnosis and the study eye was randomized. 24-2 AIZE-Rapid threshold visual fields were obtained using the TEMPO/IMOvifa (Topcon/CREWT, Tokyo, Japan). Suprathreshold perimetry was also conducted using a 28-point pattern at the normal age-adjusted 1% probability to prioritize high specificity and short test time for glaucoma screening and considered positive when one or more points were missed. OCT parameters, along with age, central corneal thickness, intraocular pressure and pattern standard deviation, were then used to derive the Glaucoma Health Scores (GHS) reported by Chaglasian et al.[1] Sensitivity and specificity were calculated to assess the performance of suprathreshold visual field and GHS in distinguishing glaucomatous eyes from healthy.

Results
The study included 102 healthy eyes and 79 glaucomatous eyes from 181 subjects. Specificity was 94% for suprathreshold visual field. At the cutoff of 90 (out of 100), Glaucoma Health Score had specificity of 98%. Using the 1% probability, suprathreshold visual field demonstrated clinically acceptable sensitivity of 46% for glaucoma screening in a cohort that included eyes with pre-perimetric glaucoma. Screening VF tests are known to have better sensitivities with later stage disease given the failure criteria of a single point being abnormal while traditional OCT analysis has been noted to have better sensitivity in early disease with a tradeoff of a lower specificity. By including OCT and other parameters, GHS yielded greater sensitivity of 60% for the same eyes.

Conclusions
A risk score that includes OCT is effective and potentially more sensitive at identifying early glaucoma than suprathreshold testing alone in a primary eyecare population. The findings suggest these risk scores provide complementary insights to suprathreshold visual field in glaucoma screening.

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P-0680

LONGITUDINAL CHORIOCAPILLARIS VASCULAR DENSITY CHANGES IN PRIMARY OPEN-ANGLE GLAUCOMA – A SIX-MONTH PILOT STUDY

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Background
Researchers' interest in using optical coherence tomography-angiography (OCT-A) in the glaucoma field has increased significantly in recent years. Yet the exact rate of changes in the vascular density (VD) with time is not well defined. We aim to explore those changes in the peripapillary and macular region in healthy versus glaucoma patients for a six-month period.

Methods
A prospective longitudinal pilot study was conducted. A total of 120 eyes of 60 patients were evaluated. After a full ophthalmological exam, the patients were divided into two groups – healthy controls (60 eyes) and open-angle glaucoma group (60 eyes). The rate of changes in the OCT-A parameters such as radial peripapillary capillary (RPC) vessel density, superficial parafoveal VD, retinal nerve fiber layer (RNFL) thickness, and ganglion cell complex thickness were assessed on the first visit and in 6 months. A correlation analysis with the axial length (AL) was conducted.

Results
The rate of changes of the superficial peripapillary VD in the glaucoma group varied between +2.8% and -3.4% for a 6-month period in confront to the rate of changes in the RPC in the healthy group: +3.1% and -0.8%. A negative correlation between the AL and the RPC VD was found in both groups. The RPC VD was positively correlated with the rate of the RNFL thinning. An increase in the RPC VD was found in 6 patients from the glaucoma group after the six-month period. A possible correlation with the significant decrease in the intraocular pressure (IOP) after the commencement of topical treatment in newly diagnosed cases (all 6 patients) was suggested.

Conclusions
Understanding the dynamics of VD changes with time would help practitioners establish suitable periods for follow-up using OCT-A technology. Defining the pathological rate of change in the VD for an exact period of time would lead to a better and earlier diagnosis of glaucoma. Standardization of the methodology of VD measurements along with correlation analysis of background factors such as AL, medications, IOP, blood pressure, and others is necessary.

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P-0681

ASSOCIATION OF THE PRESENCE OF BETA AMYLOID PROTEINS IN ANTERIOR LENS CAPSULE IN COGNITIVE IMPAIRMENT AND GLAUCOMA

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Background

Cognitive impairment and glaucoma are neurodegenerative diseases that are characterized as current public health problems. There are a variety of epidemiological studies that have reported the potential risk of dementia in subjects with glaucoma, and common pathogenic mechanisms have been described, it is necessary to establish the pathophysiological and functional relationship that exists between these two entities since this could be essential to understand their overlapping pathophysiology and develop targeted therapies.

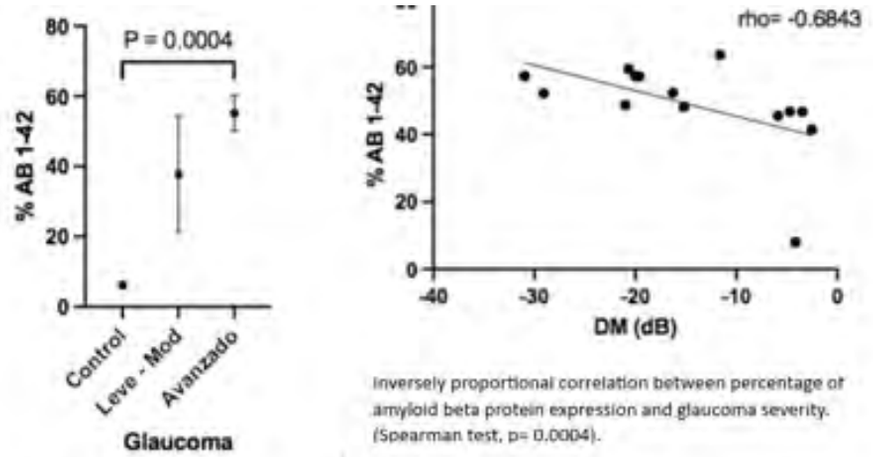
Methods

Subjects diagnosed with glaucoma and who had an ophthalmological medical indication for phacoemulsification surgery plus intraocular lens implantation were included in the study, and who also had a record of a complete ophthalmological examination and optical coherence tomography (OCT) of the optic nerve and visual fields of Humphrey, in the glaucoma department of the FAP Conde de Valenciana Institute of Ophthalmology in the period from October to November 2023. A total of 19 patients divided into two groups, made up of those with and without a diagnosis of glaucoma. Once the database was obtained, an evaluation was carried out with the Mini Mental Examination (MMSE). Subsequently, the anterior lens capsule, obtained from the capsulorrhexis during phacoemulsification surgery, was collected, for subsequent processing for immunofluorescence and identification of proteins: Aβ1-42. Subsequently, the analysis was carried out with the digital image processing program, ImageJ Java, and the data obtained were analyzed.

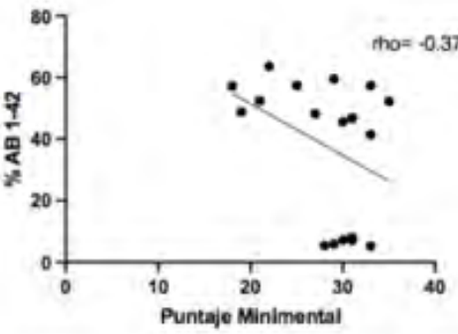
Results

19 patients who came for consultation to the glaucoma service of the Conde de Valenciana Institute of Ophthalmology, with a diagnosis of glaucoma from October to November 2023, were included. They were distributed into 2 groups, a control group and a group with glaucoma. The group with advanced glaucoma obtained a lower score. On the other hand, the thickness of the nerve fiber layer did have a statistical difference, as well as the percentage expression of the Beta amyloid protein in the anterior capsule of the lens between groups. Therefore, an inversely proportional correlation between these variables was demonstrated, as well as a correlation between amyloid beta expression and glaucoma severity.

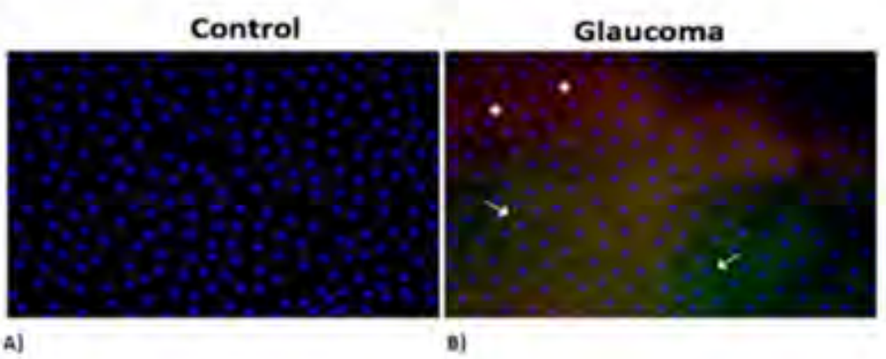
Image



Inversely proportional correlation between percentage of amyloid beta protein expression and glaucoma severity. (Spearman test, p= 0.0004).



Correlation analysis between percentage of amyloid beta protein expression and mini-mental exam score, without statistically significant values (Spearman test, p= 0.1167)



Double immunostaining with pTau and AB 1-42 antibodies in the anterior lens capsule. A) Control group without immunoreactivity for antibodies, only nuclei staining is observed (blue). B) Superposition between immunoreactivity for beta amyloid (red, asterisk) and tau protein (green, arrows) in a patient with glaucoma.

Conclusions

The present study is the first carried out in humans analyzing the anterior lens capsule, in which the correlation that exists between the presence of proteins involved in the pathology of neurodegenerative diseases and the severity of glaucoma is evident. The existing evidence and the results found in the present study strongly support considering glaucoma as a multifactorial chronic neurodegenerative disease that widely affects the central nervous system. Therefore, research gaps must be opened in search of therapies that improve neuroprotection in patients with glaucoma because neuroprotection is today a therapeutic objective to preserve visual and cognitive functions, to improve quality of life.

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P-0682

ANALYSIS OF LENS PARAMETERS IN THE INTER-EYE ANTERIOR CHAMBER DEPTH DIFFERENCE AMONG PATIENTS WITH PRIMARY ACUTE ANGLE-CLOSURE

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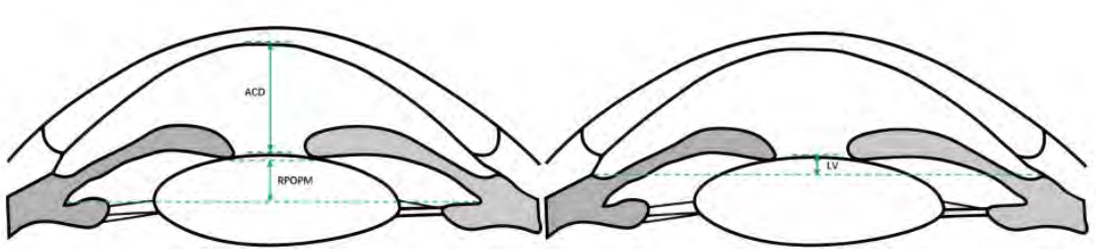
Background
The anterior surface position of the lens affects the central anterior chamber depth(ACD). A more anterior lens position associated with shallower ACD and a higher risk of acute primary angle-closure (APAC) episodes. Clinical observations show that in APAC patients with unequal ACD in both eyes, the eye with the acute attack usually has a shallower anterior chamber. An inter-eye ACD difference exceeded 0.2mm increases the risk of acute glaucoma, indicating the significant role of lens factors. This study compares various eye parameters in APAC patients with different inter-eye ACD differences, performing intra-eye comparisons and correlation analyses to understand the impact of lens parameters on acute APAC episodes.

Methods
A retrospective analysis was conducted on 95 patients (190 eyes) with unilateral APAC episodes treated at Shijiazhuang People's Hospital. The observation group(49 cases, 98 eyes) had a ACD difference>0.2mm between both eyes, while the control group(46 cases, 92 eyes) had an ACD difference≤0.2mm. Independent sample t-tests compared the differences in ACD, axial length(AL), lens vault(LV), relative position of pupillary margin(RPOPM), lens thickness(LT), lens position(LP=ACD+1/2LT), relative lens position(RLP=LP/AL), and chamber crowd ratio (CCR=LT/ACD) between acute attack eyes and the contralateral eyes in both groups. Pairwise t-tests were used for intra-individual comparisons. Univariate linear regression identified risk factors for unequal ACD in bilateral eyes.

Results
There were significant differences in ACD, LV, RPOPM, LT, LP, RLP and CCR (P<0.05) between the acute attack eyes of the observation group and the control group. Significant differences in ACD and CCR (P<0.01) were found between non-attack eyes in both groups. Intra-individual comparisons revealed significant differences in ACD, LV, RPOPM, LP, RLP, and CCR in the observation group (P<0.05) and ACD, LP, RLP, and CCR in the control group (P<0.01). Univariate linear regression showed that in the observation group, LV (R^2=0.42, P<0.01), RPOPM (R^2=0.28, P<0.01), and CCR (R^2=0.65, P<0.01) were negatively correlated with ACD, while LP (R^2=0.79, P<0.01) and RLP (R^2=0.59, P<0.01) were positively correlated with ACD. In the control group, LV (R^2=0.26, P<0.01), RPOPM (R^2=0.13, P<0.01), and CCR (R^2=0.76, P<0.01) were negatively correlated with ACD, while AL (R^2=0.07, P<0.05), LP (R^2=0.65, P<0.01), and RLP (R^2=0.44, P<0.01) were positively correlated with ACD.

Image



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Conclusions

High LV, anteriorly positioned RPOPM, LP, RLP, and crowded CCR may be risk factors for unequal anterior chamber depth in bilateral APAC eyes.

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P-0683

INVESTIGATION OF TOUCH RESPONSE BY MULTI-STIMULUS METHOD USING A TABLET TOOL OF MULTI-STIMULUS VISION TESTER (MVT-S)

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Background
We have developed the MVT-s, a tablet-based screening tool for the detection of visual field defects. This tool differs from a conventional perimeter, in which the examinee responds by directly touching the tablet, and up to three optotypes are presented simultaneously. However, the accuracy of the touch response has not been studied. In this study, we assessed the accuracy of the touch response using location error, which is the distance between the presented optotype and the touched location, and reaction time to the optotype.

Methods
Forty-five eyes of 45 patients with glaucoma (19 early, 16 moderate 10 severe) were included. Average mean defect (MD): 8.4 ± 5.3 dB, mean age: 65.0 ± 12.3 y.o.) were included. Thirty-one eyes of 31 visually normal individuals (mean age 59.0 ± 11.8 y.o.) were enrolled. Participants underwent testing with both MVT-s and 24plus AIZE rapid (imo®). We measured location error and reaction time for the first, second, and third visual field points in both groups. Reaction time was defined as the duration from showing the stimulus to touching it by subject. We investigate whether these indices are influenced by test point locations, age and stage of glaucoma.

Results
The average location error was 1.7±4.5 degrees in the normal group and 1.8±1.6 degrees in the glaucoma group. The maximum location errors averaged 2.7 degrees in the normal group, 5.7 degrees in the glaucoma group respectively. A positive correlation was observed between location error and eccentricity of test points in both groups ($R=0.82$, $p<0.05$). On the other hand, the location error didn't correlate with age and there was no significant difference in stage of glaucoma. Reaction times for the second and third responses were approximately half as long as those for the first responses in both groups.

Conclusions
In the MVT-s, location error was influenced by the eccentricity of the stimulus points. However, it didn't affect on ages and glaucoma stage. We would consider an acceptable range of location errors for the touch responses at each stimulus.

P-0684

EVALUATION OF CONTRAST SENSITIVITY AND ITS ASSOCIATION WITH VISUAL FIELD AND QUALITY OF LIFE IN GLAUCOMA PATIENTS IN SOUTH WEST, NIGERIA

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Background
Glaucoma is a group of optic nerve diseases with a characteristic optic neuropathy consistent with loss of neural tissue of the optic nerve and with corresponding visual field defects. Glaucoma prevalence is highest in Africa and primary open angle glaucoma (POAG) is the second most common cause of blindness in Nigeria. Visual function assessment in glaucoma includes visual acuity and visual field assessments. Visual acuity is based on high contrast prototype assessment and may be normal in glaucoma patients even when visual perception is already impaired. Contrast sensitivity(CS) assessment will allow the patient's vision to be assessed with optotypes of varied contrast levels and mirrors real life visual perception where objects of varied contrasts are viewed. This study aims to assess contrast sensitivity levels in patients with primary open angle glaucoma and evaluate its association with the mean deviation scores of their central visual field (an objective assessment of glaucomatous damage) and the quality-of-life scores (subjective assessment of patient's visual perceptions) with a view to including contrast sensitivity in the regular clinic assessment of these patients.

Methods
This was a cross-sectional study in which consecutive patients with POAG attending the follow up clinic of the Glaucoma unit of the department who met selection criteria were recruited until sample size was obtained. All patients had visual acuity, contrast sensitivity assessment using the peli-robson chart, anterior and posterior segment examination done. Recent (done within the last 3 months) and reliable Humphrey visual field results of the patients were analyzed and the mean deviation scores of both eye noted for each patient. Quality of life assessment using Glaucoma quality of life -15 (GQL-15) questionnaires was scored for each patient.

Results
The study analysed 151 patients and 302 eyes. The mean age of patients was 58.39 ± 15.4 and 63.6% of the participants were females. The mean contrast sensitivity score was 1.48±0.2 and a gradual reduction in mean contrast sensitivity in eyes with mild -moderate-severe glaucoma was recorded (1.56,1.52,1.37, $p<0.001$). There was a significant association between contrast sensitivity and mean deviation on Humphrey visual field ($r=0.500$, $p<0.001$). Correlation between binocular contrast sensitivity and overall GQL-15 scores was not significant ($r=-0.046$; $p=0.580$), however association between the worse eye contrast sensitivity and GQL-15 scores were significant ($r= -0.307$, $p<0.001$).

Conclusions
This study has demonstrated a reduction in CS in glaucoma patients. The study also demonstrated a significant correlation of contrast sensitivity with the mean deviation scores on visual field and the quality-of-life scores of these patients. For patients with good visual acuity and reduced performance on contrast sensitivity charts, it may increase compliance to medications, hospital visits and will help in overall management of glaucoma patients.

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P-0685

PATTERN ELECTRORETINOGRAM PARAMETERS ARE ASSOCIATED WITH ESTIMATED RETINAL GANGLION CELL COUNT BASED ON COMBINED STRUCTURE FUNCTION INDEX (CSFI)

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Background

Glaucoma is a chronic eye disease associated with retinal ganglion cell (RGC) dysfunction and death. Although clinical glaucoma treatments are utilized, the best intervention is early detection and diagnosis. Precise, objective *in-vivo* RGC counts (RGCC) are only obtained on postmortem eyes. As clinicians cannot directly measure RGCCs *in vivo*, representative empirical models are used to predict estimated counts. Medeiros et al. displayed that the Combined Structure and Function Index (CSFI) better detected perimetric and preperimetric glaucoma than models utilizing either structural or functional measures alone. Promising results of CSFI as a diagnostic tool motivated our investigation to novelly compare this model with the reliable pattern electroretinography (PERG) parameters to assess RGC function in glaucoma suspects (GS).

Methods

In this cross-sectional study, 16 subjects (23 eyes) were recruited from Manhattan Ear, Eye, and Throat Hospital- Glaucoma Center. All subjects underwent comprehensive eye examinations including Humphrey Field Analyzer (HFA) Test, Optical Coherence Tomography (OCT), and steady-state PERG (ssPERG). Estimated RGCC ($eRGCC_{CSFI}$) was calculated based on HFA global indices, average retinal nerve fiber layer thickness (AvRNFLT), and age.

Results

A linear regression model used $eRGCC_{CSFI}$ as a dependent variable, and after controlling for age (step 1), Mag was entered as a predictor (step 2) and explained 7% of variance in the $eRGCC_{CSFI}$; $F(1.20)= 7.216$, $p=0.014$. In a similar regression model, MagD was entered as a predictor (step 2) and explained 7.7% of variance in the $eRGCC_{CSFI}$; $F(1.20)= 8.390$, $p=0.009$. MagD/Mag ratio was also entered as a predictor and explained 5.8% of variance in the $eRGCC_{CSFI}$; $F(1.20)= 5.668$, $p=0.027$. To contrast PERG's ability to predict variance in $eRGCC_{CSFI}$, we used a linear regression model where $eRGCC_{CSFI}$ was a dependent variable, and after controlling for age, average ganglion cell layer – inner plexiform layer (AvGCL-IPL) thickness was entered as a predictor and explained 5% of variance in the $eRGCC_{CSFI}$; $F(1.20)= 4.740$, $p=0.042$.

Conclusions

PERG can better predict variance in estimated ganglion cell count than AvGCLIPL thickness in GS. PERG performed better than $eRGCC_{CSFI}$ or OCT measures. Future studies are needed to incorporate PERG parameters in the eRGCC models to be used in early stages of glaucoma and GS.

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P-0687
THREE DIMENSINAL VIEW OF VITREOUS ZONULA

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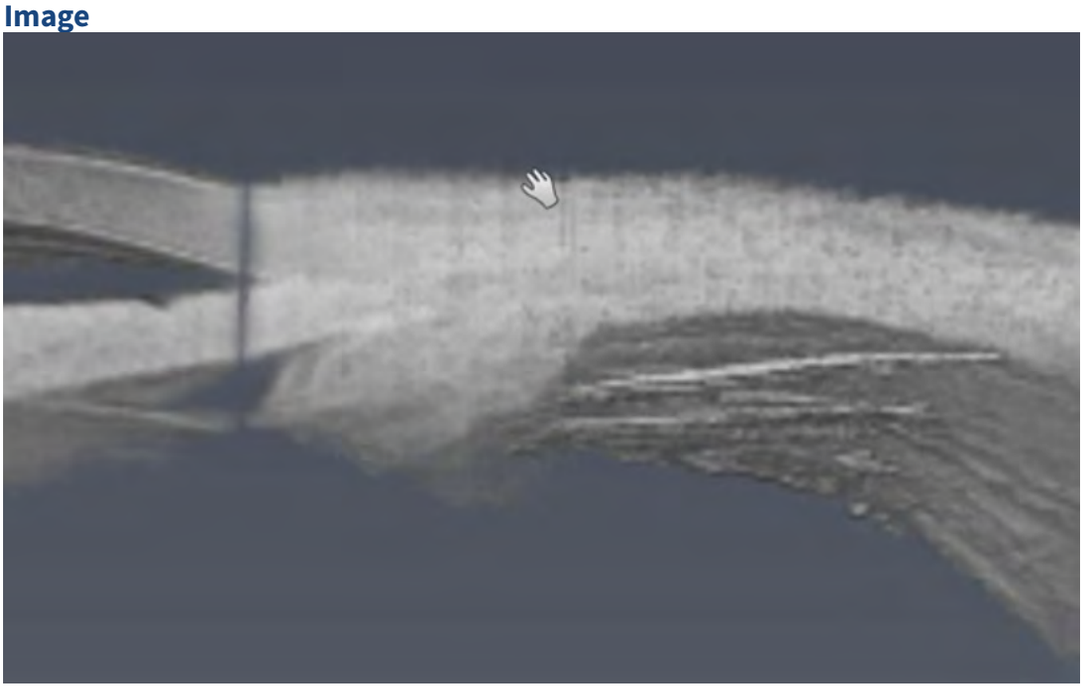
Background
Primary angle closure glaucoma (PACG) is an eye disease characterized by increased intraocular pressure caused by angle closure, resulting in optic neuropathy and visual field defects. Its pathogenesis is not fully understood, and it is currently believed to be related to anatomical abnormalities in the anterior segment of the eye, including multiple factors such as pupil block and non pupil block. However, these theories cannot fully and continuously reflect the pathogenesis of PACG.The aim of this study is to explore the role of the vitreous zonula (VZ) in the pathogenesis of PACG and attempt to use a novel three-dimensional UBM for imaging VZ.

Methods
(1) Design a rotary scanning system: Design a low-quality rotary motor, fix the UBM probe on the rotary motor through self-made 3D printing equipment, and control the motor through serial communication to achieve an automated rotary scanning system. (2) Geometric parameter acquisition: By scanning a known parameter phantom, calculate the geometric relationship between the rotation axis and the imaging plane. (3) Scanning image acquisition: Obtain two-dimensional UBM images from multiple angles through a rotating scanning system, which can control the sampling rate and scanning speed. (4) Image registration: Registering the collected two-dimensional images to correct for displacement and distortion caused by motion during rotational scanning. Using the mean square error corresponding to the previous and subsequent frame images as the loss function, fix one image, and traverse the pose parameters of the next frame image within a fixed range to find the image with the minimum value of the loss function as the registration result. (5) Image interpolation: Interpolate the registered image to fill the gaps between angles. After obtaining the results of image registration, linear interpolation is performed between adjacent frames of images to reduce the data requirements for 3D reconstruction. (6) 3D reconstruction: Using the processed data mentioned above, generate 3D eye images with ideal geometric structures. For the data obtained by rotational scanning, the larger the distance between the rotation axis and the area, the lower the sampling rate, and the area near the rotation axis is in an oversampling state. The pixels in this vicinity will receive multiple ultrasound intensity values from adjacent angles, and the average of these data will be taken as the final pixel value.

Results
VZ can be observed in 3D space in vidio, manifested as a radial arrangement of fibrous structures from the ora serrata to the ciliary process. (Figure)

Image



Conclusions

Innovative 3D UBM can observe the spatial structure of VA.

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P-0688

SOME UBM FEATURES OF ANTERIOR SEGMENT MEASUREMENTS IN THE GLAUCOMATOUS EYES

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Background
Biometric parameters, anatomical & topographic relationships of eye's anterior segment structures can be not only a risk factor, but a cause of diseases. Some studies suggest that relationships between AL, corneal curvature, ACD, and LT can determine ocular hydrodynamics and may be considered as predisposing factors in the development of primary open-angle glaucoma. Purpose: Detection of some features of the relationship between anterior segment structures in glaucomatous eyes using UBM.

Methods
A total of 60 patients (60 eyes) aged 20 to 67 years with primary glaucoma & ophthalmic hypertension were examined. They're divided into 3 groups in accordance with the AL: short (up to 23,0 mm), medium (23,0-24,5 mm) and long eyes (above 24,5 mm). Main linear and angular parameters of the eye anterior segment were measured using ultrasound biomicroscopy (Ellex Eye Cubed, 40 MHz, Ellex Inc., Australia).

Results
Average ACD and posterior chamber depth in short eyes was 2,11±0,05 and 0,58±0,04 mm, in medium – 2,47±0,04 and 0,65±0,03 mm, in long eyes – 3,02±0,06 and 0,69±0,05 mm respectively. Almost all patients had predominantly flat iris profile. In patients with short AL the iris profile was slightly more convex and combined with its anterior position. In eyes with the AL greater than 24,5 mm a straight profile of iris was combined with posterior position more frequently. In several cases we observed a concave profile. Iris thickness in root zone was 0,34±0,02 mm in 1st group, 0,34±0,01 mm in 2nd group, 0,33±0,03 mm in 3rd group. The ciliary body thickness at 1 and 2 mm from scleral spur: 0,47±0,03 and 0,28±0,03 mm, 0,55±0,04 and 0,33±0,02 mm, 0,62±0,05 and 0,38±0,03 mm respectively. The "trabecula-iris" distance (at 250 & 500 µm from scleral spur) was: in 1st group – 0,09±0,03 and 0,14±0,02 mm, in 2nd group – 0,12±0,03 and 0,18±0,03 mm, in 3rd group – 0,21±0,04 and 0,27±0,03 mm. The "trabecula-ciliary processes" distance in group with short AL was 0,65±0,05 mm, with medium AL – 0,87±0,04 mm, with long – 1,07±0,06 mm. The length of Zinn zonules – 0,33±0,05, 0,52±0,04, 0,71±0,06 mm respectively .

The angle of anterior chamber (at 12´) was 16,34^0±5,65 (1st group), 22,49^0±3,85 (2nd), 27,04^0±3,23 (3rd). Another angular parameters ("sclera-iris" and "sclera-ciliary processes" angles) were 15,80°±2,34, 19,56°±1,12, 24,97°±1,59 and 38,21°±2,44, 48,69°±2,97, 51,22°±3,66 respectively.

Conclusions
During the study it was established that the ACD is the most important factor in spatial arrangement of the eye's anterior segment structures. Thus, in eyes with short AL a critical decrease of the posterior chamber depth and adhesion of iris to trabecula, as well as partial coverage of the posterior chamber by ciliary processes were observed. In eyes with medium and long AL, difficulty in visualizing the zonules was noted. It happened due to the coverage of this zone by the ciliary processes and their adjacency to the root zone of iris.

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P-0689

DIFFERENCES IN STRUCTURE-FUNCTION RELATIONSHIPS BETWEEN OPTIC NEURITIS AND GLAUCOMA

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Background

We aimed to compare structure-function relationships in patients with optic neuritis (ON) to those in patients with primary open-angle glaucoma (POAG), focusing on the extent of retinal nerve fibre layer (RNFL) and ganglion cell-inner plexiform layer (GCIPL) damage and its correlation with visual field (VF) defects.

Methods

This single-centre, retrospective, comparative study involved 194 patients (47 with ON and 147 with POAG) at Yonsei University Severance Eye Hospital between March 2017 and October 2023. Patients with ON received standard care, including high-dose intravenous methylprednisolone followed by oral prednisolone tapering. Patients with POAG received medications to maintain target intraocular pressure. Optical coherence tomography measured RNFL and GCIPL thickness. VF tests were performed to assess VF indices (mean deviation [MD], pattern standard deviation, VF index [VFI]). The relationships between structural and functional measures in patients with ON and POAG were evaluated.

Results

Significant differences in structure-function relationships were found between ON and POAG. In patients with ON, the MD and VFI were maintained despite decreases in RNFL and GCIPL thickness, suggesting functional recovery that conceals structural damage.

Conversely, a direct correlation between decreased RNFL and GCIPL thickness and worsening VF indices was observed in patients with POAG, indicating ongoing structural and functional decline.

Conclusions

The differences in structure-function relationships underscore the different pathophysiological mechanisms underlying ON and POAG. Our findings highlight the importance of disease-specific diagnostic approaches and the need for further research into the underlying mechanisms to improve the management of visual impairment caused by ON and POAG.

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P-0690

THREE-DIMENSIONAL CHOROIDAL VASCULARITY INDEX IN FELLOW EYES OF PATIENTS WITH ACUTE PRIMARY ANGLE-CLOSURE USING OPTICAL COHERENCE TOMOGRAPHY

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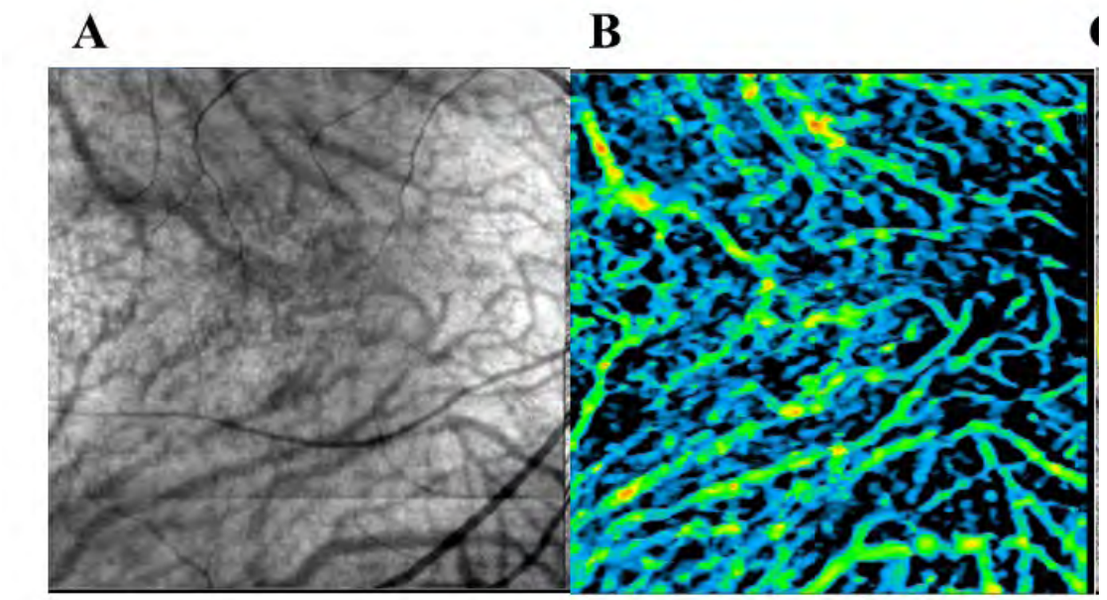
Background
Acute primary angle-closure (APAC) is an important cause of blindness in the Asian populations. This study aimed to evaluate the three-dimensional choroidal vascularity index (CVI) and choroidal thickness (CT) in the fellow eyes of patients with acute primary angle-closure (APAC) using swept-source optical coherence tomography (SS-OCT) compared to normal eyes.

Methods
This study included 67 fellow eyes defined as primary angle-closure suspect (PACS) of 67 patients experienced unilateral APAC and 66 eyes of 66 healthy participants as control. Using SS-OCT, the macular and peripapillary CT and three-dimensional CVI were measured and compared globally and sectorally. Pearson correlation analysis and multivariable regression models were used to evaluate CT or CVI with related factors.

Results
The mean subfoveal CVIs were 0.34 ± 0.10 and 0.29 ± 0.04 in the PACS and normal groups, respectively. All the macular sectors showed significantly higher CVIs in PACS eyes than in normal eyes. In the peripapillary region, the mean overall CVIs were 0.21 ± 0.08 and 0.19 ± 0.05 in the PACS and normal groups, respectively. There were no significant differences between the two groups in any peripapillary sectors except the temporal upper sector (P = 0.046). The mean subfoveal CT were 318.21 ± 50.12 µm and 260.89 ± 48.59 µm in the PACS and normal groups (P < 0.05), the peripapillary CT showed no significant differences between the two groups. Younger age (P < 0.001) and the PACS diagnosis (P = 0.002) were significantly associated with higher subfoveal CVI. Younger age (P = 0.005), the PACS diagnosis (P = 0.014) and shorter axial length (P = 0.018) were significantly associated with the thicker subfoveal CT.

Image



Conclusions

PACS eyes with a fellow eye experienced APAC had a higher macular CVI and CT value than the normal controls. A thicker choroid with higher vasculature volume might play a role in the pathogenesis of APAC.

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ONLINE CIRCULAR CONTRAST PERIMETRY: EVALUATING CONSISTENCY OF TESTING ON DIFFERENT COMPUTER MONITORS

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Background

Glaucoma is a leading cause of irreversible vision loss worldwide, with significant impact on the quality of life of those affected.[1] Standard automated perimetry (SAP) is the current clinical standard for glaucoma diagnosis and monitoring.[2] However, its reliance on costly equipment and highly trained personnel limits its accessibility to specialised clinical settings, posing significant barriers for patients and health services alike.[3-4]

Online Circular Contrast Perimetry (OCCP, Eyeonic Melbourne) enables visual field testing from any personal computer (PC) or tablet device with no additional hardware requirements. Prior studies have shown comparable sensitivity, specificity, and repeatability of OCCP testing to SAP.[5-6] However, these studies tested OCCP on pre-calibrated monitors with the same screen size and pixel resolution.[5-6] Therefore, to determine the feasibility of at-home use, it is necessary to explore the consistency of OCCP testing across computer monitors of different size and display without external calibration processes. This study aimed to evaluate OCCP testing on three different computer monitors, to determine the stability of testing on devices with varying displays, and to establish the accuracy of testing on different devices compared to SAP.

Methods

Sixty one participants (19 healthy controls, 42 with glaucoma) underwent SAP testing followed by OCCP testing on three uncalibrated monitors in a randomised order: a large-screen (24 inch) desktop personal computer (DPC) (Dell, Texas US), a 17 Inch laptop (Dell) (LPC) and a 14 Inch MacBook Pro (MP) (Apple, California US). Deming's regression, Intraclass Coefficients and Bland Altman analyses were used to assess the agreement of perimetric indices between the three computer monitors, and when compared to SAP.

Results

Agreement of mean deviation (MD), Pattern standard deviation (PSD) and Visual Index (VI) values between MP, DPC and LPC OCCP use were excellent, with intraclass correlation and Deming's coefficients ranging from 0.96-1.00 and 0.93-1.03 respectively. When OCCP tests were compared to SAP, ICCs and Deming's coefficients ranged from 0.89-0.95 and 0.72-0.89. Bland Altman analysis revealed low test biases ranging from -0.69 to -0.11, 0.16 to 0.30 and -0.77 to -0.03 for MD, PSD and VI values. Deming's Coefficient of contrast sensitivities for each 24-2 test location revealed stronger relationships between OCCP tests on different computers (0.58 to 1.50) than between OCCP and SAP tests (0.10 to 3.24).

Conclusions

OCCP demonstrates strong levels of agreement when tested on computer monitors of varying display, with moderate to strong levels of correlation to SAP perimetric indices. These results support the feasibility of OCCP usage on different personal computers, which may expand the scope of in-clinic and at-home glaucoma detection and monitoring.

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P-0692

DISTRIBUTIONAL DIFFERENCES OF TESSELLATED FUNDUS IN MYOPIA WITH AND WITHOUT OPEN-ANGLE GLAUCOMA

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Background

Tessellated fundus refers to the visibility of large choroidal vessels at the posterior pole of the fundus and represents the category 1 of myopic fundus appearance. The prevalence of tessellated fundus in high myopia ranges from 76.1% to 94.3%. A higher degree of tessellation in the posterior pole is associated with an increased prevalence of open-angle glaucoma (OAG). Although the distributional patterns of tessellated fundus have been studied in healthy adults and highly myopic individuals, limited research has focused on its distribution in myopic eyes with OAG.

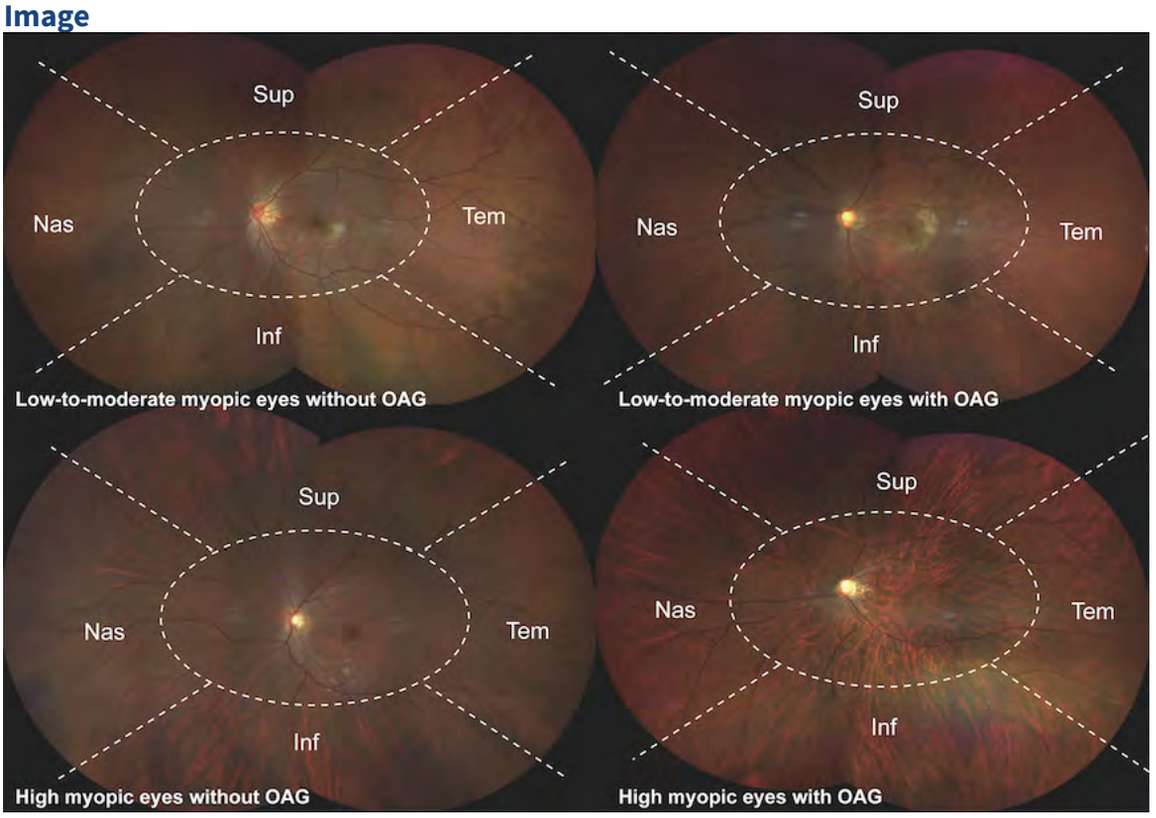
Methods

This prospective cross-sectional study included consecutive myopic participants with and without OAG. Tessellated fundus was assessed using ultra-widefield fundus photography and analyzed in three major regions: peripapillary, macular, and peripheral. The degree of tessellation was graded on a scale of grade 0–3. One hundred high-quality ultra-widefield fundus photographs were randomly selected for inter-observer and intra-observer agreement analysis. Chi-square tests were used to evaluate distributional differences in tessellated fundus grades across subregions of the posterior pole and peripheral regions among groups.

Results

A total of 209 eyes from 209 participants were included (109 low-to-moderate myopic eyes with and without OAG, 100 high myopic eyes with and without OAG). Inter-observer and intra-observer assessments of tessellated fundus distribution showed good consistency. In the posterior pole and peripheral regions, high myopia with OAG exhibited significantly higher tessellated fundus grades compared to both low-to-moderate myopia with OAG and high myopia without OAG ($P < 0.05$). In the peripapillary region, the inferior and temporal subregions showed significantly higher tessellated fundus grades in high myopia with OAG compared to the other groups ($P < 0.05$).

Image



Conclusions

Tessellated fundus is more prevalent and pronounced in the posterior pole and peripheral regions in the eyes with high myopia coexisting with OAG. A higher grade of tessellation in the inferior and temporal peripapillary regions is specifically associated with high myopia with OAG.

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P-0693

EVALUATION OF OPTIC NERVE HEAD STRUCTURES IN SUPERIOR SEGMENTAL OPTIC NERVE HYPOPLASIA WITH AND WITHOUT GLAUCOMATOUS OPTIC NEUROPATHY

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Background
To investigate the overhanging of Retinal pigment epithelium (RPE)/Bruch membrane (BM) complex and retinal nerve fiber layer thickness (RNFLT) in superior segmental optic nerve hypoplasia (SSOH) and coexisting glaucomatous optic neuropathy (GON) with SSOH.

Methods
We retrospectively examined 17 eyes with SSOH and 12 with GON with SSOH. Using swept-source optical coherence tomography (SS-OCT) (Triton, Topcon), we measured the circumpapillary RNFLT (cpRNFLT) and RPE/BM complex extension over the laminar cribrosa overall in the quadrants and the 12 sectors. We compared the eyes with SSOH and those with GON with SSOH.

Results
In eyes with SSOH, the patient age was significantly ($p<0.01$) younger and the baseline intraocular pressure was significantly ($p<0.01$) lower. There were no significant differences in the cpRNFL overall, while the cpRNFL in the superior quadrant was significantly thinner (53.1±19.0 vs 81.6±31.0 µm; $p=0.01$) and the cpRNFLT in the inferior quadrant was thicker (109.2±21.7 vs 82.4±25.5 µm; $p<0.01$) in eyes with SSOH than in the eyes with GON with SSOH. Compared to SSOH, in those with GON with SSOH the RPE/BM complex extended for a longer distance in the inferior quadrant (119.3±50.7 vs 81.2±35.9 µm; $p=0.04$), while no significant differences were seen in the nasal (171.7±70.4 vs 146.6±50.9 µm; $p=0.30$) and superior quadrants (139.6±53.4 vs 123.5±44.1 µm; $p=0.40$).

Conclusions
The RPE/BM complex extended over the laminar cribrosa in the nasal, superior, and inferior quadrants in the eyes with SSOH. The overhanging RPE/BM complex in the inferior quadrant was longer and cpRNFL in the inferior quadrant was thinner in the eyes with GON with SSOH.

P-0694

CLINICAL OBSERVATION OF MACULAR CHOROIDAL THICKNESS IN PRIMARY CHRONIC ANGLE-CLOSURE GLAUCOMA

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Background
Primary angle-closure glaucoma(PACG) eyes have certain characteristics, such as a flat cornea, shallow anterior chamber, thick lens, short axial length, and thick choroid .Choroidal expansion may play a role in primary angle-closure disease (PACD) pathogenesis.Choroidal expansion has been confirmed in untreated and treated acute and chronic PACD eyes.In this study, We employed the mean choroidal thickness and volume of nine macular regions in PACG eyes, fellow eyes, and normal eyes of a Chinese population. Changes in overall macular choroidal thickness were analyzed, and the role of the choroid in PACG occurrence and progression was examined.

Methods
Thirty-one PACG patients were sequentially selected for this case-control study. Thirty-one eyes with PACG were included in group A, 31 fellow eyes were included in group B, and group C included 67 normal eyes. Enhanced-depth imaging optical coherence tomography (EDI-OCT) was used to measure choroidal thickness and volume.

Results
The choroidal thicknesses and volumes of the central subfield macula (CSM), nasal inner macula(NIM), temporal inner macula (TIM), inferior inner macula (IIM), temporal outer macula (TOM), inferior outer macula (IOM), and mean macula (MM) in group A were all higher than those in group C (P<0.05).The choroidal thicknesses and volumes of the NIM,superior inner macula (SIM), IIM, nasal outer macula(NOM), and MM in group B were all higher than those in group C (P<0.05). No statistically significant differences were found between groups A and B(P> 0.05). The choroidal thicknesses of different macular regions in group A were not correlated with the mean defect (MD).

Conclusions
Increased macular choroidal thickness may be a common anatomical characteristic of PACD eyes. Macular choroidal thickness is not a good marker for assessing PACG severity.

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P-0695

TOWARDS AUTOMATED ASSESSMENT OF CONJUNCTIVAL HYPEREMIA: A SEMI-SUPERVISED ARTIFICIAL INTELLIGENCE APPROACH

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Background

To develop an automated approach for conjunctival hyperemia grading from slit-lamp images using semi-supervised learning.

Methods

This retrospective study included slit-lamp images from individuals from two study sites. Two independent graders assessed tthe severity of heperemia in the images according to the Efron Grading Scales. Segmentation of the conjunctiva and its vessels was conducted using a semi-supervised deep learning segmentation framework with limited labelled data. Conjunctival vessel densities were calculated from the model outputs and compared against the clinical / manual Efron gradings.

Results

317 slit-lamp images from the primary site and 164 from an additional external site were included in the study. The semi-supervised models with unlabelled data demonstrated significantly superior segmentation performance when compared to a baseline fully-supervised model using only the labelled data. Calculated vessel densities showed correlations of 0.86 [0.76, 0.93] with ground truth vessel densities.

Comparisons of conjunctival vessel densities against mean manual, clinical Efron gradings showed correlations of 0.83 and 0.80 for the test, respectively.

Conclusions

Conjunctival vessel densities obtained with semi-supervised learning showed good agreement with clinical grading of conjunctival hyperemia. This approach may be applied towards an automatic, objective assessment of the conjunctiva.

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P-0696

CLINICAL ANALYSIS OF MACULAR CHOROIDAL THICKNESS IN PSEUDOEXFOLIATIVE GLAUCOMA AND PRIMARY OPEN-ANGLE GLAUCOMA

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Background
Pseudoexfoliative glaucoma (PXG) is a type of secondary open-angle glaucoma caused by pseudoexfoliative syndrome(PEX). It is well known that patients with PXG have higher intraocular pressure (IOP), and more rapid progression than patients with primary open-angle glaucoma (POAG).High IOP is a major risk factor for open-angle glaucoma.However, in some cases, loss of visual function is exacerbated even when IOP is under control, indicating that there might be other factors that affect disease progression . Choroidal may play a role in the development and progression of glaucoma.Previous studies on macular choroidal thickness in PXG and POAG have obtained mixed conclusions. In this study, the macular choroidal thickness and volume were measured using EDI-OCT to investigate the changes in macular choroidal thickness in PEX and POAG eyes and to analyze the role of the choroid in the progression of PXG.

Methods
A total of 50 PXG patients (50 eyes) and 56 POAG patients (56 eyes) were selected as the PXG group and the POAG group, respectively, in this case-control study. A total of 54 age-, gender-, IOP-, and axial length-matched healthy individuals (54 eyes) were selected as the control group. Enhanced-depth imaging-optical coherence tomography (EDI-OCT) was used to measure and analyze the choroidal thicknesses and volumes in 9 macular regions of all subjects.

Results
The choroidal thicknesses in the central subfield (CSM), temporal inner macula (TIM),inferior inner macula (IIM), and temporal outer macula (TOM) and the mean macular choroidal thickness were significantly thinner in the PXG group than in the control group (all $P < 0.05$). The choroidal volumes in the TIM, IIM, and TOM and the mean macular choroidal volume were significantly smaller in the PXG group than in the control group (all $P < 0.05$). The choroidal thicknesses in the CSM and IIM and the mean macular choroidal thickness were significantly thinner in the PXG group than in the POAG group (all $P < 0.05$). The choroidal volumes in the IIM and TOM and the mean macular choroidal volume were significantly smaller in the PXG group than in the POAG group (all $P < 0.05$). Multivariable linear regression analysis showed that the mean macular choroidal thickness was significantly thinner in association with older subjects and longer axial length eyes.

Conclusions
The macular choroidal thicknesses and volumes (inferior and temporal) in PXG patients were thinner and smaller than those in POAG patients and healthy individuals. The role of choroidal thickness changes in the course of PXG remains unclear. A future prospective study is needed to better define these changes in PXG patients.

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P-0698

EVALUATION OF FALSE POSITIVE AND NEGATIVE RATES AS THE RELIABLE INDICES FOR VISUAL FIELD TEST IN GLAUCOMA PATIENTS

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Background

False positive (FP) and false negative (FN) responses are conventional reliable indices for visual field (VF) test. False positive rate (FPR) and false negative rate (FNR) are new indices which are calculated from all patient responses during the estimation of visual sensitivities. The purpose of this study was to compare between the FP and FPR, as well as the FN and FNR, and to evaluate the relationship between those four parameters and the severity of glaucomatous VF abnormalities.

Methods

One thousand two hundreds seventy-one eyes of 821 glaucoma patients were enrolled, and all patients underwent VF test by the imo perimeter, test strategy was the AIZE. Spearman's rank correlation was used to evaluate a relationship between mean deviation (MD) of VF and the FP, FN, FPR and FNP. The coefficient of variation for these four parameters were also calculated.

Results

Significant correlations were found in between the FPR and FP ($r=0.431$, $p<0.001$), as well as the FNR and FN ($r=0.461$, $p<0.001$). MD showed significant but weak correlations with FP ($r = -0.074$, $p = 0.003$) and FPR ($r = -0.197$, $p < 0.001$), whereas significant correlations were observed with FN ($r = -0.531$, $p < 0.001$) and FNR ($r = -0.634$, $p < 0.001$). In the comparison of coefficients of variation, the FPR (1.28) and FNR (1.12) were smaller than the FP (1.52) and FN (1.60), respectively ($p < 0.001$).

Conclusions

The severity of glaucomatous VF abnormalities influences the FNR and FN, while weak relationship is observed with the FPR and FP. The FNR and FPR, which show small fluctuations, have the potential to serve as new reliable indices for VF test.

P-0699

ACCOMMODATION INDUCED OCULAR BIOMETRY CHANGES IN HEALTHY VS. GLAUCOMA PATIENTS: A COMPARATIVE STUDY

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Background
This study aimed to assess accommodation-induced changes in anterior segment and biometry parameters in healthy eyes, primary angle-closure suspects (PACS), and glaucoma patients, including those with primary open-angle glaucoma (POAG) and primary angle-closure glaucoma (PACG). It also sought to correlate these changes with variations in intraocular pressure (IOP) to explore the potential impact of near-work stress on glaucoma progression.

Methods
Thirty-six patients aged 18–49 years underwent anterior segment and biometry evaluations using A-scan and anterior segment optical coherence tomography (AS-OCT). Parameters measured included central corneal thickness (CCT), anterior chamber depth (ACD), anterior chamber angle (ACA), angle opening distance (AOD), iris-lens contact (ILC), trabecular-iris space area (TISA), lens thickness (LT), and axial length (AL). Measurements were taken before and after inducing accommodation with -3D and -6D lenses.

Results
The study found that PACG eyes had narrower iridocorneal angles (ICA) compared to other groups, with further narrowing during accommodation. Lens thickness increased post-accommodation across all groups, while axial length elongated with accommodation except in POAG eyes. PACS and PACG eyes exhibited lower AOD500 values compared to healthy eyes. Additionally, significant changes were noted in temporal AOD750 and TISA500 in PACG eyes. However, no significant differences were observed in other parameters between the groups. Changes in IOP following accommodation were statistically insignificant across all groups.

Conclusions
Accommodation induces significant structural changes in the anterior segment, particularly in PACG eyes, which may indicate a heightened sensitivity to the stress of near work. Although no significant IOP variations were detected, the observed alterations highlight the need for further investigation into the implications of sustained accommodation on the progression of glaucoma.

P-0700

EVALUATION OF MACULAR AND OPTIC DISC PERFUSION DENSITY IN ADVANCED GLAUCOMA BY OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY (OCTA)

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Background
To investigate the relationship between foveal threshold and macular/optic disc perfusion density in patients with advanced glaucoma.

Methods
This study included 74 eyes from 74 patients with advanced glaucoma (mean deviation (MD) ≤ -18 dB) as determined by the Humphrey Field Analyzer 30-2 (HFA 30-2) program. The mean age of the participants was 67.9 years, with 46 men and 28 women. The mean MD was -22.10 dB, and the mean spherical equivalent was -2.68 diopters. Using OCT Angiography (Cirrus 5000 HD-OCT Angioplex), macular perfusion density (6 × 6 mm, Macular Cube 200 × 200) and optic nerve head perfusion density (4.5 × 4.5 mm, Optic Disc Cube 200 × 200) were evaluated. The patients were divided into two groups based on their foveal threshold, as measured by the HFA 30-2: Group 1 included eyes with a foveal threshold ≥ 30 dB, while Group 2 included eyes with a foveal threshold < 30 dB. Statistical comparisons between the two groups were conducted, with significance set at $p < 0.05$.

Results
Forty-three eyes were included in Group 1, with a mean MD of -21.28 dB, a mean logMAR best-corrected visual acuity (BCVA) of -0.04, and a mean foveal threshold of 33.6 dB. In contrast, Group 2 comprised 31 eyes, which had a mean MD of -23.22 dB, a mean logMAR BCVA of 0.55, and a mean foveal threshold of 20.1 dB. Macular perfusion density was significantly higher in Group 1 compared to Group 2 across all sectors (outer superior, inner superior, outer temporal, inner temporal, outer inferior, inner inferior, outer nasal, and inner nasal). However, no significant differences in optic disc perfusion density were observed between the two groups in any of the four sectors (superior, temporal, inferior, and nasal).

Conclusions
Macular perfusion density may still reflect changes in advanced glaucoma, suggesting its potential utility in evaluating disease progression.

P-0701

ANTERIOR SEGMENT OCT PARAMETERS IN ANGLE CLOSURE DISEASE: INSIGHTS FROM A KOREAN POPULATION

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Background
Angle closure disease (ACD) is a major cause of visual impairment, particularly in Asian populations. This study aimed to evaluate anterior segment optical coherence tomography (AS-OCT) parameters in Korean patients across the primary angle closure disease (PACD) spectrum and to identify structural indicators associated with disease severity and progression.

Methods
A retrospective analysis was performed on 160 eyes from 91 Korean patients treated at Seoul National University Hospital between May and October 2024. AS-OCT imaging was conducted using the Tomey CASIA2 AS-OCT Angle Study Protocol, assessing AS-OCT parameters such as anterior chamber depth (ACD), angle opening distance (AOD), trabecular iris space area (TISA), angle recess area (ARA), and iris-trabecular contact (ITC) Index and Area. Exclusion criteria included secondary angle closure, previous intraocular surgery, significant ocular comorbidities, or incomplete AS-OCT data. Statistical analyses employed one-way ANOVA with post-hoc Tukey's HSD for intergroup comparisons and Receiver Operating Characteristic (ROC) curve analysis to explore associations between AS-OCT parameters and disease severity.

Results
Significant differences in AS-OCT parameters were observed across the PACD spectrum for ACD ($p = 0.020$), AOD ($p < 0.001$), TISA ($p < 0.001$), ARA ($p < 0.001$), ITC Index ($p = 0.001$), and ITC Area ($p = 0.013$). AACG patients exhibited the most severe reductions in AOD, TISA, and ARA, alongside the highest ITC Index and Area, indicating advanced anatomical narrowing and trabecular obstruction. PACG showed intermediate structural alterations, while PACS exhibited minimal compromise. Key AS-OCT parameters, such as AOD and ITC Index, demonstrated high sensitivity and specificity in distinguishing early-stage (PACS, PAC) from advanced-stage (PACG, AACG) disease.

Conclusions
AS-OCT provides valuable insights into the structural changes associated with angle closure disease, facilitating effective risk stratification and early detection. Parameters such as smaller AOD, TISA, and ARA, along with elevated ITC Index and Area, are robust indicators of advanced disease requiring urgent intervention. These findings support the utility of AS-OCT in guiding targeted screening and timely clinical management to improve patient outcomes.

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P-0702
DIFFERENCES IN EYELID PRESSURE BY THE LOCATION OF THE EYELID

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Background
The eyelid pressure is a pressure exerted on the eyeball from the eyelids. Recently, it has been pointed out that the eyelid pressure may affect intraocular pressure and the success rate in glaucoma filtration surgery. It has also been recognized that the bleb formation may be affected by the location of the scleral flap. Therefore, the eyelid pressure vary by location may be one of the factors to influence the outcome of glaucoma filtration surgery. The purpose of this study was to determine the differences in eyelid pressure by the location of the eyelid.

Methods
The subjects were 22 eyes in 11 normal volunteers (6 males and 5 females), the mean age was 33.1±4.9 (27~40) years, and the eyelid pressures were measured at Ehime University Hospital. The location of the eyelid was divided based on the pupil center into 1) Upper temporal eyelid, 2) Upper central eyelid, 3) Upper nasal eyelid, 4) Lower temporal eyelid, 5) Lower central eyelid, 6) Lower nasal eyelid. The eyelid pressures of each location were measured and compared.

Results
The mean refraction value was -3.4±2.7 (-9.0~0.5) D, the average axial length was 25.4±1.1 (23.5~27.3) mm, and the degree of eyeball protrusion was 17.0±2.1 (13~21) mm. The mean upper and lower eyelid pressure was 16.7 ± 6.9 (2.8-34.7) mmHg and 21.8 ± 7.3 (7.5-40.4) mmHg, respectively, and they were significant differences ($p<0.001$). The mean eyelid pressure of each site was 1)14.4±6.0 (6.1~29.48) mmHg, 2) 18.0±6.8 (7.5~34.7) mmHg, 3) 17.1±6.7 (3.2~31.2) mmHg, 4) 20.5±8.3 (8.4~39.0) mmHg, 5) 21.4±6.8 (8.0~31.7) mmHg, 6) 22.5±8.5 (6.2~40.4) mmHg. There were significant differences in 1) and 5), 1) and 6) ($p=0.0164$, $p=0.0177$).

Conclusions
The eyelid pressure was different by the location of the eyelids, and the differences may affect the outcome of glaucoma filtration surgery.

P-0703

COMPARING VISUAL FIELD ASSESSMENT TOOLS: VIRTUAL REALITY AND HUMPHREY IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background
This pilot study analyzes the correlation between reliability indices, time of test, global indices and satisfaction of the PalmScan VF2000 virtual reality perimetry headset and gold standard Humphrey visual field analyzer.

Methods
Participants (n = 22) for this investigation had a diagnosis of mild or suspicious primary open angle glaucoma. Perimetry visual field testing was done using the PalmScan (PALM) VF2000 G2 headset in lieu of a Humphrey Visual Field test during one follow up exam. Inclusion criteria required a minimum of 5 Humphrey 24-2 or 30-2 SITA standard visual fields in total with the most recent HVF completed within the preceding 6 months. Reliability indices of FL, FP, FN, global indices of MD, PSD, VFI, and time taken to complete the examination were analyzed for the PALM and HVF. Intraclass correlation coefficient (ICC) was used to calculate reliability and a *p*-value of < 0.05 was considered statistically significant. A patient satisfaction 5-point Likert scale questionnaire was analysed to compare HVF to PALM and analyzed using Wilcoxon signed-rank test.

Results
ICC for MD was 0.62 (95% CI:0.40 – 0.77) and 0.73 (CI:0.55 –0.85) for PSD, indicating good correlation between HVF and PALM. The ICC for VFI demonstrated poor agreement at 0.25 (CI:0.-0.05 – 0.51). ICC for FL, FN, and FP revealed weak and fair agreements (FL: 0.44, CI: 0.16 – 0.65, FN: 0.24, CI: -0.06 – 0.50, FP: 0.10, CI: -0.21 – 0.38; Figure 1). Spearman and Pearson parametric testing revealed moderate correlation with MD and PSD (r = 0.54 and r = 0.80, respectively; all p < 0.05) and poor correlation with VFI (r = 0.35; Figure 1). Reliability indices revealed no significant correlation for FN, and FP. There was a moderate correlation noted with FL (r = 0.50, p = 0.017; There was a statistically significant difference in completion times (Z = 4.07, p < 0.05), with the HVF taking longer to complete (mean change ± SEM: 390.87 ± 20.41s) compared to the PALM (271.27 ± 14.50s) and overall higher comfort scores for PALM compared to HVF (Z = 2.67, p < 0.05). Furthermore, PALM showed significantly less reported fatigue (Z = 2.80, p < 0.05) and apprehension (Z = 2.20, p<0.05). Overall, there was a patient preference for PALM over HVF (p < 0.05).

Image

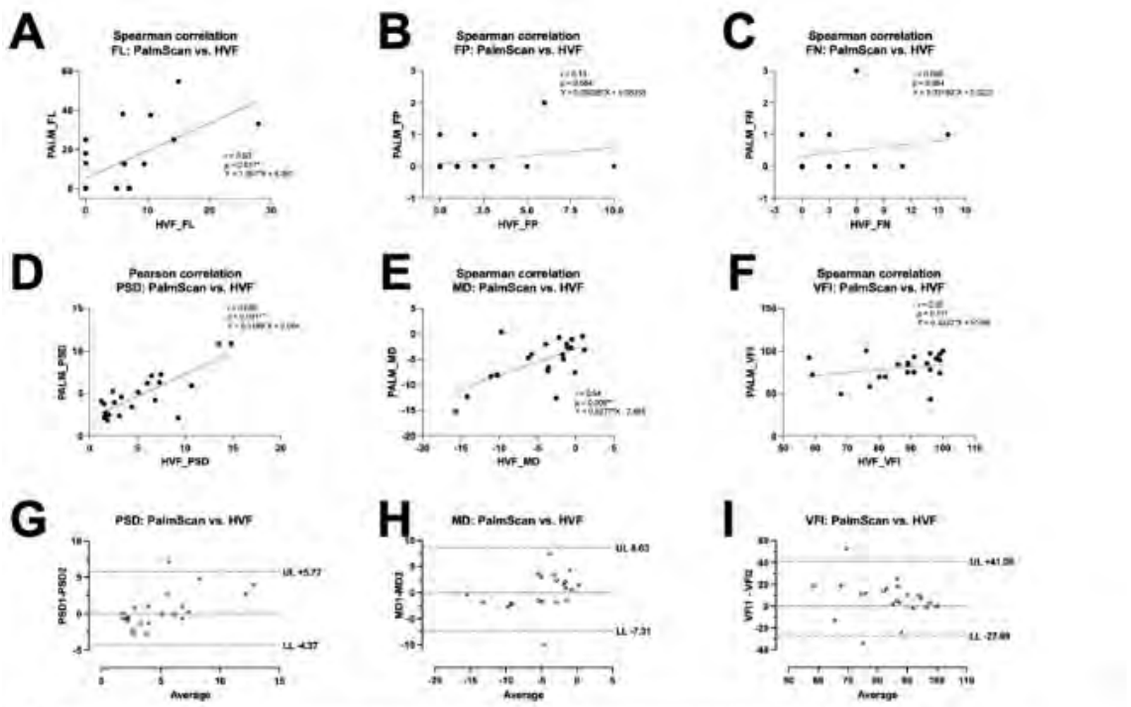

Figure 1. Bland Altman and Pearson parametric or Spearman non-parametric correlation plots comparing correlation of global indices and reliability indices between PalmScan and HVF

A) FL correlation between PalmScan and HVF B) FP correlation between PalmScan and HVF C) FN correlation between PalmScan and HVF D) Pearson non-parametric correlation plot comparing PSD values E) Spearman non-parametric correlation plot comparing MD values. F) Spearman non-parametric correlation plot comparing VFI values. G) Bland Altman plot comparing MD values H) Bland Altman plot comparing PSD values I) Bland Altman plot comparing VFI. MD = mean deviation, PSD = pattern standard deviation, VFI = visual field index, FL = fixation loss, FP = false positive, FN = false negative. Upper (UL) and lower limits (LL) for the Bland Altman plots are denoted as dotted lines. Correlation coefficient (r) and slope (Y) are denoted in the graph along with a linear regression (red). * (p < 0.05) ** (p < 0.01) *** (p = < 0.001)

Conclusions

This study demonstrated that the PalmScan VF2000 VR visual field analyzer exhibits good agreement with the Humphrey visual field analyzer when comparing global indices values with greater patient satisfaction and lesser time for completion.Parameters still need to be tested with a larger population-based study with more refined algorithms to account for discrepancies between reliability indices.

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P-0705

CILIARY PROCESS TO LENS DISTANCE IN PACG AND ITS RELATIONSHIP WITH SHALLOW ANTERIOR CHAMBER: INSIGHTS FROM OCULAR MRI

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Background
This study sought to employ Magnetic Resonance lmaging (MRl) to investigate lens and ciliary spatial characteristics in PACG patients aiming to elucidate the mechanism underlying PACG pathogenesis.

Methods
This is a cross-sectional observational case-control study.PACG patients underwent Laser Peripheral lridotomy (LPl) were enrolled. Utilizing a clinical 3.0T MRl with a specialized coil, binocular images in the axial plane were acquired. Quantitative measurements were conducted to obtain anatomical parameters of the lens, ciliary body,and vitreous cavity.

Results
25 eyes of 13 PACG patients and 19 eyes of 10 healthy participants were enrolled in this study. Significantly statistical differences were noticed that the PACG group exhibited a larger Area of the Lens(33.37+2.43mm^2 vs 30.40+2.37mm^2, p<0.001)and lower Ciliary to Ciliary Distance (CCD)(9.69+0.47mmvs 10.35+0.61mm,p=0.002) and Ciliary Process to Lens Distance(CPLD)(0.53+0.10mm vs0.83+0.18mm,p<0.001).No statistical differences were found in Lens Equator Diameter (LED) and characteristic parameters of vitreous cavity. Significant positive correlations between CPLD and Anterior Chamber Depth (ACD)(B=1.221),and sianificant negative correlations between Lens Thickness (LT) and ACD (B=-0.586) were revealed by Linear Mixed Effects Models.CPLD demonstrated to be a significantly strong predictor of PACG(AUC=0.945,p<0.001),

Conclusions
CPLD is a crucial indicator of ciliary block, with smaller CPLD correlating with shallow anterior chamber.

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P-0707

A NEW PROGNOSTIC PARAMETER IN GLAUCOMA: THE PHOTOPIC NEGATIVE RESPONSE (PHNR) WAVE

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Background

The photopic negative response (PhNR), an essential electrophysiological marker for assessing retinal ganglion cell (RGC) function, plays a significant role in glaucoma diagnosis. PhNR is a negative wave that follows the positive b-wave in the photopic electroretinogram (ERG), predominantly generated by the electrical activity of RGCs and other cells such as amacrine and glial cells. Given that glaucoma primarily involves the degeneration of RGCs and their axons, numerous studies have suggested that PhNR could serve as a reliable indicator for early glaucomatous damage [1,2]. This study aimed to investigate the correlation between PhNR and visual field parameters in patients with glaucoma.

Methods

A total of 178 eyes from 89 patients with primary open-angle glaucoma, followed at the Glaucoma Department of Marmara University Hospital, were enrolled. Each patient underwent Humphrey 24-2 SITA standard visual field testing, retinal nerve fiber layer (RNFL) thickness and ganglion cell complex (GCC) analysis, as well as PhNR evaluation using ERG. Based on mean deviation (MD) values from visual field testing, patients were categorized into early (MD < 6), moderate (MD 6–12), and advanced (MD ≥ 12) glaucoma stages. All collected data were statistically analyzed.

Results

The mean age of the patients was 55.8 ± 18.5 years (range: 11–87), and 51 (57.3%) were female. In right eyes, the mean PhNR amplitude was 22.4 ± 17.0 (range: -107.0 to 7.3), and the mean MD was -10.6 ± 9.6 (range: -31.59 to 0.78). In left eyes, the mean PhNR amplitude was -23.9 ± 15.57 (range: -77.4 to 7.6), and the mean MD was -7.0 (range: -29.3 to 19.9). There was a significant correlation between PhNR amplitude and MD values in both right ($r = -0.304$, $p = 0.038$) and left eyes ($r = -0.382$, $p = 0.011$). No statistically significant correlation was found between the electroretinographic b/a ratio and MD (Right eye: $r = -0.060$, $p = 0.691$; Left eye: $r = 0.146$, $p = 0.344$), or between glaucoma stage and MD (Right eye: $r = 0.006$, $p = 0.954$; Left eye: $r = -0.097$, $p = 0.386$). A significant association was observed between PhNR amplitude and RNFL thickness in both the superior and inferior regions of the right eye ($r = -0.280$, $p = 0.011$; $r = -0.269$, $p = 0.019$), and in the inferior region of the left eye ($r = -0.428$, $p < 0.001$). No significant correlation was found between PhNR amplitude and GCC averages in either eye ($p > 0.05$).

Conclusions

PhNR amplitude demonstrates a significant correlation with MD values in the visual fields of glaucoma patients. Thus, PhNR amplitude may serve as an important supplementary parameter for monitoring patients who require evaluation based on MD values.

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P-0709

QUANTITATIVE ANALYSIS OF RETINAL MICROSCOPIC CHARACTERISTICS IN GLAUCOMA PATIENTS BASED ON AO-SLO: A PILOT STUDY

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Background
To investigate the characteristics of cone cells, retinal blood vessels and blood flow in the macular region of the retina in glaucoma patients by using adaptive optics scanning light ophthalmoscopy (AO-SLO).

Methods
A single-center, cross-sectional design was adopted for this investigation. A total of 9 glaucoma patients (14 eyes), including those diagnosed with primary open-angle glaucoma (POAG), primary angle-closure glaucoma (PACG), and secondary glaucoma, were enrolled. For comparison, 4 healthy individuals (7 eyes) were recruited from the outpatient clinic. The density, spacing, regularity, and disparity of cone cells in the macular area, as well as the thickness of the blood vessel wall, lumen diameter and blood flow velocity of small retinal vessels were compared between the two groups.

Results
A notable reduction in cone cell density was observed in the glaucoma group compared to the control group (23,743.53 ± 8,841.26 vs. 37,855.49 ± 5,216.77 cells/mm^2, p = 0.002). Additionally, cone cell spacing was significantly greater in the glaucoma group (4.71 ± 0.74 vs. 3.97 ± 0.28 µm, p = 0.019). The dispersion of cone cells was markedly elevated in glaucoma patients (26.20 ± 7.71%) compared to the control group (17.46 ± 2.28%, p < 0.001). Furthermore, cone cell regularity in the glaucoma group was significantly lower (92.52 ± 1.45% vs. 94.19 ± 1.05%, p = 0.014). However, no significant differences were detected between the two groups regarding the retinal small vessel wall thickness (23.63 ± 5.71 vs. 17.32 ± 4.23 µm), lumen diameter (81.71 ± 31.29 vs. 69.12 ± 5.18 µm), or blood flow velocity (37.09 ± 9.74 vs. 28.33 ± 5.82 mm/s).

Conclusions
This study highlights a significant reduction in cone cell density and an increase in cell spacing in glaucoma patients. Compared to the control group, cone cells in glaucoma patients exhibited greater dispersion and lower regularity. No significant differences in small retinal vessel blood flow parameters in the macular area were observed between the two groups.

P-0710

REAL-WORLD DATA: ONLINE CIRCULAR CONTRAST PERIMETRY USED IN ROUTINE GLAUCOMA CLINICS ACROSS NIGERIA

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Background

Online circular contrast perimetry (OCCP) allows visual field testing on any computer or tablet without additional hardware. This study assessed the performance of OCCP compared to conventional perimetry in routine glaucoma clinics across Nigeria.

Methods

A multisite clinical trial was conducted across ten ophthalmology clinics. Patients underwent visual field testing using conventional perimetry devices (Humphrey, Octopus) and OCCP. Demographics, socioeconomic details, intraocular pressure, best-corrected visual acuity, refraction, and retinal nerve fiber layer thickness were collected. Visual field indices—mean deviation (MD), pattern standard deviation (PSD), and test reliability based on false positive, false negative and fixation loss rates were compared using paired *t*-tests and intra-class correlation (ICC), with significance set at $p<0.05$.

Results

The study included 431 patients (862 eyes) with a mean age of 52 years (SD=13); 52% were female, 64% had tertiary education, and 31% were unemployed. The mean IOP was 16.9 mmHg (SD=7), BCVA was 0.36 (SD=0.85), and RNFL thickness was 85.95 µm (SD=24.93). Conventional perimetry included Humphrey (50%), Octopus (19%), and others (30%). OCCP showed a moderate ICC with conventional tests (ICC: 0.60 for MD and 0.57 for PSD, $p<0.05$) but consistently produced lower values. The mean MD for OCCP was -7.27 dB (SD=7.61) compared to -8.8 dB (SD=9) for conventional tests, and the mean PSD was 3.9 dB (SD=2.9) versus 4.2 dB (SD=3.2), respectively. Test reliability was slightly higher with OCCP (77%) compared to conventional devices (73%), though the difference was not statistically significant ($p>0.05$).

Conclusions

OCCP demonstrated moderate agreement with conventional perimeters but systematically reported lower global indices. Its slightly improved test reliability and versatile accessibility make OCCP a promising, reliable tool for glaucoma testing, particularly in resource-limited or remote settings.

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P-0711

THE CHARACTERISTICS OF VISUAL FIELD DEFECTS IN PATIENTS WITH HIGH MYOPIA AND OPEN-ANGLE GLAUCOMA

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Background
In glaucoma patients, visual field defects caused by nerve fiber bundle abnormality often have characteristic patterns. Due to the presence of myopic maculopathy and highly myopic optic neuropathy, glaucoma-like visual field defects can also be observed in patients with high myopia, which often affects the specificity and accuracy of visual field examination in high myopia. Understanding the pattern of visual field defect in patients with high myopia and OAG, especially in patients with pathologic myopia, is helpful for better diagnosis of glaucoma in highly myopic eyes.

Methods
In this cross-sectional study, eyes of consecutive participants were categorized into the high myopia group and the high myopia with OAG group. Then the two groups were divided into pathologic myopia and non-pathologic myopia subgroups. Only OAG patients with early and moderate stage were included. Based on the previous studies, the modified visual field classification system included four major types: normal, glaucoma-like defects (paracentral scotoma, nasal step, arcuate defect, partial arcuate defect, altitudinal defect), myopia-related defects (enlarged blind spot, vertical step, non-specific, partial peripheral rim, temporal wedge), glaucoma or myopia-related defects (central defect, combined defect, generalized sensitivity reduction, partial hemianopia). The types of visual field defects between groups and subgroups were compared.

Results
A total of 908 eyes of 602 participants were analyzed, including 423 highly myopic eyes, 485 highly myopic eyes with OAG. In the high myopia group, normal, glaucoma-like defects, myopia-related defects, glaucoma or myopia-related defects accounted for 50.94%, 8.92%, 22.77% and 17.37%, respectively. In the high myopia with OAG group, normal, glaucoma-like defects, myopia-related defects, glaucoma or myopia-related defects accounted for 13.81%, 37.73%, 9.69% and 38.76%, respectively. And in the high myopia group and high myopia with OAG group, the three most common visual field defects in pathologic myopia were generalized reduction sensitivity (18.48% and 9.64%), enlarged blind spot (18.48% and 7.23%), and combined defects (25.00% and 42.17%).

Image

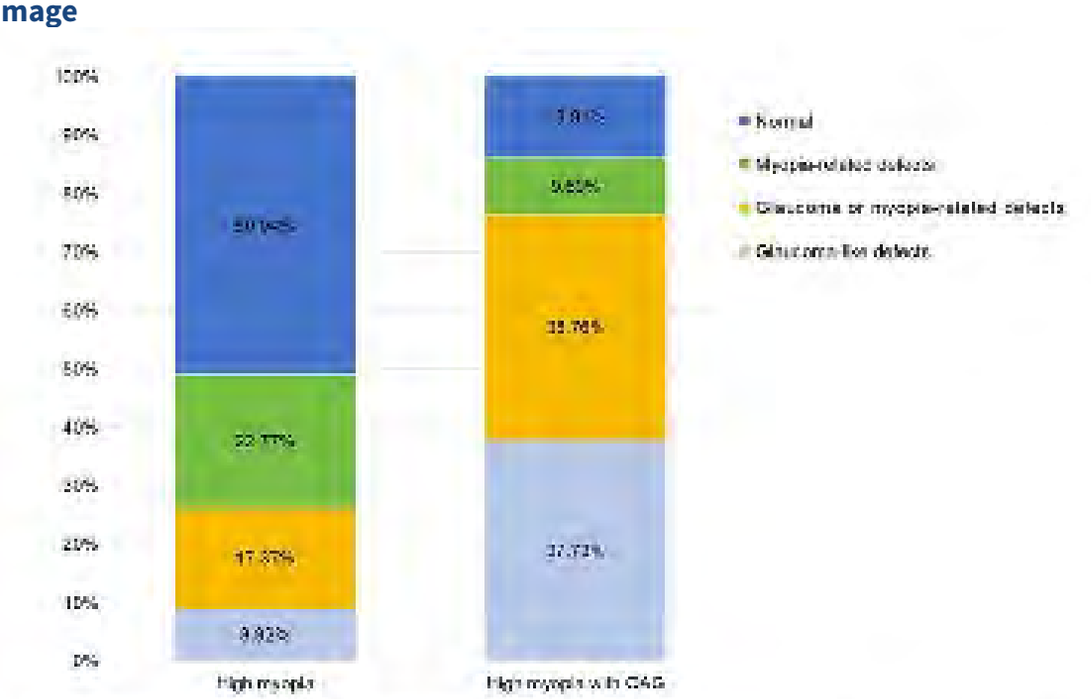

Figure 1. Bar graph of the frequency distribution of each visual field type in highly myopic eyes and highly myopic eyes with OAG

Conclusions

The visual field defects pattern in patients with high myopia and OAG was different from that in patients with high myopia. And pathologic myopia has a significant effect on visual field defects, which should be paid attention to by clinicians.

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P-0712

CLINICAL PROFILE, IMAGING FEATURES AND PROGNOSTIC CHARACTERISTICS IN UVEITIC GLAUCOMA: COHORT STUDY IN A TERTIARY EYE CENTRE

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Background

Uveitic glaucoma is an aggressive and complex and can occur due to many causes. The likelihood of visual loss is high as there is severe damage to the optic nerve and since medical management does not adequately control progression most patients require surgical management. This study aims to identify the causes and to determine the prognosis for the various clinical types. The management, their varying response and the correlation between the severity of uveitis and extent of glaucoma was investigated.

Methods

This is a retrospective study performed on a cohort of 406 patients over 3 years with a minimum follow up of 1 year. All patients were examined by both the glaucoma and uveitis specialist. Categorical variables were analyzed using chi-square test and those with p equal to or less than 0.05 were considered statistically significant

Results

The clinical records of 406 uveitis patients were reviewed. Among them, 180 patients had elevated intraocular pressure and 117 developed glaucoma. Females were more commonly affected (62%). Anatomically, anterior uveitis was the most frequent cause with clinical manifestation of recurrent non-granulomatous type in 65%. Of this, HLA B27 associated AU was seen in 33%, Posner Schlossman syndrome in 3%, idiopathic in 21% and herpetic etiology in 18%. Open angle glaucoma occurred in 7% and angle closure in 24%. The mean visual acuity was 0.02 LogMAR. Retinal nerve fibre layer defects were denser in 9%. Associated features such as complicated cataract and vitritis was noted in 28% and 12% respectively. Good prognosis was noticed in 72% of patients who received anti-glaucoma medication and surgical procedure.

Conclusions

Both UG and ocular hypertension are common sequelae of uveitis. Vision-threatening complications if glaucoma occur earlier and are more severe in UG associated with AU. Non-infective types of uveitis are more frequently associated with UG. Our results study suggests that more aggressive treatment with topical anti-glaucoma medications and surgical procedures could positively influence visual outcomes.

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P-0713

DEVELOPMENT AND VALIDATION OF A NOVEL COMPUTERIZED VISUAL ACUITY TEST AIMED FOR LOW VISION AND COMPROMISED VISUAL FIELD PATIENTS

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Background

Visual acuity (VA) test has surprisingly remained unchanged since the introduction of the Snellen chart over 100 years ago and the ETDRS chart 50 years ago. This test ignores eyes with less than 20/200 vision as well as reading VA which is often compromised in glaucoma patients. In contrast to visual field testing, VA testing remains to the present day a non-computerized, non-automated and non-patient-tailored test. In this study, we evaluate the validity and reproducibility of a novel computerized test. Among the potential benefits of this test: measuring very low VA and measuring reading VA which is paramount in glaucoma patients.

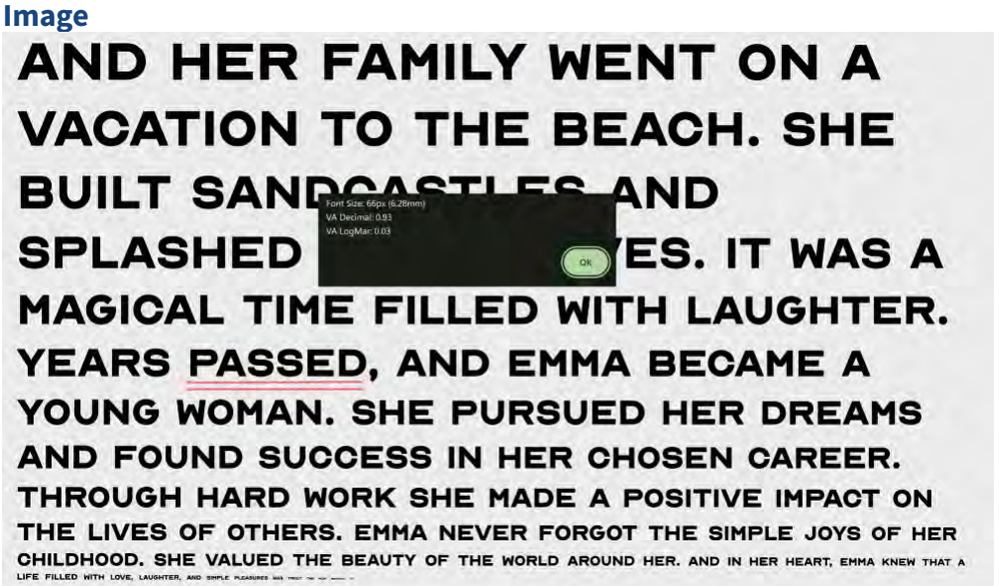
Methods

Prospective Study, including 200 participants (100 healthy individuals and 100 with ophthalmic pathology). Aside from the ETDRS arm, participants read sentences displayed on a screen with progressively decreasing font sizes in the novel reading arm. Each participant completed three repetitions of each arm. Testing orders were randomized.

Results

Preliminary results of 80 healthy and 26 patients. The mean VA (LogMAR) using the novel reading arm was -0.19 ± 0.16 for the healthy and -0.11 ± 0.24 for the patient group. In the ETDRS arm mean VA was 0.04 ± 0.19 and 0.13 ± 0.20, respectively. Both methods demonstrated excellent reproducibility, with Intraclass Correlation Coefficient of 0.89 for the novel reading test arm and 0.95 for the ETDRS arm. A strong positive correlation was observed between the two methods with Pearson correlation coefficient of 0.742. The VA evaluation required reading 31 words in the novel reading arm and 52 letters in the ETDRS arm.

Image



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Conclusions

A novel reading VA test aimed at patients with very low VA and reading disabilities is introduced. This novel approach may be less time-consuming, less stressful and can be self-administered without the need for a technician. Our preliminary results demonstrate excellent reproducibility comparable to the gold standard VA test. We envision this test to be more informative in measuring functional visual acuity than the Snellen/ETDRS test performed with a 100% contrast in a darkened room.

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P-0714

FACTORS ASSOCIATED WITH THE REPRODUCIBILITY OF AUTOMATED OPTIC NERVE HEAD HEMOGLOBIN MEASUREMENTS IN PATIENTS WITH GLAUCOMA

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Background

Vascular dysfunction represents one of the theories of damage in glaucoma. In this context, previous studies have already demonstrated the association between low measurements of estimated hemoglobin in the optic nerve head (ONH Hb) in patients with glaucoma.

The estimation of hemoglobin is performed by the Laguna ONhE software through a colorimetric analysis. The software divides the optic nerve by sectors and provides a pseudocolor map of hemoglobin distribution and two indexes the GDF, which is already established for glaucoma diagnosis and the GIP, more related to progression.

Considering all this, the aim of this study is to evaluate factors affecting the reproducibility of automated ONH Hb in patients with glaucoma, through indexes provided by the Laguna ONhE software.

Methods

Treated glaucoma patients with at least 5 medical visits, were included in this historical cohort. At each medical visit, they underwent a set of color retinographies (CR), as part of the optical coherence tomography protocol, performed by the same examiner.

All CR were analyzed by the Laguna ONhE Software, to estimate ONH Hb based on colorimetric analyses. Its main index, for diagnosing glaucoma, is the Glaucoma Discriminant Function (GDF). The latest index, Globin Individual Pointer (GIP), may be useful in longitudinal evaluation.

For both indexes, reproducibility was assessed using the standard deviation (SD) and the coefficient of variation (CV). The comparison between GIP and GDF was also carried out. Regression Lines and Scatter Plots were constructed to identify which factors could influence the variability of the measurements.

Results

An evaluation of 168 medical visits of 21 patients (42 eyes) was accessed.

The mean age of the patients was 72.8±11.9 years old and 12 of them were female.

A total of 2879 CR were carried out, 263 (9.3%) could not be analyzed by the software, resulting in an average of 7.8 CR/per eye/per visit.

The reproducibility was evaluated in 327 sets of CR. Both indices presented a fair SD and CV, however the values were significantly lower in the GIP evaluation. SD related to GIP presented median of 7.60 (Interquartile Range- IR:5.52-11.06) and 8.85 (IR:5.31-12.92) considering GDF, p=0.04. CV demonstrated median of 0.21 (IR:0.12-0.55) and 0.28 (IR:0.13-0.66), respectively, p=0.02.

Factors including age, intraocular pressure, disc area, vertical cup-to-disc-ratio, average retinal nerve fiber layer and mean defect on visual field were not significant (p>0.05)

Conclusions

The ONH Hb, through indexes provided by the Laguna software, demonstrated good reproducibility, mainly in relation to GIP. No factor related to patient characteristics or the stage of glaucoma seems to interfere with the variability of measurements. This suggests that the software could be useful in the longitudinal monitoring of glaucoma patients

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P-0715

DEEP RETINAL MICROVASCULATURE DROPOUT AND CHOROIDAL THICKNESS IN GLAUCOMA PATIENTS. A PILOT STUDY

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Background

Studies have found that glaucomatous eyes show an abnormally reduced peripapillary choroidal circulation.

Recent imaging of the choroidal layer using optical coherence tomography angiography (OCTA) identified microvascular dropouts in the parapapillary area in glaucomatous eyes which was closely related to the location of glaucomatous damage.

The aim of this prospective cross-sectional study is to identify microvasculature dropouts and to evaluate the choroidal thickness in glaucoma patients and age and sex matched normal subjects.

Methods

In this cross-sectional study eighty-seven subjects, 41 glaucoma patients and glaucoma suspects, and 47 normal subjects were evaluated using the OCT-A PLEX Elite 9000. The peripapillary vascularisation using two parameters: vascular density (VD) and flow index (FI), b-zone parapapillary atrophy (b-PPA), choroidal thickness (CT) in the superior, inferior, temporal, and nasal sectors, as well as the peripapillary retinal nerve fiber layer (RNFL) thickness were evaluated in a 6x6mm area from the neuroretinal ring. The AngioPlex Elite 9000 algorithm (AngioPlex Elite 9000, Zeiss, Germany) from the Zeiss Advanced Imaging Network Hub was used for the processing of the images. Specifically, we used the v0.9 algorithm that provides quantitative information on peripapillary micro vascularization and RNFL thickness.

Results

Both vascular parameters, such as VD, 0.53 vs 0.52, p 0.004 FI, 0.37 vs 0.34, p <0.001, temporal CT 211 [172.7;309] vs 158 [115;201], p 0.004 , nasal CT 203 [158;252.5] vs 165 [124.5;208.5] p 0.007, superior CT 222 [172.75;279.25] vs 172 [127.5;210], p 0.013, inferior CT 176 [141.7;176] vs 131 [106.5;162.5], p 0.007 and RNFL thickness 81.5 vs 74.7 m, p<0.001, were lower in glaucoma patients. b-PPA was similar in both groups, 0.76 [0.56;1.17] vs 0.97 [0.75;1.6], p 0.080. Dropouts were detected in 24.4%, 10 of 41 glaucoma patients. No differences in b-PPA or CT between those subjects with deep or superficial micro vessel dropouts and glaucoma patients without dropouts were found, b-PPA 1.62[1.17;1.91] vs 0.8[0.61;1.17] , p 0.066 temporal CT 150 [114.7;261] vs 194 [153;267.5], p 0.332 , nasal CT 124.5 [113.25;193.5] vs 194 [152.5;236] p 0.117, superior CT 142.5 [126.75;230] vs 201 [153.5;252], p 0.332, inferior CT 102 [95.25;150.5] vs 155 [129;198.5], p 0.117. Neither difference was found between the two groups in vessel indices or RNFL thickness. VD was 0.53±0.02 vs 0.53±0.02, p 0.812, FI 0.33±0.03 vs 0.36±0.04 and RNFL thickness was 76.45±10.7 vs 78.53±9.71, p 0.529 in patients with and without dropouts respectively.

Conclusions

Peripapillary vascular density, choroidal thickness and peripapillary retinal nerve fibre layer thickness were lower in glaucomatous patients. The percentage of patients with dropouts was low. No further alteration of peripapillary vascular parameters was found in patients with both deep and superficial dropouts.

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P-0716

CLINICAL METHOD OF TRANSCRANIAL DIRECT CURRENT STIMULATION ON VISUAL FUNCTION REHABILITATION AND ASSESSMENT

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Background

There are many studies also introduces the concept of areas of residual vision (ARVs), which are regions containing fibers spared by the lesion. These spared fibers can activate the plastic cortex, as indicated by various observations. Such as, animals with optic nerve damage show recovery of visually guided behavior with as little as 10% to 20% retinal ganglion cell survival, achieving up to 80% detection. And, retinal ganglion cells spared by damage compensate by increasing cell soma size and becoming hyperactive. And, training-induced vision improvement in patients following stroke is directly related to the size of ARVs. Lastly, vision restoration is influenced by residual activity locally and in the immediate surrounding area.

On the other hand, a pilot trial demonstrated that training improved detection accuracy in patients with glaucoma, but definitive evidence regarding the efficacy of vision restoration training in glaucoma is still lacking.

Overall, past studies highlights the adaptability and recovery potential of the visual system, both in animals and humans, even after damage. So we suggest that targeted training and stimulation can lead to improvements in visual function and daily activities, emphasizing the importance of understanding and harnessing visual system plasticity for potential therapeutic interventions.

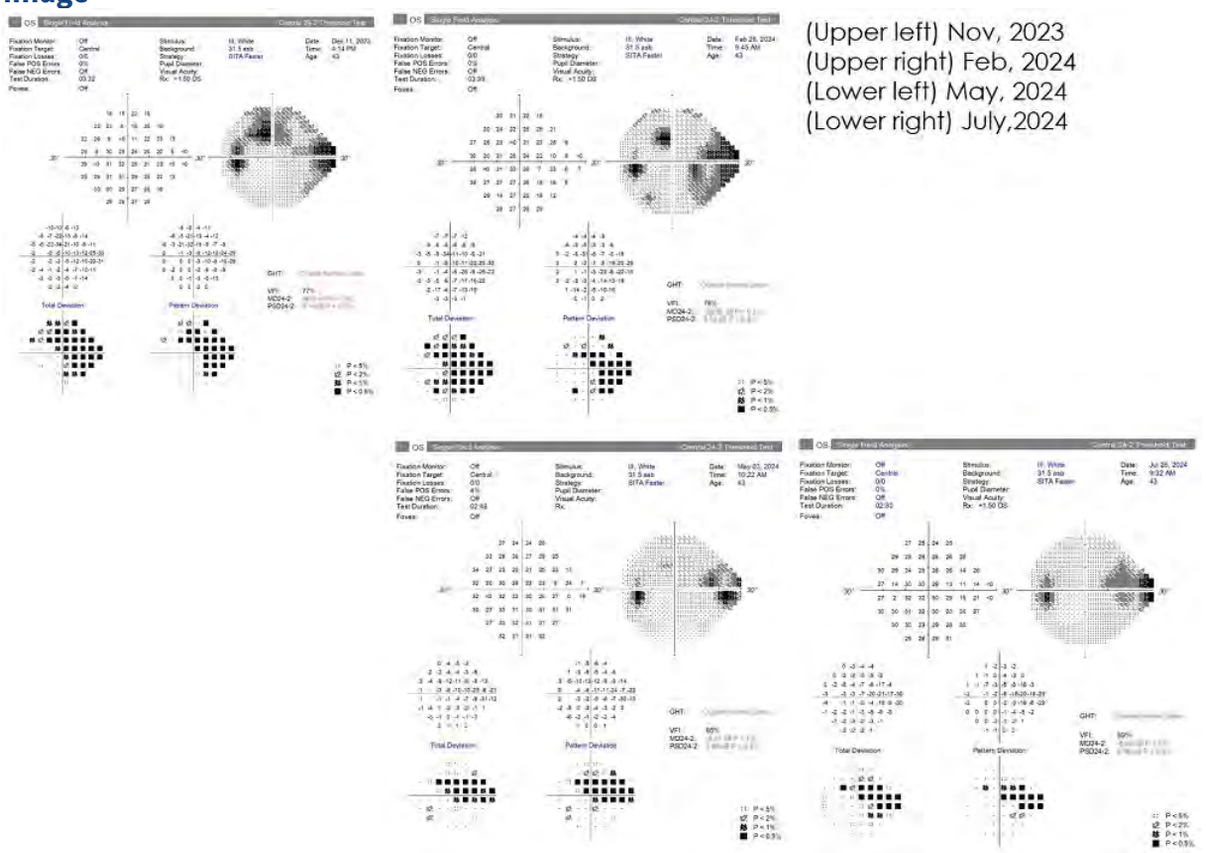
Methods

There are two groups of 10 random people aged between 40 to 70, one is an experimental group(cathodal tDCS stimulation of V1; 2 mA for 10 min) and the other is a comparison group(simulate stimulation; 2 mA for 30 s). Each cycles were applied every week for total of 10 weeks. In this paper, SITA 24-2, SITA 10-2, ERG, VEP tests were used for measuring the improved residual vision.

Results

As a result of the experiment, when more than 10 cycles were performed on the transorbital area for about 10 weeks in patients with glaucomatous visual field damage, the group that received transcranial direct current stimulation treatment using tDCS showed statistically significant visual function compared to the group that used sham. In the case of the tDCS group, visual function was preserved, and the effect of slowing the deterioration of visual function compared to the sham group was confirmed to be statistically significant.

Image



(Upper left) Nov, 2023
(Upper right) Feb, 2024
(Lower left) May, 2024
(Lower right) July,2024

Conclusions

Visual field defects caused by glaucoma can be improved by repetitively activating residual vision through tDCS. Our randomized clinical trial revealed evidence that visual field loss is in partly reversible by behavioral, computer-based, controlled electrical stimulation. We suggest a new rehabilitation treatment option in glaucoma and neuroplasticity of the visual cortex or other cortical areas is the proposed mechanism of action.

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P-0717

SOME ASPECTS OF THE CLINICAL AND SOCIAL PROFILE OF CHILDREN WITH GLAUCOMA

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Background

Congenital glaucoma (CG) is relatively rare - 1 case per 10,000-18,000 newborns (Kadyshev V.V., Egorov E.V., Oganezova Zh.G. 2024). The frequency of V.G. According to the materials of the TashPMI clinic for 2018 -2021, there was a persistent tendency to increase almost 2 times: from 17.25% to 34.05% (Khamraeva L.S., Khamroeva Yu.A., Khamidova Sh.N. ., 2022). As a cause of blindness among children, it represents 4.2% of cases, and low vision - 2.2%.

Methods

A retrospective analysis of the medical records of 71 patients who were treated in the ophthalmology department of the TashPMI clinic was carried out for the first half of 2024.

Results

The diagnosis of Congenital glaucoma (CG) was established according to the classification of N.A. Kagan, T.K Taykuliev (2004), Avetisov E.S., Kovalevsky E.I., Khvatova A.B (1987). Simple VH (actually hydrophthalmos) was diagnosed in 59 children (118 eyes, 83%) of which 43 were boys (86 eyes, 72.89%), 16 girls (32 eyes, 27.11%).

There were 27 children (54 eyes) with anomalies of the eyeball: keratopathy - 36 eyes (30.5%), aphakia - 4 eyes (3%), macrospherophakia - 2 eyes (1.5%), posterior embryotoxon - 2 eyes (1.6%), microphthalmia - 1 eye (0.8%), aniridia - 1 eye (0.8%), corneal ulcer - 1 eye (0.8%), Descemetocele - 1 eye (0.8%), Peters anomaly - 2 eyes (1.6%), ectopia pupil - 2 eyes (1.6%), Marshall syndrome - 2 eyes (1.6%).

Infantile CH in 12 children: boys – 9 (18 eyes), girls – 3 (6 eyes), with concomitant moderate myopia in 4 children (8 eyes).

Juvenile Congenital glaucoma (CG) in 6 children, 4 boys (8 eyes), 2 girls (4 eyes)

Secondary post-traumatic glaucoma 1 child in a pseudophakic eye.

Secondary postveal glaucoma in 3 children (3 eyes), with corneal dystrophy - 1 eye (SPO. Penetrating injury of the cornea), bullous keratopathy - 1 eye, with descemetocele - 1 eye.

Types of surgery: sinusotrabeculotomy and basal iridectomy with autoscleral pedicle - 35 eyes (66%), without autoscleral pedicle - 12 eyes (22%), sclerectomy with Glautex implantation - 1 eye (2%), synechiotomy. IOL explantation. Fibrosectomy – 1 eye (2%), anterior partial vitrectomy – 3 eyes (6%), ulcer coverage according to Kunt. Blepharorrhaphy – eye (2%).

Conclusions

Based on materials from the TashPMI clinic for the first half of 2024. The majority of patients with glaucoma were 43 (86 eyes) boys with hydrophthalmos. According to the stages of the disease, children were divided into the following groups: initial stage - 14%, advanced stage - 23%, advanced stage - 53%, terminal stage in 8% of cases.

Of the children operated on, in 45% of cases, children required repeat operations. In 32% of cases, stabilization of the process was achieved, and this led to an improvement in visual functions, and in 13% of cases the eye was preserved as an organ. Thus, based on the course of glaucoma, IOP indicator, as well as the number of previously performed operations, the surgeon will be able to choose the most optimal treatment method for each patient individually.

P-0719

DETECTION OF CHOROIDAL DETACHMENT USING A WIDEFIELD FUNDUS OCT WHICH IS UNIDENTIFIED BY FUNDUS EXAMINATION OR FUNDUS PHOTOGRAPHY

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Background

Choroidal detachment (CD) due to low intraocular pressure (IOP) after trabeculectomy (TLE), which is often seen in the ciliary body to the peripheral sub-choroid, is usually diagnosed by fundus examination, ultrasound examination or anterior segment optical coherence tomography (AS-OCT). However, it may be difficult to detect CD by fundus examination when it is mild.

Methods

This is a case report of low IOP with CD after TLE, in which the CD was not clear on fundus examination or ultra-widefield fundus photography, but was confirmed its extent by a widefield fundus OCT.

Results

A 63-year-old woman with diagnosis of primary open angle glaucoma (POAG) received TLE in her right eye. Since the IOP was high from the day after surgery to postoperative day (POD) 3, she underwent the laser suture lysis. On POD 4, the IOP was 3 mmHg without CD or hypotonic maculopathy. On POD 9, IOP had elevated slightly to 6 mmHg, with a shallow CD in the inferonasal peripheral detected by fundus examination, and a mild maculopathy by fundus OCT. On POD 16, the improvement of CD was observed by ultra-widefield fundus photography and the improvement of maculopathy was also seen on fundus OCT, while the IOP remained the same at 6 mmHg. However, widefield fundus OCT detected a previously unseen low-intensity region between the choroid and sclera indicating CD in the midperipheral fundus. It was not clearly visible on fundus examination or ultra-widefield fundus photography. On POD 23, widefield fundus OCT showed the improvement of CD, although IOP had decreased slightly to 3 mmHg. On POD 37, IOP had increased to 8 mmHg, and the disappearance of CD was confirmed by widefield fundus OCT.

Conclusions

A widefield fundus OCT can detect and confirm the extent of shallow CD that is difficult to diagnose by fundus examination or ultra-widefield fundus photography.

P-0720

THE ROLE OF SERPINE3 IN THE DAMAGE OF RGCS NEAR THE OPTIC DISC IN RATS UNDER HIGH INTRAOCULAR PRESSURE WITH LONG AXIAL LENGTH

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Background
Despite decades of research, knowledge about the genes that are important for myopia combined with glaucoma of the mammalian eye and are involved in human eye disorders remains incomplete. The inappropriate extension of the longer ocular axis was established using circumlimbal suture than sclerosant injection in ocular hypertension models.

Methods
Building on these observations, we performed retinal transcriptome sequencing on rats of different models to clarify the genes that were not characterized in the long axis combined with the ocular hypertension model.

Results
The screen uncovered several genes, including *SERPINE3*, a putative serine proteinase inhibitor, which is predicted to be a gene that may be associated with axial elongation, distinct from chronic high intraocular pressure. To test this, we show that *SERPINE3* has higher expression in eyes of the longer ocular axis established using circumlimbal suture compared to rats with sclerosant injection, and was upregulated in the sclera, cornea, and retina, accompanied by biomechanical changes in the cornea and sclera and reduced blood flow in the posterior pole of the retina. In addition, immune changes related to *SERPINE3* were detected in the retina.

Conclusions
Furthermore, these results indicate that *SERPINE3* plays a role in the eye of a rat model of long axis combined with high intraocular pressure, which may provide a reference for genetic testing in the early diagnosis of myopia combined with glaucoma.

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P-0721

DIFFERENCE OF RETINA NERVE FIBER LAYER THICKNESS AFTER CATARACT SURGERY

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Background

Optical coherence tomography (OCT) is widely used powerful imaging technology in diagnosis of glaucoma. However cataract can affect image of OCT and retinal nerve fiber layer (RNFL) thickness measured by OCT.

Methods

This retrospective clinical study included 32 eyes of 32 patients who underwent cataract surgery. All patients had no preexisting corneal opacity, retinal disease or history of intraocular surgery that might influence the RNFL thickness. The classification and the grading of cataract were based on the Lens Opacities Classification System III (LOCS III). RNFL thickness was measured with 3D swept-source OCT before cataract surgery and 4 weeks after surgery.

Results

The mean preoperative average RNFL thickness was 93.16±12.42 and the postoperative mean average RNFL thickness was 99.38±13.09. RNFL thickness was compared in 4 quadrants. The pre- and postoperative values of the mean average RNFL thickness showed statistically significant difference ($P < 0.05$).

Conclusions

Lens opacities may affect the accuracy of estimation of RNFL thickness using OCT. We should consider the effect of cataract when analyze the RNFL thickness by OCT.

P-0722

CHARACTERIZATION OF THE OPTIC NERVE HEAD BY OPTICAL COHERENCE TOMOGRAPHY IN MYOPIC PATIENTS FROM A LATIN AMERICAN POPULATION

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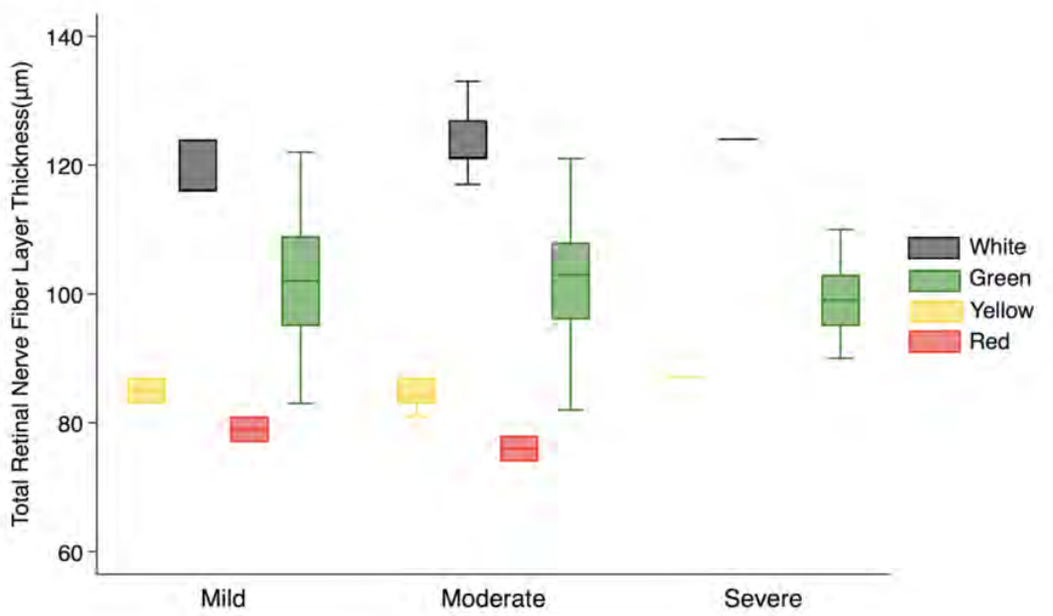
Background
Myopia leads to thinning of the retinal nerve fiber layer (RNFL) detectable by Optical Coherence Tomography (OCT), often mimicking glaucoma, highlighting the need for specific normative baselines for glaucoma assessment in myopic eyes. This retrospective cross-sectional study aims to characterize the morphology of the optic nerve head and ganglion cell complex (GCC) in myopic patients from a Latin American population.

Methods
A retrospective analysis was conducted on 180 eyes from 90 patients with a median age of 38 years (IQR 26), predominantly female (64.4%), from January 2022 to November 2024 at a glaucoma referral center in Bogotá, Colombia. Included myopia without a history of glaucoma, inflammatory or infectious diseases, or refractive/filtering surgeries. Myopia was classified as mild (+0.50 to -0.50 D), moderate (-0.50 to -6.0 D), and severe (<-6.0 D). OCT measurements for RNFL and GCC were performed using the myopic normative database of NIDEK RS-3000 Advance 2. Multivariate analyses were performed, Chi-square tests were used to evaluate associations between qualitative variables, while analysis of variance assessed differences between qualitative and quantitative variables, adjusting for normality. San Buenaventura University, ethics committee approval was obtained.

Results
Of the analyzed eyes, 64 (35.5%) had mild myopia, 101 (56.1%) moderate, and 15 (8.3%) severe. Severe myopia correlated with increased alpha (40.0% vs. 26.6%, p=0.022) and beta (73.3% vs. 18.8%, p<0.001) peripapillary atrophy, lower vertical cup-to-disc ratios (0.41 vs. 0.54 and 0.55, p=0.005), and smaller cup areas (0.31 mm^2 vs. 0.68 mm^2 and 0.76 mm^2, p=0.009). Greater degrees of myopia showed thinning of the inferior GCC (p=0.047) and nasal and inferior RNFL, specifically in sectors C4 (p=0.011), C5 (p=0.007), C7 (p=0.014), C8 (p<0.001), and C9 (p=0.043). Normative color scales fit severe myopia adequately, while deviations toward red and yellow predominated in mild and moderate myopia.

Image



Conclusions

Higher degrees of myopia are linked to increased peripapillary atrophy and thinning of the RNFL and GCC. Existing OCT normative data are sufficient for severe myopia but insufficient for mild and moderate cases, proving the need for specific normative databases that allow a more reliable assessment of glaucoma in myopic eyes

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P-0723
OUTCOMES OF 100 TRABECULECTOMIES BY A SINGLE SURGEON AT A SINGLE SITE

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Background
Trabeculectomy is regarded as the gold standard glaucoma operation. To achieve a better understanding of the outcomes of trabeculectomy at our center, we conducted a prospective study to evaluate the performance of primary trabeculectomies at Al Shifa Trust Eye Hospital, Rawalpindi, Pakistan

Methods
A prospective study of 100 Trabeculectomies was performed at Al Shifa Trust Eye hospital Rawalpindi by a single surgeon using the same technique *i.e.* fornix based, with the use of mitomycin C over a period of 4 years. Patients with primary open angle glaucoma and primary angle closure glaucoma were included in the study. The trabeculectomies were performed and the patients were followed at 2 weeks, one month, 3 months, 6 months and one year duration.

Results
The patients included in the study were between 20 and 70 years of age. The patients had been using topical antiglaucoma treatment for at least six months prior to the surgery. The patients were other fundus pathologies like diabetic, hypertensive retinopathies and maculopathies were excluded from the study. The results were concluded on the basis of AGIS and visual acuity prior to the surgery and at the end of one year, were recorded. 70% of the patients fell in ‘qualified success’ and 17% of the patients had trabeculectomy failure.

Conclusions
The patients who undergo early trabeculectomy while their visual acuity is still good retained their vision at the end of 1 year and had better control of their IOP with less chances of failure.

P-0727

TAILORING VISUAL FIELD TEST PATTERNS TO INDIVIDUALS: THE INDIVIDUALISED PERIMETRY PROGRESSION OBSERVATIONS IN GLAUCOMA STUDY

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Background

The Individualised Perimetry Progression Observations in Glaucoma Study (IPPOGS) commenced in October 2023 (Lions Eye Institute, Perth), with recruitment complete in February 2025. IPPOGS is evaluating the Australian Reduced Range Extended Spatial Test (ARREST)[1] which customises visual field (VF) test location placement for eyes with existing VF loss, to improve VF spatial depiction and increase the number of locations with sensitivity estimates capable of contributing to progression analysis. IPPOGS will collect ARREST data every 4 months for 3 years in 140 people with established glaucomatous visual field loss. Here, we evaluate the number of locations added by ARREST when collected over the first 3 study visits.

Methods

95 eyes from 95 people with established open-angle glaucoma who had completed 3 visits (by date 24th Feb 2025) as part of the Individualised Perimetry Progression Observations in Glaucoma Study were included. The first visit measured a baseline 24-2 VF. The following 2 visits (after approximately 4 months and 8 months) applied ARREST testing. ARREST stops testing locations established as perimetrically blind, and censors those with sensitivity <17dB (tested with 0dB only). Saved presentations are used to test new locations at scotoma edges. VFs were measured using a Compass fundus-tracked perimeter controlled by the Open Perimetry Interface. Repeat tests were referenced to the fundus image collected at visit 1 to enable consistent stimulus placement.

Results

Participants were aged between 33-88 years with a VF mean deviation (MD) (ZEST-Fast, Compass Perimeter) between -0.10 dB and -19.21dB at visit 1. On average, ARREST added 7.5 new locations (range 0-22) at visit 2, and then an additional 5.5 locations (range 0-12) at visit 3, resulting in between 54-85 test locations (average 65) compared to the 52 test locations (24-2) at visit 1. The number of added locations was negatively correlated with MD ($R = -0.64$, $p<0.01$). The average number of presentations per test was 239 +/-23 (baseline 24-2), 237+/-18 (first ARREST), 248+/-22 (second ARREST). An illustrative case example is depicted in the Figure.

Image

Targeted increased sampling in the superior macular area

Conclusions

IPPOGS is collecting novel longitudinal visual field data customised to individual eyes, using the ARREST visual field procedure. Visual field test patterns are automatically selected, with enhanced spatial fidelity at the scotoma edge. Our longitudinal study will uncover whether ARREST is beneficial for detecting visual field progression and for relating to structural changes.

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P-0728

CORNEAL CONFOCAL AND SPECULAR MICROSCOPIC CHARACTERISTICS IN PRIMARY OPEN-ANGLE GLAUCOMA: AN OCT-BASED CASE-CONTROL STUDY

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Background
Glaucoma, particularly open-angle glaucoma (OAG), is a leading cause of irreversible blindness, associated with optic nerve damage, retinal ganglion cell death, and visual field defects. Corneal biomechanical properties and cellular components, such as corneal nerve and keratocyte densities assessed by *in vivo* confocal microscopy (IVCM), may serve as biomarkers for glaucoma progression. This study aimed to explore the relationship between corneal nerve parameters, keratocyte density, and optical coherence tomography (OCT)-derived retinal nerve fiber layer (RNFL) thickness in primary open-angle glaucoma (POAG) patients and controls.

Methods
This case-control study was conducted at Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan, from January 2023 to October 2024. It included 26 eyes of 17 glaucoma patients and 28 eyes of 18 age-matched controls. POAG was diagnosed based on elevated intraocular pressure (IOP), optic disc changes, RNFL defects, and visual field abnormalities. Participants underwent full ophthalmic evaluation, including OCT for RNFL thickness, specular microscopy, and corneal confocal microscopy (CCM). Data were analyzed using IBM SPSS Statistics for Windows, Version 26.0 (Released 2019; IBM Corp., Armonk, New York, United States), with Spearman's correlation and linear regression for association analysis.

Results
Anterior stromal keratocyte density was significantly lower in glaucoma patients (436.63+145.44 cells/mm^2) compared to controls (546.54+141.20 cells/mm^2; p=0.007). No significant difference was found in posterior stromal keratocyte density (p-0.788). Corneal nerve parameters showed a higher nerve fiber length in glaucoma patients (19.25+5.74 mm/mm^2), but the difference was not significant (p=0.143). Nerve branch density was significantly higher in glaucoma patients (40.22+23.44 branches/mm^2) compared to controls (26.12+10.17 branches/mm^2; p-0.054). Specular microscopy revealed significantly lower endothelial cell density in glaucoma patients (2159.8+393.39 cells/mm^2) compared to controls (2474.15+272.59 cells/mm^2; p=0.002). OCT measurements showed a significantly thinner global RNFL in glaucoma patients (69.79+24.79 um) compared to controls (98.86+9.04 µm; p<0.001). Spearman's correlation analysis showed that anterior keratocyte density was positively correlated with global (r=0.294; p=0.045), superior (r=0.312; p=0.031), and inferior quadrant RNFL thickness (r=0.285; p=0.049). It was also negatively correlated with central corneal thickness (CCT) (r--0.367; p=0.039). In multivariate analysis, the duration of glaucoma was significantly associated with RNFL thickness (p-0.011).

Conclusions

This study found that anterior stromal keratocyte density was positively correlated with RNFL thickness, suggesting a potential link between corneal cellular changes and glaucoma severity. Endothelial cell density was significantly lower in glaucoma patients, which may reflect the disease's impact or the effect of medications on corneal health. While corneal nerve parameters did not show significant differences, these findings highlight the importance of corneal biomechanical properties in glaucoma pathophysiology. Further studies with larger sample sizes and longer follow-up periods are needed to confirm these findings and explore the role of corneal parameters in glaucoma progression.

P-0729

EVALUATION OF READING PERFORMANCE IN EYES SIMULATED WITH DIFFERENT VISUAL ACUITY AND VISUAL FIELD IMPAIRMENT

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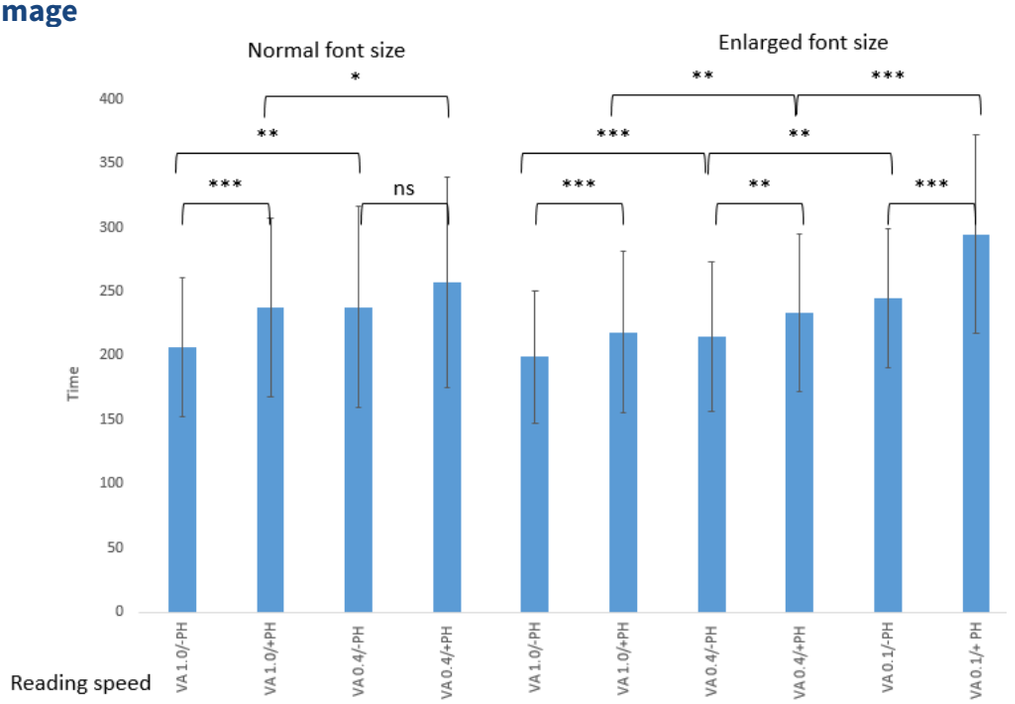
Background
Understanding the additional time needed for visually impaired examinees to complete an exam is essential in preventing discrimination. This study aims to quantify and individualize the additional time required under various visual conditions.

Methods
Thirty participants aged 20 to 40 were included in the study. Visual acuity was reduced to 0.4 or 0.1 using a fogging technique, with or without a pinhole, respectively. Tests were conducted under normal and enlarged font size conditions. Reading and searching speed assessments were performed across different settings.

Results
The findings indicate that reduced visual acuity and the use of a pinhole led to decreased reading speed. However, increasing the font size improved reading speed. Regarding searching speed, both reduced visual acuity and the use of a pinhole resulted in a decline. Additionally, searching speed was slower with enlarged font size compared to normal font size, except in the visual acuity 0.4/without pinhole condition (p = 0.26). Based on these findings, we developed a conversion table that quantifies the additional time required under different visual conditions compared to the baseline of visual acuity 1.0/without pinhole with normal font size.

Image



Conclusions

Our data provide precise time adjustments for various visual conditions, allowing for an equitable allocation of extra time for visually impaired examinees. However, individual differences in test-taking abilities and strategies must be considered. Further research is needed to assess examinees' performance on complete real-world exams under varying visual conditions.

Surgery & Wound Healing

P-PW-0730

OUTCOMES OF COMBINED PHACOEMULSIFICATION WITH GATT VERSUS PHACOEMULSIFICATION WITH TRABECULECTOMY IN PRIMARY ANGLE CLOSURE GLAUCOMA (PACG)

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Background
To compare the surgical outcomes and safety of 5-0 prolene Gonioscopy assisted transluminal trabeculotomy(GATT) versus Trabeculectomy combined with phacoemulsification in Primary angle closure glaucoma(PACG).

Methods
Prospective, comparative, interventional study of 90 eyes of 77 patients who underwent Phaco-GATT(N=45) and Phaco-Trab(N=45) who were followed up for 1 year. Outcome measures included changes in intraocular pressure (IOP), percentage IOP reduction, antiglaucoma medications (AGM), patients remaining AGM-free, and best-corrected visual acuity (BCVA). Success was defined as at least 20%/25%/30% IOP reduction and IOP ≤21, 18, or 15 mmHg(-Criteria 1, 2, or 3). Additionally, complications, interventions, and the risk factors for surgical failure were compared using the Cox proportional Hazard model. A p-value <0.05 was considered statistically significant.

Results
In the Phaco-GATT group, mean IOP reduced significantly from 21.87±3.79mmHg to 12.11±2.97mmHg, and in the Phaco-Trab group from 21.44± 4.66mmHg to 13.35±3.24 mmHg at 12 months(p<0.001), with no significant difference between the groups(p=0.311). AGM significantly reduced from 2.40±0.89 to 0.58±0.55 in the Phaco-GATT group and from 1.69±0.70 to 0.59±0.60 in the Phaco-Trab group(p<0.001), with no significant difference between the groups(p=0.711).The mean IOP percentage reduction was significantly higher in the Phaco-GATT group. (43.8 vs 36%,p=0.045).17 eyes in each group remained medication-free at the end of 1 year.The cumulative probability of success was 100%,95.6%,95.6% in the Phaco-GATT group, and 90.6%,86.2%, and 76.5% in the Phaco-Trab group(Criteria 1,2,3). Surgical success was significantly higher in the PhacoGATT group by criteria 1 and 3(p=0.041,p=0.013).

The Cox proportional hazard model showed that patients undergoing the Phaco-Trab have a higher risk of surgical failure compared to those undergoing Phaco-GATT by criteria 3 in both univariate (HR = 5.40, 95% CI [1.18 to 24.66]) and multivariable analysis (HR = 5.17, 95% CI [1.03 to 25.90]).2 patients in the Phaco-GATT group required an Anterior chamber wash.2 patients in the Phaco-trab group underwent bleb needling and 1 patient underwent conjunctival resuturing.

Conclusions
Phaco-GATT is safe, efficacious, and superior to Phaco-Trabeculectomy in primary angle closure glaucoma(PACG).

P-PW-0731

12-MONTH RESULTS OF THE VENICE RANDOMIZED CONTROLLED TRIAL COMPARING STREAMLINE CANALOPLASTY TO ISTENT INJECT W IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background

The purpose of this study is to report the Month 12 (M12) results of the ongoing VENICE Study, a multi-center, randomized, controlled trial (RCT) comparing the safety and efficacy of STREAMLINE Surgical System (STREAMLINE) canaloplasty to iStent inject W (iStent W) implantation in eyes with primary open-angle glaucoma (POAG) that underwent phacoemulsification.

Methods

POAG eyes on 1-3 intraocular pressure (IOP)-lowering medications at Screening, an unmedicated Baseline (BL) diurnal IOP (DIOP) of 22-34 mmHg, and a visually significant cataract were randomized 1:1 to either STREAMLINE or iStent W after uncomplicated phacoemulsification. Assessments included unmedicated mean DIOP (MDIOP) and medication count, visual field (VF), and adverse events (AEs). Endpoints included MDIOP reduction of ≥20% from BL at M12, MDIOP ≤16 and ≤18 at M12, and mean medication count.

Results

Of the first 72 eyes randomized, 66 (STREAMLINE=31, iStent W=35) completed their M12 visit. Unmedicated BL MDIOP [mmHg (SD)] was 24.50 (3.02) for STREAMLINE vs. 25.00 (3.23) for iStent W, (p=0.691). Mean VF [dB (SD)] at Screening was -3.50 (3.01) for STREAMLINE (n=35) and -2.90 (3.20) for iStent W (n=37), p=0.362; medication count was 1.90 ± 0.81 for STREAMLINE and 1.70 ± 0.90 for iStent W, (p=0.531). At the M12 pre-washout visit, 87.1% (27/31) of STREAMLINE eyes and 74.3% (26/35) of iStent W eyes were medication-free. All 4 medicated STREAMLINE eyes and 5/9 iStent W eyes were deemed safe for washout. The iStent W eyes unsafe to washout had a mean medication count of 2.00 ± 1.15 and mean IOP of 17.00 ± 3.56. At the M12 visit, unmedicated MDIOP was 16.8 (3.03) and 16.9 (3.25) for STREAMLINE (n=31) and iStent W (n=31) respectively, p=0.872. There were 27/31 eyes (87.10%) in both groups with ≥20% reduction in MDIOP from Baseline at M12, (p=1.000). Twenty-one (67.74%) STREAMLINE eyes and 22 (70.97%) iStent W eyes had MDIOP ≤18, (p=0.783); 17 (54.84%) STREAMLINE eyes and 15 (48.39%) iStent W eyes had MDIOP ≤16 (p=0.611). M12 mean VF for these unmedicated eyes was -2.82 (4.71) for STREAMLINE and -2.50 (3.10) for iStent (p=0.754). All AEs were mild and self-limited.

Conclusions

There were no statistically significant differences in M12 IOP outcomes between the STREAMLINE canaloplasty and iStent W groups. More eyes were on medications at the pre-washout M12 visit in the iStent group. Both groups exhibited improvement in VF at M12 compared to baseline, consistent with improved vision post cataract surgery.

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P-PW-0732

PERIPHERAL IRIDECTOMY WITH GONIOSYNECHIALYSIS AND GONIOTOMY VS. TRABECULECTOMY FOR ADVANCED PACG: A RANDOMIZED CONTROLLED TRIAL

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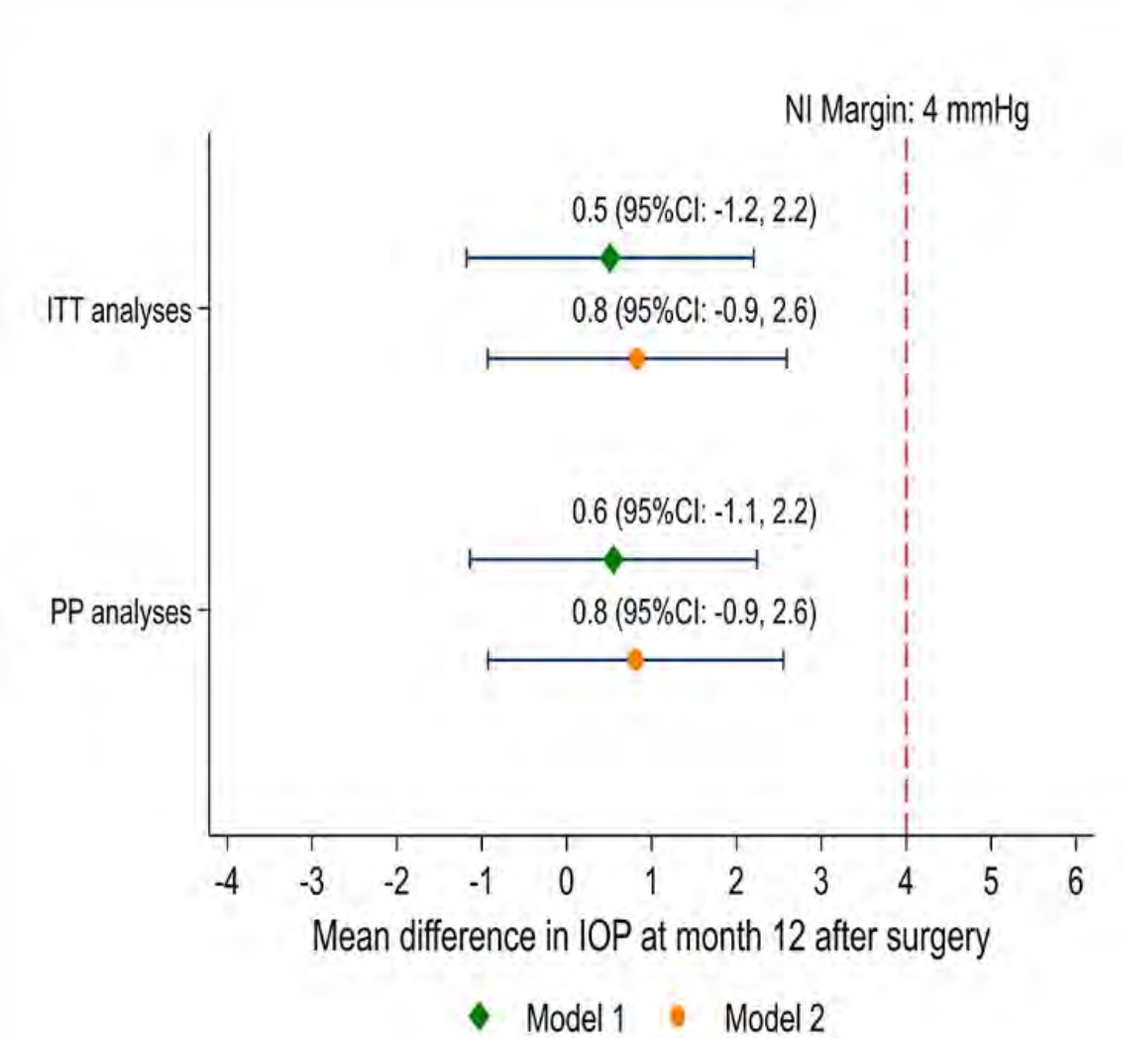
Background
A combination of surgical peripheral iridectomy (SPI), goniosynechialysis (GSL), and goniotomy (GT) has been proven not only to effectively lowers intraocular pressure (IOP) but also to address the challenges associated with trabeculectomy in advanced primary angle-closure glaucoma (PACG) without cataract. However, the safety and effectiveness of combining SPI with GSL and GT versus trabeculectomy for IOP reduction remains unknown.

Methods
Eighty-eight Chinese patients (88 eyes) with advanced PACG without cataract, aged 60.3±7.3 years (52 female [59.1%]), enrolled from January 2022 to July 2023. Forty-three were randomized to SPI+GSL+GT and 45 to trabeculectomy; 86 (97.7%) completed the 12-month follow-up. Primary outcome measure was IOP at 12 months (non-inferior margin 4-mmHg). Secondary outcomes included surgical success (IOP 5-18 mmHg, ≥20% reduction from baseline, with or without anti-glaucoma medications), post-operative complications and interventions, including bleb massage, suture lysis, or releasable sutures, and anti-glaucomatous medication-numbers.

Results
At 12 months, the SPI+GSL+GT group had a mean IOP of 15.6 mmHg versus 14.9 mmHg in the trabeculectomy group (difference: 0.5 mmHg, 95% CI: -1.2 to 2.2; P=.55), within 4-mmHg non-inferiority margin. Qualified success rates were 38 (88.4%) of 43 participants for SPI+GSL+GT and 42 (93.3%) of 45 participants for trabeculectomy (difference: -5.0%, 95% CI: -19.6 to 8.5; P=.48). However, complete success rates were lower in the SPI+GSL+GT (60.5% vs. 82.2%; P=.03). Post-operative complications and interventions were 8 (18.6%) and 3 (7.0%) of 43 participants for SPI+GSL+GT, versus 9 (20.0%) and 25 (55.6%) of 45 participants for trabeculectomy (P=.71 and <.001, respectively). Medication use decreased from 2 (0, 3) to 0 (0, 1) in the SPI+GSL+GT group and from 2 (2, 3) to 0 (0, 0) in the trabeculectomy group (difference: -.81, 95% CI: -1.36 to -.26; P=.004).

Image



Conclusions

SPI+GSL+GT demonstrated non-inferiority (4mmHg-margin) to trabeculectomy for IOP at 12 months, with fewer complications (including bleb massage, suture lysis, or releasable sutures) but similar post-operatively medications use. This suggests SPI+GSL+GT as a potential alternative to trabeculectomy for similar cases, pending validation in larger sample sizes with smaller non-inferiority margins.

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P-PW-0733

THREE-YEAR SAFETY AND EFFICACY RESULTS OF A SUPRACILIARY DRAINAGE DEVICE IN OPEN ANGLE GLAUCOMA PATIENTS (STAR-GLOBAL)

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Background
Three-year safety and efficacy of a novel, minimally invasive glaucoma surgery (MIGS) device, MINIject® (iSTAR Medical, Wavre, Belgium) is described. The device was implanted ab interno into the supraciliary space in subjects with medically uncontrolled primary open-angle glaucoma.

Methods
The MINIject device was implanted in a standalone procedure in phakic and pseudophakic eyes in 4 prospective trials (STAR-I,II,III,IV). There was no medication washout. The trials were completed in 83 subjects in 11 sites in Europe, Asia and Central America with 2-year follow-up. Subjects were then invited to enrol into the STAR-GLOBAL study to continue follow-up annually from 3 until 5 years post implantation. Outcome measures were intraocular pressure (IOP), IOP-lowering medications, adverse events and corneal endothelial cell density (ECD).

Results
Seventy-three subjects were enrolled in the STAR-GLOBAL trial, with 65 subjects completing 3-year post-implantation follow-up (89.0%). In the STAR-GLOBAL population, mean baseline diurnal IOP prior to implantation was 23.9±3.5 mmHg with a mean of 2.5±1.2 IOP-lowering medications (n=73). At two-years post implantation, mean diurnal IOP was 14.3±4.1mmHg (-9.7mmHg, -39.9%; p<0.0001) on 1.4±1.3 medications in these subjects (n=72). At three-year post-implantation follow-up (n=65), mean diurnal IOP was 15.1±4.2mmHg (-8.7mmHg, -36.2%; p<0.0001) on 1.3±1.3 medications (p<0.0001). Further, 90.8% of subjects achieved an IOP reduction of >=20% from baseline, 81.5% of subjects achieved an IOP <=18 mmHg, and 36.9% of subjects were medication-free at three years. Adverse events related to MINIject since STAR-GLOBAL study enrolment were one case of ECD loss and one cataract progression.

Conclusions
Standalone MINIject implantation resulted in a clinically significant reduction in IOP and hypotensive medication use up to three-years post-implantation in an ethnically diverse cohort of subjects. This supraciliary MIGS device offers an effective bleb-free treatment option for patients with medically uncontrolled primary open angle glaucoma requiring low target IOPs.

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P-PW-0734

SIMULTANEOUS GLAUCOMA DRAINAGE DEVICE (GDD) REVISION AND DESCEMET'S STRIPPING ENDOTHELIAL KERATOPLASTY (DSEK): FIVE-YEAR OUTCOMES

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Background

Glaucoma drainage device (GDD) surgery is a common intervention, with approximately 20,000 procedures performed annually in the United States over the past decade. A recognized complication of GDD placement is corneal endothelial failure, leading to the need for subsequent Descemet's Stripping Endothelial Keratoplasty (DSEK).

Evidence suggests that GDD placement in the anterior chamber (AC) accelerates corneal endothelial cell loss compared to placement in the ciliary sulcus or pars plana, increasing the risk of both primary corneal failure and also graft failure after transplantation. While some advocate for a staged approach—revising the GDD location before DSEK—there remains ongoing debate regarding the safety and efficacy of simultaneous surgery.

This study describes a cohort of patients who underwent simultaneous GDD revision to the ciliary sulcus or pars plana and DSEK in a single surgical episode. We report outcomes on intraocular pressure (IOP) control, visual acuity and graft survival over a 5-year follow-up period.

Methods

We conducted a retrospective chart review of patients who underwent simultaneous GDD revision—relocating the GDD tube to the ciliary sulcus or pars plana—and DSEK within the same surgical encounter. All procedures were performed between November 2018 and June 2024 by two surgeons (SW, KD) at a single academic institution using standardized techniques.

Seventy (70) patients were identified. Data extracted included demographic information, date of original glaucoma surgery (if available), pre-operative IOP, glaucoma medications, best-corrected visual acuity (BCVA), and post-operative outcomes (BCVA and IOP) at 1, 3, 6, and 12 months, as well as final follow-up.

Results

The average patient age was 73.5 years; 51% were female, and 56% were right eyes. Mean pre-operative IOP was 14.5 mmHg. Mean post-operative BCVA was improved at all time points up to POM12. In cases where BCVA did not improve, the most common reason cited was advanced glaucoma. No cases of endophthalmitis or suprachoroidal hemorrhage were observed in the cohort.

Conclusions

We report a large cohort of patients undergoing simultaneous GDD revision and DSEK. Outcomes, including IOP control and visual acuity, are comparable to those achieved with staged procedures. Simultaneous surgery may offer advantages, including reduced total operative and anesthesia time, without compromising safety or efficacy.

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P-PW-0735

TWO-YEAR OUTCOMES OF PHACOGONIOTOMY VERSUS PHACOTRABECULECTOMY STUDY: A NON-INFERIORITY RANDOMIZED CLINICAL TRIAL

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Background
While intraocular pressure (IOP) reduction with phacogoniotomy was not worse than phacotrabeculectomy for advanced primary angle-closure glaucoma (PACG) with cataract at one year follow-up, longer-term outcomes are needed. To investigate whether the reduction of IOP with phacogoniotomy not worse than phacotrabeculectomy when treating advanced primary angle-closure glaucoma (PACG) with cataract at 2 years of follow-up.

Methods
Multicenter, non-inferiority clinical trial. A total of 124 participants (124 eyes) with advanced PACG and cataract were enrolled. One hundred and twelve participants with 112 eyes completed the 2-year follow-up study. Participants were randomly assigned in a 1:1 ratio to receive either phacogoniotomy or phacotrabeculectomy. The primary outcome measure was the reduction in intraocular pressure (IOP) from baseline to the final visit at 2-year postoperatively, with a non-inferiority margin of 4 mmHg evaluated. Success rate, intraoperative and postoperative complications, and the reduction of anti-glaucomatous medications were the main secondary outcomes. The results were reported by group differences and their 95% confidence intervals (CI). Complete surgical success (postoperative IOP of 5-18 mmHg with >20% reduction from baseline, without additional topical medications), qualified success (same as complete success except allowing use of ocular hypotensive medications), complications, and hypotensive medication use were secondary outcomes.

Results
The trial started on 31st May 2021, and the 2-year follow-up ended at 31st May 2024. One hundred and twenty-four participants (124 eyes) were randomized, and one hundred and twelve participants (90.3%) complete the 2-year follow-up. All the participants were Chinese, and of these, 60 participants were women (53.6%); mean (SD) age was 66.4 (8.6) years. At the 2-year follow-up visit, phacogoniotomy demonstrated a mean IOP reduction of -25.6 mmHg and -24.7 mmHg in phacotrabeculectomy, respectively. The upper boundary of the CI for difference in change between groups was lower than the non-inferiority margin (mean difference -0.4 (95%CI -1.5 to 0.7); *P* = 0.417), supporting non-inferiority. The phacogoniotomy group also showed no superiority for complete success (mean difference 0.90; [95%CI 0.32 to 2.58]; P = .85) or qualified (mean difference 1.4 [95%CI -11.0 to 14.3], P>.99) success rate, complications (none in both groups), and anti-glaucomatous medications (mean difference 0.13; [95%CI -0.36 to 0.63]; P = .60).

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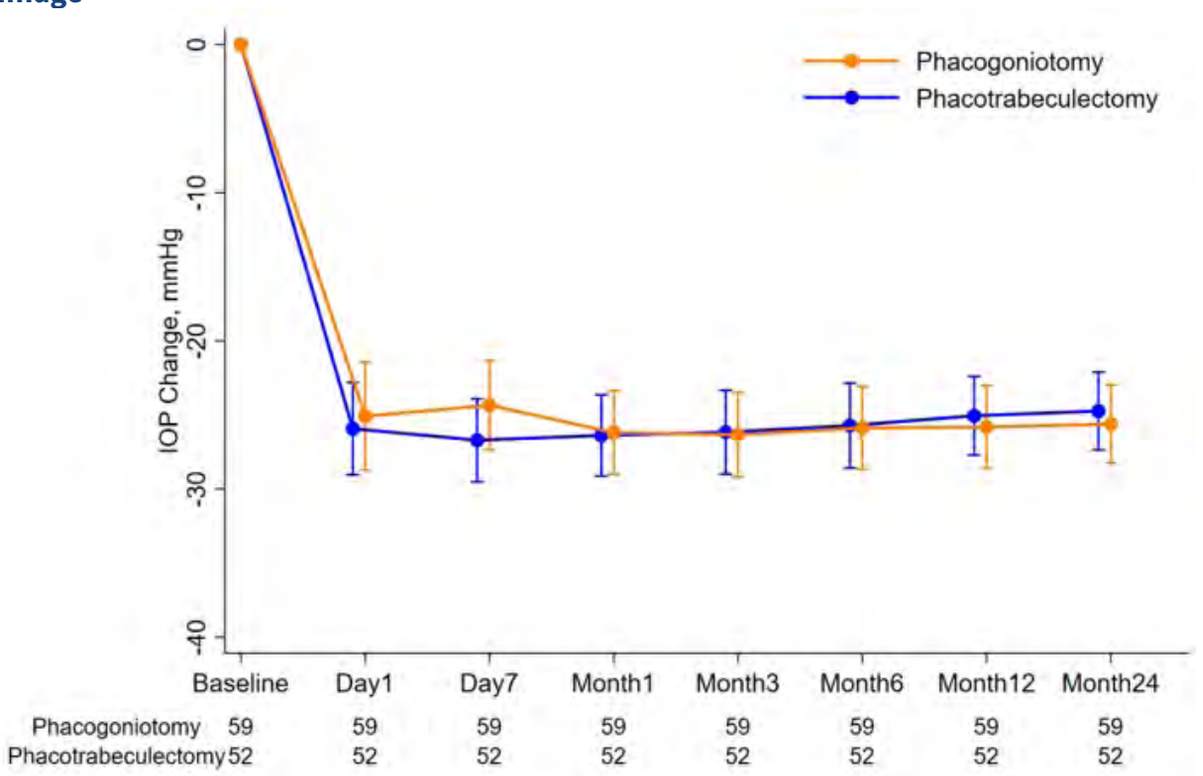

Conclusions

Phacogoniotomy was non-inferior to phacotrabeculectomy in terms of IOP reduction for advanced PACG and cataract in this 2-year follow-up study and no difference was found in complete or success rate, nor in postoperative comlications. It is suggested that phacogoniotomy could be considered as an alternative.

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P-PW-0736

BIO-INTERVENTIONAL UVEOSCLERAL OUTFLOW ENHANCEMENT IN PATIENTS WITH MEDICALLY UNCONTROLLED OPEN-ANGLE GLAUCOMA: 1-YEAR RESULTS

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Background

Scleral allograft-reinforced cyclodialysis intervention can achieve sustained intraocular pressure (IOP) reduction by enhancing uveoscleral outflow in hypertensive patients with open-angle glaucoma (OAG) failing medical therapy[1-3]. To evaluate clinical outcomes of bio-interventional cyclodialysis surgery through 12 months of follow-up in OAG subjects who are inadequate responders to IOP-lowering medical treatment.

Methods

This was a prospective interventional series from the CREST real-world evidence trial of 51 eyes with POAG and medicated baseline IOP >21mmHg failing medical therapy. Bio-interventional uveoscleral outflow enhancement surgery was performed with an ab-interno cyclodialysis procedure and adjunct scleral reinforcement using an allogenic bio-scaffold. Effectiveness outcomes such as IOP and IOP-lowering medication use as well as ocular safety and tolerability were analyzed through 12 months post-op.

Results

Fifty-one were enrolled with a baseline medicated IOP greater than 21 mmHg. The average age was 70.9 ± 8.5. The mean BCVA at baseline was 0.40 ± 0.32 and the mean medicated IOP was 25.7 ± 4.4 mmHg on 1.2 ± 1.3 IOP-lowering medications. In 83% of cases, visually significant cataract comorbidity was present and treated with adjunct phacoemulsification. The bio-interventional cyclodialysis surgery and scleral reinforcement was successfully performed in all cases. The procedures were well tolerated and there were no visually significant or serious, vision-threatening ocular adverse events. Durable and sustained reinforcement of the cyclodialysis was achieved through 12 months of follow-up without migration, displacement or attrition of the allograft bio-scaffold. At 12 months post-op, there was a statistically significant ($p<0.01$) and sustained reduction in IOP from 25.7± 4.4 mmHg at baseline down to 15.4 ± 4.5 mmHg, with a concurrent 42% reduction in IOP lowering medications. 86.7% of subjects achieved a medicated IOP ≤18 mmHg while on fewer or the same number of IOP-lowering medications.

Conclusions

Uveoscleral outflow enhancement can be surgically enhanced in an ab-interno approach through bio-interventional cyclodialysis with adjunct scleral allograft reinforcement to lower IOP in OAG patients who are inadequate responders to medical therapy.

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P-PW-0737

WIN RATIOS IN GLAUCOMA: APPLYING A NEW METRIC TO ASSESS ADVERSE EVENTS IN GLAUCOMA SURGERY

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Background

Win Ratios have been used to examine composite endpoints in cardiology randomised trials comparing treatment versus placebo or a reference standard. In this study we explore the use of Win Ratios as a novel metric to examine hierarchical adverse event endpoints in sub-conjunctival minimally invasive glaucoma surgery.

Methods

Retrospective study of patients in the multicentre Fight Glaucoma Blindness registry who underwent Xen45 gel stent (Xen) vs trabeculectomy (Trab) surgery with at least 12 months of follow up. Subjects in each arm were propensity-score matched by baseline intraocular pressure (IOP), number of medications, visual field mean deviation (VF MD) and age at surgery. We calculated a Win Ratio for prioritised adverse event outcomes in the following order: loss of light perception (LP), secondary glaucoma filtration surgery, rate of symptomatic hypotony, bleb needling and hyphaema associated with 10 letters of visual acuity loss within the first six months.

Results

Of 1209 eyes that met the inclusion criteria, 314 eyes (N = 157 per arm) were included after propensity matching. The Xen and Trab cohorts had similar baseline IOP (22.3 vs 21.5 mmHg, p = 0.35), medications (2.9 vs 3.0, p = 0.62), VF MD (-9.9 vs -10.1 dB, p = 0.79) and age at surgery (71.2 vs 71.7 years, p = 0.68). There were no loss of LP events recorded (tied at level 1), while the Win Ratio for Xen was 0.62 for secondary glaucoma surgery, 1.2 for symptomatic hypotony, 0.51 for bleb needling and 0.35 for symptomatic hyphaema. 24335 paired comparisons were performed, with 9320 ties. The overall Win Ratio was 0.71 (CI 0.49 – 1.02) indicating that Xen had a worse adverse event profile compared to Trab, although this did not achieve significance (p = 0.07).

Image

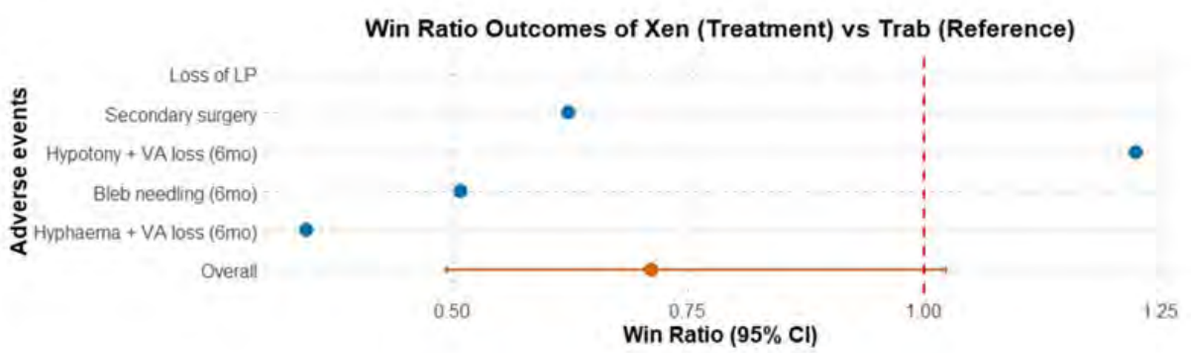

Figure 1: Proportion of wins for Xen compared to Trab in loss of light perception, secondary glaucoma filtration surgery, rate of symptomatic hypotony, bleb needling and hyphaema associated with 10 letters of visual acuity loss within the first six months. There was no loss of LP events. The overall Win ratio was 0.71 (CI 0.49 – 1.02) indicating that Xen had a worse adverse event profile compared to Trab.

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Conclusions

Win Ratios can be used to examine prioritised adverse event outcomes in comparative studies in glaucoma surgery. In this cohort of eyes matched by baseline characteristics, Xen had a worse adverse event profile compared to Trab. Win Ratios are a transparent and effective method of summarising comparative adverse events of varying clinical severity when assessing glaucoma surgery outcomes.

P-PW-0738

COMPLICATIONS AND ADVERSE EVENTS ASSOCIATED WITH THE HYDRUS MICROSTENT: A RETROSPECTIVE MAUDE DATABASE ANALYSIS

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Background

The Hydrus microstent (Alcon) is a minimally invasive glaucoma surgery device used to lower intraocular pressure in patients with primary open-angle glaucoma. Clinical trials report that the Hydrus microstent is generally safe and effective at lowering intraocular pressure, but recent reports highlight adverse events including uveitis-glaucoma-hyphema syndrome, necessitating device explantation.[1, 2] This retrospective analysis explores patient and device-related complications associated with Hydrus microstent implant using the Manufacturer and User Facility Device Experience (MAUDE) database.

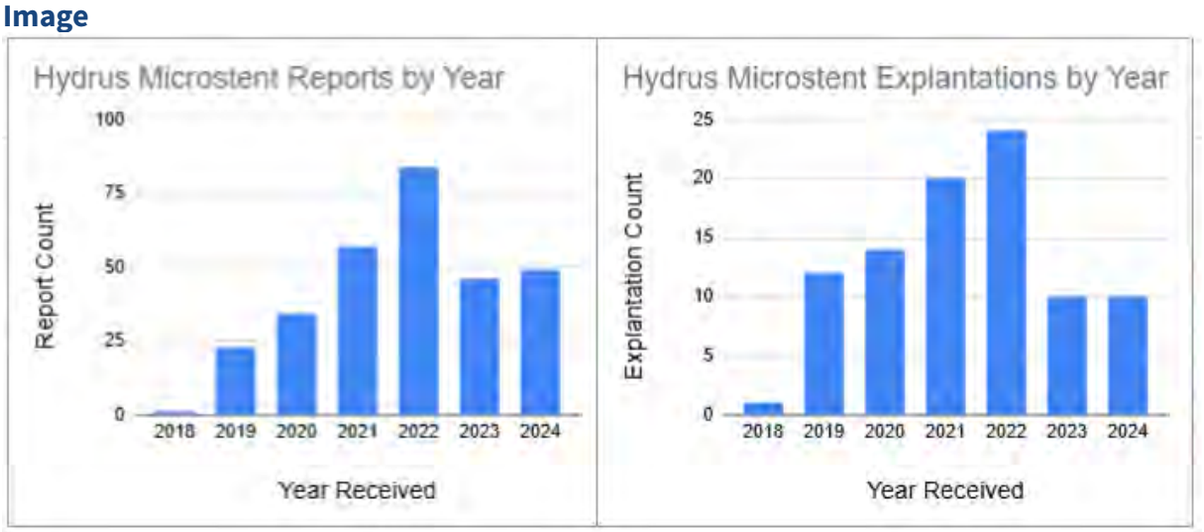
Methods

The MAUDE database contains medical device reports sent to the Food and Drug Administration. We queried the MAUDE database for reports related to the Hydrus microstent from January 2018 through November 2024, yielding 313 results. These medical device reports were screened for duplicates or insufficient information, and 19 reports were excluded. Descriptive analysis of these reports was performed using R (R version 4.4.2).

Results

A total of 294 reports met inclusion criteria. The reports comprised 270 reported injuries (91.8%) and 24 reported device malfunctions (8.2%). The most commonly reported device problems include device malposition (37.8%), obstruction of flow (5.4%), and device migration (3.7%). The most commonly reported adverse patient outcomes include an increase in intraocular pressure (34.7%), eye injury (18.7%), and hyphema (16.7%). There were 6 reported cases (2.0%) of uveitis-glaucoma-hyphema syndrome. The highest number of reports and explantations occurred in 2022, with both declining and stabilizing afterward [Figure 1]. Overall, 91 cases (31.0%) required device explantation.

Image



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Conclusions

We provide a detailed analysis of complications and adverse events associated with the Hydrus microstent, finding that device malposition, obstruction of flow, and device migration are the most frequently reported device problems. Adverse patient-related outcomes included elevated intraocular pressure, hyphema, and eye injury, with 6 reported cases of uveitis-glaucoma-hyphema syndrome. Nearly one-third of all reported cases necessitated explantation. Reported adverse events, including those necessitating explantation, decreased and stabilized since 2022, potentially due to improved physician training, better patient selection, and enhanced educational materials. These findings highlight the importance of thorough preoperative patient selection, precise surgical technique, and vigilant postoperative monitoring to optimize patient safety and device efficacy.

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P-PW-0739

POST-OPERATIVE ADJUSTMENT OF INTRAOCULAR PRESSURE WITH A NOVEL TITRATABLE GLAUCOMA DRAINAGE DEVICE IN HUMAN EYES

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Background
This prospective, non-randomized, open-label, multi-center study was designed to evaluate the safety and effectiveness of using a green laser to modify the outflow resistance of a novel titratable glaucoma drainage device (GDD) to control intraocular pressure (IOP) after surgical implantation.

Methods
The Calibreye System (Myra Vision, Campbell, CA) is a GDD that diverts aqueous humor from the anterior chamber to the subconjunctival space via three microfluidic channels. Two channels are controlled by nitinol valves that can be reversibly opened or closed using a green laser. This design enables the physician to incrementally lower or raise (titrate) IOP in the clinic postoperatively by selecting from the four device resistance settings (Baseline, Moderate, High, and Maximal). Calibreye implantation was performed in 32 patients with open-angle glaucoma. Titrations were performed using a slit lamp mounted green laser (100ms pulse duration: 200micron spot diameter, 300mW power). IOP was measured prior to and at least 30 minutes following titration.

Results
At least one titration event was performed in 31 of the 32 eyes included in the study. One eye did not required titration and remained at Baseline resistance setting. A total of 64 titrations were performed within the first 32 post-operative days, with the 1st titration occurring on average at 6.4 days (range 1-30, median 3). Of the 64 titrations, 58 were performed to lower the resistance (opening of valves). Titrations from Baseline to Moderate setting (n=27) resulted in an IOP reduction of 3.6 ± 1.7 (mean ± SD) mmHg and titrations from Moderate to Maximal (n=15) resulted in an additional IOP reduction of 3.0 ± 1.4 (mean ± SD) mmHg. 6 titrations were performed in 6 eyes to increase resistance to aqueous outflow (closing of valves). These 6 titrations resulted in an IOP increase of 2.0 ± 1.4 (mean ± SD) mmHg. No adverse outcomes were reported related to the laser titration procedure.

Conclusions
This study demonstrates the ability to bidirectionally modulate IOP post-operatively using the titratable Calibreye System. Improved control of IOP in the post-operative period following GDD surgery may improve the ability to lower IOP while theoretically also reducing the risk of hypotony related complications.

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P-PW-0740

THE EFFECT OF ANTITHROMBOTIC THERAPY ON SHORT AND LONG-TERM OUTCOMES AFTER GONIOSCOPY ASSISTED TRANSLUMINAL TRABECULOTOMY

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Background
There is no consensus among surgeons regarding the cessation of antithrombotic treatment prior to gonioscopy assisted transluminal trabeculotomy (GATT), a surgery after which bleeding into the anterior chamber is common. This decision must balance the risk of systemic thromboembolism with the risk of intraocular bleeding and its sequelae. Micro- and macrohyphemas are common and usually temporary complications of GATT. This study aims to evaluate the influence of antithrombotic agent use on early hyphema related complications and surgical outcomes.

Methods
A retrospective, single-center study involving 444 consecutive eyes from patients who underwent GATT between December 2019 and December 2023 with at least 3 months follow-up. Pre and post-operative characteristics as well as surgical success were compared between the antithrombotic (AT) and the non-antithrombotic (NAT) groups.

Results
Antithrombotic agents were used in 139 of the 444 cases (31.3%). Seventy three percent of the antithrombotic agents were anti platelets, COX-1 inhibitors. Patients in the AT group were older (75 ± 7.6 vs. 66.6 ± 17.2; P < 0.01) and had a lower maximal intraocular pressure (IOP) (28.6 ± 10.3 vs. 34.7 ± 11; P < 0.01). There were no differences between the AT and NAT groups in rates of micro and macrohyphema (85% vs 89%; P=0.3), duration of hyphema (7.98±8.4 vs 8.7±8.6; P=0.4), and presence of anterior chamber clots (22.2% vs 24%; P=0.7). There was also no difference in the occurrence of IOP spikes (23.9% vs 21.6%; P= 0.6), or in overall surgical success (77.6% vs 77.3%; P=0.5). Patients in the AT group underwent fewer additional surgeries to control IOP compared to the NAT group (4.3% vs. 10.1%; P = 0.04). A sub-analysis of all patients with anti-thrombotic agents, comparing anti aggregation (n=111; 81%) to anti coagulation agents (n=26; 18.9%) revealed more microhyphemas in the anti-aggregation group (93.6% vs 80.7%; P=0.05) and more macro-hyphemas in the anti-coagulation group (3.6% vs 15.3%; P=0.04).

Conclusions
There were no significant differences in bleeding prevalence or bleeding duration between patients receiving antithrombotic therapy and those not receiving it prior to GATT. These results suggest that GATT can be performed safely without cessation of antithrombotic therapy prior to surgery.

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P-PW-0741

RISK FACTORS FOR HYPOTONY FOLLOWING PRESERFLO MICROSHUNT SURGERY

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Background
PreserFlo MicroShunt (PMS) is a novel device designed to achieve significant IOP reduction with a less invasive approach compared to traditional surgeries. However, postoperative hypotony remains an encountered complication post PMS implantation. This study aimed to identify risk factors associated with hypotony following PMS implantation.

Methods
This multicenter retrospective cohort study was conducted on consecutive eyes underwent PMS implantation between August 2022 and May 2024 at Kyoto Prefectural University of Medicine and affiliated institutions. Only cases with follow-up data covering the first three months postoperatively were included in this study. Data was obtained via a review of the medical records of the patients, and included the following data points: 1) patient demographic(*i.e.*, age, sex, preoperative best-corrected visual acuity, preoperative IOP, preoperative medication scores, central corneal thickness, axial length, mean deviation, glaucoma subtypes, and previous surgery), 2) surgical procedure performed (PMS stand-alone or PMS combined with cataract surgery), 3) additional procedures with PMS (posterior end of the tube fixation, intraluminal suture stenting). In this study, hypotony is defined as an IOP <5 mmHg associated with complications such as a shallow anterior chamber or choroidal detachment or hypotony maculopathy. Risk factors for hypotony were identified using univariate and multivariate analyses. Statistical significance was set at $p<0.05$.

Results
A total of 471 eyes that underwent PMS implantation were included. Hypotony occurred in 18.7% of eyes, and interventions were required in 1.5%. Univariate analysis identified advanced age (≥80 years), preoperative IOP ≥25 mmHg, medication scores ≥5, and pseudoexfoliative glaucoma as risk factors for hypotony. Axial length ≥25.5 mm and intraluminal stenting were protective. In multivariate analysis, preoperative IOP ≥25 mmHg (adjusted OR: 2.02, $p=0.047$), medication scores ≥5 (adjusted OR: 2.09, $p=0.021$), axial length ≥25.5 mm (adjusted OR: 0.19, $p<0.001$), and intraluminal stenting (adjusted OR: 0.08, $p<0.001$) remained significant.

Conclusions
Postoperative hypotony is a notable complication, with preoperative IOP and medication burden being key risk factors. Long axial length and intraluminal stenting mitigate hypotony risk.

P-PW-0743

3-YEAR SURGICAL OUTCOMES OF PRESERFLO MICROSHUNT WITH MITOMYCIN C 0.4-0.5MG/ML FOR THE MANAGEMENT OF MODERATE TO ADVANCED GLAUCOMA: REAL WORLD DATA

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Background

To evaluate the long term effectiveness of Preserflo Microshunt with Mitomycin C in the management of moderate to advanced glaucoma.

Methods

Single centre analysis of consecutive patients with advancing glaucomatous visual field loss, IOP refractory to IOP lowering medication, and no previous glaucoma filtration surgery, who were treated with Preserflo Microshunt with MMC 0.4-0.5mg/ml.

A minimum of 2-year follow up was required for inclusion in data analysis. At the time of abstract submission available 3-year outcomes have been included, with further data expected to be included by conference date.

Complete success was defined as an IOP<21mmHG, >20% IOP reduction, and no use of IOP lowering medication. Qualified success was defined as complete success with the use of IOP lowering medication.

Failure was defined as an IOP>21 mmHg, <20% IOP reduction, surgical revision, further glaucoma filtration surgery, or loss of visual acuity (V/A) to no perception of light (NPL)

Other recorded parameters included hypotony (IOP<6mmHg) and complications.

Results

Data from a consecutive cohort of 116 eyes (107 patients) was collected. Pre-operatively this group had a mean IOP of 25.6mmHg using an average of 2.7 IOP lowering drops. 2-year outcomes collected from 82 eyes (76 patients) had a mean IOP of 11.9 mmHg using an average of 0.4 IOP lowering drops. Currently available 3-year outcomes from 30 eyes (29 patients) describe a mean IOP of 11.8 mmHg and average of 0.5 IOP lowering drops use.

At 2-year follow up, 79.3% (N=65) and 92.7%(N=76) achieved complete success and qualified success, respectively. Failure was noted in 7.3% (N=6). 5 patients required surgical revision within year 1 post-operatively. All revision patients achieved a 20% reduction in pre-operative IOP. 1 patient required trabeculectomy.

Of the currently available 3-year data, 76.6% (N=23) and 93.3% (N=28) achieved complete success and qualified success, respectively. Failure was noted in 6.7%(N=2). No need for late surgical revisions or further glaucoma filtration surgery have been noted thus far.

Early complications included numerical hypotony (N=13), choroidal detachment (N=6), and hyphaema (N=5). These all resolved within 1 month post-operatively without any permanent complication induced visual loss.

Conclusions

The Preserflo Microshunt with MMC 0.4-0.5mg/ml demonstrates to be effective and safe in the treatment of moderate to advanced glaucoma, with positive and stable success rates at 3 years post-operatively. Our volume of data adds value to the current body of evidence for longer term Preserflo outcomes.

P-PW-0744

THE ASIA PRIMARY TUBE VS TRABECULECTOMY STUDY: RATIONALE, DESIGN AND BASELINE CHARACTERISTICS OF A MULTINATIONAL, MULTICENTER RCT

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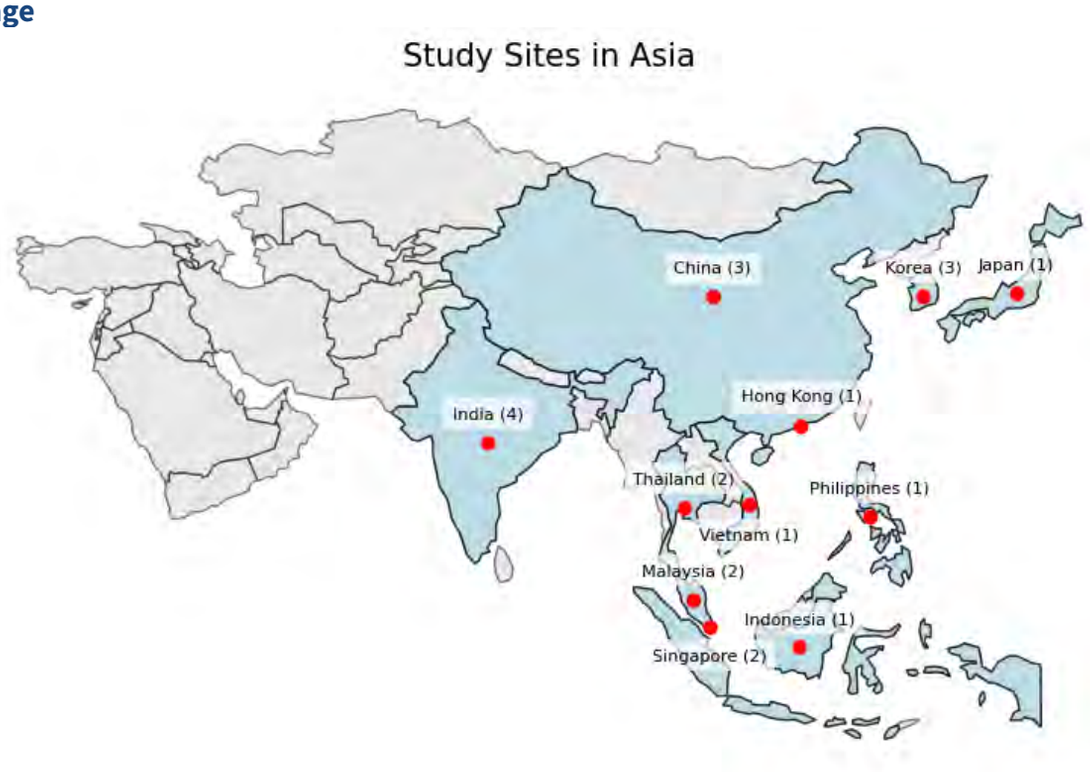
Background
The Asia Primary Tube Versus Trabeculectomy (Asia PTVT) Study aims to address the need for population-specific evidence on the surgical management of glaucoma in Asian patients. It evaluates the efficacy, safety, and long-term outcomes of Ahmed Glaucoma Implant (AGI) surgery versus trabeculectomy with mitomycin C (Trab/MMC) in medically uncontrolled glaucoma.

Methods
This prospective, multicenter, randomized clinical trial recruited 176 participants from 21 centers across 11 Asian countries between February 2017 and January 2024. Eligible participants, aged 18–85 years, with primary open-angle glaucoma (POAG) or related subtypes, were randomized to receive AGI or Trab/MMC surgery. Participants were followed for five years with scheduled visits assessing intraocular pressure (IOP), visual acuity, glaucoma medication usage, and adverse events. Surgical procedures adhered to standardized protocols, and data were analyzed on an intention-to-treat basis.

The primary outcome was failure, defined as IOP ≥18 mmHg or ≤5 mmHg with hypotony maculopathy, or < 20% reduction in IOP from baseline, or the need for additional glaucoma surgery or loss of light perception. Secondary outcomes included mean IOP, medication use, visual acuity, and adverse event rates over 5 years. Quality of life and functional impairment were also assessed using the Glaucoma Quality of Life-15 questionnaire.

Results
A total of 176 participants (88 per group) were enrolled, with comparable baseline demographics and ocular characteristics. Most participants had primary open-angle glaucoma (POAG) (90%), followed by pseudoexfoliation glaucoma (4–6%), pigmentary glaucoma (~3%), and other types (~3%). The mean baseline IOP was 25.1 ± 5.3 mmHg, and participants were using an average of 3.1 ± 1.2 medications preoperatively. Comparison with the US PTVT Study revealed key differences: the Asia PTVT included a broader range of glaucoma types, such as pigmentary and pseudoexfoliation glaucoma, while the US study focused predominantly on POAG. Inclusion criteria in the Asia PTVT allowed for prior cataract surgery, whereas the US PTVT study excluded these cases. Additionally, the Asia study employed AGI implants instead of Baerveldt implants and incorporated aqueous suppressants to manage the hypertensive phase—a strategy not used in the US trial.

Image



Conclusions

The Asia PTVT Study successfully completed subject recruitment and will provide critical insights into the comparative performance of AGI and Trab/MMC surgeries in Asian populations. These results will inform tailored surgical strategies to address the rising glaucoma burden in Asia, improving patient outcomes and public health strategies.

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P-PW-0745

2-YEAR SURGICAL OUTCOMES OF PRESERFLO MICROSHUNT WITH MITOMYCIN C 0.4-0.5MG/ML COMBINED WITH CATARACT SURGERY: REAL WORLD DATA

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Background
To evaluate the effectiveness of Preserflo Microshunt with Mitomycin C combined with Phacoemulsification and intraocular lens implantation in patients with moderate to advanced glaucoma over a 2-year period.

Methods
Single centre analysis of consecutive patients with an IOP refractory to IOP lowering medication and no previous glaucoma filtration surgery, who were treated with Preserflo Microshunt with MMC 0.4-0.5mg/ml in combination with cataract surgery.

Complete success was defined as an IOP<21mmHG, >20% IOP reduction, and no use of IOP lowering medication. Qualified success was defined as complete success with the use of IOP lowering medication.

Failure was defined as an IOP>21 mmHg, <20% IOP reduction, surgical revision, further glaucoma filtration surgery, or loss of visual acuity (V/A) to no perception of light (NPL)

Other recorded parameters included hypotony (IOP<6mmHg) and complications.

Results
Data from a consecutive cohort of 53 eyes (50 patients) was collected. At 2-year follow up, data from 42 eyes (40 patients) was available for outcome analysis. The rate of complete success was 73.8% (N=31) and qualified success 90.5% (N=38). Failure rate was 9.5% (N=4); 2 of these patients required surgical revision within year 1 but achieved 20% IOP reduction thereafter. No patients required further glaucoma filtration surgery.

A reduction in mean IOP from 24.5 mmHg to 12.2 mmHg was observed. The average number of IOP lowering medications also lowered from 2.72 to 0.36.

Early complications included numerical hypotony (N=4), choroidal detachment (N=2), hyphaema (N=2), and bleb leak (N=1). These all resolved within 1 month following surgery with conservative management.

Conclusions
Preserflo Microshunt with Mitomycin C 0.4-0.5mg/ml combined with cataract surgery proves to be safe and effective in the management of moderate to advanced glaucoma with concurrent lens induced angle closure or visually significant cataract. 2-year success rates and complication profile were comparable with our standalone Preserflo data. Our data adds value to the current body of evidence, demonstrating combination surgery as a useful strategy in select cases, without impacting success or increasing risks of complications.

P-PW-0747

THREE YEAR RESULTS OF PENETRATING CANALOPLASTY IN GLAUCOMA SECONDARY TO IRIDOCORNEAL ENDOTHELIAL SYNDROME: A PROSPECTIVE STUDY

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Background
To report the 3-year midterm efficacy and safety of penetrating canaloplasty in the management of glaucoma secondary to iridocorneal endothelial syndrome (GS-ICE).

Methods
This was a prospective non-comparative clinical study.Penetrating canaloplasty was performed on 112 eyes from 112 patients with GS-ICE and medically uncontrolled intraocular pressure (IOP) between January 2018 and February 2024. Patients were followed up at 1 week, 1, 3, 6, 12 months postoperatively, and semiannually thereafter. The IOP, anti-glaucoma medication, and surgery-related complications, endothelial cell density (ECD), best corrected visual acuity (BCVA) were recorded. Main surgical success was defined as 6mmHg ≤ IOP ≤ 21 mmHg without (complete success) or with/without (qualified success) glaucoma medications.

Results
A total of 91 eyes (81.3%) had 360° catheterization and successfully received penetrating canaloplasty without or with RMI technique. In total of 91 eyes, 73.4% eyes achieved qualified success with 6mmHg ≤ IOP ≤ 21 mmHg and 61.5% eyes achieved complete success with 6mmHg≤ IOP ≤21 mmHg at 36 months after surgery. The mean IOP decreased from 36.4±11.7mmHg on 3.0±0.9 medications to 16.1±4.0mmHg on 0.4±1.0 medications at 36 months (all P<0.0001). The median of BCVA (LogMar) increased from 0.4 (0.1,1.0) to 0.15 (0.01,0.30) at the last follow -up time with 24.0 (12.0,42.25) months (P=0.0182). The ECD decreased from 1432 (1071,1779) to 1222 (866,1899) after a follow up of 24.0 (12.0,42.8) months (P=0.6379). Transient IOP elevation (36.3%) and hyphema (30.8%) were the most complications. No late complications were observed.

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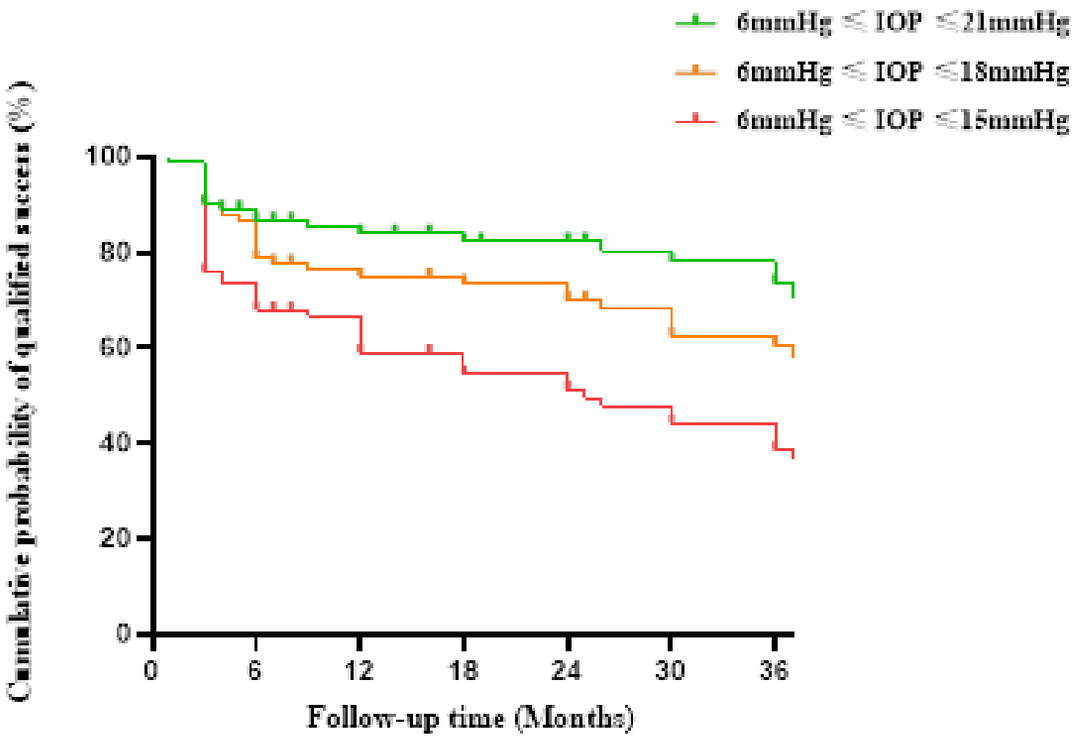

Conclusions

Penetrating canaloplasty has a quite steady and high surgical success in the treatment of GS-ICE patients at 36 months. It can be a promising glaucoma surgery for GS-ICE patients with long -term good IOP and medications.

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P-PW-0749

TREATMENT MODALITIES AND TRENDS FOR HOSPITALIZED PATIENTS WITH NEOVASCULAR GLAUCOMA: A RETROSPECTIVE STUDY OF 10 YEARS

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Background

With the development of anti-VEGF agents[1] and cyclodestructive procedures[2], there are increasingly more treatment options available for NVG patients. Moreover, due to urbanization, economic growth and an aging population, the disease spectrum of NVG may have changed. Both phenomena can induce sudden changes in the choice of primary treatment modality. To date, there has been a lack of comprehensive longitudinal studies analyzing the evolving trends in NVG treatment methodologies over consecutive years. Consequently, we undertook a retrospective analysis to address this gap in the literature.

Methods

This study retrospectively included inpatients diagnosed with NVG and receiving NVG-related treatment at Zhongshan Ophthalmic Centre, Sun Yat-sen University, between January 1, 2012, and December 31, 2021. The diagnosis of NVG was based on neovascularization in the iris and/or anterior chamber angle, identified through slit-lamp biomicroscopy and gonioscopy.[3,4] Two trained professionals collected detailed data, including age, sex, affected eye, best-corrected visual acuity (BCVA), IOP, clinical stage, etiology and treatment modality. Statistical analyses were performed by SPSS 26 (IBM Corporation, Chicago, USA) and Joinpoint Regression Program version 4.5 (Statistical Research and Applications Branch, National Cancer Institute, Bethesda, MD). Figures were constructed in GraphPad Prism version 9.1.1 (225).

Results

This study included 1331 inpatient cases of NVG, with 66.94% male patients, 96.09% cases affecting a single eye, and 92.63% cases in the angle-closure stage. Over time, we observed a progressive annual increase in the volume of surgeries for NVG, with an annual percentage change (APC) of 11.59% (95% CI=6.6-16.9%, P=0.001), and the three most prevalent surgical procedures included drainage valve implantation (46.88%), cyclodestructive procedures (22.55%), and trabeculectomy (6.24%). The frequency of drainage valve implantation (APC=6.59%, 95% CI=0.9-12.6%, P=0.028), cyclodestructive procedures (APC=17.26%, 95% CI=9.3-25.8%, P=0.001) and trabeculectomy (APC=21.93%, 95% CI=1.6-46.3%, P=0.036) increased. The proportion of drainage valve implantation gradually decreased (APC=-4.48%, 95% CI=-8.6 to -0.2%, P=0.042), while that of cyclodestructive procedures increased (APC=5.08%, 95% CI=0.6-9.8%, P=0.042), with no significant alteration observed in the proportion of trabeculectomy (APC=9.26%, 95% CI=-8.8 to 30.9%, P=0.290).

Conclusions

During the study period, both the cases of NVG and the volume of related surgeries escalated year by year. Among the three most frequently employed procedures—drainage valve implantation, cyclodestructive procedures, and trabeculectomy—annual frequency trends revealed an increase in drainage valve implantation alongside a decreasing proportion, while cyclodestructive procedures exhibited a rising trend in both frequency and proportion; simultaneously, trabeculectomy showed an increasing frequency without a significant change in its proportion.

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P-PW-0750

ANTI-VEGF AUGMENTATION ENHANCES TRABECULECTOMY OUTCOMES IN GLAUCOMA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background
Trabeculectomy remains the cornerstone surgical intervention for glaucoma management. Despite decades of technical advancements, outcomes remain variable and are frequently compromised by postoperative scarring and fibrosis. Anti-vascular endothelial growth factor (anti-VEGF) agents have gained attention as potential adjunctive therapies, targeting these fibrotic processes to optimize surgical efficacy. A systematic review and meta-analysis was completed to establish the effectiveness of anti-VEGF agents when used in conjunction with standard anti-scarring treatments, specifically examining their impact on surgical success rates, intraocular pressure (IOP) reduction, and the need for IOP-lowering medications.

Methods
A systematic search was conducted across Medline, EMBASE, and Web of Science for randomized controlled trials (RCTs) comparing trabeculectomy with or without anti-VEGF agents. Nineteen RCTs involving 1,049 patients met the inclusion criteria. Primary outcomes included complete and qualified success rates (as defined by the World Glaucoma Association reporting guidelines), mean IOP reduction, and reduction in IOP-lowering medications at 6, 12, and 24 months. Data was pooled and analysed using Review Manager (version 5.4). Risk of bias was assessed using the Cochrane Risk of Bias 2.0 tool.

Results
At 12 months, trabeculectomy augmented with anti-VEGF, particularly intracameral or intravitreal bevacizumab (1.25 mg), showed significantly improved odds of complete success compared to controls (OR = 1.47, p = 0.04). While mean IOP reduction at 6 and 12 months did not differ significantly between groups, the combination of anti-VEGF and mitomycin C significantly reduced dependency on IOP-lowering medications at 12 months (Mean Difference (MD) = 0.34, p = 0.008). Subgroup analysis demonstrated superior outcomes with intracameral or intravitreal administration routes compared to subconjunctival delivery. Bevacizumab at 1.25 mg was associated with better surgical success rates, whereas higher doses or alternative delivery routes yielded less consistent results.

Conclusions
Anti-VEGF agents, notably 1.25 mg intracameral bevacizumab, improve trabeculectomy outcomes when combined with mitomycin C, enhancing success rates and reducing medication dependence at 12 months. These findings highlight the potential of anti-VEGF therapy as a valuable adjunct in glaucoma surgery. However, further studies are required to standardise dosing protocols and assess long-term efficacy and safety.

P-PW-0751

10-YEAR EFFICACY AND SAFETY OF ITRACK AB-INTERNO CANALOPLASTY IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background

To evaluate the long-term effectiveness of iTrack (Nova Eye, Inc., Fremont, USA) ab-interno canaloplasty in reducing intraocular pressure (IOP) and glaucoma medications in patients with primary open-angle (POAG) and pseudoexfoliative (PEX) glaucoma.

Methods

In this retrospective monocentric consecutive case series, eyes were treated with ab-interno canaloplasty performed as a standalone procedure or combined with cataract surgery and followed for up to 10 years (no medications washout). The iTrack was used to circumferentially catheterize and viscodilate Schlemm's canal over 360°. Primary efficacy endpoints included intraocular pressure (IOP) and number of glaucoma medications. Timepoints were baseline and the latest postoperative observation.

Results

Twenty-seven eyes of 22 patients, with a mean age of 76.9±6.28 years were recruited and followed up for up to 10 years (mean follow up: 6 years). Mean IOP significantly decreased from 19.9±5.2 mmHg at baseline to 14.9±3.9 mmHg at the latest follow-up ($p<0.001$); the mean number of glaucoma medications also significantly reduced from 1.9±1 at baseline to 1±1.1 ($p=0.006$); the mean mean deviation remained stable from -8.14±6.93 dB (n=22) to -7.17±7.45 (n=21) ($p=0.623$). Four eyes were followed for 10 years, with IOP reduced from 20±4.1 mmHg to 14.5±2.1 mmHg, while medication use remained stable at 2. Four eyes were operated as a standalone procedure: they showed reductions in IOP from 23.5±9.3 mmHg to 18.5±8.7 mmHg, and in medication use from 2±0.8 to 1±0.8 over a mean follow-up of 6 years. Two eyes required additional glaucoma surgery (ab-externo canaloplasty and iStent), with their latest results prior to further surgery included in the analysis. No serious complications were reported.

Conclusions

iTrack ab-interno canaloplasty, performed either as a standalone procedure or in combination with cataract surgery, significantly reduced IOP and medication use in patients with POAG for up to 6 years. Sustained IOP reduction was observed up to 10 years postoperatively. To the authors' knowledge, this represents the longest follow-up for ab-interno canaloplasty reported in the literature.

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P-PW-0752

INVESTIGATION OF CASES WITH DIFFICULTY IN INSERTING PRESERFLO® MICROSHUNT

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Background
The PRESERFLO® MicroShunt (PMS) is one of the minimally invasive glaucoma surgery (MIGS) device in filtering surgeries. Successful insertion of PMS requires scleral penetration, which varies in difficulty since the closer insert to the cornea causes the endothelial damage. This study retrospectively examines factors affecting PMS insertion and evaluates surgical outcomes, including intraocular pressure (IOP) reduction and complications.

Methods
This study analyzed 109 eyes that underwent PMS implantation between August 2022 and July 2023 at Baptist Eye Clinic, Nagaokakyo, and affiliates. Criteria for repeat penetration are; 1) failure to reach the anterior chamber (AC) despite scleral penetration up to 4.5 mm, 2) contact with the iris during penetration, and 3) inappropriate tube length or direction within the AC, including insufficient distance from the iris or cornea. Patients were categorized into two groups; single-penetration (SP) and multiple-penetration (MP). Factors analyzed included gender, operated eye, glaucoma type, prior intraocular surgery, presence of deepening of the upper eyelid sulcus (DUES), single vs combined cataract surgery, insertion site, surgical period (first vs second half), pre- and postoperative IOP until one year, and complications. Statistical analyses were performed using the chi-squared, Mann-Whitney U, and paired t-test, with significance set at $p < 0.05$.

Results
Approximately 24.8% (27/109) of cases required multiple penetration attempts. Postoperative IOP until one year significantly decreased in both groups compared to preoperative levels, but there was no significant difference between the two groups. Additionally, complications, such as shallow anterior chamber, hyphema, choroidal detachment, and corneal endothelial decompensation, showed no significant correlation with the number of penetration attempts, either overall or for individual complications. Among the analyzed factors, only the presence of DUES showed a significant association with multiple penetration attempts, with a higher prevalence in the MP group compared to the SP group (OR: 0.28, [0.099-0.808], $p = 0.009$).

Conclusions
DUES increases the need for multiple scleral penetration attempts during PMS implantation but does not affect IOP reduction or complication rates. These findings suggest that PMS is effective and safe even in eyes with DUES, although careful preoperative evaluation and surgical technique adjustments are recommended.

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P-0753

COMPARISON OF 360 DEGREE GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY VS 180 DEGREE TANITO MICROHOOK TRABECULOTOMY WITH PHACO IN OPEN ANGLE GLAUCOMA

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Background
In recent years, there has been a notable shift towards MIGS. The adoption is driven by its minimally invasive nature and minimal complications. Tanito microhook ab interno trabeculotomy employs a reusable specially designed hook to incise the trabecular meshwork,which has been shown to effectively reduce intraocular pressure.Gonioscopy Assisted Transluminal Trabeculotomy using 5-0 prolene is a cost-effective technique that involves an ab interno trabeculotomy approach to circumnavigate 360 degrees of Schlemm's canal.Both techniques are device-independent and cost-effective.While some research has shown varying efficacy in IOP reduction based on the extent of trabeculotomy, other studies have found no such differences.In our study, we present a comparative analysis of the efficacy and safety of 360-degree GATT and 180-degree TMH combined with cataract surgery prospectively.

Methods
Prospective, comparative, interventional study.Patients with Primary open-angle glaucoma or pseudoexfoliation glaucoma with visually significant cataracts were included.Angle closure, uveitic glaucoma, traumatic glaucoma,retinal pathologies and monocular patients were excluded.Group 1(N=55)underwent Phaco-GATT and Group 2-N=55 underwent Phaco-TMH and the patients were followed up for 12 months. Outcome measures included changes in intraocular pressure (IOP), antiglaucoma medications (AGM), and best-corrected visual acuity (BCVA). Success was defined as at least 20%/25%/30% IOP reduction and IOP <21/18/15 mm Hg(Criteria 1, 2,3). Additionally, interventions and complications were compared between the groups.

Results
55 eyes of 50 patients were included in group 1 and 55 eyes of 51 patients were included in group 2. In Group 1, mean IOP reduced significantly from 26.55± 5.22mmHg to 12.45±3.59 mmHg ,and in Group 2 from25.45±5.65mmHg to 12.80±3.12mmHg at 12 months($p<0.001$), with no significant difference between the groups($p=0.736$).The percentage reduction of IOP in Group 1 was 51.5%and Group 2 was 47.7%.AGM significantly reduced from 1.36±0.65 to 0.31±0.57 and 1.64±0.73 to 0.09±0.29 in Group 1 and 2 respectively($p<0.001$), with significantly lesser requirement of AGM in Group 2($p=0.022$). The cumulative probability of overall success with a 95% confidence interval was 94.6%,85.5%, and 67.3% in Group 1, and 98.2%,98.2%, and 92.7% in Group 2(Criteria 1,2,3 respectively) at 12 months. There was a significant difference between groups, with Group 2 (Phaco-GATT) having better surgical success using stringent criteria 2 and 3($p=0.016$,$p=0.001$). Hyphema was seen in 1 patient in Group 1, 7 patients in Group 2, and two patients in Group 2 required anterior chamber wash.

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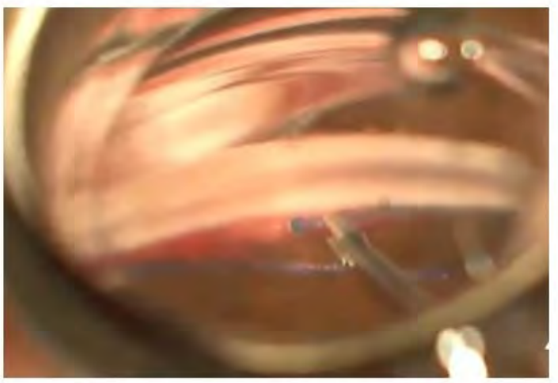
Tanito Microhook Trabeculotomy



Gonioscopy assisted Transluminal Trabeculotomy

Conclusions

Tanito microhook trabeculotomy with Phacoemulsification is safe, efficacious, and comparable to 360 degree GATT combined with phacoemulsification. Phaco-GATT fared better in terms of antiglaucoma medication reduction and surgical success.

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P-0754

TRABECULECTOMY IN THE 21ST CENTURY: SAFETY, EFFICACY AND POST-OPERATIVE BURDEN OVER 24 MONTHS AT A TERTIARY REFERRAL CENTRE

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Background: Trabeculectomy remains the gold-standard incisional glaucoma surgery. Prior studies have only assessed surgical outcomes for open angle glaucoma. Minimally invasive techniques have been purported to reduce post-operative visits and the overall burden on the health care system. We aimed to characterise the burden of post-operative care and surgical outcomes for all patients undergoing trabeculectomy and phaco-trabeculectomy in a public tertiary referral glaucoma unit.

Methods: Retrospective review of procedures performed in a single centre over a two-year period (2019-2020) with 24-months post-intervention follow-up. Success was defined according to World Glaucoma Association guidelines. Patients with failure but incomplete follow up were included in success analysis at 24-months.

Results: A total of 289 surgeries (257 patients) were performed, including 234 trabeculectomies and 55 phaco-trabeculectomies. Pre-operative diagnoses varied substantially, including primary open angle glaucoma (46%) and primary angle closure glaucoma (17%). Phaco-trabeculectomy patients required more post-operative appointments (14.7 ± 5.6) in the first 12-months than trabeculectomy patients (12.9 ± 5.2, p=0.049). At 24-months there was no significant difference between the phaco-trabeculectomy (19.7 ± 7.2) and trabeculectomy (17.8 ± 8.2, p=0.19) groups. Anti-metabolite injections were administered in clinic to 144 (74%) of trabeculectomy patients (mean 1.9 ± 1.9 injections) and 37 (88%) of phaco-trabeculectomy patients (2.5 ± 1.7 injections). Comparative survival at 24 months was similar for trabeculectomy (75%, 95%%CI=70-81) and phacotrabeculectomy (79%, 95%CI=70-92), as demonstrated by Kaplan Meier analysis (p=0.65). At 24 months, IOP was lower in patients following trabeculectomy (10.9 ± 3.7) compared to phaco-trabeculectomy (13.6 ± 4.3, p=0.0008). Mean Snellen LogMAR acuity was 0.33 ± 0.43 at 24 months post-trabeculectomy, a decline of 1 Snellen line from baseline (p=0.0002). Post operative complications occurred more commonly in trabeculectomy patients (n=85, 36%) than phaco-trabeculectomy patients (n=10, 18%, p=0.01). Return to theatre was required in 72 (25%) patients.

Conclusions: Trabeculectomy and phaco-trabeculectomy performed at a tertiary referral teaching centre have complex case mixes. To our knowledge, this is the first study assessing the post-operative burden of these procedures to the health system.

P-0755

MANAGEMENT OF REFRACTORY TRAUMATIC GLAUCOMA WITH AHMED OR PAUL GLAUCOMA IMPLANTS IN A NATIONAL REFERRAL CENTER

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Background

Traumatic glaucoma is a secondary glaucoma resulting from severe ocular injuries. It arises through mechanisms such as hyphema, lens trauma, and trabecular meshwork damage. Early-onset cases often resolve with medical therapy, but late-onset glaucoma, commonly associated with angle recession or synechial closure, usually requires surgical intervention. Trabeculectomy carries a high risk of failure in these patients, particularly due to factors like lens and conjunctival status or prior trauma. Tube shunt implantation has emerged as a viable alternative, offering effective intraocular pressure (IOP) control while reducing the risks associated with trabeculectomy. Ahmed and Paul glaucoma implants are widely used, but their comparative efficacy in managing traumatic glaucoma remains unclear.

Methods

A retrospective review was conducted on patients with refractory traumatic glaucoma who underwent Ahmed or Paul tube implantation between 2021 and june 2024 at the Ocular Trauma Unit, Hospital del Salvador, Santiago, Chile. Surgical outcomes, including intraocular pressure control and reduction in medication use, were assessed. Additional variables analyzed included age, sex, trauma mechanism, previous surgeries, and follow-up duration.

Results

A total of 47 eyes were included, with 22 receiving Ahmed implants and 25 receiving Paul implants. Baseline characteristics, including age (44.5 ± 10.3 years vs. 44.3 ± 9.7 years, p = 0.96) and trauma mechanism (77% blunt vs. 72% blunt, p = 0.68), were similar. Ahmed patients averaged 2.67 previous surgeries, while Paul patients averaged 2.33 (p = 0.45). Preoperative IOP was higher in the Ahmed group (30.77 mmHg) compared to the Paul group (25.12 mmHg), but this difference was not statistically significant (p = 0.07). Preoperative glaucoma medication was similar (Ahmed: 4.86; Paul: 4.80; p = 0.68). The mean follow-up was longer for the Ahmed group (427.5 days) than for the Paul group (376.7 days; p = 0.34).

At one week, one month, and three months postoperatively, mean IOP and medication use showed no significant differences between groups. However at six months, the Paul group had significantly lower IOP (12.5 ± 0.82 mmHg vs. 16.07 ± 1.29 mmHg, p < 0.05) and required fewer medications (1.5 ± 0.82 vs. 2.69 ± 1.02, p < 0.05). Hypotonic maculopathy occurred in one patient in the Ahmed group and two in the Paul group. Reinterventions for uncontrolled IOP were more frequent in the Ahmed group (3 vs. 1, p = 0.12).

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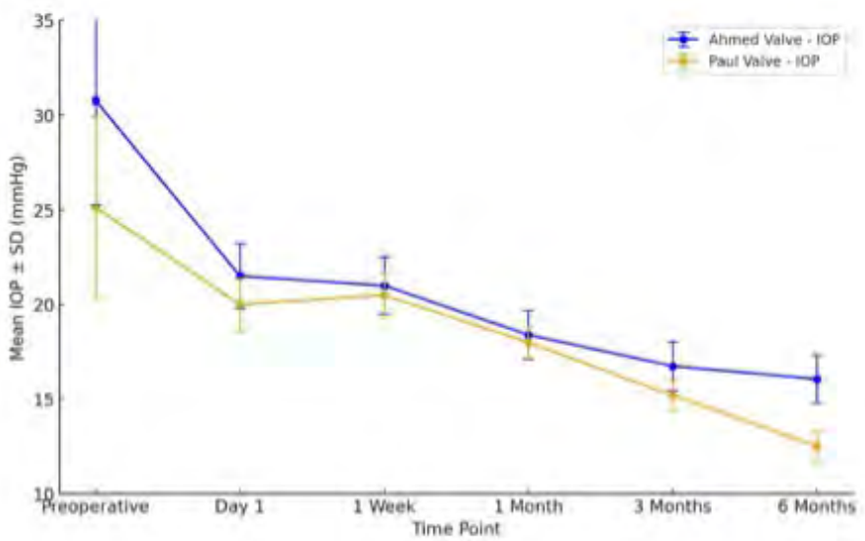

Conclusions

Ahmed and Paul glaucoma implants effectively manage refractory traumatic glaucoma, but in our study the Paul implant showed superior outcomes in IOP control and medication reduction by six months. As we know, this is the first study to compare Ahmed and Paul implants in traumatic glaucoma, providing valuable insights for surgical decision-making in this condition.

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P-0756

A COMPARATIVE RETROSPECTIVE ANALYSIS ASSESSING THE EFFICACY AND SAFETY OF TRABECULECTOMY COMBINED WITH MITOMYCIN C, WITH AND WITHOUT THE OLOGEN

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Background

To compare the efficacy and safety of trabeculectomy with mitomycin C, with and without using the Ologen. Design: It is a retrospective multicenter study with records of patients scheduled for glaucoma surgery.

Methods

The authors followed 365 eyes from 277 patients who completed a one-year follow-up and submitted to surgery either with or without using Ologen. A five-year review of patient records, including one- year follow-up data.

Results

Trabeculectomy with mitomycin, with or without the use of Ologen is effective in lowering IOP and reducing the number of eyedrops during the study period of one-year follow-up. The need for suture lysis after trabeculectomy is lower in the Ologen group, and hypotony is the main complication in 16.44% of the eyes.

Conclusions

Using the Ologen in the trabeculectomy did not add any advantage except for reducing the need for lysis sutures after the surgery. Both groups showed similar efficacy in decreasing the IOP and the need for eyedrops in glaucoma patients with the same safety profile.

Methods

Study Design and population: This retrospective multicenter study compares the one-year results of eyes undergoing trabeculectomy mitomycin with or without Ologen from 2017 to 2022. One group underwent MMC trabeculetomy with and without Ologen, following the same steps as the standard procedure. The Ologen implanted in all cases was the 10x2 mm model.

Results

The authors followed 365 eyes who completed a one-year follow-up. A five-year review of patient records, 212 eyes underwent trabeculectomy MMC, while 153 trabeculectomy with Ologen. The final mean intraocular pressure (IOP) in the No Ologen group was 11.57 ± 4.52 mmHg, whereas the Ologen group exhibited a mean IOP of 10.90 ± 3.80 mmHg and the difference was not statistically significant (p=0.07). The complete success (without the use of medications) was observed in 73.42% of the whole sample, being achieved in 78.43% in the Ologen group (p = 0.42) Qualified success, (with or without the use of glaucoma medi-

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cations) was observed in 83.29% of cases, with 85.62% in the Ologen group (p = 0.31). The survival curve for the IOP reduction ≥ 20% criterion indicates similar outcomes in the Ologen group, compared to no Ologen group, Figure 1. A high number of eyes free from medication at the end of the study was observed in our data, which brings these complete and qualified success curves closer together. Suture lysis was performed more frequently in the No Ologen group (129 eyes, 60.85%) compared to the Ologen group (75 eyes, 49.02%), with a statistically significant difference (p = 0.025). Hypotony occurred in 18.30% of cases in the Ologen group and 15.09% in the No Ologen group (p = 0.42).

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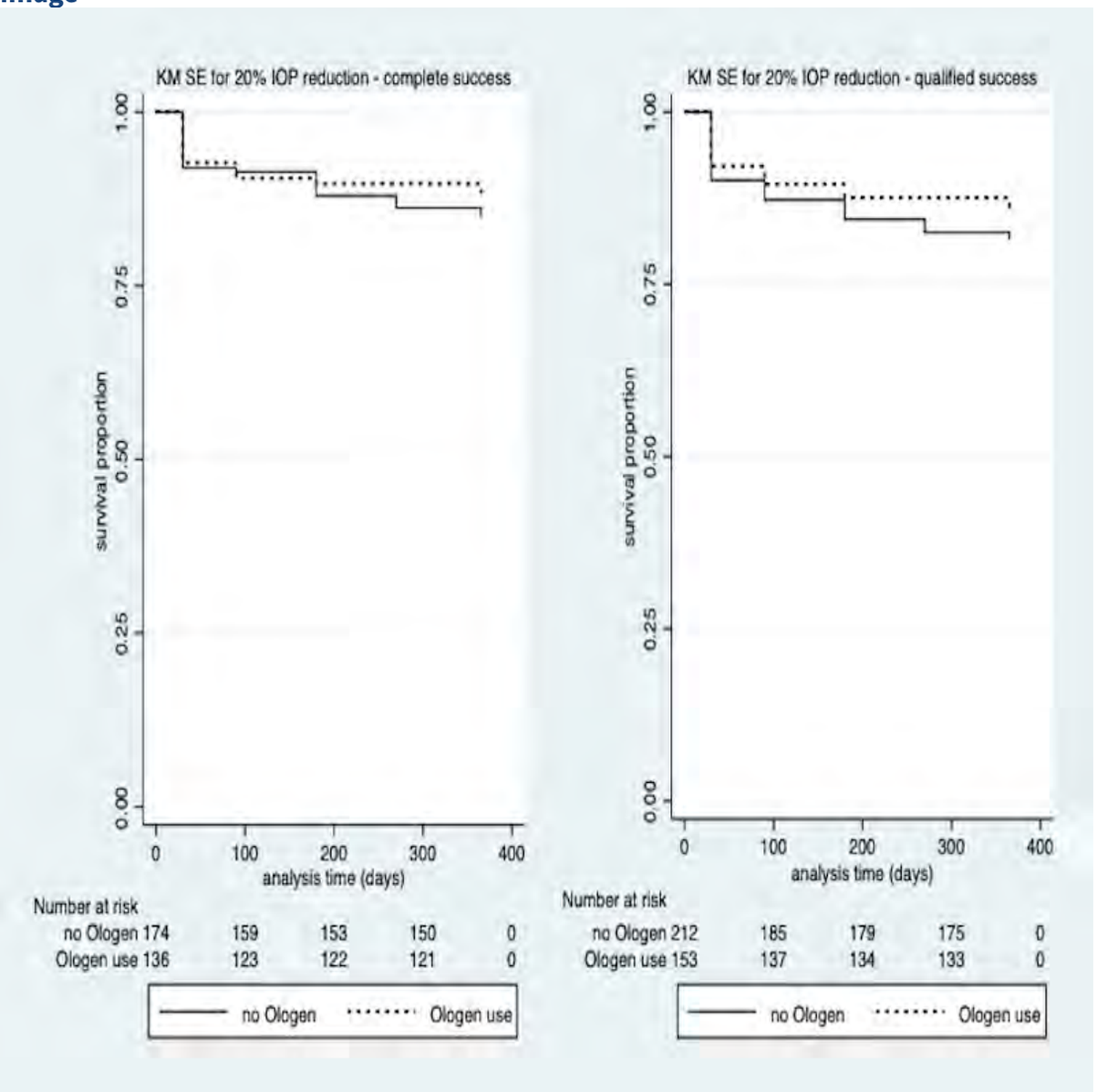

Conclusions

Using the Ologen in the trabeculectomy did not add any advantage except for reducing the need for lysis sutures after the surgery. Both groups showed similar efficacy in decreasing the IOP and the need for eyedrops in glaucoma patients with the same safety profile.

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P-0757

GEL STENT 63 AND MICROSHUNT IN THE SURGICAL MANAGEMENT OF GLAUCOMA: A PROSPECTIVE 18-MONTH FOLLOW-UP STUDY

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Background
Minimally invasive bleb surgery has been developed to reduce complications associated with traditional glaucoma surgery. Limited scientific evidence directly comparing the XEN® 63 Gel Stent (Gel Stent) and the PRESERFLO™ MicroShunt (MicroShunt). The aim of the study is to evaluate the efficacy, safety, and 18-month success rates of the Gel Stent versus the MicroShunt.

Methods
This prospective, non-randomized, single-center study included glaucoma patients who underwent surgery between January 2023 and May 2023. All surgeries were performed by the same surgeon and both procedures were augmented with Mitomycin C (MMC). For the Gel Stent, a 0.1 ml subconjunctival injection of 0.2 mg/ml MMC was used, while for the MicroShunt, two cellulose sponges soaked in 0.4 mg/ml MMC were applied for 3 minutes. Follow-up visits were conducted at 1 day, 1 week, 1, 3, 6, 12 and 18 months postoperatively. Complete success was defined as an intraocular pressure (IOP) between 5-18 mmHg, achieved in two consecutive follow-up visits without the need for medications, whereas qualified success was defined as achieving the same IOP range with or without the use of medications.

Results
A total of 49 patients received the Gel Stent (Group A), while 47 patients underwent MicroShunt implantation (Group B). Baseline characteristics were similar between the two groups, except for a higher number of phakic patients in the Group A (p=0.02). Both devices demonstrated significant reductions in IOP and the need for topical hypotensive medications at the 18-month follow-up. Group A experienced a lowering in IOP from 20.7 ± 3.8 mmHg to 13.5 ± 3.1 mmHg (p<0.01), while Group B showed a lowering from 21.7 ± 4.3 mmHg to 12.8 ± 2.1 mmHg (p<0.01). The reduction in IOP was comparable between the two groups at all follow-up points except for the first day and first week, where the MicroShunt achieved a slightly greater reduction. Both devices significantly reduced the need for hypotensive medications, from 2.5 ± 1.0 to 0.6 ± 0.8 in Group A, and from 2.7 ± 1.0 to 0.7 ± 1.0 in Group B. The complete success rate 18 months after surgery was 61.2% for the Gel Stent and 53.2% for the MicroShunt, while the qualified success rate was 87.8% and 85.1%, respectively. Post-operative needling of the bleb was more frequent in the Gel Stent group (16 cases) compared to the MicroShunt group (1 case), while bleb revisions were more common after MicroShunt implantation (10 versus 5 cases). Complications were comparable and self-limiting in both groups. No significant differences were observed in the rate of subsequent glaucoma surgeries between the two groups.

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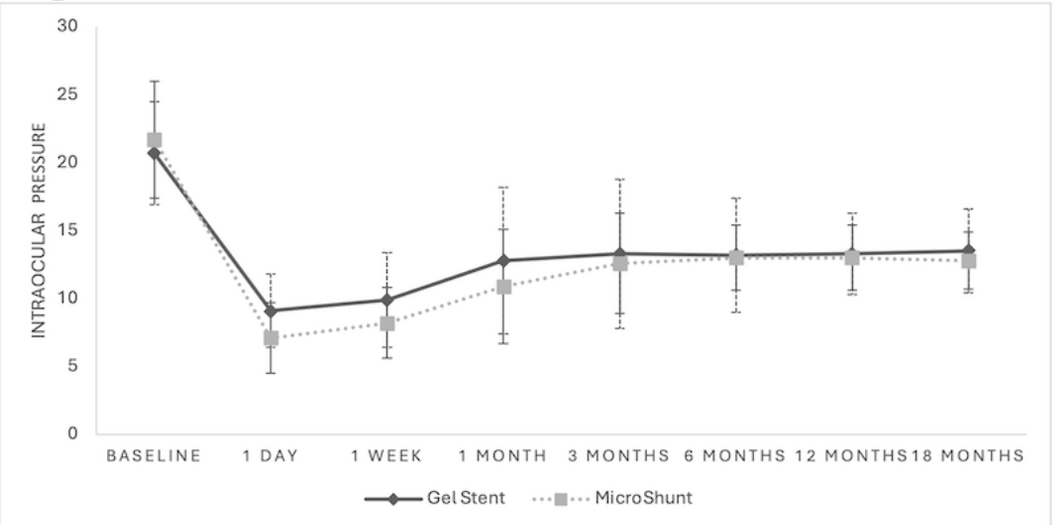

Conclusions

Both the XEN® 63 Gel Stent and PRESERFLO™ MicroShunt are safe and effective in lowering IOP and reducing the use of hypotensive medications in glaucoma patients over an 18-month follow-up period.

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P-0758

OUTCOMES OF GATT VERSUS CONVENTIONAL TRABECULOTOMY IN PRIMARY CONGENITAL GLAUCOMA TREATMENT: A RETROSPECTIVE STUDY

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Background

Primary Congenital Glaucoma (PCG) is a leading cause of childhood blindness. The preferred treatment is trabeculotomy (TRO) via the ab externo approach, but GATT, an ab interno technique, preserves the conjunctiva and can be a first-line treatment. This study aims to compare the effectiveness of GATT with conventional trabeculotomy and evaluate the epidemiological and clinical profiles of PCG patients treated at reference centers in Brazil.

Methods

This retrospective multicenter study compared 1-year outcomes of GATT versus conventional TRO in PCG patients at seven specialized centers in Brazil. Eligible eyes underwent either procedure at the surgeon's discretion. Primary outcomes were a ≥20% reduction in intraocular pressure (IOP) and maintaining IOP between 6 and 21 mmHg. Follow-up data included tonometry, corneal diameter measurement, visualization of Haab's striae, gonioscopy, biometry, and retinal examination.

Results

A total of 87 eyes were analyzed: 17 in the GATT group and 70 in the TRO group, with 65 bilateral cases (7 in GATT, 58 in TRO). Mean follow-up was 350.69 ± 9.31 days, and mean age was 26 ± 42.19 months. The mean preoperative IOP was 26.10 ± 4.92 mmHg. The GATT group used more preoperative medications (3.06 ± 0.75) than the TRO group (1.30 ± 1.03, $p < 0.0001$). IOP reductions were similar between groups: 13.80 ± 7.19 mmHg for GATT and 12.76 ± 5.28 mmHg for TRO ($p = 0.25$). At 1-year follow-up, IOP was lower in the GATT group (11.87 ± 2.74 mmHg) compared to TRO (13.27 ± 2.82 mmHg, $p = 0.034$). No permanent vision-threatening complications occurred in either group. Survival curves showed slight visual differences, but no statistically significant differences in success categories (complete and qualified). Among reoperations, trabeculectomy was most common in the TRO group (11.43%), with no reoperations in the GATT group. The cumulative probability of qualified success (≥20% IOP reduction) was 100% in the GATT group for both complete and qualified success. In the TRO group, these probabilities were 90% and 91.3%, respectively.

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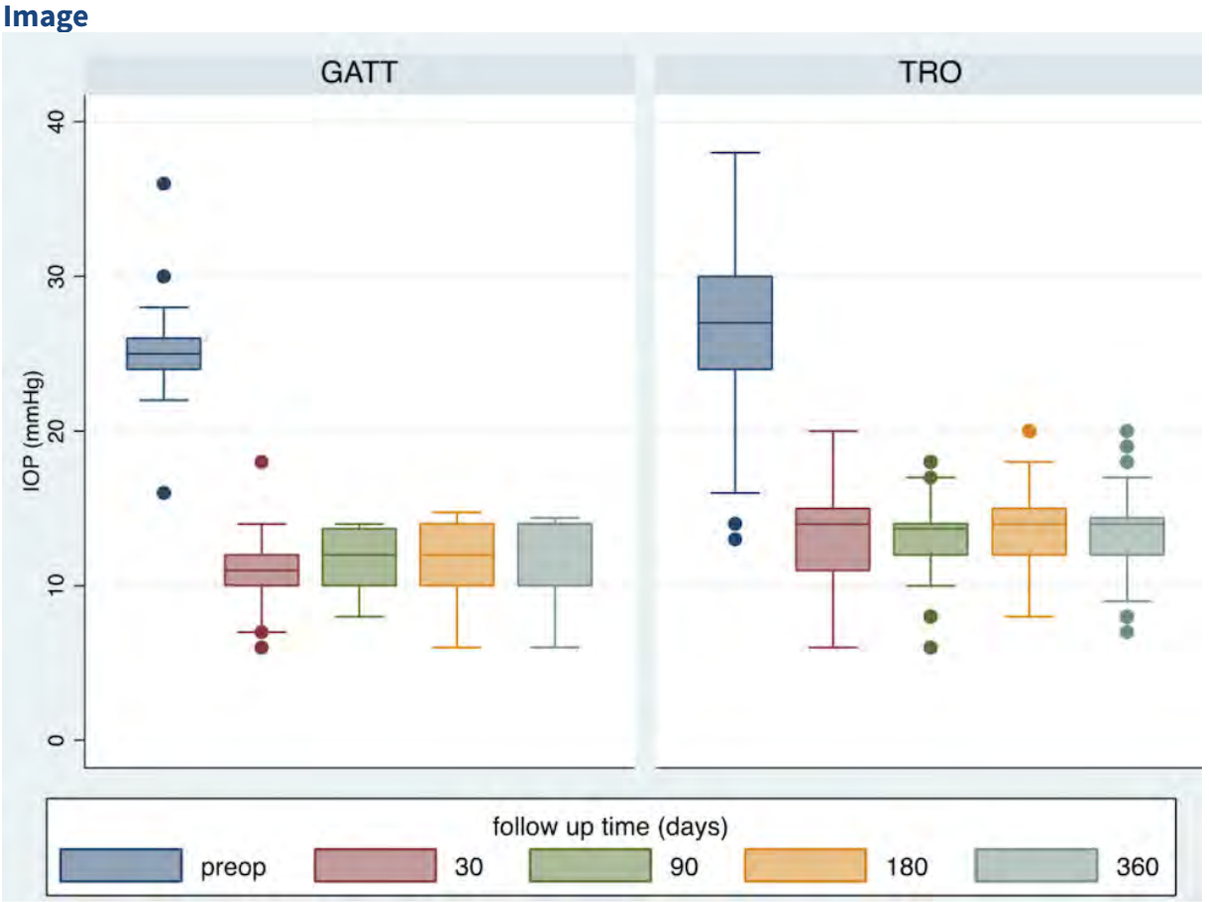

Conclusions

Both GATT and TRO effectively reduced IOP. GATT's lower final IOP and clearer corneas suggest a better prognosis, likely due to less advanced disease. The broader angle treatment in GATT (compared to the 100-120 degrees addressed by TRO) offers an advantage. GATT also reduced medication dependency, as seen in previous studies. Both techniques were safe without permanent vision-threatening complications, though 11.43% of the TRO group required additional surgery, reflecting more severe disease. The TRO group's younger age and greater severity suggest a need for earlier intervention. Delayed treatment, likely due to limited access to specialized glaucoma centers in Brazil, probably contributed to more advanced disease.

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P-0760

COMBINED TRABECULOTOMY-NON-PENETRATING DEEP SCLERECTOMY FOR GLAUCOMA IN STURGE-WEBER SYNDROME

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Background
The aim of the study was to evaluate the efficacy and safety of combined trabeculotomy-non-penetrating deep sclerectomy (CTNS) in the treatment of Sturge-Weber syndrome (SWS) secondary glaucoma.

Methods
This retrospective study reviewed cases that underwent CTNS as initial surgery for SWS secondary glaucoma at our Ophthalmology Department center from April 2019 to August 2020. Surgical success was defined as an intraocular pressure (IOP) ≤ 21 mm Hg with (qualified success) or without (complete success) the use of anti-glaucoma medications. IOP >21 mm Hg or <5 mm Hg despite 3 or more applications of anti-glaucoma medications on 2 consecutive follow-up visits or at the last follow-up, performance of additional glaucoma (IOP-lowering) surgery, or with vision-threatening complications were classified as failure.

Results
A total of 22 eyes of 21 patients were included. Twenty-one eyes were of early-onset type and 1 eye was of adulthood onset. For Kaplan-Meier survival analysis, the overall success rates at 1st and 2nd years were 95.2% and 84.9%, while the complete success rates at 1st and 2nd years were 42.9% and 36.7%. At the last follow-up (22.3 ± 4.0 months, range: 11.2~31.2), overall success was achieved in 19 (85.7%) eyes and complete success in 12 (52.4%) eyes. Postoperative complications included transient hyphema (11/22, 50.0%) and transient 1 degree shallow anterior chamber (1/22, 4.5%), and retinal detachment (1/22, 4.5%). No other severe com plications were detected during the follow-up.

Conclusions
CTNS significantly reduces IOP in SWS secondary glaucoma patients who have serious episcleral vascular malformation. CTNS in SWS secondary glaucoma patients is safe and effective for short and medium periods. A randomized controlled study comparing the long-term prognosis of SWS early-onset and late-onset glaucoma underwent CTNS is worth conducting.

P-0761

SAFETY OF SURGICAL IMPLANTATION AND POSTOPERATIVE TITRATION OF A NOVEL LASER-ADJUSTABLE GLAUCOMA DRAINAGE DEVICE

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Background
Evaluate the early safety of implanting a novel aqueous shunt and subsequently postoperative adjusting outflow resistance.

Methods
The feasibility of implanting, and postoperatively titrating, a novel aqueous shunt (Calibreye System, Myra Vision, Campbell, CA) was assessed in 32 eyes with open-angle glaucoma with the use of Mitomycin-C (MMC). The device communicates the anterior chamber with the subconjunctival space with three flow channels, two of which are controlled by nitinol valves that can be reversibly opened or closed using a green laser mounted on the slit lamp. The device has four decreasing resistance settings of baseline, moderate, high, and maximal.

Surgeons used an ab-externo approach to open conjunctiva and sub-Tenon's space. The shunt was placed through a scleral tunnel into the AC after MMC application. The tenon and conjunctiva were closed over the shunt in a watertight fashion.

Postoperatively, laser titration was performed to decrease or increase the resistance of the aqueous humor through the shunt using green light energy from a slit lamp mounted laser.

Adverse events, and IOP changes were monitored.

Results
32 of 32 eyes were successfully implanted with the novel shunt by 5 different surgeons. No intraprocedural adverse events were reported.

31 of the 32 eyes implanted with the shunt were successfully titrated by 6 different operators. One eye did not require a resistance adjustment and remained at baseline level. In the remaining 31 eyes the first titration occurred on average 6.4 (range 1-30, median 3) days post-operatively. As resistance is reversible, some eyes were titrated multiple times. In totality, going from baseline to moderate setting adjustment resulted in mean IOP reduction of 3.6 mmHg (n=27, SD 1.7 mmHg) and a baseline to high setting adjustment resulted in mean IOP reduction of 4.2 mmHg (n=5, SD 1.5 mmHg). The IOP measurements were taken at least 30 minutes post-titration. No adverse outcomes were reported related to the titration laser procedure.

Conclusions

The surgical implantation and subsequent resistance adjustment of a laser titratable glaucoma drainage device has been demonstrated with an encouraging safety profile. The ability to implant a postoperatively adjustable outflow resistance shunt offers a promising approach to personalized patient care in glaucoma management.

P-0762

CAPSULECTOMY SHUNT REVISION IS AN IMPORTANT RISK FACTOR FOR IMPLANT EXPOSURE: SHANGHAI AGVIE (AHMED GLAUCOMA VALVE IMPLANT EXPOSURE) STUDY

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Background
Few studies have reported the risk factors for implant exposure among Asian populations. This study aimed to investigate and better understand the risk factors for implant exposure by comprehensive review of medical records.

Methods
This retrospective case-control study population comprised inpatients with diagnosis of implant exposure who underwent primary Ahmed glaucoma valve (AGV) implantation in Eye & ENT Hospital of Fudan University, fromJanuary 2016 to December 2020. Inpatients without implant exposure who accepted AGV implantation were included as control. All of the medical records of the patients who met inclusion criteria were reviewed. Baseline clinical characteristics, along with preoperative, intraoperative, and postoperative factors, were collected for both the implant exposure and control groups.

Results
A total of 164 patients (164 eyes) were included, with 41 exposures and 123 controls based on the case-to-control ratio of 1:3. The mean time of exposure was 18.22 ± 19.83 months after AGV implantation. More combined ocular surgeries were found in the implant exposure group compared with controls (P = 0.009). In both univariable and multivariable analyses with the Cox proportional-hazards regression model, the capsulectomy shunt revision (OR 3.65, 95% CI 1.20–11.09) other than the needle revision was significantly associated with the implant exposure. The cumulative probability of implant exposure was significantly higher in the capsulectomy shunt revision group (p = 0.0224).

Image

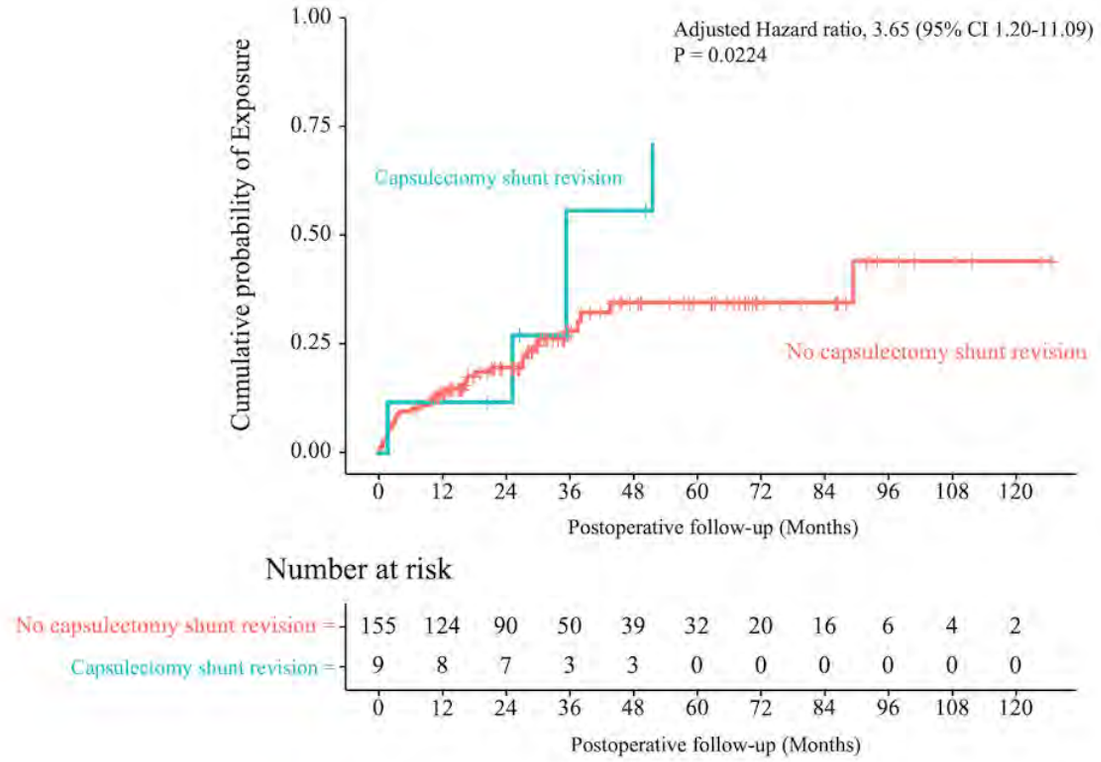

FIGURE 2. Kaplan–Meier survival curves illustrating cumulative exposure rates of initial Ahmed glaucoma valve implantation in the capsulectomy shunt revision group and the remaining 155 patients.

Conclusions

Except for combined ocular surgeries, capsulectomy shunt revision is a significant risk factor for implant exposure after initial AGV implantation in Chinese patients. Attention should be paid to if such procedures were implied.

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P-0763

PROVOCATIVE GONIOSCOPY AND AQUEOUS VEIN ASSESSMENT INDICATES OUTCOMES OF GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY

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Background
Microinvasive glaucoma surgery (MIGS) has emerged as a frequently employed surgical interveion designed to improve safety outcomes while minimizing postoperative complications and the medication burden for patients diagnosed with glaucoma. To assess the outcomes of gonioscopy-assisted transluminal trabeculotomy (GATT) through provocative gonioscopy and aqueous vein assessment in Primary Open Angle Glaucoma (POAG). One innovative MIGS, known as gonioscopy-assisted transluminal trabeculotomy (GATT), facilitates a reduction in intraocular pressure (IOP) by promoting aqueous outflow into and through Schlemm's canal (SC) without the formation of bleb and the need for device implantation. Research has domenstrated that the suceess rate of GATT in treating POAG ranges from 68% to 80%. Microcatheter-assisted channelography and episcleral venous fluid wave have been documented as methods to aid in predicting the results of GATT. However, these techniques are all invasive. The purpose of the present study was to evaluate the outflow system preoperatively through provocative gonioscopy and aqueous vein assessment in POAG and to investigate the relationship between these assessments and the outcomes of GATT.

Methods
Prospective, interventional case series. Forty-four eyes of 39 patients with POAG scheduled to receive GATT as initial surgery were recruited in this study. Provocative gonioscopy and aqueous vein assessment was performed one day before GATT. The principal outcome measures were IOP and number of medications at 12 months postoperatively. The secondary outcome measure was defined as complete surgical success, which was characterized by the absence of any further glaucoma surgical interventions, an IOP maintained within the range of 6 to 21 mmHg, and no necessity for medications aimed at lowering IOP. All statistical tests were performed using the software SPSS 20.0 (SPSS, Inc., Chicago, IL, USA), and a value of 0.05 were used for statistical calculations.

Results
In provocative gonioscopy, 5 eyes had complete blood reflux, 24 had patchy blood reflux, and 15 eyes had no blood reflux. Discernable aqueous vein was found in 43 eyes, including 25 eyes presented positive glass-rod phenomenon. 1-year postoperative, IOP and the number of topical antiglaucoma medication reduced to 14.3 ±3.6 mmHg and 0.8 ± 1.2 respectively. The complete success rate was 72.7%. multinomial logistic regression showed that the combination of provocative gonioscopy and aqueous vein assessment have significant relationship with the success rate of GATT (r=0.711, p=0.037).

Conclusions
Combination of provocative gonioscopy and aqueous vein assessment serves as a predictive method for the outcomes of GATT.

P-0764

EFFICACY AND SAFETY OF COMBINED PHACOEMULSIFICATION AND ISTENT IMPLANTATION IN PRIMARY ANGLE CLOSURE DISEASE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background
Minimally invasive glaucoma surgery has been increasing in popularity in the management of open angle glaucoma. Although considered off-label, the iStent trabecular micro-bypass series has been performed in combination with phacoemulsification in patients with primary angle-closure disease (PACD). This systematic review and meta-analysis evaluates the efficacy and safety of combined phacoemulsification and iStent (Phaco-iStent) implantation in PACD.

Methods
Medline, Embase, and CENTRAL databases were searched from inception up to August 18, 2024 for studies evaluating the efficacy of Phaco-iStent (including G1, G2, G2W) in PACD patients. A meta-analysis of single means and binary outcomes were conducted to assess clinical endpoints. Pairwise analysis of treatment outcomes was also conducted against patients undergoing standalone phacoemulsification.

Results
4 studies were included in this study, with 174 subjects and 219 eyes in the combined Phaco-iStent group, and 142 subjects and 188 eyes in the standalone phacoemulsification group. Subjects undergoing Phaco-iStent surgery had a mean age of 70.0 years (n=174) of which 42.30% (n=132) of the eyes included were from male subjects. At 12 months postoperatively, the mean difference (MD) in intraocular pressure (IOP) from baseline was -2.69 mmHg (n=219, 95%CI: -4.72 mmHg to -0.66 mmHg, p<0.001), with the mean number of IOP-lowering medications also significantly reduced (n=219, MD: -1.33, 95%CI: -1.60 to -1.06, p<0.001). When compared to standalone phacoemulsification, the 12-month mean reduction in IOP (p=0.314) and number of IOP-lowering medications (p<0.001) was greater in the Phaco-iStent group, although only reaching statistical significance in medication reduction. The most common complication was stent occlusion (n=7, 9.69%, 95%CI: 0.00% to 31.47%), followed by transient hyphema (n=17, 3.50%, 95%CI: 0.00% to 20.72%). The odds of transient hyphema was 10 times that in the Phaco-iStent group compared to standalone phacoemulsification (n=370, OR: 10.01, 95%CI: 1.24 to 81.15, p=0.031). However, the odds of postoperative IOP spikes were approximately 6 times less likely to occur in patients undergoing Phaco-iStent surgery as compared to standalone phacoemulsification (n=370, OR: 0.16, 95%CI: 0.05 to 0.52, p=0.002).

Conclusions
This meta-analysis provides quantitative evidence supporting the potential use of Phaco-iStent surgery in PACD patients. Future studies are needed to establish its comparative efficacy against standalone phacoemulsification, as well as its longer-term outcomes, before its integration into PACD treatment protocols.

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P-0765

EFFICACY AND SAFETY OF THE PRESERFLO MICROSHUNT IN EYES WITH A HISTORY OF GLAUCOMA SURGERY

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Background

This study aims to assess the efficacy and safety of Preserflo MicroShunt (PMS) in Japanese glaucoma patients with a history of prior glaucoma surgeries, categorized by the type of previous surgical intervention.

Methods

A retrospective observational study was conducted on patients who underwent mitomycin C (MMC)-augmented PMS implantation, with or without cataract surgery, from October 2022 to July 2023. All had a history of at least one glaucoma surgery. Patients were categorized into three groups: Group 1, filtration surgery; Group 2, transscleral cyclophotocoagulation (CPC); and Group 3, minimally invasive glaucoma surgery (MIGS) or laser trabeculoplasty. Primary outcomes were complete success, defined as (A) intraocular pressure (IOP) of 6–18 mmHg with ≥20% reduction from baseline without medication or additional interventions, and (B) IOP of 6–15 mmHg with the same criteria. Secondary outcomes included rates of needling, reoperation, and complications.

Results

Sixty-two eyes from 62 patients were analyzed (Group 1: n=23, Group 2: n=7, Group 3: n=32). At one year, success rates were: Group 1, 47.8% (A), 39.1% (B); Group 2, 0% (A, B); Group 3, 39.8% (A), 36.6% (B). Needling was required in 17.4% (Group 1), 57.1% (Group 2), and 37.5% (Group 3). Bleb reconstruction was performed in two cases (Group 1) and six cases (Group 3). Complications included transient hyphema and choroidal detachment, with no lasting visual impairment.

Conclusions

PMS significantly reduced IOP and medication dependency in eyes with prior glaucoma surgery at one year, with an acceptable safety profile. However, its efficacy was limited in eyes with a history of CPC. This limitation may be attributed to insufficient standardization of irradiation conditions in CPC, highlighting the need for further investigation to clarify the underlying causes and optimize outcomes.

P-0767

MICROCATHETER-ASSISTED TRABECULOTOMY COMBINED WITH DEEP SCLERECTOMY AND TRABECULECTOMY IN ADVANCED OPEN ANGLE GLAUCOMA: 3-YEAR RESULT

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Background
Open-angle glaucoma (OAG) is one of the main cause of blindness. In China, most OAG patients are already in the late stage when diagnosed, and the intraocular pressure(IOP) remains uncontrolled despite the maximum dose of medication administered. Trabeculectomy is considered one of the primary surgical treatments for OAG. However, the surgical success rates gradually decrease over time.We aimed to evaluate the safety and efficacy of multi-channel mechanism surgery, specifically ab-externo trabeculectomy combined with deep sclerectomy and trabeculectomy (MATT-DS -Trab), in the surgical treatment of advanced OAG.

Methods
49 eyes of 47 OAG cases in advanced stage who received MATT-DS-Trab were retrospectively collected and analyzed. The IOP, best corrected visual acuity(BCVA), use of anti-glaucomaous medicines, intraoperative penetration rate of Schlemm's canal, postoperative complications, surgical success rate, and the relationship between filtration channels and IOP were measured.

Results
The total intraoperative penetrational rate was 87.76% (43/49), and 26 eyes that underwent the first surgery were successfully penetrated and incised at 360°. The IOP decreased to 12.88±1.44 mmHg, 13.04 ± 1.29 mmHg and 13.10 ± 1.87 mmHg at 1, 2, and 3 years after surgery, respectively. The differences were all significant relative to preoperative IOP (all P<0.001). Cases required 4-5 kinds of anti-glaucoma medication pre-operation, and only 0-2 drugs at 1,2 and 3 years after surgery, and the numbers of lower IOP medication were significantly reduced than that used preoperatively (P<0.001). The complete success rates at 1, 2, and 3years after surgery were 97.96, 93.88 and 91.84%, respectively, according to criterion A; 97.96, 87.76, and 85.51% , respectively, according to criterion B; and 93.88, 91.84 and 87.76%, respectively, according to criterion C. The conditional success rates at 1 year were 100% for standards A and B and 95,92% for standard C. Subsequently, the conditional success rates at 2 and 3 years after surgery were 97.96 and 95.92%, respectively, according to criterion A; 95.92, and 91.84% , respectively, according to criterion B; and 93.88 and 89.80%, respectively, according to criterion C. Complications related to filtrating bleb were not measured after the operation. As shown in UBM and anterior segment photography at 1 year after surgery: (1) the IOP was 11.46±1.1mmHg in 24 eyes with filtering blebs, scleral pools, and the broken end of the Schlemm's canal; (2) the IOP was 13.92±2.73mmHg in 8 eyes with filtering blebs and the broken end of the Schlemm's canal; (3) the IOP was 14.03±1.72mmHg in 14 eyes with scleral pools and the broken end of the Schlemm's canal; (4) the IOP was16.58±1.39 mmHg in 3 eyes with the broken end of the Schlemm's canal.

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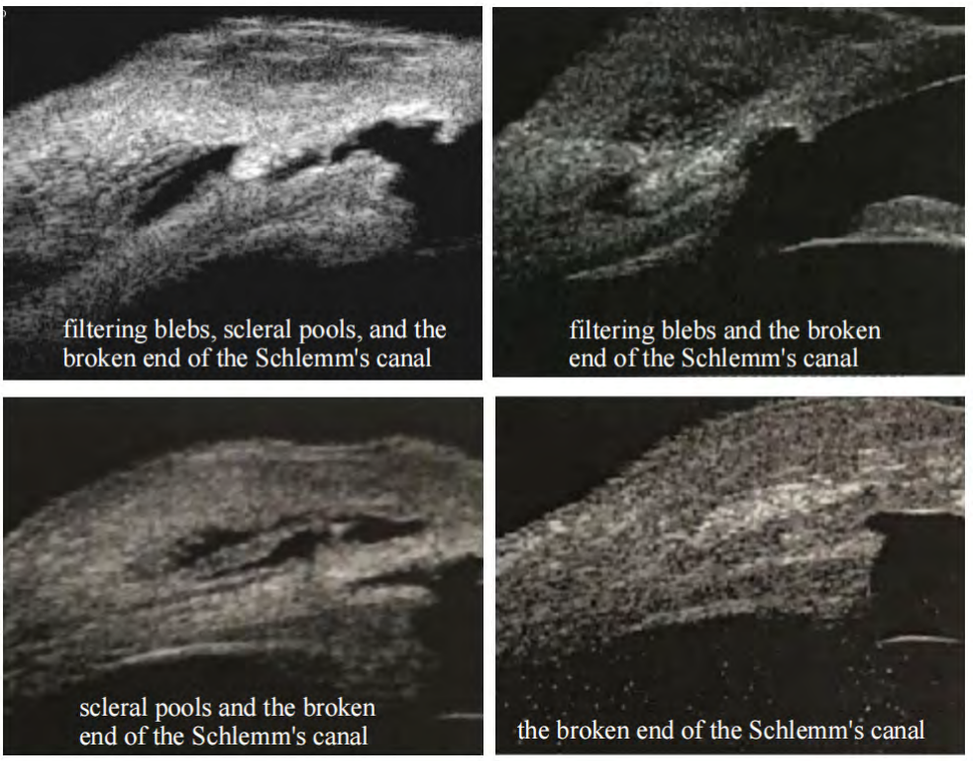

Conclusions

As a multi-channel mechanisms surgery, MATT-DS-Trab is able to effectively decrease IOP in advanced OAG subjects, with few serious complications and a high success rate.

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P-0768

RISK FACTORS FOR TUBE EXPOSURE IN BAERVELDT GLAUCOMA IMPLANTATION: A RETROSPECTIVE STUDY

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Background
Tube exposure is a severe complication of Baerveldt glaucoma implantation, with reported rates ranging from 0.9% to 15%. It can cause vision-threatening endophthalmitis. Previous studies suggest various risk factors for tube exposure, but findings remain inconsistent. This study aims to identify risk factors using identical surgical procedures.

Methods
A retrospective study was conducted on 405 eyes that underwent Baerveldt glaucoma tube shunt surgery using scleral patch grafts and BG101-350 at Kumamoto University Hospital between October 2014 and December 2022. Data collected included demographic and clinical variables, systemic diseases (*e.g.*, hypertension, diabetes mellitus), glaucoma types, history of ocular surgeries or laser treatments, implant positioning, tube insertion sites, concurrent surgeries, preoperative intraocular pressure (IOP), and the number of preoperative medications from the medical record. Univariable analyses were performed using the Wilcoxon test for quantitative variables and Fisher's exact test for qualitative variables. Multivariable analyses were conducted using Firth logistic regression.

Results
Among the 405 eyes, tube exposure occurred in 12 eyes (2.96%) during a mean follow-up period of 1638.83 days. The mean time to tube exposure was 592 days (median: 191 days; range: 12–1945 days). The Univariable analysis using the Wilcoxon and Fisher's exact tests showed no statistically significant differences between the exposure and non-exposure groups for any factor. However, the multivariable Firth logistic regression analysis identified anterior chamber tube insertion as a significant risk factor (odds ratio 5.613, p=0.024). Subgroup analysis of eyes with anterior chamber insertion suggested that neovascular glaucoma (NVG) may be a potential risk factor, but this was not statistically significant in multivariable analysis (odds ratio 5.771, p=0.073).

Conclusions
Anterior chamber tube insertion was identified as a significant risk factor for tube exposure following Baerveldt glaucoma implantation. NVG may also be a risk factor but requires further study. These findings underscore the importance of careful surgical planning, particularly in selecting tube insertion sites, to minimize postoperative tube exposure risk.

P-0769

EFFECTIVENESS AND SAFETY OF THE GEL STENT IN ANGLE CLOSURE GLAUCOMA: ANALYSIS OF A PROSPECTIVE, MULTICENTER, SINGLE-ARM STUDY BY SHAFFER GRADE

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Background

The gel stent is being used to treat angle closure glaucoma (ACG), typically following an angle-widening procedure (AWP). Whether the gel stent is effective if the angle remains narrow is unclear. Evaluated herein is the intraocular pressure (IOP)-lowering effectiveness and safety of the gel stent in ACG, based on preoperative Shaffer grade.

Methods

This is a post hoc analysis of a prospective, multicenter, interventional, nonrandomized, open-label study of 62 patients with ACG (ie, iridotrabecular contact in ≥2 quadrants, glaucomatous damage to the optic disc, and visual field loss); baseline IOP 20–35 mmHg after prior medical and/or surgical treatment failed; and healthy/free/mobile conjunctiva in the target quadrant. Fifty (80.6%) patients had AWPs immediately before ab-interno implantation of the gel stent. Primary effectiveness endpoint: patients (%) achieving at Month 12 ≥20% IOP reduction from baseline without IOP-lowering medication increase. Secondary effectiveness endpoints: mean IOP and mean medication count over time, and changes from baseline (CFB). Safety endpoints: surgical complications and postoperative treatment-emergent adverse events (TEAEs). Postoperative needling was also documented.

Results

Ten, 31, 11, and 9 patients had Shaffer grades of 0 (SG0), 1 (SG1), 2 (SG2), and 3-4 (SG3-4), respectively; 1 patient had missing data. At baseline, 100% (SG0), 96.8% (SG1; n=30/31), 90.9% (SG2; n=10/11), and 33.3% (SG3-4; n=3/9) were phakic. The mean cup:disc ratio and mean central corneal thickness were similar across subgroups. The average visual field mean deviation was -12.7 dB (SG0), -7.2 dB (SG1), -8.5 dB (SG2), and -11.6 dB (SG3-4). Mean (standard deviation [SD]) IOP was 24.6 (3.7) mmHg on 2.2 (1.1) medications (SG0), 24.1 (4.4) mmHg on 2.3 (1.2) medications (SG1), 24.5 (4.7) mmHg on 2.4 (1.8) medications (SG2), and 21.7 (3.5) mmHg on 2.1 (1.8) medications (SG3-4). At 12 months, 66.7% (SG0; n=6/9), 82.1% (SG1; n=23/28), 100% (SG2; n=10/10), and 77.8% (SG3-4; n=7/9) achieved the primary endpoint (p=.2885 between subgroups). Mean (SD) IOP CFB of -9.0 (5.9) mmHg (SG0), -8.4 (4.4) mmHg (SG1), -10.6 (5.6) mmHg (SG2), and -8.8 (4.8) mmHg (SG3-4) were reported, with mean (SD) CFB in medication count of -1.2 (2.1), -1.5 (0.8), -1.9 (1.5), and -1.9 (1.5), respectively. The proportion of patients whose medication count was reduced (vs baseline) was 77.8% (SG0), 92.9% (SG1), 70.0% (SG2), and 66.7% (SG3-4). The needling rate was 60.0% (SG0), 19.4% (SG1), 36.4% (SG2), and 55.6% (SG3-4). The incidence of ocular TEAEs was 70.0% (SG0), 83.9% (SG1), 81.8% (SG2), and 77.8% (SG3-4), with IOP increased and conjunctival hyperemia being the most common ocular TEAEs in all subgroups.

Conclusions

The gel stent effectively lowered IOP and the medication burden in ACG with SG0, SG1, SG2, and SG3-4. There is no clear evidence suggesting potential associations between outcomes and Shaffer grade, possibly due to the small size of some subgroups.

P-0770

ONE-YEAR OUTCOMES OF TRABECULAR MICRO-BYPASS STENTS IN ADVANCED OPEN ANGLE GLAUCOMA

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Background
Of all minimally-invasive glaucoma surgery devices the iStent inject micro-trabecular bypass implant has the largest evidence base with the longest follow-up data to date. Despite this, there is still limited evidence of its safety and efficacy in advanced glaucomas. The aim of this study was to evaluate the safety and efficacy of iStent implantation in advanced glaucoma.

Methods
Consecutive retrospective series of all eyes who had iStent inject implantation with or without phacoemulsification in patients with advanced glaucoma with a minimum of one year post-operative follow up. All procedures were carried out by one surgeon. Outcome measures included intraocular pressure (IOP), proportion of eyes achieving 20% reduction of IOP at one year, number of glaucoma medications (NGM) at one year and change in Humphrey visual field (HVF) mean deviation (MD) at one year compared to baseline.

Results
43 eyes of 37 patients were included. Mean pre-op IOP was 20.4 (6.8) mmHg on a mean of 3.1 (0.9) medications. Mean IOP was reduced to 19.2mmHg on 1.7 (1.2) drops at week one, 18.2mmHg ($p = 0.03$) on 2.3 (1.2) drops at one month, 16.3 mmHg ($p<0.001$) on 2.4 (1.2) drops at month three, 13.9 mmHg ($p<0.001$) on 2.4 (1.0) drops at month six and 14.0 mmHg ($p<0.001$) on 2.4 (1.0) drops at one year. At one year, 67% of eyes had achieved 20% reduction in IOP. The HVF MD showed no significant deterioration at one year, measuring -15.1 dB (5.8) at baseline compared to -17.3 dB (6.9) at the one-year timepoint ($p=0.07$). There were no sight-threatening complications.

Conclusions
The current evaluation demonstrates that the iStent inject implant is safe and effective in achieving a sustained IOP reduction over one year in advanced glaucoma patients, albeit with the continued need for topical glaucoma drops. The study also found no significant change in visual field loss after one year in this group of advanced glaucoma patients.

P-0771
ONE-YEAR SURGICAL OUTCOMES OF A-STREAM GLAUCOMA SHUNT

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Background
The A-stream glaucoma shunt, a new glaucoma shunt device recently developed in Korea, is designed to improve the safety and predictability of intraocular pressure (IOP) control following filtering surgery. This study evaluates 1-year efficacy and safety of A-stream glaucoma shunt device.

Methods
A total of 26 eyes from 26 patients who underwent A-stream implantation between January 2023 and February 2024 were included in the analysis. The primary outcome was surgical success at one-year postoperative. Success was defined as (1) IOP measurements ≤ 21 mmHg without clinically significant hypotony (<6 mmHg and hypotony maculopathy) with (qualified) or without (complete) glaucoma medications, and (2) at least a 20% reduction from the preoperative IOP.

Results
At 1-year postoperative, the mean IOP significantly decreased from 28.8 ± 8.3 mmHg to 12.0 ± 5.3 mmHg ($P < 0.001$). Complete success was achieved in 76.9% of eyes, and qualified success in 80.8%. The intraluminal ripcord was removed in all included eyes at an average of 2.8 ± 2.1 months postoperatively, leading to a further significant IO reduction of 4.6 ± 0.3 mmHg. No clinically significant hypotony was observed.

Conclusions
The A-stream glaucoma shunt has demonstrated excellent efficacy and safety in reducing IOP, achieving a high success rate. Incorporation of the ripcord within the tube facilitated controlled postoperative IOP reduction. Further studies are required to evaluate its long-term outcomes and to compare it with that of established glaucoma surgeries.

P-0772

SURGICAL OUTCOMES ANALYZED WITH AAO MIGS SUCCESS CRITERIA FROM A JAPAN POSTMARKET SURVEILLANCE OF ISTENT INJECT® W COMBINED WITH PHACOEMULSIFICATION

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Background

A 2-year post-market surveillance study was initiated in conjunction with Japan's Pharmaceuticals and Medical Devices Agency to confirm the safety and effectiveness of iStent inject W combined with phacoemulsification in open-angle glaucoma (OAG) patients. We analyzed the surgical outcomes using American Academy of Ophthalmology's (AAO) success criteria for minimally invasive glaucoma surgery (MIGS).

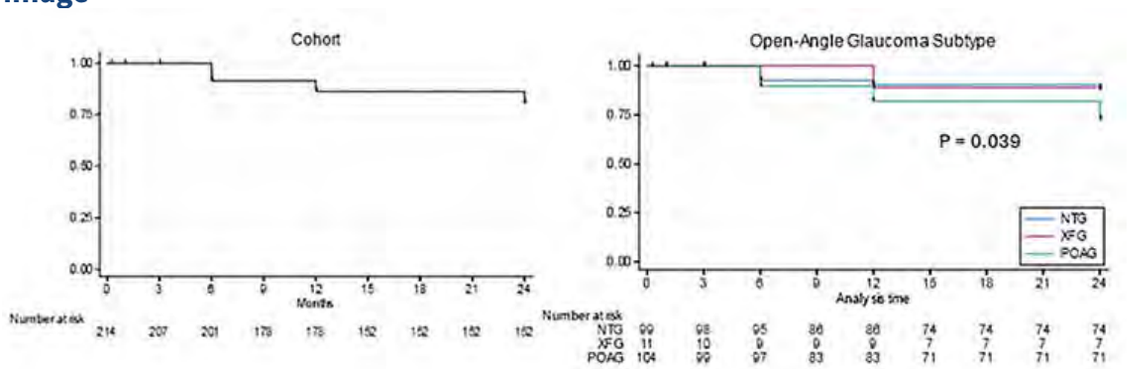
Methods

The intended study population was 200 adults with mild to moderate OAG, including primary OAG (POAG), normal tension glaucoma (NTG), and exfoliative glaucoma (XFG) on ocular hypotensive medications who required phacoemulsification recruited from 30 sites. The iStent inject W combined with phacoemulsification procedures were performed during September 2020 to October 2021. Study time points were at preoperative; and postoperative Day 1; Week 1; Months (M) 1, 3, 6, 12 and 24. Given that the AAO's Glaucoma Preferred Practice Pattern® committee recommended the success criteria for MIGS with phacoemulsification (*i.e.*, no additional laser or incisional glaucoma surgery, loss of light perception vision, or hypotony and at least a one glaucoma medication decrease without an increase in intraocular pressure (IOP), or IOP of 21 mmHg or less and minimum reduction of 20% from preoperative without an increase in number of glaucoma medications) after collection of study outcomes, we conducted a Kaplan Meier analysis to assess the study's success at M24 post hoc.

Results

The study included 214 eyes with procedures performed by 22 surgeons from 14 institutions. Most eyes were either POAG (48.6%) or NTG (46.3%) subtypes. The cohort cumulative probability of success at M24 was 80.7% (95% CI: 74.4%, 85.7%). For the glaucoma subtype analysis, the cumulative success rates at M24 were 88.9% (95% CI: 43.3%, 98.4%) for XFG, 88.0% (95% CI: 79.4%, 93.2%) for NTG, and 72.9% (95% CI: 62.5%, 80.8%) for POAG [log-rank test: P = 0.039]. Cox proportional hazard regression showed a statistically reduced risk of failure in NTG vs. POAG (reference), but not for XFG (NTG vs. POAG: HR, 0.44, 95%CI: 0.21, 0.88 P = 0.021; XFG vs. POAG: HR, 0.41; 95%CI: 0.06, 3.00; P = 0.377).

Image



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Conclusions

The probabilities of success for the cohort and all OAG subtypes were greater than the AAO's recommended minimal clinically important difference of 65% for MIGS combined with phacoemulsification at postoperative 2 years, indicating benefits to the individual patient.

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P-0773

EFFICACY OF INTERNAL FILTRATION PATHWAY RECONSTRUCTION IN SALVAGING FAILED FILTRATION SURGERY

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Background

Currently, for patients experiencing scarring of the filtration bleb following external filtration surgery, the conventional method involves repairing the filtration bleb combined with anti-fibrotic injections. While this technique has shown some efficacy in many patients, the collateral damage and lack of precision during the process often lead to uncertain outcomes in lowering intraocular pressure (IOP), and can result in additional scarring, thereby reducing the success rate. Given the aqueous humor dynamics of trabeculectomy, the internal orifice and sub-flap pathway are less susceptible to scarring blockage. Thus, a minimally invasive and precise reconstruction via the internal route appears both feasible and rational.

Objective: To compare the efficacy and safety of internal filtration pathway reconstruction surgery versus classic filtration bleb repair surgery in managing failed filtration surgeries.

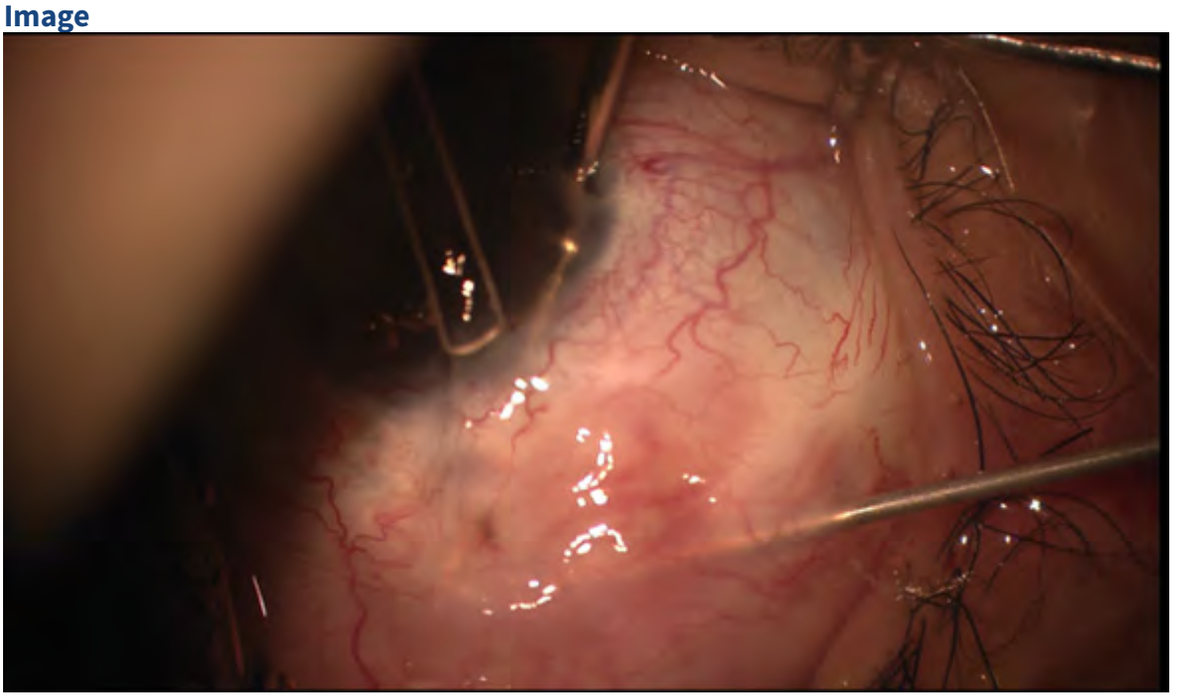
Methods

The single-center, case-control study was conducted. The enrollment period was from Jan 2020 to Sep 2023. Two treatment groups were set, including 15 eyes in the internal filtration pathway reconstruction group and 15 eyes in the classic filtration bleb repair group. Main measurements included intraocular pressure (IOP), the number of anti-glaucoma medications, best-corrected visual acuity (BCVA), and visual field tests.

Results

12-month follow-up revealed significant IOP reductions in both groups compared to pre-op level ($p < 0.05$). The average IOP in the classic filtration bleb repair group decreased from 27.8±7.6 to 17.2±4.0 mmHg, while in the internal reconstruction group, it decreased from 25.5±6.4 to 14.3±4.9 mmHg. The internal reconstruction group exhibited a more significant reduction in IOP. The number of anti-glaucoma medications in the classic repair group decreased from 3.2±1.2 to 1.7±1.4, and in the internal reconstruction group from 2.8±1.8 to 1.4±1.2. BCVA and the mean defect in standard automated perimetry did not show significant changes in either group. The internal reconstruction group had a shallower anterior chamber and lower IOP early postoperatively compared to the classic repair group. Mild bleb leakage was more common early in the classic repair group, and required more frequent postoperative needling ($p < 0.05$). BCVA and visual field indices remained relatively stable during the 12-month follow-up. The 1-year IOP reduction in the internal reconstruction group was associated with preoperative bleb morphology.

Image



Conclusions

Internal filtration pathway reconstruction demonstrates potential as a safe and more effective surgical approach for managing failed filtration surgeries. Preoperative bleb morphology need to be assessed in determining surgical technique suitability.

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P-0774

TWELVE-MONTH OUTCOMES OF EXCISIONAL GONIOTOMY USING THE KAHOOK DUAL BLADE IN ADVANCED AND REFRACTORY GLAUCOMA

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Background
To assess the efficacy and safety of goniotomy with trabecular meshwork excision using the Kahook Dual Blade (KDB, New World Medical Inc., Rancho Cucamonga, CA) in patients with advanced or refractory glaucoma.

Methods
This retrospective observational study reports on 28 eyes(from 26 subjects)with advanced or refractory glaucoma that underwent standalone or combined KDB goniotomy with an MD of -19.27±7.72dB,and were followed for 19.8±5.8 months post-operatively in Beijing Tongren Hospital,China.15 eyes had undergone anti-glaucoma surgery,10 eyes had primary open-angle glaucoma,13 eyes had primary angle-closure glaucoma,while 5 eyes had secondary glaucoma. Intraocular pressure(IOP) was monitored using a noncontact tonometer;-best-corrected visual acuity was collected using the International Visual Acuity Scale and converted to LogMAR visual acuity analysis;and the number of antiglaucoma medications used and surgical adverse events were collected.Cumulative surgical success was calculated,with surgical success was defined as unmedicated IOP ≤12 mmHg,≤15 mmHg,or ≤18 mmHg with a 20% reduction from baseline,no complications affecting vision,and no secondary surgery;conditional success was achievement of the above conditions with anti-glaucoma eyedrops.

Results
Mean IOP decreased from 27.26 ± 11.2 mmHg at baseline to 16.82 ± 5.11 mmHg at 12 months(30%reduction,P <=0.001).Concomitantly,the mean number of glaucoma medications decreased from 3.6 ± 1.1 to 2.1 ± 1.3(36% reduction,P = 0.001).71.4%(n = 20)eyes were reduced by at least 1 medication.Best-corrected LogMAR visual acuity in the PEI+KDB-GTE group improved from 0.53 ± 0.38 to 0.35 ± 0.5 at baseline(P = 0.036).The absolute success rates for IOP ≤18 mm Hg,≤15 mm Hg,and ≤12 mm Hg with at least 20%reduction were 7.14%,3.60%,and 3.60%,respectively;the conditional success rates were 64.20%,32.10%,and 10.70%,respectively.Postoperative complications included anterior chamber hemorrhage(3/28),malignant glaucoma(2/28),and IOP spike(1/28).There were no adverse outcomes affecting visual function after treatment.

Conclusions
KDB-GTE as an optional minimally invasive glaucoma surgical procedure in advanced or refractory glaucoma can lower IOP,reduce anti-glaucoma medications,and have a better surgical safety.

P-0775
2-YEAR RESULTS OF THE VW-50 GLAUCOMA IMPLANT

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Background
Improvement to the efficacy, safety, predictability and accessibility of current glaucoma filtration surgery is required. A comprehensive design and engineering development process intending to address these limitations resulted in VW-50, a novel microfluidic glaucoma implant. A feasibility study was performed to determine the efficacy, safety and ease of surgical implantation of VW-50.

Methods
A 10-participant 12-month non-comparative single-surgeon clinical feasibility study of the VW-50 implant was performed with institutional ethics approval. One eye of each participant underwent implantation of VW-50 alone (5 eyes) or combined with cataract surgery (5 eyes); none with a scleral graft. The key eligibility criterion was failure of maximum tolerated medical therapy for glaucoma, with no IOP criteria. Secondary glaucoma (except for pigment dispersion) or previous filtration surgery were excluded. Routine clinical follow-up of study participants was performed by the treating surgeon after completion of the initial 12-month study.

Results
10 participants (7 female, 3 male) were enrolled with a mean age of 68 years and a variety of glaucoma mechanism and severity (POAG, PACG & PDG; RNFL range 36-108mm & MD range -22 to -1dB). Baseline mean diurnal IOP was 17.6mmHg (SD 3.0) on an average of 2.5 classes of glaucoma medication. The mean surgical duration was 23 minutes excluding cataract (5 eyes underwent combined VW-50 implantation plus cataract). There has been no loss to follow-up, with mean IOP reduced to 8.2mmHg (SD 1.7) on day 1 post-op; 11.1mmHg (SD 2.3) at 1 month; 14.1mmHg (SD 1.9) on an average of 0.3 medications at 12 months; and 13.3 mmHg (SD 2.1) on an average of 0.4 medications at 24 months. 5 of 10 participants have experienced conjunctival erosion with device exposure, requiring revision surgery and scleral graft. All eyes were at clinical target IOP at furthest follow-up on fewer medications than pre-operatively, with no other clinically significant adverse events (including shallow AC, persistent hypotony or greater than 10% reduction in central corneal endothelial cell density).

Conclusions
The VW-50 implant effectively reduces IOP to 2 years post-operatively, but the significant risk of conjunctival erosion requires mitigation. A 65-participant multi-centre pivotal study is underway of the modified VW-51 implant and patch graft.

P-0777

CATARACT SURGERY COMBINED WITH EXCIMER LASER TRABECULOSTOMY VERSUS CATARACT SURGERY ALONE IN PATIENTS WITH OPEN-ANGLE GLAUCOMA

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Background
This study aims to evaluate and compare intraocular pressure (IOP) change and number of topical IOP-lowering medications after combined cataract surgery with excimer laser trabeculostomy (ELT) versus cataract surgery alone in patients with open-angle glaucoma.

Methods
Prospective comparative evaluation of 28 patients (49 eyes) with different types of open-angle glaucoma, who were naïve to any previous intraocular procedure and underwent combined cataract surgery with ELT (phaco-ELT group - 24 eyes) or cataract surgery alone (control group - 25 eyes), was performed. Study outcomes were median IOP change in the operated eye and the mean number of topical IOP-lowering medications on the first postoperative day, 1st and 2nd week, and then at 1, 3, and 6 months after surgery.

Results
The median pre- and postoperative IOP in phaco-ELT group on the first postoperative day, 1st and 2nd week, and at 1, 3, and 6 months were 14 (12-16.75) mmHg, 11.0 (9-13) mmHg, 13.5 (10-16.5) mmHg, 13 (11-15) mmHg, 12 (9.5-15) mmHg, 10 (8.25-10) mmHg and 9 (8-9) mmHg, respectively. The median postoperative IOP level was statistically significantly lower than preoperative IOP level at last follow-up ($p<0.05$). The median IOP change in study group at 1, 3, and 6 months follow up was -2 (-3.5 to 0.5) mmHg, -4.5 (-9.75 to -3) mmHg, and -6 (-12.25 to -3) mmHg, respectively. The median IOP change in the control group at 1, 3, and 6 months follow up was -2.5 (-5 to 1.25) mmHg, -2 (-4.25 to 1) mmHg, and -2 (-4.5 to 0) mmHg, respectively. Thus, IOP reduction in the study group was statistically significantly larger than in the control group at 3 months (-2.49, $p<0.05$) and 6 months (-2.38, $p<0.05$) follow up. The higher the preoperative IOP was in the operated eye, the larger was the IOP-lowering effect at 6 months after combined surgery (-0.99; $p<0.001$). We found a statistically significant difference between the mean number of topical IOP-lowering medications before and after combined surgery (1.17±0.6 vs. 0; -2.27, $p<0.05$), while control group showed no reduction in preoperative medications (1.44±0.5 vs. 1.4±0.6).

Conclusions
This study shows a statistically significant IOP reduction at 6 months after combined cataract surgery with ELT and this IOP change is significantly larger compared to IOP change after cataract surgery alone in glaucoma patients. ELT in combination with cataract surgery is associated with the reduction of topical IOP-lowering medications.

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P-0778

8-YEAR RESULTS OF GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) FOR OPEN-ANGLE GLAUCOMA PATIENTS

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Background
This study aimed to evaluate the long-term outcomes of gonioscopy-assisted transluminal trabeculotomy (GATT) over an 8-year period in patients with open-angle glaucoma (OAG).

Methods
A retrospective study was conducted on Japanese OAG patients who underwent GATT as a standalone procedure at Keio University Hospital and were followed for at least three months postoperatively. The primary outcomes included intraocular pressure (IOP), the number of antiglaucoma medications used (scored as 1 point per topical eye drop and 2 points per oral medication), and the incidence of complications. Surgical failure was defined by specific criteria, including inadequate IOP reduction (IOP ≥22 mmHg or <20% reduction from preoperative IOP under Criterion A, and IOP ≥18 mmHg or <20% reduction under Criterion B), the need for additional glaucoma surgery, or loss of light perception.

Results
A total of 110 eyes from 110 patients were included in the study. The mean preoperative IOP and medication use were 27.6 ± 10.3 mmHg and 4.6 ± 2.4 points, respectively. Postoperative mean IOP (mean number of antiglaucoma medications) was reduced to 15.2 ± 4.5 mmHg (2.0 ± 1.8) at 12 months, 14.8 ± 4.5 mmHg (2.3 ± 1.7) at 60 months, and 13.1 ± 4.0 mmHg (2.4 ± 1.7) at 96 months. The success rates for Criterion A and Criterion B at 12, 60, and 96 months were 66.6% and 57.6%, 37.9% and 29.9%, and 28.7% and 20.9%, respectively. Additional glaucoma surgeries were performed in 42 eyes (38.2%). Early postoperative complications included hyphema with Neveu formation in 67 eyes (60.9%) and transient IOP elevation exceeding 30 mmHg in 36 eyes (34.6%).

Conclusions
GATT demonstrated substantial and sustained IOP reduction with an acceptable safety profile over an 8-year follow-up in Japanese patients with OAG.

P-0779

36-MONTH MULTI-CENTRE OUTCOMES OF COMBINED PHACOEMULSIFICATION AND HYDRUS MICROSTENT IMPLANTATION IN NORMAL TENSION GLAUCOMA

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Background

This multicentre study aims to analyse 3-year outcomes of combined phacoemulsification and Hydrus Microstent implantation in eyes with normal tension glaucoma (NTG).

Methods

A multicentre, retrospective, consecutive case-series of eyes with cataract and NTG that underwent phacoemulsification combined with implantation of Hydrus Microstent performed between December 2014 and May 2023. Outcome measures included intraocular pressure (IOP), number of topical glaucoma medications and adverse outcomes.

Results

77 eyes from 77 subjects with cataract and NTG underwent phacoemulsification combined with implantation of Hydrus Microstent performed within the specified time period, of which 30 eyes successfully completed 3 years post-operative follow-up ("the consistent cohort"). Mean age of all subjects was 72.7±7.3 years. 45.5% of subjects were male, and 24.7% of eyes had mild, 23.3% had moderate and 52.1% had severe glaucoma. The mean visual field mean deviation (MD) was -11.3±6.5 dB, mean central corneal thickness was 537.2±29.4 µm and the average retinal nerve fibre layer thickness was 71.1±9.3 µm. Pre-operatively, the pooled mean IOP was 13.3±2.2 mmHg and mean number of medications was 1.7±0.9. In the "consistent cohort" of 30 eyes, significant IOP reduction was only observed at post-operative day 1. However, the number of medications were reduced at all timepoints. By POM24, there was a reduction of 0.88 ± 1.2 medications and by POM36, there was a reduction of 0.9 ± 1.2 medications (all $p < 0.001$). None of the eyes experienced sight-threatening complications.

Conclusions

Eyes with NTG undergoing combined phacoemulsification and Hydrus Microstent implantation demonstrated a sustained reduction in number of glaucoma medications compared to baseline, up to 3 years post-operatively.

P-0780

COMPARATIVE EVALUATION OF OUTFLOW FACILITY IN GLAUCOMA EYES FOLLOWING HYDRUS AND ISTENT IMPLANTATION USING THE WATER DRINKING TEST

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Background
To compare the efficacy of Hydrus and iStent implants in enhancing aqueous outflow facility using the Water Drinking Test (WDT) in patients with primary open-angle glaucoma (POAG).

Methods
This prospective study evaluated 50 patients (50 eyes) who underwent either Phaco-Hydrus (25 eyes) or Phaco-iStent (25 eyes) procedures. After a baseline intraocular pressure (IOP) assessment, subjects drank 10 ml water/kg body weight over 5 minutes. IOP was then measured with a Goldman tonometer every 15 minutes. Baseline intraocular pressure (IOP), peak IOP, IOP fluctuation, IOP range, and the time taken for IOP to return to baseline were assessed. The mean number of pre-operative and post-operative anti-glaucoma medications was also analyzed

Results
The mean baseline IOP for the Hydrus group was 17.67 mmHg, while the iStent group recorded 16.98 mmHg (p = 0.128). The mean peak IOP was higher in the Hydrus group (24.89 mmHg) compared to the iStent group (21.64 mmHg), though not statistically significant (p = 0.127). The time taken for IOP to return to baseline was slightly shorter for Hydrus (76.67 minutes) compared to iStent (81.82 minutes; p = 0.662). No significant differences were observed in IOP fluctuation (p = 0.858), IOP range (p = 0.776).Both devices demonstrated comparable control of IOP fluctuation and recovery time following WDT, indicating similar outflow facility. Post-operative medication use decreased from 2.78 to 0.89 in the Hydrus group and 2.73 to 0.91 in the iStent group (p = 0.953). Both groups demonstrated significant reductions in medication use after surgery, with no significant differences between them

Conclusions
Both Hydrus and iStent implants showed comparable performance in controlling IOP dynamics post-WDT. These findings suggest that both devices can effectively enhance aqueous outflow facility, with no significant difference in IOP stability or recovery.

P-0781

REAL-WORLD OUTCOMES OF STANDALONE ISTENT INJECT W IMPLANTATION: 24-MONTH RESULTS

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Background
The purpose of this study was to investigate the IOP-lowering efficacy and safety of standalone iStent *inject W* implantation over 24 months

Methods
Retrospective, non-randomized case series review of surgeries where iStent inject W (n = 62 patients) were implanted without concurrent phacoemulsification. Main outcome measures were intraocular pressure (IOP), number of medications, and post-op complications. Outcomes were compared using paired Student's t-test.

Results
Mean pre-operative IOP was 21.1 ± 1.7 mmHg on an average of 2.4 ± 0.6 medications. One week post-operative, IOP had decreased to 15.7 ± 2.3 mmHg and remained low throughout the course of the study. After 12 months, patients' mean IOP was 16.1. ± 2.1 mmHg on an average of 1.2 ± 1.4 medications. After 24 months, patients' mean IOP was 17.1. ± 2.3 mmHg on an average of 1.4 ± 1.3 medications. After 24 months post-op, 51.2% of patients had IOP reductions > 20% from baseline. Furthermore, 24 months post-op, 21% of patients remained medication-free, compared to no patients prior to surgery. The safety of the procedure was excellent, with more than 90% of patients developing no post-op complications.

Conclusions
iStent inject W significantly reduced IOP and medication burden for up to 24 months in patients with open-angle glaucoma.

P-0782

RISK FACTORS FOR FAILURE AFTER PRESERFLO MICROSHUNT WITH MITOMYCIN C

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Background
Ab externo poly(styrene-block-isobutylene-block-styrene) (SIBS) microshunt implantation (PRESERFLO MicroShunt) is a new implant surgery for glaucoma introduced in Japan in 2022. We investigated risk factors for failure after PRESERFLO MicroShunt with Mitomycin C.

Methods
We retrospectively reviewed 94 consecutive eyes of 83 patients who had undergone PRESERFLO MicroShunt and were followed up for at least 1 year. “Surgery failure” was defined as intraocular pressure (IOP) > 15mmHg at 1 year after surgery or requiring an additional filtration surgery to reduce IOP within 1 year after surgery. We used unpaired t-test, chi-square test, and Fisher’s exact test for univariate analysis, and we used multiple logistic regression analysis for multivariate analysis.

Results
Mean age (SD) of subjects was 67.9 (11.8) with 67 eyes of primary open-angle glaucoma (including normal tension glaucoma), 15 eyes of exfoliation glaucoma, and 12 eyes of other types of glaucoma. There was surgery failure with 18 eyes (19.6%), and univariate analysis revealed that 1-month postoperative IOP ($p<0.0001$), preoperative IOP ($p=0.0098$) and surgery time ($p=0.0364$) had a statistically significant correlation to surgery failure, and age ($p=0.0576$) had a weak correlation to surgery failure, while other factors including gender, type of glaucoma, preoperative medical score, surgical history, combined surgery, and axial length did not have any significant correlation. Multivariate analysis revealed that 1-month postoperative IOP ($p=0.0021$) and preoperative intraocular pressure ($p=0.0313$) had a statistically significant correlation to surgery failure, while surgery time ($p=0.0605$) and age ($p=0.0803$) had a weak correlation to surgery failure.

Conclusions
Our results suggest that higher preoperative intraocular pressure, longer surgery time and younger age are risk factors for surgery failure after PRESERFLO MicroShunt with mitomycin C, and the prognosis of the procedure is predictable from 1-month postoperative IOP.

P-0783

PREDICTORS OF FAILURE IN MINIMALLY INVASIVE GLAUCOMA SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background
In recent years minimally invasive glaucoma surgery (MIGS) has been adopted by surgeons worldwide for its potential to reduce intraocular pressure (IOP) and lower medication use while being safer than traditional filtration surgeries. To date, predictors of failure have not been well defined. In this systematic review and meta-analysis, we examine the range of demographic and ophthalmic variables reported to be significantly associated with surgical failure in MIGS.

Methods
A systematic review and meta-analysis were conducted using PubMed, Scopus, and Cochrane databases to evaluate baseline ophthalmic and demographic factors significantly associated with MIGS with a primary endpoint of IOP-lowering efficacy. We calculated pooled odds ratios from these predictors and grouped them by category (ie. diagnosis, ethnicity) and anatomical location of device placement (trabecular bypass or subconjunctival).

Results
44 cohorts within 39 studies were included, with a total participant sample size of 25,369 eyes. Subconjunctival MIGS comprised Xel gel stent (N = 12 cohorts) and Preserflo microshunt (N = 3), while trabecular bypass devices included Trabectome (N = 10), iStent (N = 8), Kahook Dual Blade (N = 6) and Gonioscopy-Assisted Transluminal Trabeculotomy/other (N = 4). For subconjunctival MIGS, secondary glaucoma (OR 1.41, 95% CI: 0.87–2.27, Figure 1), angle closure glaucoma (OR 1.66, 95% CI: 1.43–1.92), and non-White ethnicity (OR 1.62, 95% CI: 1.39–1.89) were associated with an increased risk of surgical failure. For trabecular bypass MIGS, increased risk of failure was observed with non-White ethnicity (OR 1.56, 95% CI: 0.50–4.81), prior selective laser trabeculoplasty (SLT; OR 2.10, 95% CI: 1.60–2.76, Figure 2) and increased axial length (OR 1.46, 0.91-2.33). Conversely, lower risk of failure was observed with pseudoexfoliative glaucoma (PXFG; OR 0.40, 95% CI: 0.33–0.49) and combined phacoemulsification with MIGS surgery (OR 0.26, 95% CI: 0.10–0.64). Age and baseline IOP had a marginal influence on surgical outcomes for trabecular bypass MIGS.

Image

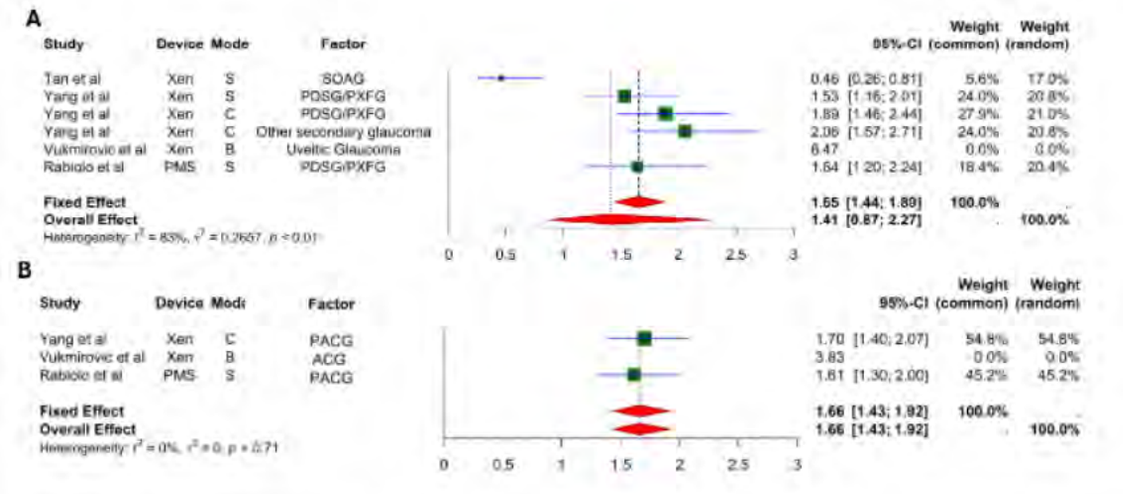

Figure 1: Forest plots of pooled odds ratios from studies on significant associations between secondary glaucoma (panel A), angle closure glaucoma (panel B) and surgical failure in subconjunctival MIGS implant surgery. Abbreviations— S: Standalone procedure, C: combined phaco-MIGS procedure, B: both standalone and combined phaco-MIGS procedure.

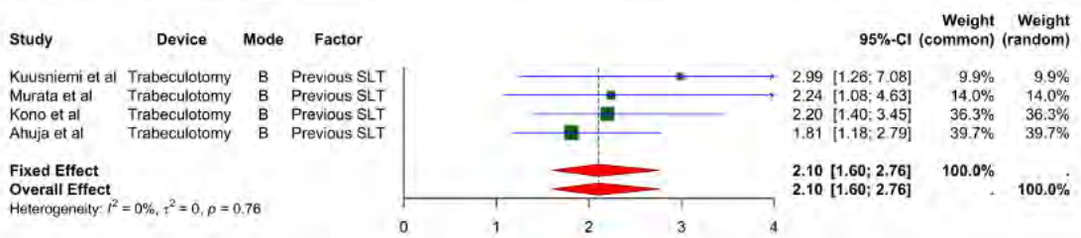

Figure 2: Forest plots of pooled odds ratios from studies on significant associations between previous selective laser trabeculoplasty (SLT) and surgical failure in trabecular bypass MIGS implant surgery. The reference is no previous SLT. Abbreviations—B: both standalone and combined phaco-MIGS procedure.

Conclusions

Demographic and preoperative ophthalmic factors such as non-White ethnicity, previous SLT and secondary glaucoma can significantly influence MIGS efficacy outcomes. Predictors of surgical failure in MIGS may help guide patient selection to improve efficacy and safety.

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P-0784

EVALUATION OF BLEB MORPHOLOGY AFTER PRESERFLO MICROSHUNT AND FACTORS ASSOCIATED WITH 1-YEAR SURGICAL SUCCESS

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Background

The efficacy of Preserflo Microshunt (PFM) in lowering intraocular pressure (IOP) has been demonstrated in previous studies. The aim of this study was to evaluate the bleb morphology after PFM and to determine the factors associated with 1-year surgical success.

Methods

This was a prospective study of PFM performed between February 2023 and October 2023 at Kanazawa University Hospital, Japan. Patients with primary open-angle glaucoma or exfoliation glaucoma who were scheduled for PFM surgery despite using maximal tolerated medical therapy were enrolled. IOP data at follow-up visits of 1, 3, 6, and 12 months were evaluated. Surgical success was defined as postoperative IOP ≤15 mmHg and IOP reduction ≥ 20% with or without medications. The cumulative probability of success was examined using the Kaplan-Meier method. The relationship between surgical success and variables including bleb morphology and background factors such as age, gender, disease type, surgical history, preoperative IOP, mean deviation of Humphrey visual fields, and axis length were examined using univariate and multivariate Cox proportional hazards models. Bleb morphology was evaluated 1 month after surgery with anterior-segment optical coherence tomography and the presence or absence of episcleral fluid space between the corneal limbus and the scleral entry site of PFM was determined.

Results

A total of 51 eyes of 51 patients were included in the study. IOP decreased significantly from 20.8±7.5 mmHg (mean ± standard deviation) at baseline to 10.7 ± 4.6 mmHg 12 months after surgery (P<0.001, Mixed-effects model). The cumulative probability of success at 12 months was 68.6% (95% confidence interval: 55.0-79.4%). Factors significantly associated with the success of PFM in the multivariate Cox proportional hazards model were axis length (hazard ratio: 0.63/mm, 95% confidence interval: 0.44-0.90, P=0.012) and the presence of episcleral fluid space near the corneal limbus (hazard ratio: 0.28 (yes versus no), 95% confidence interval: 0.09-0.85, P=0. 024).

Conclusions

A longer axial length and the presence of episcleral fluid space near the corneal limbus in the early postoperative period were associated with 1-year surgical success of PFM.

P-0785

OUTCOME OF COMBINED BAERVELDT 350 IMPLANT & TRABECULECTOMY WITH MITOMYCIN C IN PATIENTS WITH ADVANCED GLAUCOMA AND HIGH RISK OF TRABECULECTOMY FAILURE

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Background
To describe the surgical outcomes of patients with advanced glaucoma and high risk of primary trabeculectomy failure who underwent combined Baerveldt glaucoma implant surgery (BGI) and trabeculectomy with mitomycin C (MMC). Primary tube in these patients risks further deterioration of visual fields while the tube is kept ligated for the bleb to develop over the plate.

Methods
This single centre, single surgeon consecutive case series included patients with advanced glaucoma (according to Hodapp classification) and were high risk of primary trabeculectomy failure *e.g.* immobile conjunctiva, African-Caribbean descent, uncontrolled intraocular pressure (IOP) or glaucoma progression on maximally tolerated medical treatment for combined BGI and trabeculectomy with MMC. Outcome measures were reduction of IOP, antiglaucoma drugs (AGD) and surgical complications.

Results
Fifty-four eyes of 51 patients, with a mean age of 65.9 +/- 13 (range 43.9 to 89.1) years were included. Most patients had POAG (81.5%), were Afro-Caribbean (80.9%), and had a mean preoperative MD of -21.4 +/- 6.9dB. The mean preoperative IOP was 19.9 +/- 7.0 mmHg at baseline and 10.9 +/- 4.1 mmHg at last follow-up ($p<0.001$). The mean duration of follow-up was 34.6 +/- 19.8 months. The antiglaucoma medication was reduced from 3.4 +/- 0.7 before surgery to 1.8 +/- 1.4 post-surgery ($p<0.001$). 2 eyes (7.1%) required cyclodiode for further IOP reduction. One eye developed late endophthalmitis. Hypotony occurred in 2 eyes, and one had exotropia from muscle restriction. There was no loss of light perception in this cohort and visual fields remained stable during this follow up period.

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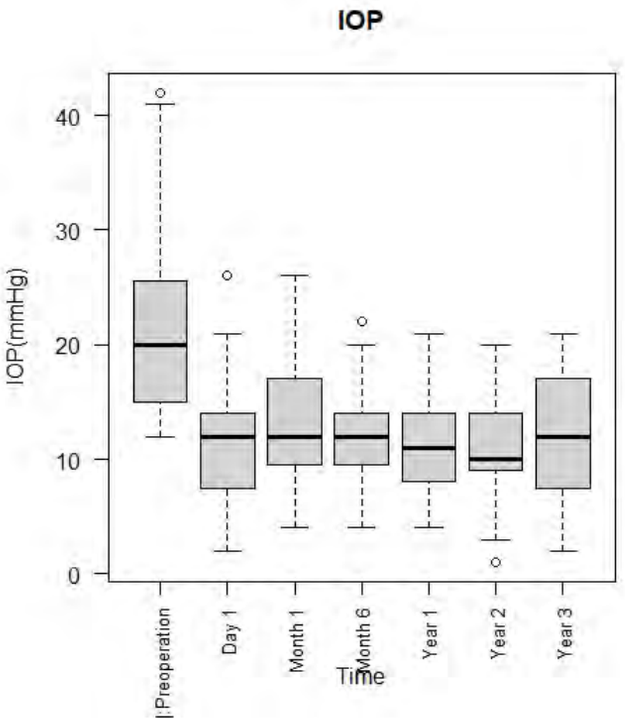

Conclusions

The technique of combined BGI with trabeculectomy with MMC significantly lowered IOP and reduced medication use. It provided good short and intermediate IOP control in eyes with advanced glaucoma, which are at higher risk of Trabeculectomy failure.

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P-0786

EARLY CLINICAL EXPERIENCES OF THE NOVEL A-STREAM GLAUCOMA STENT SURGERY COMBINED WITH MID-POSTERIOR TENON'S CAPSULE ADVANCEMENT FLAP

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Background

With the advent of the XEN Gel Stent and the Preserflo Microshunt several years ago, subconjunctival Minimally Invasive Bleb Surgery (MIBS) devices have made remarkable progress in glaucoma surgery. In late 2023, the A-stream Glaucoma Stent was approved by South Korean Food and Drug Administration, and launched in South Korea for the first time. This novel device which is made of medical grade silicone has a dimension of 6-mm length, 100-micrometer inner lumen diameter, and preloaded intraluminal ripcord insdie the stent. It has been receiving significant attention from South Korean glaucoma specialists, and its usage volume is rapidly expanding. The prototype of the A-stream Stent has proven its efficacy and safety in animal models and in clinical settings.[1-5] The purpose of this study is to evaluate the early clinical outcomes of the A-stream stent combined with Mid-Posterior Tenon's capsule Advancement Flap (MPTAF) and to suggest a more optimal surgical approach.

Methods

This single-center, retrospective study enrolled 59 eyes who underwent the A-stream stent surgery and completed 6-month follow-up. The eyes were grouped into two groups based on the different surgical techniques in the aspect of intraluminal ripcord management and stent coverage. Group A consisted of initial 25 eyes, in which ripcord distal tip was left exposed outside conjunctiva, and various materials were used to cover the stent. Group B consisted of subsequent 34 eyes, in which ripcord loop was made at limbus and MPTAF technique was used for stent coverage.

Results

During the 6-month follow-up, both groups showed similar efficacy in the aspect of IOP lowering and the number of anti-glaucoma medications. Numerical hypotony of IOP ≤ 6mmHg without intraocular complication was observed in 11 eyes (44.0%) of group A and in 13 eyes (38.2%) of group B at postoperative 1 week. Choroidal effusion was seen in 2 eyes (8.0%) of group A and in 5 eyes (14.7%) of group B at postoperative 1 week. However, most of these conditions resolved by postoperative 1 month. There was no case of serious complications affecting visual acuity such as anterior chamber collapse, or hypotony maculopathy. There was no stent exposure in both groups. Regarding the ripcord and bleb-related issues, there was statistical difference between both groups. In group A, 7 eyes had ripcord dislocation or ripcord retraction into subconjunctival space. In group B, there was none observed. Bleb needling rate was significantly lower in group B.

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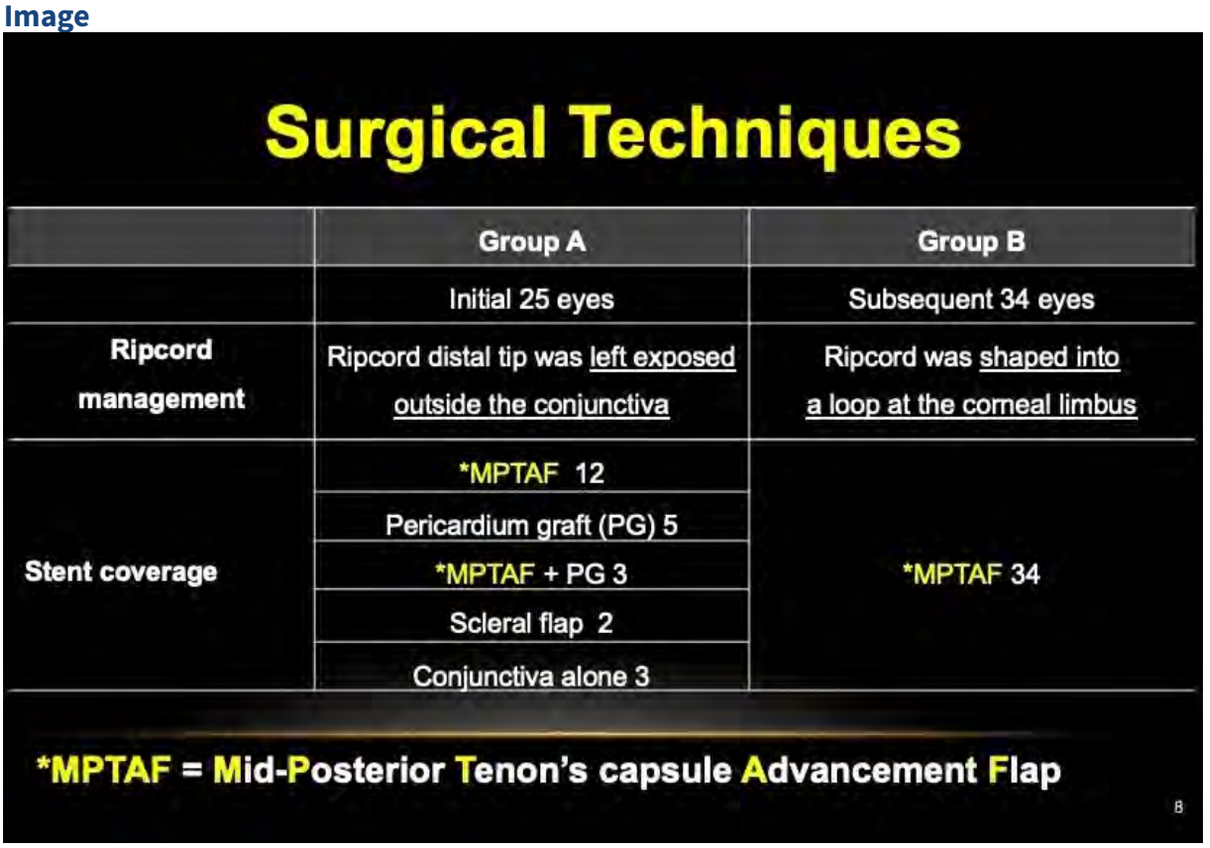

Conclusions

The A-stream glaucoma stent surgery combined with MPTAF technique and the usage of a limbal ripcord loop appears to be an effective and safe procedure with minimal risk of stent exposure or ripcord-related complications.

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P-0787

PRELIMINARY RESULT OF STENT ASSISTED LIANG'S INTERNAL DRAINAGE TRABECULAR SURGERY: A PILOT STUDY

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Background
Nowadays, Schlemm 'canal (SC)-based bleb-independent glaucoma surgery attracts more attentions. Canaloplasty is a presentative which relies on the 360° canalization of SC. Clinically, 10-20% patients with having SC-based glaucoma surgery failed to complete the canalization of SC. Stent assisted Liang's Internal drainage Trabecular Surgery (SLITS) is a new SC-based glaucoma surgery without the dependence of SC canalization to restoration of aqueous outflow.

Methods
This was a prospective case series in primary glaucoma patients. Stent assisted Liang's Internal drainage Trabecular Surgery (SLITS) was an ab externo bleb-independent glaucoma surgery with a new Schlemm' canal stent. Patients with primary glaucoma were enrolled to have SLITS. Baseline and postoperative intraocular pressure, glaucoma medications taken, visual acuity, mean deviation (MD) of visual field, corneal endothelial cell density (CCD), adverse events and postoperative interventions were collected. Surgical successes were defined as 6mmHg≤IOP≤21mmHg without (complete success) or with and without glaucoma medications (qualified success).

Results
26 patients with glaucoma (12 patients with primary open angle glaucoma , 6 patients with primary angle closure glaucoma and 8 patients with secondary glaucoma) were enrolled in this study. The mean age was 51.9±12.8 years old. The mean time of follow-up visits was 3.7±3.6 months. The mean IOP decreased from 30.1±7.0mmHg to 16.1±4.0mmHg at 6 months and 16.8±5.9 at 12 months. The mean glaucoma medications decreased from 2.6±0.8 to 0.3±1.0 at 6 months and 0.8±1.5 at 12 months. The qualified success rate was 85.7% at both 6 and 12 months. The conplete success rate was 71.4% at both 6 and 12 months. The main complications were transient IOP elevation (19.2%), hypotony (19.2%) and cyclodialysis (15.4%).

Conclusions
Stent assisted Liang's Internal drainage Trabecular Surgery can efficaciously decrease the IOP and glaucoma medications of primary glaucoma patients with a tolerable safety file.

P-0788

COMPARISON OF SHORT-TERM POST-OPERATIVE OUTCOMES OF PRESERFLO® MICROSHUNT AND TRABECULECTOMY IN JAPAN

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Background
The PRESERFLO MicroShunt® was introduced in Japan in 2022. This study compares the early postoperative outcomes of the PRESERFLO MicroShunt and trabeculectomy.

Methods
We retrospectively reviewed 48 eyes of 45 patients who underwent either PFM or TLE at our institution between June 2023 and October 2024. Patients were divided into PFM and TLE groups. We compared preoperative, 1-week, 1-month, and 2-month postoperative intraocular pressure (IOP), anti-glaucoma medication scores, visual acuity (VA), and corneal endothelial cell density (CECD) loss.

Results
The PFM group included 19 eyes of 18 patients (10 primary open-angle glaucoma, 5 normal-tension glaucoma, 2 exfoliation glaucoma, and 2 secondary glaucoma). The TLE group included 29 eyes of 27 patients (12 primary open-angle glaucoma, 2 primary angle-closure glaucoma, 7 normal-tension glaucoma, 3 exfoliation glaucoma, and 5 secondary glaucoma). IOP significantly decreased in both groups from preoperative levels (PFM: 23.2±12.3mmHg, TLE: 25.8±13.0mmHg) to 1 week (PFM: 9.7±3.9mmHg, TLE: 8.3±3.3mmHg), 1 month (PFM: 12.9±5.2mmHg, TLE: 10.3±3.67mmHg), and 2 months (PFM: 12.1±2.8mmHg, TLE: 10.6±2.1mmHg). There was no significant difference in preoperative (P=0.50) and 1-week postoperative IOP (P=0.19) between the groups. However, IOP was significantly lower in the TLE group at 1 month (P<0.05) and 2 months (P<0.05) post-surgery. There were no significant differences in eye drop scores at baseline (PFM: 3.9±1.0, TLE: 3.8±1.3, P=0.68), 1 month (PFM: 0.5±1.4, TLE: 0±0, P=0.08), or 2 months (PFM: 0.4±1.2, TLE: 0.1±0.3, P=0.19). No significant differences were found in logMAR visual acuity at baseline (PFM: -0.20±0.45, TLE: -0.20±0.43, P=1.0), 1 month (PFM: -0.37±0.62, TLE: -0.33±0.47, P=0.77) or 2 months (PFM: -0.10±0.18, TLE: -0.12±0.20, P=0.72). Visual acuity in the TLE group was significantly worse at 1 month postoperatively compared to preoperative levels (P=0.003). There were no significant differences in CECD at baseline (PFM: 2441.3±450.1/mm2, TLE: 2183.5±557.1/mm2, P=0.13), 1 month (PFM: 2355.6±358.5/mm2, TLE: 2234.3±602.9/mm2, P=0.46), or 2 months (PFM: 2201.5±542.6/mm2, TLE: 2233.2±610.4/mm2, P=0.87).

Conclusions
The TLE group showed significantly lower IOP than the PFM group at 1 and 2 months post-surgery. There were no significant differences in visual acuity or CECD reduction rates between PFM and TLE groups in the early postoperative period.

P-0790

TWO YEAR OUTCOMES OF ANTI-VEGF USE IN AQUEOUS SHUNT SURGERY FOR GLAUCOMA

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Background

There is growing curiosity surrounding the use of anti-VEGF agents to enhance the long term success of glaucoma surgeries. Studies are few for the use of bevacizumab outside of neovascular glaucoma. Furthermore, the result of its use alongside mitomycin-C (MMC) has not been established. The purpose of this study was to compare the 2 year outcomes of aqueous shunt insertion surgeries with and without intraoperative use of anti-VEGF at Moorfields Eye Hospital, London, UK

Methods

Retrospective review using OpenEyes electronic patient records of adult patients who underwent aqueous shunt insertion under the glaucoma service at Moorfields Eye Hospital in 2020 and 2021. Exclusion criteria included surgery without mitomycin-C (MMC) or patients without 2-year follow up.

Results

422 eyes underwent aqueous shunt implantation with MMC of which 45 eyes received intraoperative anti-VEGF. Ninety-one percent of the anti-VEGF group (AV) received bevacizumab as the anti-VEGF agent, given intracamerally. Fifty-six percent of eyes in the AV group and 59% of surgeries in the non anti-VEGF group (NAV) had insertion of a Baerveldt tube, with the remaining receiving mostly Paul glaucoma implants. At 2 years, there was no statistically significant difference in the mean reduction in intraocular pressure (IOP) and number of medications between the AV and NAV groups. The rate of further surgery for an IOP related indication excluding removal of stent suture was 11% in the AV group compared to 7.4% in the NAV group at 2 years.

Conclusions

Widespread use of intraoperative intracameral bevacizumab may have little benefit in glaucoma drainage implant surgery. Larger, prospective trials are required to further elucidate the long-term outcomes of intraoperative anti-VEGF use with glaucoma drainage implants.

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P-0791

COMPARISON OF RETINAL NERVE FIBER LAYER THICKNESS IN THREE TYPES OF PHAKIC INTRAOCULAR LENSES

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Background
Phakic intraocular lenses are commonly used for refractive correction in patients unsuitable for corneal refractive surgery. However, concerns exist regarding their potential effects on intraocular pressure (IOP) and the retinal nerve fiber layer (RNFL), which are critical factors in glaucoma development and progression. This study aims to compare the glaucoma-related impact, among three types of phakic IOLs.

Methods
A retrospective comparative study was conducted on 182 eyes implanted with three types of phakic IOLs. 60 eyes were Implantable collamer lens (ICL), 59 eyes iris-fixated Artisan lens, and 63 eyes with foldable iris-fixated Artiflex lens. Each patient underwent Intraocular pressure(IOP) and RNFL thickness measurement. ANOVA analysis was conducted to compare RNFL thickness and IOP changes across the three groups, and paired t-test for intergroup comparisons. RNFL thickness was categorized into Top 5% (thickest) and Bottom 5% (thinnest) measurements. The proportion of each lens type within these categories was analyzed. Kaplan-Meier survival analysis was conducted using the bottom 5% RNFL thickness cutoff as the event threshold. Time-to-event was defined as the duration from lens insertion to RNFL thickness falling below the cutoff, with censoring for cases without events during follow-up. Survival curves for each lens type were compared using the log-rank test, with significance set at $p < 0.05$.

Results
Baseline characteristics, including age, gender, insertion duration, use of intraocular pressure-lowering medication, axial length, anterior chamber depth (ACD), and IOL diopter, showed no significant differences among the three groups. The mean IOP was 15.7 mmHg in the Artisan group, 16.9 mmHg in the Artiflex group, and 18.2 mmHg in the ICL group. While there was no significant difference between the Artisan and Artiflex groups (Tukey, p=0.405), significant differences were observed between the ICL and Artisan groups(Tukey, p=0.008). The mean RNFL thickness was 81.2 µm in the ICL group, 93.1 µm in the Artiflex group, and 86.9 µm in the Artisan group. A significant difference was observed between the Artiflex and ICL groups (Tukey, $p = 0.002$). The mean RNFL thickness was 86 µm, and the proportion of eyes falling below the bottom 5% cutoff value was 18.3% in the ICL group, 13.5% in the Artisan group, and 6.7% in the Artiflex group. Kaplan-Meier survival analysis, using the bottom 5% RNFL thickness as the event threshold, showed a mean survival time of 8.1 years for the ICL group, 7.5 years for the Artisan group, and 7.8 years for the Artiflex group. However, no statistically significant difference was observed in survival distributions among the groups (log-rank test, $p > 0.05$).

Conclusions
The ICL group showed higher mean IOP and thinner RNFL compared to the Artisan and Artiflex groups. Although ACLs are known to have a higher association with glaucoma, close monitoring of RNFL thickness and IOP is recommended for patients with ICLs.

P-0793
OUTCOMES AND COMPLICATIONS OF CATARACT SURGERY IN NANOPHTHALMIC EYES WITH PREEXISTING ANGLE CLOSURE

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Background
Nanophthalmos is characterized by proportionally small eyes with short axial length (AL), reduced ocular volume and shortening of both the anterior and posterior segments without other major ocular malformation.[1] It is often associated high lens/eye volume ratio, crowded anterior segment and hyperopia typically ranging from +8 D to +25.00D.[2] Generally lens extraction plays an important role in reliving angle closure, deepening the anterior chamber and possibly control the IOP. There is limited evidence on the effect of lens extraction on IOP control in nanopthalmic eyes. Moreover, intraocular surgeries in nanophthalmic eyes have significant risks and complications, both intraoperatively and postoperatively.

Methods
Purpose: To evaluate the refractive and visual outcomes, glaucoma control, and complications in nanophthalmic eyes with preexisting angle closure undergoing cataract surgery

Setting: Tertiary eye care centre

Methods
Preoperative, intraoperative, and postoperative data of nanophthalmic eyes (axial length ≤20 mm) undergoing cataract surgery were analysed. Primary outcome measures included best-corrected visual acuity (BCVA), intraocular pressure (IOP), and the number of antiglaucoma medications at the final visit. Secondary outcomes included complications observed during follow-up.

Results
A total of 61 eyes from 46 patients (mean age: 51.5 ± 11 years) were included. The mean axial length was 16.75 ± 1.5 mm. Preoperatively, laser peripheral iridotomy was performed in 59 eyes. Post-surgery, BCVA significantly improved from 1.2 ± 0.7 LogMAR to 0.9 ± 0.5 LogMAR ($p < 0.05$). Mean IOP decreased by 3.7 mmHg (from 17.4 ± 10 mmHg to 13.7 ± 2.5 mmHg, $p < 0.05$), and the mean number of antiglaucoma medications reduced by 0.6 (from 2.2 ± 1 to 1.6 ± 0.9, $p < 0.05$). Complications were observed in 11 eyes (18%), with the most common being malignant glaucoma (5 eyes, 8.2%) and uveal effusion (3 eyes, 4.9%). Additional interventions to control IOP were required in 5 eyes (8%).

Conclusions
Cataract surgery significantly improves visual acuity, reduces IOP, and decreases the need for antiglaucoma medications in nanophthalmic eyes. However, these cases carry a notable risk of complications, emphasizing the importance of meticulous preoperative assessment and vigilant postoperative follow-up for optimal outcomes.

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P-0794

SHORT-TERM OUTCOMES OF TRABECULECTOMY FOLLOWING MICROPULSE TRANSSCLERAL LASER THERAPY: A PILOT STUDY

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Background

Micropulse transscleral laser therapy (MPTLT) has emerged as a non-incisional treatment option for glaucoma. However, some patients may still require trabeculectomy for adequate intraocular pressure (IOP) control after MPTLT. The impact of prior MPTLT on subsequent trabeculectomy outcomes remains unclear. This study evaluated the short-term efficacy and safety of trabeculectomy in eyes previously treated with MPTLT.

Methods

This retrospective study included 16 eyes from 16 Japanese patients who underwent primary trabeculectomy after MPTLT. MPTLT was performed using the Cyclo G6 (Iridex) with either the original or revised probe, set at 2,000-2,500 mW output. The laser targeted 180-360 degrees of the limbus, with session durations ranging from 80 to 200 sec. Trabeculectomy with mitomycin C was performed due to insufficient IOP control following MPTLT.

Results

The mean age of patients was 63.1 ± 21.1 years. Among the 16 eyes, 10 were diagnosed with primary open-angle glaucoma, 3 with secondary glaucoma, 1 with normal-tension glaucoma, 1 with exfoliation glaucoma, and 1 with combined mechanism glaucoma. Prior surgeries included trabectome surgery in 4 eyes, microhook trabeculotomy ab interno in 2 eyes, trabeculotomy in 2 eyes, vitrectomy in 1 eye, and intrascleral intraocular lens fixation combined with vitrectomy in 1 eye before MPTLT. In terms of lens status, 10 eyes were pseudophakic and 6 were phakic. Thirteen eyes underwent a single session of MPTLT, 2 eyes had two sessions, and 1 eye had three sessions. The mean preoperative IOP decreased significantly from 30.5 ± 8.8 mmHg to 11.8 ± 4.0 mmHg at 6 months post-trabeculectomy ($p < 0.001$). The mean number of glaucoma medications also reduced significantly from 3.8 ± 1.0 to 0.3 ± 1.0 ($p < 0.001$). Postoperative complications included shallow anterior chamber and choroidal detachment in 1 eye, macular edema in 1 eye, spontaneously remitted hypotensive maculopathy in 2 eyes, hyphema requiring anterior chamber irrigation in 1 eye, and malignant glaucoma necessitating zonulo-hyaloidectomy-iridectomy combined with vitrectomy in 1 eye. No additional glaucoma surgeries were needed within the 6-month follow-up.

Conclusions

MPTLT does not appear to adversely affect the outcomes of subsequent trabeculectomy. It may be a valuable step in the surgical management of glaucoma, although further studies with larger sample sizes and longer follow-up are warranted to confirm these findings.

P-0795

SHORT-TERM OUTCOMES OF LENSECTOMY FOLLOWING LASER PERIPHERAL IRIDOTOMY IN ACUTE PRIMARY ANGLE CLOSURE

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Background

The timing of lensectomy for acute primary angle closure (PAC) remains controversial due to surgical challenges in acute settings. This study assessed the outcomes of lensectomy performed after laser peripheral iridotomy (LPI) in patients with acute PAC.

Methods

This retrospective study included 43 eyes of 43 patients who underwent LPI followed by lensectomy. Outcome measures included intraocular pressure (IOP), glaucoma medications, best-corrected visual acuity (BCVA), spherical equivalent refraction, complications, corneal endothelial cell density, and additional glaucoma surgery.

Results

The mean patient age was 69.5 ± 12.0 years. LPI was performed 3.2 ± 6.1 days after the acute PAC episode, and lensectomy 16.6 ± 16.4 days after LPI. The mean IOP decreased significantly from 50.8 ± 17.0 mmHg during the acute PAC attack to 18.2 ± 11.5 mmHg after LPI ($p < 0.001$) and further to 13.4 ± 3.9 mmHg at 1 month post-lensectomy ($p < 0.001$). The mean number of glaucoma medications decreased significantly from 3.3 ± 1.6 after LPI to 0.7 ± 1.1 at 1 month post-lensectomy ($p < 0.001$). BCVA improved significantly from 0.9 ± 0.8 logMAR during the acute PAC attack to 0.2 ± 0.3 logMAR at 1 month post-lensectomy ($p < 0.001$). The mean deviation between target and postoperative refraction was 0.78 ± 0.52 diopters. Intraoperative complications included zonular weakness requiring capsular tension ring insertion (14.0%), zonular dehiscence (4.7%), and retinal tear (2.3%), with 4.7% of eyes resulting in aphakia. Postoperative complications included IOP spikes (2.3%) and macular edema (4.7%). Corneal endothelial cell density showed a non-significant decline at 1 month post-lensectomy ($p = 0.381$). Additional glaucoma surgeries were required in 4.7% of eyes.

Conclusions

Lensectomy following LPI for acute PAC appears to be a safe and effective procedure, achieving satisfactory IOP control and small deviation from target refraction with acceptable complication rates. However, further long-term studies with larger sample sizes comparing lensectomy with and without prior LPI in acute PAC are needed to validate these findings.

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P-0796

COMPARATIVE EFFECTIVENESS AND SAFETY PROFILE OF DIFFERENT TYPES OF MIGS DEVICES IN PATIENTS WITH OPEN ANGLE GLAUCOMA

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Background

This study compared outcomes and safety profile of 3 different MIGS devices in patients with open angle glaucoma. Intraocular pressure (IOP) reduction, reduction of medications as well as early and late complications were observed in patients who received iStent, MINIject and Preserflo implants. All three devices are implanted in different anatomical areas: iStent in trabecular meshwork, MINIject in supraciliary space and Preserflo in subconjunctival space.

Methods

One Hundred and twenty two subjects with open angle glaucoma were included in this single-centre, retrospective study. Ninety seven patients underwent phacoemulsification either with iStent (85 eyes) ,MINIject (13 eyes) or Preserflo implant (24 patients)as a stand alone procedure. Outcomes were recorded at months 1, 3, 6 and 12 after the surgery. Outcomes included IOP reduction, medication dependency, early and late complications. The study also looked at the number of post operative visits required.

Results

All devices achieved IOP reduction by an average of 31.5% during the period of observation. The most significant reduction was achieved in Preserflo eyes 57%. Miniject achieved 37% IOP reduction and istent 22% IOP reduction. At 1, 3, 6 and 12 months versus baseline, mean IOP reduced from 18.2 mmHg to 13.9 mmHg at 1 month after surgery, 14.2 mmHg at 3 and 6 months and 13.6 mmHg at 12 months after the surgery in eyes with istents. From 22 mmHg to 14.9 mmHg, 15.7 mmHg and 16.1 mmHg at month 1,3 and 6 respectively in eyes with MINIject. From 26.6 mmHg to 11.6mmHg; 12.9 mmHg; 11.7 mmHg and 14 mmHg at month 1,3,6 and 12 respectively in eyes with Preserflo implants. Mean number of glaucoma medications reduced from 2.13 to 1.91 in iStent eyes, from 2.38 to 1.46 in MINIject eyes and from 3.33 to 0.33 in Preserflo eyes. The most common early complication was hyphema which was present in 10% of all cases. This resolved spontaneously in all cases. Hyphema was present in 54% of MINIject , 13% of preserflo and 2% of istent patients. Choroidal detachment was present in 17% of Preserflo patients , but only 8% required secondary intervention for resolution. Early IOP spike appeared in 2% of patients. Cystoid macula oedema was observed in 5% of istent patients.

Conclusions

Preserflo implant offered the most effective IOP reduction and medication reduction. However, it required the highest number of post operative visits and post operative interventions. IStent offered a very sustainable IOP reduction of 28% after 12 months with small number of complications. MINIject appeared to be very effective in the initial 3 months after the surgery, however, its efficacy diminished with time. It eventually achieved similar results to istent, but was associated with a higher complication rate.

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P-0797

REAL-LIFE SAFETY AND EFFICACY RESULTS OF A SUPRACILIARY DRAINAGE DEVICE AT 12 MONTHS (STAR-LIFE)

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Background
The safety and efficacy of a novel, minimally-invasive glaucoma surgery (MIGS) device (MINIject®; iSTAR Medical, Belgium) implanted ab interno into the supraciliary space in glaucoma patients is described in a real-life setting.

Methods
STAR-LIFE is a real-life, observational, multi-centre registry with follow-up until two years in up to 320 adult patients diagnosed with open-angle glaucoma. Patients were treated in either a standalone procedure (phakic or pseudophakic) or combined with cataract surgery, and followed according to the surgeon's standard of care with no medication washout. The primary endpoint was the reporting of unexpected incidents and/or serious reportable incidents, and secondary endpoints included intraocular pressure (IOP) measurements and ocular hypotensive medication use compared with baseline. Interim results from the first 145 patients who completed 12-month follow-up are reported here.

Results
In 12 sites in Germany, Switzerland, the UK, and Austria, 145 patients were followed until 12 months. Mild-to-moderate glaucoma was reported in 61.1% of patients. Mean baseline IOP prior to implantation was 21.0±6.7 mmHg using 2.7±1.5 IOP-lowering medications. At 12-month follow-up, mean IOP was 15.1±6.0mmHg (-5.9mmHg, -23.0%; p<0.0001) on 1.5±1.6 medications (-1.1, -43.4%; p<0.0001). Further, 53.1% of patients achieved an IOP reduction of >=20% from baseline, 77.2% achieved an IOP <=18 mmHg, and 42.1% of patients were medication-free. Either an IOP reduction of >=20% and/or a reduction in medication was shown in 82.1% of patients. Outcomes after standalone (84.1% patients) vs combined-cataract surgery were similar. There were no unexpected nor serious reportable incidents. Serious incidents related to MINIject included: anterior chamber (AC) inflammation, narrow AC, vitreous haemorrhage (all 0.7%), hyphaema (1.4%), device migration (2.1%), hypotony (3.4%) and IOP increase (4.1%). All incidents resolved apart from one IOP increase treated only with medication. Secondary surgical interventions related to MINIject occurred in 7.6% of patients.

Conclusions
In a diverse number of centres in the STAR-LIFE study, a meaningful mean IOP reduction of 5.9mmHg was achieved 12 months after treatment with MINIject, in addition to a mean 1.1 medication reduction. This supraciliary MIGS procedure offers a valuable bleb-free treatment option for patients with glaucoma, either as a standalone procedure or in combination with cataract surgery, with minimal complications.

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P-0798

PREOPERATIVE CONJUNCTIVAL VESSEL DENSITY IS PREDICTIVE FOR EARLY REINTERVENTION AFTER PRESERFLO MICROSHUNT IMPLANTATION

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Background
While preoperative conjunctival vascularization has long been linked to surgical success after filtration surgery, clinical quantification of conjunctival vessels may, however, be challenging due to observer-dependent, subjective grading and reduced visibility of deeper vessels. Anterior segment optical coherence tomography angiography (AS-OCTA) allows for the objective, quantitative and depth-resolved assessment of conjunctival vascularization and was, therefore, used in this study, to evaluate the predictive potential of preoperative conjunctival vessel density for early reintervention until 6 months after Preserflo Microshunt (PM) implantation.

Methods
After prospective study inclusion, preoperative clinical assessment, limbal marking of targeted implantation position and conjunctival AS-OCTA imaging (PlexElite 9000, Zeiss Meditec), PM implantation was performed in 21 patients with uncontrolled open-angle glaucoma. Patients were clinically followed for 6 months regarding IOP and necessity for reintervention. AS-OCTA images were exported to ImageJ where further processing (artefact removal, binarization) was performed. Preoperative conjunctival vessel density (CVD) was calculated for circular conjunctival areas (diameter: 550 pixels) adjacent to the implantation position marking.

Results
Preoperative IOP was 23.65±5.53 mmHg and decreased to 8.19±2.66, 8.71±2.45, 13.29±8.39, 10.78±2.80, 10.78±3.04 and 12.18±3.70 mmHg one, two, four and eight weeks as well as 6 months after surgery. In three patients reinterventions were necessary (3 needlings, 1 open bleb revision, 1 Ahmed tube implantation) with first reinterventions (all needlings) being necessary in all three patients 4 weeks after primary surgery. Logistic regression modelling revealed that preoperative CVD was significantly associated with necessity for reintervention until 6 months after surgery ($p=0.0498$, AUC: 0.7963). No correlation between CVD and postoperative IOP or IOP percentage change (r between -0.1777 and 0.3453, $p>0.05$ at any postoperative timepoint) was found.

Conclusions
In this study preoperative CVD was associated with necessity for reintervention but not with postoperative IOP until 6 months after surgery. While preoperative CVD was previously shown to correlate with surgical success after trabeculectomy, the present results are the first evidence that this also holds true after PM implantation with more posterior and differentially organized blebs.

P-0799

EYETUBE, A NOVEL GLAUCOMA DEVICE DRAINING AQUEOUS HUMOR IN THE PERIORBITAL FAT: 6 MONTHS FOLLOW-UP DATA

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Background

The eyeWatch implant (eW) (Rheon Medical, Lausanne, Switzerland) was first described in 2014, and designed to better control IOP fluctuations and avoid hypotony during the early postoperative period. The innovation of the device lies in the possibility to finely adjust aqueous humor outflow resistance through a magnetically-based mechanism that allows for a rotating magnetic disk to variably change the compression, and thus the opening and fluidic resistance of the silicone tube.

A novel device the eyeTube, consists of a silicone drainage tube measuring 40 mm in length, with dimensions comparable to other seton tubes (outer diameter: 0.63 mm, inner diameter: 0.3 mm). It features 30 perforations, each 80 µm in diameter, evenly distributed over 180° at its distal end. This unique design enhances the diffusion area for aqueous humor beneath the conjunctiva and within the orbital space. Once in position, the eyeTube is connected to an eyeWatch.

This allows for periorbital aqueous humor drainage and supposedly less bleb-related complications. Previous experience with a similar approach was published by Sponsel et al. (2014). Their results demonstrated that aqueous humor can be effectively diverted from the anterior chamber to the retrobulbar space.

Methods

Prospective, single-center study of patients undergoing eyeTube insertion. As the procedure is innovative, only eyes lost to terminal glaucoma, with no visual acuity were included, and the procedure was only offered as a palliative pain management method after informed consent was obtained.

Results

15 eyes of 15 patients were included in the study. Preoperative IOP was 27.6 ± 4.08 mmHg with a mean number of 3.27 ± 0.46 preoperative hypotensive medications.

Postoperatively, IOP was reduced to 7.14 ± 2.32, 13.23 ± 4.94, 10.92 ± 2.40 and 11.30 ± 1.64 mmHg at day 1, day 7, month 1 and month 3 respectively. All medications were dropped after surgery.

At the latest follow up at M6, mean IOP was 16.62 ± 1.71 mmHg with no medication ($p<0.01$).

Two patients out of 15 (13.33%) required additional surgery. One had an anteriorly placed eyeWatch in the chamber, that was repositioned. The second had an exposed eyeWatch requiring repositioning and fixation. None of the patients suffered from serious complications.

Conclusions

Glaucoma tube drainage are the most invasive yet effective IOP-lowering devices currently used in glaucoma. They however suffer from both immediate hypotensive-related complications, as well as late onset bleb-related complications. The eyeTube aims to address these challenges by enabling precise control of the valve's tubular opening through the eyeWatch system and positioning the bleb within the periorbital fat. This approach minimizes complications related to scarring, fibrosis, and inflammation-driven responses. The present study shows highly promising results in managing end-stage glaucoma, which need to be validated through further studies.

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P-0800

ANTIFIBROTIC-FREE DEEP SCLERECTOMY COMBINED WITH ESNOPER CLIP IMPLANTATION FOR UNCONTROLLED PRIMARY OPEN-ANGLE GLAUCOMA

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Background
This prospective study evaluates the efficacy and safety of supraciliary Esnoper Clip (EC) drainage device implantation in deep sclerectomy (DS) without antifibrotic agents, as a treatment for uncontrolled primary open-angle glaucoma (POAG).

Methods
A total of 50 eyes of 45 patients (27 female, 18 male) with uncontrolled POAG underwent DS with EC (AJL Ophthalmic, Alava, Spain) implantation between October 2017 and September 2023 at the University Hospital Kralovske Vinohrady, Prague, Czech Republic. No antifibrotic agents were used peri- or postoperatively. Intraocular pressure (IOP), the number of glaucoma medications, goniopunctures, needlings, and complications were recorded at 1 day, 1 week, and at 1, 3, 6, and 12 months postoperatively.

Results
The mean preoperative IOP was 22.4 ± 7.1 mmHg, showing a significant reduction at each assessment point and reaching 14.1 ± 3.6 mmHg at the final 12-month evaluation ($p < 0.001$). The mean number of medications dropped significantly at all follow-ups, decreasing from 3.1 ± 0.8 preoperatively to 0.5 ± 1.0 at 12 months ($p < 0.001$). The complete success rate (IOP ≤ 21 mmHg without glaucoma medication) and the qualified success rate (IOP ≤ 21 mmHg with or without glaucoma medication) were 80.0% and 94.0%, respectively. Nd-YAG goniopuncture was performed in 38.0% of eyes, while no needling procedures were required throughout the study period. Regarding complications, intraoperative microperforation of the trabeculodescemet membrane occurred in 6% of eyes. Postoperatively, mild hyphema occurred in 16% of eyes on day 1 and 4% at one week. Hypotony (2–5 mmHg) was noted in 34% of eyes on day 1 and 32% at week 1, while anterior chamber shallowing was observed in 12% on day 1 and 2% at week 1. By one month, no patients showed any signs of hypotony, anterior chamber shallowing, or choroidal detachment. Additionally, no changes in visual acuity were observed at the final follow-up visit.

Conclusions
Supraciliary EC implantation in DS without antifibrotic agents is a safe and effective treatment for managing uncontrolled POAG. This procedure achieves significant and sustained IOP reduction, demonstrates a relatively low complication rate, and decreases the need for adjunctive glaucoma medications over a 1-year follow-up period.

P-0801

EXPLORING MYRIOCIN AS AN ADJUVANT IN GLAUCOMA SURGERY: AN *IN VITRO* STUDY

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Background

The main reason for glaucoma surgery failure is represented by the excessive subconjunctival scarring, primarily caused by the transformation of Tenon's fibroblasts into myofibroblasts. Antiproliferative agents like Mitomycin C (MMC) are widely used to prevent scarring but are associated with significant cytotoxicity and complications. Myriocin (Myr), a natural inhibitor of sphingolipid synthesis, has shown anti-inflammatory and antifibrotic properties in other conditions. This study investigates the antifibrotic efficacy and cytotoxicity of Myr as a potential adjuvant in glaucoma surgery.

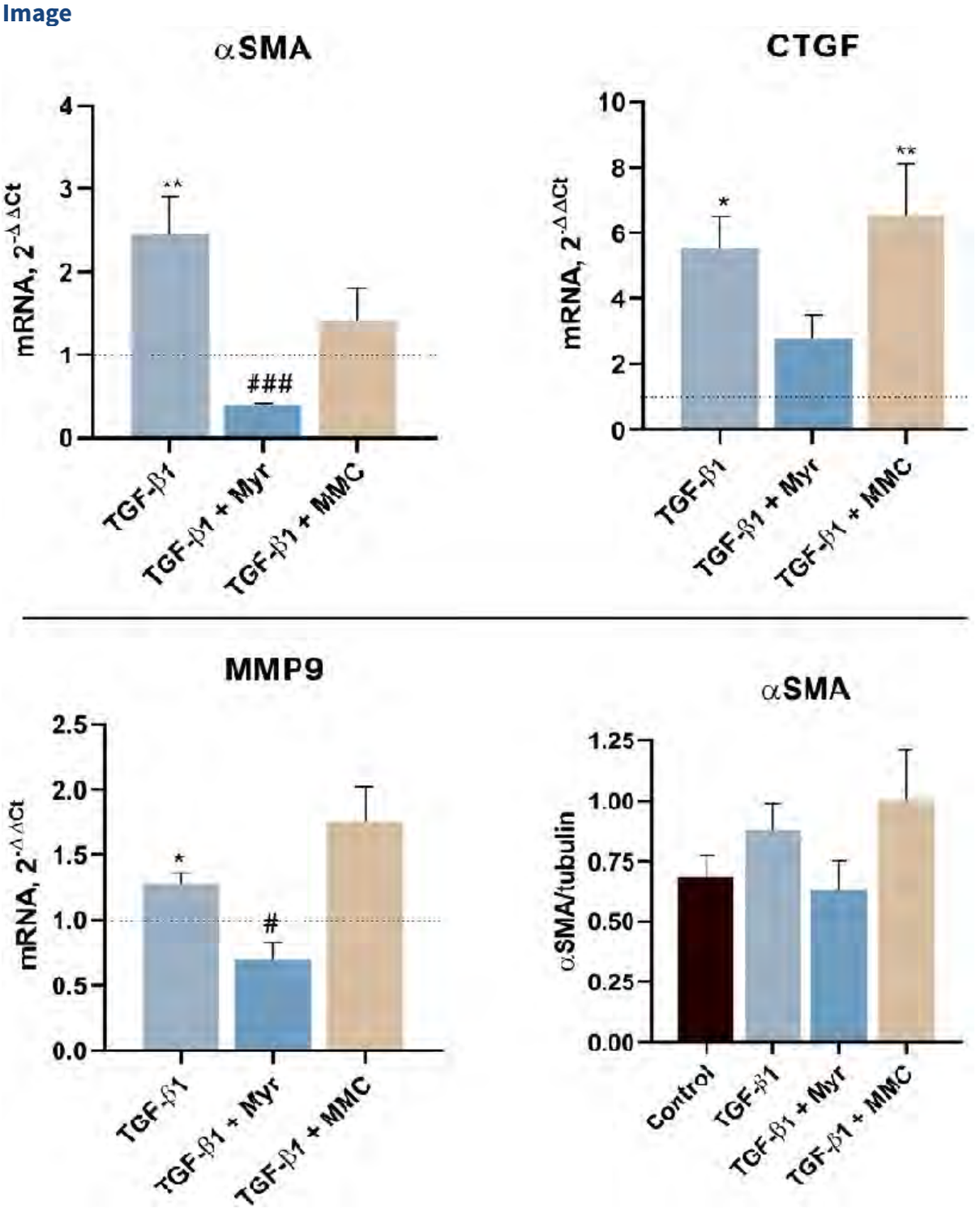
Methods

Human dermal fibroblasts (HDFs), used as a substitute for Tenon's fibroblasts, were treated with transforming growth factor-beta (TGF-β1) to induce myofibroblast transformation. Myr and MMC were applied as pre-treatments, and their effects on fibrosis markers (α-SMA, CTGF, MMP9) and collagen deposition were evaluated using qPCR, Western blotting, and immunofluorescence. Cell motility was evaluated via scratch wound assays, while cytotoxicity and proliferation were analyzed using annexin staining and CFSE assays. The influence of Myr on sphingolipid metabolism was measured via LC-MS/MS.

Results

Myr significantly reduced TGF-β1-induced expression of fibrosis markers and collagen deposition, restoring levels close to control values, whereas MMC had a limited effect on these markers, as shown in figure 1. Both Myr and MMC inhibited fibroblast motility comparably, as demonstrated by the scratch wound assay, which revealed reduced wound closure at 24 and 48 hours post-treatment.. Myr demonstrated lower cytotoxicity than MMC, preserving cell viability and proliferation. Myr also reduced sphingolipid accumulation induced by TGF-β1. Prolonged Myr exposure showed good tolerability compared to MMC, which exhibited substantial apoptotic and antimitotic effects.

Image



Conclusions

Myr represents a promising co-adjuvant for glaucoma surgery due to its antifibrotic efficacy and favorable safety profile. Its ability to inhibit fibroblast-to-myofibroblast transformation, reduce collagen deposition, and maintain cell viability highlights its potential as a safer alternative to MMC. Further studies on Tenon's fibroblasts and *in vivo* models are necessary to validate these findings.

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P-0802

PROSPECTIVE RCT OF BENT AB INTERNO NEEDLE GONIECTOMY VERSUS CONSERVATIVE TREATMENT FOR EVALUATION OF IOP , AGM AND QOL IN POAG PATIENTS

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Background

Minimally Invasive Glaucoma Surgery (MIGS) is being in use since last decade. Bent Ab Interno Needle Goniectomy (BANG) is a cost effective MIGS procedure compared to other MIGS. Most of studies in literature reflect combining it with cataract in mild to moderate POAG patients. Standalone BANG is not described in literature. We did a prospective, randomized, controlled, comparative study of BANG versus Conservative Treatment in mild to moderate POAG patients. Being cost effective, BANG is more suitable for developing countries.

Methods

46 patients were recruited prospectively from glaucoma clinic of a tertiary institute and randomized in two groups- Group A: BANG (N=23) and Group B: Conservative management (N=23). Group A underwent BANG and Group B managed conservatively. Patients were evaluated for IOP control, number of AGMs and QOL as primary outcome and VA, VF, Endothelial cell density, CCT and complications as secondary outcome at baseline and follow up visits at 1,7,30 , 90 and 120 days. For IOP, success was defined as IOP <21 mmHg or at least 20% reduction from baseline.

Results

Our stand-alone BANG study showed that mean IOP decreased from15.21±2.81mmHg at baseline to 12.6±2.78 mmHg and AGMs decreased from 2.69 at baseline toon 0.30±0.55 at 6 months (p=<0.006).The percentage reduction was 19.4%, but all pts had IOP < 21mm Hg. Thus, our study was successful in reducing both IOP and number of AGMs significantly, proving BANG to be efficacious in controlling IOP in Mild-Moderate Glaucoma. Also, significant Improvement was noticed in Quality of life in Surgical Group compared to Medical Group.

Conclusions

Standalone BANG is a cost effective procedure suitable for developing countries. IOP decreased by 19.4% and AGMs decreased by 88.84 % at 6 months. BANG can be an alternative to costly MIGS. Quality of life also improved in BANG group.

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P-0804

IOP AND SAFETY OUTCOMES FOLLOWING IMPLANTATION OF ISTENT INFINITE OR HYDRUS MICROSTENT IN PATIENTS WITH OPEN-ANGLE GLAUCOMA: 6-MONTH RESULTS

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Background

Comparison of intraocular pressure (IOP) and safety of 2 current generation trabecular bypass stent technologies implanted in patients with open-angle glaucoma.

Methods

In this prospective, randomized, controlled multicenter study in 180 eyes of patients 35-85 years with OAG, inclusion criteria included preoperative mean IOP ≤24 mmHg on 0-3 IOP-lowering medications and baseline unmedicated mean diurnal IOP (MDIOP) 21-36 mmHg following a medication washout period. Eligible eyes were randomized to standalone implantation of iStent infinite trabecular micro-bypass stents or Hydrus microstent. Month 6 analyses assessed the proportion of eyes in each group achieving ≥20% reduction in MDIOP from baseline, a primary effectiveness analysis of the proportion of eyes with ≥20% reduction in unmedicated MDIOP from baseline with no surgical complications, and reduction from baseline in MDIOP. Safety assessments entailed surgical complications, adverse events (AEs), gonioscopy, slit-lamp exam, visual acuity, visual field and fundus exam.

Results

In 91 iStent infinite eyes, screening mean (± standard deviation [SD]) IOP was 17.0±3.2 mmHg on 1.6±0.9 medications and baseline unmedicated MDIOP was 23.7±2.9 mmHg. In 89 Hydrus eyes, screening mean IOP was 17.1±3.3 mmHg on 1.5±0.9 medications and baseline unmedicated MDIOP was 23.5±2.7 mmHg. At Month 6, MDIOP reduction ≥20% from baseline was achieved in 82.7% of iStent infinite vs. 78.9% of Hydrus eyes regardless of IOP medication use or surgical complications (p=0.3795); 78.2% of iStent infinite vs. 65.0% of Hydrus eyes had unmedicated MDIOP reduction ≥20% with no surgical complications (p=0.0111). Mean MDIOP reduction from baseline, regardless of IOP medication use or surgical complications, was 7.4±2.9 mmHg in iStent infinite and 7.2±2.9 mmHg in Hydrus eyes (p=0.4732). Unmedicated MDIOP reduction without surgical complications was 6.8±4.1 mmHg in iStent infinite and 5.7±4.1 mmHg in Hydrus eyes (p=0.0147). The rate of AEs was 24.2% in eyes implanted with iStent infinite and 36.0% in eyes with Hydrus stents.

Conclusions

Results through Month 6 of this study comparing IOP and safety outcomes following standalone implantation of 2 current trabecular stent technologies in OAG eyes showed high proportions in both groups with clinically meaningful IOP reduction. When considering surgical complications as failures, a statistically significantly higher proportion of iStent infinite versus Hydrus eyes achieved a MDIOP reduction ≥20%.

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P-0807

ONE-YEAR EFFICACY AND SAFETY OF NOVEL MINIMALLY INVASIVE GLAUCOMA SURGERY USING THE DIAMOND DUSTED SWEEPER

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Background

To evaluate the 1-year efficacy and safety of phacoemulsification cataract extraction combined with gonio scratch (GS-Phaco), a novel minimally invasive glaucoma surgery using the Diamond Dusted Sweeper, in patients with open-angle glaucoma and cataracts.

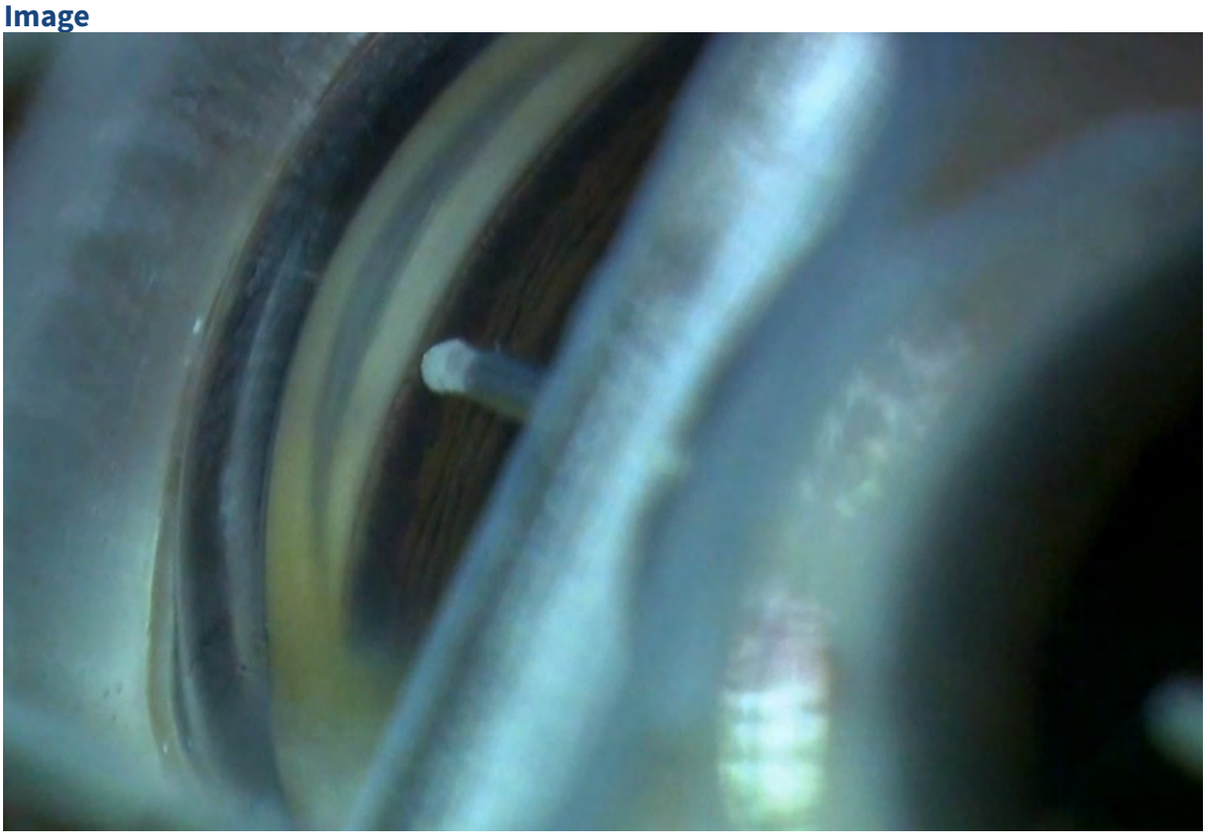
Methods

This prospective multicenter clinical trial was conducted at Hiroshima University Hospital, Yokoyama Retina Clinic, Kusatsu Eye Clinic, and Miyoshi Eye Clinic in Japan. The primary outcome measure was the rate of intraocular pressure (IOP) control. Failure was defined as IOP of >18 mmHg or a <20% reduction from baseline pressure on two consecutive follow-up visits after 3 months, the need for additional glaucoma surgery, or loss of light perception. Kaplan–Meier analysis was used to assess surgical success rates.

Results

Forty-seven eyes of 47 patients who underwent GS-Phaco surgery were included in the analysis. None of the patients had undergone prior ocular surgery. The median baseline IOP was 17 mmHg. At 1 year postoperatively, there was a significant reduction in IOP to a median of 12 mmHg ($P < 0.01$). The number of glaucoma medications also decreased significantly, from a median of two to one ($P < 0.01$). The surgical success rate at 12 months was 80.9%. The only complication observed was transient elevation of IOP in two (4.3%) eyes. No patients developed anterior chamber hemorrhage or hyphema with niveau.

Image



Conclusions

GS-Phaco achieved sustained IOP reduction and a decrease in medication use at 1 year postoperatively in patients with open-angle glaucoma and cataracts.

P-0808

LONG TERM OUTCOMES OF NEEDLE ASSISTED CIRCUMFERENTIAL GONIOTOMY (NAG) IN PRIMARY CONGENITAL GLAUCOMA

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Background

Aim: To evaluate the long-term outcomes of Needle assisted circumferential Goniotomy (NAG) in Primary Congenital Glaucoma (PCG)

Methods

This is a hospital-based prospective interventional study. Patients diagnosed with PCG, age <2 years with good corneal clarity, who underwent NAG procedure in a single tertiary eyecare center were included in the study. The patients were followed up regularly in the post operative period. The pre and post operative intraocular pressure (IOP), number of anti-glaucoma medications (AGMs), corneal diameter, axial length, fundus findings, any complications were recorded at 3, 6, 9, 12, 18 & 24 months. The data was analyzed prospectively. Outcomes were defined as absolute success when IOP is ≤ 18 mmHg, Qualified Success when IOP ≤18mmHg on ≤ 2 AGMs and failure when IOP is >18 on 2 topical AGMs.

Results

Total 52 eyes (14 bilateral, 24 unilateral) of 31 children were included in the study. 80.6% were males and 19.4% were females with mean age of 1.14±1.04 years. The baseline IOP was 23.28±5.98 mmHg, which decreased to 11.03±5.06mmHg at 3 months, 12.08±3.80mmHg at 6months, 12.54±5.09mmHg at 12 months 12.5±2.3mmHg at 24months, p-value<0.001. The mean number of topical AGMs reduced from 2.48±1.03 to 1.35±1.23 at 12 months follow up, p-value<0.001. The mean follow up period was 21.6±3.09 months. Complete success was seen in 88.46% (46/51) eyes. Failure was noted in 11.52% (10/51) eyes, out of which, 9.61% (9/51) eyes required trabeculectomy. There was no significant vision threatening intraoperative or postoperative complications.

Conclusions

24G Needle assisted circumferential Goniotomy (NAG) is a safe and effective surgical procedure to control the IOP in PCG with fair corneal clarity. NAG being a single-sitting, minimally invasive circumferential angle surgery while sparing the superior conjunctiva completely for future surgeries if needed.

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P-0809

COMPARISON OF THE EFFICACY OF HYDRUS MICROSTENT, OMNI CANALOPLASTY, AND COMBINATION HYDRUS WITH OMNI IN THE MANAGEMENT OF GLAUCOMA

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Background
Recent advances in microinvasive glaucoma surgeries (MIGS) include the Hydrus microstent and OMNI canaloplasty. The purpose of this project was to compare the efficacy and safety of the combination Hydrus/OMNI procedure with the solo Hydrus and OMNI surgeries.

Methods
A retrospective chart review was conducted with pre-procedure and 3-year post-procedure data from medical records of 64 eyes from glaucoma patients who underwent either the Hydrus, OMNI, or Hydrus/OMNI combination procedure at the time of cataract surgery at the Eye Consultants of Pennsylvania between June 2019 and August 2022.

Results
The analysis included 30 eyes undergoing the combination procedure, 24 eyes with Hydrus, and 10 eyes with OMNI. The mean improvement in best corrected visual acuity (BCVA) was -0.21(±0.25) logMAR for patients with the combination procedure, -0.17(±0.20) logMAR for Hydrus, and +0.18(±0.64) logMAR for OMNI. BCVA improvement was significantly higher in comparing combination to OMNI (p=0.005) and Hydrus to OMNI (0.017). Patients who underwent OMNI had the highest mean reduction in IOP (5.20±8.02 mmHg), followed by the combination procedure (2.30±3.16 mmHg), then Hydrus (0.71±3.41 mmHg). OMNI had a significantly greater IOP reduction than Hydrus (p=0.023). The mean increases in optical coherence tomography retinal nerve fiber layer (OCT RNFL) thickness were 0.36(±4.65) µm for the combination procedure, 2.15(±4.96) µm for Hydrus, and 9.75(±15.93) µm for OMNI. Both the combination procedure (p=0.007) and Hydrus (p=0.048) had significantly less OCT RNFL thinning when compared to OMNI. There was a mean reduction in number of glaucoma medications used for all three cohorts of combination procedure (0.43±0.63), Hydrus (0.71±1.12), and OMNI (0.80±1.03), which did not differ significantly from each other. There were no significant differences in the change in optic cup-to-disc ratios (CDR) amongst all three procedures. The mean number of adverse events was 0.03(±0.18) for the combination procedure, 0.08(±0.41) for Hydrus, and 0.70(±1.57) for OMNI. Both the combination procedure (p=0.024) and Hydrus (p=0.049) had significantly fewer adverse events than OMNI.

Conclusions
The combination procedure is comparable to the solo Hydrus and OMNI procedures in reducing IOP, number of glaucoma medications, and CDR enlargement at the 3-year post-operative timepoint. The combination procedure outperformed OMNI in improving visual acuity and minimizing OCT RNFL thinning and adverse events.

P-0810

BANG WITH CATARACT SURGERY: A COMPARATIVE STUDY OF POSTOPERATIVE IOP AND MEDICATION REDUCTION FOR GLAUCOMA MANAGEMENT IN RESOURCE-LIMITED SETTINGS

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Background
Bent Ab interno Needle Goniectomy (BANG) is a novel, low-cost, minimally invasive glaucoma surgery (MIGS) that utilizes readily available materials, making it particularly suitable for resource-limited settings. When combined with cataract surgery, BANG has been proposed to achieve superior postoperative intraocular pressure (IOP) control and reduced medication dependency compared to cataract surgery alone. However, direct comparative data are limited. This study aimed to evaluate postoperative IOP and glaucoma medication changes in patients undergoing BANG combined with cataract surgery versus cataract surgery alone in a retrospective comparative analysis.

Methods
A retrospective comparative case series was conducted at Hospital Sótero del Río, Santiago, Chile. Starting December 2023, 27 BANG procedures were performed; 26 cases were analyzed after excluding one patient with prior scleral band implantation and vitrectomy. Matched control cases (cataract surgery alone) were selected based on three variables: type of glaucoma (Primary Open-Angle Glaucoma, Chronic Primary Angle-Closure Glaucoma, or Pseudoexfoliative Glaucoma), baseline IOP (±3 mmHg), and baseline number of glaucoma medications used (1, 2, or ≥3). Postoperative IOP and medication changes were compared using Student's t-test.

Results
At baseline, the mean number of glaucoma medications was 2.23 ± 0.56 in both the BANG + Cataract Surgery group and the Cataract Surgery Only group. At one month postoperatively, the medication usage decreased to 1.58 ± 0.86 in the BANG + Cataract Surgery group versus 2.23 ± 1.03 in the Cataract Surgery Only group, demonstrating a significant reduction favoring BANG + Cataract Surgery ($p < 0.001$). Baseline IOP was 15.1 ± 5.6 mmHg in the BANG + Cataract Surgery group and 15.5 ± 5.6 mmHg in the Cataract Surgery Only group. At one month, IOP decreased to 12.2 ± 5.3 mmHg in the BANG group and 13.0 ± 6.1 mmHg in the Cataract Surgery Only group. This gave a non-significant mean difference in IOP reduction of 0.54 mmHg favoring the BANG + Cataract Surgery group over Cataract Surgery alone.

Image

Table 1. Patient Characteristics

	BANG + Cataract Surgery	*Cataract Surgery Alone*	*P-value*
Age (years), Mean (SD)	76.3 (7.2)	15.5 (5.6)	0.93
Male Gender, n (%)	15 (57.6)	7 (26.9)	0.048
Types of Glaucoma			
Primary Open-Angle Glaucoma, n (%)	17 (65.4)	17 (65.4)	1
Chronic Primary Angle-Closure Glaucoma, n (%)	3 (11.6)	3 (11.6)	1
Pseudoexfoliative Glaucoma, n (%)	6 (23.1)	6 (23.1)	1

Table 2. Intraocular Pressure and Glaucoma Medical Therapy

	BANG + Cataract Surgery	*Cataract Surgery Alone*	*P-value*
Baseline			
IOP (mmHg), Mean (SD)	15.1 (5.6)	15.5 (5.6)	0.82
Glaucoma Meds, Mean (SD)	2.23 (0.95)	2.23 (0.95)	0.99
1 Month Postoperative			
IOP (mmHg), Mean (SD)	12.2 (5.3)	13.0 (6.1)	0.58
Glaucoma Meds, Mean (SD)	1.58 (0.86)	2.23 (1.03)	0.02
Difference between Baseline and 1 month postoperative			
IOP (mmHg), Mean (SD)	-2.96 (7.2)	-2.42 (3.4)	0.73
Glaucoma Meds, Mean (SD)	-0.65 (0.7)	0.01 (0.4)	0.0003325

Conclusions

The addition of BANG to cataract surgery significantly reduces the postoperative use of glaucoma medications compared to cataract surgery alone and shows a trend toward greater IOP reduction. This combined surgical approach offers a low-cost, effective alternative for glaucoma management, particularly favorable in resource-limited settings where traditional MIGS procedures may be inaccessible. Further studies with larger sample sizes and extended follow-up are necessary to confirm these findings and establish long-term efficacy.

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P-0811

EFFICACY AND SAFETY OF PAUL® GLAUCOMA IMPLANT SURGERY IN PATIENTS WITH ADVANCED AND REFRACTORY GLAUCOMA

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Background
The objective of the study was to evaluate the efficacy and safety of Paul® Glaucoma Implant (PGI) surgery in patients with advanced and refractory glaucoma over a period of 18 months.

Methods
Retrospective study of 45 patients (54 eyes) that underwent PGI. Inclusion criteria were: age ≥ 18 years, diagnosis of advanced and refractory glaucoma and PGI surgery performed by a single surgeon between 2022 and 2024. Controls were performed: preoperative and at 1, 3, 6,12 and 18 months postoperatively. Outcome measured during the follow-up were intraocular pressure (IOP), number of hypotensive drugs and complications related to the procedure.

Success was defined as IOP > 5 and ≤ 21 mmHg and IOP reduction ≥ 20% from its preoperative value, without vision threatening complications, novo procedures or loss of light perception. Success was subcategorized as complete success without medications and qualified success with ≥ 1 medication at last follow-up. Failure was defined as IOP > 21 mmHg or ≤ 5 mmHg on ≥ 2 consecutive visits, IOP reduction < 20% from preoperative value, or the need for reintervention for glaucoma.

Results
The mean preoperative IOP of 22.8 ± 9.6 mmHg significantly decreased to 13.1 ± 3.3 mmHg at 18 months postoperatively ($p < 0.01$). The average number of glaucoma medications reduced from 4.0 ± 0.8 preoperatively to 1.4 ± 1.1 at the last follow-up ($p < 0.01$). Recorded complications related to the procedure were: hypertensive phase in 5 eyes (9.3%), choroidal detachment in 5 eyes (9.3%), hyphema in 2 eyes (3.7%), corneal decompensation in 1 eye (1.9%) and central retinal vein occlusion in 1 eye (1.9%). Overall, 40 eyes (74.1%) achieved success: 10 (18.5%) of them achieved complete success and 30 (55.6%) qualified success. Of the remaining 14 eyes, 11 (20.4%) accomplished success criteria except for IOP reduction ≥ 20%, and 3 (5.6%) required novo procedures.

Conclusions
PGI surgery showed significant decrease in IOP and in hypotensive drug dependence. The success rate was high and complications were manageable. PGI seems to be an effective and safe surgical option for managing advanced and refractory glaucoma. However, as they were advanced cases, most of them required complementary pharmacological treatment.

P-0812

IMPACT OF PREVIOUS SELECTIVE LASER TRABECULOPLASTY ON PHACO-ISTENT INJECT EFFICACY

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Background
Reports on the impact of previous selective laser trabeculoplasty (SLT) on trabecular bypass minimally invasive glaucoma surgery (MIGS) efficacy outcomes are conflicting. This study evaluates the impact of previous SLT on intraocular-pressure (IOP) lowering efficacy of phacoemulsification combined with iStent-inject (Phaco-iStent) in a large multi-centre cohort using MIGS specific success endpoints.

Methods
Retrospective study of eyes in the Fight Glaucoma Blindness registry that underwent Phaco-iStent with a minimum of 12-months follow-up. Surgical success was defined by three different endpoints: (A) ≥20% IOP decrease or ≥ 1 med reduction vs baseline (no washout), (B) ≥20% IOP decrease alone with no increase in baseline med, (C) ≥ 1 med reduction with no increase in baseline IOP. Success was compared between eyes with and without previous SLT using Kaplan Meier curves and hierarchical cox regression models adjusted by age, baseline IOP and IOP-lowering medication use and visual field mean deviation (VF MD).

Results
1550 eyes of 1023 patients (46% male) were included, with mean age at surgery of 74 (SD 7.8) years. The baseline IOP, medication use, and VF MD was 16.1 (4.7) mmHg, 1.6 (1.1) and -4.6 (5.6) dB respectively. 232 eyes (15.0%) had undergone previous SLT. In the adjusted cox models, previous SLT was associated with an increased risk of failure using endpoints A [odds ratio (OR) 2.23, 95% confidence intervals (CI) 1.32-3.41], B (OR 1.43, CI 1.05-1.95) and C (OR 1.81, CI 1.15-2.83)] (Figure 1). In eyes with previous SLT, there was no difference in proportion of failure by baseline IOP (p = 0.20, Figure 2). In a sub-analysis of eyes with and without previous SLT propensity matched by baseline characteristics (N = 184 eyes per arm), previous SLT similarly demonstrated an increased risk of failure across the three endpoints.

Image

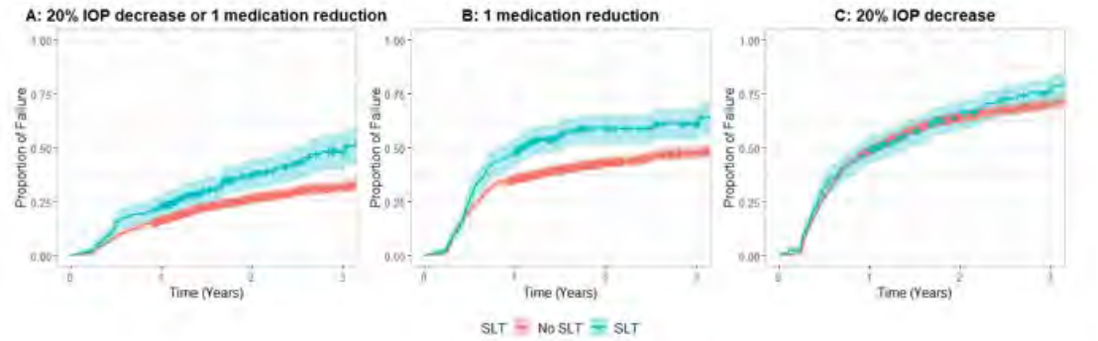

Figure 1: Kaplan-Meier curves of proportion of failure following Phaco-iStent inject surgery up to three years post-operatively in eyes with SLT (green) vs no previous SLT (orange) when using the following definitions: (A) ≥20% IOP decrease or ≥ 1 medication reduction vs baseline (no washout), (B) ≥ 1 medication reduction with no increase in baseline IOP, (C) ≥20% IOP decrease alone with no increase in baseline medication. There was a statistically significant increase in failure for definitions A and C.

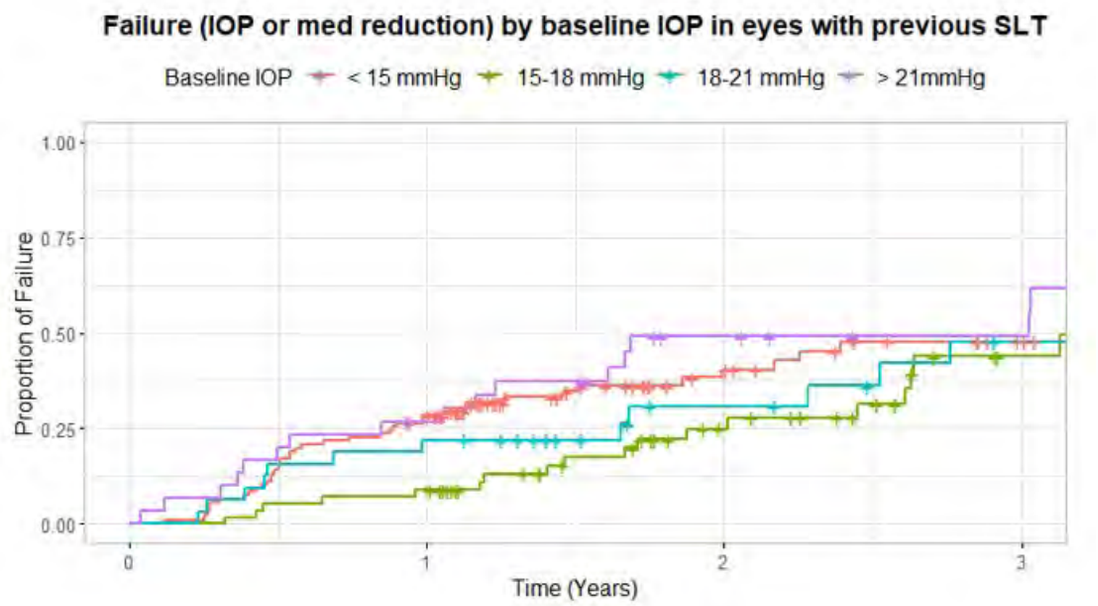

Figure 2: Proportion of failure following Phaco-iStent inject surgery up to three years post-operatively in eyes with previous SLT only. The endpoint was ≥20% IOP decrease or ≥ 1 medication reduction vs baseline (no washout). There was no significant difference in proportion of failure across the four strata of baseline IOP. Confidence intervals are not shown for clarity.

Conclusions

Previous SLT may be associated with an increased risk of failure after Phaco-iStent inject surgery, defined by either a decrease in IOP by at least 20% or one medication reduction compared to baseline. In eyes with previous SLT, there was no impact of baseline IOP on Phaco-iStent efficacy. These findings may guide patient selection and prognosis for Phaco-iStent surgery.

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P-0813

A NOVEL RETROBULBAR SURGICAL APPROACH WITH AHMED VALVE FP-7 AND TUBE EXTENDER IN BLACK AND AFRO-LATINO PATIENTS WITH GLAUCOMA: A RETROSPECTIVE STUDY

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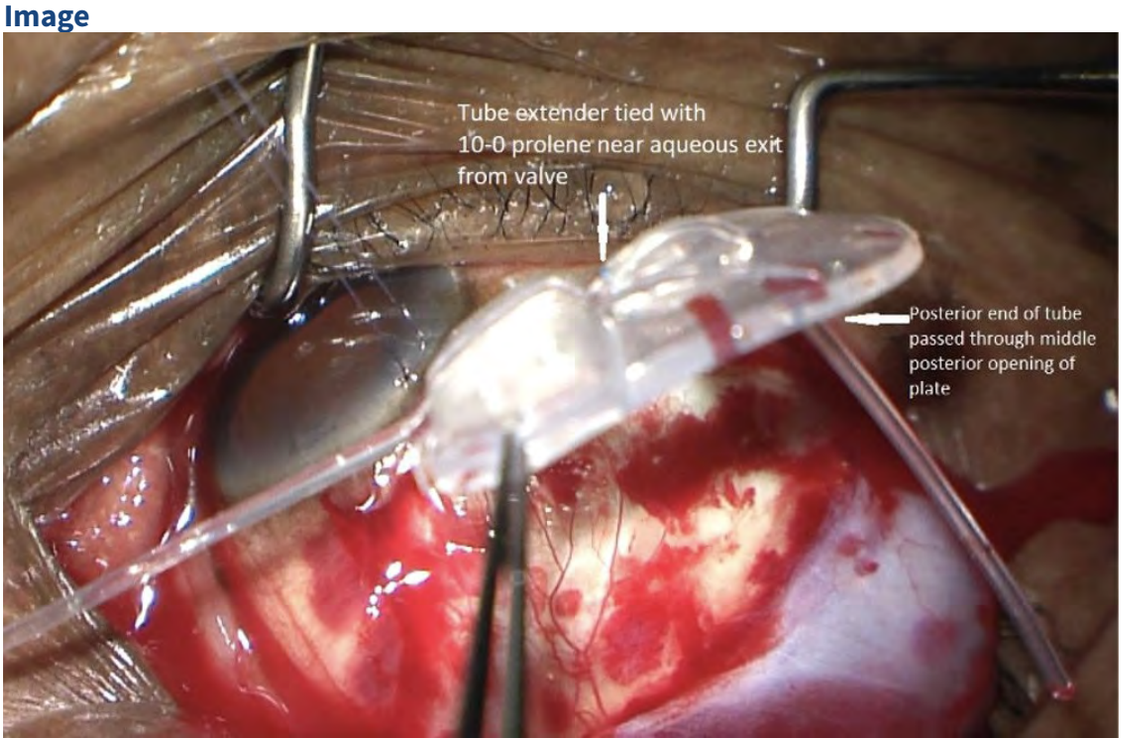
Background
The Ahmed FP-7 valve is useful in the management of refractory glaucoma. However, this can often have ocular hypertensive phase and subconjunctival fibrosis that can lead to increased medication use and failure. We report how retrobulbar and intraconal plate placement with tube extension can avoid the ocular hypertensive phase, lower intraocular pressure, and reduce medication burden.

Methods
We evaluated results from 38 patients who underwent Ahmed valve FP-7 placement with a tube extender attached posteriorly, placed in the retrobulbar space superotemporally. Patients with 12 months of follow-up were included in this study. The measured parameters were intraocular pressure, number of medications, visual field mean deviation, visual acuity, and adverse events.

Results
Among all 38 eyes in the study that underwent surgery with Ahmed valve FP-7 and tube extender to the retrobulbar space, the mean intraocular pressure was reduced from 24.05 mmHg at baseline to 13.39 mmHg at month twelve, nearly a 50% reduction. The mean number of topical intraocular pressure lowering medications was reduced by over 58%, from 4.55 at baseline to 1.87 at month twelve. The baseline visual field mean deviation was -20.03 and stable, with a mean of -19.49 at 12 months.

Image



Conclusions

Ahmed valve FP-7 placement with a tube extender placed in the retrobulbar space effectively reduced intraocular pressure and the amount of ocular hypertensive medications used in Black and Afro-Latino patients with primary open angle glaucoma. The visual field mean deviation was stable at 12 months. No ocular hypertensive stages were observed. This is a promising technique that will undergo further research.

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P-0814

THE SURGICAL OUTCOMES OF OPEN BLEB REVISION FOR BLEB FAILURE FOLLOWING PRESERFLO MICROSHUNT IMPLANTATION

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Background

Preserflo microshunt (PFM) is known to significantly reduce intraocular pressure (IOP) and the number of glaucoma medications with fewer significant adverse events[1-4]. It has increasingly been chosen as an option for filtration surgery in recent years. On the other hand, some cases lead to an increase in IOP due to bleb failure after PFM implantation. Although there is a consensus that bleb revision is preferred over needling for bleb failure following PFM implantation[5], reports on bleb revision remain very limited[6, 7]. In this study, we report our open bleb revision (OBR) procedure for bleb failure following PFM implantation and its outcomes.

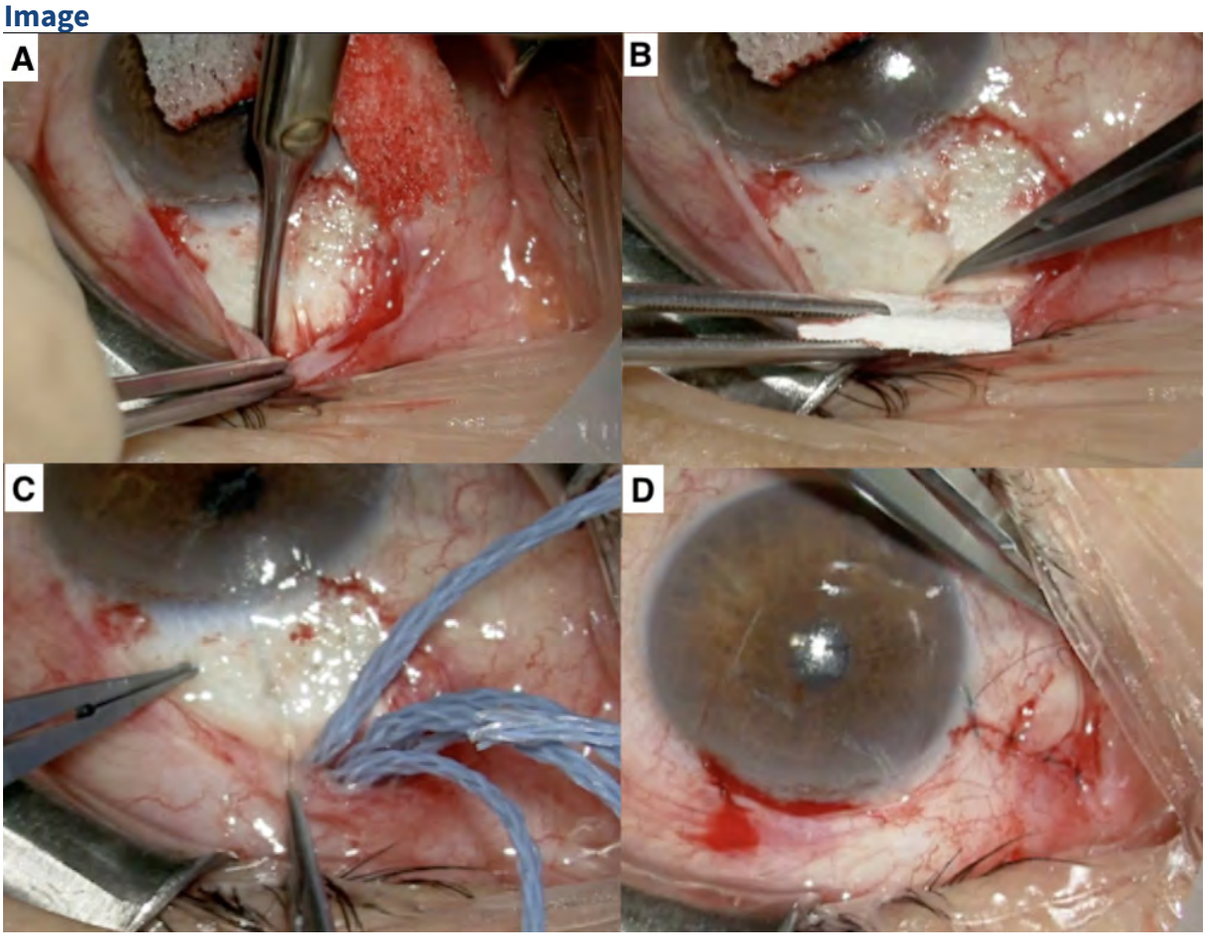
Methods

We retrospectively analyzed the outcomes of OBR using mitomycin-C (MMC) 0.4 mg/mL, which was performed due to insufficient IOP reduction caused by bleb failure following PFM implantation. These patients were selected from a total of 116 patients (142 eyes) in which PFM was implanted between January 2023 and December 2024. The analyzed data included age, sex, axis length, glaucoma type, IOP and number of glaucoma medications (NoM) before and after OBR, success rate (SR), complications, and the duration from the initial surgery to OBR. Complete and qualified success were defined as an IOP reduction of >20%, without and with medications, respectively.

Results

23 eyes of 22 consecutive patients received bleb open revision for bleb failure following PFM implantation by the single surgeon. The preoperative mean IOP was 26.4±10.8 mmHg, and the preoperative mean NoM was 2.0±1.8. At 6 months and 1 year postoperatively, the mean IOP was 13.3±5.9 mmHg and 10.6±5.8 mmHg, and the mean NoM was 0.3±0.7 and 0.4±0.9, respectively. The complete SR at 6 months and 1 year was 71.4% and 62.5%, and the qualified SR was 91.7% and 75.6%, respectively. As complications, overfiltration (OF) was found in 4 eyes and choroidal detachment (CD) was also found in 4 eyes.

Image



Conclusions

At 6 months and 1 year, OBR with MMC for bleb failure following PFM implantation effectively reduced IOP. However, cases of OF and CD are occasionally observed; therefore, measures to prevent these complications need to be considered.

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P-0815

CLINICAL OUTCOMES OF HYDRUS MICROSTENT IN ASIAN EYES WITH NORMAL TENSION GLAUCOMA

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Background

Hydrus Microstent has not been specifically studied in Normal Tension Glaucoma (NTG), which is more prevalent in Asian populations.[1-4] In this study, we evaluated the safety and efficacy of the Hydrus Microstent in conjunction with cataract surgery in Asian NTG patients.

Methods

We performed a retrospective chart review of Asian NTG eyes having Hydrus Microstent placement with cataract surgery between August 2018 and September 2023 by a single surgeon. Only eyes with at least 12 months of follow up were included. Glaucoma was staged by the Hodapp-Parrish-Anderson criteria. The primary endpoint was medication reduction from baseline at 1 year postoperatively. We also evaluated medication reduction from baseline, IOP change from baseline and percentage of eyes requiring secondary surgical intervention at yearly intervals through 4 years of follow up.

Results

Thirty-two eyes from twenty-one patients were included in the analysis. The mean patient age was 73.7 ± 10.14 years with nearly equal number of male and female patients (10 vs 11, respectively). Glaucoma severity was mild in 37.5% of eyes, moderate in 43.8% of eyes, and severe in 18.8% of eyes. Baseline IOP was 13.66 ± 2.62 mmHg on 1.84 ± 0.85 medication classes. At one year, there was a mean reduction of medication classes by 1.13 ± 0.83 and IOP by 0.25 ± 2.16 mmHg, which was sustained through the 4-year period though fewer eyes were available for analysis at later timepoints. IOP was 16 mmHg or less on same or fewer medications in 100% (32/32) of eyes at year 1, 92.3% (24/26) of eyes at year 2, 85.7% (12/14) of eyes at year 3, and 100% (6/6) of eyes at year 4 after surgery. No secondary surgical interventions occurred during the study period.

Conclusions

Hydrus Microstent was safe and effective in Asian NTG eyes with a significant, sustained reduction in medication use through four years following surgery.

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P-0816
INCIDENCE OF HYPOTONY AFTER TRANS SCLERAL CYCLOPHOTOCOAGULATION: A SYSTEMATIC REVIEW

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Background
Hypotony and subsequent phthisis bulbi are feared consequences of cylcodestructive procedures [1,2]. The aim of this systematic review is to identify complication rates following Trans Scleral Cyclophotocoagulation (TSCPC) in patients with refractory glaucoma. While individual studies have reported complication rates, no comprehensive review of the literature has yet been conducted.

Methods
The full protocol was registered on PROSPERO (42023485891). The electronic databases OVID MEDLINE (Jan 1946 – May 2024), and EMBASE (Jan 1947 – May 2024) were searched using keywords related to TSCPC and hypotony or other complications. Studies were included if they reported hypotony rates in at least five adult patients undergoing TSCPC. Non-English studies were excluded. Study and patient level data were collected including demographics, study characteristics, TSCPC parameters, intraocular pressure (IOP), treatment outcomes, and complication rates. Pooled estimates of hypotony and phthisis bulbi incidence were calculated through Freeman-Tukey transformation and single proportion meta-analysis.

Results
There were 98 studies included, with a total of 7072 eyes. Weighted mean age of patients was 60.1 ± 1.2 years, with 2793 males (39.5%) and 4279 females (60.5%). %). Follow-up periods of the studies consisted of 27.6% with less than 1 year follow-up, 49.0% with between 1-2 years, and 23.4% with more than 2 year follow-up. The overall weighted mean follow-up time was 18.4 ± 0.1 months. In total, 32.4% of patients had primary open angle glaucoma, 64.9% had some form of previous eye surgery, and 41.8% had previous glaucoma surgery. Pooled estimate of hypotony was 2.7% (95% CI: 1.8 – 3.7, I^2: 67%), and phthisis bulbi was 0.5% (95% CI: 0.2 – 1.1, I^2: 46%). Other complications included prolonged uveitis: 5.1%, hyphema: 2.9%, keratopathy: 2.0%, prolonged macular edema: 0.9%, vitreous hemorrhage: 0.8%, and choroidal or retinal detachment: 0.6%. Surgical success – defined as IOP<22 – was achieved in 66.3% of patients, and 31.7% required repeat TSCPC. The weighted mean IOP was 36.4 ± 0.1mmHg at baseline, 17.0 ± 0.1mmHg at 12 months, and 19.4 ± 0.4mmHg at last follow-up (range 1-60 months, mean 18.4).

Conclusions
In this systematic review of published reports on TSCPC, the incidence of prolonged hypotony and phthisis bulbi is much lower than generally held conceptions. While nearly two-thirds of procedures resulted in surgical success, only 2.7% of patients experienced prolonged hypotony, and 0.5% experienced phthisis bulbi. These findings suggest that TSCPC is a relatively safe and effective option for managing refractory glaucoma and may warrant more frequent consideration in clinical practice.

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P-0817

VISUAL ACUITY OUTCOMES AFTER TRANS SCLERAL CYCLOPHOTOCOAGULATION: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background

The aim of this systematic review and meta-analysis is to evaluate best-corrected visual acuity (VA) outcomes following Trans Scleral Cyclophotocoagulation (TSCPC) in patients with refractory glaucoma. While individual studies have reported various outcomes, no comprehensive review of the literature has yet been conducted[1,2]

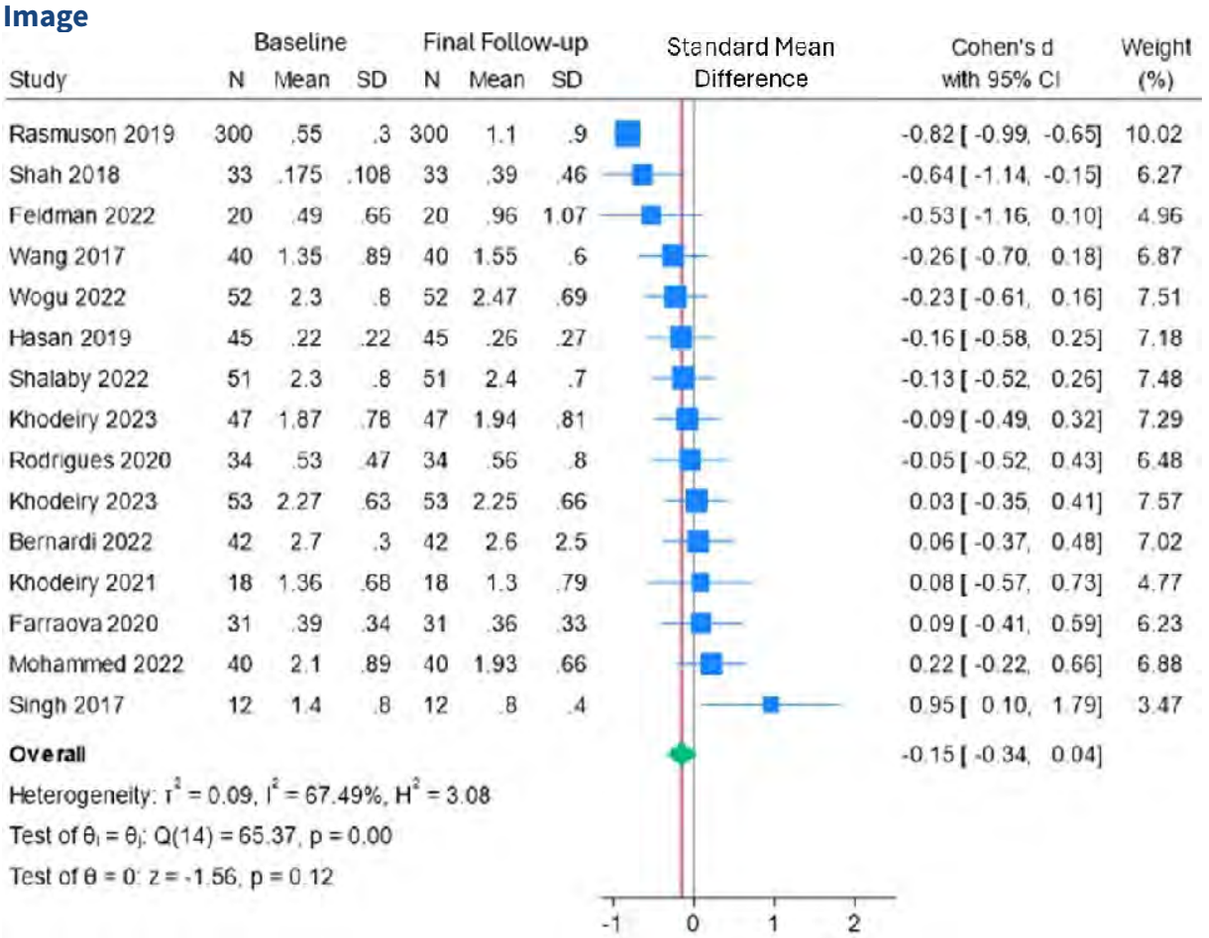
Methods

The full protocol was registered on PROSPERO (42023485891). The electronic databases OVID MEDLINE, and EMBASE were searched using keywords related to TSCPC and visual acuity outcomes (start date to May 12, 2024). Meta-analysis was completed using random effects models and risk ratios to calculate pooled estimates.

Results

In total, 86 studies with 5,915 eyes were included. Weighted mean patient age was 48.8±4.3 years, with 53.0% males (n=3135). Follow-up periods of the studies consisted of 19.8% with less than 1 year follow-up. 38.4% with between 1-2 years, and 40.7% with more than 2 year follow-up. Weighted mean pre-operative VA was 1.17±0.30 logMAR (20/295 Snellen), and 1.40±0.20 (20/502 Snellen) post-operatively. Meta-analysis did not show a statistically significant difference between VA before TSCPC and at last follow-up (Standardized Mean Difference: -0.15, 95% confidence interval: -0.34 to 0.04). At 12 months follow-up, 50.3% of patients showed no change in VA, while 7.1% experienced an improvement of 1 Snellen line, and 14.0% improved by 2 or more lines. Conversely, 15.1% saw a reduction of 1 line, and 13.1% experienced a decrease of 2 or more lines. At the final follow-up, 37.8% of patients maintained their VA, with 9.0% showing a 1-line improvement,15.8% improving by 2 or more lines, 25.1% decreasing by 1 line, and 12.3% decreasing 2 lines or more. The mean pre-operative IOP was 30.9±8.0 mmHg, which dropped to 17.2±6.5 mmHg, with 70.0% of patients achieving an IOP below 22 mmHg. The average number of glaucoma eye drops decreased from 3.03±1.00 pre-operatively to 2.05±1.11.

Image



Conclusions

TSCPC results in a significant reduction in IOP, with a substantial proportion of patients achieving post-operative IOP below 22 mmHg. Additionally, the need for glaucoma medications decreases following TSCPC, indicating a reduced treatment burden. Importantly, the VA of most patients remains stable, with no statistically significant decline observed over approximately two years. These results support the role of TSCPC as a viable treatment option for patients with refractory glaucoma, providing effective IOP control without a marked deterioration in VA.

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P-0818

COMPARATIVE EFFECTIVENESS AND SAFETY OF GATT COMBINED WITH OR WITHOUT ABIC IN PATIENTS WITH OPEN-ANGLE GLAUCOMA

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Background
This is the first comprehensive comparison between gonioscopy-assisted transluminal trabeculotomy (GATT) and GATT combined with ab interno canaloplasty (ABiC) in patients with OAG.

Methods
This retrospective study included 48 OAG patients who underwent GATT (group 1) or GATT + ABiC (group 2). Primary outcomes were intraocular pressure (IOP) and number of glaucoma medication used at 12 and 24 months postoperatively. Surgical success was defined as 1) a preoperative IOP > 21 mmHg and a postoperative IOP ≤ 21 mmHg with at least 20% reduction from baseline with (qualified success) or without (complete success) glaucoma medications or 2) a preoperative IOP < 21 mmHg while taking 3 or more glaucoma medications, a postoperative IOP ≤ 21 mmHg and a reduction of more than two (qualified success) or zero (complete success) medications.

Results
At 12 months, mean IOP was 14.8±2.2 mmHg in group 1 and 16.6±2.3 mmHg in group 2 (*P*=0.008). Number of medications was 0.6±1.0 in group 1 and 0.9 ± 1.3 in group 2 (*P*=0.334). At 24 months, mean IOP was 15.3±2.0 mmHg in group 1 and 15.5±2.4 mmHg in group 2 (*P*=0.676). Number of medications was 0.5±0.9 in group 1 and 0.9±1.1 in group 2 (*P*=0.197). Complete success rates were 63.0% in group 1 and 50.0% in group 2 (*P*=0.16), qualified success rates were 81.5% in group 1 and 76.9% in group 2 (*P*=0.51).

Conclusions
GATT procedure is safe and effective in decreasing the IOP and the number of antiglaucoma medications used with or without ABiC.

P-0819

COMPARING THE SURGICAL OUTCOMES OF COMBINED KDB PHACOEMULSIFICATION VERSUS NPDS PHACOEMULSIFICATION FOR ADVANCED GLAUCOMA WITH COEXISTING CATARACT

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Background
To compare the one-year safety and efficacy of combined Kahook dual blade(KDB) phacoemulsification versus Mitomycin-C augmented non penetrating deep sclerectomy(NPDS) combined with phacoemulsification for advanced open angle glaucoma(OAG) and coexisting cataract

Methods
This was a single-center longitudinal retrospective comparative study. We included 114 patients diagnosed to have advanced OAG,with co-existing cataract, of which 49 patients underwent 120 degrees of KDB-excisional goniotomy with phacoemulsification(Group A) and 65 patients underwent MMC augmented NPDS with phacoemulsification(Group B). The main outcome measures based on criteria 1 were maintaining stable post operative best corrected visual acuity(BCVA) & central visual fields and criteria 2 were intraocular pressure(IOP) control,need for anti-glaucoma medications(AGM), surgical complications and any additional interventions.

Results
We observed stabilization of central visual fields & visual acuity in both groups at 12 months follow-up(p=0.913). Mean (SD) baseline IOP in Group A & Group B was 15.47(4.78) and 17.43(5.92) mmHg respectively. There was no significant difference in mean IOP between the groups at all follow up visits (p=0.712). However, there was significant decrease in the number of AGM in Group A than Group B at all follow up visits(p<0.001). Cumulative probability of success at the end of 12 months based on criteria 1& 2 were 93.9%(95%CI:82.2–97.9) &96.9%(95%CI:88.3–99.2), and 73.5% &80% in Group A and in group B respectively.

Conclusions
Both KDB-phaco and NPDS-phaco had similar IOP lowering effect in advanced glaucoma with stable post-operative visual acuity and central fields. However, KDB group achieved a significant reduction in AGM post-operatively compared to the NPDS phaco group.

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P-0820

24-MONTH CLINICAL OUTCOMES OF CANALOPLASTY AND TRABECULOTOMY IN PSEUDOPHAKIC EYES WITH SEVERE GLAUCOMA

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Background
This minimally Invasive Glaucoma Surgery presents an innovative approach when both canaloplasty and trabeculotomy are combined. assessing the safety and efficacy of standalone canaloplasty and trabeculotomy with the OMNI Surgical System in the treatment of pseudophakic eyes with severe primary open-angle glaucoma (POAG) is another step toward managing the battle of glaucoma.

Methods
This monocentric, retrospective cohort study analyzed data from 34 eyes with severe primary open-angle glaucoma at Mayo Clinic, Florida. Primary outcomes assessed were changes in baseline intraocular pressure (IOP) and the number of antiglaucoma medications (AGMs) required through 24 months of follow-up, analyzed with paired sample t-tests. Secondary outcomes assessed included the percentage of eyes achieving an IOP $\leq$ 21 mmHg, an IOP $\leq$ 17 mmHg, and $\geq$ 20% IOP reduction from baseline at 24 months.

Results
At 24 months, the baseline mean IOP was reduced from 25.1 ± 5.1 mmHg to 16.1 ± 6.9 mmHg (35.9% reduction; $p<0.01$), and the mean number of AGMs was reduced from 1.3 ± 0.5 to 1 (25% reduction; $p<0.05$). An IOP < 21 mmHg was achieved in thirty eyes (88.24%) and an IOP $\leq$ 17 mmHg was achieved in twenty-four eyes (70.6%) at 24 months. Twenty-seven eyes (79.41%) met an IOP reduction $\geq$ 20% from baseline. sixteen eyes (47.1%) experienced a reduction by $\geq$ 1 AGM, with the remaining eyes maintaining their baseline number of AGMs. No adverse effects occurred.

Conclusions
Through 24 months, canaloplasty and trabeculotomy with the OMNI Surgical System significantly lowered both the IOP and glaucoma medication burden while maintaining an excellent safety profile. This minimally invasive procedure appears to be highly effective in treating pseudophakic eyes with severe POAG.

P-0821

SURGICALLY INDUCED ASTIGMATISM AND CHANGE IN CORNEAL ABERRATIONS AFTER TRABECULECTOMY: A DUAL SCHEIMPFLUG-PLACIDO TOMPOGRAPHY-BASED ANALYSIS

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Background
In this study, the authors evaluated changes in corneal astigmatism and high-order aberrations following trabeculectomy in glaucoma patients.

Methods
This was a retrospective study involving 44 eyes of 44 glaucoma patients. All patients underwent conventional trabeculectomy with mitomycin C. The patients' best corrected visual acuity (BCVA), intraocular pressure (IOP), and corneal surface parameters were obtained from their medical records. Corneal surface change had been measured using a Galilei G4 Scheimpflug-placido analyzer at preoperative 1 week, postoperative 1 week (POW1), 1 month (POM1), 3 months (POM3), and 6 months (POM6). Simulated keratometry (SimK), posterior corneal astigmatism, total corneal power (TCP) astigmatism, central corneal thickness (CCT), anterior chamber volume (ACV), aqueous depth (AQD), and high-order aberrations (HOA) (Coma, Trefoil, Spherical, HOA of the third to sixth orders, Root mean square [RMS] total) were evaluated as well.

Results
Mean IOP showed a significant reduction from 31.91 ± 10.37 mmHg preoperatively to 11.82 ± 5.84 mmHg at POM6. All of the parameters of the corneal surface and anterior chamber (SimK, posterior corneal astigmatism, TCP astigmatism, IOP, CCT, ACV, AQD) showed significant change at POW1, but losing their significance with time except for IOP, CCT, AQD. Likewise, HOA (Astigmatism, HOA of third to sixth orders, RMS total) showed significant change at POW1, but the significance had disappeared by POM6.

Conclusions
After trabeculectomy, SimK, posterior astigmatism, and TCP astigmatism had significantly increased by POW1. Posterior astigmatism and TCP astigmatism lost their significance from POM3, whereas SimK did so from POM1. Decreased BCVA in the post-trabeculectomy state appears to be related to changes in the anterior and posterior corneal parameters after surgery, though this deteriorated visual acuity is likely to be only temporary.

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P-0822

IMPACT OF PREOPERATIVE STEROID EYE DROPS ON TRABECULECTOMY OUTCOMES AND BLEB MORPHOLOGY: A 3D AS-OCT STUDY

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Background

Trabeculectomy success is influenced by preoperative factors, particularly conjunctival condition. Conjunctival inflammation and fibrosis can compromise surgical outcomes, as they affect the healing response and bleb formation. The use of topical medications, including steroids, may modulate these inflammatory processes. This study evaluated the impact of preoperative steroid eye drop administration on 1-year outcomes after trabeculectomy and bleb morphology, assessed via three-dimensional anterior segment optical coherence tomography (3D AS-OCT).

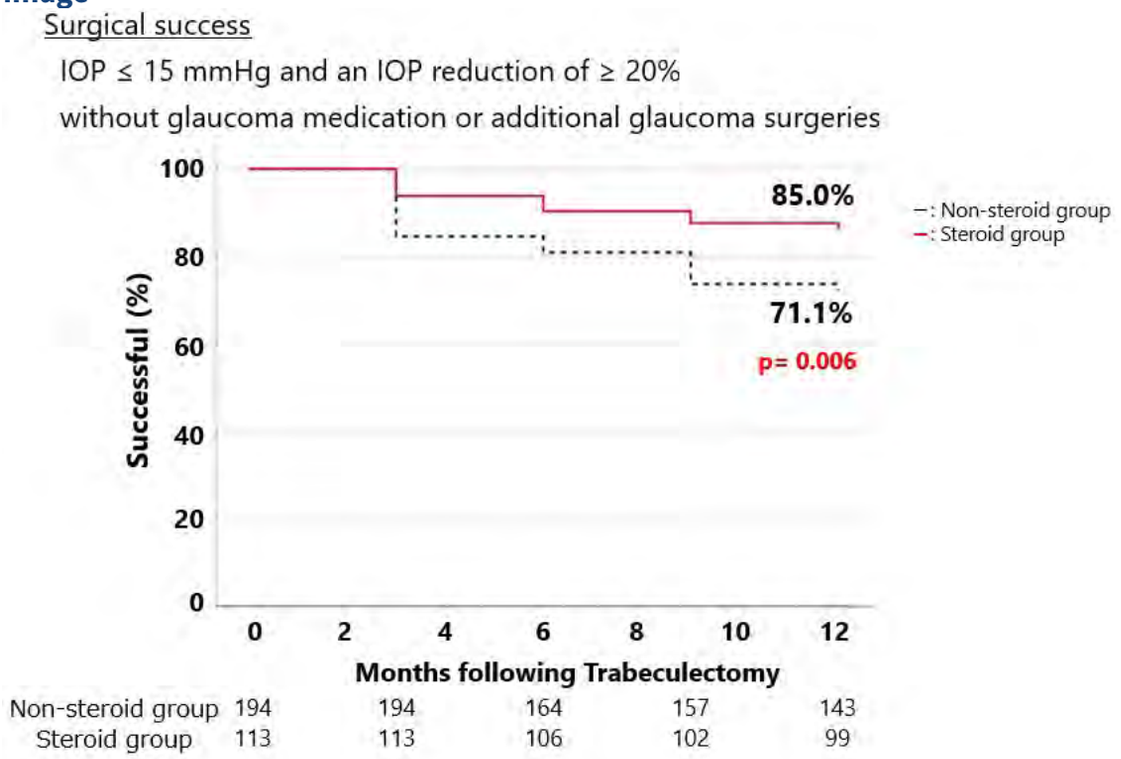
Methods

This retrospective study included 307 eyes of 275 patients who underwent primary trabeculectomy with mitomycin C. Subjects were classified into steroid and non-steroid groups based on preoperative use of unpreserved betamethasone 0.1% eye drops, three times daily for one week before surgery. Primary outcome measures were surgical success and 3D AS-OCT bleb parameters. Surgical success was defined as IOP ≤ 15 mmHg and ≥ 20% IOP reduction without glaucoma medication or additional glaucoma surgeries at 1 year after trabeculectomy. Bleb morphology was analyzed using 3D AS-OCT at 2 weeks and 1 year postoperatively, with parameters including maximum bleb height, maximum bleb wall thickness, and the presence of multiple parallel hyporeflective layers (striping phenomenon).

Results

The mean patient age was 69.2 ± 11.2 years. The mean preoperative IOP decreased from 19.7 ± 7.3 mmHg to 10.2 ± 4.0 mmHg in the non-steroid group (194 eyes) and from 18.4 ± 7.0 mmHg to 9.2 ± 3.7 mmHg in the steroid group (113 eyes) at 1 year after trabeculectomy. At 1 year, IOP was significantly lower in the steroid group ($p = 0.037$), and success rates were higher in the steroid group (85.0%) compared to the non-steroid group (71.1%) ($p = 0.006$). Preoperative steroid use was significantly associated with surgical success according to multivariable analysis. No significant differences were found in maximum bleb height ($p = 0.059$) or bleb wall thickness ($p = 0.052$) between the groups at 1 year, although these were borderline significant. The striping phenomenon, however, was significantly more frequent in the steroid group at 1 year ($p < 0.001$). Notably, 47.3% of eyes in the steroid group experienced an IOP increase of ≥ 20% on the day of the surgery.

Image



Conclusions

Preoperative steroid eye drops may improve bleb morphology and surgical outcomes after trabeculectomy. However, clinicians should be cautious of potential IOP elevation due to steroids.

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P-0823

OUTCOMES OF TRABECULECTOMY AND RISK FACTORS FOR FAILURE IN A REGIONAL HOSPITAL IN THAILAND: A RETROSPECTIVE COHORT STUDY

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Background
This study aimed to evaluate the outcomes of trabeculectomy and identify risk factors for its failure.

Methods
This retrospective study included all patients who underwent trabeculectomy with mitomycin C between January 2019 and December 2022. Surgical success was defined as achieving an intraocular pressure (IOP) between 6 and 21 mmHg, while failure was defined as an IOP <6 mmHg or >21 mmHg on two consecutive visits, loss of light perception, or the need for additional glaucoma surgery. Fisher's exact test, the chi-square test, and binary (multivariable) regression analysis were used to compare the success and failure groups and identify risk factors for trabeculectomy failure. Changes in visual acuity (VA) and IOP were assessed using "growth curve parameters" and the "two-stage mixed-effects model" method.

Results
A total of 192 eyes from 162 patients were included. Secondary glaucoma accounted for 49% (94 eyes) of cases, with neovascular glaucoma being the most common subtype (34 eyes). The success rate of trabeculectomy was 87%, with a median (interquartile range) follow-up duration of 19.3 (6.9–29.7) months. Perioperative complications were observed in 42.2% of cases. Younger age, secondary glaucoma, worse preoperative VA, greater early postoperative VA deterioration, and less early postoperative IOP reduction were significant risk factors for trabeculectomy failure, with odds ratios of 0.95, (95% confidence interval [CI]: 0.91–0.99), 9.11 (95% CI: 1.68–49.38), 3.87 (95% CI: 1.96–7.66), 5.11 (95% CI: 1.30–20.01), and 1.09 (95% CI: 1.01–1.19), respectively. Additionally, a higher median-term IOP increase and showed a trend toward contributing to trabeculectomy failure.

Conclusions
The success rate and complication profile of trabeculectomy in our cohort were comparable to those reported in other studies. Significant risk factors for trabeculectomy failure included patient age, type of glaucoma, preoperative VA, and patterns of early postoperative VA and IOP changes.

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P-0824

OUTCOMES OF XEN GEL STENT INSERTION USING A SEMI-OPEN VS. TRADITIONAL TECHNIQUE

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Background
The XEN gel microstent is a microinvasive glaucoma surgical device developed and used to lower intraocular pressure. We performed a retrospective analysis to evaluate outcomes of XEN gel stent insertion using a semi-open technique vs. the standard ab interno approach without conjunctival dissection.

Methods
We performed a retrospective chart review of patients who underwent XEN gel stent insertion using a semi open technique and the standard ab interno approach without conjunctival dissection at a tertiary medical center, performed by one surgeon. Primary outcomes were Complete surgical success (defined as IOP ≤ 18mmHg + ≥ 20% reduction baseline IOP without the use of any IOP lowering eye drops.), Qualified surgical success (defined as IOP ≤ 18mmHg + ≥ 20% reduction baseline IOP without increase in number of baseline IOP lowering drops), and IOP <15mmHg (also without increase in number of baseline IOP lowering drops). In addition, to meet qualified or surgical success there were no events of clinical hypotony, loss of vision to count fingers, or any other secondary glaucoma intervention. Secondary outcomes included needling rates, visual acuity, number of IOP lowering drops, and complications from surgery. Outcomes were recorded on post-operative day 1, week 1, month one, month 3, month 6, month 9-10, and month 12.

Results
We identified 39 eyes from 26 different patients who underwent XEN gel stent via a semi-open technique and 40 eyes from 29 different patients who had a XEN gel stent inserted via a traditional technique. Both XEN gel stent insertion via semi-open technique and traditional ab-interno technique had similar rates of complete surgical success and qualified surgical success at each post operative time point. At post operative month 6, 9-10, and 12 the eyes in the semi-open surgical group had a significantly lower rate of an IOP<15mmHg without an increase in the number of baseline IOP lowering drops. Xen gel stent insertion via the semi-open technique had a significant lower rate of needling compared to Xen gel stent insertion via semi-open technique. There was a significantly higher rate of transient hypotony in the semi-open technique group. There was no difference in the rate of clinical hypotony between the two surgical techniques. The traditional technique group had a higher rate of secondary glaucoma procedures. There was no difference in visual acuity between the two techniques. There were no cases of bleb leak or bleb related infections with either surgical technique.

Conclusions
Both techniques are effective in lowering IOP, however XEN gel stent insertion with a semi open technique created more consistent bleb with a lower rate of needling, lower rate of secondary glaucoma procedures. We believe the semi-open technique allows the surgeon to create a more consistent bleb formation by increasing the likelihood of placing the tip of the XEN gel stent in the sub-tenons space.

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P-0825

SIX MONTH CLINICAL OUTCOMES FOLLOWING IMPLANTATION OF A LASER TITRATABLE AQUEOUS SHUNT

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Background
Evaluate the intraocular pressure (IOP) lowering and adverse event profile following adjustment of postoperative outflow resistance in a novel aqueous shunt using a green laser to titrate valve-controlled channels.

Methods
The 6-month clinical outcomes of the Calibreye System (Myra Vision, Campbell, CA) were assessed in 24 eyes with open-angle glaucoma that underwent Calibreye shunt implantation with Mitomycin- C. The shunt connects the anterior chamber with the subconjunctival space via three microfluidic channels, two of which are controlled by nitinol valves that can be opened or closed using a slit lamp mounted green laser with a single 0.1 second pulse at 300 mW power. Following implantation, the investigators opened and closed the valves to titrate device resistance as needed to lower or increase IOP. Postoperative study visits were scheduled on days 1 and 3, weeks 1, 2, and 3, and months 1 and 3. Additional patient follow-up is ongoing.

Results
Calibreye shunt was implanted in 25 eyes at four clinical sites by 5 surgeons. At baseline, the IOP was 21.9 ± 4.2 mmHg (mean ±SD) on 2.9 ± 1.3 medications with a visual field mean deviation of -18.1 ± 9.9 dB. At 6-months, the IOP was 13.9 ± 5.1 mmHg (mean ±SD) on 0.5 ± 1.0 medications, representing a 34.7% reduction in IOP from baseline in 24 eyes. 18 out of 24 eyes (75%) underwent titration to the lowest device resistance setting on average by day 18 (range 3-59 days). An IOP reduction of 20% from baseline was achieved in 83.3% of eyes at month 6. Additionally, 70.8% of eyes were medication-free with an average number of IOP lowering medications of 0.5 ± 1.0. There was one case that required explantation due to hypotony maculopathy in a complex patient. Needling was not required for any of the cases. A few transient adverse events were reported in 10 of 24 eyes, most of which were mild, such as transient reduction in visual acuity (n=2) and shallow anterior chamber (n=2), which occurred in the early postoperative period and resolved with conservative management.

Conclusions
Clinical outcomes of the titratable Calibreye aqueous shunt demonstrated a significant IOP and medication reduction and an encouraging safety profile. The ability to adjust outflow resistance postoperatively offers a promising approach to personalized patient care in postoperative glaucoma management.

P-0826

INFLUENCE OF ETHNICITY ON TWO-YEAR OUTCOMES AFTER IMPLANTATION OF A SUPRACILIARY DRAINAGE DEVICE

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Background
In a post-hoc analysis, investigate the influence of ethnicity on two-year outcomes in open-angle glaucoma patients after treatment with a minimally invasive glaucoma surgery (MIGS) device (MINIject ® ; iSTAR Medical, Belgium).

Methods
The implant was delivered into the supraciliary space in a standalone, ab-interno procedure in phakic and pseudophakic eyes with no medication washout. The results from 4 prospective, multi-centre, single-arm trials (STAR-I,II,III,IV) were pooled in a post-hoc analysis. Data from 76 patients who completed two-year follow-up without secondary surgery were divided into groups by race. Intraocular pressure (IOP) reduction and medication reduction from baseline were compared between groups. Asians were primarily of Indian origin. A between-group difference was considered significant using the analysis of variance (ANOVA) if the p-value was less than 0.05.

Results
Among the 76 patients, 26 were Hispanic, 17 were Caucasian, 16 were Black and 15 were Asian. There were two patients described as “Other” who were excluded from the analysis. Neither mean diurnal baseline IOP (range 22.92 - 25.93mmHg) nor mean medications at baseline (range 1.92-2.71) were significantly different between groups (p>0.05), although there was a trend towards significance.

No other demographic variable measured (age, gender, visual field mean deviation, lens status) showed between-group differences at baseline. The percentage of patients with mild-to-moderate glaucoma at baseline were 77%, 94%, 88% and 100%, respectively. At two-year follow-up, mean IOP reduction was 39.0%, 39.3%, 44.3% and 41.5% respectively (p=0.784 for differences between groups). Mean medication reduction was 19.6%, 42.2%, 33.9% and 65.6% respectively (p=0.276).

Conclusions
Prior studies have shown ethnicity as a predictive factor of outcomes after glaucoma surgery, with outcomes particularly worse in patients of Black race. This post-hoc analysis demonstrates similar longer-term outcomes can be achieved after MINIject supraciliary MIGS implantation, regardless of ethnicity considering Asian, Black, Caucasian, and Hispanic races.

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P-0827

PROGNOSTIC OUTCOMES OF SURGICAL TREATMENTS IN UVEITIC GLAUCOMA: A COMPARATIVE ANALYSIS

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Background
Managing uveitic glaucoma surgically poses significant challenges, as persistent inflammation both pre- and postoperatively complicates outcomes, rendering them unpredictable. Despite this, limited evidence exists comparing the effectiveness of various surgical approaches in real-world clinical settings. Therefore, this study aimed to evaluate and compare the efficacy of three widely used surgical modalities—trabeculectomy, the Xen 45 gel stent, and the Ahmed glaucoma valve—in the treatment of uveitic glaucoma.

Methods
A retrospective analysis was conducted on patients diagnosed with uveitic glaucoma who underwent glaucoma surgeries—trabeculectomy, Xen 45 gel stent implantation, or Ahmed glaucoma valve implantation—at Gachon University Gil Medical Center between 2013 and 2024. Intraocular pressure (IOP), best corrected visual acuity and glaucoma medications used before and after surgery were reviewed. The primary outcome measure was the proportion of patients achieving complete or partial surgical success. Secondary outcomes included the postoperative reduction in IOP and the requirement for topical anti-glaucoma medications.

Results
A total of 45 eyes from 41 patients were included in the study, with primary anterior uveitis being the most frequent underlying diagnosis. Of these, 18 eyes underwent trabeculectomy, 10 received Xen 45 gel stent implantation, and 13 underwent Ahmed glaucoma valve implantation. At the 1-year follow-up, significant differences were observed among the three groups. The trabeculectomy group achieved the highest complete success rate (65% compared to 46% and 31%; P = .003). While partial success rates did not differ significantly between groups, the Xen gel stent group demonstrated the lowest overall success rates. Notably, Xen failures occurred in four patients, necessitating additional glaucoma surgeries.

Conclusions
Trabeculectomy demonstrated superior efficacy in controlling intraocular pressure during the early postoperative period compared to other implant-based procedures.

P-0828

THE EFFECT OF DIFFERENT GLAUCOMA SURGERIES ON AQUEOUS HUMOUR OUTFLOW FACILITY

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Background
Little is known about the effect of angle based glaucoma surgeries on aqueous humour outflow facility. An understanding of the effect of different glaucoma surgeries on pressure related outflow facility could facilitate better surgical decision making. The purpose of this study was to compare the effect of trabecular-based (Gonioscopy Assisted Transluminal Trabeculotomy- GATT) and subconjunctival-based (Ahmed Glaucoma Valve – AGV and Preserflo Microshunt – PFLO) glaucoma surgeries on aqueous humour outflow facility.

Methods
In this prospective before-and-after study patients with primary or secondary open-angle glaucoma who were scheduled for GATT, PFLO, or AGV surgery were included in the study. Patients without glaucoma undergoing cataract extraction alone served as controls. The pre-and-post operative intraocular pressure (IOP), number of medications, and biometric data were analyzed. The outflow facility coefficient (C) measured by pneumatonography (Model 30 Classic, Reichert Technologies, Depew, NY, USA) was compared preoperatively and 1 and 3 months post-operatively.

Results
Forty-seven eyes (45 patients; mean age, 77.88 ± 12.8 years) were included: 20 in the GATT group, 12 in the PFLO group, 5 in the AGV group, and 10 in the cataract extraction alone group. All patients in the GATT group underwent the surgery combined with cataract extraction. The preoperative C values for GATT, PFLO, AGV, and cataract alone were 0.11, 0.08, 0.108, and 0.2 µl/min/mmHg, respectively. There was no significant difference between glaucoma patients in the different surgical groups in mean baseline IOP (P=0.22) and C values (P=0.394). The C value increased significantly ($p < 0.001$) at post-operative month 3 to 0.248, 0.27 and 0.2 µl/min/mmHg in the GATT, PFLO and AGV groups, respectively. In the group that underwent cataract extraction alone there was no statistically significant change in IOP or C values before surgery (0.2 µl/min/mmHg) and at post-operative month 3 (0.215 µl/min/mmHg).

Conclusions
Outflow facility increased significantly after both trabecular-based and subconjunctival-based glaucoma surgery, but not after cataract extraction alone three months after surgery. In well-selected patients, GATT was not inferior in improving outflow facility to glaucoma drainage implants.

P-0829

ACCURACY OF IOL CALCULATION FORMULAS IN RELATION TO IOP REDUCTIONS FOLLOWING COMBINED PHACOTRABECULECTOMY

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Background

Combined phacotrabeculectomy is an effective procedure to lower intraocular pressure (IOP) and improve visual clarity in glaucoma patients. However, considerable IOP reductions after trabeculectomy can alter ocular biometrics, such as anterior chamber depth and axial length1, leading to inaccuracies in intraocular lens (IOL) power calculations2. This study aims to identify the IOL formula that most accurately predicts postoperative refraction while being least influenced by IOP reductions.

Methods

This retrospective cohort study included glaucoma patients who underwent uncomplicated combined phacotrabeculectomy with monofocal IOL implantation. Ocular biometrics were measured using the IOL Master. Predicted spherical equivalents were obtained using the SRK/T and Holladay II formulas from the IOL Master 700, and the Barrett Universal II and Kane formulas from the ESCRS IOL calculator. Postoperative refraction at 1 month was used to calculate prediction error (PE), which was compared among the formulas. Linear regression analysis was performed to evaluate the relationship between PE and IOP changes at 1-month post-operation for each formula.

Results

Data from 79 patients (25 with primary open-angle glaucoma [POAG], 49 with primary angle-closure glaucoma [PACG], and 5 with secondary glaucoma) were analyzed. At 1 month postoperatively, the mean refraction was -0.44 ± 0.87 D. Median (interquartile range) IOP reduction was -8 (-2 to -6.5) mmHg. All formulas showed slight myopic outcomes, with PE ranging from -0.15 ± 0.83 D (Barrett Universal II) to -0.32 ± 0.83 D (SRK/T). The SRK/T formula exhibited the most myopic shift but was the least influenced by IOP changes, with a regression coefficient of -0.001 (95% CI -0.020 to 0.018). The Holladay II formula was the most affected by IOP reductions, with a regression coefficient of -0.008 (95% CI -0.026 to 0.011); the more IOP reduction, the smaller the PE. The influence of IOP changes differed significantly between SRK/T and Holladay II (p = 0.02), while no significant differences were observed in other pairwise comparisons among the formulas.

Conclusions

All four formulas predicted slight myopic outcomes after combined phacotrabeculectomy. While the SRK/T formula demonstrated the largest myopic shift, it provided the most consistent postoperative refraction due to its least susceptibility to IOP fluctuations.

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P-0832

12 MONTH OUTCOMES OF HYDRUS AND OMNI PERFORMED DURING SURGEONS' LEARNING CURVE

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Background

This study aims to examine the efficacy and safety of Hydrus and OMNI during the learning curve of 4 surgeons new to the procedure.

Methods

A retrospective study including a consecutive series of the first Hydrus and OMNI procedures performed by 4 surgeons (AJT, TRM, MLC, SD) in 3 centres. 3 were experienced cataract and glaucoma surgeons with previous experience of Schlemm's canal minimally invasive glaucoma surgery (MIGS) (istent, ab interno canaloplasty, ab interno trabeculotomy) and 1 a glaucoma fellow with no previous experience of MIGS. All patients were followed for a minimum of 12 months, with the primary outcomes, percentage, and absolute change in IOP from baseline (IOP at time of listing for surgery) compared to the visit after and closest to 12 months post-op. Secondary outcomes included number of glaucoma medications and complications. The relationship between order of surgery and IOP reduction was examined using regression analyses.

Results

95 MIGS procedures combined with cataract surgery, including 57 Hydrus and 28 OMNI procedures. All OMNI procedures involved 360-degree canaloplasty and attempted 180 trabeculotomy. By time of last follow up, 79 of 85 (92.94%) had not required any further glaucoma surgery. None of the 28 OMNI patients had undergone further glaucoma surgery compared to 6 of 51 of the Hydrus patients (P=0.075). 5 of the patients requiring further surgery had a Preserflo, with 1 undergoing trabeculectomy. 4 were performed within 12 months of the Phaco-MIGS procedure and 1 between 12 and 24 months. At one year, patients treated with OMNI had on average a 29% reduction in IOP compared 14.7% with Hydrus (P-0.044). The absolute reduction in IOP for OMNI was from 19.6mmHg at baseline to 13.04 at 12 months (P<0.001). The absolute reduction for Hydrus was from 19.02 to 14.64 mmHg (P<0.001). At one year, OMNI patients were taking an average of 2.57 drops at baseline which was reduced to 1.5 at 12 months. Hydrus patients were taking 2.34 at baseline compared to 1.25 at 12 months. At one year 42 of 57 Hydrus patients had not required further surgery and were on same or fewer drops. Of these eyes, the mean IOP at 12 months was 13.9 mmHg compared to 18.04 mmHg at baseline (P<0.002). At one year 27 of 28 OMNI patients had not required further surgery and were on the same or fewer drops. Of these the mean IOP at 12 months was 12.9mmHg compared to 19.2mmHg at baseline (P<0.001). Intraoperative complications were rare. There was no relationship between order of surgery (*i.e.* whether it was the surgeon's first, second or nth case and outcome at 12 months (measured as percentage change in IOP) (P=0.148 for Hydrus and P=0.924 for OMNI).

Conclusions

The absolute reduction in IOP for patients who underwent combined phaco-Hydrus and -OMNI were significant at 12 months. Surgeon experience during the initial learning curve for Hydrus and OMNI had no apparent effect on efficacy or safety at 12 months.

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P-0833

SHORT-TERM POSTOPERATIVE OUTCOMES OF PRESERFLO MICROSHUNT SURGERY USING THE TENON'S CAPSULE POSTERIOR SUTURING TECHNIQUE

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Background
We have developed a method (Tenon's capsule posterior suturing technique) in which the Tenon capsule is sutured 2 mm posterior to the limbus during PreserFlo MicroShunt (PFM) insertion surgery, with the aim of forming a wide posterior filtering bleb. In this study, we report the short-term postoperative results of the PFM insertion surgery using this method.

Methods
We retrospectively examined intraocular pressure and major complications within three months postoperatively in 49 consecutive cases (63 eyes) with a follow-up of at least three months after standalone PFM surgery performed by the same surgeon at Nippon Medical School Tama Nagayama Hospital and affiliated hospitals from September 2023 to July 2024. The mean age was 67.3 ± 12.7 years, with 28 male and 21 female patients. The types of glaucoma included 55 eyes with open-angle glaucoma and 8 eyes with exfoliation glaucoma. All surgeries involved a conjunctival limbal incision, mitomycin C application, PFM insertion, Tenon capsule suturing to the sclera 2 mm posterior to the limbus, and conjunctival flap suturing at the limbus.

Results
Preoperative intraocular pressure was17.8 ± 3.2mmHg (eye drop score: 4.1 ± 1.1), while postoperative IOP was significantly reduced to 9.2 ± 3.2 mmHg at one month, 9.2 ± 3.0 mmHg at two months, and 9.2 ± 2.5 mmHg at three months (eye drop score: 0.2 ± 0.5), with all time points showing a significant IOP decrease compared to preoperative levels ($P < 0.001$, Wilcoxon signed-rank test). Complications included hyphema with a fluid level in 19 eyes (30.2%), choroidal detachment in 5 eyes (7.9%), shallow anterior chamber in 4 eyes (6.3%), and aqueous leakage in 1 eye. In one case, PFM exposure occurred on postoperative day 35, requiring removal. Needling was performed once in 7 eyes (11.1%), and filtering bleb reconstruction was performed in 2 eyes.

Conclusions
PFM insertion using the posterior Tenon capsule suturing technique demonstrated effective IOP reduction over a three-month postoperative period. All cases exhibited posteriorly extended filtering blebs, with no blebs formed near the limbus. While there were no prolonged cases, the frequency of transient hyphema was high, indicating that careful postoperative management is necessary, similar to other filtering surgeries.

P-0834

SAFETY OF PRESERFLO MICROSHUNT® SURGERY ON CORNEAL ENDOTHELIUM: A SIX-MONTH RETROSPECTIVE STUDY

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Background
Glaucoma drainage device implantation is highly effective in reducing intraocular pressure (IOP). However, if positioned too close to the cornea, it poses a significant risk of corneal endothelial cell (CEC) damage. This study aims to evaluate the effects of PreserFlo MicroShunt® (PMS) surgery on CECs.

Methods
A retrospective analysis was conducted on 111 eyes with primary open-angle glaucoma (POAG, 72 eyes), exfoliation glaucoma (PEG, 18 eyes), and secondary open-angle glaucoma without PEG (SG, 21 eyes) treated with PMS surgery at Baptist Eye Clinic, Nagaokakyo, and affiliates from August 2022 to December 2023. Cases with at least 6-month follow-up were included. Data on surgical history, procedure type, IOP, medication score, endothelial cell density (ECD), coefficient of variation (CV), and hexagonal cell percentage (HEX) were extracted. Anterior segment optical coherence tomography (AS-OCT) measured the distance between the PMS tip and corneal endothelium (TE distance), tip and the iridocorneal angle (TI distance), and the angle of tube placement (tube angle). Preoperative (pre-) and postoperative (post-) IOP were analyzed with Steel's multiple comparison test, others with the Wilcoxon signed-rank test.

Results
Surgical history included cataract surgery (CS, 58 eyes), glaucoma surgery (20 eyes), or none (33 eyes). PMS surgery was performed in 83 eyes alone and in 28 eyes with CS. The mean IOP decreased significantly from 21.2 ± 7.1 mmHg pre- to 9.3 ± 1.8 at 1 month, 10.5 ± 2.0 at 3 months, and 11.4 ± 2.6 at 6 months post- ($p < 0.05$). The medication scores also decreased significantly from 2.7 ± 0.9 to 0.0 ± 0.2 ($p < 0.05$). The pre- and at 6 months post- ECD (2308.0 ± 413.0 vs. 2312.5 ± 392.4 cells/mm^2), CV (39.8 ± 6.9% vs. 38.5 ± 5.2%), and HEX (46.2 ± 9.2% vs. 45.7 ± 7.2%) showed no significant changes ($p > 0.05$). AS-OCT at 6 months post- revealed mean TE distance, TI distance, and tube angle as 901 ± 246 µm, 2645 ± 382 µm, and 21.9 ± 5.5 degrees, respectively. ECD loss of >20% was observed in 6 eyes (5.4%), while the majority (83 eyes, 74.8%) experienced ≤5% reduction. These 6 eyes consist of cases with PEG, SG, pre-existing CECs loss, and proximity of the tube to the cornea.

Conclusions
No significant CEC loss was observed within 6 months after PMS surgery. However, close monitoring is recommended for cases with PEG, SG, pre-existing CEC loss, and proximity of the tube to the cornea.

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P-0835

ONE TUBE FOR ALL: 1-YEAR OUTCOMES AFTER TRANSITION TO PAUL GLAUCOMA IMPLANT AT A TERTIARY CENTER

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Background
Since January 2022 Paul Glaucoma Implant (PGI) has been used as first-choice glaucoma drainage device at our clinic. The purpose of this study was to evaluate the intraocular pressure (IOP) lowering effect and success rate of PGI in refractory glaucoma after changing practice pattern from Ahmed and Baerveldt tubes to PGI.

Methods
A prospective observational study of the first 50 consecutive PGI surgeries at a single Danish tertiary center from January 2022 to October 2023. Primary endpoints were IOP and success rates after 12 months. Secondary endpoints were use of IOP lowering medications and complications. All cases had risk of failure for traditional glaucoma surgery (neovascular glaucoma, oil filled eye or uveitis).

Results
Pre-operative IOP was 29.9±8.6 mmHg and the mean number of topical IOP lowering medications used was 3.4±0.76 with 14 cases on systemic acetazolamide. 12 months after surgery IOP was reduced to 11.4±3.1mmHg and complete success rate with a) IOP≤21mmHg was achieved in 43%, b) IOP≤18mmHg in 43%, c) IOP≤15mmHg in 41% and d) IOP≤12mmHg in 33%. Qualified success rate (on topical glaucoma medications) was achieved in a) 96%, b) 94%, c) 86% and d) 71% of the cases. The number of topical IOP lowering medication was 0.9±0.9 after surgery and 47% were medication free. Early (<3 months) and late (>3 months) complications were observed in 22% and 16% of patients, respectively.

Conclusions
This study indicates that PGI provides a good IOP lowering effect after 12 months in a population with risk factors for failure for traditional glaucoma surgery.

P-0836

COMPARATIVE STUDY OF BENT ANGLE NEEDLE GONIECTOMY(BANG) WITH KAHOOK DUAL BLADE IN PRIMARY OPEN ANGLE GLAUCOMA AT A TERTIARY CARE CENTRE

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Background

Minimally invasive glaucoma surgery (MIGS) has erupted as new bunch of options for management of patients with Primary open angle glaucoma (POAG). Kahook Dual Blade (KDB) has been introduced to bypass the aqueous humor to Schlemm's Canal via excision of trabecular meshwork. Bent ab-Interno Needle Goniectomy (BANG) has emerged as an alternative to KDB.

The aim of the study was:
- To study the efficacy, safety & complications of MIGS by KDB & BANG
- To do the comparison of KDB versus BANG in patients of mild to moderate POAG

Methods

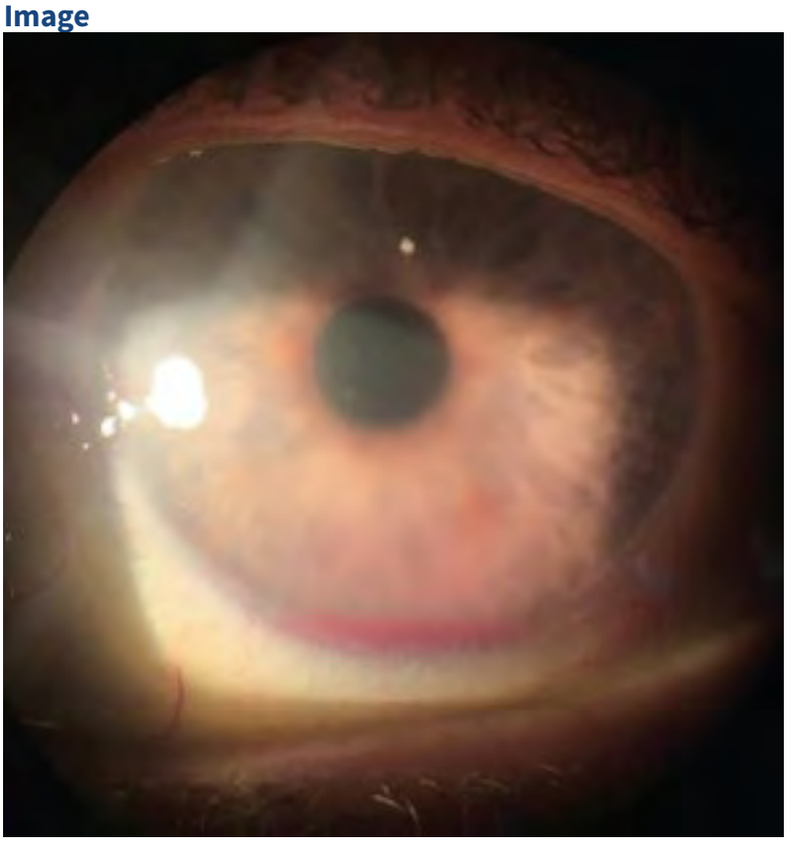
Study Design: Prospective interventional study
Duration: 2023-2024
Place: GSVM Medical College, Kanpur
Sample size - 40, KDB group n=20, BANG n =20
Inclusion Criteria: Patients with mild to moderate POAG as classified by Hodapp Parrish Anderson Classification on anti glaucoma drugs.

Written & Informed consent as per Helsinki's decleration. Detailed history and ophthalmic examinations were done on all follow-up visits. The data were statistically analyzed using SPSS 26.0 version to assess significant associations.

Results

The study revealed a significant IOP reduction by the end of six months in both the groups -26.9% and -29% respectively (p-value 0.004). A significant decrease in corneal endothelial cell density (CD) was seen in both the groups, -90 cells/mm sq in the KDB group and -101.65 cells/mm sq in the BANG group (p<0.001). Insignificant changes were seen in Central corneal thickness and visual acuity by the end of 6 months. Mean reduction in antiglaucoma medications were from 2.23 to 1.31. The most common post operative adverse after MIGS were IOP spike (25%) followed by hyphema (15%).

Image



Conclusions

- MIGS by KDB & BANG reduces IOP to significant levels
- KDB and BANG were equally effective in patients with mild to moderate glaucoma
- BANG can be an option for patient with low socio sconomic stata

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P-0837

EVALUATION OF THE EFFECTIVENESS OF AHMED'S VALVE IMPLANTATION ADDING MITOMICIN C IN PATIENTS WITH REFRACTORY GLAUCOMA AFTER ONE YEAR OF FOLLOW-UP

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Background

Glaucoma is a progressive, chronic optic neuropathy. It is considered the first cause of irreversible blindness worldwide. There are several risk factors related to the development of the disease; among them is intraocular pressure (IOP), which is the leading risk factor and to date, the only modifiable one since it decreases and limits the progress of the disease[1].There are various glaucoma treatments, from pharmacological therapy, laser, micro-invasive surgery (MIGS), conventional surgery, and aqueous humor drainage devices. The latter is the first choice in refractory glaucomas. A major limitation of drainage devices is the accelerated healing process caused by the eye rejecting the foreign body, which limits the function of the valve, generating unfavorable success rates for the patient. The hypertensive phase occurs days after valve implantation and is characterized by forming a fibrotic tissue capsule around the valve body[2-3]. To overcome this condition many strategies have been explored. Among them, mitomycin C (MMC), which has antiproliferative properties[4]. For this reason, this study aimed to evaluate the efficacy and safety of the Ahmed valve implant using MMC in patients with refractory glaucoma and to compare it with a group of patients who did not receive this compound.

Methods

Cohort study involving 34 patients divided into two groups of 17 patients each: Group 1 (MMC use) and Group 2 (no MMC use), with one-year follow-up. Complete success was defined as intraocular pressure (IOP) between 6-18 mmHg without the use of antiglaucoma medications; qualified success referred to the same IOP range but associated with antiglaucoma medications, while failure was characterized by IOP outside this range, severe complications or reintervention.

Results

The overall success rate in Group 1 was 88.2% and in Group 2, it was 94.2%. There was an average reduction in IOP of 18.0-± 11.5 mmHg in Group 1 and 11.3 ± 5.0 mmHg in Group 2. The hypertensive phase occurred in 17.6% of the participants in the first group and in the second 70.6%.

Conclusions

The use of MMC decreases the hypertensive phase observed in Ahmed valve implant surgery, thereby achieving better IOP control.

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P-0838

EFFECTIVENESS AND SAFETY OF THE GEL STENT IN ANGLE CLOSURE GLAUCOMA: ANALYSIS OF A PROSPECTIVE, MULTICENTER, SINGLE-ARM STUDY BY ETHNICITY

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Background
The prevalence of angle closure glaucoma (ACG) varies across ethnicities and geographical areas, and Asia accounts for >75% of ACG cases.[1,2] Evaluated herein is the intraocular pressure (IOP)-lowering effectiveness and safety of the gel stent in Asian and non-Asian patients with ACG.

Methods
This is a post hoc analysis of a prospective, multicenter, interventional, nonrandomized, open-label study. Eligible adults had ACG (ie, iridotrabecular contact in ≥2 quadrants, glaucomatous damage to the optic disc, and visual field loss); baseline IOP 20–35 mmHg after prior medical and/or surgical treatment failed; and healthy/free/mobile conjunctiva in the target quadrant. Angle-widening procedures were permitted immediately before ab-interno implantation of the gel stent. Primary effectiveness endpoint: proportion of patients achieving at Month 12 ≥20% IOP reduction from baseline without IOP-lowering medication increase. Secondary effectiveness endpoints: mean IOP and mean medication count over time, and changes from baseline. Safety endpoints: surgical complications and postoperative treatment-emergent adverse events (TEAEs). Postoperative needling was also documented.

Results
Of 62 patients implanted, 31 were Asian and 31 were non-Asian. At baseline, 83.9% (Asian) and 90.3% (non-Asian) of eyes were phakic, and 64.5% (Asian) and 80.6% (non-Asian) had prior glaucoma procedures. The mean cup:disc ratio and mean central corneal thickness were similar in both groups, while the average visual field mean deviation appeared higher in Asian (-9.9 dB) than non-Asian (-8.6 dB) patients. At month 12, 77.8% of Asian patients (n=21/27; 95% CI: 57.7%–91.4%) and 86.2% of non-Asian patients (n=25/29; 95% CI: 68.3%–96.1%) achieved the primary endpoint (p=.4105 between subgroups). Mean (standard deviation [SD]) IOP decreased from 24.0 (4.4) mmHg on 2.1 (1.3) medications at baseline to 15.1 (4.8) mmHg on 0.8 (1.4) medications at month 12 in Asian patients, and from 24.0 (4.3) mmHg on 2.5 (1.5) medications to 14.7 (2.8) mmHg on 0.6 (1.2) medications in non-Asian patients. At month 12, the proportion of patients whose medication count was reduced (vs baseline) was similar in Asian (81.5%) and non-Asian (82.8%) patients. The rate of needling was 41.9% (Asian) and 29.0% (non-Asian), consistent with previous findings.[3-5] The incidence of ocular TEAEs was 74.2% (Asian) and 87.1% (non-Asian), with IOP increased and conjunctival hyperemia being the most common ocular TEAEs overall.

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Conclusions

Baseline characteristics were fairly similar in both subgroups and the gel stent was as effective in lowering IOP and the medication burden in Asian and non-Asian patients with ACG. The safety profile was acceptable in both subgroups, with no unexpected findings.

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P-0839

EFFICACY AND SAFETY OF COMBINED PHACOEMULSIFICATION WITH HYDRUS TRABECULAR BYPASS MICROSTENT IN PRIMARY ANGLE CLOSURE GLAUCOMA

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Background

Primary angle closure glaucoma (PACG) is characterized by irido-trabecular contact[1]. Cataract extraction in eyes with narrow angles can effectively lower intraocular pressure (IOP)[2], and an additional implantation of Hydrus Microstent would augment this IOP lowering effect[3].

Methods

The study included 15 eyes of 13 PACG patients, who underwent combined phacoemulsification and Hydrus implantation from April 2023 to July 2024 at University Hospitals of Northamptonshire, United Kingdom. Pre-operative and post-operative visual acuity, IOP, number of glaucoma medications, visual field mean deviation was recorded. Clinic review was arranged for 2 weeks, 3 months and 6 months post-operatively. Eyes with previous glaucoma surgery, end stage refractory glaucoma and other secondary causes of angle closure were excluded from the study. The study aimed to assess the reduction of IOP and number of glaucoma medications, post-operatively. Success was defined as IOP ≥ 5 mm Hg and ≤ 21 mm Hg with or without anti-glaucoma medications.

Results

The mean age of patients who underwent combined phacoemulsification with Hydrus implantation was 74.67± 8.31 years. 9 of 13 patients were female. 13 of 15 (86.67%) eyes were previously treated with YAG laser peripheral iridotomy. The mean pre-operative BCVA (Log MAR) was 0.45± 0.8, which improved to 0.19 ± 0.27 at 2 weeks post-operatively. Baseline visual field mean deviation was –9.5± 9.4 and mean cup disc ratio was 0.68± 0.31. Mean pre-operative IOP was 23.4 ± 6.8 mm Hg. Post op IOP was 14.5, 15.1- and 15.7-mm Hg at 2 weeks, 3 months and 6 months respectively. The mean number of glaucoma medication was 2.4 ± 1.1, which reduced post-operatively to 1.3, 1.5 and 1.3 at 2 weeks, 3 months and 6 months respectively. The average reduction of IOP from baseline was 35.8 %, 39% and 33.6% at 2 weeks, 3 months and 6 months respectively. Intra-operative complications included weak zonules in one eye and Descemet membrane tear in one eye. Post-operative complications were seen in 2 eyes which were corneal oedema and cystoid macular oedema, managed conservatively. Complete success was seen in 2 eyes and 13 eyes had qualified success.

Conclusions

Combined phacoemulsification with Hydrus was found to be effective in reducing IOP and glaucoma medications in patients with mild- moderate Primary Angle Closure Glaucoma.

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P-0840

SURGICAL OUTCOMES OF COMBINED PHACOEMULSIFICATION AND HYDRUS MICROSTENT IMPLANTATION IN GLAUCOMA

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Background

The reduction of intra-ocular pressure (IOP) is known to slow the progression of glaucoma[1]. Micro-invasive glaucoma surgery (MIGS) aims to lower IOP and bridge the gap between conservative medical therapy and invasive glaucoma surgeries[2,3]. Implantation of Hydrus Microstent is known to significantly increase the outflow facility in glaucoma eyes[4].

Methods

The study recruited 76 consecutive eyes of 63 patients, scheduled to undergo combined Phacoemulsification with Hydrus Microstent implantation at University Hospitals of Northamptonshire, United Kingdom from April 2023 to July 2024. Data collection included pre-operative visual acuity, visual field mean deviation (MD), type of glaucoma, mean IOP and number of glaucoma medications at baseline and week 2, month 3 and 6. Eyes with previous glaucoma surgery, secondary glaucoma, end stage refractory glaucoma were excluded from the study. Eyes in which implantation of Hydrus Microstent was abandoned during surgery were also excluded from the analysis. A note of any intra operative and post-operative complication was made.

Results

Implantation of Hydrus Microstent was abandoned in 7 eyes due to Schlemm's canal resistance (4 eyes), poor visualization (2 eyes) and patient movement (1 eye). These eyes were excluded from the analysis. Of the 69 eyes included, 43.47% were females. The mean age of patients was 79.7± 8.0 years. The study included 50 eyes with primary open angle glaucoma (POAG), 3 with Pseudoexfoliation glaucoma (PXFG), 1 with normal tension glaucoma (NTG) and 15 with primary angle closure glaucoma (PACG). The mean pre-operative BCVA (Log MAR) was 0.44±0.61, which improved to 0.32± 0.57 at 2 weeks post-op. Baseline visual field MD was -11.89± 8.55. Mean pre-op IOP was 22.06± 5.87 mm Hg. Post op IOP was 16.1, 14.6-, and 14.4-mm Hg at 2 weeks, 3 months and 6 months respectively. The average IOP reduction from baseline was 24.4 %, 33.6% and 34.4% at 2 weeks, 3 months and 6 months respectively. The mean number of glaucoma medications reduced from 2.43± 0.95 to 1.3, 1.6 and 1.6 at 2 weeks, 3 months and 6 months respectively. Intra-operative complications were seen in 2 eyes. Post-operative complications were seen in 5 eyes. 1 eye was treated with YAG Hyaloidotomy and trans-scleral cyclophotocoagulation for aqueous misdirection. Another eye underwent Preseflo micro shunt surgery for uncontrolled glaucoma.

Conclusions

Combined Phacoemulsification and Hydrus Implantation was found to be safe and effective in lowering IOP and slowing the progression of glaucoma.

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P-0841

ONE - YEAR OUTCOMES OF PRESERFLO MICROSHUNT SURGERY AND TRABECULECTOMY IN JAPANESE PATIENTS WITH GLAUCOMA

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Background
To compare the success rate of Preserflo MicroShunt (PMS) surgery for glaucoma with that of trabeculectomy (TLE) and to assess the efficacy and safety of the PMS.

Methods
This retrospective study included patients who underwent surgery performed by the same surgeon between January 2023 and July 2024. The follow-up duration was 12 months, and cases with at least 3 months of postoperative observation were enrolled. The primary outcome was the surgical success rate, defined as a ≥20% reduction in intraocular pressure (IOP) from baseline and an IOP ≤15 mmHg with no glaucoma medication. Secondary outcomes included changes in mean IOP, medication use, and frequency of postoperative intervention. Analyses were also performed based on glaucoma subtype (primary open-angle glaucoma, pseudoexfoliative glaucoma, and other secondary glaucoma). Success rates for standalone procedures and those combined with phacoemulsification were also compared. Success rates were compared between groups using the log-rank test.

Results
A total of 115 eyes underwent PMS and 78 underwent TLE, with comparable success rates (76.7% vs 64.6%, p=0.16). There was no significant difference in the success rate between the PMS and TLE groups when stratified by glaucoma subtype. Similarly, there was no significant difference in success rate between the PMS and TLE groups according to whether surgery was standalone or combined with phacoemulsification (73.6% vs 80.7%, p=0.47 and 69.0% vs 57.9%, p=0.45, respectively). Baseline IOP was significantly higher in the PMS group than in the TLE group (19.2 ± 6.4 mmHg vs 17.2 ± 6.3 mmHg, p=0.0462). Postoperatively, IOP decreased significantly to 12.1 ± 2.7 mmHg in the PMS group and 10.7 ± 2.9 mmHg in the TLE group (p<0.0001), with no significant between-group difference. Number of medications decreased from 3.7 to zero in the PMS group and from 3.8 to 0.1 in the TLE group (p<0.0001). Hypotony was more frequent in the TLE group (35.4% vs 17.2%, p=0.0021) and hyphema was more common in the PMS group (10.3% vs 2.5%, p=0.003). There were no significant differences in the frequency of other complications, additional interventions, or reoperations.

Conclusions
PMS demonstrated a success rate comparable with that of TLE over a 12-month period.

P-0842

PAUL GLAUCOMA IMPLANT: A DESCRIPTION ON TWO-YEAR OUTCOMES

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Background
Glaucoma drainage device implantation has became a mainstay in the surgical management of various glaucoma cases and the utilization rates has been rising. The Ahmed Baerveldt Comparison (ABC) Study and Ahmed Versus Baerveldt (AVB) Study showed that Ahmed Glaucoma Valve (AGV) had lower success rate while Baerveldt Glaucoma Implant (BGI) had a significant higher rate of serious complications. The novel Paul Glaucoma Implant (PGI) was developed to address the above mentioned issues. This study aimed to describe the intraocular pressure (IOP) and medication reduction after PGI implantation and the associated serious complications.

Methods
Retrospective review of patients who underwent PGI implantation in a single tertiary eye centre between December 1, 2019 to June 30, 2024.

Results
Two-hundreds and fifty-four cases of PGI implantation were identified. Fourty-one percent were primary glaucoma. Majority (60%) were advanced and severe disease. The mean preoperative IOP was 25.1mmHg, while the IOP at 1 year and 2 years postoperative were 13.4mmHg and 13.6mmHg respectively. The IOP reduced 46.7% at 1 year and 45.7% at 2 years compared to baseline preoperative IOP. Mean number of medication decreased from 3.7 preoperatively to 1.8 at 1 year and 2.0 at 2 years. Significant complications include 0.8% (n=2) malignant glaucoma required pars plana vitrectomy, 0.8% (n=2) hypotony requiring intervention and 0.4% (n=1) wound breakdown with plate exposure.

Conclusions
The PGI was effective in achieving sustainable IOP reduction and reduction of medication used in glaucoma patients.

P-0843

INHIBITION OF THE RAPAMYCIN-INSENSITIVE MTORC1 /4E-BP1 AXIS ATTENUATES TGF B1 INDUCED FIBROTIC RESPONSE IN HUMAN TENON'S FIBROBLASTS

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Background
Subconjunctival fibrosis is the major cause of failure in both conventional and modern minimally invasive glaucoma surgeries (MIGSs) with sub-conjunctival filtration. The search for safe and effective anti-fibrotic agents is critical for improving long-term surgical outcomes. In this study, we investigated the effect of inhibiting the rapamycin-insensitive mTORC1/4E-BP1 axis on the transforming growth factor-beta 1(TGF-β1)-induced fibrotic responses in human Tenon's fibroblasts (HTFs), as well as in a rat model of glaucoma filtration surgery (GFS).

Methods
Primary cultured HTFs were treated with 3 ng/mL TGF-β1 for 24 h, followed by treatment with 10 μM CZ415 for additional 24 h. Rapamycin (10 μM) was utilized as a control for mTORC1/4E-BP1 signaling insensitivity. The expression level of fibrosis-associated molecules was measured using quantitative real-time PCR, Western blotting, and immunofluorescence analysis. Cell migration was assessed through the scratch wound assay. Additionally, a rat model of GFS was employed to evaluate the anti-fibrotic effect of CZ415 *in vivo*.

Results
Both rapamycin and CZ415 treatment significantly reduced the TGF-β1-induced cell proliferation, migration, and the expression of pro-fibrotic factors in HTFs. CZ415 also more effectively inhibited TGF-β1-mediated collagen synthesis in HTFs compared to rapamycin. Activation of mTORC1/4E-BP signaling following TGF-β1 exposure was suppressed by CZ415 but not by rapamycin. Furthermore, CZ415 was found to decrease subconjunctival collagen deposition in rats post GFS.

Conclusions
Rapamycin-insensitive mTORC1/4E-BP1 signaling play a critical role in TGF-β_1-driven collagen synthesis in HTFs. This study demonstrated that inhibition of the mTORC1/4E-BP1 axis offers superior anti-fibrotic efficacy compared to rapamycin and represents a promising target for improving the success rate of both traditional and modern GFSs.

P-0844

PRESERFLO MICROSHUNT IN KERATOPLASTY-INDUCED GLAUCOMA TREATMENT – SHORT-TERM OBSERVATIONS

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Background
The aim of the study was to evaluate the efficacy and safety of Preserflo MicroShunt implantation in keratoplasty-induced glaucoma patients.

Methods
In this non-randomized, prospective, single-arm, single-center follow-up clinical study sixteen patients with secondary glaucoma to keratoplasty were enrolled to undergo MicroShunt implantation. The primary outcome measures were intraocular pressure (IOP) reduction, success rates, glaucoma medication use, corneal endothelial cell density (ECD) and visual acuity after shunt implantation. An IOP reduction of 20% compared to the baseline value without re-intervention was considered a successful treatment. Complete success was defined as cessation of antiglaucoma medications. Secondary outcome measures included intraoperative and postoperative complications. Measurements were performed preoperatively and at 1 week, and 1, 3, 6 and 12 months postoperatively.

Results
The mean ± SD values of IOP preoperatively and postoperatively, and at 1 week,1; 3; 6; 12 months postoperatively were 36.9±14.3 mmHg, 13.3±6.0 mmHg, 13.3±3.9 mmHg, 14.9±5.4 mmHg, 18.8±10.8 mmHg and 14.9±5.3 mmHg ($p<0.001$ for all values), respectively. The mean IOP at the last follow-up was reduced by 59.0%. One patient underwent bleb revision and finally due to non-achievement of the target intraocular pressure underwent TSCPC surgery. No statistically significant changes in ECD were observed during the follow-up period. No major intraoperative or postoperative complications occurred after procedure.

Conclusions
MicroShunt implantation seems to be an effective and well-tolerated method to reduce intraocular pressure in patients with keratoplasty-induced glaucoma. Longer-term observation in a larger group of patients is needed to confirm these results.

P-0845

TRABECULECTOMY WITH MITOMYCIN C ON AN EXTENDED LONG-TERM BASIS: OUTCOMES AND RISK FACTORS

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Background
Despite the recent introduction of innovative and minimally invasive surgical methods, trabeculectomy remains the most widely performed surgical procedure for lowering intraocular pressure (IOP). However, limited studies have reported its outcomes over 10 years. We evaluated the extended long-term outcomes of trabeculectomy with mitomycin C (MMC) and the factors associated with its successful outcomes.

Methods
We retrospectively evaluated 509 eyes that underwent trabeculectomy with MMC performed by a single surgeon from 1999 and were followed up for more than 10 years. We investigated cumulative surgical success, blindness rates and postoperative complications. Surgical success was defined as no requirement for reoperation, IOP ≤15 mmHg, and no loss of light perception. Legal blindness was defined as visual acuity<3/60. To determine the cumulative dose of IOP-lowering eyedrops, the glaucoma medication index (GMI) was calculated by multiplying the number of eyedrops by the number of years of use. We also investigated the factors associated with surgical failure using Cox regression analysis.

Results
The average follow-up period after the trabeculectomy was 14.6 years (range: 10.0-23.1 years). The Kaplan–Meier survival analysis showed that the cumulative qualified success rates were 90.0%, 81.7%, 76.4%, and 74.7% at 5, 10, 15, and 20 years after the trabeculectomy, respectively. Overall, 14.3% of the total eyes became legally blind. The most common complication following surgery was cataract (23.5%), followed by hyphema (9.1%) and bleb leaks (7.1%). Patients with older age, certain glaucoma subtypes (*i.e.*, neovascular glaucoma and exfoliative glaucoma), a worse visual field mean deviation, and a greater GMI were significantly associated with lower complete success rates of trabeculectomy. The IOP at 1 year after surgery was a strong indicator of long-term surgical success. Unexpectedly, the number of preoperative eyedrops per se, the preoperative IOP, and subsequent cataract surgery did not affect long-term surgical success.

Conclusions
This study showed that trabeculectomy with MMC is an effective and safe surgical procedure for uncontrolled glaucoma in the long term. Patients with certain risk factors, such as exfoliative glaucma and prior use of multiple IOP-lowering eyedrops over prolonged periods, require more attention for long-term postoperative IOP management.

P-0846

LONG-TERM EFFICACY AND SAFETY OF STAND-ALONE AND COMBINED EXCIMER LASER TRABECULOSTOMY IN GLAUCOMA: A SYSTEMATIC LITERATURE REVIEW AND META-ANALYSIS

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Background
This systematic review and meta-analysis report the long-term efficacy and safety of Excimer Laser Trabeculostomy (ELT) with the AIDA (TUI-Laser AG, Germering, Germany) or ExTra laser system (MLase AG, Germering, Germany) when used as stand-alone or phaco-ELT treatment in open-angle glaucoma (OAG) or OHT patients.

Methods
A systematic literature review was performed by two independent reviewers using the PubMed and EMBASE databases to identify articles that examined the efficacy and safety endpoints of the ELT procedure performed in adult patients with glaucoma. Data was extracted after screening articles using a pre-defined patient, intervention, comparison, and outcome (PICO) process. Meta-analysis was performed using R version 4.1.0 with the meta package.

Results
The meta-analysis of the key performance endpoints showed that stand-alone ELT and phaco-ELT improve visual acuity while reducing medication burden and intraocular pressure (IOP). The improvement in visual acuity was -0.23 LogMAR (95% CI: -0.32, -0.14; n=564) at 1-year follow-up and -0.12 LogMar (95% CI: -0.20, -0.05; n=70) at 2-year follow-up, which was only measured in patients that underwent phaco-ELT. The absolute reduction in glaucoma medication was 0.37 (95% CI: -0.18, 0.92; n=107) at 1-year follow-up and 1.26 (95% CI: 0.74, 1.78; n=95) at 2-year follow-up after standalone ELT. In patients undergoing phaco-ELT, the absolute reduction in glaucoma medication was 0.73 (95% CI: 0.49, 0.97; n=854) at 1-year follow-up and 0.58 (95% CI: 0.33, 0.83; n=130) at 2-year follow-up. The absolute reduction in IOP was 6.18 mmHg (95% CI: 3.69, 8.68; n=127) at 1-year follow-up and 7.10 mmHg (95% CI: 6.25, 7.95; n=105) at 2-year follow-up after standalone ELT. In patients undergoing phaco-ELT, the absolute reduction in IOP was 5.41 mmHg (95% CI: 4.12, 6.70; n=847) at 1-year follow-up and 6.72 mmHg (95% CI: 3.01, 10.42; n=130) at 2-year follow-up. The meta-analysis of the key safety endpoints showed a low complication rate and a low rate of additional surgeries following standalone ELT or phaco-ELT.

Conclusions
ELT reduces IOP and simultaneously reduces medication burden in OAG and OHT at one and two years with a favorable safety profile. The need for subsequent glaucoma surgery was low. The implant-free MIGS procedure, ELT, is an efficacious and safe option in managing OAG and OHT as either stand-alone or combined with phaco.

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P-0847

ARE WE DOING BETTER A DECADE LATER: GLAUCOMA PROGRESSION AND THE ROLE OF GLAUCOMA SURGERY FOLLOWING BOSTON KERATOPROSTHESIS (KPRO) TYPE 1 IMPLANTATION

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Background
To compare glaucoma outcomes after Boston type 1 Keratoprosthesis (KPro) implantation with another cohort from a decade prior and assess impact of glaucoma surgery.

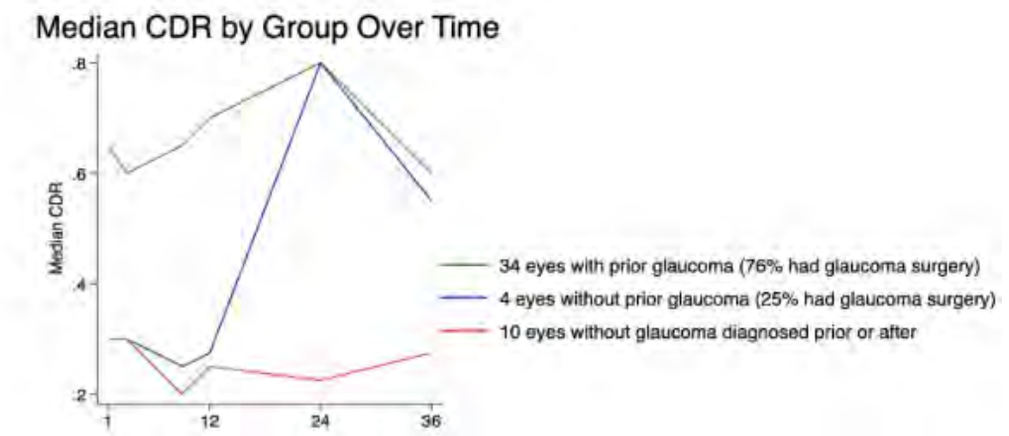
Methods
Retrospective study of 48 eyes (47 patients) who underwent KPro surgery at Mass Eye and Ear (2016-2022) with ≥1 year of follow-up. Glaucoma outcomes were compared to 106 eyes (87 patients) who received KPro from 2004 to 2009.[1] Pre- and postoperative data at months 1,12, 24, 36, and 48 were analyzed.

Results
The recent cohort had a mean follow-up of 3.6±1.3 vs. 3.3±1.0 years in the previous cohort. The recent cohort was older (64±17 vs. 54±6.7 years, p<0.001) and had more males (71% vs. 54%, p=0.047). Prior infection was the leading KPro indication in both cohorts (31% vs. 21%, p=0.18). In the recent cohort, visual acuity (VA) trended toward improvement from preoperative VA (LogMAR 1.82±0.94, CF) to the most recent visit (1.51±1.13, 20/650, p=0.12), similar to the VA outcomes in the previous cohort.

In the recent cohort, IOP decreased at the last visit (13±4 mmHg) compared to pre-KPro (15±6 mmHg, p=0.12). Glaucoma drop use was lower in the recent cohort compared to previous (1.45±1.3 vs. 2±0.9, p=0.003). Mean CDR increased from 0.52 to 0.58 in 4 years in the recent cohort (0.015/year) vs. 0.46 to 0.76 (0.075/year) in the previous cohort. The recent cohort had more eyes with prior glaucoma (71%) compared to the previous cohort (66%; p=0.54). In these eyes, median CDR remained stable over 3 years (0.65 to 0.6, Figure) vs. a significant increase in the previous (0.5 to 0.8). In eyes without prior glaucoma, fewer eyes in the recent cohort developed de novo glaucoma (4/14, 29%) characterized by significant increase in CDR (0.3 to 0.8 in 2 years) compared to the previous cohort (27/36, 75%, p=0.003).

Glaucoma surgery was performed before or simultaneously with KPro in 65% of eyes with prior glaucoma and 0% of eyes with no prior glaucoma in the recent cohort, compared to 47% and 6% in the previous (p=0.08, p=0.35, respectively). Overall, glaucoma surgery was performed in 76% of eyes with prior glaucoma and 7% of eyes with no prior glaucoma during the entire follow-up in the recent cohort vs.73% and 33% in the previous (p=0.74, p=0.004).

Image



Eyes w prior glaucoma	34	21	26	23	18
Eyes with no prior glaucoma	4	3	2	3	2
Eyes with no glaucoma prior or after	10	2	3	5	5

Conclusions

The recent KPro cohort showed better glaucoma outcomes than the previous cohort, with lower rates of CDR increase, de novo glaucoma, and drop use. The results likely reflect improved glaucoma care, including a trend for earlier or concurrent glaucoma surgery, particularly in eyes with prior glaucoma.

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P-0849

OUTCOMES IN XEN GEL STENT PLACEMENT WITH AND WITHOUT CONCURRENT CATARACT EXTRACTION: A SINGLE LARGE INSTITUTIONAL RETROSPECTIVE REVIEW

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Background
XEN Gel Stent implantation is an effective intraocular pressure (IOP)-lowering procedure with relatively low complication rates due to minimally invasive access and may be performed alone or in combination with cataract extraction (CEIOL). The purpose of this study was to assess IOP reduction and complication rates in XEN alone vs. CEIOL-XEN.

Methods
This study is a single institution retrospective chart review. Surgical cases of XEN Gel Stent placement between 2021 and 2024 were reviewed. Baseline data was collected including age, gender, race, disease severity, glaucoma type, baseline IOP, baseline medications, and whether it was a combined case with CEIOL. Post-operative outcomes of IOP and complication rates were collected and compared via Student's T-test (IOP) or binomial logistic regression (complication rates).

Results
A total of 127 surgical cases were reviewed. 75 patients (59.1%) had XEN alone, and 52 patients (40.9%) had combined CEIOL-XEN. The surgical approach used was ab interno in 60 patients (80.0%) for XEN alone and 37 for CEIOL-XEN (71.2%) (p=0.26); the remainder were ab externo.

Mean pre-operative IOP for patients undergoing XEN alone was 21.8 ± 7.7 on 2.8 ± 1.2 eyedrops; mean pre-operative IOP for patients undergoing combined CEIOL-XEN was 15.9 ± 4.8 on 2.9 ± 1.1 eyedrops (p<0.001 XEN alone vs. CEIOL).

Post-operative year 1 IOP for patients undergoing XEN alone was 13.3 ± 6.4 on mean 1.3 ± 1.2 eyedrops; post-operative year 1 IOP for patients undergoing combined CEIOL-XEN was 13.2 ± 4.1 on mean 2.1 ± 1.5 eyedrops. There was no significant difference in post-operative year 1 IOP. XEN alone (p<0.001) and CEIOL-XEN (p=0.01) each had a significant difference in IOP from pre-operative to post-operative year 1.

Complications of XEN alone vs. CEIOL-XEN included bleb needling 9 (12.0%) vs 7 (13.5%) (p=0.81), cystoid macular edema 0 (0.0%) vs 3 (5.8%) (p=0.02), bleb leak 8 (10.7%) vs 0 (0.0%) (p=0.003), IOP spike 7 (9.3%) vs 7 (13.5%) (p=0.47), hypotony 8 (10.7%) vs 4 (7.7%) (p=0.31), endophthalmitis 1/75 (1.3%) vs 0 (0.0%) (p=0.30), and other future procedure 19 (25.3%) vs 19 (36.5%) (p=0.69).

Conclusions
In a single center retrospective study, XEN Gel Stent implantation, with or without concurrent cataract extraction, resulted in statistically significant reduction in IOP at post-operative year 1. The rate of cystoid macular edema was significantly lower in XEN alone vs. CEIOL-XEN. The rate of bleb leak was significantly higher in XEN alone than in CEIOL-XEN.

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P-0850

COMPARATIVE LONG TERM OUTCOMES OF BAERVELDT IMPLANTS AND AHMED VALVES IN UVEITIC GLAUCOMA: A RETROSPECTIVE ANALYSIS

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Background
Management of uveitic glaucoma is challenging due to inflammation and steroid-induced complications. This study compares the outcomes of Ahmed valves versus Baerveldt implants in treating uveitic glaucoma.

Methods
A retrospective review of 40 patients with uveitic glaucoma who underwent Ahmed valve (n=24) or Baerveldt implant (n=16) was conducted. Patients were grouped by valve type and uveitis subtype (anterior, intermediate, posterior, panuveitis). Primary outcomes included IOP control, IOP spikes (IOP >30 mmHg or an increase >10 mmHg from baseline), hypotony (IOP ≤5 mmHg), and complications (maculopathy, revision surgeries, adverse events). Steroid responders were analyzed as a subgroup. Statistical analysis included Kruskal-Wallis tests and Dunn's post hoc for continuous variables and chi-square/Fisher's exact tests for categorical variables. Follow-up ranged from 1 to 5 years.

Results
The average IOP for the Ahmed group was 12.52 mmHg ± 1.82 mmHg, while the Baerveldt group had an average IOP of 11.78 mmHg ± 1.96 mmHg. No significant differences in IOP were observed between groups at any postoperative interval with no difference in IOP lowering medications at 12, 24, and 48 months. IOP spikes occurred more frequently with Ahmed valves (50.0% vs. 31.2%, p=0.0396), while hypotony was more common with Baerveldt implants (62.5% vs. 45.8%, p=0.0477). No significant differences were seen in other postoperative complications. The distribution of uveitis subtypes in the Ahmed group was 4 patients with anterior (16.7%), 1 with intermediate (4.2%), 10 with posterior (41.7%), and 9 with panuveitis (37.5%). The Baerveldt group had 8 patients with anterior (50.0%), 3 with intermediate (18.8%), 4 with posterior (25.0%), and 1 with panuveitis (6.3%). Subgroup analysis showed high rates of hypotony in Ahmed valve recipients with anterior uveitis (75%, 3/4 patients). Baerveldt implants had notable hypotony rates in anterior uveitis (50%, 4/8 patients) and intermediate uveitis (100%, 3/3 patients). No statistically significant differences were found between devices when stratified by uveitis subtype.

Conclusions
Ahmed valves and Baerveldt implants showed similar efficacy in controlling IOP in uveitic glaucoma. Ahmed valves had more frequent IOP spikes, while Baerveldt implants were associated with higher rates of hypotony. No significant differences were observed between the devices when stratified by uveitis subtype. This suggests that both devices are viable options for managing uveitic glaucoma.

P-0851

CLINICAL EVALUATION OF MODIFIED AHMED GLAUCOMA VALVE IMPLANTATION WITHOUT PLATE SUTURES IN THE TREATMENT OF REFRACTORY GLAUCOMA

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Background
To assess the clinical efficacy and safety of modified Ahmed glaucoma valve (AGV) implantation without plate sutures for the treatment of refractory glaucoma.

Methods
This single-center, consecutive clinical case study included 46 patients (46 eyes) diagnosed with refractory glaucoma. Of these, 27 patients (27 eyes) underwent modified AGV implantation without plate sutures, while 19 patients (19 eyes) underwent standard AGV implantation. The demographic characteristics, surgical outcomes, including intraocular pressure (IOP), best corrected visual acuity (BCVA), number of anti-glaucoma medications, surgical success rate, and intraoperative and postoperative complications were compared at 1 day, 1 week, 2 weeks, 1 month, 3 months, and 6 months post-surgery. Success was defined as an IOP between 6 mmHg and 21 mmHg without the need for additional IOP-lowering procedures.

Results
There were no significant differences between the two groups regarding eye laterality, gender, mean age, mean IOP, mean BCVA, mean number of anti-glaucoma medications, or history of previous ocular surgeries ($P > 0.05$). Both groups demonstrated significant improvements in IOP, BCVA, and the number of anti-glaucoma medications compared to preoperative values ($P < 0.05$). However, no significant differences were observed between the two groups in postoperative IOP, BCVA, or anti-glaucoma medication use ($P > 0.05$). At the final follow-up, the overall surgical success rate was 84.21% in the standard group and 85.19% in the modified group. During the follow-up period, the standard group reported 5 cases of shallow anterior chamber and low IOP, 1 case of hyphema, 3 cases of choroidal detachment, 1 case of drainage tube obstruction, 2 cases of drainage tube dislocation, 1 case of Tenon capsule fibrous encapsulation, 2 cases of drainage valve exposure, 1 case of endophthalmitis, and 1 case of corneal endothelial decompensation. The modified group reported 3 cases of shallow anterior chamber and low IOP, 2 cases of drainage tube dislocation, 1 case of Tenon capsule encapsulation, and 1 case of drainage valve exposure. No other severe complications were observed in either group.

Conclusions
Modified AGV implantation yields similar outcomes and success rates to standard AGV implantation for refractory glaucoma, with a lower incidence of postoperative complications.

P-0852

EFFICACY OF COMBINED PHACOEMULSIFICATION AND GONIOSYNECHIALYSIS IN PRIMARY ANGLE-CLOSURE GLAUCOMA WITH PERIPHERAL ANTERIOR SYNECHIA ≥ 180 DEGREES

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Background
Phacoemulsification with intraocular lens implantation and goniosynechialysis (PEI+GSL) is one of effective treatments of moderate primary angle-closure glaucoma (PACG) with peripheral anterior synechia (PAS) < 180 degrees. There is still controversy whether it still is effective for PAS more than or equal to 180°. This study is to evaluate the surgical outcome of PEI+GSL for PACG with PAS≥180°.

Methods
A retrospective study was conducted on 72 patients (76 eyes) who were diagnosised with PACG with PAS≥180° and performed PEI+GSL between February 2023 and August 2024 at Beijing Tongren Hospital. Each eye was assessed before surgery and at 1, 3, 6, and 12 months postoperation. All patients were followed up at least 6 months. The complete success was IOP<21mmHg without any hypotensive medications. The qualified success was IOP <21mmHg with hypotensive medications.

Results
Before surgery, IOPs were 21.39±10.63mmHg, LogMAR were 0.40±0.37 and number of anti-glaucoma drugs were 2.99±1.45. The postoperative IOP, LogMAR and the number of anti-glaucoma drugs decreased at all follow-up time points (P<0.001). At the last follow-up, IOPs were14.21±2.97, LogMAR were 0.12±0.21, number of anti-glaucoma drugs were 0.7±1.21. The complete and qualified success rate were 78.8% and 98.5% at the last follow-up. Multivariate analysis showed that the range of PAS, MD of visual field were associated with success rate.

Conclusions
PEI+GSL could be an effective surgery for PACG with more than PAS≥180°.

P-0853

GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY VERSUS AB-EXTERNO VISCO CIRCUMFERENTIAL SUTURE TRABECULOTOMY IN PRIMARY CONGENITAL GLAUCOMA

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Background
Primary congenital glaucoma (PCG) is a severe form of glaucoma that presents in infancy and requires surgical intervention to prevent irreversible vision loss. Angle-based surgery is the primary treatment for PCG, with recent reports suggesting promising outcomes for gonioscopy-assisted transluminal trabeculotomy (GATT) in children with PCG. Ab-Externo Visco Circumferential Suture Trabeculotomy (AVCST) offers the advantages of combining the efficacy of 360-degree circumferential trabeculotomy via low-cost Prolene sutures with the facilitation of the Schlemm's canal cannulation using viscoelastic.

Methods
This retrospective interventional study compared the two-year outcomes of GATT and AVCST in managing PCG. The records of 65 eyes of 39 children who underwent surgery for their PCG were reviewed.

Results
The key outcome measures included intraocular pressure (IOP) reduction, the success rate, and surgical complications. At two years, both surgical techniques demonstrated significant IOP reduction from baseline (GATT: mean reduction of 15.33 ± 2.56 mmHg; AVCST: mean reduction of 15.96 ± 2.95 mmHg). The complete success rate, defined as an IOP ≤ 16 mmHg with at least a 40% reduction from the baseline without IOP-lowering medications or further surgical interventions, was 87.1% for the GATT and 85.3% for the AVCST. The complication rates were comparable between the two groups, with transient hyphaema being the most common adverse event.

Conclusions
Our findings indicate that both GATT and AVCST are effective and safe surgical options for PCG, with similar efficacy and complication profiles after two years. Further long-term studies are warranted to assess the durability of these outcomes.

P-0854

NONLINEAR PREOPERATIVE AND POSTOPERATIVE IOP RELATIONSHIP IN AB INTERNO TRABECULOTOMY COMBINED WITH CATARACT SURGERY FOR PSEUDOEXFOLIATION GLAUCOMA

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Background

Pseudoexfoliation glaucoma (EXG) is characterized by high preoperative intraocular pressure (IOP) and a significant reduction in IOP following internal ab interno trabeculotomy (AIT) combined with cataract surgery. However, few studies investigated the relationship between preoperative and postoperative IOP. The purpose of this study was to evaluate whether the relationship between preoperative IOP and 1-year postoperative IOP differs between EXG and other glaucoma subtypes.

Methods

This study was a multicenter, retrospective, interventional comparative study, including 241 eyes, one per patient, from patients who underwent AIT combined with cataract surgery at Kyoto University Hospital and at Sensho-kai eye institute. were enrolled. Eligible patients had a diagnosis of EXG, primary open-angle glaucoma, or ocular hypertension. They were followed for at least 6 months postoperatively. Eyes with a history of prior glaucoma surgery were excluded. Patients were divided into EXG and non-EXG groups. The relationship between preoperative IOP and 1-year postoperative IOP was analyzed using univariable and multivariable analyses adjusting for age, sex, refractive error, the number of preoperative glaucoma medications.

Results

A total of 41 eyes with EXG and 200 eyes with non-EXG glaucoma were included. The mean preoperative IOP in the EXG group (23mmHg) was significantly higher than that in the non-EXG group (19.8 mmHg; P<0.001). There was no significant difference in the mean number of preoperative medications between EXG group (3.0) and non-EXG group (3.1; P=0.93). At 1 year postoperatively, the mean IOP decreased to 13.8 mmHg in the EXG group and 14.2 mmHg in the non-EXG group, with both groups requiring an average of 1.7 medications. In the non-EXG group, there was a significant linear relationship between preoperative and 1-year postoperative IOP in both univariable and multivariable analyses (both P<0.001, β=0.27 (95% confidence interval: 0.20 to 0.35) in multivariable analysis). In contrast, no significant relationship was found between preoperative and 1-year postoperative IOP in the EXG group in either univariable or multivariable analyses (P=0.87 for both).

Conclusions

In the EXG group, unlike the non-EXG group, there was no significant correlation between preoperative IOP and IOP at 1 year postoperatively. Regardless of the level of preoperative IOP, the IOP at 1 year postoperatively tended to converge to under 14 mmHg in the EXG group.

P-0855
LONG TERM OUTCOMES OF THE PRESERFLO MICROSHUNT

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Background
The Preserflo microshunt offers a less invasive alternative to glaucoma treatment compared to traditional surgery with promising results. There is emerging study data as to its safety and efficacy. However, long term data on the device is scarce, which is required as glaucoma is a chronic disease. The purpose of this study was to audit the long term outcomes of the Preserflo Microshunt procedures performed by a single surgical team.

Methods
Retrospective cohort study of all patients who underwent Preserflo Microshunt procedure at Croydon University Hospital, London, UK up till December 2023 under one single Consultant (Attending) surgeon (either operating/ supervising fellow). Data was extracted using electronic patient records on Open Eyes, Medisoft EPR and Zeiss Forum. The primary outcomes were rate of surgical failure, mean percentage IOP change and mean number of medications. Surgical failure was defined as further operation for an IOP related indication excluding needling; explantation of implant; less than 20% reduction in IOP on 2 consecutive visits or loss of light perception.

Results
In total, 19 eyes received the Preserflo Microshunt between September 2020 and June 2023. The mean listing pressure was 26mmHg on 3 medications. At 12 months, the surgical failure rate was 5% with cases of surgical success having a mean IOP reduction of 43% on 0.4 medications. At a median follow-up of 32 months, the surgical success rate was 85% with an average IOP reduction of 42% with a mean of 0.8 medications at this later time point.

Conclusions
The Preserflo microshunt could potentially offer long term IOP control with a consistent reduction in the use of glaucoma medications, however careful patient selection is required with regards to target IOP.

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P-0856

MODIFIED APPLICATION OF MITOMYCIN C IN TRABECULECTOMY SURGERY TO IMPROVE THE OUTCOME

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Background
To study safety and efficacy of applying Mitomycin C in sub scleral flap area in addition to posterior subconjunctival wide area application in a standard trabeculectomy.

Methods
Forty eyes which underwent standard trabeculectomy with or without mitomycin C , were randomly allocated into two groups of twenty eyes each. Group A eyes underwent standard Trabeculectomy with posterior wide area application of mitomycin C in subconjunctival space for two minutes. In group B, all the eyes underwent standard trabeculectomy with wide area application of Mitomycin C in subconjunctival space for two minutes similar to group A, and in addition to that Mitomycin C was applied under the scleral flap for one minute.

Results
All the 40 eyes completed one year of follow up. The age ranged from 40 to 73 years, preoperative IOP ranged between 15 and 32 mmHg on maximum tolerated anti Glaucoma medications, with 24 male and 16 female patients. Post operative IOP at one week, one month and three monthly there after for one year were recorded and studied. After one year of post operative period, all the eyes of group B achieved IOP below 21 mmHg without any anti glaucoma medication and without bleb needling. While in Group A at the end of one year, 13 eyes achieved IOP of 21 mmHg or less without any anti glaucoma medication or bleb needling, remaining 7 eyes underwent bleb needling and/or required anti glaucoma medications to keep the IOP below 22 mmHg. None of the eyes in either group had any major complications, exept one eye in group B, who had hyphema in the first two postoperative weeks which resolved with conservative management.

Conclusions
Application of Mitomycin C in sub scleral flap area for one minute in addition to subconjunctival posterior wide area application in standard Trabeculectomy has better IOP control as compared to the eyes which underwent standard Trabeculectomy with postieror wide area application of MMC at the end of one year with no major adverse effects.

P-0857

COMPARISON OF PENETRATING CANALOPLASTY VERSUS GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY IN OPEN-ANGLE GLAUCOMA

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Background
To compare the efficacy and safety of penetrating canaloplasty (PCP) and gonioscopy-assisted transluminal trabeculotomy (GATT) in the treatment of open-angle glaucoma (OAG).

Methods
A two-centers comparative study included patients with OAG who underwent PCP or GATT with a minimum follow-up of 6 months. Collected outcome measures included baseline characteristics, pre and postoperative IOP, number of glaucoma medications and procedure-related complications. The surgical success rate was defined as 6 mmHg ≤ intraocular pressure (IOP) ≤ 21 mmHg with or without glaucoma medications (qualified success) and without glaucoma medications (complete success) . Generalized estimation equations were used to analyze postoperative IOP and medications.

Results
547 eyes in 432 OAG patients (284 PCP, 263 GATT) were enrolled. The mean preoperative IOP of PCP group (30.9±11.3 mmHg) was higher than the GATT group (26.5±10.2 mmHg), and glaucoma medications in PCP group (2.9 ± 1.1) were less than GATT group (3.5 ± 0.9; all P<0.001). Qualified success rates were 93.0% and 89.7% in the PCP group and 93.7% and 92.3% in the GATT group at12 and 24 months, respectively (P=0.467), with a significantly higher rate of complete success rates in the PCP group (85.9% vs. 79.7%, 75.5% vs. 62.9%; P=0.024). Early transient IOP elevation (52.8% in PCP group and 64.6% in GATT group, P=0.005) and hyphema (29.2% in PCP group and 77.9% in GATT group, P<0.001) were the most common observed complications.

Conclusions
Both surgeries were safe and effective for OAG patients in the mid-term with comparative success rate.

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P-0858

COMPARING ONE YEAR OUTCOMES OF OPEN AND CLOSED CONJUNCTIVAL SURGICAL APPROACHES IN THE 63-MM GELATIN MICROSTENT

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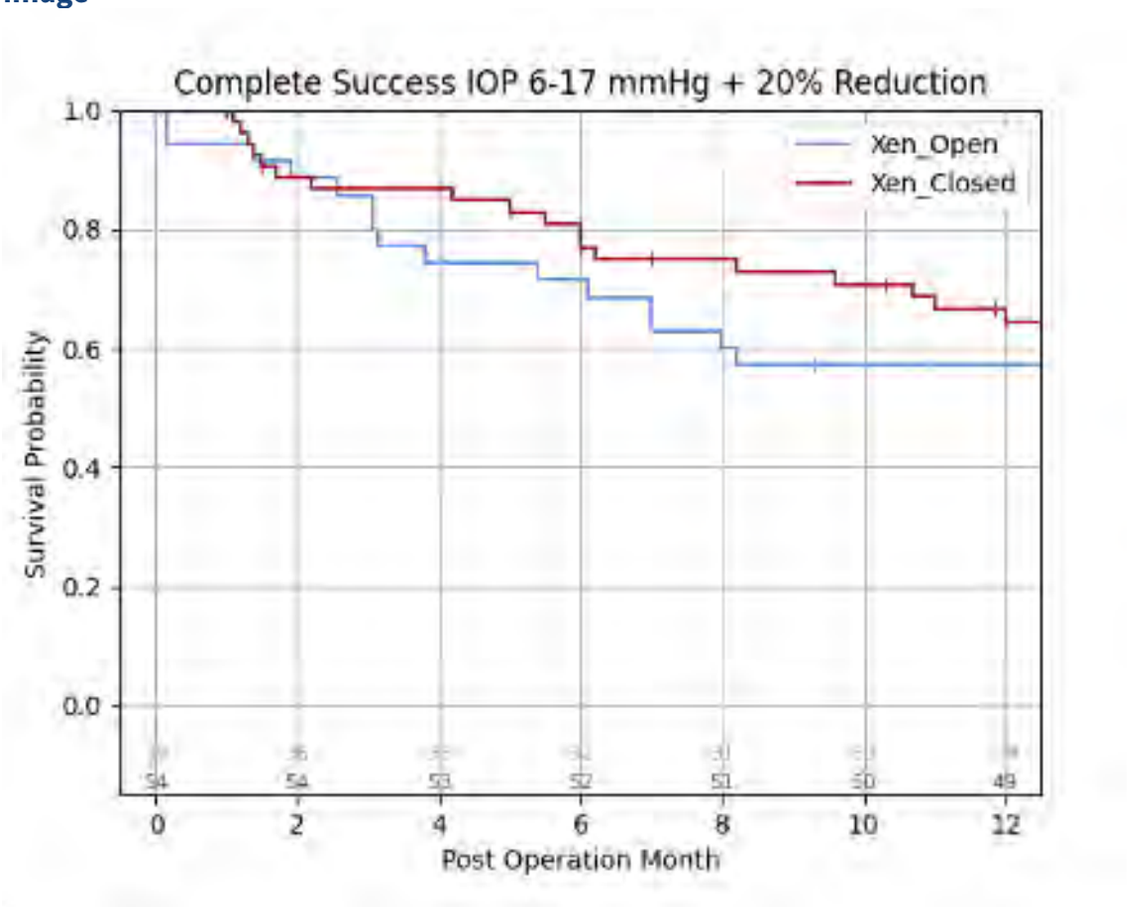
Background
The 63-µm Gelatin Microstent can be implanted in the sub-Tenon or subconjunctival space using either an open conjunctival approach or a closed conjunctival approach with primary needling. This study aims to evaluate the IOP-lowering efficacy and adverse event profiles of both techniques after 1-year follow-up.

Methods
In this retrospective cohort study, eighty-nine glaucomatous eyes that received standalone 63-µm Gelatin Microstent Implants at 6 surgical centres across 4 countries (Canada, Italy, Austria, Belgium) were included. The primary outcome was complete success (ie. no two consecutive IOP>17mmHg, <6mmHg, or > 20% reduction from baseline on no medications and no reoperations). Secondary outcomes included upper IOP thresholds of 14mmHg and 21mmHg, qualified success (with medications), change in IOP, medications, complications, interventions, and re-operations. A Cox proportional hazards model was used to assess risk factors for failure.

Results
Baseline median IOP were 24.0 (19.0-26.5) and 24.0 (19.0-29.8) mmHg, and baseline medications were 3.0 (3.0-4.0) and 4.0 (3.0-4.0) for open and closed eyes, respectively. Final IOP were 10.0 (8.0-11.3) and 12 (8.5-16.5), and final medication was 0 (0-0) and 0 (0-1) for open and closed eyes respectively. Complete success was achieved in 57.1% of 35 open eyes and 64.2% of 54 closed eyes (HR, 1.33; 95% CI, 0.67-2.65). Qualified success was achieved in 79.3% and 91.8% (HR, 2.82; 95% CI, 0.83-9.64). Cox regression did not identify risk factors for failures, including open approach (HR, 1.33; 95% CI, 0.67-2.65; p=0.411), high preop IOP, poor preop vision, and disease severity. Complications occurred in 28 open and 49 closed eyes, most of which were transient. Open and closed had similar IOP and medication reduction at 12 months (p>0.05). Five (14.2%) open and 11 closed (20.3%) eyes underwent reoperations, and 1 (2.9%) and 6 (11.1%) eyes underwent needling (p=ns).

Image



Conclusions

The standalone open conjunctiva approach demonstrated similar success rates as the closed approach in 63-µm Gelatin Microstent implantation. Both showed comparable IOP reduction from baseline at 1-year follow-up.

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P-0859

REAL WORLD OUTCOMES OF MINIJECT MINIMALLY INVASIVE GLAUCOMA SURGERY IN AUSTRALIA

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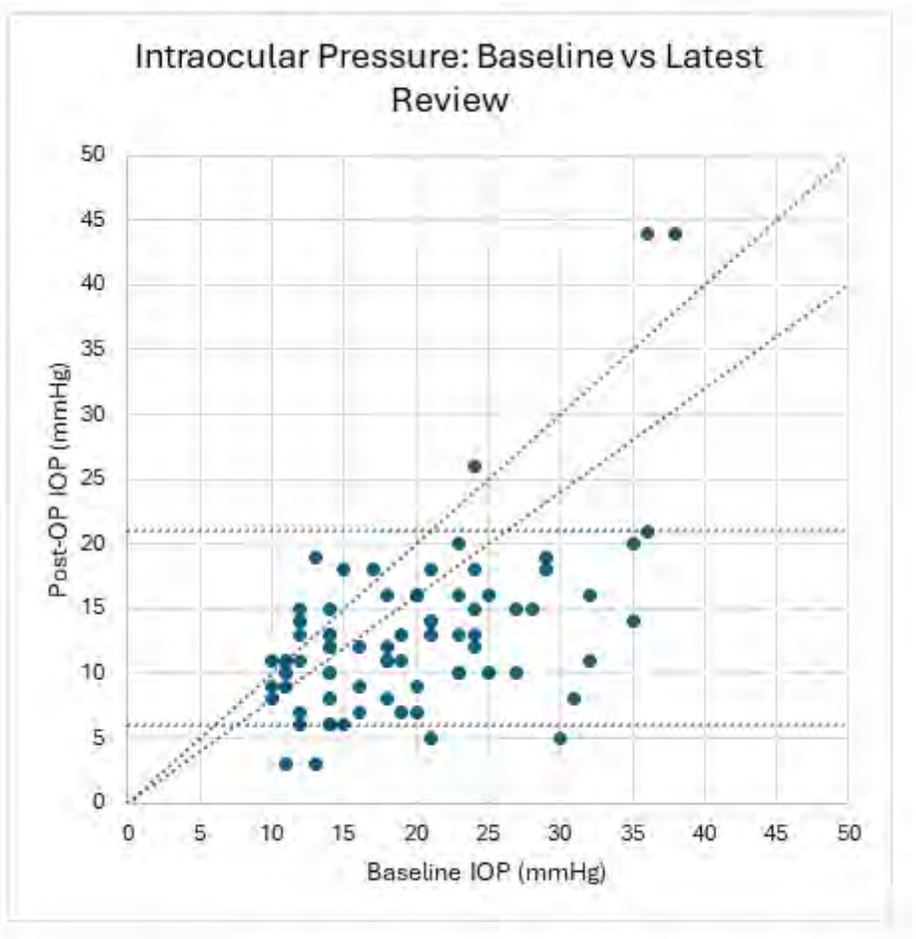
Background
To evaluate the real world performance of the MINIject supraciliary minimally invasive glaucoma device in Australia.

Methods
Retrospective analysis of data from 85 eyes of 68 patients who underwent MINIject minimally invasive glaucoma surgery, with or without phacoemulsification across multiple centres in Australia. Primary outcomes were intraocular pressure (IOP) and medication burden at time of last review. Secondary outcomes included monthly post-operative IOP, medication burden, visual acuity, adverse events and reoperations.

Results
Average age of patients was 76.0 ± 8.7 years, 42% were male. Primary open angle glaucoma was the most common diagnosis (62%). The average visual field mean deviation was -9.57 ± 8.12 dB. Most cases had not undergone previous ophthalmic surgery or laser treatment (62%). Most cases were combined with phacoemulsification (86%). At time of last review 87% of cases (n=75) had either a 20% reduction in IOP from baseline (n=52) or a reduction in their glaucoma medication burden (n=50). Average IOP decreased from 19.4mmHg at baseline to 12.9mmHg ($p<0.05$) Average medication burden decreased from 1.9 at baseline to 0.5 classes of glaucoma medication ($p<0.05$). Visual acuity improved from 72.1 LogMAR score at baseline to 75.1 LogMAR score ($p<0.05$). Hyphaema was the most common complication (n=15). 15 cases underwent further operations, the most common being device revision, which may be related to the learning effect.

Image



Conclusions

Real-world data shows MINIject is effective at reducing intraocular pressure and medication burden within the first year post-operatively. MINIject may require revision due to device malposition.

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P-0861

USE OF PRESERFLO MICROSHUNT AND PRE-OPERATIVE INTRAVITREAL BEVACIZUMAB IN THE TREATMENT OF NEOVASCULAR GLAUCOMA

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Background
To evaluate the effectiveness of a combined approach of Preserflo Microshunt with Mitomycin C and pre-operative intravitreal bevacizumab in the management of Neovascular Glaucoma (NVG) over 6 months.

Methods
Single centre analysis of consecutive patients with a diagnosis of neovascular glaucoma with an IOP refractory to IOP lowering medication and no previous glaucoma filtration surgery, who were treated with Preserflo Microshunt with MMC 0.4-0.5mg/ml. All patients received intravitreal bevacizumab within 1 week pre-operatively.

Complete success was defined as an IOP<21mmHG, >20% IOP reduction, and no use of IOP lowering medication. Qualified success was defined as complete success with the use of IOP lowering medication.

Failure was defined as an IOP>21 mmHg, <20% IOP reduction, surgical revision, further glaucoma filtration surgery, or loss of visual acuity (V/A) to no perception of light (NPL)

Other recorded parameters included hypotony (IOP<6mmHg) and complications.

Results
Data from a cohort of 11 eyes (11 patients) with a mean age of 64.4 (range 44-90) was collected. 6 month outcomes were evaluated from 10 out of 11 eyes, with 1 patient passing away secondary to advanced diabetic co-morbidities prior to sufficient follow up. NVG was due to proliferative diabetic retinopathy (PDR) in 8/10 eyes, and central retinal vein occlusion (CRVO) in 2/10 eyes.

We observed a reduction in average IOP from 38.7mmHg to 13.9mmHg, and mean number of medications from 3.4 to 0.4. Complete success was achieved in 80% (N=8), with a further 10% (N=1) achieving qualified success. Failure occurred in 10% (N=1).

Hyphaema was recorded in 30% (N=3), which resolved spontaneously within 1 month in all cases, and complete success still achieved at 6 months. No cases of hypotony, choroidal detachment, bleb leak, blebitis, or endophthalmitis were identified.

Conclusions
The Preserflo Microshunt with MMC and pre-operative intravitreal bevacizumab proves to be effective and safe. Early outcome data is encouraging and adds value to a current low body of evidence, demonstrating the Preserflo Microshunt as a viable surgical strategy in the management of NVG.

P-0862

HYPERTENSIVE PHASE FOLLOWING RIPCORD REMOVAL IN PAUL GLAUCOMA IMPLANTATION FOR REFRACTORY GLAUCOMA

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Background
The Paul glaucoma implant, a novel non-valved device with a smaller caliber tube, incorporates the routine use of a ripcord during surgery to regulate aqueous outflow, achieve early IOP control, and mitigate the risk of postoperative hypotension. The hypertensive phase (HP) is a postoperative increase in intraocular pressure (IOP), often seen in valved glaucoma drainage devices, attributed to early egress of inflammatory aqueous. This study investigates the occurrence and management of HP following Paul glaucoma implantation.

Methods
A retrospective chart review was conducted on 14 consecutive eyes (14 patients) with refractory glaucoma who underwent Paul Glaucoma Implant placement, with a follow-up period exceeding 3 months. A ripcord was placed during the procedure and removed 3 weeks postoperatively. The primary outcomes assessed were the occurrence HP and IOP control. HP was defined as an IOP > 21 mmHg following ripcord removal within the first 3 months after surgery. Resolution of HP was characterized by an IOP < 22 mmHg and a reduction of at least 3 mmHg with the same or fewer glaucoma medications. Differences in IOP levels and medication requirements between HP and non-HP groups were analyzed.

Results
HP was identified in 6 eyes (42.9%), occurring on average 1.7 weeks after surgery (median: 1 week; range: 1-5 weeks), with a mean peak IOP of 26.5 ± 4.99 mmHg. Resolution was observed in 5 out of 6 eyes (83.3%) within 6 months, while the remaining eye resolved in 12 months, based on available data. Eyes with HP exhibited higher mean IOP and required more medications at 6 months post-surgery compared to eyes without HP (26.5 ± 4.99 vs. 14.00 ± 4.0 mm Hg; 2.0 ± 1.22 vs. 1.14 ± 1.36 medications, respectively). By 12 months, IOP in the HP group decreased to 17.25 ± 3.27 mm Hg with 1.5 ± 1.5 medications, compared to 14.33 ± 3.77 mm Hg and 1.0 ± 1.41 medications in the non-HP group.

Conclusions
Eyes with HP demonstrated a transient elevation in IOP following surgery, with resolution achieved in the majority within 6 months and complete resolution by 12 months. However, these eyes experienced higher IOP levels and required more medications at both 6 and 12 months post-surgery compared to eyes without HP. Despite improvement over time, HP remains a notable risk factor for prolonged elevation of IOP and increased medication dependency, highlighting the need for closer monitoring and management in affected cases.

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P-0863

SURGICAL OUTCOMES OF GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY WITH PHACOEMULSIFICATION IN MILD-MODERATE VERSUS SEVERE OPEN-ANGLE GLAUCOMA

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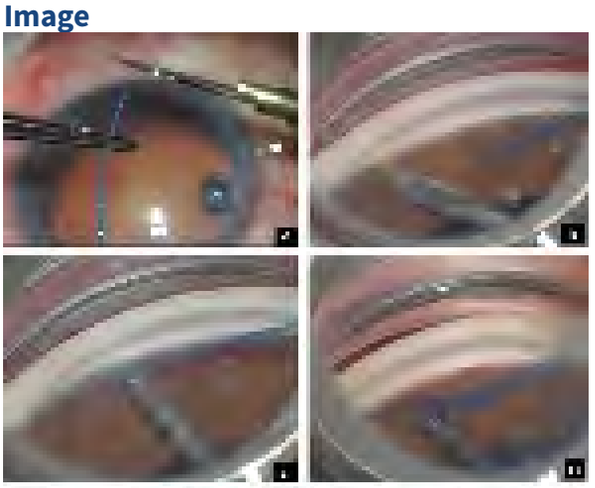
Background
In the past few years, an increasing trend of Minimally invasive glaucoma surgery (MIGS) has been observed because of its safer surgical profile. Gonioscopy-assisted transluminal trabeculotomy (GATT), one of the family members of MIGS has demonstrated its efficacy and safety in mild-moderate open glaucoma. However, data on MIGS; especially GATT in advanced glaucoma is still emerging. An idealistic goal for managing glaucoma patients is to prevent the progression of the early stage of glaucoma to an advanced stage. In dealing with advanced staged glaucoma patients, there should be a holistic approach by considering lowering IOP to low teens and choosing the safest surgical approach at the same time. Our study aims to assess the surgical outcomes of GATT combined with phacoemulsification in primary open-angle glaucoma based on its severity.

Methods
Prospective, interventional study. Patients with primary open-angle glaucoma with visually significant cataracts, showing signs of glaucoma severity on visual field testing were included. Angle closure, secondary open-angle glaucoma, neovascular glaucoma, decompensated cornea, and monocular patients were excluded. Group 1 (mild-moderate: 141 eyes) and Group 2 (severe: 121 eyes) underwent combined Phaco-GATT and were followed up for 12 months. Outcome measures included changes in intraocular pressure (IOP), antiglaucoma medications (AGM), and best-corrected visual acuity (BCVA). Success was defined as at least 25% and 30% IOP reduction and IOP $\leq$18 and $\leq$15mmHg from baseline (Criteria 1 and 2). Additionally, any secondary interventions and complications were evaluated between the groups

Results
Intraocular pressure reduced from 20.40±4.47 mmHg and 21.46±6.45 mmHg to 12.44±2.88 mmHg and 12.49±2.90 mmHg in group 1 (37.1% reduction) and group 2 (38.5% reduction) respectively at 12 months (p=0.625). AGM decreased from 1.35±0.36 and 2.00±0.90 to 0.08± 0.30 and 0.13±0.38 in group 1 (92.3% AGM free) and group 2 (89.0% AGM free) respectively at 12 months ((p =0.468). Mean (SD) BCVA in both groups improved to 0.02 (0.06) from 0.29(0.28) (group 1) and 0.36(0.36) (group 2). Complete success was 81.2%, 70.1% in group 1, and 77.7%, 67.7% in group 2, according to criteria 1 and 2, by the end of 12 months. Hyphema was seen in 26 patients in group 1 and 32 patients in group 2. AC wash was done in 5 patients (2 patients group 1, 3 patients group 2).

Image



Conclusions

In patients with open-angle glaucoma, Gonioscopic assisted transluminal trabeculotomy combined with phacoemulsification is a safe and efficacious procedure with relatively minimal complications, regardless of its severity.

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P-0864

PHACOEMULSIFICATION VERSUS PHACOEMULSIFICATION COMBINED WITH MINIMALLY INVASIVE GLAUCOMA SURGERY IN ANGLE-CLOSURE GLAUCOMA. 12-MONTH FOLLOW-UP

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Background
To describe and compare the long-term outcomes in patients with angle-closure glaucoma (ACG) who underwent phacoemulsification alone (Phaco) versus phacoemulsification combined with minimally invasive glaucoma surgery (Phaco-MIGS).

Methods
In this cross-sectional observational study, we retrospectively reviewed the medical records of patients with ACG who underwent Phaco or Phaco-MIGS with a follow-up of at least 12 months. We included different types of angle-based MIGS. The main outcomes were: change in intraocular pressure (IOP), best corrected visual acuity (BCVA), change in number of hypotensive medications, and intraoperative and postoperative complications.

Results
395 eyes of 303 patients were included, 82% were female, with a mean age of 73.8 years. 129 eyes underwent Phaco and 266 Phaco-MIGS. Phaco-MIGS group included Kahook Dual Blade (KDB), Endocyclophotocoagulation (ECP), synechiolysis and Gonioscopy Assisted Transluminal Trabeculotomy (GATT). Mean IOP reduction was 61.22% for the Phaco group and 57.25% for Phaco-MIGS. The procedures with the highest IOP reduction were phaco-ECP(63.25%) and Phaco-KDB (62.60%). Synechiolysis showed the least reduction (47.92%). BCVA had a significant improvement from baseline to final follow-up but there was no difference between groups. Number of medications had a significant reduction from baseline, but there was no statistically significant difference between groups. Complications were rare, with posterior capsule rupture being the most frequent (2.0%).

Conclusions
Phacoemulsification alone is effective in improving BCVA, reducing IOP and number of medications in patients with ACG, and may be sufficient in most cases. MIGS may offer additional benefits in specific subgroups, but no statistically significant difference between groups were observed. Further studies are needed to confirm these findings.

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P-0865

RETROSPECTIVE ANALYSIS OF EYELID CHANGES AFTER GLAUCOMA SURGERY USING THE SOURCE DATABASE

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Background
It is believed that glaucoma surgery is associated with eyelid position changes. However, little high quality data for lid position changes after glaucoma surgery exists. The purpose of this study is to determine the prevalence of eyelid malposition associated with glaucoma surgery using a large multi-institutional database.

Methods
De-identified patient data from the Sight Outcomes Research Collective (SOURCE) Ophthalmology Data Repository, including electronic health records from 16 academic centers as of 9/30/2024 was extracted for patients ≥18 years of age who underwent glaucoma surgery between 2009 and 2023. Eyes without specified laterality of glaucoma surgery, with pre-existing lid malposition, or with more than one glaucoma surgery or other ocular surgeries except cataract surgery were excluded. Glaucoma revision surgeries were not counted as glaucoma surgery. Lid malposition disorders evaluated were: lid retraction, ptosis, lagophthalmos, entropion, and ectropion. Data were summarized by mean (±SD) for continuous variables and frequency (%) for categorical variables.

Results
Of the 13,000 eligible eyes from 11,300 patients, the mean age is 67.1 (±13.8) years. 5,480 (49.2%) were female. The racial/ethnic distribution is 6,144 (55.2%) white, 2,372 (21.3%) black, 752 (6.8%) Asian, 1,050 (9.4%) Hispanics, 495 (4.4%) others, and 317 (2.9%) unknown.

Overall 712 eyes (5.5%) were diagnosed with lid malposition during the follow-up period. The glaucoma surgery either alone or combined with phacoemulsification with the greatest risk of lid malposition was Xen gel stent ab interno 9.1%, (47/514), followed by Xen gel stent ab externo 7.7% (66/859), trabeculectomy 6.3% (274/4,382). trabeculotomy 5.7% (37/652), anterior chamber tube shunt (ACTS) 4.8% (272/5,620), and other microinvasive glaucoma surgery (MIGS) 1.6% (16/973) with a P<0.001.

Of 712 lid malposition eyes, 62 (8.7%) underwent one or more eyelid surgeries. Eyes with Xen gel stent ab interno had the highest rate of undergoing eyelid surgery 1.36% (7/514), followed by trabeculotomy 0.77% (5/652), trabeculectomy 0.68% (30/4,382), ACTS 0.34% (19/5,620), Xen gel stent ab externo 0.1% (1/859), and other MIGS 0% (0/973). There were statistically significant different risks for developing eyelid malposition undergoing surgical repair between the glaucoma surgeries (P<0.001).

Conclusions
Over 5.5% of eyes undergoing one glaucoma surgery developed eyelid malposition and 8.7% of those eyes underwent eyelid surgeries within two years. Xen gel stent ab interno surgery had the highest rate of eyelid malposition requiring eyelid surgical intervention.

P-0866

EVALUATION OF ASTIGMATISM AFTER TRABECULECTOMY USING ANTERIOR SEGMENT OCT

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Background
Trabeculectomy (LET) can cause post-operative astigmatic changes. This study aimed to evaluate the changes in astigmatism before and after LET using anterior segment OCT.

Methods
This retrospective study included 129 cases (142 eyes) that underwent LET at our hospital between January 2020 and December 2021, with a follow-up of more than 6 months postoperatively. Intraocular pressure and corneal refractive power along the steep (Ks) and flat (Kf) meridians of the anterior and posterior cornea were measured using anterior segment OCT (CASIA, Tomey, Nagoya, Japan), and pre- and post-operative values were compared.

Results
The mean preoperative IOP was 23.1±9.4 mmHg. Postoperative IOP was significantly lower than preoperative at all time points, measuring 9.5±5.2 at 1 month, 9.5±4.9 at 3 months, and 10.2±5.0 mmHg at 6 months (all p<0.001).Preoperative anterior Ks was 49.94±1.96 D, anterior Kf was 48.54±1.73 D, posterior Ks was -6.30±0.29 D, and posterior Kf was -6.04±0.25 D. Postoperative anterior Ks values were significantly higher than preoperative values at all time points, measuring 50.76±2.99 D, 50.43±2.13 D, and 50.26±2.52 D at 1, 3, and 6 months, respectively (all p<0.001). Anterior Kf values were 48.58±1.96 D (p=0.257), 48.39±2.01 D (p=0.00172), and 48.49±2.02 D (p=0.734) at 1, 3, and 6 months, respectively. Postoperative posterior Ks values were significantly lower than preoperative values at all time points, measuring -6.45±0.36 D, -6.41±0.36 D, and -6.36±0.32 D at 1, 3, and 6 months, respectively (all p<0.001). Posterior Kf values were significantly higher than preoperative values at all time points, measuring -6.00±0.26 D, -6.01±0.29 D, and -5.99±0.27 D at 1, 3, and 6 months, respectively (p=0.00264, 0.000903, 0 0.00287).

Conclusions
LET induced changes in all corneal refractive power except for anterior Kf at all time points.

P-0868

THE INTERNATIONAL GLAUCOMA SURGERY REGISTRY: A MULTINATIONAL INITIATIVE FOR ADVANCING EVIDENCE-BASED GLAUCOMA CARE

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Background
Surgical interventions for glaucoma, ranging from conventional procedures to minimally invasive glaucoma surgery (MIGS), aim to lower intraocular pressure (IOP) and mitigate optic nerve damage. Despite their growing adoption, there remains a paucity of real-world, longitudinal data comparing their safety, efficacy, and cost-effectiveness. The International Glaucoma Surgery Registry (IGSR) seeks to address this gap.

Methods
The IGSR is a prospective, multicentre, observational registry designed to collect comprehensive data from glaucoma surgeries worldwide. To date, the registry has captured data from 9,477 procedures. The most common surgeries include glaucoma drainage devices (2,374), trabeculectomy (1,324), Hydrus Microstent (458), iTrack (475), XEN Gel Stent (433), PreserFlo MicroShunt (691), and iStent (combined total of 1,333, including iStent Inject, iStent Inject W, iStent Infinite, and other iStent variants). Data collection spans baseline demographics, surgical details, and longitudinal clinical outcomes. A total of 50,773 follow-ups have been recorded across various post-operative time points. Secure, encrypted data management ensures compliance with international privacy standards.

Results
Preliminary analyses from the IGSR reveal diverse practice patterns in surgical glaucoma management. Early findings highlight variability in IOP reduction, medication burden, and complication rates across different surgical modalities. The registry's robust data infrastructure supports granular subgroup analyses, enabling insights into patient-specific factors influencing outcomes.

Conclusions
The IGSR represents an unprecedented effort to aggregate and analyse global real-world data on glaucoma surgery. By providing insights into the comparative effectiveness, safety, and economic impact of surgical treatments, the IGSR is poised to inform clinical guidelines, enhance patient care, and support future research. The registry underscores the value of international collaboration in addressing complex ophthalmic challenges.

P-0869

FACTORS AFFECTING BLEB MORPHOLOGY AND POSTOPERATIVE INTRAOCULAR PRESSURE IN INFEROTEMPORAL PRESERFLO MICROSHUNT IMPLANTATION

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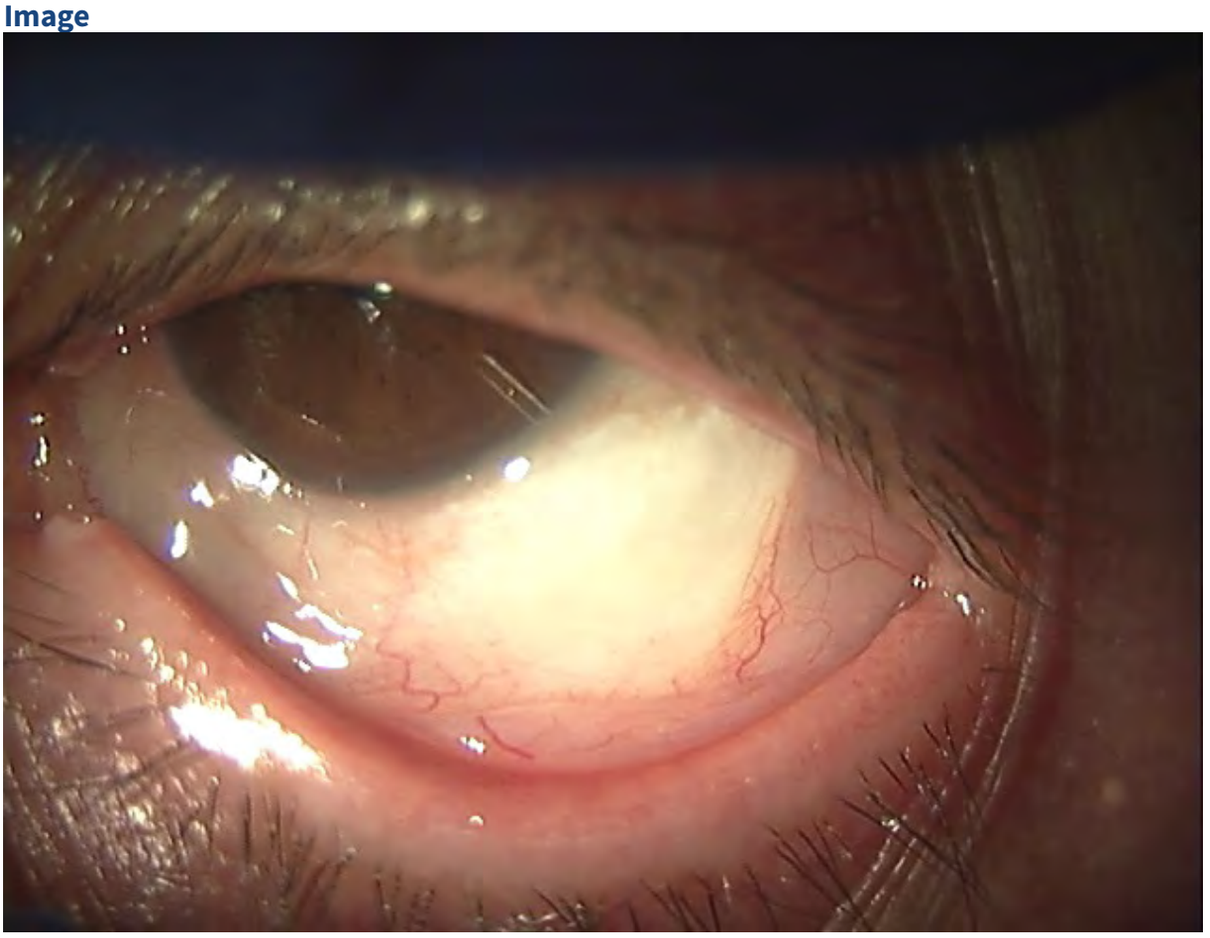
Background
There have been very few reports on bleb morphology following PreserFlo MicroShunt implan. To investigate factors associated with bleb morphology and postoperative intraocular pressure (IOP) in eyes with inferotemporal PreserFlo microstent implantation.

Methods
We analyzed 94 eyes that underwent PreserFlo microstent implantation in inferotemporal quadrant. Slit-lamp photographs of the bleb at approximately 6 months postoperatively were used for bleb morphology analysis. Bleb vascularity was assessed using two classification criteria. Multivariate analysis was performed to identify factors associated with bleb morphology and 6-month postoperative IOP, considering preoperative IOP, age, sex, axial length, glaucoma type, surgical technique, glaucoma medication score, and surgical history.

Results
Mean age was 71.6 ± 12.0 years, with 46 males (64%). Open-angle glaucoma accounted for 69 eyes (73%), mean axial length was 25.4 ± 2.2 mm, and 54 eyes (57%) underwent standalone surgery. IOP significantly decreased from 24.9 ± 6.8 mmHg preoperatively to 14.4 ± 2.8 mmHg at the time of photography (P<0.001). Avascular blebs were observed in 7 eyes (7.5%) according to both classification systems. No bleb-related infections occurred during the observation period. There was no significant difference in IOP between avascular and vascularized blebs (13.5 ± 0.9 vs 14.4 ± 2.9 mmHg, P=0.08). No preoperative factors predicted bleb morphology. Age was the only factor significantly associated with 6-month postoperative IOP (P<0.001), with a 0.157 mmHg decrease in IOP for each 1-year increase in age.

Image



Conclusions

While inferotemporal PreserFlo microstent implantation may result in a small proportion of avascular blebs, postoperative IOP was primarily associated with age rather than bleb morphology.

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P-0870

36-MONTH RESULTS OF PHACOEMULSIFICATION WITH EXTENDED-DEPTH-OF-FOCUS INTRAOCULAR LENS IMPLANTATION AND AB-INTERNO CANALOPLASTY

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Background
Many glaucoma surgeons are wary of using extended-depth-of-focus intraocular lenses (EDOF IOLs) in glaucoma patients due to their potential negative impact on vision. Ab-interno canaloplasty (ABiC) rejuvenates the entire trabecular outflow pathway and can clinically and significantly reduce both IOP and glaucoma medication burden. This study evaluated 36-month results of combined phacoemulsification with extended-depth-of-focus intraocular lens and ab-interno canaloplasty (EDOF IOL + ABiC) in eyes with mild-moderate primary open angle glaucoma (POAG).

Methods
Post-operative changes in corrected and uncorrected distance visual acuity (CDVA and UCDVA), uncorrected near visual acuity (UCNVA), IOP, and glaucoma medications were analyzed in 20 eyes via paired sample t-tests. An EDOF IOL (Symfony, ZXR00, J&J) and microcatheter (iTrack 250A, Nova Eye) with cohesive viscoelastic (Healon GV or Healon Pro, J&J) were used.

Results
Baseline mean IOP (15.6 ± 5.7 mmHg), glaucoma meds (1.5 ± 1.1 meds), CDVA (0.36 ± 0.22 logMAR), UCDVA (0.35 ± 0.28 logMAR), and UCNVA (0.2 ± 0.1 logMAR) were established. At 36 months, both mean IOP (to 13.3 ± 4.1 mmHg; $p<0.05$) and glaucoma medication burden (to 0.9 ± 0.9 meds; $p<0.05$) were significantly reduced. At 36 months, 100% of eyes had IOP ≤ 21 mmHg, 63% of eyes had IOP ≤ 17 mmHg, and 45% of eyes had IOP ≤ 14 mmHg. At 36 months, 35% of treated eyes were medication free. CDVA (to 0.09 ± 0.11 logMAR; $p<0.05$), UCDVA (to 0.07 ± 0.09 logMAR; $p<0.05$), and UCNVA (to 0.06 ± 0.1 logMAR; $p<0.05$) all significantly improved with minimal residual refractive error (average sphero-equivalent -0.23 D). No adverse events occurred (*e.g.*, no decline in BCVA, surgical reintervention, or complications).

Conclusions
EDOF IOL + ABiC can safely and effectively maintain well-controlled baseline IOPs, improve post-operative distance and near visual acuities, and reduce both spectacle dependence and medication burdens in eyes with mild-moderate POAG.

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P-0871

COMPARATIVE STUDY OF AHMED GLAUCOMA VALVE IMPLANTATION WITH AND WITHOUT INTRAOPERATIVE MITOMYCIN-C

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Background
To evaluate whether adding intra-operative subconjunctival mitomycin-C (MMC) injection during Ahmed glaucoma valve (AGV) surgery was associated with an improvement in post-operative outcomes.

Methods
Consecutive cases of AGV without MMC performed in 2021-2022 were compared with consecutive cases of AGV with intra-operative MMC performed in 2022-2023. The MMC group received 0.1 ml of 0.2mg/ml MMC injected subconjunctivally over the AGV plate at the end of the surgery. All patients were from a single clinical site and all eyes had follow up duration of 12 to 18 months unless they failed earlier due to additional IOP lowering intervention or AGV removal in which case the last follow-up was the time point at which the decision for further intervention was made. The main outcome measures were IOP, use of glaucoma medications, additional interventions, and incidence of hypertensive phase (defined as IOP>21mmHG in the first 3 months).

Results
There were 24 eyes each in the No MMC and MMC groups. The mean follow-up duration of 16 ± 4 months in the No MMC group versus. 14 ± 5 months in the MMC group was not significantly different. Baseline characteristics between the two groups were similar with respect to age, vertical cup to disc ratio, Humphrey visual field mean deviation, number of eyes with POAG, number of eyes with AGV as the primary glaucoma surgery, CCT, number of pseudophakic eyes, and number of patients on pre-operative oral medications. Pre-operative IOP was 20.0 ± 5.6 in the No MMC group and 22.9 ± 7.6 in the MMC group; the difference was not statistically significant. IOP at last follow-up was 12.7 ± 3.2 in the No MMC group and 12.7 ± 3.4 in the MMC group; the difference was not statistically significant. Baseline number of medications was the same in both groups (4.0 ± 1.0) but the number of medications at last follow-up was lower in the MMC group (1.9 ± 1.1, versus 2.7 ± 1.5 in the No MMC group, p = 0.032). The reduction in number of medications from baseline to the last follow-up was 48% in the MMC group and 28% in the No MMC group but this difference was not statistically significant. The number of eyes with any additional intervention was 2 in the No MMC group and 5 in the MMC group and the difference was not statistically significant. In the No MMC group, 1 eye each had cyclophotocoagulation, and cataract surgery combined with MIGS. In the MMC group, 3 eyes had cyclophotocoagulation,1 eye with prior scleral buckle had AGV removal for plate migration, and 1 eye had AGV tube ligated for hypotony. The incidence of hypertensive phase was similar in the two groups and occurred in one eye each.

Image

	No MMC (N=24)	MMC (N=24)	p-value
Age (years)	73.5 ± 8.9	71.9 ± 13.6	0.626
No. of eyes with POAG	16	15	1.000
No. of eyes with AGV as primary surgery	12	15	0.561
HVF Mean deviation	-11.4 ± 7.4	-12.13 ± 6.9	0.727
Vertical cup to disc ratio (VCDR)	0.8 ± 0.2	0.8 ± 0.1	0.636
No. of pseudophakic eyes	19	18	1.000
Central corneal thickness (CCT)	518 ± 35	536 ± 35	0.138
No. on pre-op oral meds	8	11	0.053
Pre-op IOP	20.0 ±5.6	22.9 ±7.6	0.144
Pre-op no. meds	4.0 ±1.2	3.9 ±1.1	0.712
Last follow-up IOP	12.7 ±3.16	12.7 ±3.4	0.979
Last follow-up no. meds	**2.7 ±1.5**	**1.9 ±1.1**	**0.032**
IOP reduction (%)	34 ±17	39 ± 25	0.396
Med reduction (%)	28 ± 37	48 ± 36	0.071
Follow-up duration (months)	16.3 ± 4.3	14.6 ± 5.5	0.239
No. of eyes with hypertensive phase	1	1	1.000
No. of eyes with hypotony	0	1	1.000
No. of eyes with tube erosion	2	1	1.000
No. of eyes with any additional intervention	2	5	0.702

Conclusions

In this comparative study with up to 18 months of follow-up the addition of intraoperative MMC to AGV surgery was associated with a reduction in the number of post-operative medications. The incidence of hypertensive phase in both groups in this study was lower than previously reported.

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P-0872

POSTOPERATIVE EYE DROP EFFECTS ON VISUAL FIELD OUTCOMES AFTER ISTENT INJECT W IMPLANTATION USING A LINEAR MIXED MODEL ANALYSIS

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Background
The iStent inject W (ISIW) implantation has emerged as an effective surgical option for patients with open-angle glaucoma. However, the optimal postoperative management, especially regarding the use of eye drops, remains a subject of ongoing investigation. This study aims to determine the impact of different classes of eye drops (prostaglandin analogs (PGA), beta-blockers (BB), carbonic anhydrase inhibitors (CAI), alpha-2 agonists (A2A), and rho kinase inhibitors (ROCK) on outcomes of visual field test following ISIW implantation.

Methods
A total of 74 eyes rom 51 patients who underwent ISIW implantation were included in the analysis. A linear mixed model (LMM) was used to account for the repeated measures from both eyes. The dependent variable was the change in mean deviation (MD) of the 24-2 SITA Standard Humphrey Visual Field test from 12 to 6 months post-surgery. Explanatory variables included the use of five types of eye drops at 6 months post-surgery, change of intraocular pressure (IOP) from preoperative to 6 month after operation, preoperative number of eye drops, and preoperative mean deviation of Humphrey visual field analysis (HFA). The LMM was computed using MATLAB to assess the effects of these variables on the change in mean deviation (MD).

Results
The linear mixed model results revealed that both carbonic anhydrase inhibitors CAI and A2A were statistically significant in influencing change in MD values. The coefficients for CAI ($p = 0.0076$) and A2A ($p = 0.0116$) indicated negative and positive associations with MD change, respectively. Other factors such as PGA, BB, ROCK, preoperative number of eye drops, preoperative MD values and change of IOP showed no significant association with MD change. The marginal R^2 was 0.22075, while the conditional R^2 was 0.4338, indicating moderate explanatory power for the model.

Conclusions
Our findings suggest that CAI and A2A usage at 6 months post-ISIW implantation may have a significant impact on vvisual outcomes. While the results indicate that some eyedrops might influence the mean deviation change, further studies with larger sample sizes and longitudinal follow-ups are required to validate these findings and refine postoperative management strategies.

P-0873

ONE-YEAR EFFICACY AND SUCCESS RATES OF ITRACK AB-INTERNO CANALOPLASTY

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Background
Glaucoma remains a leading cause of irreversible blindness. Minimally invasive glaucoma surgery (MIGS) is becoming an increasingly common intervention for management due to its effectiveness in intraocular pressure (IOP) reduction and lower safety risk profile compared to traditional surgeries. This study evaluates the 1-year clinical outcomes of ab-interno canaloplasty using the iTrack surgical microcatheter (Nova Eye Medical Inc.).

Methods
This is a retrospective single-center case series performed by chart review. Records of patients who underwent canaloplasty between 1/1/2023 and 12/7/2023 were identified. Inclusion criterion was iTrack catheter use. Exclusion criteria included goniotomy and/or trabeculectomy performed in conjunction with canaloplasty. Primary endpoints were IOP and number of glaucoma medications at 1 year after surgery.

Results
13 eyes of 10 patients were included in the study, with 3 cases performed as stand-alone procedures and 10 were combined with cataract surgery. Two eyes underwent further surgical intervention for glaucoma management within the first year of follow-up. Of the remaining 11 eyes, average IOP at baseline was 15.2 mmHg, similar to average IOP of 15.4 mmHg at 1 year after canaloplasty (p=0.848). The average number of glaucoma medications used significantly decreased from 2.3 before to 1.4 after canaloplasty (p=0.005). The rate of complete success, defined as IOP ≤ 21 mmHg with no use of anti-glaucoma medication at 1-year follow-up, was 45.5%. The rate of qualified success, defined as IOP ≤ 21 mmHg with the use of 2 or less antiglaucoma medications at 1-year follow-up was 81.8%. No serious complications were recorded.

Conclusions
Patients were able to reduce their treatment burden by about one glaucoma medication and maintained their IOP at 1 year after canaloplasty with the iTrack microcatheter. This study contributes to the literature supporting the efficacy and success rates of this device. Future studies with larger patient populations and longer follow-up would be valuable in further characterizing this MIGS technique.

P-0874

AQUEOUS HUMOR CYTOKINES ASSOCIATED WITH SURGICAL FAILURE AFTER ILLUMINATED MICROCATHETER-ASSISTED CIRCUMFERENTIAL TRABECULOTOMY OF OPEN-ANGLE GLAUCOMA

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Background
To investigate the influence of aqueous humor cytokines levels and demographic characteristics on the success rate of illuminated microcatheter-assisted circumferential trabeculotomy (MAT) in open-angle glaucoma patients.

Methods
Demographic features, medical histories and surgical information were recorded. Aqueous humor was collected at the time of MAT surgery. A variety of cytokines were analyzed in the aqueous humor. As for outcomes, surgical failure was defined as requirement for glaucoma reoperation or intraocular pressure (IOP) greater than 21mmHg with more than 3 supplemental topical antiglaucoma medications at 1-year follow-up.

Results
A total of 65 eyes were enrolled (58 eyes surgical success and 7 eyes surgical failure). A statistical higherpercentage of primary glaucoma ($P < 0.001$) and patients receiving trabeculotomy not less than 180 degrees ($P = 0.019$) were present in the surgical success group. Smaller age ($P = 0.019$), worse preoperative ($P = 0.022$) and postoperative CDVA ($P = 0.003$), greater amount of preoperative ($P = 0.031$) and 1-year postoperative ($P < 0.001$) topical antiglaucoma medications, higher preoperative ($P = 0.012$) and 1-year postoperative ($P = 0.020$) IOP were associated with surgical failure. Greater levels of MCP-1, CD-54, IL-6 and IP-10 in the aqueous humor were significantly observed in the surgical failure group than success group ($P = 0.024$, 0.002, 0.022 and 0.008, respectively).

Conclusions
The research revealed that higher concentrations of MCP-1, CD-54, IL-6 and IP-10 in the aqueous humor were related to failure of MAT surgery. Further studies are needed to explore the regulation of these cytokines on the advantage of success rate of MAT surgery.

P-0875

EVALUATION OF THE EFFECTIVENESS AND SAFETY OF THE AADI DRAINAGE DEVICE IN GLAUCOMA MANAGEMENT

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Background

Trabeculectomy is the standard surgical treatment for glaucoma; however, in cases of failure or secondary glaucoma, drainage devices such as the Ahmed and Baerveldt valves are commonly used. These devices are expensive, and for low-income populations, cost-effective alternatives are crucial. In response, a new drainage device similar to the Baerveldt, called the **Aadi drainage device,** was developed in India at a more affordable price. This study aims to evaluate the effectiveness and safety of the Aadi device in reducing intraocular pressure (IOP) and medication use, as well as to evaluate any associated complications.

Methods

A prospective, cross-sectional, and interventional study was conducted between June 2021 and March 2022 in Santo Domingo, Dominican Republic. A total of 8 patients diagnosed with glaucoma were implanted with the Aadi drainage device. The study followed these patients for 6 months, monitoring changes in IOP, the reduction in glaucoma medication use, and the occurrence of any postoperative complications.

Results

In the analysis performed, it was observed that on the first postoperative day there was a 39.26% reduction in IOP, and at 3 months this decrease increased to 66.34%. In addition, the number of medications was reduced by 34.48% on the first postoperative day and by 75% at 6 months. Regarding complications, only 37.5% of participants presented some adverse event, which were managed and resolved in a timely manner.

Conclusions

The Aadi drainage device holds promise as a cost-effective solution for managing glaucoma, particularly in low-income settings where the cost of traditional devices may be prohibitive. Its ability to significantly reduce both intraocular pressure and the need for medications, coupled with manageable complication rates, suggests that it could offer a viable alternative to more expensive drainage devices like the Ahmed and Baerveldt. Further studies with larger sample sizes and longer follow-up periods will be essential to confirm these findings and establish the long-term efficacy and safety of the device. Given the high demand for glaucoma treatments in low-income populations and the affordability of the Aadi device, its use could improve access to effective care, helping to reduce the burden of glaucoma-related blindness in underserved regions.

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P-0876

A 10-YEAR RETROSPECTIVE STUDY ON POST-PENETRATING KERATOPLASTY GLAUCOMA

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Background
The objective of this study was to perform a retrospective statistical analysis of patients who underwent penetrating keratoplasty (PK) at our hospital over the past decade. The aim was to identify and observe potential factors influencing postoperative intraocular pressure (IOP) elevation and the development of glaucoma following PK surgery.

Methods
This retrospective case series included patients who underwent PK at Taipei City Hospital Zhong Xing Branch. All procedures were performed by a single surgeon between December 2013 and December 2023. Patients were followed up for at least one year postoperatively.

Results
A total of 89 eyes were reviewed, with 68 eyes from 64 patients included after excluding those with less than one year of follow-up (13 eyes) and repeated transplants (8 eyes). Postoperative IOP elevation or glaucoma requiring treatment occurred in 32 eyes (47.1%), of which 53% had no prior glaucoma-related treatment (including medication, iridotomy, or filtering surgery). Glaucoma medications were initiated at a median of 76 days post-transplantation, with beta-blocker monotherapy as the first-line treatment. Seven eyes (10.3%) underwent glaucoma surgery, with a median time of 200 days after transplantation.

In univariate analysis, variables such as sex (p=0.35), age (p=0.28), pre-transplantation glaucoma diagnosis (p=0.51), pre-transplantation herpes/uveitis diagnosis (p=0.52), diabetes mellitus (p=1.00), hypertension (p=0.81), axial length (p=0.92), graft size (p=0.71), corneal size (p=0.70), and the result of intraoperative herpes polymerase chain reaction (p=0.66) were not statistically associated with post-penetrating keratoplasty glaucoma.

In multivariable regularized logistic regression analysis, age (coefficient = 0.28) and pretransplantation glaucoma diagnosis (coefficient = 0.16) were identified as positive predictors. Conversely, pre-transplantation herpes/uveitis diagnosis (coefficient = -0.21) demonstrated a notable negative association with post-penetrating keratoplasty glaucoma. Although not statistically significant (p=0.37), the graft failure rate was higher in cases with postkeratoplasty glaucoma (18.8%) compared to those without (11.1%). One patient experienced graft bulging, resulting in a substantial myopic shift.

Conclusions
Glaucoma following corneal transplantation is a common and challenging issue that can lead to irreversible vision loss and, as shown in our study, may increase the likelihood of graft failure. Long-term steroid use may be one of the contributing factors. Other potential risk factors include older age and pre-transplantation glaucoma. Closer monitoring and individualized management are essential for high-risk patients, and when medical treatment is insufficient, glaucoma surgery may be necessary to prevent further complications.

P-0877

THE SEVERITY OF PROSTAGLANDIN-ASSOCIATED PERIORBITOPATHY HAS LIMITED INFLUENCE ON THE SURGICAL OUTCOMES OF THE AHMED GLAUCOMA VALVE

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Background
Our previous findings suggested that severe prostaglandin-associated periorbitopathy (PAP) could reduce the effectiveness of trabeculectomy[1]. This study investigates the impact of PAP severity on the surgical outcomes of Ahmed Glaucoma Valve (AGV) implantation.

Methods
A retrospective case series was conducted involving 102 eyes from 102 Japanese patients (55 males, 47 females; mean age ± standard deviation, 74.9 ± 7.8 years) who underwent AGV implantation for primary open-angle glaucoma (POAG), attended all postoperative visits for 12 months, and had PAP severity evaluated using the Shimane University PAP Grading System (SU-PAP)[2]. Data were collected from medical records. Surgical success rates were compared among groups categorized by SU-PAP grades (grades 0–3) through survival curve analysis. Surgical failure was defined by the need for additional glaucoma procedures, an IOP reduction of less than 20%, postoperative IOP exceeding 18 mmHg (definition A) or 15 mmHg (definition B), or postoperative visual acuity deteriorating to no light perception.

Results
At the 12-month follow-up, success rates across grades 0, 1, 2, and 3 were 47%, 43%, 42%, and 73%, respectively, for definition A (p=0.35), and 35%, 26%, 19%, and 27%, respectively, for definition B (p=0.64, log-rank test). For definition A, younger age was linked to higher surgical failure (Hazard ratio = 0.97/year, p=0.049, Wald test), while other factors, such as gender, baseline IOP, medication use, refractive error, previous conjunctival procedures, or SU-PAP grade, did not significantly impact surgical failure. For definition B, no factors were found to affect outcomes.

Conclusions
Preoperative PAP severity may have limited influence on the outcomes of AGV implantation. Given the impact of PAP severity on trabeculectomy success, for patients with severe PAP, clinicians may consider long-tube shunt surgery either as the primary filtration option or as a secondary intervention if trabeculectomy fails.

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P-0878

CLINICAL OUTCOMES OF WIDE-ANGLE BENT AB INTERNO NEEDLE GONIECTOMY: A SUB-SAHARAN AFRICAN EXPERIENCE

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Background
This study evaluates the safety and efficacy of wide-angle bent ab interno needle goniectomy (BANG) as a standalone procedure for patients with various types of glaucoma.

Methods
This retrospective single-centre review included 28 eyes of 21 patients with various types of glaucoma, who underwent standalone BANG using a 26 gauge needle to excise 100 degrees of trabecular meshwork from January to April 2024. The primary outcome was Intraocular pressure(IOP). Secondary outcomes included the percentage reduction in IOP, the number of antiglaucoma medications (AGMs) used, and any intraoperative complications. Surgical success was defined as an IOP reduction by ≥ 20% and a reduction in the number of anti-glaucoma medications by at least one at the 6-month follow-up with no surgical re-intervention

Results
At the 6-month follow-up, there was a significant decrease in mean IOP, from 28.7 ± 12.7 to 16.4 ± 7.1 mmHg (a 35% reduction; $p < 0.001$). The mean reduction in the number of AGMs was 0.9 ($p < 0.001$). A reduction of 20% or more in IOP was achieved in 78.6% (22/28) of the eyes. Overall success at the 6-month mark was observed in 13 eyes (46.43%). Mild postoperative hyphema was noted in 8 eyes (28.6%), and 2 eyes (7.1%) required surgical re-intervention by the end of the 6 months

Conclusions
Wide angle bent ab interno needle goniectomy demonstrated a good safety profile with effective pressure control and reduced medication needs in most patients within a 6-month follow-up period.

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P-0879
OUTCOMES OF GLAUCOMA IN CHILDREN WITH RETINOPATHY OF PREMATURITY

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Background
Glaucoma in children with Retinopathy of Prematurity (ROP) is a common and an important sight threatening complication. Reports of outcomes of glaucoma in ROP children is scarce. This study aims to study the outcomes of glaucoma in children with ROP.

Methods
We performed a retrospective chart review at a tertiary care center from January 2014-March 2024 in ROP children with secondary glaucoma. Glaucoma was defined as use of antiglaucoma medications or requiring glaucoma surgery for intraocular pressure control.

Results
A total of 196 eyes of 144 patients were included with a mean follow-up of 31.1 months (0-117 months). Out of 144 patients, 96 (66%) were males, one eye was affected in 92 (64%) and both the eyes were affected in 52 (36%) patients. The mean age was 6 ± 7.8 months (1-48), 93 babies (64.6%) were ≤ 5 months of age at the time of presentation, 17 babies (12%) presented within 1 month of age. The mean gestational age was 29.2 ± 2.8 weeks (23-38) and the mean birth weight was 1300 ± 425 g (680-3200). Majority of secondary glaucoma was seen in stage 5 ROP 106 eyes (54%), followed by stage 4b in 27 eyes (13.7%), stage 4a in 20 eyes (10%), aggressive posterior ROP in 18 eyes (9.2%). Prior lensectomy with vitrectomy was the most common retinal intervention performed in 70 eyes (35.8%), followed by antiVEGF injection in 33 eyes (17%) and laser photocoagulation in 27 eyes (13.7%). In our series, only 2 eyes (1%) developed secondary glaucoma following lens sparing vitrectomy. The mean age at diagnosis of glaucoma was 12.8 months (2-60), 75(38.3%) were diagnosed in <6 months of age babies. The mean baseline intraocular pressure (IOP) was 23.14 mm of Hg (10-48). The cornea was clear in 108 eyes (55%), hazy in 23 (11.8%), Haab's striae was seen in 4 (2%) and hyphema was seen in 9 eyes (4.6%). IOP was managed medically in 171 eyes (87.3%), surgical management was required in 25 eyes (12.8%). Ahmed glaucoma valve (AGV) was done in 10 eyes (40%), 7 eyes (28%) underwent trabeculectomy with Mitomycin C, 5 eyes (20%) underwent diode cyclophotocoagulation and 3 eyes (12%) underwent goniotomy. At the final visit, the mean IOP was 12.7 mm of Hg (0-48), IOP was within 6-21 mm of Hg in 79 eyes (40%), hypotony (IOP < 6mm of Hg) was seen in 59 eyes(30%) and 46 eyes (23.5%) had IOP > 21 mm of Hg. 117 eyes (59.7%) were on 1-2 antiglaucoma medications, 41 eyes (21%) were not on any medications and 21 eyes (10.7%) were on 3-4 medications for IOP control at the final visit. 17 eyes (8.7%) eyes had vision >1/60 vision (logMAR 1.77), 14 eyes (7.1%) had 3/60-6/18 (logMAR 1.3- 0.48). The Kaplan Meier Survival analysis showed the survival rate of developing glaucoma was 83% at 5 years and 42% at 10 years.

Conclusions
Secondary glaucoma is a major complication in children with ROP, especially in more severe ROP *i.e.*, stage 5 ROP. Majority can be managed by medical treatment and few may require surgery for IOP control. Less than 10% of the patients had ambulatory vision.

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P-0880

TRABECULECTOMY WITH MITOMYCIN C VERSUS PRESERFLO MICROSHUNT WITH MITOMYCIN C

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Background

Trabeculectomy with mitomycin C has been the gold standard of surgical management of glaucoma for decades. Newer modalities have been coming up including various MIGS. Whilst many show promise and now have a place in the surgical armamentarium, the question remains whether trabeculectomy still remains the gold standard for real, blinding refractory glaucoma and the place of newer modlaities like the preserlo microshunt.

Methods

Trabeculectomy with mitomycin c (performed using the moorfields safe surgical system, consecutive cross-sectional retrospective) sample cases were audited in 2015 compared to the UK National trabeculectomy Survey 2002 and other regional standards. Trabeculectomy with mitomycin c cases were again reaudited in 2021 compared to the same standards. Then preserflo microshunt was audited in Nov 2024 compared to the preserflo systematic review and meta-analyses (Pietris et al) published in july 2024 along with other regional studies. All cases were performed by a single surgeon (author), single centre all using mitomycin C under LA or GA as per the patients preference.

Results

Majority of trabeculectomy with mitomycin C cases achieved satisfactory IOP enabling stopping all glaucoma medications at the latest review in the intiail audit as well as the reaudit. Most of the Preseflo with mitomycin C cases are medication free in the initial followup and there seems less IOP fluctuation in the initial postop period. Both modalites were safe with low complication rartes and similar or better results than the standards. Postop modulation like Needling with 5fu, releasable suture removal, bleb manipulation are more effective in trabeculectomy in the initial postoperative period. No serious complications with both modaltiies like endophthalmitis, return to theatre within 2weeks, hyopotony needing reformation noted. Preserflo used a higher concentration of mitomycin C in caucasian population and the impact of this needs to be studied longterm especially if further glaucoma surgery needed later. Needling, bleb manipulation seem less effective in preserflo which may need higher rates of revision or eventual trabeculectomy or tube. Preserflo seemed to show a good response to failed trabeculectomy cases and traumatic refractory glaucoma in the initial followup.

Conclusions

Preserflo microshunt shows similar success rate compared to trabeculectomy with mitomycin C in the initial followup. The postoperative regimen of preserflo seems slightly less intensive, complications seem slightly lesser which may justify moving to this modality in appropriate cases, and also possibly justify the cost of the device. Trabeculectomy has a longer learning curve for the newer surgeon but still seems to achieve better rates of glaucoma totally medication free results and postoperative modulation (like needling of bleb and releasable suture adjustments) seem more effective. A longer term followup required though the initial results of preserflo microshunt are encouraging.

P-0881

MINIMALLY INVASIVE GLAUCOMA SURGERY IS EFFECTIVE AT LOWERING OCULAR PRESSURE AND NUMBER OF DRUGS SIMULTANEOUSLY IN A MULTIVARIATE ANALYSIS OF 202 EYES

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Background
Minimally invasive glaucoma surgery (MIGS) with the Hydrus Microstent has been shown to reduce intraocular pressure in key landmark trials. However, few analyses perform multivariate measure the change in intraocular pressure (IOP) and number of pressure-lowering medication (nRx) simultaneously.

Methods
A retrospective study of eyes that underwent MIGS with the Hydrus Microstent from 31-March-2021 to 12-February-2024 at a single-surgeon clinic in Gold Coast, Australia. Billing codes were used to identify cases of standalone Hydrus and phaco-Hydrus, followed by a chart review to collect demographic and clinical information. IOP and nRx data were clustered into four post-operative periods: 2-4, 5-10, 10-14 months, and "most recent". Cases were excluded for insufficient follow-up (n = 65), failed implantation (n = 1), indeterminate diagnosis (n = 6), or complex ocular disease (n = 8).

Results
202 eyes from 115 patients were included, of which 54% were male. Mean age at surgery was 71.3 years. The most common indications were primary open angle (n = 102), normal tension (n = 37) and chronic angle closure glaucoma (n = 27). One-way MANOVAs revealed that both IOP and nRx were significantly different between pre-op, and each post-op interval ($p < 0.05$ for four analyses). Univariate analyses revealed that both IOP (-4.2, -4.0, -3.1, and -3.9 mmHg) and nRx (-0.5, -0.2, -0.5, and -0.3 classes) decreased for each interval pair; all eight were significant ($p < 0.05$). A repeated-measures MANOVA did not reveal a significant change in IOP and nRx across the first three follow up intervals ($F = 1.095$, $p = 0.352$).

Conclusions
The Hydrus Microstent is effective at lowering both IOP and nRx simultaneously in a real-world multivariate analysis of cases from a single-surgeon clinic. This effect appears to be most pronounced immediately following surgery.

P-0882

RESULTS OF TRABECULECTOMY WITH SUPRACHOROIDAL DERIVATION COMPARED TO TRADITIONAL TRABECULECTOMY IN PATIENTS WITH OPEN ANGLE GLAUCOMA

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Background

Among the different surgical treatments of glaucoma, a new procedure has been performed which optimal results. It consists of a trabeculectomy with mitomycin C with suprachoroidal derivation with two autologous scleral flaps. Success depends fundamentally on preventing scarring in the scleral flap zone and in the episclera, it maintains a continuous flow through the ostium/flap and the suprachoroidal space as well as maintaining the aqueous humor flow in the subconjunctival space.

The study aims to compare the outcomes of two types of surgery, suprachoroidal derivation trabeculectomy and traditional trabeculectomy, in patients aged 40 to 70 years with open angle glaucoma in a 3 year follow up. Aspects such as intraocular pressure, visual acuity, post-surgery medications, and complications will be evaluated to determine which procedure is more effective. Additionally, the study aims to provide insights into this new surgical technique for glaucoma treatment.

Methods

A retrospective study will be conducted on a group of patients who underwent either of these two surgeries. Clinical records provided by a specialized institute that performs these surgeries will be used.

Results

The study included 80 patients divided into two groups: 40 for traditional trabeculectomy and 40 for suprachoroidal derivation trabeculectomy. The average age was 66 years old. They were grouped based on the time of glaucoma diagnosis. There were no significant differences in the intraocular pressure or visual acuity between the groups at different follow up times. However, the suprachoroidal derivation group had a 15% lower probability of using post-surgery medications compared to the reference group. Suprachoroidall derivation surgery was also associated with a longer time without glaucoma progression.

Conclusions

Suprachoroidal derivation trabeculectomy demonstrated greater benefits in terms of time without glaucoma progression and reduced post-surgery medication usage compared to traditional trabeculectomy. Further research with larger groups and longer follows up periods is recommended to confirm these findings and enhance the treatment for glaucoma patients.

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P-0883

A COMPARATIVE STUDY OF EXCISIONAL GONIOTOMY USING KAHOOK DUAL BLADE IN MILD GLAUCOMA KDB GROUP IN SEVERE GLAUCOMA AFTER FAILED GLAUCOMA SURGERIES

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Background
In recent years, KDB has provided moderate reduction in medication burden and/or intraocular pressure (IOP) in eyes with therapeutic needs. It involves removal of a small part of the trabecular meshwork to create a wider channel for aqueous humor outflow into schlemm's canal to reduce IOP. Aim of the study is to describe the efficacy and safety of KDB in patients with mild to severe glaucoma and compare the outcomes between both the groups.

Methods
In this study, a retrospective chart review was performed involving 10 eyes in KDB- phaco vs 10 eyes in KDB group.The outcome measures included mean IOP reduction, mean reduction in IOP lowering medications and adverse effects. Surgical success was defined as IOP reduction of at least 20% from baseline at 6 months, and /or reduction of at least 1 glaucoma medication.

Results
Statistically significant mean IOP and mean number of IOP medication reductions from baseline were achieved at all points in both groups. At 3 months, mean IOP decreased significantly from 29.5 ±3.5 to 15.1 ±2.5 ($p<0.001$) and from 21.8 ±2.9 to 11.5 ±2.2 ($p<0.001$) in the KDB and phaco-KDB groups, respectively.The number of IOP lowering agents decreased from a baseline of 3.9±1.2 to 0.62± 0.39($p<0.001$) at 1 month followed by a slight increase to 0.87±1.2 at 3months in the KDB group whereas in the phaco-KDB group, medications reduced from 1.6±1.1 to 0.23 ±0.4($p<0.001$) at 1 month and remained unchanged at 3 months. The common complications on day 1 were corneal edema, which was significantly greater in the KDB group at 72.7% vs 37.5% in phaco-KDB group ($p<0.001$)and hyphema which was 54.5% in KDB group vs 37.5% in phaco-KDB group. All the complications resolved spontaneously in 1-2 weeks with no adverse effects. Surgical success is yet to be calculated after a follow up of 6 months.

Conclusions
KDB achieved a statistically significant IOP and medication burden reduction in both groups. The most common complication reported in both groups was corneal edema which was significantly greater in the KDB group. No severe complications were reported. Although its efficacy decreases over time, its cost effectiveness and favorable safety profile makes this procedure a potentially useful primary adjunctive in high risk eyes.

P-0885

THE BENEFITS OF ISTENT INFINITE COMBINED WITH PHACOEMULSIFICATION IN GLAUCOMA PATIENTS: A 6-MONTH RETROSPECTIVE ANALYSIS IN A SINGAPOREAN -CENTER

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Background
This study evaluated the safety, effectiveness, and glaucoma medication-saving potential of iStent infinite combined with phacoemulsification in Asian patients with glaucoma over a 6-month postoperative period.

Methods
A retrospective analysis was conducted between November 2023 and November 2024 at the National University of Singapore Hospital. The study included patients who underwent iStent infinite implantation in conjunction with phacoemulsification. The cohort comprised of individuals with ocular hypertension, primary open-angle glaucoma, primary angle-closure glaucoma, and normal-tension glaucoma. Outcomes included mean changes in intraocular pressure (IOP), number of glaucoma medications, and monthly glaucoma-medication costs estimated with multilevel mixed effects regression modeling; and frequency of postoperative complications.

Results
A total of 22 patients (26 eyes) were included, with a male predominance (17 patients, 65.38%). Preoperatively, the observed mean IOP and number of glaucoma medications were 16.38 mmHg and 1.92, respectively. At the 6-month follow-up, the estimated mean IOP reduction was 2.59 mmHg (95% CI: -3.89 to -12.9; P < 0.001), and the estimated mean reduction in number of medications was 1.53 (95% CI: -2.10 to -0.97; P < 0.001). The average reduction in monthly glaucoma-related costs across all postoperative months 1, 3, and 6 was S$22.04 (95% CI: S$-28.57 to S$-15.50; P < 0.001). Adverse events were minimal, with one eye experiencing a <1 mm hyphema on postoperative day 1, which resolved within a week, and another eye requiring anterior chamber washout for residual epinucleus and minimal blood clot, with no further complications reported.

Conclusions
iStent infinite demonstrated significant early benefits consisting of reduced IOP, medication burden, and monthly glaucoma-medication costs, with minimal adverse events. While these results highlight its potential as a safe and effective treatment option for glaucoma management, further studies with long-term follow-up are warranted to assess its durability, sustained efficacy, and economic value over extended periods.

P-0886

ANALYSIS OF THE EFFICACY OF PHACOEMULSIFICATION COMBINED WITH GONIOTOMY IN PSEUDOEXFOLIATIVE GLAUCOMA

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Background
Pseudoexfoliative glaucoma(PEXG) is a type of refractory glaucoma, and traditional trabeculectomy has disadvantages such as large trauma, high risk, and uncertain long-term outcomes. In recent years, minimally invasive glaucoma surgery (MIGS) has developed rapidly in China.Previous studies have suggested that GT are suitable for PEXG. In this study we compare the efficacy and safety of phacoemulsification + intraocular lens implantation + trabeculectomy (PEI + Trab) and phacoemulsification + intraocular lens implantation +120 degrees goniotomy(PEI +GT) in the treatment of advanced PEXG to provide better surgical treatment for PEXG.

Methods
This study was a retrospective cohort study. Sixty patients with moderate and advanced PEXG were enrolled,and randomly divided into 2 groups .The 2 groups underwent PEI+Trab or PEI+GT surgery separately.The definition of successful surgery was postoperative average intraocular pressure (IOP) <18 mmHg. Follow up visits were conducted on the 1months , 3months,6 months and 12months after surgery. The visual acuity,IOP value, the number of IOP-lowering medications, the proportion of surgical success and complications were evaluated. And statistical analysis was performed.

Results
There was no significant difference in clinical baseline conditions between the two groups (P<0.05). The IOP in the PEI+Trab at postoperative 1months (13.74±2.40mmHg) were lower than that of PEI+GT (15.73±1.76mmHg) (P<0.05).The IOP in the PEI+Trab and PEI+GT at postoperative 3 months [(15.77±1.62)and(15.60±1.86)mmHg],6 months [(16.28±1.50) and (15.44±1.91)mmHg] and 12 months [(17.06±1.67) and (16.45±2.41)mmHg] were lower than those before surgery [(27.58±4.38)and(8.62±4.18)mmHg] (all P>0.05). The IOP in the two groups were lower than preoperative(P<0.05). The numbers of IOP lowering medications used in the PEI+Trab and PEI+GT groups at 1 , 3 ,6 and 12months after surgery were less than those before surgery (both P>0.05). There was no statistical significance in the overall number of IOP-lowering medications used between the two groups (P>0.05).There was no significant difference in the complete success rate and qualified success rate between the two groups at 1, 3, 6 and 12 months after surgery (P > 0.05).There was no statistical difference in the occurrence of postoperative short-term complications between the two groups (X^2 = 0.089, P = 0.766), and the postoperative long-term complications in the PEI+GT group were lower than those in the PEI+Trab group (P = 0.026).

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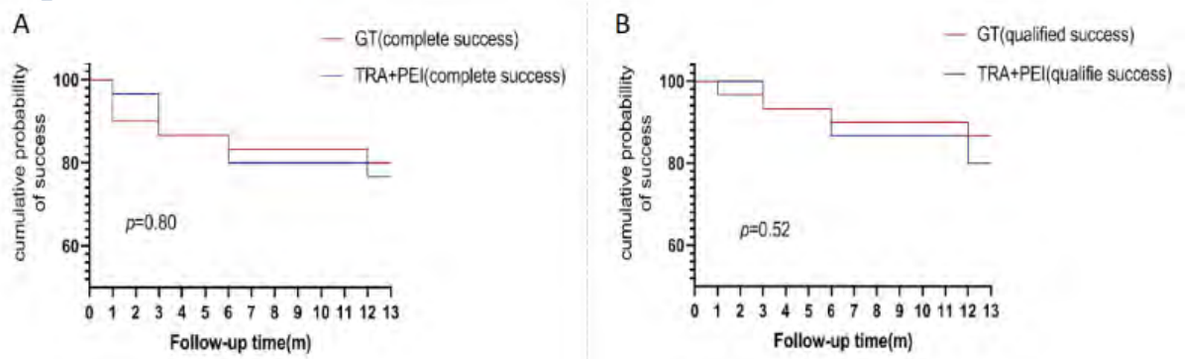

Figure 1 Kaplan-Meier survival analysis of complete (A) and qualified (B) success of GT group and TRA+PEI group. Complete and qualified success rates were no significantly different in the GT group and TRA+PEI group (P =0.80, P=0.52, Mantel-Cox log-rank test).

Conclusions

The combined PEI+GT surgery can significantly reduce intraocular pressure and the numbers of IOP lowering medications,and have a lower incidence of long-term surgical complications and good surgical safety.

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P-0887

THE SURGICAL OUTCOMES OF TRABECULOTOMY AB INTERNO IN GLAUCOMA PATIENTS WHOSE PREOPERATIVE IOP WAS CONTROLLED WITHIN THE NORMAL RANGE

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Background
We investigated the surgical outcomes of trabeculotomy ab interno for glaucoma patients controlled within the normal intraocular pressure (IOP) with the glaucoma medications.

Methods
From September 2022 to October 2023, we conducted a retrospective study of 58 cases (58 eyes) that underwent Trabeculotomy ab interno with 5-0 nylon or Tanito microhook at Hyogo Medical University Hospital, where the preoperative IOP was below 21 mmHg. The mean age of the patients was 70.6 ± 11.2 years, and the type of glaucoma included 37 eyes with open-angle glaucoma, 11 eyes with normal-tension glaucoma, 6 eyes with pseudoexfoliation glaucoma, and 4 eyes with other conditions. We assessed IOP and medication scores at various time points (postoperative weeks 1 and 2, and 1, 3, 6, and 12 months) retrospectively. Failure was defined as a decrease in IOP of less than 20% from the preoperative level on two consecutive measurements, and we performed Kaplan-Meier analysis for this outcome.

Results
Significant differences in IOP were observed at 1, 3, and 12 months postoperatively compared to preoperative IOP, while the medication score significantly decreased throughout the entire follow-up period ($P<0.05$). Kaplan-Meier survival analysis showed survival rates of 46.4% and 41.4% at 6 and 12 months postoperatively, respectively.

Conclusions
Trabeculotomy was effective in reducing the medication score in glaucoma patients whose preoperative IOP was controlled within the normal range.

P-0888

OUTCOMES OF GATT IN EYES WITH JUVENILE OR PRIMARY OPEN-ANGLE GLAUCOMA: UP TO 5 YEARS FOLLOW-UP AND PROGNOSTIC FACTORS

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Background
Gonioscopy-assisted transluminal trabeculotomy (GATT) is a novel minimally invasive glaucoma surgery. Numerous studies have demonstrated short- and mid-term safety and efficacy of GATT in treating many types of glaucoma. However, long-term outcomes of GATT were rarely reported. Moreover, many risk factors have been identified to affect the outcomes of GATT, including the type of glaucoma, age, surgical history, and complications et al. This study is to evaluate the efficacy of GATT in treatment of juvenile open-angle glaucoma (JOAG) or primary open-angle glaucoma (POAG) and to determine the factors that may influence the GATT outcomes.

Methods
Retrospective interventional case series. A cohort of JOAG and POAG receiving GATT with a minimum follow-up of five years were evaluated. Pre- and postoperative intraocular pressure (IOP) and the number of glaucoma medications were compared. Success was defined as IOP < 21mm Hg or > 20% reduction below baseline at any visit after 3 months. The primary outcome measure was surgical success. The secondary outcomes included IOP and the number of medications used at 6-month, 12-month, 2-year, 3-year, 4-year and 5-year postoperatively. All statistical tests were performed using the software SPSS 20.0 (SPSS, Inc., Chicago, IL, USA), and a value of 0.05 were used for statistical calculations.

Results
The study comprised a total of 44 eyes from 37 patients with POAG and 44 eyes from 36 patients with JOAG. The age at the time of GATT was 50.1 ± 6.7 years for POAG and 25.7 ± 8.2 years for JOAG. The average duration of follow-up was 68.2 ± 3.8 months for POAG and 68.9 ± 4.0 months for JOAG (p=0.369); the number of prior surgical interventions was 0.7 ± 0.7 for POAG and 0.5 ± 0.7 for JOAG (p=0.097). IOP exhibited a significant reduction from preoperative 26.0 ± 12.1 mmHg with 3.2 ± 1.0 medications and 28.2 ± 11.6 mmHg with 3.6 ± 0.6 medications, to 15.3 ± 2.2 mmHg with 1.0 ± 1.2 medications and 15.3 ± 2.6 mmHg with 0.7 ±1.0 medications at the 5-year follow-up in patients with POAG and JOAG (p<0.001). The quantitative success rate for POAG and JOAG were 63.6% and 75% (p= 0.248). Furthermore, Cox regression analysis showed that the occurrence of IOP spike, surgical history and the extent of visual field defect did not significantly influence the success rate of GATT for both POAG ($p_{\text{IOP spike}}$=0.270, $p_{\text{surgical history}}$=0.580, $p_{\text{visual field defect}}$=0.568) and JOAG ($p_{\text{IOP spike}}$=0.482, $p_{\text{surgical history}}$=0.736, $p_{\text{visual field defect}}$=0.294). Nevertheless, the preoperative IOP showed significant relationship with the success rate of GATT for JOAG (p=0.002) not for POAG (p=0.986).

Conclusions
GATT can be a safe and effective conjunctival sparing procedure in POAG and JOAG, irrespective of the surgical history and the severity of glaucoma.

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P-0889

COMPARISON OF TRABECULAR MICRO-BYPASS STENT (ISTENT INJECT® W) AND MICROHOOK AB INTERNO TRABECULOTOMY PERFORMED IN CONJUNCTION WITH CATARACT SURGERY

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Background
To evaluate the effectuality and safety of cataract surgery combined with either ab interno trabeculotomy by the microhook (µLOT) or iStent inject® W trabecular bypass implantation (iStent inject W) in eyes with cataract and mild-to moderate glaucoma.

Methods
This study enrolled subjects with mild-to moderate open angle glaucoma with visually significant cataract who used two or more ophthalmic antiglaucoma agents between 60 and 90y of age. Patients underwent cataract surgery cooperated with either implantation of an iStent inject W (iStent inject W-phaco) or excisional goniotomy with the µLOT (µLOT-phaco). Patients underwent µLOT-phaco in the eye with lower the mean deviation, according to the Humphrey field analyzer, while iStent inject W-phaco was carried out on the other eye. Intraocular pressure (IOP) pre- and post-surgery, alterations in anterior chamber flare (ACF), and corneal endothelial cell density (ECD) were estimated.

Results
Twenty three subjects were enrolled (mean age: 73.3±6.7y). The mean medicated preoperative IOP was 16.2 mmHg in the µLOT and 16.3 mm Hg in the iStent inject W eyes. The mean final IOP at 24mo was 12.7 mmHg in the µLOT eyes and 12.4 mmHg in the iStent inject W eyes, representing a 20.5% and 22.7% reduction, respectively. The preoperative ACF in the µLOT eyes was 6.7 pc/ms and it returned to normal in 30d postoperatively, with a value of 6.8 pc/ms. In the iStent inject W eyes, ACF was 9.6 pc/ms preoperatively and it returned to normal by 14d postoperatively (7.9 pc/ms at day 14), demonstrating that postoperative inflammation was less in the iStent inject W eyes. The corneal ECD in both groups was not significantly decreased.

Conclusions
In this study, iStent inject W and µLOT are both effective through 24mo of follow-up. Safety is more favorable in the iStent inject W eyes, based on early anterior chamber inflammation.

P-0890

INTERMEDIATE RESULTS OF PHACO-ENDOCYLOPHOTOCOAGULATION IN HUNDRED CONSECUTIVE EYES WITH PRIMARY ANGLE CLOSURE GLAUCOMA

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Background

Background/ Purpose: Minimally Invasive Glaucoma Surgery (MIGS) have been exponentially used in the past decade or so, but most ab-interno procedures require an open angle for this purpose. The main ab-interno MIGS suitable for Primary Angle Closure Glaucoma (PACG), especially when synaechial angle closure is present, is endocyclophotocoagulation (ECP) as it is used independent of angle status. We aim to report the safety and efficacy of combining ECP MIGS with phaco – in hundred consecutive eyes of PACG.

Methods

Retrospective study of subjects with PACG, more than 30 years of age who underwent ECP with phaco-surgery. Primary outcome measure was IOP. Secondary were number of anti-glaucoma medications (AGM), best corrected visual acuity (BCVA), total success and complications, with interventions for these.

Results

100 eyes with phaco-ECP and a mean follow-up of 15 months were included. 39% IOP reduction was achieved (pre surgery 23.0±7.7 to 14.1±2.0 mmHg post-surgery, p <.001); AGM reduced by 88% (pre surgery 3.4±1.2 to 0.5 ±0.8 mmHg post-surgery p <.001). Subgroup analysis between mild-to-moderate versus advanced glaucoma did not reveal any difference between groups. No sight threatening complications or loss of vision occurred. There were 4 failures (4%).

Conclusions

Conclusion: Combining endocyclophotocoagulation (a MIGS procedure) with phaco is very effective and safe with significantly improved BCVA in all grades of severity of PACG.

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P-0892

COMPARISON OF RESECTION OF FIBROUS CAPSULE AROUND THE PLATE AND MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION AFTER BAERVELDT TUBE IMPLANTATION

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Background
Managing an increase of intraocular pressure (IOP) after long tube shunt surgery is challenging and some approaches are considered but have not been established. The purpose of this study is to compare the intraocular pressure (IOP) lowering effect and safety between resection of the fibrous capsule forming around plate of Baerveldt glaucoma device (BGD) and micropulse transscleral cyclophotocoagulation (MP-CPC) against an increased IOP after BGD implantation.

Methods
This study was a retrospective cases series of 15 eye in resection group and 18 eyes in MP-CPC group who underwent BGD implantation since 2014 at Kumamoto University Hospital. For Kaplan-Meier survival analysis, criteria A, B, and C was defined as 6 ≤ IOP ≤21, 18, and 15mmHg, respectively. Hypotony was defined as an IOP < 6mmHg. An IOP spike was defined as an increase of IOP ≥10 mmHg from baseline.

Results
The mean (SD) changes of IOP and medication score were from 25.7 (5.09) to 16.0 (8.99) mmHg and 3.47 (1.46) to 3.13 (1.36) in resection group, and from 26.82 (9.23) to 16.10 (4.15) mmHg and 4.17 (1.29) to 4.80 (2.30) in MP-CPC group at 1 year of each treatment. Seven eyes in MP-CPC group underwent MP-CPC multiple times. In criterion C, median survival time was 97 [95% confidence interval (CI)71-389] days in resection group and 73 (95%CI, 59-82) days in MP-CPC group and there was a significant difference between resection group and MP-CPC group (p=0.0325, Peto-Peto-Wilcoxon test). Complications were hypotony (n=7), hyphema (n=2), flat anterior chamber (n=2), an IOP spike (n=1), leakage (n=2), endophthalmitis (n=2), vitreous hemorrhage (n=2), and tube obstruction by iris incarceration (n=1) in resection group. Complications in MP-CPC group were dehiscence of conjunctiva (n=1), endophthalmitis (n=1), and hyphema (n=1). Numbers included multiple complications in the same eye.

Conclusions
Resection of fibrous capsule was more effective in controlling IOP but more complications occurred than MP-CPC.

P-0893

OUTCOMES OF PARTIAL VERSUS COMPLETE GONIOTOMY WITH OR WITHOUT PHACOEMULSIFICATION FOR PRIMARY OPEN ANGLE GLAUCOMA: A MULTICENTER STUDY

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Background
To compare the surgical outcomes and safety profiles of 120 degrees and 360 degrees GT with or without phacoemulsification cataract extraction and intraocular lens implantation (PEI) for primary open angle glaucoma.

Methods
This multicenter retrospective study consisted of 139 eyes and was divided into 4 groups: (1) 120 degrees GT, (2) 360 degrees GT, (3) PEI + 120 degrees GT, and (4) PEI + 360 degrees GT. IOP, number of topical hypotensive medications, and complications were recorded and evaluated at baseline and at the final visit. The complete and qualified success rate and their potential associated factors were also investigated. The effectiveness and safety profile of the surgery were compared between different subgroups.

Results
After a mean follow-up of 8.6 months, the IOP reduction was 13.2 ± 8.3 (38.8 ± 28.8%), 12.4 ± 8.3 (41.6 ± 18.2%), 12.8 ± 9.9 (39.4 ± 34.5%), and 13.8 ± 7.2 (46.0±17.1%) mm Hg in 120 degrees, 360 degrees, PEI + 120 degrees GT group, and PEI + 360 degrees GT, respectively. No significant difference was found in IOP, a decline of IOP from baseline, topical hypotensive medication, and complete or qualified success between either standalone 120 degrees versus 360 degrees GT, or PEI + 120 degrees versus PEI + 360 degrees GT (all P s > 0.05). The PEI + 120 degrees GT group had a lower final IOP than the 120 degrees GT group (P = 0.0002) whereas there was no difference between PEI + 360 degrees GT and 360 degrees GT group (P = 0.893). Both 360 degrees GT and PEI + 360 degrees GT group had a significantly higher incidence of hyphema than the 120 degrees GT and PEI + 120 degrees GT groups (all P s < 0.0001).

Conclusions
GT of 120 or 360 degrees lowered IOP equally with or without cataract surgery, and hyphema was most commonly noted after complete GT. Partial GT alone or in combination with cataract surgery was an effective and safe approach to manage patients with open angle glaucoma.

P-0894

INTRAOCULAR PRESSURE CONTROL EFFICACY AND SAFETY OF HA-MG GLAUCOMA DRAINAGE PLATE IMPLANTATION IN THE ANTERIOR CHAMBER OF RABBIT EYES

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Background
The current clinical application of glaucoma drainage devices is made of non-degradable materials. These non-degradable drainage devices often trigger inflammatory responses and scar proliferation, possibly leading to surgical failure.We developed a biodegradable material hydroxyapatite coated magnesium (HA-Mg) as a glaucoma drainage device.

Methods
Twelve New Zealand white rabbits were randomly assigned to three groups: HA-Mg drainage plate group (6 right eyes), trabeculectomy group (6 right eyes) , control group (12 left eyes).

Results
Results showed that all HA-Mg drainage plates were completely degraded approximately four months postoperatively. At the 5th month postoperatively, there was no statistical difference in the corneal endothelium density between the HA-Mg drainage plate group and the control group (p=0.857).The intraocular pressure (IOP) level in the HA-Mg drainage plate implantation group was lower than in the other two groups. The trypan blue dye still drained from the anterior chamber to the subconjunctiva five months after HA-Mg drainage plate implantation. HE staining revealed the scleral linear aqueous humor drainage channel and anterior synechia were observed after drainage plate completely degraded, with no obvious infiltration with the inflammatory cells.

Conclusions
This study showed the safety and efficacy of HA-Mg glaucoma drainage plate in controlling intraocular pressure after implantation into the anterior chamber of rabbit eyes.

P-0895

DISTINCTIVE INTRABLEB CHARACTERISTICS OF FUNCTIONING BLEBS POST-TRABECULECTOMY WITH OR WITHOUT AMNIOTIC MEMBRANE TRANSPLANTATION

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Background
Intrableb structures are hallmark features of filtering blebs. This study aimed to evaluate and compare the characteristics of functioning blebs using anterior segment optical coherence tomography (AS-OCT) with or without amniotic membrane transplantation (AMT).

Methods
Forty eyes from 40 patients with primary open-angle glaucoma who underwent trabeculectomy were included in the study. The cohort was divided into two groups: 20 eyes treated with AMT and 20 eyes serving as the control group (without AMT). AS-OCT was used to evaluate bleb parameters, including bleb height, bleb wall thickness, striping layer thickness, striping-to-bleb wall ratio, bleb wall reflectivity, fluid-filled space score, height, and area, as well as the presence of microcysts. Surgical success was defined at the time of AS-OCT as an intraocular pressure (IOP) ≤18 mmHg and ≥30% IOP reduction without the need for medication. In these patients, if the bleb had a clinically diffuse and healthy without any signs of an encapsulated bleb, the bleb was then defined as functioning bleb.

Results
Significant differences were observed between the two groups, except for bleb height (P = 0.352) and microcyst formation (P = 0.266). Functioning blebs in the AMT group demonstrated significantly greater fluid-filled space score, area, and height compared to the control group after adjusting for AS-OCT time (all P < 0.001). In contrast, functioning blebs in the control group exhibited thicker bleb wall and striping layer, higher striping-to-bleb wall ratio, and lower bleb wall reflectivity compared to the AMT group, also following adjustment for AS-OCT time (all P ≤ 0.001).

Conclusions
Distinct intrableb structures were identified in functioning blebs according to amniotic membrane transplantation. In functioning blebs following trabeculectomy alone, the bleb wall structures exhibited greater reflectivity and thickness. Conversely, in functioning blebs after trabeculectomy with AMT, the extent of the fluid-filled space emerged as a more prominent characteristic of the intra-bleb structures.

P-0896

COMPARISON OF POSTOPERATIVE OUTCOMES WITH OR WITHOUT COMBINED CATARACT SURGERY IN AHMED GLAUCOMA VALVE SURGERY

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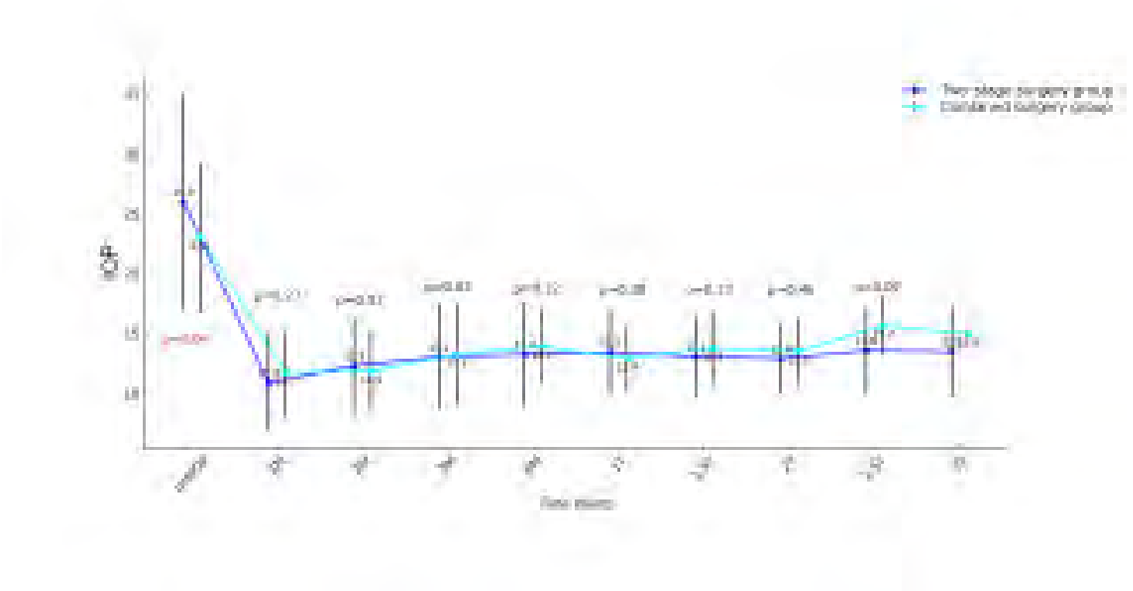
Background
The optimal surgical strategy for glaucoma eyes with cataracts remains controversial: whether to perform cataract surgery simultaneously with tube shunt surgery or to perform cataract surgery first, followed by tube shunt surgery at a later time. Previous reports on cases combining AGV and cataract surgery remain limited to a relatively small number of case series.This study aims to evaluate the postoperative outcomes of Ahmed Glaucoma Valve (AGV) surgery with or without combined cataract surgery.

Methods
This was a retrospective cohort study including 93 consecutive cases (129 eyes) that underwent AGV surgery at Kurashiki Medical Center between January 2021 and November 2023, with at least one year of follow-up. The study targeted cases of primary open-angle glaucoma and exfoliation glaucoma. All surgeries were performed by the same surgeon (MH). Pars plana vitrectomy was performed in all cases, and the AGV tube was inserted into the pars plana. For phakic eyes, cataract surgery with intraocular lens (IOL) implantation was performed simultaneously (combined surgery group). For pseudophakic eyes, AGV surgery was conducted at least one year after prior cataract surgery (two-stage surgery group). Pre- and postoperative intraocular pressure (IOP), visual acuity, medication score, cumulative survival rates, and postoperative complications were analyzed.

Results
The combined surgery group and two-stage surgery group included 21 cases (34 eyes) and 72 cases (95 eyes), respectively. The median age (IQR) was 72.5 (64, 76) years in the combined surgery group and 76.0 (71, 83) years in the two-stage surgery group (p=0.02). IOP (mmHg) before surgery, and at 6 months, 1 year, and 2 years postoperatively were as follows for the combined surgery group and two-stage surgery group, respectively: 23.1±6.3 vs. 26.0±9.1 (p=0.04), 14.0±3.2 vs. 13.3±4.3 (p=0.32), 13.0±2.8 vs. 13.5±3.7 (p=0.38), and 13.5±2.8 vs. 12.9±2.9 (p=0.46). One case in the two-stage surgery group required AGV removal due to necrotizing scleritis leading to scleral melting, but no other serious complications were observed.

Image



Conclusions

No significant effect of combined cataract surgery on postoperative IOP outcomes was observed. The technique of combining AGV surgery with cataract surgery could potentially address the unmet need for an effective and safe surgical approach for advanced glaucoma cases with concurrent cataracts.

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SURGICAL OUTCOMES AND PROGNOSTIC FACTORS FOR SUCCESS OF TRABECULECTOMY WITH INTRAVITREAL BEVACIZUMAB FOR NEOVASCULAR GLAUCOMA

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Background

In the treatment of neovascular glaucoma (NVG), we can use intravitreous injection of anti-vascular endothelial growth factor (VEGF) drug and panretinal photocoagulation to treat retinal ischemia, but they are not sufficient in the angle closure stage. Then we perform trabeculectomy with mitomycin C (MMC), Glaucoma Drainage Device surgery and ciliary body photocoagulation, but postoperative complications are frequent and intractable. To evaluate the 3-year surgical outcomes and the prognostic factors for success of trabeculectomy with MMC and intravitreal bevacizumab (IVB) (Avastin, Genentech) for NVG.

Methods

We retrospectively analyzed 26 eyes with NVG (21 patients) that underwent primary trabeculectomy with mitomycin C. All patients received IVB before trabeculectomy for NVG, and 25 eyes (96.2%) underwent panretinal photocoagulation. Fifteen eyes (68.2%) had a history of pars plana vitrectomy (PPV). The patients were followed for a minimum of 3 years postoperatively. We analyzed the success rates. Failure was defined as follows: definition 1, the need for additional surgery for intraocular pressure (IOP) reduction, loss of light perception vision, and IOP >21 mmHg and IOP reduction <20%; definition 2, IOP >18 mmHg and IOP reduction <30%; and definition 3, IOP >15 mmHg and IOP reduction <40% at two consecutive follow-up visits with or without medication (qualified or complete success, respectively). The risk factors were analyzed by Cox's proportional hazard model.

Results

The complete and qualified success rates 3 years postoperatively were 42.3% and 73.1%, respectively, based on definition 1; 38.5% and 61.5%, respectively, based on definition 2; and 34.6% and 46.2%, respectively, based on definition 3. The incidence rates of early (occurring within 2 weeks) postoperative hyphema and vitreous hemorrhage were 15.4% and 0%, respectively. A history of PPV in eyes with NVG was associated with a significant risk factor for failure ($p<0.01$).

Conclusions

The 3-year surgical outcomes of trabeculectomy with IVB for NVG were favorable. A history of PPV was associated with a high risk for trabeculectomy.

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P-0898

THE AQUEOUS HUMOR DYNAMICS IN A GLAUCOMA DRAINAGE DEVICE IMPLANTATION MODEL:A FINITE ELEMENT STUDY

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Background

To evaluate the aqueous humor (AH) dynamics in a a glaucoma drainage device (GDD) implantation model and assess the optimal implantation position.

Methods

We obtained the geometry of the anterior segment of the eye from an OCT image by SOLIDWORKS. To model the AH dynamics, we used the Navier-Stokes equations for modeling, combined with realistic anterior segment boundary conditions base on our previous published study. And the 3D finite element model of the anterior segment was built in COMSOL Multiphysics, based on which we simulated the implantation of a GDD. The major measurements were the mass flow and the maximum intraocular pressure (IOP).

Results

In the GDD model, when the GDD implanted closer to the opened angle, the mass flow through the GDD are smaller than the mass flow in the middle of the aqueous humor outflow obstruction (AHOO) of the GDD implantation.And the IOP was lower when the GDD implanted in the middle of the AHOO after surgery .When the GDD outlet pressure increased, the mass flow through the GDD reduced and the IOP increased.

Conclusions

Tube implanted at the middle of aqueous humor outflow obstruction (AHOO) was better than implanted at the marginal position of the AHOO.

P-0899

CLINICAL EFFICACY OF MICROINCISION TRABECULECTOMY: A SIMPLIFIED AND MINIMALLY INVASIVE APPROACH

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Background

Our team optimized and simplified the surgical procedures on the basis of trabeculectomy, a classic filtration surgery [1], and named it microincision trabeculectomy. Subconjunctival anesthesia often used for trabeculectomy may stimulate fibroblasts [2], so surface anesthesia is used for microincision trabeculectomy since the anesthetic effect is similar [3]. We also shrink the conjunctiva flap in order to reduce the disturbance of Tenon 's capsule [4]. We chose the 3x3mm triangular scleral flap instead of the conventional the 4x4mm rectangular scleral flap in order to achieve similar IOP control but less damage [5]. It has been reported that sclerostomy shrink does not reduce drainage volume while greatly improves the safety [6]. We therefore performed sclerostomy by a micro scleral punch and reduced the diameter to 1 mm. Releasable sutures and adjustable sutures increase the incidence of conjunctival perforation, bleb leakage and even endophthalmitis [7]. Therefore, fixed suture was used in the microincision trabeculectomy and the tension of single suture was adjusted to tight that the aqueous humor cannot leak without external pressure but can flow out slowly after gently pressing the scleral flap side lip. In addition, the anterior chamber (AC) can be reformed intraoperatively because of tighter suture of scleral flap than the conventional one, so there is no need to make additional incision for paracentesis to control the AC.

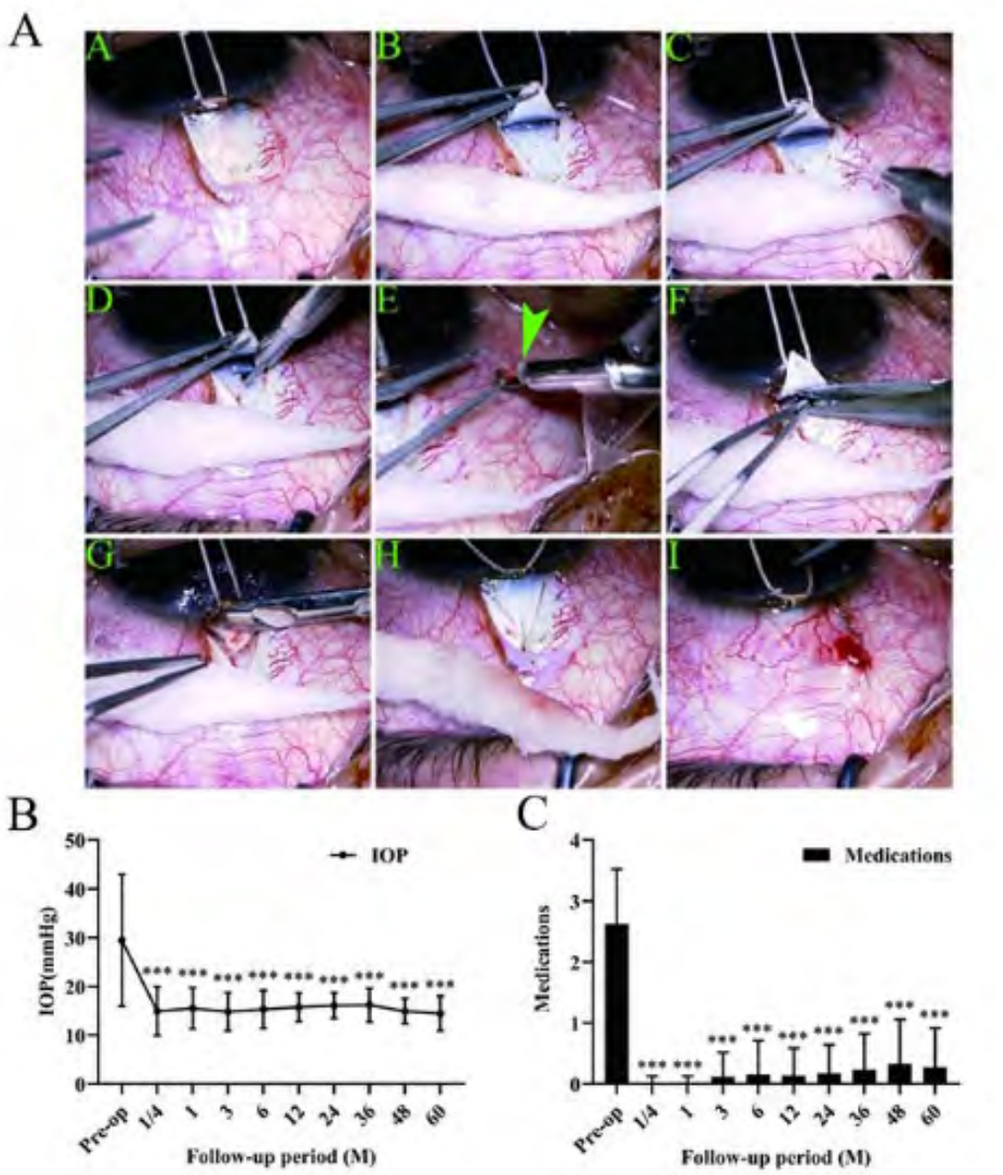
Methods

This retrospective review included 75 eyes with primary angle closure disease (PACD) that underwent microincision-trabeculectomy as initial surgical treatment between July 1, 2016 and July 30, 2020 and were followed up for at least 12 months. The primary outcome was surgical success rate (*i.e.* 5mmHg≤IOP≤21mmHg and no reoperation) and incidence of complications. The reduction of intraocular pressure (IOP) and anti-glaucomatous medication used as well as postoperative intervention were assessed as secondary outcomes.

Results

Mean IOP decreased from 29.45±13.49mmHg [95% confidence interval (CI): 26.33- 32.58] preoperatively to 15.76±2.96mmHg (95% CI: 15.07-16.45) at 12 months postoperatively, and still be maintained at 14.45±3.56mmHg (95% CI: 12.57-16.29) at 60 months postoperatively. The number of anti-glaucomatous medication used decreased from 2.62±0.90 (95% CI: 2.41-2.83) preoperatively to 0.14±0.45 (95% CI: 0.03-0.24) at 12 months postoperatively and 0.27±0.65 (95% CI: -0.16-0.71) at 60 months postoperatively. The 3 complete success rate and overall success rate at 12 months postoperatively were 86.5% and 95.9%, respectively. At 60 months, it remained at 74.9% and 93.3%. 11 eyes (14.9%) received postoperative intervention. The most common complication was shallow AC (9.5%), followed by bleb-related complications (8.1%).

Image



Conclusions

Microincision-trabeculectomy has higher efficacy and safety than trabeculectomy, which is worthy of promotion in the majority of ophthalmologists.

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P-0900

CONTRAST SENSITIVITY AS A CLOSER MEASURE OF VISION: EDOF VS. MONOFOCAL IOLS IN GLAUCOMA PATIENTS

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Background
This study compares contrast sensitivity (CS) and visual acuity (VA) outcomes in glaucoma patients with cataracts who underwent implantation of either an extended depth of focus (EDOF) intraocular lens (IOL) (Isopure, PhysIOL) or a monofocal IOL (Micropure, PhysIOL). We aim to evaluate whether CS is a more sensitive measure of visual impairment than VA in glaucoma patients, as CS may detect early visual dysfunction more effectively. While limited research exists on EDOF IOLs in glaucoma, Isopure lenses, designed to enhance depth of focus while minimizing optical aberrations, could offer advantages for glaucoma patients. This study examines whether Isopure provides superior visual outcomes compared to traditional monofocal IOLs and whether CS is a more reliable indicator of visual changes in this population.

Methods
A prospective, single-site trial included patients with primary open-angle glaucoma (POAG) or angle-closure glaucoma (ACG) and cataracts. Patients underwent cataract surgery with implantation of either an EDOF IOL (n=60) or a monofocal IOL (n=24). CS was measured using the Pelli-Robson chart, and VA was assessed with the Snellen chart. Outcomes were evaluated at 1, 3, and 6 months post-surgery. Statistical analysis used repeated measures ANOVA.

Results
Eighty-four patients (mean age 70 years) were enrolled: 71% received EDOF IOL (n=60), and 29% received monofocal IOL (n=24). At 1 month, CS scores were 0.29 for EDOF and 0.30 for monofocal. By 3 months, CS decreased to 0.24 for EDOF and 0.22 for monofocal, and at 6 months, the scores were 0.22 for EDOF and 0.19 for monofocal. Statistically significant differences were observed in CS ($p<0.01$) and between IOL types ($p=0.048$). Post-hoc analysis showed significant CS differences at 3 months ($p<0.01$ for EDOF, $p=0.002$ for monofocal) and 6 months ($p<0.01$ for both).

For VA, at 1 month, mean VA was 0.39 for EDOF and 0.46 for monofocal. By 3 months, VA improved to 0.53 for EDOF and 0.60 for monofocal, stabilizing at 6 months (0.53 for EDOF, 0.60 for monofocal). While VA showed statistical improvement over time ($p<0.01$), there was no significant difference between IOL types ($p=0.1$).

Conclusions
Our study demonstrates that CS is a more sensitive measure of visual function than VA for monitoring glaucoma patients after phacoemulsification and IOL implantation. Both IOL types (Isopure, EDOF; Micropure, monofocal) showed significant improvements in CS, with the EDOF group showing slightly better outcomes at 1 month. VA outcomes were similar between the two groups and not significantly influenced by lens choice. These findings suggest that EDOF IOLs like Isopure, designed to enhance depth of focus while minimizing optical aberrations, may offer a slight advantage in CS—an important factor for functional vision in glaucoma patients. The results underscore the value of CS as a more accurate indicator of visual function and support the consideration of EDOF IOLs for glaucoma patients.

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P-0901

RISK FACTORS AFFECTING TRANSIENT INTRAOCULAR PRESSURE ELEVATION EARLY AFTER CATARACT SURGERY COMBINED WITH ISTENT INJECT W IN OPEN-ANGLE GLAUCOMA EYES

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Background
Glaucomatous eyes are more prone to experiencing transient intraocular pressure (IOP) elevation after cataract surgery compared to normal eyes, and the magnitude of the rise is also greater. The use of iStent inject W (Glaukos) in combination with phacoemulsification may suppress IOP elevation. This retrospective study aims to investigate whether concomitant iStent inject W implantation can affect IOP rise, and to identify the risk factors for IOP elevation.

Methods
We included patients with primary open-angle glaucoma who underwent either cataract surgery (CS) alone or CS combined with iStent inject W (iStent group). Eyes with posterior capsule rupture or a history of glaucoma surgery were excluded. We compared IOP spikes (defined as a postoperative IOP elevation greater than 10 mmHg compared to preoperative values) and IOP changes (postoperative IOP at 16 - 20 hours minus preoperative IOP) between the CS group and the iStent group. We also evaluated factors that may influence the IOP change, such as age, sex, central corneal thickness, anterior chamber depth, axial length (AL), preoperative IOP, glaucoma medication score, glaucoma treatment duration, mean deviation measured by static perimetry, operation time, and cumulative dissipated energy. Multiple regression analysis was performed to assess the relationship between these factors and IOP changes. Because the number of patients in the iStent group was small, factors with significant differences in the CS group and factors previously reported (*e.g.*, AL) were used as independent variables in the analysis.

Results
There was a significant difference between CS group (48 eyes of 48 patients) and iStent group (18 eyes of 18 patients) only in operation time ($p<0.01$). The mean postoperative IOP in the CS group and the iStent group were 18.5 ± 6.8 mmHg and 18.6 ± 6.3 mmHg ($P = 0.78$), respectively. The IOP spikes occurred in 25.0% of the CS group and 22.2% of the iStent group, with no significant differences between the groups ($P = 0.55$). The IOP changes were 4.9 ± 6.5 mmHg ($P = 0.87$). Multiple regression analysis revealed that in the CS group, medication score and operation time were positively correlated with IOP changes ($P<0.01$, 0.02, $\beta=0.43$, 0.32, $R^2=0.24$). In the iStent group, only AL showed a significant correlation with IOP changes ($P=0.01$, $\beta=0.58$, $R^2=0.29$).

Conclusions
The addition of iStent inject W to cataract surgery did not reduce the incidence of early postoperative IOP spikes. Moreover, long AL was found to be a significant risk factor for postoperative IOP elevation.

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P-0902

THE EFFICACY AND SAFETY OF A TENECTOMY DURING A PRESERFLO® MICROSHUNT IMPLANTATION FOR MANAGEMENT OF GLAUCOMA

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Background
We aimed to assess the efficacy and safety profile of sectoral resection of tenon tissue during implantation of a Preserflo® microshunt (PMS) (Santen, Miami, Florida, USA) for the management of glaucoma

Methods
This retrospective chart review includes patients who underwent PMS implantation with primary sectoral tenonectomy, between Jan 2022 and Sep 2023, at Vancouver General Hospital. Patients with non-glaucomatous optic neuropathy and those follow-up period <6 months were excluded. Primary outcomes for safety were the proportion of eyes without two or more consecutive hypotonic intraocular pressure (IOP) measurements (IOP < 6 mmHg) after post-operative month (POM) 1, and the proportion of eyes without the need for salvage surgical treatment (*i.e.* exposed implant coverage or other filtration surgery). For efficacy, primary outcomes were the proportion of eyes with IOPs between 6 mmHg and 18 mmHg, and IOP reduction of 20% or more without (complete) or with (qualified) glaucoma medications. Secondary outcomes included IOPs lower than 14 mmHg and 21 mmHg with or without treatment, number of medications needed, exposure rate, failure rate, complications, and re-operation rates

Results
A total of 84 eyes were included in this study, 49 of which underwent PMS implantation without tenonectomy, and 35 had tenonectomy prior to implantation. Participants in both groups were similar with respect to age, gender, and severity of disease, while IOP was found to be slightly higher at baseline in the non-tenonectomy group. With regards to surgical efficacy outcomes, we did not see a statistically significant difference in rates of IOP reduction or medication reduction between the two groups. There was a 73.6% medication reduction and 28.3% IOP reduction in the tenonectomy group, compared to 64.8% and 40.3% without tenonectomy, respectively (p=0.32, p=0.06). We also found a trend towards higher complete success (52.6% vs. 36.5%) and qualified success (65.8% vs. 61.5) rates with tenectomy compared to the non-tenonectomy group, although this difference did not reach statistical significance (p=0.14, p=0.83)

Conclusions
Primary tenonectomy during PMS implantation is a novel unreported technique which requires further assessment of its safety and efficacy. Here, we demonstrate that primary tenonectomy is an effective and safe modification, with potentially reduced need for second surgeries or open revisions

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P-0903

LONG-TERM OUTCOMES OF G2 ISTENT INJECT COMBINED WITH PHACOEMULSIFICATION

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Background

Minimally invasive glaucoma surgery (MIGS) is now established as a treatment modality for glaucoma patients[1]. The second generation (G2) iStent inject is a MIGS device which delivers two titanium shunts into the trabecular meshwork to allow drainage of aqueous humour from the anterior chamber into Schlemm's canal[2]. We aimed to assess long-term outcomes, up to seven years, of the G2 istent insertion combined with phacoemulsification at our two centres.

Methods

A retrospective casenote review of patients who had a G2 iStent insertion combined with phacoemulsification between January 2018 and June 2024 at two of our centres, Moorfields St Ann's and Moorfields Stratford. Demographic data, visual acuity (VA), intra-ocular pressure (IOP), number of topical medications and visual field mean deviation (MD) was recorded pre-operatively and at yearly intervals up to a maximum of 72 months. We also recorded whether the patients were seen in face to face or virtual clinics at their latest follow up.

Results

A total of 61 patients (mean age 78.8 years, 39.3% female, 60.7% male) were included in this study. The mean change in VA following the procedure was a gain of 1.9 lines on a Snellen chart. The mean pre-operative IOP was 16.5 ± 4.8mmHg. Mean IOP at 12 months was 14.9 ± 5.0mmHg, a reduction of 2.6mmHg ($P < 0.001$). At 48 months mean IOP was 14.6 ± 4.0mmHg, a reduction of 1.9mmHg ($P < 0.01$). A 72 months mean IOP was 16.7 ± 2.7mmHg, a difference of 0.2mmHg ($P = 0.12$). The mean number of drops used preoperatively was 1.5 ± 0.8 compared to 1.2 ± 0.8 at 12 months, 1.2 ± 0.9 at 48 months, and 0.7 ± 0.7 at 72 months but the differences were not statistically significant. Visual field analysis revealed no significant worsening of MD at 12 months and 72 months. (Average MD pre-op -8.34dB, 12 months post-op -8.72dB and 72 months post op -7.96dB). 62% of patients were managed in the virtual clinic at most recent follow up compared to 38% in face-to-face clinics.

Conclusions

In our study there was a statistically significant decrease in mean IOP at 12 and 48 months but no difference at 72 months. There was no worsening of the visual field mean deviation over the 72 months. There was no statistically significant reduction in the number of topical drops used by patients over the study period. At their most recent review, the majority of patients could be safely managed in a virtual clinic. The G2 iStent appears to play a role in the management of patients with mild and moderate glaucoma, helping to maintain safe IOP, stabilise visual field mean deviation, and allow virtual clinic follow-up. More studies in a larger cohort would be necessary to draw further conclusions on long term outcomes.

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P-0904

PREDICTORS OF SUCCESS FOR SECTORAL GONIOTOMY AND GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY WITH CATARACT SURGERY IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background
To evaluate the association of baseline ocular factors on surgical success in primary open-angle glaucoma (POAG) patients undergoing cataract surgery combined with either sectoral goniotomy using Kahook Dual Blade (phaco-KDB) or gonio-assisted transluminal trabeculotomy (phaco-GATT).

Methods
A retrospective cohort review comprised of 67 adult subjects with mild to severe POAG who underwent phaco-KDB or phaco-GATT with a single surgeon at a tertiary medical center between January 2021 and December 2022. Data collected included patient demographics, visual acuity, intraocular pressure (IOP), number of IOP-lowering mediations, post-surgical hyphema, and anti-coagulation status. Success was defined as a minimum of a 20% IOP reduction or a reduction of at least 1 medication from baseline, without the need for additional IOP-lowering procedures.

Results
The study encompassed 87 eyes of 61 patients, and there were 58 eyes (66%) undergoing phaco-KDB and 29 eyes (33%) undergoing phaco-GATT. The mean age was 73 years while 58.6% of patients were female and 86.2% were Black. Eyes undergoing phaco-GATT had a significantly greater net IOP reduction at 6 months, 3.3 mmHg on 2.6 medications, compared to phaco-KDB eyes, 1.2 mmHg on 2.1 medications ($p = 0.0052$, $p = 0.0713$). Surgical success at 6-months was achieved in 53.4% of the phaco-KDB eyes and 72.4% of the phaco-GATT eyes ($p = 0.0890$). A higher baseline IOP and number of IOP-lowering medications were associated with a significantly decreased likelihood of surgical success at 6 months. For every additional 1 mmHg higher baseline IOP, achieving at least a 20% IOP reduction was 33% less likely at 6 months (OR = 0.67; 95% CI = [0.55-0.79]; $p<0.001$). Further, for every additional IOP-lowering medication taken at baseline, patients were 38% less likely to achieve at least a 1 medication reduction at 6 months (OR = 0.62; 95% CI = [0.40-0.92]; $p=0.023$).

Image

Table 1: Descriptive summary of the data overall and by surgery type.

	Overall N = 87	[1] Phaco-KDB N = 29	[2] Phaco-GA N = 58
[in years]			
(%)	87 (100%)	29 (100%)	58 (100%)
ean (SD)	72.9 (8.2)	68.0 (5.8)	75.3 (8.2)
edian (IQR)	72 (67 - 80)	67 (63 - 72)	77 (70 - 81)
ıge	58 - 93	58 - 81	59 - 93
der, n (%)			
male	36 (41.4%)	13 (44.8%)	23 (39.7%)
female	51 (58.6%)	16 (55.2%)	35 (60.3%)
C stage, n (%)			
mild	19 (21.8%)	4 (13.8%)	15 (25.9%)
moderate	14 (16.1%)	2 (6.9%)	12 (20.7%)
severe	54 (62.1%)	23 (79.3%)	31 (53.4%)
n (%)			
yes	26 (29.9%)	12 (41.4%)	14 (24.1%)
no	61 (70.1%)	17 (58.6%)	44 (75.9%)
n (%)			
yes	58 (66.7%)	18 (62.1%)	40 (69.0%)
no	29 (33.3%)	11 (37.9%)	18 (31.0%)
pre-operative [baseline]			
(%)	87 (100%)	29 (100%)	58 (100%)
ean (SD)	13.9 (4.6)	14.7 (3.6)	13.6 (5.0)
edian (IQR)	14 (10 - 17)	15 (12 - 18)	13 (10 - 16)
ıge	6 - 34	8 - 20	6 - 34
post-operative [after 3 months]			
(%)	87 (100%)	29 (100%)	58 (100%)
ean (SD)	12.2 (4.9)	11.1 (2.8)	12.8 (5.6)
edian (IQR)	12 (9 - 14)	11 (9 - 13)	13 (9 - 15)
ıge	5 - 44	5 - 17	6 - 44
post-operative [after 6 months]			
(%)	87 (100%)	29 (100%)	58 (100%)
ean (SD)	12.0 (3.4)	11.3 (2.8)	12.4 (3.6)
edian (IQR)	12 (9 - 14)	11 (10 - 13)	13 (9 - 15)
ıge	5 - 21	5 - 17	7 - 21
ication pre-operative [baseline]			
(%)	87 (100%)	29 (100%)	58 (100%)
ean (SD)	2.8 (1.4)	3.2 (1.2)	2.6 (1.4)
edian (IQR)	3 (2 - 4)	3 (3 - 4)	3 (1 - 4)
ıge	0 - 6	0 - 6	0 - 6
ication post-operative [after 3 months]			
(%)	87 (100%)	29 (100%)	58 (100%)
ean (SD)	2.3 (1.5)	2.7 (1.4)	2.1 (1.5)
edian (IQR)	3 (1 - 3)	3 (2 - 3)	2 (1 - 3)
ıge	0 - 6	0 - 6	0 - 5

Conclusions

Both phaco-KDB and phaco-GATT groups experienced comparable results with regard to surgical success and medication withdrawal results at 6 months postoperatively. However, phaco-GATT eyes achieved a significantly greater magnitude of IOP reduction than the phaco-KDB group at 6 months. Lower baseline IOP and number of IOP-lowering medications were predictive of surgical success at 6 months.

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P-0905

OUTCOMES OF GLAUCOMA FILTRATION SURGERY ON A TERTIARY CARE CENTER FROM THE NORTH OF MEXICO

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Background

The study titled “Outcomes of Glaucoma Filtration surgery on a tertiary care center from the north of Mexico” has as an objective to analyze the surgical outcomes of glaucoma filtering surgeries, with a postoperative follow-up of six months, evaluating success rates at 1,3 and 6 months. Considering most frequent diagnosis, BCVA, IOP, number of IOP-lowering medications, complications, and surgical interventions.

Methods

This is a tertiary reference center that receives patients from four states of the Republic of Mexico. On this period, 165 filtrating surgeries were performed by senior surgeons and residents of ophthalmology of the center; of which 26 were trabeculectomies, 125 were Ahmed valve implants, and 15 were Baerveldt glaucoma implants. 111 patients were analyzed for qualified or complete success was defined as IOP reduction with or without IOP-lowering medications respectively:
- 50% IOP reduction from preoperative measures or <14 mmHg if no preoperative IOP was recorded for severe glaucoma.
- 30% IOP reduction from preoperative measures or <18mmHg if no preoperative IOP was recorded for moderate glaucoma.

Surgical failure was defined as IOP ≥21 mmHg on three or more consecutive measurements with IOP-lowering medications after surgery.

Results

Most frequent diagnosis was neovascular glaucoma on 66 patients (59.5%)

The mean IOP registered a month after the surgery (13 mm Hg, range 10-18) was statistically significant $p<0.00001$; and at 3 and 6 months after surgery (14 mm Hg range 10-19) $p<0.00001$.

Qualified success was achieved on 83 patients (74.77%) at one month, 77 (69.37%) at three months, and 80 patients(72.07%) at six months. Complete success rates were 46 patients (41.44%), 39 (35.14%) and 39 (35.14%) at 1,3 and 6 months follow-up visits, respectively.

Image

Table 1. IOP before filtrating surgery and 24 hours, 1 week, 1, 3 and 6 months after surgery

Pre-surgery intraocular pressure	34 (23.75-44)	
Intraocular pressure 24 hours after surgery	11 (8-18)	**<0.00001**
Intraocular pressure 1 week after surgery	12 (9-16)	**<0.00001**
Intraocular pressure 1 month after surgery	13 (10-18)	**<0.00001**
Intraocular pressure 3 months after surgery	14 (10-19)	**<0.00001**
Intraocular pressure 6 months after surgery	14 (10-18)	**<0.00001**

Statistical test: Mann-Whitney U test

Conclusions

Comorbidities and other added factors, such as the type and amount of topical medications, the duration and severity of glaucoma, as well as the initial diagnosis, influence the results that can be expected in each patient. The most frequent complications are closely related to the initial diagnosis. In this study, a higher frequency of hyphema was observed as the main complication than that reported in other studies, as neovascular glaucoma was the most frequent diagnosis in our center.

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P-0906

AB EXTERNO CHOROIDAL FLUID DRAINAGE, PARS PLANA VITRECTOMY AND ENDOTAMPONADE FOR THE MANAGEMENT OF PERSISTENT HYPOTONY FOLLOWING GLAUCOMA SURGERY

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Background

Persistent severe serous choroidal detachment is a rare complication after glaucoma surgery. Surgical treatment with choroidal fluid drainage through a scleral incision is an option in these cases. Combining this procedure with pars plana vitrectomy and gas endotamponade has potential advantages. In the following, the perioperative course of this surgical option in a small cohort will be presented.

Methods

This is a retrospective cohort study of the postoperative course of ab externo drainage of persistent serous choroidal detachment (≥ 4 weeks) in combination with pars plana vitrectomy and gas endotamponade in six eyes of six patients after exhausting all conservative treatment options. Inclusion criteria was persistent hypotony with severe serous choroidal detachment after intraocular pressure (IOP) lowering surgery due to medically uncontrolled glaucoma. Eyes were evaluated according to resolution of choroidal detachment, change in IOP and visual acuity (VA), post-drainage complications and need for further surgeries.

Results

Before surgery all patients presented with flat anterior chamber, decreased vision, and persistent choroidal detachment. The surgery itself was uneventful, but due to the complexity of the cases, tailoring the procedure to each patient's needs was required. Complete resolution of choroidal effusion was achieved by one month in 5 eyes and in one eye by month 3. There was an increase in average IOP from 5 (± 2.1) mmHg before surgery to 11.3 (± 3.7) mmHg and in VA from 1.7 (± 0.8) to 1.2 (± 0.6) logMAR. Five out of six patients required additional surgery, mainly to further increase the IOP even though choroidal detachment had already resolved.

Conclusions

Ab externo choroidal fluid drainage combined with pars plana vitrectomy and gas endotamponade seems to be an effective and safe treatment option in persistent ocular hypotony. Although repeated surgeries might be necessary, large scale prospective studies must be undertaken to provide corroborative evidence.

P-0907

PRIMARY PRESERFLOTM MICROSHUNT VERSUS TRABECULECTOMY BLEBS – THE REAL WORLD

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Background

To compare patient outcomes and safety profile of PreserFlo™ MicroShunt (PFM) (Santen, Osaka, Japan) and trabeculectomy (Trab) as the primary bleb-forming procedure in eyes with glaucoma.

Methods

Retrospective cohort analysis of 100 (49 PFM(24M:22F):51 Trab(18M:25F) consecutive patients by a single surgeon using a standardised technique. Primary outcome measures: intraocular pressure (IOP), number of IOP lowering medications at day 1, week 1, months 3, 6, and 12. Secondary outcome measures: best-corrected-visual-acuity, visual field, mean NFL thickness, intraluminal stent removal, revision rate and adverse events.

Results

The IOP at 12 months in the PFM group reduced from 23.3 to 12.7.6mmHg and 3.6 medications to 0.4 medications and in the Trab group reduced from 26.5 to 9.8 mmHg and 3.4 medications to 0.2 medications. The intraluminal stent was removed in 32 (65.3%) at varying time points post-surgery, with no cases of clinically significant hypotony. In 9 (14.5%) (out of 62 to date) PFM cases, open revision was required with or without further drainage procedure.

Conclusions

The IOP and medication lowering is less efficacious with the PFM compared with the trabeculectomy, however the post-operative recovery is faster due to the less invasive nature of the surgery. Both procedures require mitomycin C application to reduce post-operative fibrosis. Active bleb management with topical steroids and 5-fluorouracil needling as required is critical for success. Open revision is required more often in PFM to achieve a well-draining bleb, with the choice of revision technique depending on the appearance of the stent and the state of the surrounding tissues

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P-0908

IMPROVING GLAUCOMA OUTCOMES: A COMPARISON OF TWO SURGICAL COMBINATIONS INCORPORATING PHACOEMULSIFICATION AND MIGS

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Background

Glaucoma is the leading cause of irreversible blindness, often coexisting with cataracts. Minimally invasive glaucoma surgery (MIGS) combined with cataract surgery has shown promising outcomes in addressing both conditions simultaneously. This study evaluates two MIGS combinations: phacoemulsification (phaco), endocyclophotocoagulation (ECP), and Kahook dual blade (KDB) (PEcK), and phacoemulsification (phaco), micropulse transscleral cyclophotocoagulation (MP-TSCPC), and Kahook dual blade (KDB) (PMiK).

Methods

A retrospective study of 41 eyes (32 patients) focused on comparing PEcK and PMiK for the management of glaucoma. Intra ocular pressure (IOP), number of glaucoma medications, and visual acuity were evaluated preoperatively and postoperatively. Postoperative complications were also analyzed. Success was defined as an IOP > 5 and ≤ 18 mmHg with a reduction of ≥ 20% from the preoperative value, without vision-threatening complications or reinterventions. Success was further categorized as complete (without medications) or qualified (with ≥ 1 medication at the last follow-up).

Results

The PEcK group showed significant mean reductions in IOP (19.16 ± 7.81 to 11.04 ± 2.75 mmHg, Δ8.12 ± 8.59, $p = 0.0001$) and medication burden (2.72 ± 1.08 to 0.4 ± 0.75, Δ2.32 ± 1.38, $p < 0.0001$), alongside improved VA (0.66 ± 0.23 to 0.88 ± 0.23, Δ0.21 ± 0.21, $p = 0.00005$). The PMiK group also demonstrated significant IOP reduction (16.81 ± 4.32 to 13.19 ± 3.2 mmHg, Δ3.63 ± 2.93, $p = 0.0002$), reduced medication burden (2.69 ± 1.26 to 0.31 ± 0.84, Δ2.38 ± 1.22, $p < 0.0001$), and improved VA (0.59 ± 0.24 to 0.86 ± 0.16, Δ0.27 ± 0.23, $p = 0.0004$). Postoperative inflammation was slightly more frequent in PMiK (44% vs. 32% in PEcK), though not statistically significant (p = 0.746). For PEcK there were 23 eyes (92%) classified as qualified success and 16 eyes (64%) as complete success. For PMiK there were 15 eyes (93.75%) classified as qualified success and 13 eyes (81.25%) as complete success.

Conclusions

Both PEcK and PMiK appear to be effective options for glaucoma management, even in advanced stages, demonstrating significant reductions in IOP and medication burden alongside improvements in visual acuity. Combining MIGS procedures with cataract surgery represents a promising and safe approach. Further studies with longer follow-up and larger cohorts are warranted to confirm these results and guide optimal patient selection.

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P-0909
PERSISTENT IRIDODIALYSE AFTER MINIJECT-IMPLANTATION

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Background
We report the case of a 68-year-old patient who was treated with a Miniject implant for wide-angle glaucoma after achieving sufficient intraocular pressure (IOP) reduction with conservative therapy. Following the procedure, the patient developed hypotony, with an IOP of 4 mmHg one year post-implantation. Despite this low pressure, central visual acuity remained 1.0. Imaging revealed choroidal folds and Descemet's membrane folds, which were attributed to a persistent iridodialysis adjacent to the implant. Surgical closure of the iridodialysis with a chamber angle suture led to stabilization of both the IOP and the eye, resolving the hypotony. This case highlights the importance of recognizing and addressing complications such as iridodialysis following minimally invasive glaucoma surgery, and it underscores the necessity of prompt intervention to prevent long-term ocular complications.

Methods
In the ophthalmology clinic, a Miniject implantation (MIGS) was performed. The patient attended regular follow-up visits for visual acuity and intraocular pressure (IOP) monitoring. Conservative methods such as cycloplegia to regulate the low IOP were unsuccessful. Nevertheless, the patient was initially discharged with full visual acuity to the care of the external colleagues. One year after the implantation, the patient was referred back to our clinic from an external provider. Gonioscopy revealed a chamber angle recession, which was treated with a chamber angle suture with 10,0 Prolene, successfully resolving the hypotony.

Results
Discussed in Methods

Conclusions
Minimally invasive glaucoma surgery (MIGS) has become an increasingly popular treatment option for glaucoma, offering a safer and less invasive alternative to traditional surgical methods. The Miniject implant is one such MIGS procedure designed to lower intraocular pressure (IOP) in patients with open-angle glaucoma. While the procedure is generally well-tolerated, complications can still occur, including hypotony and structural changes in the eye. This case report presents a 68-year-old patient who developed persistent hypotony and a chamber angle recession following Miniject implantation, which was successfully managed with surgical intervention.

P-0910

SAFETY AND EFFICACY OF PHACOEMULSIFICATION WITH HIGH FREQUENCY DEEP SCLEROTOMY OR WITH KAHOOK DUAL BLADE IN ANGLE CLOSURE DISEASE

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Background
Treatment options for Angle Closure Disease (ACD) include lens extraction and minimally invasive glaucoma surgery (MIGS). When combined, phacoemulsification (PHACO) and MIGS allow effective intraocular pressure (IOP) reduction.

Kahook Dual Blade (KDB) has proven to be a safe and effective treatment for ACD.

High Frequency Deep Sclerotomy (HFDS) shows adequate success rates for open angle glaucoma, as standalone or as a combined procedure. However, the safety and efficacy of this technique have not been yet demonstrated in ACD.

The purpose of this study is to prove that PHACO combined with HFDS is not inferior in efficiency and safety when compared to PHACO combined with KDB in ACD.

Methods
Patients with ACD from Conde de Valenciana glaucoma department were selected between June and September 2024.

Ten patients were assigned for each group: PHACO HFDS, PHACO KDB and PHACO alone (control group).

IOP, glaucoma medication and best corrected visual acuity (BCVA) were recorded before surgery and 1 and 3 months after. Follow-up will continue up to 6 months (February 2025).

Surgical success was defined as IOP reduction of at least 20% without the need of glaucoma medication.

Results
At 3 months, the success rate was 28.57%, 33.33% and 42.85% for PHACO HFDS, PHACO KDB and PHACO alone, respectively.

Mean IOP was reduced from 17.57mmHg (SD 5.09) on 1.28 medication, to 14.00mmHg (SD 1.73) on 0.42 medication in the PHACO HFDS group; from 15.50mmHg (SD 2.73) on 1.83 medication, to 12.10mmHg (SD 2.40) on 1.00 medication in the PHACO KDB group; and from 15.85mmHg (SD 1.46) on 0.14 medication, to 12.28mmHg (SD 1.70) on 0.14 medication in the PHACO group.

The most common complication was transient IOP spike at 1 week. Partial peripheral anterior synechiae (PAS) were found at the site of the HFDS treatment in all the eyes.

Visual acuity improved in all 3 groups.

Conclusions
At 3 months the number of glaucoma medication reduced significantly in the PHACO HFDS group when compared with the PHACO KDB group and we have not found significant visual complications in the PHACO HFDS group, showing promising results so far. By the time of the congress, we will present our 6 months follow-up results.

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P-0911

COMPARISON OF SUBCONJUNCTIVAL INJECTION WITH SPONGE APPLICATION OF MITOMYCIN C IN TWO-SITE PHACOTRABECULECTOMY – A RANDOMIZED CONTROLLED TRIAL

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Background

Glaucoma patients undergo phacotrabeculectomy with MMC for cataract-related visual rehabilitation and IOP control. Subconjunctival injection of MMC in phacotrabeculectomy is increasingly favored for its ease of use. This study compared the safety, efficacy, and bleb morphology of MMC injection versus sponge application in two-site phacotrabeculectomy.

Methods

Patients aged over 40 years with glaucoma and visually significant cataracts were included. Baseline assessments included BCVA, slit lamp examination, cataract grading, fundus evaluation, IOP and automated perimetry. Patients were randomized into two groups: the test group underwent phacotrabeculectomy with subconjunctival MMC injection, and the control group, sponge-applied MMC. Follow-ups at days 1, 7, 30, 90, and 180 assessed BCVA, IOP, anti-glaucoma medications AGM and bleb morphology using Moorfields classification (MBGS) and imaging (ASOCT). Success was defined as IOP ≤18 mmHg, with failure requiring re-surgery. Complete success was defined as IOP between 6 and ≤18 mmHg, without AGM; qualified success as IOP ≤18 mmHg with maximum of AGM. Failure was when more than 2AGMs, needling or re-surgery was required. Complications and interventions were noted.

Results

The study included 65 eyes of 59 patients comprising 33 eyes in Injection group and 32, Sponge. But only 29 and 31 eyes in Injection and sponge groups respectively completed 6 months follow-up. Mean pre-op BCVA was 0.71 (Injection) and 0.79 (Sponge) improving to 0.21 in both groups. IOP reduction was 13.86 ± 3.89 mmHg and 13.56 ± 4.16 mmHg respectively (p-0.78). The mean preoperative anti-glaucoma medications were 1.81 (Injection group) and 1.67 (Sponge group), which reduced to 0.22 and 0.33, respectively, postoperatively. Complete success rate, qualified success, and failure was 86.2%,10.3%,3.5% (Injection) and 77.4%,12.9%,9.7% (Sponge) respectively . The mean rate of complications, including bleb leak, hypotony, shallow anterior chamber , retinal detachment, and choroidal detachment, was 0.07 in the Injection group and 0.11 in the Sponge group. The injection group exhibited larger bleb areas (Grades 3 and 4) and low vascularity but ASOCT analysis showed more multiform cysts in Sponge group than Injection group (65.6% vs 57.6%). Additional interventions like 5FU injection, AC reformation, bleb leak repair, laser suturelysis, scleral flap resuturing were comparable between the 2 groups.

Conclusions

Injection MMC is a superior alternative to conventional sponge application, offering better IOP-lowering efficacy and fewer postoperative complications.

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P-0912

COMPARISON OF 5-0 PROLENE GONIOSCOPY ASSISTED TRANSLUMINAL TRABECULOTOMY WITH PHACO IN PRIMARY OPEN-ANGLE GLAUCOMA VS PRIMARY ANGLE CLOSURE GLAUCOMA

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Background

Primary-angle closure glaucoma (PACG) is more devastating than primary open-angle glaucoma (POAG) and is reported to cause more blindness. Over the past few years, minimally invasive glaucoma surgeries have revolutionized glaucoma surgery because of their safer surgical profile, conjunctival sparing, and fast recovery. Gonioscopy-assisted transluminal trabeculotomy is one of the MIGS procedures, that has been shown promising outcomes in primary open-angle glaucoma.GATT is one of the most economic and widely performed MIGS procedure in the developing and developed world. Recent studies have shown that persisting irido-trabecular contact and progressive peripheral anterior synechia (PAS) could damage the trabecular meshwork and Schlemm's canal thereby providing a good rationale for performing MIGS in angle-closure glaucoma. Our study aims to prospectively evaluate surgical outcomes of GATT combined with phacoemulsification in POAG versus PACG

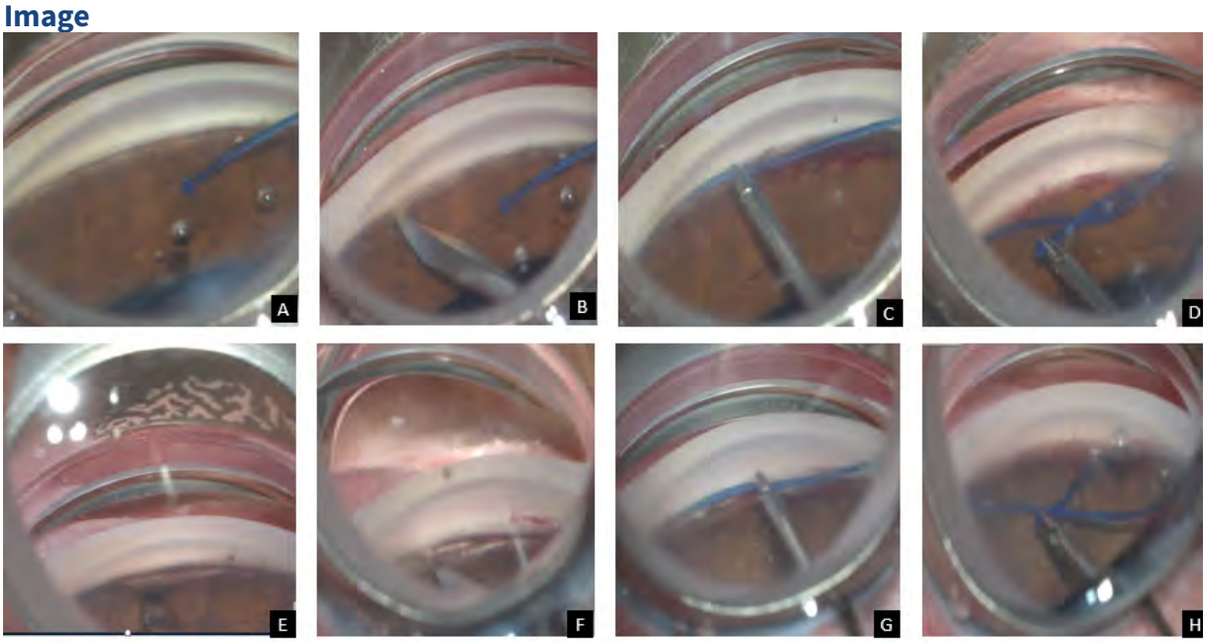
Methods

Prospective, comparative, interventional study. Patients with a visually significant cataract along with uncontrolled primary glaucoma(either open angle or closed angle) demonstrating either a progression of visual field loss and an uncontrolled IOP with medications were included.Monocular patients, patients with a history of trauma, patients who had undergone previous ocular surgeries, acute angle closure glaucoma were excluded.165 patients (90 eyes POAG and 90 eyes PACG) who underwent GATT with phacoemulsification. Outcome measures included changes in intraocular pressure (IOP), antiglaucoma medications (AGM), and best-corrected visual acuity (BCVA). Success was defined as at least 20%/25%/30% IOP reduction and IOP <21, 18, or 15mm Hg (Criteria 1, 2, or 3). Additionally, risk factors for surgical failure were analyzed

Results

In POAG group, mean IOP reduced significantly from 20.97±4.23 mmHg to 12.60±2.72 mmHg (38.4% reduction), and in PACG group from 21.02±60.13 mmHg to 13.10±3.39 mmHg (35.4% reduction) at 12 months($p<0.001$), with no significant difference between groups($p=0.685$). AGM significantly reduced from 1.66±0.80 to 0.09±0.36 in POAG group and from 1.87±0.93 to 0.11±0.39 in PACG group($p<0.001$), with no significant difference between the groups($p=0.940$). At 12 months, 93.3% and 91.8% were medication-free in POAG and PACG groups respectively. The cumulative probability of success was 91.1% in POAG and 85.2% in PACG group (Criteria 1, $p=0.223$), while Criteria 2 and 3 showed no significant difference between groups. Higher baseline IOP was associated with reduced likelihood of failure($p<0.001$). Microhyphema was seen in 11 POAG and 16 PACG and macrohyphema was seen in (5-POAG and 8 -PACG patients)and an anterior chamber wash was required in 4 POAG and 6 PACG patients.

Image



A -D: GATT in POAG
(A: open angles, B: goniotomy incision with MVR Blade, C: 5-0 prolene along Schlemm's canal, D: 360-degree complete trabeculotomy)

E –H: GATT in PACG
(E: GSL with Castroviejo cyclodialysis spatula, F: goniotomy incision with MVR blade, G: 5-0 prolene suture along Schlemm's canal, H: 360-degree complete trabeculotomy)

Conclusions

GATT combined with phacoemulsification is safe and efficacious with comparable surgical outcomes in both Primary open-angle glaucoma and angle closure glaucoma

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P-0913

RISK FACTORS FOR AND OUTCOMES FOLLOWING SUPRACHOROIDAL HEMORRHAGE POST GLAUCOMA SURGERIES IN PEDIATRIC PATIENTS

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Background

Suprachoroidal hemorrhage(SCH) is an uncommon but potentially devastating surgical complication of intraocular surgery, more commonly related to glaucoma surgeries. Reports on SCH post glaucoma surgeries in the paediatric age group are scarce.

Aim - To study incidence, risk factors for and outcomes following suprachoroidal hemorrhage(SCH) in pediatric glaucoma surgeries.

Methods

A retrospective case-control study was conducted on children <18 years of age who had SCH post glaucoma surgery between January 2015 and April 2024 with a minimum follow up of 1 month. Anatomical failure was defined as phthisis/no light perception. Intraocular pressure(IOP) based failure was defined as IOP <6 or >18mmHg with/without glaucoma medications on last follow up.

Results

Twenty four cases were compared with age(p-0.63) and etiology(p-0.97) matched forty eight controls. The incidence of SCH was 1.24% (24/1930 eyes), 2 were intraoperative and 22-delayed. There were fourteen females(58%) and ten males with mean age- 6.5 ± 3.8years, axial length- 26.8 ± 2.5mm. Ten eyes had undergone Ahmed glaucoma valve implant, ten eyes Trabeculectomy+ mitomycin C and four eyes Trabeculectomy+mitomycin C+external trabeculotomy. Three eyes required choroidal drainage and rest were managed conservatively. Mean time for resolution of SCH was 33.8 ± 11.4 days, clot lysis - 4.9 ± 2.5 days, follow up -1.16±1.4 years. Anatomical failure was found in 29%(4 - retinal detachment, 3-phthisis) of cases and no controls. IOP based failure was found in 58% of cases and 27% controls. There was no significant difference in outcomes of patients who had intraoperative versus delayed SCH. Higher preoperative IOP(Odds ratio- 1.12, p-0.012), larger corneal diameter(Odds ratio-1.83, p-0.02) and longer axial length(Odds ratio- 1.53, p-0.001) were found to be possible risk factors for development of SCH on univariate analysis. However only longer preoperative axial length(Odds ratio- 1.47, p-0.036) was significant on multivariate analysis.

Conclusions

SCH is a serious complication of pediatric glaucoma surgery, majority of which can resolve conservatively. High preoperative axial length is a potential risk factor for SCH.

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P-0914

VISCOCANALOSTOMY AND TRABECULOTOMY WITH OMNI DEVICE. TWO-YEAR RESULTS IN REAL WORLD SETTINGS

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Background
Ab interno viscocanalostomy and trabeculotomy with OMNI device has been shown to reduce IOP and number of glaucoma drops and to have a sustained effect at two years.

In this study we aim to investigate real world results from a tertiary centre in the south of England.

Methods
Retrospective study of patients with glaucoma that underwent viscocanalostomy and/or trabeculotomy with OMNI device and sufficient follow-up time. Outcome studied were best corrected visual acuity (BCVA), intraocular pressure (IOP), mean deviation (MD) and number of drops.

Results
We identified 54 patient that underwent OMNI before December 2022. Four patient were excluded as they had trabeculectomy within 6 months from their operation.

For the remaining 51 patients only the first eye was included if they had OMNI to both eyes. There were 26 females and 25 males of mean age 77.7 years. 40 eyes underwent OMNI combined with cataract surgery. Mean follow-up period was 23±3.4 months. Mean± SD VA improved from 0.32±0.32 to 0.16± 0.28 ($p<0.0001$). IOP improved from 19.1±4.7 mmHg to 15.3±3.5mmHg (19.5% reduction, $p<0.0001$). The number of drops was reduced from 2.5± 0.97 to 1.6± 1.2 ($p<0.0001$). There was no statistical significant difference of the MD (-8.2±7 preop and -9.6± 82 at follow-up, $p=0.3$).

Image
Retrospective study of patients with glaucoma that underwent viscocanalostomy and/or trabeculotomy with OMNI device and sufficient follow-up time. Outcome studied were best corrected visual acuity (BCVA), intraocular pressure (IOP), mean deviation (MD) and number of drops.

Conclusions
In our cohort of patients OMNI combined with cataract surgery or standalone appears to lead to significant reduction of IOP and number of medication while mean deviation appears stable.

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P-0915

INFERIOR KAHOOK DUAL BLADE - 12-MONTH OUTCOME FOR DIFFERENT GLAUCOMA SEVERITY

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Background

To establish and compare the IOP ranges achieved with Kahook Double Blade - goniotomy as a stand-alone procedure and in combination with phacoemulsification, performed in the inferior (lower) quadrants of the anterior chamber angle in subgroups of mild, moderate, and severe open-angle glaucoma in adult patients.

Methods

Design: Prospective comparative case series in adult patients with postoperative follow up over a period of 12 months.

Data were collected from 108 eyes of 96 patients within the period 06/2020 – 11/2024.

Interventional model:parallel

Description of interventional model:120° Kahook Dual Blade-goniotomy in the inferior (lower) quadrants of the anterior chamber angle was performed as a stand-alone procedure and in combination with phacoemulsification, in patients with mild, moderate and severe glaucoma. Comparative analysis for the cohort and the groups with different severities was performed to determine the IOP range achieved at the end of follow-up. Additional medication reduction was assessed in all the groups.

The following IOP ranges were determined:
- 18-21mmHg;
- 15-17mmHg;
- 12-14mmHg;
- IOP<12mmHg

Results

At the end of the follow-up the group with mild glaucoma achieved mean reduction of -11.6 ± 7.7mmHg (-40.6%), the group with moderate glaucoma -12.9 ± 6.8mmHg (-44.9%), and the group with severe glaucoma - 11.5 ± 6.4mmHg (-42.1%).

At the end of the follow-up the majority of patients with mild glaucoma - 38% achieved IOP between 15 - 17 mmHg, 23.8% were within the 12-14 mmHg range, 23.8% reached IOP<12mmHg, and 14.2% were with 18-21mmHg. Within those ranges the median medication reduction was 25%(-1) for mild, 50%(-2) in moderate, and 40%(-2) in severe glaucoma.

In patients with moderate and severe glaucoma, most eyes achieved an IOP between 12 and 14 mmHg, which is considered a safe range to prevent visual field loss. This range was achieved by 46.6% of patients with moderate severity, followed by 37.7% with an IOP within 15-17 mmHg; 4.4% with an IOP below 12 mmHg; and 11.1% with an IOP ≥ 18 mmHg. 50% of patients with severe glaucoma achieved an IOP in the range 12-14 mmHg; 26.1% achieved an IOP between 15-17 mmHg; 11.9% had an IOP 12 mmHg, and 11.9% had an IOP ≥ 18 mmHg.

Conclusions

The results of the AGIS study showed us that IOP <18 mmHg is safe, but visual field loss is different in different IOP ranges below this pressure. Most of the patients with inferior KDB-goniotomy achieved IOP within 12-14 mmHg and below 12 mmHg, considered the most preventive range against visual field loss.

Kahook Double Blade - goniotomy performed in the lower quadrants of the anterior chamber angle, achieved statistically and clinically significant IOP reductions and a safe IOP range within 12 months and may be an alternative to nasally performed goniotomy when the latter is available for any reason.

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P-0916

INTERMEDIATE OUTCOMES OF THE 63-MM GELATIN MICROSTENT VERSUS SIBS MICROSHUNT IMPLANTATION

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Background
The 63-µm gelatin microstent and the SIBS microshunt are two microinvasive bleb surgical approachs. Little comparative studies exist between these two procedures. The purpose of this study was to compare the effectiveness and adverse event profile of standalone 63-µm gelatin microstent versus SIBS microshunt implantation with mitomycin C (MMC) in glaucoma patients.

Methods
A retrospective cohort study of 331 glaucomatous eyes undergoing either standalone 63-µm gelatin microstent or SIBS microshunt implantation with mitomycin C. Primary outcome: complete success, defined as no two consecutive IOP readings >17mmHg or <6mmHg with >2 lines of vision loss and a 20% IOP reduction on no medication. Secondary outcomes: IOP thresholds (14mmHg, 21mmHg), qualified success, change in IOP/medication use, complications, and re-operations. Cox proportional hazards modeling was used to assess risk factors for failure.

Results
At 1-year follow-up, complete success was achieved in 61.3% of the gelatin microstent group versus 75.5%% of the SIBS microshunt group (p=0.020). Qualified success was also higher in the SIBS microshunt group (95.3%% vs. 86.8%, p=0.153). Cox analyses identified the gelatin microstent as a significant risk factor for failure (HR: 1.85, 95% CI: 1.20-2.85, p=0.006). Needling rates were similar between groups (7.9% vs. 8.7%, p>0.99), but bleb revision was more frequent in the gelatin microstent group (14.3% vs. 3.7%, p=0.0168). Early complications, as choroidals, were more frequent in the gelatin microstent group (22.5% vs. 7.4%, p<0.001).

Conclusions
Both the 63-µm gelatin microstent and the SIBS microshunt demonstrated significant IOP and medication reduction, with SIBS microshunt demonstrating a higher success rate and less need for surgical revision.

P-0917
OUTCOMES OF BLEB REVISION AFTER PRESERFLO MICROSHUNT FAILURE

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Background
Glaucoma is the second leading cause of blindness worldwide[1]. Intraocular pressure (IOP) lowering is the only proven strategy for stopping glaucoma progression. PreserFlo Ab-Externo Microshunt is a bleb-forming minimally invasive device, which effectively lowers IOP[2-5]. Despite good postoperative results, bleb fibrosis sometimes is seen. One of the surgical techniques used to restore filtration is open bleb revision[6].

The purpose of this study is to report our results of open bleb revision after PreserFlo Microshunt failure.

Methods
This is a retrospective, real-life consecutive case series report, conducted at one center, between 01/2022 and 01/2024. Demographic data, type and severity of glaucoma, previous surgeries, antiglaucoma medications, IOP, 5-fluorouracil (5-FU) injections post-revision, complications and reoperations were collected.

The revisions were performed in cases of IOP elevation and poor response to topical antiglaucoma medications with signs of bleb fibrosis.

Primary Outcomes: Complete success was defined as unmedicated IOP of <18mmHg. Qualified success was defined as IOP controlled as above with medications. Failure was defined as the need for additional glaucoma surgery.

Secondary Outcomes: Number of glaucoma medications and postoperative complications.

Results
Out of 102 PreserFlo operated eyes ,15 eyes required revision surgery (14.7%). 13 eyes were included. Revisions were done on average 111 days after the PreserFlo surgery (ranging 24-357 days). Duration of follow-up was 3 months to 1.5 years with 11 eyes followed for at least 9 months. The mean number of medications pre-revision was 3.5 (ranging 1-4) compared with 1.3 (ranging 0-5) at 9 months post-revision. The mean IOP pre-revision was 26.3 mmHg (ranging 16-45 mmHg) compared with 13.8 mmHg (ranging 6-30 mmHg) 9 months post-revision.

At the 9-month follow-up, 9/11 (81.8%) eyes had IOP <18mmHg. Of those eyes, 4/11 (36.4%) met the complete success criteria and 5/11 (45.4%) met the qualified success criteria. Other 2/11 (18.2%) eyes had IOP >18mmHg.

Most eyes, 12/13 (92.3%), required 5FU injections post-revision. The mean number of injections was 2.5 (ranging 0-8).

There was one case of bleb leak which resolved with conservative treatment. There were no other serious complications.

Conclusions
Our results show that bleb revision is an effective and safe technique for treating postoperative bleb fibrosis after PreserFlo Microshunt surgery.

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P-0918
BATTLE OF THE TUBES IN THE REAL WORLD –BAERVELDT VS PAUL

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Background
The two commonly utilized tubes are the Baerveldt and the Paul tubes. Each has different specifications in terms of plate and lumen size, but similar indications for management of glaucoma needing filtering surgery, but unlikely to succeed with MIGS, MIBS or trabeculectomy.

Methods
This study aimed to compare 40 consecutive Baerveldt tubes patients followed by 40 consecutive Paul tubes, with or without previous filtering surgery in terms of intraocular pressure and medication lowering in the first 12 months, as well as relative safety of the devices.

Results
Of the 80 cases, 40 (50.0%) (27M:13F) were Baerveldt tubes and 40 (50.0%) (28M:12F) were Paul tubes. In the first month, the intraocular pressures at Day 1, Week 1 and month 1 were 20.9, 16.5 18.0 mmHg for the Baerveldt and 12.7, 14.9, 14.8 mmHg for the Paul respectively. At month 12, the mean IOP reduction in the Baerveldt was 18.2 mmHg (from 30.6 to 12.4 mmHg), while the Paul showed a reduction of 18.8 mmHg (from 29.0 to 10.2 mmHg). There was no difference between the two groups being 0.6 mmHg ($p > 0.05$). A significant reduction in the number of medications was observed in both groups at 12 months. The mean reduction was 2.1 medications in the Baerveldt (from 3.8 to 1.7) and 2.1 medications in the Paul (from 3.4 to 1.3). The difference between the groups in terms of medication reduction was not statistically significant ($p > 0.05$). The intraluminal suture was removed in 18 (45.0%) for the Baerveldt and 19 (47.5%) for the Paul. The intraocular pressure lowering on suture removal was higher in the Baerveldt at 11.9 mmHg compared with the Paul at 7.6 mmHg. Intraoperative safety of the Baerveldt and Paul were both good, with few significant complications, including explanation or failure to reach target IOP (on or off medications) requiring further procedures.

Conclusions
This study has shown that both Baerveldt and Paul provide effective intraocular reduction and medication reduction in glaucoma patients at 12 months. In the first month, the Paul provides better intraocular pressure lowering than the Baerveldt. Both devices were well-tolerated. Surgeon preference will guide device selection.

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P-0919

PAUL GLAUCOMA IMPLANT IN REFRACTORY GLAUCOMA: SHORT-TERM RESULTS IN AZERBAIJAN

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Background
Glaucoma implants are widely used in the treatment of refractory glaucoma where İOP compensation cannot be achieved with traditional trabeculectomy. Refractory glaucoma can be caused by iris neovascularization, trauma, uveitis, congenital pathologies of the eye, excessive scarring of the conjunctiva after trabeculectomy. The aim of the study was to evaluate the safety and efficacy of the Paul Glaucoma Implant (PGI) in patients with refractory glaucoma over a short period of time.

Methods
The study included 37 patients (45 eyes) who underwent implantation of PGI. All patients were followed for 6-12 months. Visual acuity (VA), changes of intraocular pressure (IOP), use of glaucoma medications, incidence of complications and postsurgical interventions were examined.

Results
The mean preoperative VA increased from 0.11±0.01(0-0.8) to 0.20±0.03(0-0.8) ($p<0.05$) at the final (12 months) examination. The IOP and glaucoma medications decreased from a mean of preoperative value of 40±1.0(14-66) mmHg and 2.9±0.05(2-4) to mean 13.3±0.9(12-22) mmHg ($p<0.01$) and 1.3±0.17(0-1), ($p<0.01$) respectively. Complications of the early and late postoperative period were detected in 12 eyes (26.7%). Complete success was achieved in 64.8% (IOP ≥6 and ≤21 mmHg without drops), qualified in 30.2% (IOP ≥6 and ≤21 mmHg with drops) and failure (IOP < 6 and >21 mmHg) in 5% of cases. Additional procedures were performed on 1 (2.2%) eyes.

Conclusions
The use of PGI when standard glaucoma surgery is unsuccessful or unacceptable is a long-term effective treatment option in terms of lowering IOP. After surgery, you should be prepared for complications associated with hypotony.

P-0920

OUTCOMES AND PREDICTORS OF SUCCESS FOR THE PAUL GLAUCOMA IMPLANT IN REFRACTORY GLAUCOMA: A MULTICENTER RETROSPECTIVE STUDY

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Background
To evaluate outcomes and factors associated with the success of the Paul Glaucoma Implant (PGI) in the treatment of refractory glaucoma.

Methods
This multicenter, retrospective cohort study included consecutive patients who underwent PGI implantation in five European glaucoma units. Success was defined using four intraocular pressure (IOP) thresholds: IOP<21 mmHg with a 20% IOP reduction; IOP<18 mmHg with a 20% IOP reduction; IOP<15 mmHg with a 25% IOP reduction; IOP<12 mmHg with a 30% IOP reduction. Failure was defined as IOP exceeding these thresholds at two consecutive visits after three months post-surgery, loss of light perception, further IOP-lowering procedure, surgical revision for hypotony, or PGI removal. Kaplan-Meier analysis was used to estimate success, and Cox regression multivariable analysis identified factors associated with outcomes.

Results
A total of 147 eyes from 142 patients were included, with a median (interquartile range [IQR]) follow-up of 10 (4 to 19) months. The median (IQR) preoperative age was 67.8 (55.9–76.4) years, and the median visual field mean deviation was -20.1 (-9.9 to -28.1) dB. Median IOP significantly (p≤0.001) decreased from 28 (22 to 34) mmHg preoperatively to 14 (11 to 16) mmHg and 12 (10 to 16) mmHg at 6 and 12 months, respectively. The median number of medications decreased from 3 (3 to 4) preoperatively to 1 (0 to 2) at one year. Overall success rates (95% confidence interval [CI]) at 12 months ranged from 73.8% (69.6%-78.2%) for the 21-mmHg criterion to 26.9% (13.8%-52.6%) for the 12-mmHg criterion (Figure 1). Factors associated with failure for the 12-mmHg criterion included preoperative use of Diamox (Hazard ratio [HR]: 1.94; 95%CI: 1.41-2.65; p≤0.001), previous glaucoma surgery (HR: 2.29; 95%CI: 1.34-3.94; p=0.004), and prior pro-inflammatory surgery, including retinal surgery, penetrating keratoplasty, and extracapsular cataract extraction (HR: 2.02; 95%CI:1.01-4.03; p=0.05).

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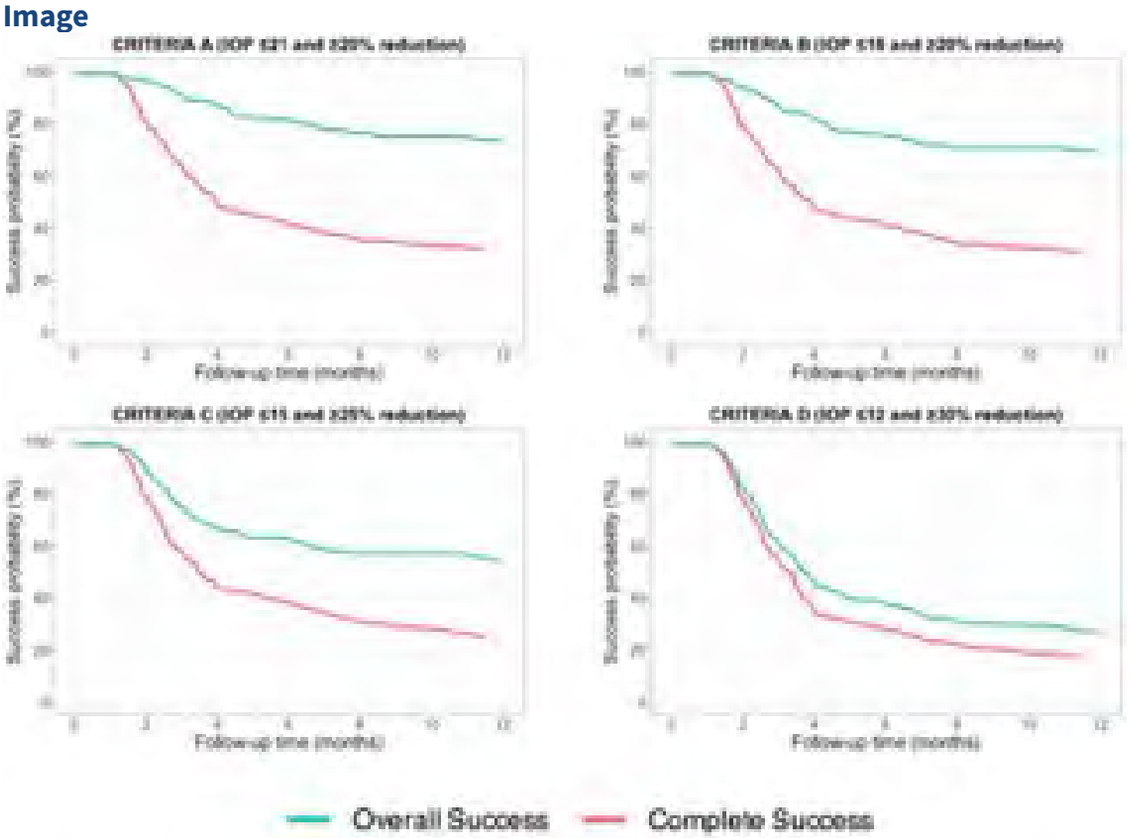

Conclusions

The PGI demonstrates good short-term efficacy in the surgical management of refractory glaucoma. Identifying factors associated with success can help surgeons better inform and counsel patients regarding expected outcomes.

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P-0921

TRABECULECTOMY VERSUS PRESERFLO MICROSHUNT AS GLAUCOMA TREATMENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background

Trabeculectomy remains the gold standard surgical treatment for glaucoma however new approaches for minimally invasive glaucoma surgery have been developed in the last decades; PreserFlo MicroShunt is a minimally invasive bleb surgery that creates a new subconjunctival outflow pathway to lower intra-ocular pressure (IOP). The aim of this study is to compare the efficacy of PreserFlo MicroShunt (PF) versus Trabeculectomy (TB) in glaucoma treatment.

Methods

Based on a PICOS question and PRISMA guidelines, two researchers conducted a blinded systematic review using a predefined Boolean search algorithm across PubMed, Cochrane CENTRAL, and ClinicalTrials.gov.

Articles from 2013 to 2024 were included if they reported experimental or observational studies comparing trabeculectomy and PreserFlo MicroShunt, Study quality and bias risk were assessed with ROBIN-I for observational studies and ROB-2 for RCTs.

Data were extracted for both, first conducting a standardized mean difference (SMD) meta-analysis for post operative IOP, using the inverse variance for study weight and the REML method, with a Random effect model; and second, a Relative Risk (RR) meta-analysis with inverse variance as study weight, REML method and a Random Effect model for the most common Adverse effects of the interventions. A meta-regression was used to assess potential heterogeneity sources. Statistical significance was set at P value ≤ 0.05, and all analyses were performed in RStudio (2023.12.1+402).

Results

A total of 706 studies were identified; 191 remained after duplicate removal. Title/abstract screening yielded 20 articles, with11 eligible studies with 2,029 eyes (PF: 1,067 eyes, TB: 962).

The post operative IOP SMD meta-analysis result in a pooled effect of 0.5862 (CI95%: -0.0233-1.1957), with PreserFlo as a negative SMD and Trabeculectomy as positive SMD. RR meta-analyses performed for postoperative hypotony and Hyphemia, demonstrated a pooled effect of -0.5367(CI95%: -1.5404-0.4669) and 0.1566 (CI95%: -0.3793-0.6925), with PreserFlo as negative and Trabeculectomy as positive relative risk.

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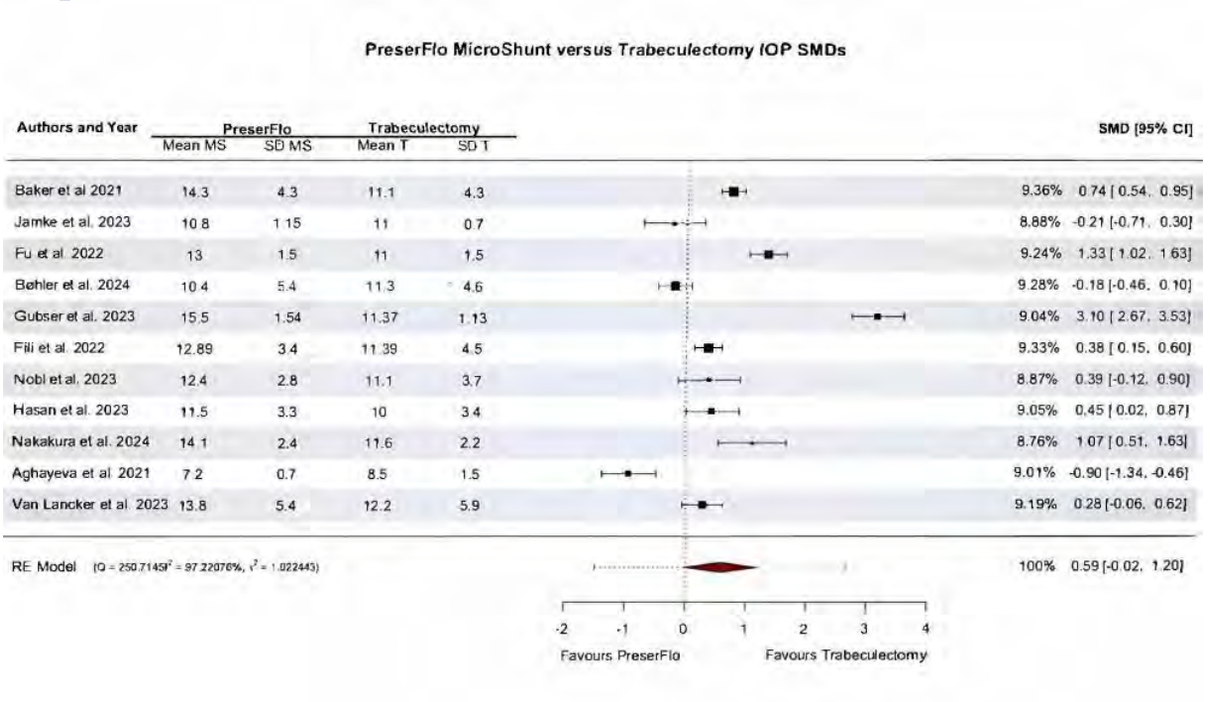

Conclusions

This study suggests that there is no statistically significant difference was observed between TB and PF. While TB tends to reduce IOP more than PF, this difference is not statistically significant. In hypotony, the results in RR suggest that PF is associated with a lower risk, although this also lacks statistical significance. We conclude that further prospective, randomized controlled trials with longer follow-up time are needed to reach a definitive conclusion.

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P-0923

A COMPARATIVE STUDY OF GONIOTOMY COMBINED WITH PERIPHERAL IRIDOTOMY VERSUS TRABECULECTOMY FOR THE TREATMENT OF PIGMENTARY GLAUCOMA

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Background
To evaluate the effectiveness and safety of goniotomy combined with peripheral iridotomy versus trabeculectomy in the treatment of pigmentary glaucoma .

Methods
A retrospective, single-center, case series study of 21 patients (21 eyes) with pigmentary glaucoma who met surgical criteria. The patients were aged 43-51 years and were divided into two groups based on the surgical procedure: goniotomy combined with peripheral iridotomy (GT group) including 9 cases (9 eyes) and trabeculectomy (TRAB group) including 12 cases (12 eyes). The preoperative and postoperative data at 1 day, 1 week, 1 month, 3 months, 6 months, and 12 months were recorded for each group, including intraocular pressure (IOP), types of anti-glaucoma medications, and surgical complications.

Results
The average baseline IOP in the GT group and the TRAB group was comparable (respectively 34.7±4.4 and 32.9±3.9 mmHg, P=0.22). At 12 months postoperatively, the average IOP in the GT group was 16.5±1.5 mmHg, while the IOP in the TRAB group was 21.7±1.8 mmHg. The percentage of IOP decrease from baseline was statistically significant between the two groups. At 12 months, the average reduction in glaucoma medication in the GT group was 1.72 types (P=0.012), while in the TRAB group it was 1.43 types (P=0.017), with statistical significance between the two groups. The complications in the GT group were hyphema (33.3%), peripheral iris anterior synechia (11.1%), elevation of the IOP (11.1%). The complications in the TRAB group included postoperative shallow anterior chamber(8.3%), bleb fibrosis (16.6%),bleb leakage (8.3%). The success rate of the GT group and the TRAB group was compared using the Kaplan-Meier method. According to the criterion of complete success, the cumulative survival rate of the GT group was 85.5%, while that of the TRAB group was 76.8%. There was a statistically significant difference between the two groups.

Conclusions
Goniotomy combined with peripheral iridotomy can reduce intraocular pressure and reduce glaucoma medication in patients with pigmentary glaucoma. The success rate of the GT group was higher than that of the TRAB group at 12 months postoperatively, and the incidence of complications was lower.

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P-0925

EFFICACY AND SAFETY OF ADJUNCTIVE MITOMYCIN C IN AHMED GLAUCOMA VALVE IMPLANTATION IN A CHINESE POPULATION

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Background
Ahmed glaucoma valve (AGV) has been an important treatment modality for complicated glaucoma patients. While its short-term efficacy has been well-established, encapsulation and filtration failure may limit its long-term efficacy. Mitomycin C (MMC), an alkylating agent, has been used in AGV implantation in patients with non-Chinese ethnicity with variable results; however, its efficacy in Chinese patients remains unknown. This study aimed to investigate on the efficacy and safety of MMC in AGV implantation in Chinese patients.

Methods
This is a retrospective case series of consecutive glaucoma patients with AGV implantation at Hong Kong Eye Hospital from January 2017 to June 2023. The primary outcome was the time to failure for AGV with or without MMC augmentation. Failure was defined as intraocular pressure (IOP) greater than IOP of 21, 18, 15 mmHg, respectively, or <6 mmHg on 2 consecutive follow-up visits after 3 months, reoperation for glaucoma, or loss of light perception vision. The secondary outcomes were IOP, number of IOP-lowering medications, and their percentage change at month 6, 12, 18 and 24.

Results
Forty eyes from 37 patients with AGV implantation were included (with MMC: 11 eyes, 27.5%; without MMC: 29 eyes, 72.5%). Baseline IOP were 33.5 mmHg and 26.0 mmHg, while on 5 and 5 medications, respectively. Survival probability was significantly higher in the MMC group at 24 months (>18 mmHg: p = 0.032; >15 mmHg: p = 0.026; Logrank test). There were significant reductions in IOP and number of medications at all time points in both groups compared with baseline (all p<0.05, Wilcoxon signed rank test). The IOP at all time points were lower in the MMC group, but statistical significance was only reached at month 6 (MMC group: 13.0 mmHg vs non-MMC group: 17.0 mmHg, p = 0.011; Mann-Whitney U test). Percentage IOP reduction at months 6, 12 and 18 were significantly greater in the MMC group compared to non-MMC group (month 6: 57% vs 31%, p = 0.003; month 12: 52% vs 41%, p = 0.011; month 18: 53% vs 35%, p = 0.037; Mann-Whitney U test). There were no significant complications *e.g.* endophthalmitis or exposed implant in both groups.

Conclusions
MMC-augmentation in AGV implantation resulted in higher success rates at reaching IOP ≤15 and ≤18 mmHg, with greater percentage IOP reduction till 18 months, and a good safety profile.

P-0926
CAN MIGS BE EFFECTIVE IN ADVANCED GLAUCOMA?

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Background
Background / Purpose: Minimally Invasive Glaucoma Surgery (MIGS) have been used exponentially in the last decade and has brought about a paradigm change in the management of mils-to-moderate glaucoma. However, the need of the hour is to bring innovative and safe solutions for advanced glaucoma. The purpose of this study is to investigate the safety and efficacy of combining two types of MIGS – one that restricts inflow and another that enhances outflow (combined inflow-outflow MIGS) – in advanced primary glaucomas and compare it with the current gold-standard of phaco-trabeculectomy (PT).

Methods
Retrospective study of subjects with advanced primary glaucomas, more than 30 years who underwent combined inflow-outflow MIGS or trabeculectomy with Mitomycin C along with phaco-surgery. Primary outcome measure was IOP. Secondary were number of anti-glaucoma medications (AGM), total success and complications, with interventions for these.

Results
34 eyes with phaco and combined inflow-outflow MIGS (I-O MIGS) and a mean follow-up of 10 months were compared to 37 eyes that underwent PT (mean follow-up 11 months). 40% IOP reduction was achieved in the former group and 47% in the latter (p not significant); AGM reduced by 78% and 67% respectively (p not significant). No serious complications occurred in either group, but interventions for complications was required only in the P-T group. No loss of vision occurred in either group.

Conclusions
Conclusion: Combined inflow-outflow MIGS has the potential to be as effective as the current gold standard in advanced primary glaucomas. Larger studies and longer follow-up are recommended.

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P-0927

TRABECULECTOMY WITH MITOMYCIN-C AND SUPRACHOROIDAL DERIVATION (TMSD) FOR UNCONTROLLED GLAUCOMA: A 5-YEAR PROSPECTIVE STUDY

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Background

Trabeculectomy with mitomycin-C and suprachoroidal derivation (TMSD) is a technique that creates an aqueous bypass into the suprachoroidal space without using special devices, but rather two autologous scleral flaps to maintain the space without inducing additional fibrosis. We previously published a 24-month study on TMSD in various uncontrolled glaucomas. This study presents the 5-year results.

Methods

Prospective case series. All patients scheduled for trabeculectomy due to uncontrolled glaucoma at the “Instituto de Glaucoma y Catarata” (Lima, Peru) between August 2011 and November 2019 were included. Patients voluntarily accepted the procedure after receiving detailed information about potential risks and benefits. Informed consent was obtained from each patient before the procedure. Visits were performed on day 1, month 1, month 3, and then every 6 months, registering best-corrected visual acuity (BCVA), intraocular pressure (IOP), number of glaucoma medications, and complications.

Results

Forty-two eyes of 41 patients were included. All patients completed a 60-month follow-up. A mean IOP decrease from baseline of 10 ± 1.36 mmHg ($p < 0.001$) was observed, representing a robust and sustained 44.4% IOP-lowering effect. Thirty-six (85.7%) eyes ended with no glaucoma medication. No significant difference was observed in BCVA before and after surgery. No severe complications were reported.

Conclusions

TMSD appears to be a safe, effective, and cost-saving alternative for uncontrolled glaucoma in various diagnoses.

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P-0928

AFFORDABLE SINSKEY HOOK GONIOTOMY AND CATARACT SURGERY IN BLACK AND AFRO-LATINO PATIENTS: RETROSPECTIVE REAL WORLD 1 YEAR RESULTS

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Background

The purpose of this study was to determine the real-world efficacy of early phacoemulsification cataract surgery and goniotomy with a Sinskey hook in patients with glaucoma.

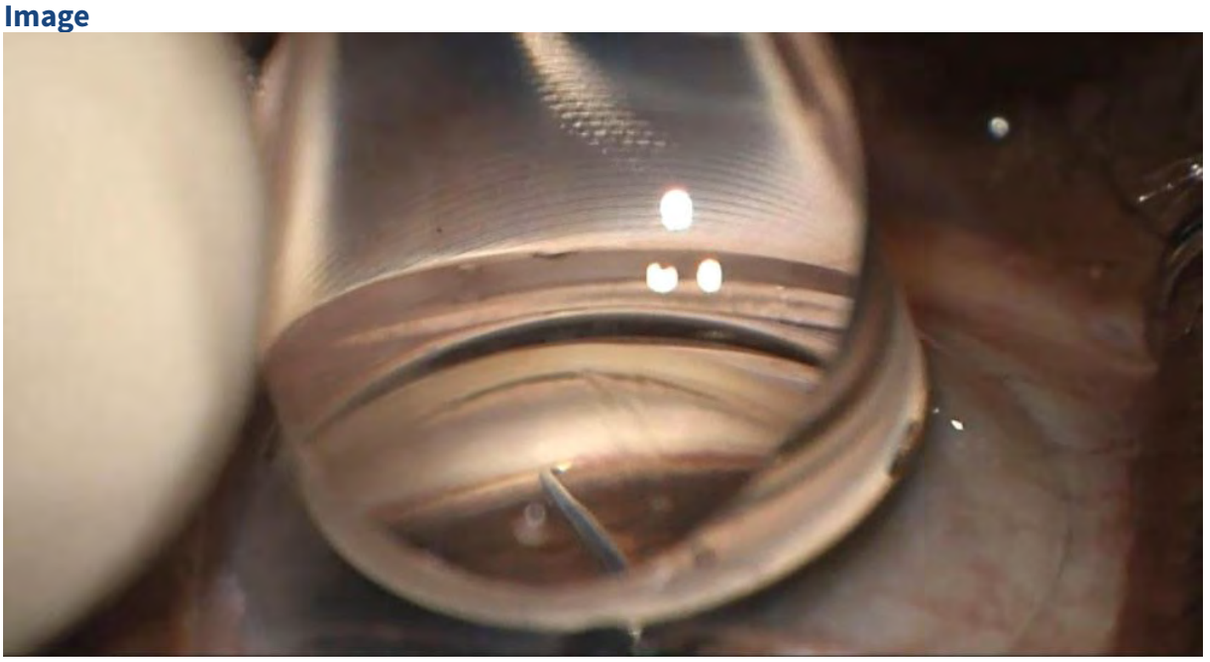
Methods

This study was conducted at Advanced Eye Care of New York, a private practice located in Manhattan, and Queens, NYC, NY. This was a single-center, retrospective study of predominantly Black and Afro-Latino patients with mild to moderate glaucoma. These patients underwent early phacoemulsification cataract surgery and goniotomy using an affordable and reusable straight Sinskey hook (Ambler 200-µm tip). Patients who underwent the combined procedure with 1 year of follow-up were included in this study. Investigated parameters were intraocular pressure, number of medications, mean deviation (MD) on visual field test, visual acuity, adverse events, and pre/postoperative spherical refractive error.

Results

121 eyes were identified with 1 year follow-up that underwent surgery (goniotomy using a Sinskey hook with phacoemulsification). The mean age was 65. The mean medically treated pre-operative intraocular pressure was lowered from 16.40 mmHg at baseline to 14.66 mmHg at 1 year, a 10.6% reduction. The mean number of topical intraocular pressure-lowering medications used was reduced from 1.67 at baseline to 0.30 at 1 year, an 82% reduction. The mean pre-operative visual field index percentage (VFI%) was 86.2% with an average MD of -6.63, and the mean post-operative VFI% was 89.0% with an average MD of -5.5%. Out of the 121 eyes, 83% (103 eyes) remained medication-free at 1-year post-operation. Postoperatively, there were 5 IOP spikes (IOP ≥30 mmHg) that were treated and 8 hyphemas that were noted, addressed and resolved.

Image



Conclusions

Combined early cataract surgery and goniotomy performed with a Sinskey hook is an affordable microinvasive surgery and an effective way to reduce intraocular pressure and the medication burden in Black and Afro-Latino patients with glaucoma with 1-year follow-up. As an affordable alternative to other microinvasive surgical techniques, this carries important implications for patients in resource poor areas in that it reduces barriers to care and could increase accessibility to glaucoma surgical treatment worldwide.

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P-0930

MANAGING POSTOPERATIVE OVERFILTRATION WITH STENTING OF PRESERFLO GLAUCOMA IMPLANT AB INTERNO: A SAFE AND EFFECTIVE APPROACH

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Background

To present a novel and effective surgical procedure for managing postoperative hypotony following the implantation of the Preserflo glaucoma implant. This technique involves stenting the implant with a 10-0 or 9-0 prolene suture intracamerally, which ensures controlled intraocular pressure regulation over a specified period.

Methods

A total of 19 patients underwent this procedure following Preserflo implantation to address postoperative overfiltration and hypotony. The technique involves stenting the implant using a prolene thread, which helps to prevent excessive drainage and stabilize the anterior chamber. This method was compared to other approaches such as the filling of the anterior chamber with viscoelastic or air, both of which can lack the precision and stability provided by stenting.

Results

The procedure demonstrated high efficacy in restoring controlled intraocular pressure and preventing hypotony, reducing the need for repeated surgeries. This technique offers a more reliable solution compared to traditional methods and provides a safer, more predictable outcome. The management of postoperative hypotony was achieved without the complications often associated with alternative strategies.

Conclusions

Stenting the Preserflo glaucoma implant with prolene suture intracamerally is a safe, effective, and easy-to-perform technique for treating postoperative hypotony. Despite its initial challenges, with proper tips and guidance, this method proves to be a valuable addition to glaucoma surgery, offering a controlled and prolonged effect on intraocular pressure regulation, minimizing the need for additional interventions. The video presentation will showcase key steps and tips to successfully perform this procedure.

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P-0932

SURGICAL OUTCOMES OF CLEARPATH 250 MM² VS. BAERVELDT 250 MM² GLAUCOMA DRAINAGE DEVICE: A RETROSPECTIVE COMPARATIVE STUDY

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Background

This study compares the efficacy and safety of two non valved glaucoma drainage devices (GDDs): the Ahmed ClearPath (ACP) 250 mm² and Baerveldt glaucoma implant (BGI) 250 mm² in reducing intraocular pressure (IOP) in patients undergoing glaucoma surgery. The study included 62 eyes from 53 unique patients who underwent surgery using either ACP or BGI, with no previous glaucoma drainage device implantation. All participants had at least 6 months of follow-up.

Methods

We conducted a chart review of patients treated at MU Health from 2020 to 2024. Data analysis was performed using Kaplan-Meier survival estimates and multivariable logistic regression to adjust for confounders. The primary outcome measure was surgical failure at the end of follow-up, defined as intraocular pressure (IOP) > 21 or < 6 mmHg at 2 consecutive visits, progression to no light perception (NLP) vision, glaucoma reoperation, or implant removal. Secondary outcome measures included the rate of postoperative complications and changes in best corrected visual acuity (BCVA), IOP, and glaucoma medications.

Results

We analyzed 62 eyes from 53 patients (32 ACP, 30 BGI). The mean follow-up duration was 12.6 ± 6.8 months. Surgical failure occurred in 5 eyes (8.1%), with no significant differences between the devices (ACP 9.4% vs BGI 6.7%; P = 0.70). Specific failure reasons reoperation (4/5), and progression to NLP vision (1/5). None of the eyes included IOP > 21 mmHg in two consecutive visits. Both groups showed significant reductions in IOP and medication use from baseline, though the ACP group had significantly fewer medications postoperatively (P = 0.001). There was no significant difference in final IOP or BCVA between the groups. Neither tube type nor plate size were predictors of surgical failure.

Conclusions

This study compares the approved ACP versus BGI. Both implants had similar surgical failures and complication rates, provide effective IOP reduction and have similar safety profiles over 12 months. The final intraocular pressure was similar in both groups, but ACP achieved a lower medication number. Neither tube type were significant predictors of surgical failure. This study supports the notion that either device can be used interchangeably in clinical practice, allowing for personalized treatment strategies based on patient needs and surgeon experience. Further research with longer follow-up is warranted to assess the durability of these outcomes and to explore specific patient populations that may benefit more from one device over the other.

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P-0933

LONG-TERM EFFICACY AND SAFETY OF THE PRESERFLO MICROSHUNT IMPLANT

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Background

The objective of this study is to evaluate the 5-year efficacy and safety of the Preserflo Microshunt device for poorly controlled open-angle glaucoma patients with maximally tolerated treatment (with disease progression), with treated intraocular pressures (IOP) between 15-35 mmHg needing glaucoma surgery.

Methods

This is a prospective, non-randomized, non-masked, single-center, clinical evaluation study. The main variables evaluated were intraocular pressure (IOP) measurement, number of antiglaucomatous medications, specular microscopy and quality of life and ocular symptoms questionnaire.

Results

At the end of follow-up:

1. The mean IOP was reduced to 14.9 ± 3.1 mmHg, so there was a statistically significant decrease ($p<0.001$) in IOP. The mean reduction at the end of the study was 4.17 ± 4.66 mmHg.
2. The number of antiglaucomatous medications used was 1.24 ± 1.18, which represents a statistically significant mean reduction of 1.57 ± 1.33 ($p<0.001$).
3. The mean number of endothelial cells/mm2 was 2499.38 ± 316.27, which represents a statistically non-significant mean decrease of 130.00 ± 210.20 ($p=0.062$).
4. The mean score of the quality of life questionnaire EQ-5D-5L was 0.789 ± 0.370 points, which is a statistically non-significant mean decrease of 0.031 ± 0.253 points ($p=0.341$).

Conclusions

The Preserflo Microshunt device used in isolated surgery in open-angle glaucoma patients is effective in the long term, providing optimal IOP results, a significant decrease in the number of antiglaucomatous medications, no significant changes in endothelial cell density, hexagonality or coefficient of variation and no decrease in patients' quality of life, but a significant increase in physical and/or perceptual ocular symptoms.

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P-0936

POSTOPERATIVE OUTCOMES OF PRESERFLO MICROSHUNT IN PATIENTS WITH EXFOLIATION GLAUCOMA

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Background
This study aimed to evaluate the postoperative outcomes of the PreserFlo MicroShunt in Asian patients with exfoliation glaucoma.

Methods
This was a single-center, retrospective observational study. The Kaplan–Meier method was used to analyze 29 eyes of 29 patients with exfoliation glaucoma who underwent PreserFlo MicroShunt surgery as a standalone procedure. Intraocular pressure (IOP) survival criteria were defined as 5–21 mmHg (condition 1), 5–18 mmHg (condition 2), and 5–15 mmHg (condition 3). Complete success was defined as achieving the target IOP without additional antiglaucoma medications or needling, while qualified success allowed for either. The mean preoperative number of antiglaucoma medications was 3.4 (±1.0), and the mean IOP was 32.6 mmHg. The MicroShunt was inserted through the superior temporal quadrant in 13 eyes and the inferior temporal quadrant in 16 eyes. The mean follow-up period was 27.9 weeks.

Results
Complete and qualified success rates at 24 weeks were 56%, 52%, and 49% and 67%, 59%, and 53% for conditions 1–3, respectively. IOP and the number of antiglaucoma medications were significantly reduced from 32.6 (±9.1) mmHg and 3.4 (±1.0) preoperatively to 16.9 (±10.5) mmHg and 1.0 (±1.3) at the final visit. Hypotony, defined as an IOP below 5 mmHg, was observed in five cases (17%). Needling or additional antiglaucoma medications were used in cases of ocular hypertension. A total of nine cases (31%) required reoperation due to ocular hypertension, with a mean IOP of 29 mmHg at the time of reoperation and a median time to reoperation of 98 days (range: 11–420 days).

Conclusions
The postoperative outcomes of the PreserFlo MicroShunt in Asian patients with exfoliation glaucoma showed an approximate 50% success rate at both 24 and 48 weeks, with a reoperation rate of approximately 30%.

P-0937

FACTORS AFFECTING CORNEAL ENDOTHELIAL CELLS IN THE ANTERIOR CHAMBER FOLLOWING AHMED GLAUCOMA VALVE IMPLANTATION

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Background
Tube shunt surgery has become a common treatment for refractory glaucoma; however, one of the well-recognized complications is the reduction of corneal endothelial cell density (ECD). This retrospective study aimed to investigate factors associated with ECD reduction related to anterior chamber placement of Ahmed Glaucoma Valve (AGV) tubes.

Methods
This study included 29 eyes from 29 patients observed for at least one year postoperatively and 22 eyes from 22 patients observed for at least two years postoperatively, all of whom underwent AGV implantation into the anterior chamber at Ehime University Hospital between January 2018 and May 2021. ECD was measured preoperatively and at one and two years postoperatively using specular microscopy. The reduction in ECD was calculated relative to preoperative levels. Using anterior segment optical coherence tomography (AS-OCT), the tube length in the anterior chamber, the distance between the tube tip and corneal endothelium, and the angle between the cornea and the tube were measured. The correlation between these parameters and ECD reduction was analyzed.

Results
A significant correlation was observed between tube length in the anterior chamber and ECD reduction at both one year ($p = 0.04$) and two years postoperatively ($p = 0.05$), with longer tubes being associated with greater ECD loss. Conversely, no significant correlation was found between ECD reduction and either the distance between the tube tip and corneal endothelium (1 year: $p = 0.11$; 2 years: $p = 0.09$) or the angle between the cornea and tube (1 year: $p = 0.07$; 2 years: $p = 0.4$).

Conclusions
The length of the Ahmed Glaucoma Valve tube in the anterior chamber may influence ECD, suggesting that careful consideration of tube length is critical to minimizing endothelial cell loss.

P-0938

GLAUCOMA DRAINAGE DEVICE IMPLANTATION IN REFRACTORY PEDIATRIC GLAUCOMA: A SURGICAL APPROACH FOR CASES WITH THIN SCLERA

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Background

Pediatric glaucoma often presents with thin sclera, complicating traditional surgical approaches. Innovative methods are critical to address these challenges. The aim is to describe a new surgical technique for the implantation of glaucoma drainage device in pediatric glaucoma patients whose sclera is so thin that conventional implantation techniques are not feasible.

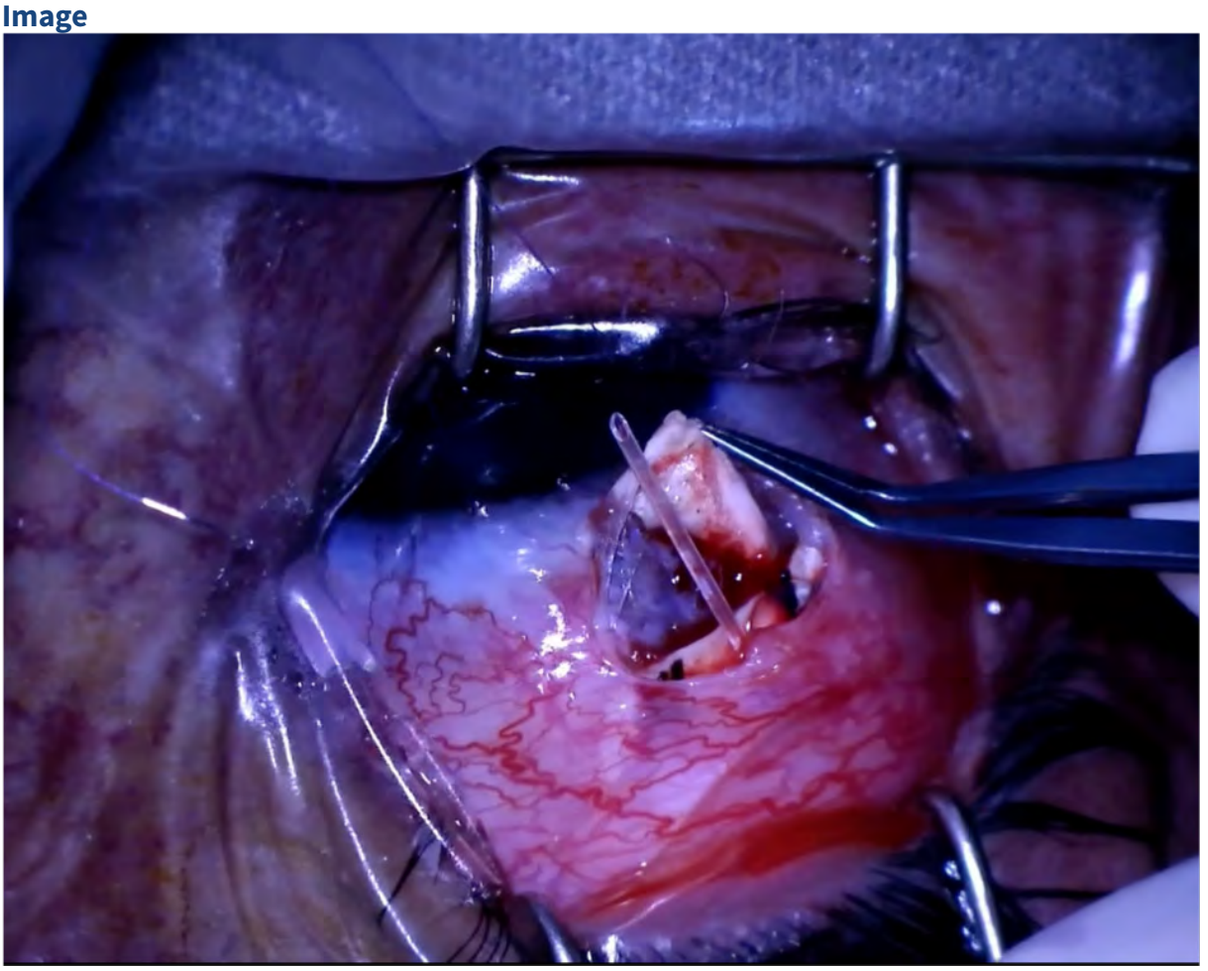
Methods

The new procedure, performed in two patients by a surgeon, consisted of three steps: a scleral patch prepared as reinforcement on the native sclera of the patients after conjunctival dissection; use of fibrin glue to adhere the scleral patch to the patient's sclera. After the introduction of the tube into the anterior chamber, it was covered with another scleral patch, fixed with fibrin glue.

Results

P1, female, 8 months, bilateral pediatric glaucoma secondary to Sturge-Weber syndrome. The eye examination showed port wine stain and bilateral buphthalmia. The biomicroscopy identified Haab's striae in both eyes (OU), elevated intraocular pressure (IOP) at 60mmHg and fundus with increased vascular tortuosity and cup to disc ratio of 0.9. The corneal diameter was 14mm in OU, with biometrics and pachymetry of 26.14mm and 680µm in right eye (OD) and 24.04mm and 568µm in left eye (OS). In gonioscopy, blood was observed in the Schlemm's canal and high insertion of the iris in OU. After the failure of angular surgeries, slow cooking cyclophotocoagulation was chosen and performed three times due to the very thin sclera, which made filtering surgeries unfeasible, but was unsuccessful. Subsequently, Susanna's implant was performed with a modification to the conventional implant technique. In the 1st PO, the IOP reduced 30 mmHg. Susanna's implant and the fixation of the donor sclera with fibrin glue on the OU receptor sclera were chosen. The plate was fixed to the donor sclera with silk suture 6.0. In the OD, there was atalamy and hypotonia, requiring reapproach of the tube. The final IOP value was 16mmHg OD and 8mmHg OS. P2, female, 5 years old, with congenital glaucoma. Anterior chamber formed OU Biomicroscopy, cornea with Haab's striae, biometrics of 25.77mm OD and 26.77mm OS, pachymetry of 596µm OD and 700µm OS, and fundoscopy with excavation of 0,85x0,85 with inferior notch OD and 0,7x0,7 OS. For IOP control, the same steps as in the previous case were taken, but all failed. Tube implantation using the new technique was then chosen, resulting in a final IOP of 12mmHg OD and 7mmHg OS.

Image



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Conclusions

We present a pioneering treatment alternative for pediatric glaucoma cases with thin sclera, offering effective IOP reduction and safety outcomes.

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P-0939

MIGS ROYALE - COMPARATIVE EARLY OUTCOMES OF MIGS IN INDIAN POAG PATIENTS: THE SKIBI (SUTURE-GATT VS KDB VS ISTENT VS BANG VS ISTENT INJECT) STUDY

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Background
To evaluate and compare the early outcomes of various MIGS techniques—Suture-GATT, KDB, iStent, BANG, and iStent Inject—in Indian patients with mild to moderate POAG on AGMs and with cataract over a six-month follow-up period.[1] The primary parameters assessed were IOP reduction and AGM usage.

Methods
This prospective study included 113 patients divided into five groups (Suture-GATT: 21 eyes, KDB: 28 eyes, iStent: 20 eyes, BANG: 31 eyes, iStent Inject: 13 eyes). The effectiveness and safety of the procedures were evaluated over 6 months, measuring IOP reduction and AGM usage at 1 week, 1 month, 3 months, and 6 months. The choice of procedure was influenced by patient preference and economic considerations.

Results
At the six-month postoperative mark, all MIGS techniques showed significant reductions in IOP: Suture-GATT (6.41 ± 2.05 mmHg), KDB (5.88 ± 0.64 mmHg), iStent (2.81 ± 0.83 mmHg), BANG (5.27 ± 0.68 mmHg), and iStent Inject (6.14 ± 1.62 mmHg). A corresponding reduction in AGM use was also observed: Suture-GATT (1.05 ± 0.26), KDB (0.54 ± 0.15), iStent (1.46 ± 0.38), BANG (0.58 ± 0.11), and iStent Inject (0.64 ± 0.12). Among the techniques, iStent Inject and iStent were associated with the fewest intraoperative complications followed by KDB, Suture GATT and BANG. Suture-GATT achieved a complete success rate of 71%, contributing to an overall total success rate of 90%. It exhibited the highest total success rate among all procedures, followed by KDB, iStent Inject, iStent, and BANG.

Image

Conclusions

MIGS offers a favourable balance between safety and efficacy in lowering IOP, making it a compelling option for complex cases. All MIGS procedures demonstrated significant IOP reduction & reduction in AGM usage. Findings suggest that Suture-GATT and iStent inject are preferable in scenarios requiring significant IOP reduction, whereas KDB and iStent inject may be ideal when safety is the primary concern. However, iStent Inject is less cost-effective and often requires more AGMs postoperatively, making KDB a more economical option.[2] Anterion imaging reveals potential mechanisms of surgical failures. KDB goniotomy creates a uniform “W”-shaped opening, improving outflow while preserving tissue. In contrast, BANG forms a rugged cleft, resulting in more peripheral damage and higher complication rates. Suture GATT, however, forms a 360° “bird beak” cleft through an inside-out approach, minimizing tissue damage and reducing complications.[3]

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P-0940

A SILVER LINING WITH KDB: TRANSFORMING OUTCOMES IN TRAUMATIC ANGLE RECESSION GLAUCOMA MANAGEMENT FOLLOWING BLUNT INJURY

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Background

Blunt ocular trauma can cause significant damage to the iris, ciliary body, and trabecular meshwork (TM) or lead to mechanical obstruction by hyphema or pigment dispersion. Closed globe injuries often result in persistent post-traumatic elevation of intraocular pressure (IOP), with angle recession glaucoma posing significant challenges for medical and surgical management.[1] Minimally Invasive Glaucoma Surgeries (MIGS), including the Kahook Dual Blade (KDB) goniotomy, have expanded treatment options.[2,3] This case is the first documented instance of traumatic glaucoma in an adult, unresponsive to maximal medical therapy, treated with combined surgery of cataract extraction and KDB goniotomy.

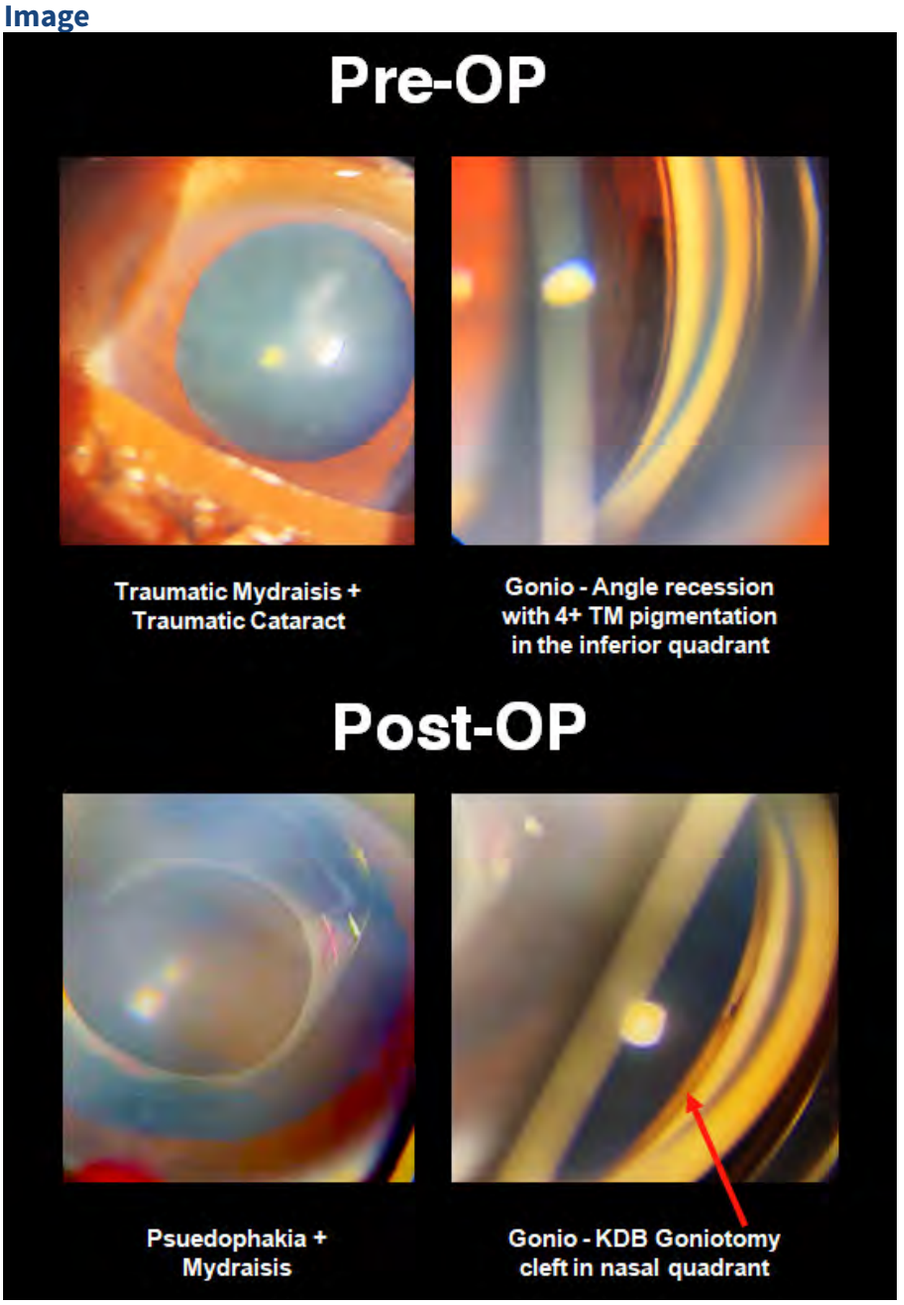
Methods

A 25-year-old male presented with pain and diminished vision in the left eye, with a history of blunt trauma 10 years prior. He was diagnosed with secondary glaucoma and traumatic cataract. Treatment with antiglaucoma medications (AGMs) was initiated, but it failed to control IOP or halt visual deterioration after two months. The patient underwent combined cataract surgery and KDB goniotomy. Follow-ups were conducted at 1 week and 1 month postoperatively.

Results

The combined surgical approach yielded promising outcomes, achieving both visual rehabilitation and IOP control. KDB goniotomy was selected due to its safety, cost-effectiveness, and ability to restore aqueous drainage by removing obstructive trabecular tissue. The procedure resulted in an approximate 50% reduction in IOP. Additionally, KDBs goniotomy avoided the astigmatic changes often associated with filtering surgeries like trabeculectomy, thus minimizing visual distortion. By preserving the conjunctiva, the procedure also maintained the option for future trabeculectomy if needed. Compared to bleb-based procedures, KDB reduced the risks of complications such as corneal edema, bleb leaks, and hypotony maculopathy.

Image



Conclusions

KDB goniotomy is an effective technique for managing traumatic glaucoma, offering dual benefits of visual improvement and glaucoma control in a single procedure. By targeting the TM, which is the primary site of resistance to aqueous outflow, KDB provided excellent IOP control while minimizing postoperative complications. This case highlights the potential of MIGS procedures to optimize outcomes in complex glaucoma management.

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P-0941

DOES POSTOPERATIVE CME HAVE A PREDICTIVE POTENTIAL FOR THE OCCURRENCE OF BLEB FAILURE AFTER COMBINED XEN GEL STENT IMPLANTATION WITH CATARACT SURGERY?

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Background
To investigate, whether postoperative cystoid macular edema (CME) after combined XEN45 Gel Stent implantation with phacoemulsification has a predictive potential for the occurrence of bleb failure and subsequent conjunctival revision surgery.

Methods
This retrospective study was based on the data acquired from the Department of Ophthalmology, St. Martinus-Krankenhaus Düsseldorf, Germany. We identified a total of 202 eyes of 149 patients who underwent combined XEN45 Gel Stent implantation with phacoemulsification. The inclusion criteria were a follow-up of at least 6 months and the availability of postoperative optical coherence tomography- (OCT) scans. If a macular edema was present, other etiologic causes such as diabetic macular edema, age related macular degeneration or uveitis had to be ruled out for inclusion. Patients with epiretinal membrane (ERM) were included, but required both pre- and postoperative OCT-scans. We excluded patients who underwent prior eye surgery, and who have been diagnosed with other forms of glaucoma other than primary open-angle glaucoma (POAG). If both eyes of a patient were eligible, only the eye which underwent surgery first was included. After applying these criteria, we included 45 eyes of 45 participants having received OCT-scans after surgery. In 15 eyes OCT detected a postoperative CME (CME group), the remaining 30 eyes did not show a postoperative CME (Control group). The occurrence of bleb failure and subsequent conjunctival revision surgery was compared among the two groups via a Kaplan-Meier survival analysis. A possibly predictive potential was assessed via a Cox proportional hazards regression model. Furthermore, postoperative intraocular pressure (IOP), medication scores and success rates were compared. Successful surgery was defined by three scores: IOP at longest follow-up <21 mmHg (Score A) or <18 mmHg (Score B), and an IOP reduction >20% respectively or IOP ≤15 mmHg and an IOP reduction ≥40% (Score C). In all scores, one open conjunctival revision was allowed, additional repeat surgery was considered a failure.

Results
Bleb failure requiring conjunctival revision surgery occurred significantly more frequently in the CME group than in the Control group (87% vs. 50%, p=0.039). The detection of CME went along with a 2.149-fold increased risk for bleb failure (p=0.045). IOP decreased by 56% in the CME group, and by 42% in the Control group after an average follow-up of 32.9 ± 20.1 months and 24.8 ± 19.0 months, respectively. There was no significant difference in terms of postoperative IOP, medication scores and success rate observed.

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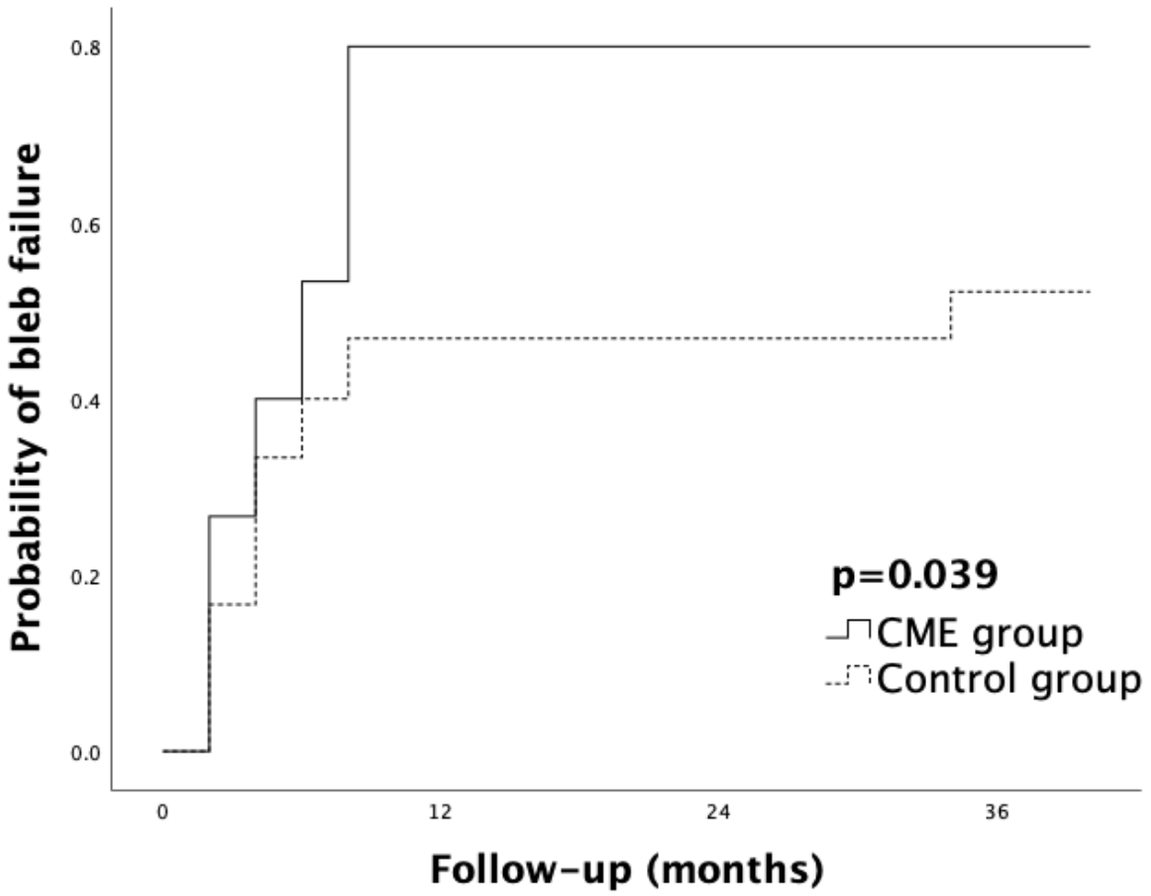

Conclusions

Our results suggest that postoperative CME goes along with a considerably increased risk for bleb failure and subsequent conjunctival revision surgery after combined XEN45 Gel Stent implantation with phacoemulsification. Therefore, when CME is detected postoperatively, we advise close follow-up examinations to detect bleb failure early.

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P-0942

SURGICAL OUTCOMES OF PAUL GLAUCOMA IMPLANT IN THE MANAGEMENT OF MEDICALLY UNCONTROLLED TRAUMATIC GLAUCOMA

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Background
Traumatic glaucoma is a severe complication of ocular trauma, often caused by hyphema, synechial angle closure, lens trauma, or trabecular meshwork damage. While early-onset cases often respond to medical therapy, late-onset glaucoma typically requires surgical intervention, especially in cases associated with angle recession or synechial closure. Trabeculectomy, despite its historical value, is less effective in ocular trauma due to conjunctival scarring, lens status, and multiple prior surgeries. Tube shunt devices like Ahmed and Baerveldt implants have demonstrated efficacy in managing refractory traumatic glaucoma. However, to date, no reports have described the use of the Paul Glaucoma Implant in this pathology.

Methods
This study retrospectively reviewed outcomes in 23 patients with traumatic glaucoma unresponsive to maximal medical therapy, who underwent Paul glaucoma implant surgery at the Ocular Trauma Unit of Hospital del Salvador between 2022 and 2024. Failure was defined as intraocular pressure (IOP) >18 mmHg or <6 mmHg on two consecutive visits after three months, reoperation for IOP-related indications, explantation of the implant, or loss of light perception. Complete success was defined as unmedicated IOP between 6 and 18 mmHg without failure, while qualified success required medications to maintain this range.

Results
The study included 23 eyes, with a mean age of 44.3 ± 9.7 years. Most patients were men (68%), and blunt trauma was the primary mechanism (72%). The mean preoperative IOP was 25.12 ± 7.01 mmHg, with patients using an average of 4.8 ± 0.65 glaucoma medications. Each eye had undergone 2.33 trauma-related surgeries on average, with some requiring up to five procedures. The mean follow-up period was 376.7 ± 138.26 days.

Postoperatively, mean IOP decreased to 11.74 ± 4.57 mmHg at six months and 11.00 ± 3.00 mmHg at one year ($p < 0.00001$). Medication use also decreased, from 4.8 ± 0.65 preoperatively to 1.5 ± 1.15 at six months and 1.0 ± 0.87 at one year ($p < 0.00001$). At six months, the median IOP was 13.5 mmHg, and at one year, the median medication use was 1.0. Complete success was achieved in 5 patients (20%), and qualified success in 13 (52%), while 3 patients (12%) experienced failure. Data for the remaining patients were unavailable due to loss to follow-up. Complications included two cases of hypotonic maculopathy requiring intervention and one reoperation for IOP control.

Conclusions
This study is the first to report outcomes using Paul glaucoma implants in traumatic glaucoma. The implants provided effective and sustained IOP control, significantly reducing medication use. Most patients achieved complete or qualified success, supporting the potential of Paul implants as a reliable surgical option

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P-0943

POSTOPERATIVE INTRAOCULAR PRESSURE ELEVATION DUE TO BENDING OF THE TUBE AFTER PARS PLANA AHMED GLAUCOMA VALVE INSERTION

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Background
Well-known causes of increased intraocular pressure (IOP) after pars plana Ahmed glaucoma valve (AGV) insertion include tubal tip occlusion, tubal cavity occlusion and fibrotic capsule development around the plate. As only a few cases of tube bending at the scleral insertion site have been reported, it is sometimes difficult to diagnose bending. Herein, we report the characteristics of 4 patients with bending of the tube.

Methods
This retrospective study included 39 eyes of 38 patients who underwent pars plana AGV insertion. The AGV tube was inserted perpendicular to the scleral surface and covered with a donor scleral patch.

Results
In 4 of 39 eyes, elevated IOP was thought to be due to bending of the tube. All 4 eyes had a hypertensive phase with poor response to ocular massage and exhibited no tube tip obstruction. The 3 eyes that underwent anterior segment optical coherence tomography (AS-OCT) exhibited no evidence of tubal cavity obstruction. In all 4 eyes, scleral donor patches and AGVs were abnormally compressed from the inside due to a high IOP, which was physically visible. All 4 eyes underwent secondary tubal reposition surgery 2 to 3 months after primary surgery, with all cases exhibiting tube bending at the scleral insertion site without fibrotic capsule around the AGV plate. After slightly withdrawing the tube, aqueous humor flowed out of the vitreous cavity into the tube, which was followed by a decreased IOP in all 4 eyes. After tube reinsertion that was oblique to the scleral surface, IOP reduction was observed.

Conclusions
When increased IOP is unresponsive to ocular massage after pars plana AGV and the AGV or scleral patch is compressed outwards from the inside of the eye without any abnormalities in the tubal tip or cavity, bending of the tube is usually suspected. Definitive diagnoses can be made by physically viewing the tube bending at the scleral insertion site in conjunction with an IOP decrease after loosely inserting the tube.

P-0944

VISUAL AND SURGICAL OUTCOMES OF COMBINED NON-PENETRATING DEEP SCLERECTOMY AND PHACOEMULSIFICATION IN EYES WITH SEVERE AND END STAGE GLAUCOMA

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Background
Surgical management of advanced glaucoma is often complex with fear of macular snuff -out phenomenon, We report the visual and surgical outcomes of mitomycin-C(MMC) augmented non-penetrating deep sclerectomy (NPDS) and phacoemulsification in patients with severe and end-stage glaucoma

Methods
A retrospective analysis of 349 eyes of 320 patients who underwent combined NPDS with phacoemulsification surgery between January 2018 to December 2020 were included.

Main outcome measures :Best corrected visual acuity (BCVA), status of central visual fields, intra ocular pressure (IOP), number of antiglaucoma medications (AGM) were compared from baseline to post-operative visits, surgical complications and interventions were noted.

Results
Mean logMAR BCVA improved significantly from baseline of 0.54±0.42 to 0.30±0.37 & 0.29±0.40 at 6($p<0.001$) & 12 months ($p<0.001$) postoperatively. HFA 10-2 analysis revealed no significant post operative change in mean deviation from baseline at 6 & 12 months ($p=0.072$, $p=0.143$) respectively. Significant post-operative reduction in mean(SD) IOP was noted from baseline of 17.54(5.43) mmHg to 15.10(5.34) & 16.23(6.87) mmHg at 6 months($p<0.001$) and one year($p<0.001$) respectively. Similarly, the need for AGM also reduced significantly from 2.95(1.01) to 1.93(0.98) & 2.01 (0.99) at 6 ($p<0.001$)& 12 months($p<0.001$) postoperatively. Cumulative surgical success was 95% and 93% at 6 months and 1 year respectively. Complications were seen in 17.8% patients and most were related to poor IOP control (8.3%). Two (0.6%) patients underwent tube surgery and 3 (0.9%) had undergone diode laser cyclophotocoagulation for refractory high IOP

Conclusions
MMC augmented NPDS combined with phacoemulsification surgery is a safe and a viable option in eyes with advanced glaucoma maintaining stable visual acuity and visual fields postoperatively

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P-0945

EFFICACY AND SAFETY OF PARS PLANA FILTRATION IN THE TREATMENT OF REFRACTORY GLAUCOMA—A SINGLE-CENTERED, RETROSPECTIVE, OBSERVATIONAL STUDY

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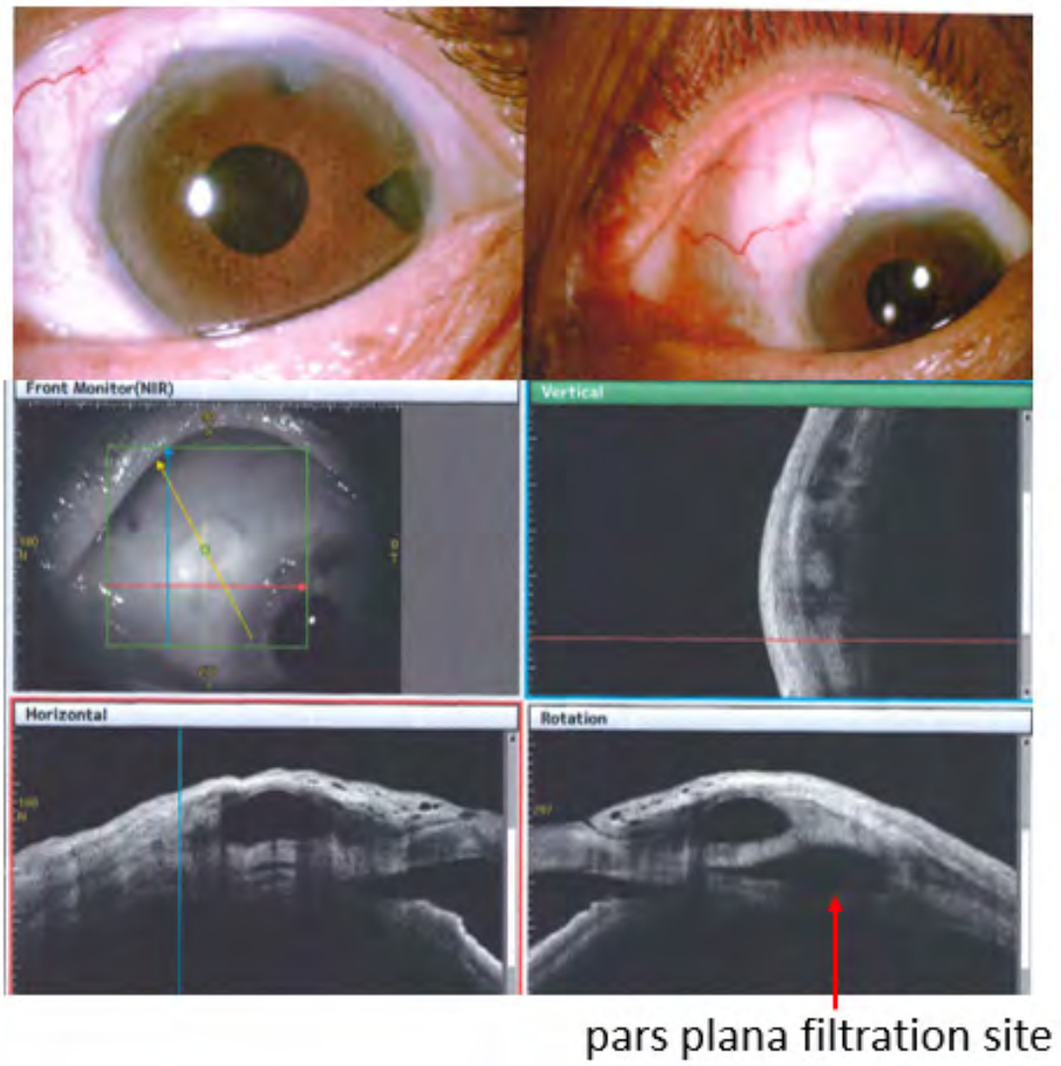
Background
To propose a novel technique named “Pars Plana Filtration” (PPF), which involves relocating the filtration site from the limbus to the pars plana area. This technique allows aqueous humor to drain directly from the posterior chamber through a sclerotomy site at the pars plana into subconjunctival blebs located posteriorly. Additionally, this study aims to report the efficacy and safety of this technique.

Methods
In this single-centered, retrospective, observational study, 80 eyes of 76 glaucoma patients with corneal endothelial decompensation (21 eyes), neovascular glaucoma (18), uveitis glaucoma(11), and uncontrol angle-closure glaucoma (30) after maximally tolerated medical therapy, laser peripheral iridoplasty combined with iridectomy, and noticeable corneal edema, along with a high risk of corneal endothelial decompensation and malignant glaucoma, as assessed by the surgeon were enrolled in Eye Hospital, China Academy of Chinese Medical Sciences, from November 2020 to December 2023. All patients were followed for 12 months. Demographic data, glaucoma subtypes, treatments, recorded intraocular pressure (IOP), best-corrected visual acuity (BCVA), the number of antiglaucoma medications, and complications related to surgery were collected. Data were compared between 40 eyes of 37 patients who underwent PPF and 40 of 39 patients who underwent trabeculectomy. The success rates of each surgery were calculated, and surgical complications were recorded. This study is registered on www.Chictr.org.cn, number ChiCTR2400089212.

Results
The postoperative intraocular pressure (IOP) values in both the PPF and trabeculectomy groups showed a significant decrease from baseline (both $p < 0.01$). Additionally, there was a marked reduction in the median number of antiglaucoma medications used, decreasing from 4 to 0 (both $p < 0.001$). No differences in IOP were observed between the two groups at any preoperative or postoperative visit. Furthermore, both groups’ success rates were similar ($p > 0.05$). In a Cox proportional hazards regression analysis, uveitis-related glaucoma was independently associated with an increased risk of treatment failure following PPF (adjusted hazard ratio = 1.140, $\chi^2 = 4.514$, $p = 0.034$). Complications related to PPF were observed in the posterior segment, including intravitreal hemorrhage in three eyes, malignant glaucoma in one eye, localized leakage in the superior choroidal cavity in two eyes, and one case of endophthalmitis.

Image



Conclusions

The effectiveness of PPF is similar to trabeculectomy. It should be considered as an alternative filtering surgery for refractory angle-closure glaucoma, glaucoma with corneal endothelial decompensation, and neovascular glaucoma.

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P-0947

ECONOMIC IMPACT OF MINIMALLY INVASIVE SURGICAL TREATMENT TYPE MICRO TRABECULAR BYPASS (ISTENT INJECT W) IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA

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Background

Glaucoma is considered the second most common cause of blindness in the world, after cataract, but the first to do so irreversibly. According to the World Health Organization, the prevalence of blindness in Latin America is 1-4%, and 1.5% in Mexico L. IAPB (2020), but there are no details about glaucoma-related blindness.

Primary open-angle glaucoma (POAG) is a chronic and progressive eye disease that causes loss of the optic nerve rim and the retinal nerve fiber layer with associated field defects (Gedde et al. 2021). POAG represents 80-85% of all glaucoma cases worldwide, and 53.7% of glaucoma cases in Mexico (Galvez-Rosas et al. 2018).

Risk factors include older age, Latino/Hispanic ethnicity, family history of glaucoma, and lower ocular perfusion pressure (Gedde et al. 2021). The main risk factor for its development and progression is ocular hypertension, and the major therapeutic option to prevent glaucomatous damage is to reduce the intraocular pressure (IOP) (EGSTGG 2021). In Mexico POAG IOP has been reported as 17.1 in adults (Galvez-Rosas et al. 2018). First choice treatment for glaucoma is the use of topical hypotensives, often more than once a day, and usually in combination with double or triple therapy, and has been associated with poor compliance (Newman-Casey et al. 2015) and low tolerability (Schuman 2000; Dreer, Girkin, and Mansberger 2012; Gatwood et al. 2021), which can lead to treatment failure.

Methods

A prospective, randomized, open, controlled, clinical trial was performed an military hospital of ophthalmological specialties

The intervention was the implantation of a trabecular micro-bypass stent (iStent inject w) in 32 patients whom met the inclusion criteria and a one-year follow-up

The inclusion criteria: intraocular pressure not greater than 22mmhg, visual field with mild to moderate damage, the use of any hypotensive drugs.

Results

There was a reduction of up to 94% in the use of topical hypotensive drugs after one year of implantation.

Conclusions

The use of the iStent it represents a reduction of at least 94% in the number of hypotensive medications, this means at least a saving of 1000 dollars per year per patient, improving the patient's quality of life in Mexican patients diagnosed with primary open angle glaucoma.

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P-0948

LONGTERM SURGICAL OUTCOME OF TRABECULECTOMY WITH MITOMYCIN-C COMPARING BETWEEN PRIMARY AND SECONDARY GLAUCOMA IN THAILAND

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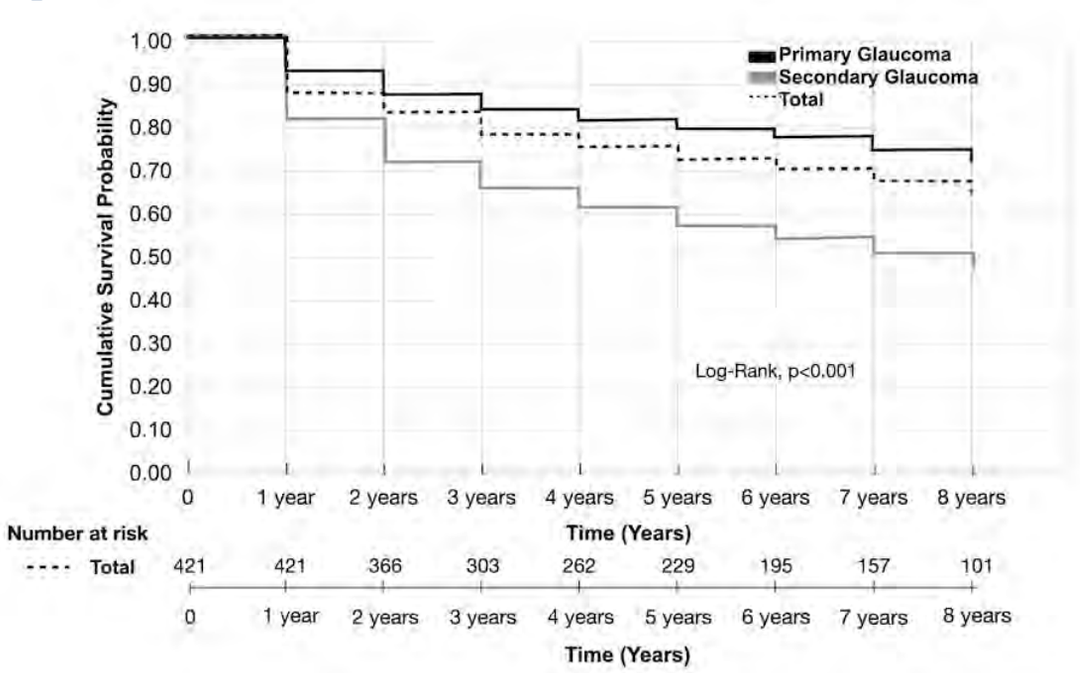
Background
This study evaluates the long-term outcomes of trabeculectomy with Mitomycin-C in Thai patients focusing on surgical success rates and factors influencing failure.

Methods
This retrospective study reviewed glaucoma patients who underwent primary trabeculectomy with MMC at Mettapracharak Hospital, Thailand, from January 2012 to December 2015. Data on demographics and outcome of treatment were recorded. Surgical success was defined as complete (IOP 4–21 mmHg without medication), qualified (IOP 4–21 mmHg with medication), or failure (IOP >21 or <4 mmHg).

Results
The study included 421 eyes from 397 glaucoma patients, with a mean follow-up of 5.2 ± 2.8 years. Patients were divided into primary glaucoma (274 eyes) and secondary glaucoma (147 eyes) groups. Both groups showed significant postoperative IOP reduction and a decrease in the number of glaucoma medications. At eight years, the cumulative probability of complete or qualified success was 65.9% (59.9%, 71.9%). The primary glaucoma group had a higher success rate (75.1%, 68.4%–81.8%) compared to the secondary glaucoma group (47.4%, 36.0%–58.8%, $p < 0.001$). Common complications included decreased visual acuity (13.78%), corneal decompensation (2.85%), and postoperative hypotony (2.14%). Factors associated with surgical failure in multivariate analysis included pseudoexfoliation glaucoma (adjusted HR 3.23, 95% CI: 1.10–9.45, $p = 0.033$), neovascular glaucoma (adjusted HR 2.87, 95% CI: 1.29–6.37, $p = 0.01$), secondary angle-closure glaucoma (adjusted HR 2.62, 95% CI: 0.997–6.889, $p = 0.05$), previous selective laser trabeculoplasty (SLT) (adjusted HR 2.45, 95% CI: 1.12–5.33, $p = 0.02$), and postoperative bleb needling (adjusted HR 1.71, 95% CI: 1.46–2.00, $p < 0.01$).

Image



Conclusions

Primary trabeculectomy with MMC effectively controll intraocular pressure with better long-term success in primary glaucoma compared to secondary glaucoma. Factors such as pseudoexfoliation glaucoma, neovascular glaucoma, secondary angle-closure glaucoma, prior selective laser trabeculoplasty, and postoperative bleb needling were associated with a higher risk of surgical failure.

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P-0949

EFFECT OF PREOPERATIVE GLAUCOMA MEDICATIONS ON THE INTRAOCULAR PRESSURE LOWERING EFFECT OF ISTENT INJECT W

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Background
With the recent development of new devices and implants, minimally invasive glaucoma surgery has emerged as new standard for mild to moderate glaucoma patients whose intraocular pressure (IOP) in the mid-teens and adequate to control disease. Trabecular microbypass stents (iStent® inject w [IW], Glaucos) allow direct aqueous flow into the Schlemm's canal, bypassing the trabecular meshwork. Although iw has been reported to have a favorable IOP-lowering effect, the influence of preoperative glaucoma medications on IOP-lowering effect of iw has not been reported. To investigate the influence of preoperative glaucoma medications on the effect of IOP reduction in iw.

Methods
Phacoemulsification with simultaneous trabecular microbypass stent insertion using iw was performed on patients with primary open-angle glaucoma from April 2022 to September 2024 at Saitama Red Cross Hospital, and 259 eyes of 140 patients who were observable for at least 12 months after surgery were included. Pre- and postoperative IOP, the number of glaucoma medications (Med), and the type of glaucoma medications that had been used for at least 3 months prior to surgery were analyzed. Glaucoma medications were classified into five categories: Prostanoid receptor analogs (PG), β-blockers (β), carbonic anhydrase inhibitors (CAI), α2 adrenergic agonist (α2), and Rho Kinase inhibitor (ROCK).

Results
Preoperative IOP and Med were 16.9±3.4 mmHg and 2.3±1.2. IOP and Med at 12 months postoperatively were 13.4 ± 2.7 mmHg and 0.73 ± 1.1, significantly lower than preoperatively. ($p<0.001$, respectively, linear mixed model) In univariate analysis, the change in IOP from preoperative to 12 months postoperative (dIOP) was negatively correlated with preoperative use of CAI and positively correlated with preoperative use of ROCK. ($p=0.03$ and $p<0.001$) In multivariate analysis, dIOP was negatively correlated with preoperative Med and positively correlated with preoperative use of ROCK. ($p<0.001$, respectively) In univariate analysis, the change in Med from preoperative to 12 months postoperative (dMed) was positively correlated with preoperative use of α2 and ROCK. ($p=0.008$ and $p=0.004$) In multivariate analysis, dMed was positively correlated with preoperative use of CAI, α2 and ROCK. ($p<0.001$, $p=0.005$ and $p<0.001$) In a multivariate analysis of 135 eyes restricted to patients using at least one of CAI, α2 and ROCK preoperatively, no values correlated with dMed.

Conclusions
In the postoperative results of iw, preoperative ROCK had a favorable effect on IOP lowering efficacy, while the high number of glaucoma medications had a poor effect.

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P-0950
CHOROIDAL EFFUSION GRADING SCALE EVALUATION STUDY

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Background
There currently exists no validated technique for observers to describe the size and extent of choroidal effusions. The purpose of this study was to evaluate the inter-observer reliability of a novel Choroidal Effusion Grading Scale (CEGS) for choroidal effusion.

Methods
A prospective, inter-observer validation study was conducted at Sunnybrook Health Sciences Centre. Thirty fundus images of choroidal effusions were obtained using Optos widefield imaging. These images were collected as part of a randomized trial assessing a possible treatment for choroidal effusion. Five experienced vitreo-retinal surgeons independently graded the images using the CEGS. Intraclass correlations (ICC) were calculated considering: ICC ≥ 0.75 excellent, 0.40 ≤ ICC < 0.75 satisfactory, and ICC <0.40 poor, with an analysis of confidence intervals (95% CI).

Results
The inter-observer agreement (correlation coefficients, ICC) was highest for clock hours (0.8), followed by quadrants (0.76), grades (0.72) and extension (0.64).

Conclusions
The CEGS is a simple and reliable system for grading choroidal effusions with good inter-observer agreement.

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P-0951

OBSERVATION ON THE THERAPEUTIC EFFECT OF PHACOEMULSIFICATION AND ATRIAL ANGLE SEPARATION ON ADVANCED PRIMARY ANGLE CLOSURE GLAUCOMA WITH CATARACT

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Background
Advanced primary angle-closure glaucoma (PACG) combined with cataract is a challenging condition that can lead to severe visual impairment if not effectively treated. Phacoemulsification combined with goniosynechialysis (PEL+GSL) has emerged as a promising surgical approach. This study aims to evaluate the clinical efficacy of PEL+GSL for managing PACG with cataract.

Methods
This retrospective study analyzed 48 PACG patients (56 eyes) who underwent PEL+GSL at Shanxi Provincial Eye Hospital between June 1, 2023, and October 1, 2023. Preoperative biometric data, visual field assessments, and ultrasound biomicroscopy (UBM) findings were recorded. Postoperative evaluations were conducted at 1 week, 1 month, 3 months, and 6 months, focusing on visual acuity, intraocular pressure (IOP), anti-glaucoma medication use, and any complications.

Results
The average age of the patients was 66.62±9.10 years, with 32 (66.66%) being female. Preoperative visual acuity was 0.375±0.245, and mean deviation (MD) of the visual field was –25.04±5.59 dB, with pattern standard deviation (PSD) of 6.516±3.042. Postoperatively, IOP significantly decreased from 27.84±11.47 mmHg to 13.69±1.69 mmHg at the last follow-up. Visual acuity improved from 3.75±2.45 to 5.45±2.24, while the use of anti-glaucoma medications reduced from 2.52±0.50 to 0.11±0.37.

Conclusions
Phacoemulsification combined with goniosynechialysis (PEL+GSL) is an effective treatment for advanced PACG with cataract, demonstrating significant reductions in IOP, improved visual outcomes, and minimal complications. This approach may provide a viable option for patients with coexisting PACG and cataract.

P-0952

SUBCONJUNCTIVAL BEVACIZUMAB AS AN ADJUNCT IN TUBE SURGERY: 18-MONTH RESULTS

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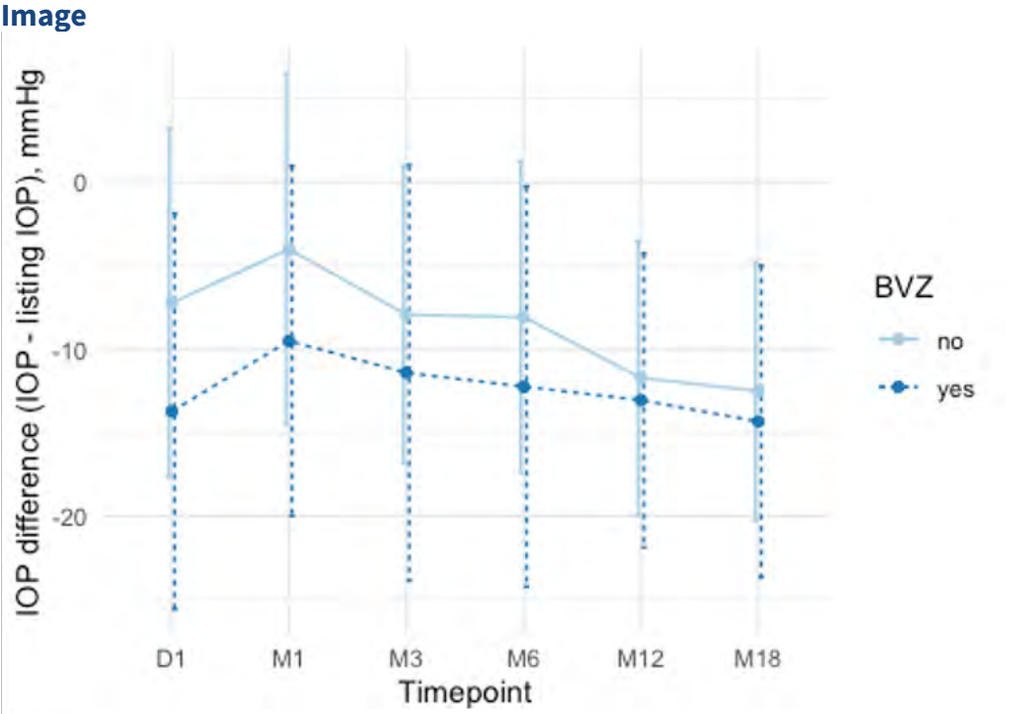
Background
To compare 18-month outcomes from tube surgery with and without subconjunctival bevacizumab (BVZ).

Methods
A retrospective cohort study comparing intraocular pressure (IOP), visual field index (VFI), visual acuity (VA), topical medications and adverse events, between eyes with glaucoma (any subtype) receiving intraoperative subconjunctival bevacizumab (1.25mg/0.05mL) over the plate, and those without (controls). Consecutive cases of Baerveldt 101-350 or Paul glaucoma implant insertion with mitomycin C were assessed from a single glaucoma firm at Moorfields Eye Hospital, London, UK, between February 2022 and March 2023.

Results
32 eyes from 28 patients were included. There were 18 eyes in the BVZ group, and 14 controls. The mean IOP reduction at 18 months in the BVZ group was 14.3 ± 9.3mmHg, and 12.5 ± 7.8 in the control group (p=0.54). VFI remained stable in the BVZ group (p = 0.21), versus a significant deterioration in the controls (p = 0.04). There was no significant difference between the change in VA (p=0.32), the number of topical medications (p = 0.54) or adverse events between the two groups.

Image


Conclusions
IOP outcomes were statistically comparable with and without BVZ at 18 months, although a trend towards greater IOP reduction with BVZ was observed. Using BVZ was associated with visual field preservation and a similar safety profile. However, this finding and its mechanism needs continued investigation in larger, prospectively controlled comparison groups.

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P-0953

TIMING OF TRABECULECTOMY ON PRIMARY OPEN-ANGLE GLAUCOMA: A LITERATURE REVIEW

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Background

Primary open-angle glaucoma (POAG) is a progressive optic neuropathy of adult onset characterized by gradual visual field loss, often associated with elevated intraocular pressure (IOP).[1,2,3] Trabeculectomy remains a “gold standard” surgical intervention for lowering IOP and preventing disease progression, it also has become a mainly chosen treatment for eradicating Glaucoma and the variety of its classification.[4]

However, concerns have been raised about the idyllic timing of trabeculectomy in Primary Open Angle Glaucoma whilst the published study are mainly focusing on measuring differences between early trabeculectomy and medical therapies, describing the long-term outcomes and discussing other filtration surgery methods for glaucoma. This literature review aims to critically examine other existing research to gain information and new insight into figuring the ideal timing of trabeculectomy in POAG.

Methods

A systematic research was implemented across various database using relevant keywords such as “trabeculectomy,” “timing,” “early,” “late,” “primary open angle glaucoma,” and “intraocular pressure.” Most articles reviewed in this literature review are discussing on Primary Open-Angle Glaucoma treated with Trabeculectomy on various aspects. The periods of literatures reviewed are from 1988-2024

Results

A total of 24 relevant articles that met the inclusion criteria were gathered. These literatures consisted of 4 main subdiscussions: the success rate and outcomes of patient with primary open-angle glaucoma undergone trabeculectomy; the long-term results of trabeculectomy; the other options of treatment versus Trabeculectomy; the other factors impacting the results of trabeculectomy.

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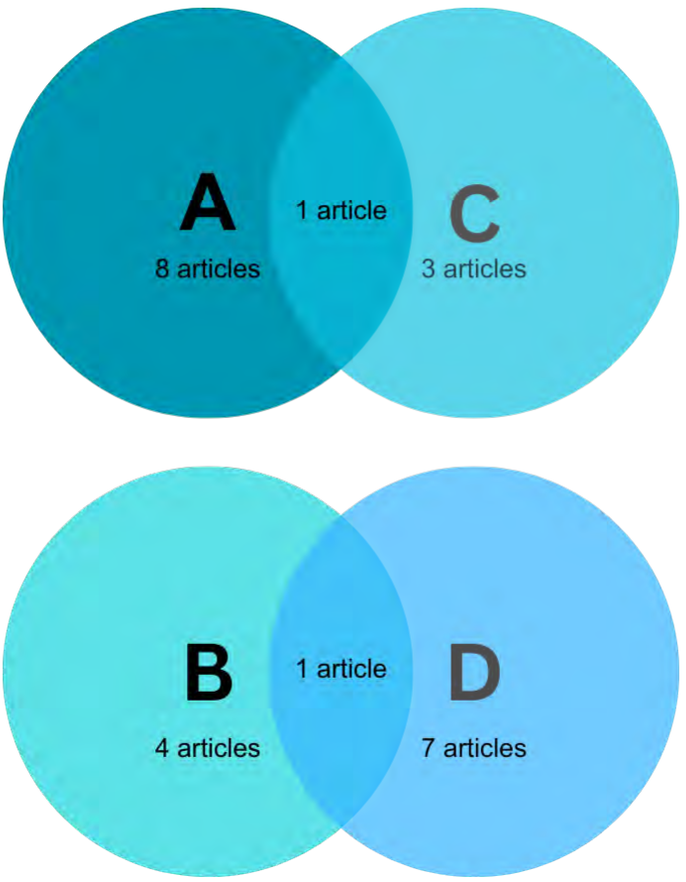
Image



Conclusions

Most articles reviewed are discussing early timing of trabeculectomy on POAG. However, the exact optimal timing have not yet been determined. Therefore, further research on determining the optimal timing of trabeculectomy on POAG is needed.

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P-0954

SHORT-TERM RESULTS OF THE PRESERFLO MICROSHUNT AND FACTORS RELATED TO EFFICACY AND SAFETY

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Background
We retrospectively examined the short-term outcomes of the Preserflo MicroShunt (PMS) and investigated factors related to the efficacy and safety of PMS surgery.

Methods
The study included 27 eyes of 26 patients who underwent PMS surgery, all of whom were observed for more than 6 months. We measured changes in IOP, best-corrected visual acuity (BCVA), and anterior chamber flare, as well as the need for additional treatment and the incidence of surgical complications. The relationship between IOP 6 months after surgery and anterior chamber flare after surgery were evaluated using Pearson's correlation coefficient. In addition, factors related to IOP 6 months after surgery were evaluated using multiple regression analysis. Preoperative IOP was compared between cases with and without complications.

Results
The age of the patients was 56.8±11.3 years. The disease types were NTG in 9 eyes, POAG in 11 eyes, childhood glaucoma in 1 eye, and secondary glaucoma in 6 eyes. Before the surgery, IOP (mmHg) was 19.4±7.4, and 6 months after the surgery, it was 9.8±3.3, which was a significant decrease ($P < 0.001$). One eye underwent additional treatment with glaucoma eye drops. Anterior chamber flare (pc/ms) was 12.9±8.1, 49.1±65.7, 39.8±50.4, 21.8±21.3, 16.5±10.4, 14.8±10.5, and 13.3±8.4 (before surgery and 3 days, 1 week, 2 weeks, 1 month, 3 months, and 6 months after surgery). The values 3 days after surgery and 1 week after surgery were significantly higher than those before surgery ($P = 0.006$, 0.031). IOP 6 months after surgery was significantly correlated with anterior chamber flare 1 week after surgery ($r = 0.64$, $P < 0.001$), and multiple regression analysis also confirmed a significant correlation between anterior chamber flare 1 week after surgery and IOP 6 months after surgery ($R^2 = 0.52$; standard β: 0.74; $P = 0.004$). BCVA (logMAR) at all postoperative periods showed no significant difference compared to the preoperative values (all: $P > 0.05$). Hyphema was observed in 8 eyes, anterior chamber disappearance in 1 eye, viscoelastic injection in 2 eyes, and tube-related problems in 4 eyes. In cases with these complications, the preoperative IOP was 24.1±8.1, which was significantly higher than the 17.1±5.5 in cases without complications ($P = 0.017$).

Conclusions
Anterior chamber flare 1 week after PMS surgery is a good indicator of the short-term outcome. Care should be taken to prevent surgical complications in cases with high preoperative IOP.

P-0956

OPERATING FROM THE TOP: SAFETY AND EFFICACY WHEN IMPLANTING THE MINIJECT SUPRACILIARY DEVICE INFERIORLY

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Background
The aim of this study is to assess the real-world safety and efficacy of MINIject, a novel, Ab-Interno, supraciliary minimally invasive glaucoma surgery device from iSTAR Medical,-Belgium.

Methods
This retrospective study analysed patients who underwent MINIject implant by a single surgeon at James Cook University Hospital, a tertiary care centre in North of England from November 2022 to July 2024. The surgeon's preference was to perform phacoemulsification from the top, so all the devices were implanted in the inferior-nasal quadrant.Twenty-one eyes underwent the procedure.

Results
Nineteen eyes had combined phacoemulsification with intraocular lens implantation with MINIject and two had stand-alone MINIject implant .Fifteen eyes had primary open angle glaucoma, two had ocular hypertension, three had normal tension glaucoma, one had neovascular glaucoma. There was a wide range of severities of glaucoma damage, as exhibited on structural and functional testing.

Mean listing intraocular pressure (IOP) was 20.7 mmHg (SD-7.3, range 48-12) with a mean maximum IOP was 32.85 mmHg (SD 12.9, range 70-19) and with a mean preoperative glaucoma medication use of 2.6. Mean IOP at post-operative week one was 11.9 mmHg (SD-3.4,n=19), at week three was 11.8 mmHg (SD-3.8,n=16), at month six was 12.1 mmHg(SD-3.7,n=11), at year 1 was 14.8 mmHg (SD-4.2,n=8).Mean IOP at last follow up was 12.7 mmHg(P value-0.001528).Mean glaucoma medication use at post-operative month 3 was 0.3,at month 6 was 0.4,at year 1 was 0.4. Mean glaucoma medication use at last follow up was 0.2. 94.7% were on glaucoma medications preoperatively and 89.5% were medications free at last follow-up. 100% had 10% IOP reduction, 84.2% had 20% IOP reduction, and 52.6% had 30% IOP reduction. IOP<15mmHg while listing was 5.2%, post-operatively was 73.68%. IOP<18mmHg while listing was 36.84%, post-operatively was 94.7%. In two eyes the implant was removed, one due to implant abutting the cornea, the other due to dislodgement to anterior chamber at post-operative week one.

Conclusions
Ab-Interno supraciliary implantation using MINIject procedure appears to lower the eye pressure considerably in this variedohort of patients, with low complication rates. It also appears to give a large proportion of patients the opportunity to be medication free for some time. Further study is warranted to assess the longevity of the device.

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P-0957

PHACOVITRECTOMY TO MANAGE LENS RELATED ACUTE ANGLE CLOSURE GLAUCOMA

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Background

Lens related acute angle closure glaucoma may occur as secondary angle-closure, which cause by lens swelling (phacomorphic glaucoma) or lens dislocation (ectopia lentis). Lens remove is the best choice to manage the hard situation. The lens related acute angle closure glaucoma has very shallow anterior chamber even flat anterior chamber. These kind of glaucoma has very high intraocular pressure, which need emergent management. The acute increase intraocular pressure may cause by swelling lens, lens subluxation or refractory angle closure. Remove the lens is the most effective procedure to lower the intraocular pressure in these situation. However, the flat anterior chamber and edematous cornea make the procedure more difficult. During operation, phacovitrectomy can gradually lower the vitreous cavity pressure safety, which can reform anterior chamber to make the next step surgical procedure. After lowering the intraocular procedure, the cornea may more became clear to provide a better surgical view. The deepen anterior chamber can protect cornea endothelium. In the study, we use phacovitrectomy to manage the lens related acute angle closure glaucoma.

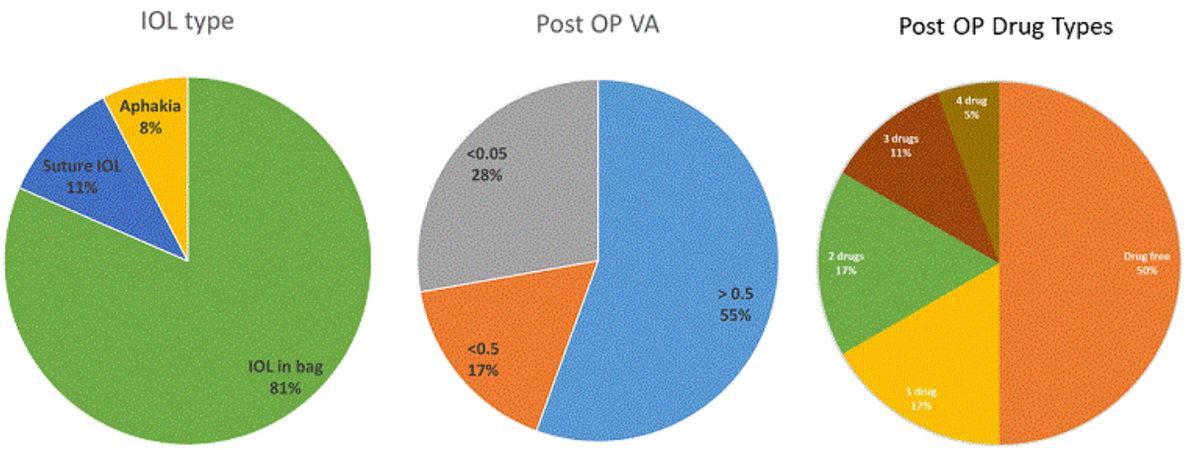
Methods

We retrospective collect 18 cases, which use phacovitrectomy to manage the lens related acute angle, from 2020.07 to 2022.12. The indication to perform phacovitrectomy is list as below, refectory acute angle closure glaucoma after laser peripheral iridotomy, refractory acute angle closure with lens subluxation, phacomorphic glaucoma, chronic angle closure glaucoma with phacomorphic acute phacomorphic attack, acute glaucoma in nanophthalmus. We evaluated the primary outcome as the post-operative intraocular pressure control and the second outcome as the post-operative visual acuity and intraocular lens position.

Results

We retrospective collect 18 cases, which use phacovitrectomy to manage the lens related acute angle, from 2020.07 to 2022.12. The mean preoperative intraocular pressure is 44.61 mmHg. The mean 6 months-postoperative intraocular is 11.90 mmHg. 50% of our cases can reach drug free after operation. The other 50% of our cases can control intraocular pressure with IOP lowering agent from 1 to 4 kinds of drug. No case need additional trabeculectomy. Besides, 55% of our cases can improve the visual acuity to above 0.5 at the 6 months follow up. 81% of our cases can success out the intraocular lens in lens bag.

Image



Conclusions

Phacovitrectomy is an effective procedure to manage lens relative acute angle closure glaucoma. It can control the intraocular pressure during operation to clear up cornea, which can provide a better surgical view to promote the success rate. It can also deepen the anterior chamber during surgery to protect the corneal endothelium. After operation, phacovitrectomized eye has lower risk of malignant glaucoma.

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P-0958

FIRST CLINICAL OUTCOMES OF PRESERFLO™ MICROSHUNT: INSIGHTS FROM HUNGARIAN CENTERS

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Background

Purpose: To evaluate the efficacy and safety of the Preserflo™ microshunt in three Hungarian centers.

Primary Outcomes: Surgical success at 6 and 12 months postoperatively.

Secondary Outcomes: Relationship between surgical success and surgeon, phakic status, glaucoma etiology, or mitomycin C (MMC) concentration.

Methods

A retrospective review of Preserflo™ microshunt procedures with MMC was conducted from January to November 2023. Patients with primary (POAG, PACG, normal tension glaucoma) and secondary glaucomas (uveitis, steroid response, pseudoexfoliation) were included. Efficacy and safety were assessed at 6 and 12 months. Success was defined as:
- Complete Success (CS): IOP <21 mmHg or >20% reduction without medications.
- Qualified Success (QS): IOP <21 mmHg or >20% reduction with medications.
- Failure (F): IOP >21 mmHg or <20% reduction.

IOP was measured via Goldmann tonometry preoperatively and at day 1, week 1, months 1, 3, 6, and 12. Data were analyzed with SPSS (version 29.0) using T-tests and chi-square tests ($p<0.05$).

Results

28 eyes (21 women, 7 men, mean age 65.89±11.46 years) were included. Glaucoma types: POAG (54%), secondary open-angle (28%), PACG (14%), and normotensive (4%). 16 eyes were phakic preoperatively. MMC concentrations used were 0.2 mg/mL (5 eyes), 0.3 mg/mL (10 eyes), 0.4 mg/mL (8 eyes), and 0.5 mg/mL (5 eyes).

Preoperative mean IOP was 22.93±6.14 mmHg with 3.75±0.64 topical medications. Postoperative mean IOP results were:
- Day 1: 13±2.55 mmHg
- Week 1: 13.75±4.2 mmHg
- Month 1: 12.60±2.6 mmHg
- Month 3: 15.62±6.5 mmHg
- Month 6: 15.67±6.5 mmHg
- Month 12: 14.13±3.8 mmHg ($p<0.001$ across all comparisons).

The mean number of medications decreased to 0.86±1.3 at 6 months and 0.55±1.0 at 12 months ($p<0.001$). CS was achieved in 62% (6 months) and 73% (12 months). QS was 24% (6 months) and 23% (12 months). Failure rates were 14% (6 months) and 4% (12 months).

Complications included 3 bleb revisions, a conjunctival suturing, viscoelastic in the anterior chamber, and hyphema (7 cases). No significante association was found between outcomes and surgeons, glaucoma etiology, phakic status, or MMC concentration.

Conclusions

This multi-center study shows excellent efficacy and safety of the Preserflo™ microshunt over 12 months, with significant and sustained IOP reduction and decreased medication use.

P-0960

RESEARCH ON THE TREATMENT OF ANGLE-CLOSURE EYES BY LENS EXTRACTION COMBINED WITH GONIOSCOPY-ASSISTED TRABECULECTOMY WITH THE KAHOOK DUAL BLADE (KDB)

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Background
To investigate the efficacy of lens extraction, intraocular lens implantation, goniosynechialysis combined with gonioscopy-assisted trabeculectomy with the Kahook Dual Blade (KDB) in the treatment of primary angle-closure eyes and angle-closure glaucoma.

Methods
A retrospective analysis was conducted on 25 cases (33 eyes) of angle-closure eyes that received lens extraction, intraocular lens implantation combined with goniosynechialysis from March 2023 to June 2024. Inclusion criteria: Patients with primary angle-closure eyes and primary angle-closure glaucoma whose anterior chamber angle opening range was < 180° under dynamic gonioscopy, and whose lens thickness was > 4.5 mm. Exclusion criteria: Patients with primary angle-closure eyes and primary angle-closure glaucoma whose anterior chamber angle opening range was > 180° under dynamic gonioscopy, patients with secondary glaucoma, congenital glaucoma and open-angle glaucoma, patients taking anticoagulants or drugs that inhibit platelet aggregation, and patients with unstable cardiovascular and cerebrovascular diseases. Experimental group: Patients who voluntarily received lens extraction + intraocular lens implantation + gonioscopy-assisted anterior chamber angle separation combined with KDB trabeculectomy, and the range of KDB trabeculectomy was 90° - 120°; Control group: Patients who received lens extraction + intraocular lens implantation + gonioscopy-assisted angle separation during the same period. All surgeries were performed by the same surgeon. Follow-up was completed at 1 week, 2 weeks, 1 month and 3 months after the operation (measurement of angle parameters: before the operation + 3 months after the operation)

Results
There were 19 cases (25 eyes) in the experimental group, including 6 cases with both eyes; there were 6 cases (8 eyes) in the control group, including 2 cases with both eyes. There were no significant differences in biometric data such as age, gender ratio, preoperative visual acuity, intraocular pressure, lens thickness and axial length between the experimental group and the control group. During the 3-month follow-up, the intraocular pressure of 25 eyes in the experimental group was well controlled (complete success rate was 100%), while 4 eyes in the control group had elevated intraocular pressure and required 1 - 2 kinds of drugs for control (complete success rate was 50% (4/8), partial success rate was 87.5% (7/8), and 1 eye received trabeculectomy). Main complication: Hyphema (all occurred in the experimental group (5/25) and was completely absorbed within 48 hours at the latest after the operation).

Conclusions
Conclusion: Lens extraction, intraocular lens implantation combined with goniosynechialysis and gonioscopy-assisted KDB trabeculectomy are safe and effective in the treatment of primary angle-closure and primary angle-closure glaucoma, and may relieve or reduce patients' dependence on antiglaucoma drugs and the need for secondary antiglaucoma surgeries.

P-0962

OUTCOMES OF THE AHMED GLAUCOMA VALVE VERSUS AUROLAB AQUEOUS DRAINAGE IMPLANT (AADI) FOR REFRACTORY PAEDIATRIC GLAUCOMA IN AZERBAIJAN

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Background

Glaucoma drainage devices (GDD) are usually reserved for glaucoma refractory to filtering surgery. Currently, the Ahmed glaucoma valve (AGV; New World Medical, Rancho Cucamonga, California, USA) and the Aurolab aqueous drainage implant (AADI; Aravind Eye Institute, Madurai, India) are the most commonly used GDDs worldwide. The potential advantages of the AADI over

the AGV are- the AADI is significantly more cost- effective, costing around five times less than the AGV. Also non- valved implants in children may offer better long- term glaucoma control compared with valved implants. The aim of this study was to compare the surgical success and outcomes of the AADI compared to the AGV in Azerbaijan children.

Methods

A comparative retrospective study of consecutive paediatric patients in National Eye Center was undertaken. Data collected included demographics, type of glaucoma, intraocular pressure (IOP), number of anti- glaucoma medications and any subsequent complications or further surgeries. The mean IOP, number of antiglaucoma medications, surgical success and number of reoperations was compared for the two groups. In our study, seven children developed transient choroidal detachment in the AADI group compared with only one in the AGV group. Surgical success at each visit was defined as IOP of ≥8 mm Hg and ≤21 mm Hg or if the reduction of IOP was ≥23% reduced from baseline.

Results

A total of 22 tube surgeries (10 eyes in AADI and 12 eyes in AGV) were performed in patients aged ≤16 years from 2012 to 2023. No difference was observed in the mean IOP between the two groups except at the first month post- operative visit. At last follow- up, all (100%) eyes in the AADI group were glaucoma medication- free vs 3 (25%) eyes in the AGV group (pp=0.001). 8 eyes in the AGV group needed one or more subsequent surgeries, whereas 1 eye needed one surgery in the AADI group.

Conclusions

This study shows an acceptable safety profile for the AADI in children, with a rate of failure that is comparable to the AGV, but less need for glaucoma re- operation or glaucoma medication in the first post- postoperative year. Further studies, with larger sample size and longer follow- up, are needed to confirm our findings and to study relative longer- term failure rates.

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P-0963

TORIC INTRAOCULAR LENSES FOR ASTIGMATISM CORRECTION DURING CATARACT SURGERY IN POST-TRABECULECTOMY EYES

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Background

Trabeculectomy (TLE) may cause a significant amount of surgically induced astigmatism, impairing visual function and quality of life. The purpose of this study was to investigate the efficacy of toric intraocular lenses (IOLs) during cataract surgery after TLE.

Methods

This retrospective study included 18 eyes of 14 consecutive patients (mean age 62.3 ± 6.2 years) with a history of TLE, who underwent cataract surgery with toric IOL implantation between January 2021 and January 2024. Preoperative and 1-month postoperative best-corrected visual acuity (BCVA), corneal astigmatism, subjective astigmatism, intraocular pressure (IOP), IOL rotation, and intraoperative and postoperative complications were evaluated.

Results

The mean preoperative corneal astigmatism was 2.18 ± 0.76 D. There were no intraoperative complications, and toric IOL implantation was successfully performed as planned in all patients. BCVA improved significantly from 0.26 ± 0.33 preoperatively to 0.06 ± 0.28 postoperatively (logMAR) ($p < 0.001$). Subjective astigmatism significantly decreased from 2.01 ± 0.94 D preoperatively to 0.72 ± 0.50 D postoperatively ($p < 0.001$). The mean IOL rotation was 2.5 ± 2.2 degrees, with one eye showing 28 degrees of rotation the day after surgery, which improved following corrective surgery performed 4 days later. No other eyes had IOL rotation exceeding 7 degrees. IOP did not change significantly, from 10.2 ± 3.4 mmHg preoperatively to 10.1 ± 3.8 mmHg postoperatively; however, one eye required bleb needling at 1 month postoperatively due to elevated IOP.

Conclusions

Toric IOLs were effective for astigmatism correction during cataract surgery in eyes with a history of TLE.

P-0964

A PILOT STUDY ON KAHOOK DUAL BLADE ASSISTED AB INTERNO TRABECULECTOMY IN SECONDARY OPEN-ANGLE GLAUCOMA

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Background
To explore the effectiveness and safety of Kahook Dual Blade (KDB) assisted Ab interno Trabeculectomy (KDB-T) in secondary open-angle glaucoma, a self-controlled case series study was held.

Methods
Secondary open-angle glaucoma patients with uncontrolled intraocular pressure (IOP) were enrolled with criteria of (1) clear secondary factors; (2) open angle under gonioscopy; (3) characteristic glaucomatous optic neuropathy and visual field defects were presented; (4) at least 3 different types of anti-glaucoma medications were used, yet IOP was still over 21mmHg; (5) the contralateral eye was normal. Under local anesthesia, a KDB-T was performed, phacoemulsification and intraocular lens implantation (P+I) was combined for the patient with cataract. The IOP and the number of kinds of anti-glaucoma medications at 1 day, 1 week, 1 month, 6 months, and 12 months post operation were compared with those before operation. Define the relative success rate of the surgery as a ≥30% reduction in IOP or a reduction of at least one type of anti-glaucoma medications at 12 months. Safety assessments included (1) the occurrence of anterior chamber hemorrhage within 1 week postoperatively; (2) IOP Spike (IOP increase ≥ 10 mmHg compared to preoperative levels or IOP ≥ 30 mmHg) within 1 month postoperatively; (3) other adverse events (including reoperation) within 12 months postoperatively.

Results
A total of 13 patients had a one-year follow-up with completed data, with an average age of 61.2±9.6 years, including 6 males and 7 females, 5 right eyes and 8 left eyes. There were 3 cases of pseudoexfoliation syndrome, 3 cases of steroid-induced glaucoma, 3 cases of herpes zoster-induced secondary glaucoma, 2 cases of Posner-Schlossman syndrome, 1 case of secondary glaucoma after silicone oil removal and 1 case of uveitic glaucoma. The average kind of anti-glaucoma medications before surgery was 3.3±0.2 with an average IOP of 33.3±4.0mmHg. 7 patients underwent simple KDB-T and 4 patients underwent P+I combined with KDB-T. The average IOP on postoperative day 1, week 1, month 1, month 6, and month 12 were 23.9±3.8mmHg, 17.4±3.4mmHg, 15.0±1.7mmHg, 17.8±0.9mmHg, and 14.4±0.9mmHg respectively, all of which was significantly lower than preoperative levels (Wilcoxon signed-ranks test, $p<0.05$) , while the average number of kind of anti-glaucoma medications was 1.3±0.1, 2.3±0.2, 2.1±0.3, 1.6±0.3, 1.7±0.4, all of which was significantly decreased compared to preoperative values (Wilcoxon signed-ranks test, $p<0.05$),too. The relative surgical success rate was 100%. Except for 4 patients who experienced an IOP spike within 1 month post operation, there were no anterior chamber hemorrhages, not any other complications or required secondary surgeries.

Conclusions
KDB-T demonstrated well IOP reduction in secondary open-angle glaucoma and could significantly reduce the use of anti-glaucoma medications to some extent. It might be considered as one of the options for glaucoma with such minimally invasive treatment.

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P-0965

SURGICAL OUTCOMES OF TRABECULECTOMY FOR ADVANCED AND REFRACTORY GLAUCOMA IN NIGERIA: A RETROSPECTIVE STUDY

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Background

The purpose of this study is to review the surgical outcomes of patients with advanced and refractory glaucoma who underwent trabeculectomy surgery.

Methods

A retrospective, interventional, non-comparative study was conducted between January 2021 and June 2023 at Eye Foundation Hospital, Lagos, Nigeria.

Data was retrieved from case files and electronic medical records of patients who underwent trabeculectomy surgery. Patients with advanced and refractory glaucoma with an intraocular pressure (IOP) ≥18 mmHg on maximum medical therapy were included in the study. Exclusion criteria included eyes with no light perception, eyes that had undergone trans-scleral cyclophotocoagulation laser, and eyes undergoing active infective and/or inflammatory processes. All surgeries were performed by a single glaucoma surgeon (AO) with the use of anti-fibrotic agents - 5- Flourouracil (5-FU) or Mitomycin C (MMC) under general anesthesia or local anesthesia. The follow-up period ranged between 1 to 3 years.

The primary outcome measure was the percentage reduction in intraocular pressure (IOP), which was measured using Goldmann applanation tonometry, model MOD A-900. The secondary outcome measure was the number of topical anti-glaucoma medications used.

Complete success was defined as an IOP reduction of ≥25% from baseline or attainment of a mean IOP of ≤ 15 mmHg without the use of topical anti-glaucoma medications. Qualified success was defined as an IOP reduction of ≥25% from baseline or attainment of a mean IOP of ≤ 15 mmHg with the use of topical anti-glaucoma medications.

Failure was defined as an IOP reduction of < 25% or a mean IOP of > 15 mmHg despite the use of topical anti-glaucoma medications. Additionally, based on the World Glaucoma Association guidelines, failure was further defined as an IOP of < 6 mmHg or > 21 mmHg on two consecutive clinic visits.

Results

There were 183 eyes of 165 patients, 96 were male and 69 were female. The mean age was 56.4 years +/- 15.5 (range: 16 - 94).

Pre- operative mean IOP was 22.3mmHg +/- 9.7 and pre-intervention mean number of anti-glaucoma medications was 2 +/- 1.1. The mean post-operative IOP was 13.9mmHg +/- 6.1 (37.6% reduction) and the mean post-operative number of anti-glaucoma medications was 1.5+/-0.9 (25% reduction).

Complete success was attained by 29 eyes (15.8%) and Qualified success was attained by 123 eyes (67%) based on percentage reduction of IOP ≥ 25%.

Failure defined based on IOP < 6mmHg was seen in 7 eyes (3.8%) and mean IOP > 21mmHg with use of topical antiglaucoma medications was seen in 24 eyes (13.1%).

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Post-operatively, 48 eyes (26%) received subconjunctival 5-FU injection, 31 eyes (16%) underwent bleb review and 10 eyes (5%) went on to have glaucoma drainage device surgery for IOP control.

There were no cases of endophthalmitis.

Conclusions

The study demonstrated that 80% of the eyes achieved at least a 25% reduction in IOP, with or without the use of topical anti-glaucoma medications.

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P-0966

MODULATION OF CONJUNCTIVAL LYMPHATICS USING VEGF-C AND RETINOIC ACID DERIVATIVE IN A RAT MODEL OF GLAUCOMA SURGERY

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Background

Glaucoma surgery typically involves incising conjunctiva and Tenon's capsule followed by cauterisation of vesses and application of Mitomycin -C. The procedure damages the conjunctival blood vessesl and lymphatics at the surgical site. Application of Mytomycin -C prevents regrowth of these vesses leaving the surgical site devoid of any drainage channels. This is likely to have negative impact on the outcome of glaucoma surgery.

The purpose of our study was to explore the possibility of enhancing conjunctival lymphatics using VEGF-C and Retinoic Acid derivative (Synthetic retinoid ec23), thereby potentially improving bleb drainage using a rat model of glaucoma surgery.

Methods

25 Sprague-Dawley rats were divided into 5 groups and a Glaucoma Filtration Surgery (GFS) was performed on the right eye of each rat. Group A rats had a subconjunctival Collagen implant, Group B rats had a collagen implant with Synthetic retinoid ec23, Group C rats had a collagen implant with VEGF-C, Group D and Group E rats received subconjunctival injections of ec23. Bleb tissue was harvested on postoperative day 14 and each specimen was stained with Masson trichome, CD-31 and D2-40.

OUTCOME MEASURES: CD-31 and D2-40 stained specimens were used to calculate the blood vessel and the lymphatic vessel density respectively. Every cluster of 3 stained structures with a lumen in a proximity was given a score of 1 and entire section was screened.

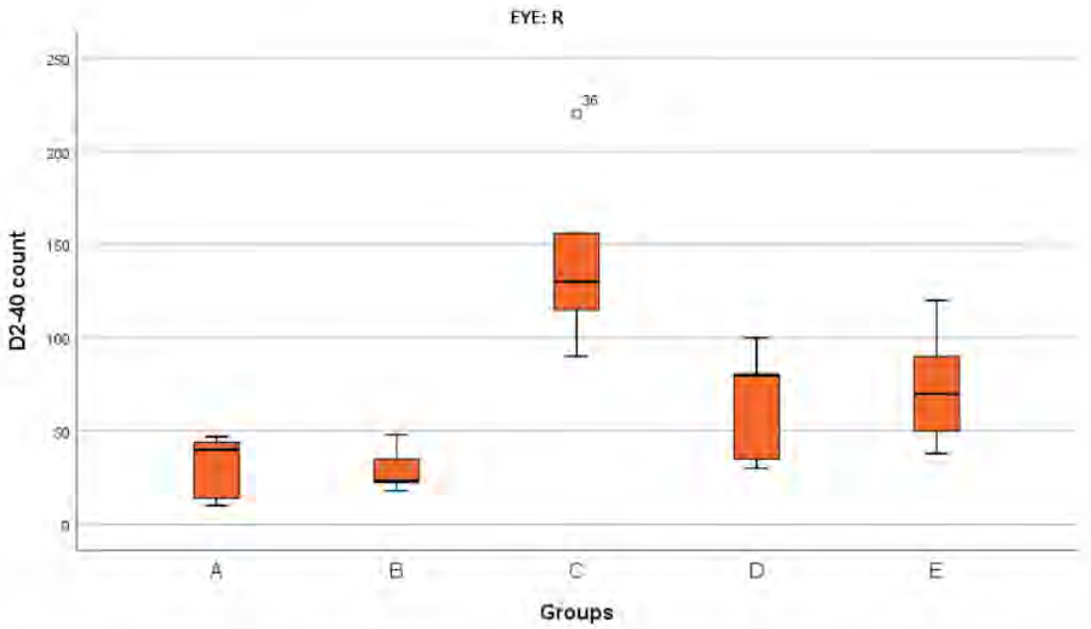
STATISTICAL ANALYSIS: The normality of the data was checked using Shapiro-Wilk test. Student-T test (Independent sample T test) and Mann Whitney U test were used for Intragroup analysis and a p-value of less than 0.05 was considered statistically significant. Intergroup comparison was done using ONE WAY ANOVA test and data with a p-value of less than 0.05 was considered statistically significant followed by Post-hoc analysis using Tukey test.

Results

There was a significant increase in the lymphatic vessel density following application of VEGF-C along with a subconjunctival collagen implant (p-value 0.0005). Retinoic acid as a subconjunctival injection led to a significant increase in the lymphatic vessel count (p-value – 0.029, 0.005). VEGF-C was found to be more potent in inducing lymphangigenesis as compared to Retinoic Acid derivative.

Image

Comparison of lymphatic vessel count in intervention eyes of different groups



Y axis – lymphatic vessel count, Group A- Collagen implant, Group B – ec23 + collagen implant, Group C – VEGF-C + collagen implant, Group D- single dose of ec23, Group E – 3 doses of ec23

Conclusions

Both EC23 and VEGF-C lead to increased lymphangiogenesis in rat model. Overall, VEGF-C was found to be a more potent lymphangiogenic agent.

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P-0967

1-YEAR OUTCOMES OF TRABECULAR MICRO-BYPASS STENT IMPLANTATION COMBINED WITH CATARACT SURGERY IN KOREANS UNDER DIFFERENT GLAUCOMA SEVERITY LEVELS

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Background
To evaluate the 1-year outcomes of trabecular micro-bypass stent implantation combined with cataract surgery under different levels of glaucoma severity.

Methods
This is a retrospective observational study of glaucomatous Korean eyes which have undergone trabecular micro-bypass stent (iStent) implantation combined with phacoemulsification with 1-year follow-up. The study eyes were divided in to three groups (mild=G1, moderate=G2, and advanced=G3) according to glaucoma severity. Clinical data were assessed preoperatively and at 1 day, 1 week, 1 month, 3 months, 6 months, and 1 year postoperatively. Intraocular pressure (IOP), number of glaucoma medications, complications, and additional glaucoma surgeries were assessed. Preoperative IOP, glaucoma medications, biometric parameters and variables for glaucoma severity were evaluated as potential predictors of postoperative IOP change.

Results
Fifty-eight eyes of open angle glaucoma were included. The mean IOP decreased significantly from 15.6±3.0 mmHg preoperatively to 13.8±2.2 mmHg at 1 year after surgery ($p<0.001$). The mean number of glaucoma medications also decreased significantly from 2.10 ± 0.78 preoperatively to 1.79 ± 0.93 at 1 year postoperatively ($p=0.008$). Three cases (5.2%) required additional glaucoma surgery. In G1, the mean IOP decreased from 14.8±1.7 mmHg preoperatively to 13.5±1.9 mmHg at 1 year postoperatively ($p = 0.003$) and the mean number of medications decreased from 1.65±0.68 preoperatively to 1.31±0.47 at 1 year postoperatively ($p = 0.001$). In G2, the mean IOP decreased from 15.3±3.9 mmHg preoperatively to 13.4±2.4 mmHg at 6 months postoperatively ($p=0.015$) and did not decrease at 1 year postoperatively (14.1±2.4 mmHg, $p>0.05$). However, the mean number of medications decreased from 2.53±0.68 preoperatively to 1.80±0.67 at 1 year postoperatively ($p= 0.003$). In G3, the mean IOP decreased from 17.1±3.2 to 14.0±2.6 mmHg at 1 year postoperatively ($p=0.002$) and the mean number of medications decreased from 2.5±0.6 preoperatively to 1.8±0.6 at 6 months postoperatively ($p=0.007$) and did differ significantly at 1 year postoperatively ($p>0.05$). Among the various factors analyzed, only the preoperative IOP was found to be associated with IOP reduction at postoperative year one ($p<0.001$).

Conclusions
These findings suggest that iStent implantation combined with cataract surgery can be also an effective treatment option in Korean glaucoma patients to lower IOP or reduce medication burden across different levels of glaucoma severity.

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P-0968

ONE-YEAR EVALUATION OF TONOGRAPHIC OUTFLOW FACILITY, EFFICACY, AND SAFETY OF THE MINIJECT SUPRACHOROIDAL IMPLANT FOR MANAGING OPEN ANGLE GLAUCOMA

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Background

The Miniject glaucoma implant is a medical device designed to increase aqueous drainage through the suprachoroidal space and thereby reduce the intraocular pressure (IOP). It is a relatively new option in the management of this condition. However, there has not been any publication on the mechanism of action, nor has there been any wash-out efficacy study on this device. This is a one year, wash-out interventional study evaluating the mechanism of action and efficacy of Miniject implant in lowering Intraocular Pressure (IOP) in Primary Open Angle Glaucoma (POAG).

Methods

Between June 2022 – February 2023, 31 pseudophakic patients with a diagnosis of POAG on 2-3 IOP lowering medications were recruited from St Thomas' hospital. Primary outcomes included tonographic outflow facility and IOP reduction. Secondary outcomes included safety profile, change in medication, endothelial cell count and aqueous flare. Paired t-tests were performed to evaluate change in outcomes at 3 months and 12 months from baseline.

Results

Of the 31 participants, 73% were female, mean age was 74, 53% were Caucasian, 40% Afro-Caribbean and 87% had POAG. Mean IOP (mmHg) was 26.23 ±8.43 at baseline, 19.62 ± 8.21 at 3 months (p=0.0002) and 20.0 ±3.18 at 12 months (p=0.031). Mean tonographic outflow facility (µL/min/mm Hg) was 0.09 ± 0.09 at baseline, 0.11 ±0.07 at 3 months (p=0.22) and 0.11 ± 0.14 at 12 months (p=0.45). Mean number of medications was 2.84 at baseline, 0.84 at 3 months (p=<0.0001) and 1.5 at 12 months (p=<0.0001). Endothelial cell count (cells/mm^2) was 2002.39 ± 303.96 at baseline, 1977.52 ± 337.9 at 3 months (P=0.5) and 1945.54 ± 293.59 at 12 months (P=0.2). Aqueous flare (ph/ms) at 3 months was 26.29 ± 24.40 and at 12 months was 16.23± 16.41. With respect to safety profile, hyphaema and IOP spike occurred in 4 patients and 1 patient had numerical hypotony. One patient had corneal decompensation after 3 months and withdrawn from the study

Conclusions

This is the first study to assess tonographic outflow facility for the Miniject device. Our findings demonstrate that supraciliary devices have no impact on trabecular outflow facility. The Miniject supraciliary implant provides sustained IOP reduction at 12 months in POAG patients and shows a relatively good safety profile.

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P-0969

RISK FACTORS FOR POSTOPERATIVE HYPOTONY AFTER PRESERFLO MICROSHUNT IMPLANTATION

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Background
To investigate risk factors associated with the development of hypotony after PreserFlo MicroShunt implantation.

Methods
This study retrospectively evaluated 149 eyes of 137 patients with glaucoma treated with PreserFlo MicroShunt implantation. Postoperative hypotony was defined as an intraocular pressure (IOP) lower than 5 mmHg within 3 months after PreserFlo MicroShunt implantation. IOP was measured at least 1 and 2 days, 1 week, and 1, 2, and 3 months postoperatively. Risk factors for postoperative hypotony were determined by logistic regression analysis.

Results
Mean preoperative IOP was 19.5 ± 8.3 mmHg, which significantly decreased to 7.6 ± 4.4 mmHg ($P < 0.001$), 10.2 ± 4.3 mmHg ($P < 0.001$), 11.6 ± 5.1 mmHg ($P < 0.001$), and 11.6 ± 4.9 mmHg ($P < 0.001$) at 1 week, and 1, 2, and 3 months, respectively. Hypotony was seen postoperatively in 88 eyes (59.1%). Complications due to hypotony included shallow anterior chamber in 10 eyes (6.7%) and choroidal detachment in 30 eyes (20.1%), with 10 of these eyes (6.7%) requiring treatment. Logistic regression analysis demonstrated age ($P = 0.03$) was a risk factor for postoperative hypotony.

Conclusions
Older patients may be at greater risk for developing hypotony after PreserFlo MicroShunt implantation.

P-0971

COMPARISON OF CLINICAL OUTCOMES FOLLOWING AB EXTERNO XEN® GEL STENT IMPLANTATION WITH OR WITHOUT CONJUNCTIVAL INCISION IN REFRACTORY GLAUCOMA

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Background
To compare clinical outcomes of ab externo XEN® gel stent implantation with or without a conjunctival dissection in patients with refractory glaucoma.

Methods
Retrospective analysis on 42 eyes (39 patients) that were followed more than 6 months after undergoing XEN® gel stent implantation for refractory glaucoma. Patients were classified into Open XEN (n=17, incision) and Closed Externo XEN (n=25, non-incision) groups based on conjunctival incision. Clinical outcome measures including intraocular pressure (IOP) and numbers of IOP-lowering medications, postoperative procedures (5-Fluorouracial injection and bleb needling), and complications were collected.

Results
Both groups showed a significant reduction in IOP and the number of medications required after XEN® gel stent implantation at all postoperative time points. At postoperative 6 month, the closed group had a significantly greater percentage of IOP reduction compared with the open group (53.8% vs 17.2%, respectively). At postoperative 6 month, the open conjunctiva group was using fewer glaucoma medications than the closed group (0.33 vs. 0.77, respectively). Complete success was achieved in 40% and 36% of the open and the closed group, respectively. Qualified success was achieved in 53% and 48% of the open and the closed group, respectively. Postoperative needling rates were higher in the open group compared with the closed group (70.6% vs 38.5%, respectively). On the other hand, the closed group had a higher incidence of complications at early stage of postoperative period compared with the open group, including choroidal detachment (24.0% vs 11.8%, respectively) and macular changes (28.0% vs 11.8%, respectively).

Conclusions
Both Ab externo XEN® gel stent implantation methods, regardless of conjunctival incision, effectively reduced IOP and dependence on topical medications in patients with refractory glaucoma. Non-incisional approach (Closed Externo) demonstrated a comparative advantage in lower bleb manipulation rate, while incisional approach (Open) resulted in a lower rate of early complications. Further prospective evaluations will be necessary to determine the best approach for XEN® gel stent implantation to achieve the desired IOP reduction while minimizing complications and postoperative procedures.

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P-0972

REFRACTIVE OUTCOMES AFTER PHACOEMULSIFICATION IN EYES WITH PRIMARY ANGLE CLOSURE GLAUCOMA

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Background
To identify preoperative anterior-segment swept-source optical coherence tomography (AS-SS-OCT) parameters that associate with refractive surprise after phacoemulsification in primary angle closure glaucoma (PACG) eyes.

Methods
139 PACG eyes from 139 Chinese patients who underwent uneventful phacoemulsification in Hong Kong Eye Hospital in 2015 - 2020 were recruited prospectively. Eyes with refractive surprise were identified by comparing the spherical equivalent (SE) at 12 months after surgery to preoperative target. Clinical and pre-operative AS-SS-OCT parameters (measured in dark and room light) were evaluated with linear regression for their association.

Results
Refractive surprise of more than 0.5D and 1D were identified in 61 (42.4%) and 16 (11.1%) PACG eyes, respectively. In the respective groups, 46 (75.4%) and 15 (93.8%) had myopic shift, while 15 (24.6%) and 1 (6.2%) had hyperopic shift. In univariate linear regression analysis, preoperative anterior chamber depth ($\beta = 0.19$, $p = 0.03$), corneal arch depth (CAD, $\beta = 0.32$, $p < 0.001$) and anterior chamber area (ACA, $\beta = 0.30$, $p < 0.001$) measured in dark correlated positively with SE deviation . The association remained statistically significant for CAD ($p = 0.001$) and ACA ($p = 0.02$) after adjusting for axial length, keratometry value, and gender in multivariate models. Other AS-SS-OCT parameters, including preoperative lens vault or iridotrabecular contact, were not associated with refractive outcomes.

Conclusions
Refractive surprise is not uncommon in PACG eyes after phacoemulsification and in this cohort, myopic shift was more prevalent. Smaller preoperative CAD and ACA measured with AS-SS-OCT were associated with more myopic deviation from target refraction.

P-0973

COMBINED TECHNIQUE OF CONTINUOUS WAVE TRANSSCLERAL CYCLOPHOTOCOAGULATION AND SUBCYCLO: EFFECT ON IOP IN PATIENTS WITH UNCONTROLLED GLAUCOMA

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Background

Glaucoma is the leading cause of irreversible blindness worldwide, affecting millions of people globally. It is characterized as a progressive optic neuropathy with gradual vision loss due to optic nerve damage. The main modifiable risk factor is elevated intraocular pressure (IOP), and treatment focuses on lowering IOP to prevent disease progression. Treatment options include medical therapies, filtration surgeries such as trabeculectomy, and glaucoma drainage devices.

Recently, less invasive techniques such as continuous-wave transscleral cyclophotocoagulation (CW-TSCPC) and micropulse transscleral laser therapy (MP-TLT) have been explored for moderate to advanced glaucoma. CW-TSCPC uses continuous laser energy and may be associated with complications, whereas MP-TLT, a micropulse diode laser, employs ON and OFF cycles to minimize thermal damage to surrounding tissues. MP-TLT has demonstrated lower complication rates compared to CW-TSCPC . Although these techniques have been studied individually, limited information is available on their combined use. These options present promising alternatives in glaucoma management.

Methods

Retrospective Case Series. Patients underwent combined treatment with Subcyclo transscleral cyclophotocoagulation and continuous wave cyclophotocoagulation. The primary outcome measure was intraocular pressure (IOP) at 24 hours, 7 days, and 1, 3, and 6 months post-intervention. Success was defined as a 30% reduction in IOP, achieving an IOP of 25 mmHg or less. The number of glaucoma medications and complications were also recorded.

Results

A total of 24 eyes were included. The mean age was 71.5 ± 18.6 years (range: 21–94 years), with a mean preoperative IOP of 33.35 ± 12.13 mmHg (range: 21–44 mmHg). The mean IOP one month after the procedure was 18.95 ± 11.47 mmHg, at 3 months: 19.19 ± 8.13 mmHg, and at 6 months: 17.16 ± 7.60 mmHg. The mean IOP reduction was 43.16%, 42.45%, and 48.55% at 1, 3, and 6 months, respectively ($P < 0.05$). The mean number of antihypertensive drugs used preoperatively was 3.91 ± 1, which decreased to 2.74 ± 1 at 6 months post-intervention, with a reduction percentage of 29.92% ($P < 0.05$). No statistically significant changes were observed in visual acuity. No severe complications were reported.

Conclusions

This combined therapy appears to be a safe treatment that effectively reduces IOP and glaucoma medications for up to 6 months.

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P-0974

SECOND TIME'S THE CHARM: UNVEILING THE PROMISE OF REPEAT XEN GEL STENTS IN GLAUCOMA

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Background
Glaucoma, a leading cause of irreversible blindness, presents a formidable challenge in its refractory form, where standard treatments often fail to control intraocular pressure (IOP). This demands innovative strategies; one such novel approach is repeat XEN-45 Gel Stent implantation("XEN-on-XEN") which involves a second procedure following the failure of the initial stent. This is the first study to evaluate the efficacy and safety of XEN-on-XEN, potentially offering a safer alternative to invasive procedures like trabeculectomy and glaucoma drainage devices (GDD).

Methods
This monocentric, retrospective cohort study analyzed data from 16 eyes with refractory glaucoma eyes at Mayo Clinic, Florida, who underwent a repeat XEN implantation after the failure of the first procedure. Patients were monitored from their pre-operative visit for the first surgery through their follow-up after the second surgery. The success criteria were defined as ≥20% IOP reduction or IOP <18 mmHg with a maximum of two topical antiglaucoma medications, well-formed functioning bleb, and no additional glaucoma-based surgeries within 12 months. Data collected included demographics, medical history, glaucoma severity, baseline and follow-up IOP, best-corrected visual acuity (BCVA), and surgical approach. Additionally, subconjunctival antimetabolites, complications, and interventions during follow-up visits were documented.

Results
The mean age of participants was 66 years. XEN-on-XEN showed a significant mean IOP reduction of 47.2%, surpassing the 33.87% IOP reduction in the initial surgery ($p < 0.01$). Both the first and second surgeries reduced medication use significantly, with reductions of 48.44% and 44.89% ($p < 0.05$), respectively. The ab externo open conjunctiva technique achieved the highest success rates (78.95% in the first surgery;77.50% in the repeat) with minimal complications, making it the most effective strategy. The ab externo closed conjunctiva method also had good results, with a 78.67% success rate in the first surgery, and reduced rates of hypotony and XEN exposure. Conversely, the ab interno closed conjunctiva approach had the lowest success rates.

Conclusions
Repeat XEN Gel Stent implantation is a promising solution for refractory glaucoma, achieving high IOP reductions, reduced anti glaucoma medication dependence, and enhanced patient comfort. The ab externo open conjunctiva approach stands out as the optimal surgical method, offering an efficacious option that might be comparable to, if not better than, more invasive alternatives like trabeculectomy and GDDs. This highlights the potential of "XEN-on-XEN" to transform the management of challenging glaucoma cases. This study underscores the value of repeat XEN stents as a viable and less invasive option in the battle against Glaucoma.

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P-0975

TWO YEARS FOLLOW UP OF AB INTERNO CANALOPLASTY (ABIC) IN TERTIARY OPHTHALMOLOGY ACADEMIC WARD

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Background

Canaloplasty is one of the minimally invasive surgical glaucoma treatment method. There are many modifications, including the ab interno and ab externo access. The procedure purpose is to improve the natural outflow of aqueous humor through the Schlemm's canal. After intervention hypotony can be avoided since aqueous is allowed to drain via the physiological outflow system. The aim of the study is to evaluate the efficacy and safety of ABiC for the treatment of open angle glaucoma in various patients in 2 years follow-up period. We have expanded the scope of the study.

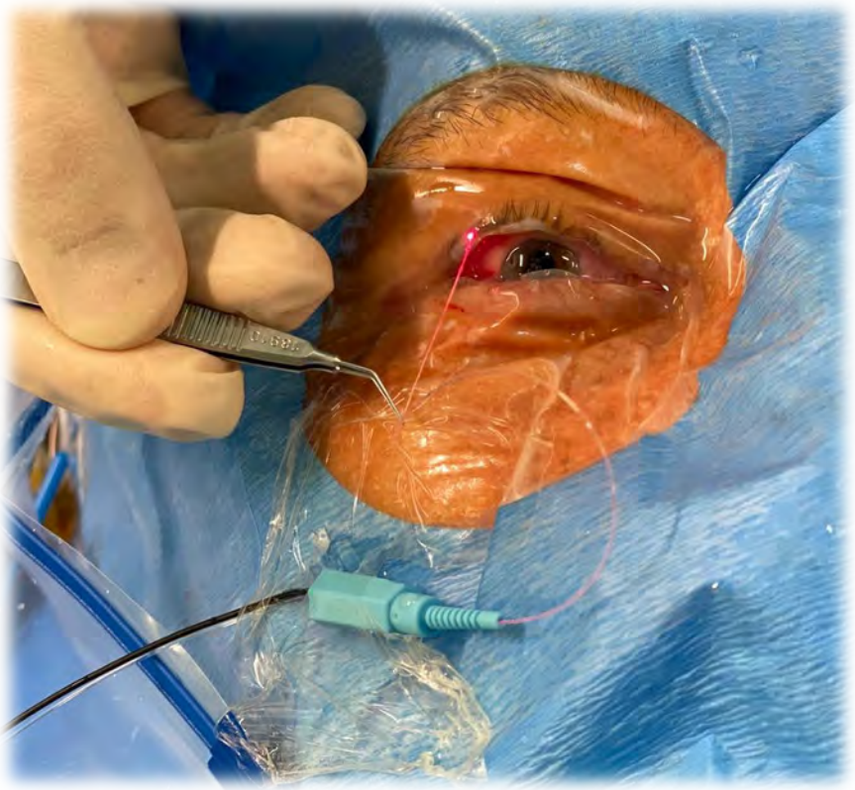
Methods

Patients with diagnosed glaucoma and insufficiently regulated intraocular pressure despite maximally tolerable antiglaucoma medications were selected to the study. We included 52 adult patients with various open angle glaucoma subtypes. All of them underwent ABiC procedure between 2017 to 2022 and had at least 2 years of follow-up period. Patients were treated with the modern ab-interno surgical technique using the iTrack canaloplasty microcatheter (Nova Eye Medical). Patients with 360-degree successful catheterization only were selected for this study. After the procedure we assessed the post-operative IOP, BCVA, OCT, the number of adverse events and complications and the number of antiglaucoma medications.

Results

After the procedure the mean IOP reduction and stabilisation was observed. The mean IOP was 23,31±9,10mmHg, 15,41±5,49 mmHg, 16,41±4,36 mmHg, 16,89±3,51 mmHg, 16,6±3,56 mmHg, 15,35±3,87 mmHg, 15,46±2,60 mmHg and 15,76±3,43 mmHg before, 1 day, 1, 3, 6, 12, 18, 24 months after the surgery, respectively. The mean usage of the antiglaucoma topical medications was 2,6±1,07, 1,19±1,27, 1,93±1,1, 1,74±1,1, 1,83±1,34, 1,85±1,14, 2,23±1,24 and 2,32±1,36, before, 1 day, 1, 3, 6, 12, 18 and 24 months after the surgery, respectively. There were no significant changes observed in the GCC. No decrease in BCVA and no severe complications were observed. Some of the patients after the surgery were qualified for another antiglaucoma surgery due to insufficient intraocular pressure reduction

Image



Conclusions

Ab-interno canaloplasty appears to be a safe and effective treatment for glaucoma in all stages of the disease, although further studies are required to assess the long-term effect and late postoperative complication rate.

P-0976

LONG AND SHORT-TERM IMPROVEMENT IN VISUAL ACUITY FOLLOWING TRABECULECTOMY

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Background

Glaucoma is a group of diseases with progressive deterioration of the optic nerve head,evidenced by structural loss of the optic nerve with corresponding visual field defects.The aim of treatment is slowing down progression through medical/surgical treatment. We report 3 cases who had visual recovery with one improvement of fields following trabeculectomy.

Methods

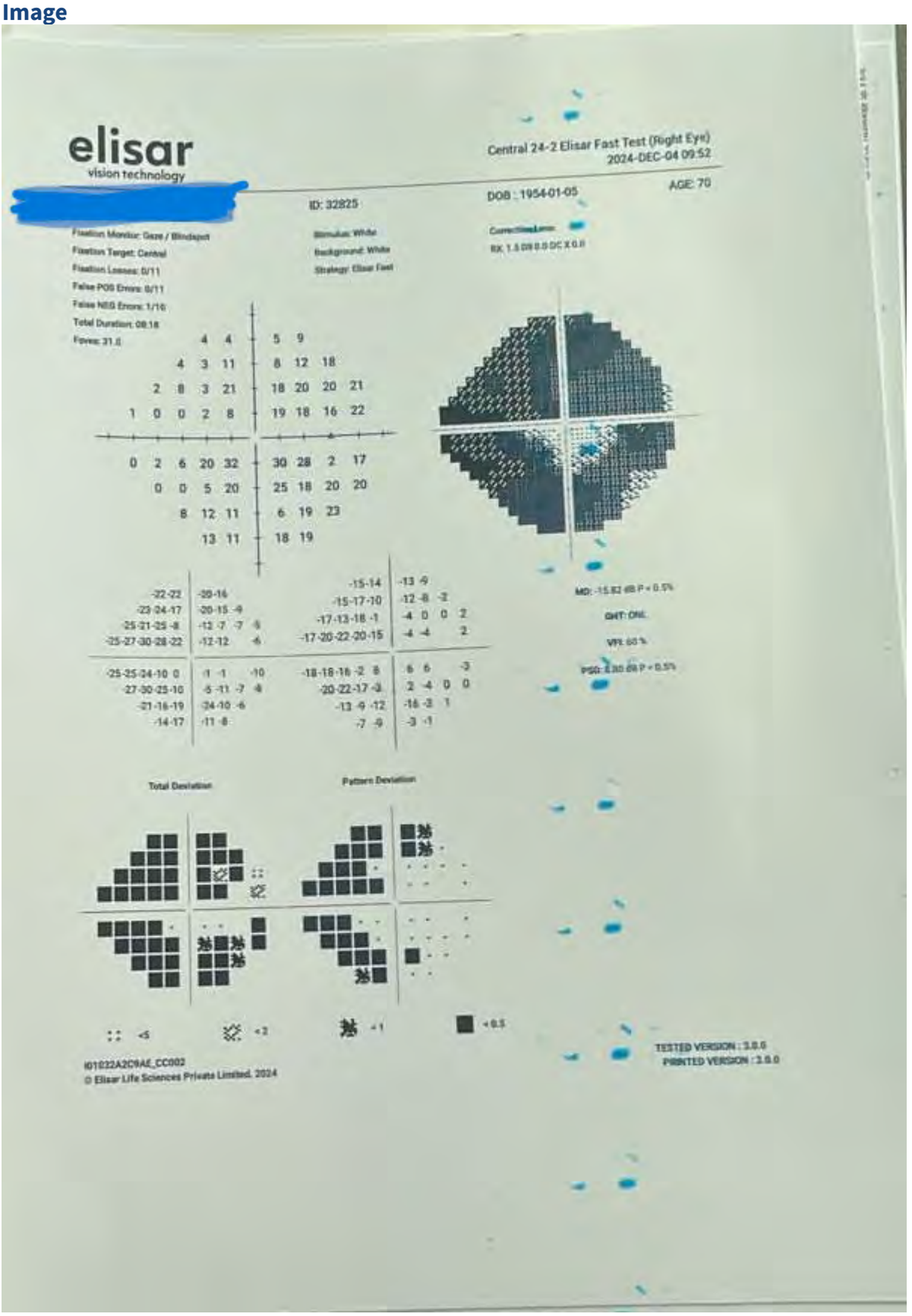
This is a retrospective case series of 3 African patients who had mitomycin -C (MMC)augmented trabeculectomy by a single surgeon at Agarwal Eye Hospital, Accra and St Thomas Eye Hospital, Accra between October 2022 and November 2024.

Case 1: 54year old female presented with progressive deterioration of vision in the right eye. She was a known primary open angle glaucoma (POAG) patient with a previous history of phacoemulsification and shunt surgery. Visual acuity was hand motions with an IOP of 41 mmHg on maximally tolerated medical therapy.Examination was normal with the exception of a relative afferent pupillary defect and a vertical cup to disc ratio (VCD) of 0.9+. A right MMC augmented trabeculectomy was performed.She had a bleb leak which resolved in 2 weeks. IOP was 10 mmHg with a BCVA improving astonishingly to 6/6 one month post-op.
Case 2: 61-year-old male presented with blurry vision in the left eye of 6 months duration. He had a history of a left small incision cataract surgery. Visual acuity was perception of light with an IOP of 60 mmHg. Examination showed left corneal oedema. BCVA improved to 6/60 after commencing medical therapy. VCD was 0.9+ and gonioscopy showed open angles.A left MMC trabeculectomy was done. BCVA improved to 6/18 in the left eye 2 weeks post-op with an IOP of 8 mmHg.
Case 3: 70-year-old male, presented with worsening vision in the right eye over the past year. He was a known POAG patient on medical therapy. On presentation examination was unremarkable except a VCD of 0.9.Visual acuity was 6/18 in the right eye with an initial IOP of 17 mmHg. A right MMC trabeculectomy was done.10 months post-op IOP was 10 mmHg and BCVA improved to 6/6 on brimonidine twice daily. Mean deviation on visual fields improved remarkably from -22.05dB to – 15.82 dB.

Results

There was a greater than 30% reduction in IOP in all 3 cases. 33%,60% and 59% respectively.Case 3 had a mean deviation of -22.05dB prior to surgery and improved to -15.82 dB ten months post-op.

Image



Conclusions

Early trabeculectomy may offer some functional benefits to advanced glaucoma patients ,especially in poorly resourced settings where medical therapy may be a burden.

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References

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P-0977

OUTCOMES OF PENETRATING CANALOPLASTY IN ANGLE-CLOSURE CHILDHOOD GLAUCOMA

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Background
Angle-closure childhood glaucoma is challenging with only limited effective treatments available and frequently develops refractory glaucoma with poor prognosis. Penetrating Canaloplasty (PCP) is a newly introduced surgical technique with the advantage of bypassing the trabecular meshwork and draining the aqueous humor to the Schlemm's canal. This study evaluates the efficacy and safety of PCP for angle-closure childhood glaucoma.

Methods
Medical records of consecutive angle-closure childhood glaucoma patients who had undergone penetrating canaloplasty between September 2020 to February 2023 at Beijing Children's hospital were retrospectively reviewed. Success was defined as an intraocular pressure of lower than 21 mmHg with (qualified success) or without (complete success) the use of antiglaucoma medications with no sight threatening complications.

Results
Overall, 26 eyes (23 patients) were included, with a mean age of 4.3±3.3 years at the time of surgery and a mean follow-up time of 15.1±8.8 months. Post-operative intraocular pressure and the number of glaucoma drops (20.1±6.4 mmHg, 1.6±1.6 medications) were significantly less than the pre-operative values (34.3±8.1 mmHg, 3.1±0.7 medications; both $P < 0.001$). At 12, 24 and 30 months follow up, the cumulative rates were 76.9%, 57.7% and 57.7% for complete success and 80.8%, 64.6% and 64.6% for qualified success. The only significant complication was choroidal hemorrhage in an aphakic eye with microphthalmia. However, the case resolved spontaneously, and the visual acuity improved to the preoperative level of hand movement.

Conclusions
PCP is a viable option in eyes with angle-closure childhood glaucoma with acceptable safety profile.

P-0978

OUTCOMES OF COMBINED PHACOEMULSIFICATION AND ISTENT INFINITE IMPLANTATION IN AN ASIAN POPULATION: A CLINICAL AUDIT

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Background

Minimally invasive glaucoma surgery (MIGS) devices have transformed glaucoma management by offering safer and effective intraocular pressure (IOP) reduction options. Designed with three trabecular micro-bypass stents, the iStent Infinite expands aqueous outflow, potentially benefiting patients requiring greater IOP control. This study evaluates the safety and efficacy of the iStent Infinite combined with phacoemulsification in an Asian population.

Methods

This retrospective audit included 22 patients who underwent combined phacoemulsification and iStent Infinite implantation at Tan Tock Seng Hospital from August 2023 to July 2024. Outcome measures included best-corrected visual acuity (BCVA), intraocular pressure (IOP), number of glaucoma eyedrop medications, and surgical complications. Snellen visual acuity was converted to LogMAR for statistical analysis. Changes in IOP and medication use were evaluated using paired t-tests.

Results

The study included 22 eyes from 22 patients with a mean age of 74.6 ± 7.8 years; 59.1% were male, and all were of Chinese ethnicity. The mean pre-operative IOP was 14.9 ± 2.59 mmHg on an average of 2.14 ± 1.13 glaucoma medications. Most patients had primary open-angle glaucoma (36.4%), angle-closure glaucoma (31.8%), or normal-tension glaucoma (27.3%). At post-operative month 6, 75% of eyes achieved target IOP with a mean IOP of 14.6 ± 3.1 mmHg ($p > 0.05$). The mean number of medications decreased to 0.45 ± 0.89 by month 6, with 95% of patients medication-free by month 12. Visual outcomes improved significantly, with BCVA improving from a mean of 0.25 ± 0.19 LogMAR pre-operatively to 0.08 ± 0.17 LogMAR at month 1 ($p < 0.001$). One eye experienced intraoperative device malfunction leading to implantation of only two stents, and one eye had transient gross hyphema, which resolved conservatively. No major adverse or sight-threatening events occurred, and no additional glaucoma surgeries were required.

Conclusions

Combined phacoemulsification and iStent Infinite implantation effectively reduced IOP and medication burden with a favorable safety profile in an Asian cohort. These findings support the iStent Infinite as a viable option for glaucoma patients requiring robust IOP control alongside cataract surgery.

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P-0979

COMBINED VISCODILATION AND ENDOSCOPIC CYCLOPHOTOCOAGULATION WITH CONCOMITANT CATARACT SURGERY

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Background
The OMNI surgical system and endoscopic cyclophotocoagulation (ECP) are utilized due to their ability to target multipl pathways and reduce aqueous humor production and outflow, respectively. However, data on the safety and efficacy of combining OMNI viscodilation and ECP with concomitant cataract surgery is lacking. Our study describes the initial safety and efficacy results of combined visodilation and endoscopic cyclophotocoagulation.

Methods
Retrospective case series of combined OMNI viscodilation of Schlemm's canal and endoscopic cyclophotocoagulation (ECP) with concomitant cataract surgery performed by a single surgeon at a single academic institution, with at least 1 month of postoperative follow-up. Patient demographics, type of glaucoma, baseline IOP, pre- and postoperative medication burden, complications, and failure rates were recorded. Primary success at this short post op time was measured by no loss of vision or IOP greater than the pre op IOP. At the latest follow up point, surgical failure was defined as IOP greater than baseline IOP, additional pressure lowering ocular surgery, IOP equal to preoperative IOP on the same number of pre-operative drops, and therapy requiring more classes of topical therapy than prior to surgery.

Results
Out of the nine eyes, six resulted in qualified success. Preoperative IOP was 21.4±5.2 mmHg, an postoperative IOP decreased significantly to 14.3±3.1 mmHg (mean reduction of 8.0 mmHg, p=0.031). The average number of preoperative medications was 2.6 ± 1.5, while the average number of postoperative medications per patient was reduced to 1.7 ± 1.0 (mean reduction of 1.17, p = 0.059). No serious complications were noted.

Conclusions
The combination of viscodilation and ECP is a safe and effective treatment in reducing IOP. While the reduction in medications did not reach statistical significance, larger, prospective studies are warranted to validate these findings and further explore the efficacy of this combined surgical approach.

P-0980

PILOT STUDY OF THE EFFECTIVENESS OF TRABECULECTOMY AFTER PRIMARY AB EXTERNO TRANS CONJUNCTIVAL XEN GEL STENT

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Background

Trabeculectomy is the gold-standard surgery for intraocular pressure (IOP) control in glaucoma, but it is not without risk. XEN-45 gel stent is a lower risk bleb-forming surgery with a lower success rate. It is unknown if having prior transconjunctival ab externo (aXen) affects the outcome of later trabeculectomy. The purpose of this study is to evaluate the effect of preexisting aXen on the outcome of subsequent trabeculectomy in glaucoma patients.

Methods

This is a retrospective, single-site, case-control study conducted between 12/2014 and 3/2024. Patients at the Cizik Eye Center who underwent aXen followed by trabeculectomy were reviewed as the case group, while patients who only underwent a trabeculectomy were reviewed as the control group. Each case was matched with a control by age (within 7 years), race (Black or non-Black), type and severity of glaucoma, lens status, and whether they underwent combined surgeries at the time of trabeculectomy. Eyes with previous ocular surgeries (except a Xen and cataract surgery) and <3 months follow-up after trabeculectomy were excluded. Visual acuity, intraocular pressure (IOP), and number of IOP-lowering medications were recorded at baseline and each follow-up. Complete success was defined as IOP≤18 mm Hg without IOP-lowering medications or any additional glaucoma surgeries (except revisions) and partial success was defined as IOP≤18 with IOP lowering medications without additional glaucoma surgeries. Kaplan-Meier survival analysis was performed to estimate the cumulative rate of complete and partial success in each group and compared using a log rank test.

Results

8 Cases with mean age 67.1 (±14.9) years and 8 controls with mean age of 67.4 (±15.3) years were included. In each group, 1 (13%) patient was black; 4 (50%) had primary open angle glaucoma, 2 (25%) primary angle closure, 1 (13%) pseudoexfoliation and 1 (13%) pigmentary glaucoma; 6 (75%) eyes had severe glaucoma; 5 (62%) eyes were phakic at pre-Trab; and 1 (13%) eye underwent combined trabeculectomy with phacoemulsification. Baseline medicated IOP was 26.2 (±9.9) and 20.8 (±7.5) for Cases and Controls, respectively (P=0.15]) with mean number IOP-lowering medications 2.6 (±1.8) and 2.5 (±1.2), respectively (P=0.88). The cumulative complete success rate at 1 year was 67% and 62% for Cases and Controls, respectively (P=0.80, Figure 1). The cumulative partial success rate at 1 year was 83% and 88% for Cases and Controls, respectively (P=0.45, Figure 2). Visual acuity, IOP and number of IOP lowering medications were not significantly different between groups at 3, 6, 9, 12, 24 and 36 months post trabeculectomy (P>0.05).

Image

Figure 1. Kaplan-Meier Survival Curve for Complete Success

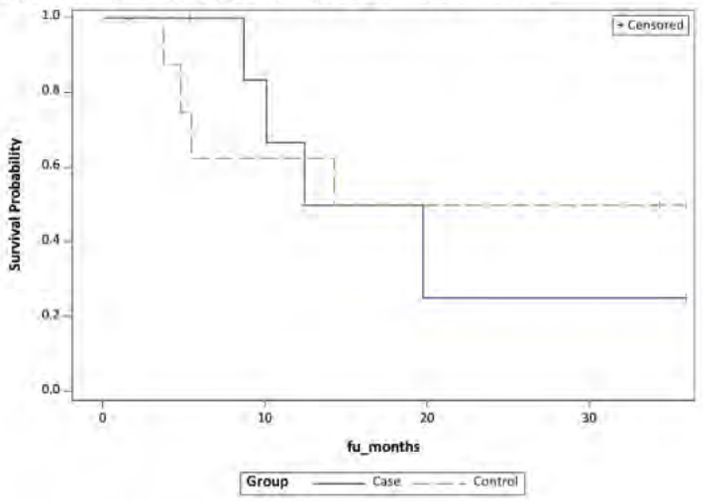
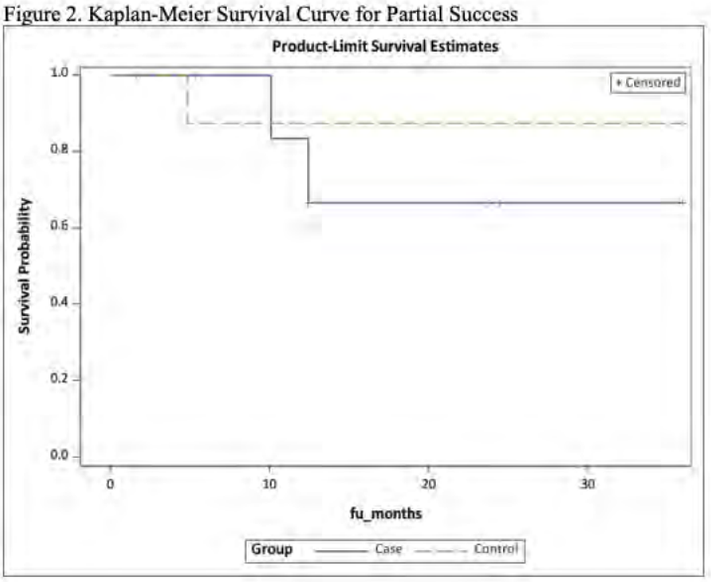


Figure 2. Kaplan-Meier Survival Curve for Partial Success



Conclusions

In this pilot study prior aXen implantation does not appear to alter the outcome of trabeculectomy. However, the sample size is too small to draw a definitive conclusion and further study is required.

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P-0982

EFFICACY OF BAERVELDT GLAUCOMA DRAINAGE DEVICES IN UVEITIC GLAUCOMA

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Background
The purpose of this study is to evaluate clinical outcomes and effectiveness of Baerveldt glaucoma drainage devices in the management of uveitic glaucoma.

Methods
This was a retrospective study of 39 eyes of 34 patients who underwent implantation of Baerveldt glaucoma drainage devices between 2020 and 2024 for the treatment of uveitic glaucoma. Primary outcome measures were intraocular pressure (IOP) reduction and number of medications at 1-year follow-up. Success was defined as IOP ≥ 5 and ≤ 21 mmHg with or without antiglaucoma medications and without the need for further glaucoma surgery, loss of light perception, or phthisis.

Results
The IOP was reduced from a preoperative median of 25 mmHg (IQR: 20-33 mmHg), with 4.23 ± 0.95 antiglaucoma medications to a postoperative median at 1 year of 11.5 mmHg (IQR: 9.25-13) ($p < 0.001$) with 1.17 ± 1.25 antiglaucoma medications ($p < 0.001$). Cumulative probability of success at 12 months was 91.6% (CI 95%: 83.0% - 100%). There were 3 cases (7.7%) of failure. Of those 3 eyes, 2 eyes presented persistent IOP ≥ 21 mmHg and 1 eye required extraction and replacement of the drainage device. None of the eyes (0%) had intraoperative complications while 18 eyes (46.2%) presented postoperative complications. The most common complication was transient choroidal effusion (23.5%). No eye lost light perception or became phthisic.

Conclusions
At 1 year follow-up, the Baerveldt glaucoma drainage device proved to be effective for IOP control with a significant reduction of antiglaucoma medications. Although postoperative complications were observed in some patients, none of the eyes presented serious complications requiring reintervention or loss of light perception.

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P-0983

NON-INFECTIOUS ENDOPHTHALMITIS ASSOCIATED WITH A RELEASABLE 10-0 MONOFILAMENT NYLON SUTURE AFTER A TRABECULECTOMY- A RARE CASE POSSIBLY FIRST EVER?

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Background

Non-infectious endophthalmitis related to suture material in cataract and corneal surgery has been widely reported in Ophthalmic literature. We report a very rare case of nylon suture related non-infectious endophthalmitis in trabeculectomy surgery.

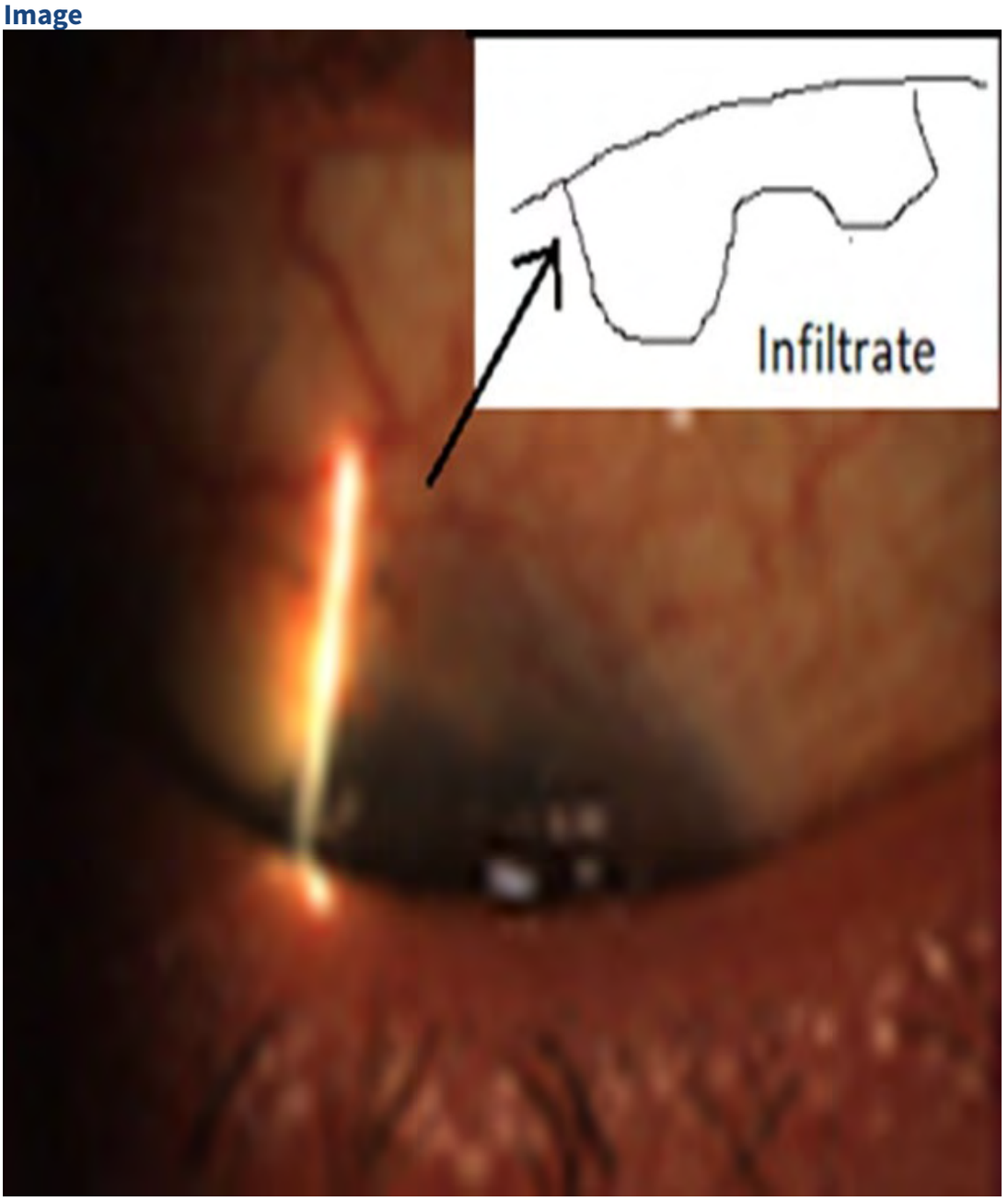
Methods

We present a case of acute non-infectious endophthalmitis associated with trabeculectomy surgery. After emergency vitreous biopsy and subsequent broad-spectrum antibiotic and antifungal treatment, inflammation did not settle. Following negative culture and sensitivity reports, including PCR testing for any bacteria, virus or fungus, the ocular inflammation was controlled successfully with topical and systemic steroids, with an improvement in patient's vision.

Results

We present the photographic evidence of inflammatory exudate around the releasable suture on presentation and sequential photographs showing the resolution correlating with medications given.

Image



Conclusions

This case highlights the importance of being vigilant against post-procedural infectious endophthalmitis. However, the possibility of non-infectious causes of intraocular inflammation should also be considered in any culture negative cases and managed appropriately with topical and systemic steroids.

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P-0984

"MIGS AND MATCH"; OUTCOMES OF THE COMBINATION OF AB INTERNO CANALOPLASTY WITH HIGH-FREQUENCY DEEP SCLERECTOMY IN PATIENTS WITH OPEN-ANGLE GLAUCOMA

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Background

Numerous minimally invasive techniques have been developed to improve access to Schlemm's canal (SC), simplifying glaucoma surgeries. Canaloplasty, a well-established method, works by dilating SC and restoring natural aqueous outflow. [1] It can be combined with other MIGS, such as high-frequency deep sclerotomy (HFDS), which uses energy to create microperforations in the trabecular meshwork, further enhancing success rates and clinical outcomes. [2] The purpose of this study is to evaluate the outcomes of the combination of two different MIGS (High Frequency Deep Sclerectomy with Ab interno canaloplasty) with cataract surgery in patients with primary open-angle glaucoma (POAG).

Methods

This is a prospective, single center, case studies of patients who underwent Ab interno Canaloplasty with the iTrack ®canaloplasty microcatheter and High Frequency Deep Sclerectomy (HFDS) performed using the Abee® glaucoma tip of Oertli phacoemulsification machine, all surgeries were done in combination with cataract surgery (n=6) with a follow up of 3 months until this moment. Eyes with controlled mild or moderate POAG were included, those with prior glaucoma surgeries were excluded. The outcomes included intraocular pressure (IOP), glaucoma medications, and adverse events.

Results

A total of 6 eyes of 5 patients with mean age of 63.8 ± 4.9 years were included in the study. At 3 months versus baseline, mean IOP reduced from 15.67 ± 1.03 to 11.83 ± 1.17 ($p < 0.005$). Mean number of glaucoma medications reduced from 2 ± 0.89 to 0.66 ± 0.83 ($p = 0.005$). In relation to complications, 20% of patients had hyphema that resolved within the first week.

Conclusions

The combination of two different MIGS as Ab-interno canaloplasty and HFDS in conjunction with cataract surgery significantly reduced medication dependency and maintained intraocular pressure within target range in patients with mild or moderate primary open-angle glaucoma, while showing a good safety profile. We are aware that sample size is small, but the study is ongoing, we are increasing patient recruitment, and the follow-up will be up to 12 months. Data updates will be made.

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P-0986

COMPARISON OF BLEB MORPHOLOGY BY AS-OCT AND CLINICAL OUTCOMES BETWEEN PHACOTRABECULECTOMY PATIENTS WITH AND WITHOUT POST-OPERATIVE 5-FU INJECTION

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Background
To compare the bleb morphological features using AS-OCT and clinical outcomes between phacotrabeculectomy patients with and without post-operative 5-Fluorouracil subconjunctival injection.

Methods
In a prospective interventional study, 60 patients aged 40 years and above underwent phacotrabeculectomy with either 5-fluorouracil subconjunctival injection (30 eyes) post-operatively or with no injection (30 eyes), and followed up for 6 months. The primary outcome measure was to note the evolution of bleb morphology by ASOCT in the two groups over 6 months. Secondary outcome measures were mean IOP, reduction in the need for anti-glaucoma medications, and complications seen in the two groups.

Results
All parameters in the two groups were comparable preoperatively (P>0.05). Best corrected visual acuity at 6 months was 0.38±0.27 in injection group and 0.31±0.23 in no injection group (P=0.151). Post-operative IOP at 6 months was 12.09±3.1mmHg in injection group, and 15.25±2.5 mmHg in no injection group (P=0.034).The mean number of medications was 0.36±0.68 in the injection group and 1.38+/-0.70 in the no injection group at 6 months (P=0.028). No major sight-threatening complications were noted in any group. AS-OCT imaging at 6 months showed multiform reflectivity, multiple areas of subconjunctival separation and microcysts in fewer patients of no injection group as compared to the injection group.

Conclusions
Subconjunctival 5-Fluorouracil injection post-operatively following phacotrabeculectomy resulted in better morphologic and functioning blebs without any potential complications.

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P-0988

PHACOMORPHIC ANGLE-CLOSURE ATTACK FOLLOWING PARS PLANA VITRECTOMY WITH SILICONE OIL FOR TRACTIONAL RETINAL DETACHMENT: A CASE REPORT

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Background
To present the clinical course of a patient with tractional retinal detachment who developed secondary angle-closure glaucoma following pars plana vitrectomy with silicone oil (SO) tamponade.

Methods
The patient's medical records were reviewed at Chi Mei Medical Center in Tainan, Taiwan, where she had been receiving ophthalmic care since June 2024.

Results
A 54-year-old woman with a history of diabetes mellitus presented due to worsening vision in her left eye. Her best-corrected visual acuity (BCVA) was recorded as 20/60, and intraocular pressure (IOP) was 13 mmHg in the affected eye. Ophthalmic evaluation showed mild nuclear sclerosis cataract and deep anterior chambers in both eyes, as well as a localized tractional retinal detachment in the superior peripheral fundus with an impending macular detachment in the left eye. The patient subsequently underwent pars plana vitrectomy with SO tamponade and was instructed to maintain a prone position for 8 hours per day over a 7-day period. On the first post-operative day, IOP was 18 mmHg, and examination indicated a deep anterior chamber and an attached retina. Her left eye's IOP remained stable at 20 mmHg until three weeks after surgery, at which point she presented to the emergency room with a sudden IOP spike to 63 mmHg in her left eye. Examination revealed a shallow anterior chamber and a mid-dilated pupil. Treatment with IOP-lowering eye drops and laser iridotomy was initiated, but the elevated IOP persisted for over a week. The patient then underwent partial removal of SO via pars plana vitrectomy, though her IOP remained elevated around 40 mmHg, unaffected by changes in head positioning. Rapid lens intumescence was suspected as the cause of acute angle-closure glaucoma and was confirmed through clinical assessment. Phacoemulsification with intraocular lens implantation was subsequently performed, resulting in a deepened anterior chamber, normal IOP, and an attached retina. At the final follow-up, her IOP was 14 mmHg without the need for anti-glaucoma medication.

Conclusions
This case illustrates a rare occurrence of secondary acute angle-closure glaucoma following minimally invasive pars plana vitrectomy in a patient with mild cataract. The presumed cause was phacomorphic glaucoma resulting from rapid lens intumescence secondary to vitreoretinal surgery with SO tamponade. This potential complication should be closely monitored in patients with intraocular use of SO and prompt management if it occurs.

P-0989

EFFICACY OF RELEASABLE SUTURE IN AHMED DRAINAGE VALVE IMPLANTATION ON REDUCING EARLY COMPLICATIONS FOR GLAUCOMA

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Background
To evaluate the efficacy of releasing suture in Ahmed drainage valve implantation for glaucoma.

Methods
Retrospective analysis was performed on patients who received Ahmed drainage valve implantation in the glaucoma department in Handan City Eye Hospital from July 2015 to April 2022. For some patients, loosening suture technology (6 6-0 absorbable sutures ligated around the drainage tube) was applied during the operation whereas the others were not treated with this procedure. Relaxable sutures were removed within 1 month after operation according to the patient's intraocular pressure (IOP). The IOP and drugs for glaucoma were recorded before operation, as well as 1 day, 1 week, 1 month and 3month after operation with the application of releasable suture (group 1) or not (group 2). Moreover, operation success rate, postoperative shallow anterior chamber, low IOP and other complications were observed in corresponding time points after the surgery. . Success was defined when the IOP was between 6 to 21mmHg.

Results
There were 33 patients (33 eyes) in group 1, including 9 males (9 eyes) and 24 females (24 eyes), with an average age of (51±7.7) years, and 37 patients (37 eyes) in group 2, including 8 males (8 eyes) and 29 females (29 eyes), with an average age of (53±5.9) years. There was no significant difference in gender and age between the two groups (P>0.05 for both); Preoperative mean IOP was (41.4±6.2) mmHg in group 1 and (39.7±8.4) mmHg in group 2, and there was no significant difference between the two groups (P>0.05). There was no significant difference between group 1 (3.7±0.3) and group 2 (3.8±0.5) in the use of drugs before operation (P>0.05); The postoperative IOP of group 1 at 1 day, 1 week, 1 month and 3 month was (15.3±5.6) mmHg, (14.7±6.9) mmHg, (17.2±5.8) mmHg and (18.1±7.4) mmHg, respectively. The postoperative IOP of group 2 at 1 day, 1 week, 1 month and 3 month was (12.9±6.6) mmHg, (14.4±7.3) mmHg, (16.5±4.9) mmHg and (18.7±8.9) mmHg, respectively. The IOP after operation was lower than that before operation for both groups, and the differences were statistically significant (P<0.01 for both); No significant differences in IOP at any time point before and after operation were observed between the two groups (P > 0.05 for all time points). The success rate of operation without intraocular pressure lowering drugs was 90.9% in group 1 and 72.9% in group 2, and there was a statistical difference between the two groups (P<0.05).

Conclusions
The application of releasing suture in Ahmed glaucoma drainage valve implantation can effectively prevent the occurrence of some postoperative complications like shallow anterior chamber and low IOP, and also improve the success rate after surgery at short-term follow-up.

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P-0990

SAFETY AND EFFECTIVENESS OF THE PRESERFLO MICROSHUNT DEVICE IN ASIAN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA – 2-YEAR RESULTS

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Background
This study aims to gather safety and effectiveness data on the Preserflo MicroShunt (PM) device in Asian patients with primary open angle glaucoma.

Methods
This was a prospective, single arm study of subjects receiving PM with Mitomycin C 0.4mg/ml for 3-4 minutes from March 2021 to August 2022 at a tertiary eye center in Singapore. Twenty-seven eyes were included. Surgical success for patients with baseline intraocular pressure (IOP) </= 21mmHg was defined as an IOP reduction of >/= 20%. For patients with baseline IOP >21mmHg, success was measured as IOP<21mmHg and IOP reduction of >/= 20%. Qualified and complete success were defined as achieving IOP target with and without medications. Definition of failure was when IOP reduction was not met at two consecutive time points or when bleb revision or another filtration surgery was performed.

Results
There were 10 eyes that had PM and 17 eyes that had combined phacoemulsification and PM (phaco-PM). The median baseline IOP was 21.0mmHg and the median baseline medication load was 3.0. At 6, 12 and 24 months, the complete success rate was 55.6%, 48.1% and 37.0% respectively. Qualified success at 6, 12 and 24 months was 81.5%, 74.1% and 63.0% respectively. The reduction in median IOP was from 21.0mmHg to 14mmHg at 6 months ($p<0.001$), 12 months ($p=0.002$) and 24 months ($p<0.001$). The reduction in median number of medications was from 3 to none at 6, 12 and 24 months ($p<0.001$). The hazard ratio (HR) of failure for complete success was 10.08 (2.26-45.07) ($p=0.002$) in the phaco-PM group as compared to standalone PM. There were no intraoperative complications. Postoperative adverse events requiring intervention occurred in 6 (22.2%) eyes. One eye required an open revision of the PM, 2 eyes required trabeculectomy and the rest had bleb needling or injection with antimetabolite.

Conclusions
The PM is a safe and effective surgical procedure that reduces IOP and burden of glaucoma medications.

P-0991

OCULAR HYPERTENSION SECONDARY TO ANIRIDIA: SURGICAL MANAGEMENT WITH PHACOEMULSIFICATION AND REPOSITIONING OF THE AMHED VALVE

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Background

Aniridia is defined as the partial or complete absence of the iris, which can be either congenital or acquired. Congenital aniridia, the most common phenotype, is a rare disorder characterized by poor development or absence of the iris and fovea, leading to reduced visual acuity and the presence of involuntary eye movements. Most cases of aniridia are associated with mutations or deletions in the PAX6 gene, located on the short arm of chromosome 11 (11p13), with a typical autosomal dominant inheritance pattern.

Methods

The case has been documented at the Fundación Hospital Nuestra Señora de La Luz I.A.P., a national ophthalmological referral center for the evaluation, treatment, and follow-up of multiple ocular diseases.

16-year-old male patient with no significant personal or perinatal medical history. Ophthalmological history of ocular hypertension, currently managed with dorzolamide/timolol every 12 hours in both eyes and latanoprostene bunod every 24 hours in both eyes treated with Ahmed valve implant + phacoemulsification with intraocular lens implantation in the right eye.

Results

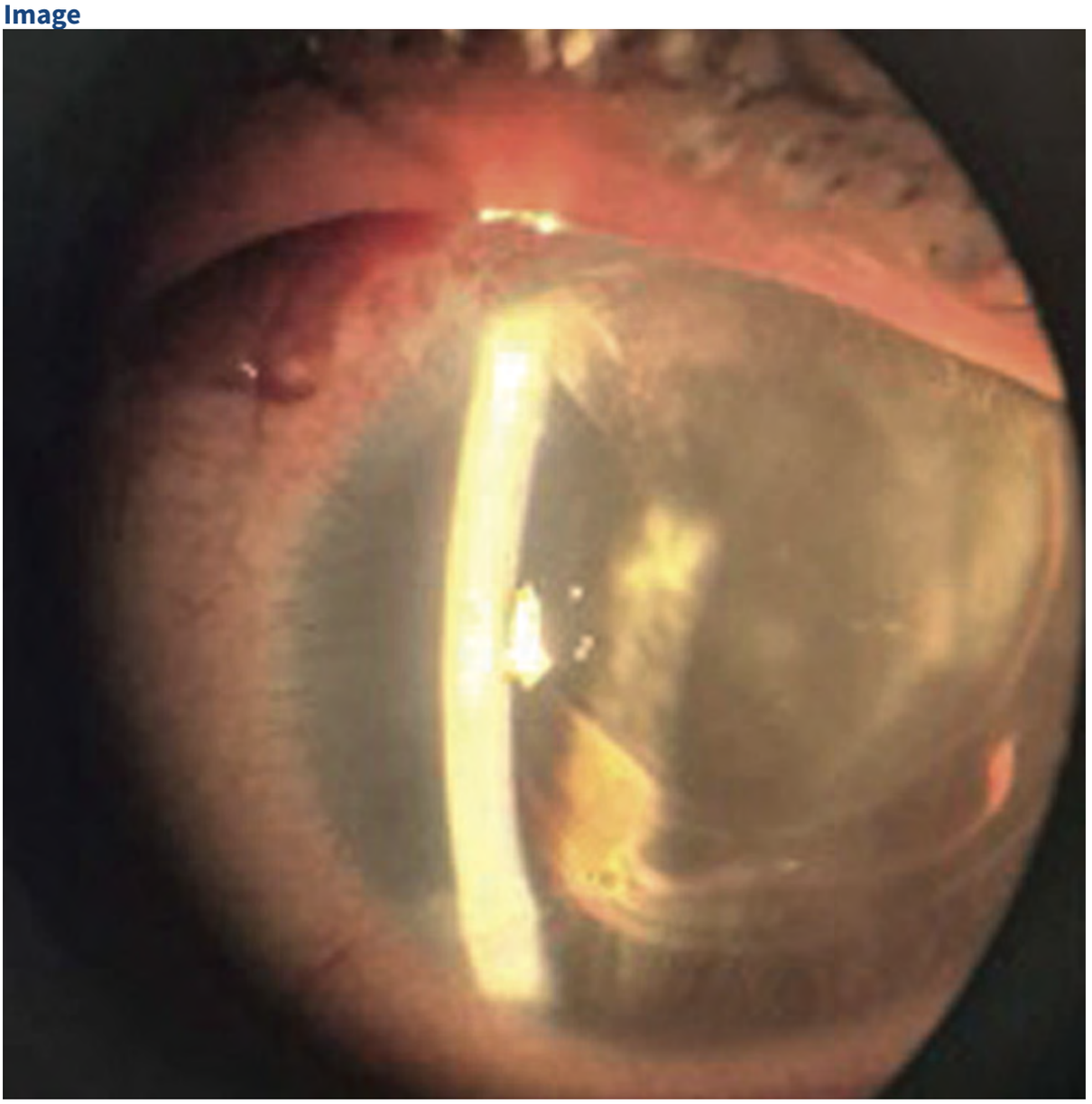
Diagnoses: Congenital aniridia in both eyes, pseudophakia in the right eye, keratopathy associated with aniridia in both eyes, secondary ocular hypertension in both eyes, foveal hypoplasia in the left eye.

During the assessments of the first postoperative week, the valve tube is not observed in the anterior chamber, and the intraocular pressure is 49 mmHg. An ultrasound biomicroscopy of the right eye is performed, revealing the following: Pseudophakia, with cyclodialysis observed at the meridians from 10 to 11 o'clock, and the valve tube located at the ciliary body level in the 10 o'clock meridian.

Plan: repositioning of valve tube in the right eye.

Discussion: In patients with ocular hypertension associated with aniridia, the response rate to both antihypertensive and systemic treatment is low (37.8%), which makes it particularly important to consider surgical treatment in these patients. Drainage devices, such as the Ahmed valve implant, are an effective and safe option, with a success rate of over 60% at 1 year. During cataract management, it is important to consider that they may have a fragile anterior capsule and alterations in the ciliary processes.

Image



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Conclusions

The Ahmed valve implant is a suitable option as an initial surgical treatment for controlling intraocular pressure in our patient.

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P-0993

TRABECULAR MICRO-BYPASS STENT IMPLANTATION WITH CATARACT EXTRACTION IN GLAUCOMA FOLLOWING REFRACTIVE SURGERY

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Background

Use of the trabecular micro-bypass stent with cataract surgery is well established to be safe and effective in primary open-angle glaucoma.

This study aimed to investigate the safety and efficacy of a trabecular micro-bypass stent in combination with cataract surgery in glaucoma after corneal refractive surgery

Methods

Baseline data was collected and compared to the following postoperative time points: 1 day, 1 week, 1 month out to 36 months (M36) after the procedure.

Results

At M36 there was a 25% reduction in IOP to 14.68 ± 3.0 ($P < .01$) from 19.50 ± 6.7 mmHg at baseline. The mean number of glaucoma medications was 0.75 ± 1.0 prior to the surgery and 0.59 ± 0.6 ($P > .05$) at 36 M. At the 36 M time-point, 95% of eyes had IOP ≤ 18 mmHg and 68% of eyes were ≤ 15 mmHg. No eyes underwent a secondary glaucoma procedure.

Conclusions

The insertion of a single trabecular micro-bypass stent in combination with cataract surgery effectively provides a sustained reduction in IOP up to 3 years after surgery in patients with glaucoma following corneal refractive surgery. The safety profile is favourable with low rate of IOP spikes and no patients requiring additional surgery. But, More data and longer follow up period are needed.

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P-0995

A CASE IN WHICH THE SURGICAL PROCEDURE WAS CHANGED FROM TRABECULECTOMY TO PRESERFLO MICROSHUNT SURGERY DURING THE OPERATION

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Background

To report a case of scleral flap rupture during trabeculectomy (TLE) for a patient with scleral thinning who had previously undergone an extracapsular lens extraction (ECCE), and the procedure was changed to Preserflo Microshunt surgery (PFM) based on intraoperative judgment.

Methods

A 48-year-old female with secondary uveitic glaucoma and a history of extracapsular cataract extraction (ECCE) was scheduled for trabeculectomy in the left eye. The upper nasal conjunctiva showed conjunctival scarring after TLE performed at another institution 24 years ago, and the upper temporal conjunctival and scleral scarring after ECCE was seen. An attempt was made to create a scleral flap through a limbal incision from the upper temporal quadrant, but the scleral flap was split about 2/3 near the base due to the thinning of the sclera caused by long-term uveitis and the overlap with the previous post-ECCE wound. Considering the risk of overfiltration, the flap was closed without creating a scleral window, and the PFM was inserted about 1 mm nasally from the scleral flap creation site. The patient's IOP remained in the mid-10s until the fourth postoperative month, but anti-glaucoma eye drops were added at the fifth postoperative month due to an increase in IOP in the low 20 mmHg. Needling was performed in the seventh postoperative month. Since then, the patient's IOP has remained in the low 10 mmHg range until the 10th month postoperatively. Corrected visual acuity was 0.5 and 0.7 before and 10 months after surgery, respectively.

Results

In a case where the scleral flap could not be created due to severe thinning of the sclera during trabeculectomy, changing the surgical method to PFM resulted in a decrease in intraocular pressure.

Conclusions

It was suggested that Preserflo Microshunt surgery may be an effective surgical technique for cases of thin sclera in which it is difficult to create a scleral flap for trabeculectomy.

P-0996

PHACOEMULSIFICATION VERSUS LASER PERIPHERAL IRIDOTOMY IN PRIMARY ANGLE CLOSURE: A PROSPECTIVE COMPARATIVE STUDY

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Background
To evaluate the efficacy and safety of primary phacoemulsification with posterior chamber intraocular lens implantation (PPI) versus laser peripheral iridotomy (LPI) in patients with primary angle closure (PAC)

Methods
In this prospective comparative study, out of 56 subjects with PAC, 30 subjects with visually significant cataract underwent PPI whereas 26 subjects underwent LPI as standard of care. The outcome measures were intraocular pressure (IOP), number of quadrants in which pigmented trabecular meshwork (PTM) visible on gonioscopy (n), best corrected visual acuity (BCVA), number of anti-glaucoma medications (AGM). The patients were evaluated on 1 week, 1 month, and 3 months.

Results
The patients who underwent PPI were older (61.93±1.27 years) as compared to patients who had LPI (54.96±1.65 years) (P = 0.001). Both the groups had female predilection (60% in PPI and 65.38% in LPI). The PPI group had significantly lower IOP (15.20±2.60) as compared to the LPI (18.42±4.56) at the last follow-up of 3 months (P = 0.003). On gonioscopy, both the groups had significant opening of angle (3.50±0.630 in PPI; 3.27±0.533 in LPI; P =0.000) but the mean 'n' were comparable between the two groups (P = 0.143). Also, the number of AGMs were significantly lower in PPI (0.066±0.253) versus LPI group (0.653±0.689)(P = 0.000). PPI group had improvement in BCVA (P = 0.000) whereas BCVA did not change significantly in LPI group (P = 0.183).

Conclusions
PPI causes significant lowering of IOP and fewer number of AGMs post operatively as compared to LPI in patients with PAC. It appears as an effective treatment in patients of PAC with visually significant cataract.

P-0997

PARS PLANA FILTRATION IN THE TREATMENT OF NANOPHTHALMOS SECONDARY ANGLE CLOSURE GLAUCOMA

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Background

Nanophthalmos (NO) is a rare condition that increases the risk of developing secondary angle-closure glaucoma (ACG). Surgical treatment for NO-ACG patients has shown limited success and carries a high risk of complications. Research on this patient population is scarce, and effective treatment options are currently unavailable. This study presents the outcomes of using pars plana filtration (PPF) surgery as a new treatment for NO-ACG.

Methods

This prospective non-randomized study enrolled consecutive patients with NO-ACG. All NO-ACG patients received PPF treatment (Figure 1). The study recorded intraocular pressure (IOP), best-corrected visual acuity (BCVA), the number of antiglaucoma medications, and surgery-related complications.

Results

This study included 10 eyes from 7 patients, with an average age of 45.5 ± 9.5 years (range, 30 to 59 years), and 6 of them were female. The mean axial length was 17.55 ± 1.54 mm (range, 15.60-20.39mm). The average follow-up duration was 14.5 ± 6.3 months (range 6-24months). At the final follow-up visit, there was a significantly reduction in average IOP from 43.9 ± 10.5 mmHg to 18.5 ± 4.1 mmHg ($p<0.001$), accompanied by a notable decrease in a median number of antiglaucoma medications from 4 to 0 ($p<0.001$). BCVA improved in 4 eyes (4/10). 8 eyes efficiently control IOP (8/10).1 eye experienced choroidal detachment (1/10), 1 eye encountered vitreous hemorrhage (1/10), and 1 eye underwent additional anti-glaucoma surgery (1/10). 7 eyes required bleb needling combined with

5-fluorouracil for management due to elevate IOP (7/10).

Image

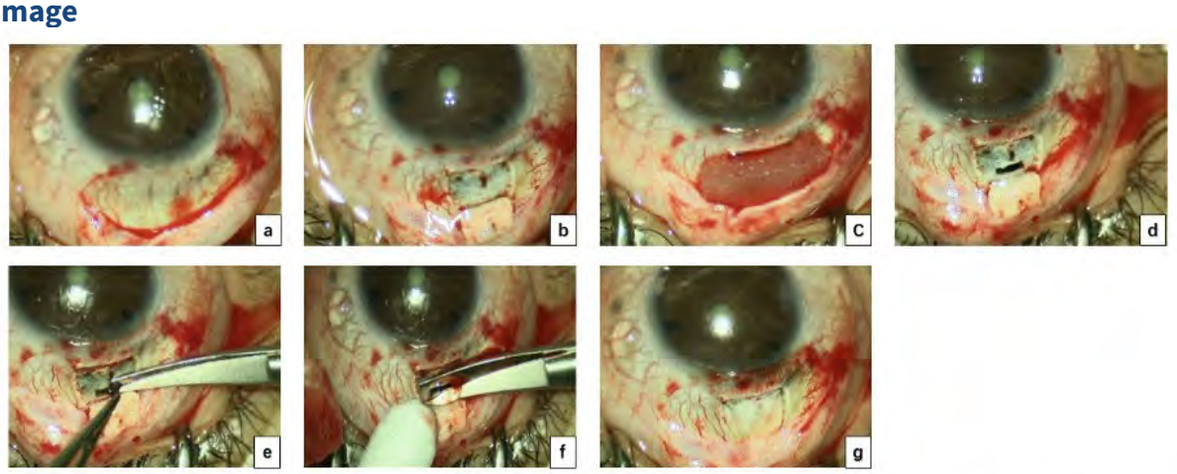

Figure 1 Surgical technique of the pars plana filtration. After conjunctival peritomy (a), a 4.0mm x 3.0mm reversed scleral flap is performed (b). A sponge soaked with 0.04% mitomycin C (MMC) is used (c), then a 0.5mm x 1.5mm full-thickness sclerectomy is performed (d). Scissors are used to cut down the pigment tissue (e) and local vitreous (f). The reversed scleral flap is sutured with 10-0 nylon (g).

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Conclusions

The outcome of pars plana filtration in these patients supports the use of this technique in cases of nanophthalmos secondary angle-closure-glaucoma in young patients when medical treatment fails to adequately control IOP.

P-0998

OUTCOMES OF PHACOEMULSIFICATION COMBINED WITH ENDOSCOPIC CYCLOPHOTOCOAGULATION AND ISTENT, IN OPEN-ANGLE GLAUCOMA – A META-ANALYSIS

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Background
Both iStent implantation and endoscopic cyclophotocoagulation (ECP) have each been demonstrated to be safe and effective in the surgical treatment of glaucoma. In recent years, the combined three-in-one Phacoemulsification-iStent-ECP procedure (ICE) has shown promise with greater intraocular pressure (IOP) and anti-glaucoma medication (AGM) reduction than the respective standalone procedures. This systematic review and meta-analysis (SRMA) aims to quantitatively evaluate the efficacy and safety of ICE in the management of open angle glaucoma (OAG).

Methods
A literature search was performed on Embase, PubMed and Cochrane Library from inception until 13 September 2024. All pilot, cohort, observational studies and randomised controlled trials including subjects undergoing ICE for OAG were included. Meta-analysis of continuous outcomes was performed using the meta routine in R version 4.3.1. Risk of bias of included studies was assessed using ROBIN-1.

Results
Four studies met the inclusion criteria, with three studies involving a pooled total of 163 eyes contributing to the meta-analysis. Two studies used the first-generation iStent while one study used the iStent inject. Reductions in mean IOP and medication burden were statistically significant at all timepoints up to 12 months post-operatively, with both indices demonstrating a sustained and increasing reduction compared to baseline, from post-operative months 3 to 12. The largest difference was observed at 12 months, with a decrease in mean IOP of 5.28 mmHg (95% CI: 1.93–8.63, $p<0.05$) and by 0.77 AGMs (95% CI: 0.50–1.04, $p<0.05$). ICE also demonstrated an overall excellent safety profile, with transient IOP spikes being the most common post-operative complication (<5%).

Conclusions
The ICE procedure delivers sustained reductions in both mean IOP and AGM, while maintaining an excellent safety profile, at least up to 12 months post-operatively, in the treatment of OAG. The favourable outcomes demonstrated by ICE may be attributed to the complementary mechanisms of both iStent implantation and ECP, the conjunctival-sparing nature of the procedure and preservation of the physiological aqueous outflow pathway.

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P-1000

ONE-YEAR COMPARATIVE OUTCOMES OF TRABECULECTOMY, EX-PRESS™, AND PRESERFLO™ SURGERIES BY A SINGLE SURGEON

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Background
Purpose: To evaluate the surgical success of three different glaucoma surgeries performed by the same surgeon.

Primary Outcomes: To assess surgical success at 6 and 12 months postoperatively.

Secondary Outcomes: To explore associations between surgical success and surgery type, phakic status, glaucoma etiology, use of mitomycin C (MMC), or postoperative complications.

Methods
This retrospective analysis included eyes undergoing trabeculectomy (TR), Ex-Press™ shunt (EX), and Preserflo™ MicroShunt (PR). TR and EX were performed from August 2014 to January 2018, and PR from July to October 2023. Eligible eyes had primary glaucomas (primary open-angle glaucoma [POAG], primary angle-closure glaucoma [PACG], and normal-tension glaucoma) or pseudoexfoliation glaucoma (PEX). Surgical outcomes were defined as:

- Complete Success (CS): IOP <21 mmHg or >20% reduction without medications.
- Qualified Success (QS): IOP <21 mmHg or >20% reduction with medications.
- Failure (F): IOP >21 mmHg or <20% reduction.

IOP was measured via Goldmann tonometry preoperatively and at day 1, week 1, months 1, 3, 6, and 12. Data were analyzed with SPSS (version 29.0) using T-tests and chi-square tests ($p<0.05$).

Results
Thirty-nine eyes (TR:18; EX:11; PR:10) of 21 men and 18 women were included (mean age: TR 60.89±11.2, EX 66.4±13.5, PR 70.9±9.2). Glaucoma types: POAG (51%), PACG (33%), PEX (13%), and normal-tension glaucoma (3%). Preoperative IOP and medications were significantly reduced in all groups ($p<0.001$). CS was achieved in TR (67% at 6 months, 57% at 12 months), EX (82%, 67%), and PR (50%, 57%). QS was achieved in TR (28%, 43%), EX (18%, 33%), and PR (38%, 29%). F was noted in TR (6%), and, in PR (13% at 6 months, 14% at 12 months). The most frequent complication was hypotony in the TR and EX groups, while hyphema was most common in the PR group. There was no significante association between surgical success and surgery type, phakic status, glaucoma etiology, use of mitomycin C (MMC), or postoperative complications.

Conclusions
While all surgeries significantly reduced IOP and medication use, Ex-Press™ showed the highest success rate. Hypotony and hyphema profiles differed, underscoring the importance of tailored approaches in glaucoma surgery. Further studies with larger sample sizes are needed to confirm these findings.

P-1001

EVALUATE THE EFFECTIVENESS OF PHACOEMULSIFICATION ALONG WITH GONIOSYNECHIALYSIS AND THE FACTORS AFFECTING THE CHANGE OF PERIPHERAL ANTERIOR SYNECHIAE

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Background
Phacoemulsification along with goniosynechialysis (Phaco-GSL) is a logical therapeutic approach for patients with primary angle-closure glaucoma (PACG) and cataract. In order to visual the structure of angle of anterior chamber, surgeons need to rotate the patient's head and tilt the surgical microscope during the operation, which is complicated. The aim of this study was to evaluate the effectiveness of the Phaco-GSL directly guide from the intraoperative gonioscope and analyze the factors resulting in the different change of peripheral anterior synechiae (PAS).

Methods
A review was conducted on 31 patients (34 eyes) who underwent Phaco-GSL between August, 2018 and October, 2023 in The First Affiliated Hospital of Tsinghua University. The extent of PAS was recorded before surgery. Phaco-GSL directly guide from the intraoperative gonioscope (VOLK) . Intraocular pressure (IOP), extent of PAS, best corrected visual acuity(BCVA), use of supplemental antiglaucoma medicine were collected and compared between preoperative and postoperative 1 monthly. The patients were divided into two groups according to the duration of disease from onset to operation. The changes of extent of PAS and IOP preoperative and postoperative 1 monthly were compared between two groups.

Results
IOP decreased from 20.0 (15.0,28.5) mmHg to 13.6±2.9mmHg. PAS decreased from 240(172.5,360)°to 90(52.5,157.5) °. BCVA increased from 0.30 (0.08,0.40) to 0.80 (0.50.1.00). The postoperative IOP and PAS was statistically lower than that preoperative (P<0.001). The BCVA was statistically higher than that preoperative (P<0.001). The number of antiglaucoma medicine was 2 (1,3) before operation. Only 1 patient needed use antiglaucoma medicine after surgery. The patients were divided into two groups according to the duration of disease. The decrease of extent of PAS in groups with duration ≤90 days (19eyes) was 180±90°, and in groups with duration > 90 days (15eyes) was 78±48°, the difference was statistically significant (P<0.001). The change of IOP in group with duration ≤90 days was 13 (2,23) mmHg , in group with duration >90 days was 4 (1,8) mmHg. The difference was no statistically significant.

Conclusions
Phaco-GSL is an effective surgical method for primary angle-closure glaucoma (PACG) and cataract patients in China. Patients with short duration of disease were ease to release more extent of PAS through surgery.

P-1002
TWO DISLODGED ISTENTS, TWO DIFFERENT MANAGEMENT STRATEGIES

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Background
Minimally-invasive trabecular bypass surgery is commonly performed for mild-moderate glaucoma. Although known for its high safety profile, rare complications can occur. This case report describes two patients with post-operative dislodgement of iStent W managed differently, both with eventual ideal outcomes.

Methods
Patient 1 was a 81-year old Chinese male who has left pseudoexfoliative glaucoma and Fuchs endothelial dystrophy with pre-operative visual acuity (VA) of 6/24 and intraocular pressure (IOP) of 18mmHg on 1 anti-glaucoma eyedrop. He underwent uneventful cataract surgery with 2 iStent W implantation. At post-operative week 1, it was noted that 1 iStent was dislodged in the inferior angle, with the other iStent remaining patent in the nasal quadrant. Conservative and surgical revision were offered and patient was keen for surgical retrieval and re-implantation of iStent(s). Intra-operatively, 2 new iStent W were implanted in the nasal quadrant in addition to the existing patent iStent. The dislodged iStent was retrieved from the inferior angle, threaded in the injector and re-implanted in the nasal quadrant as well, leaving the patient with a total of 4 iStents.

Patient 2 was a 80-year old Chinese female with primary angle closure glaucoma and Fuchs endothelial dystrophy with pre-operative VA 6/18 and IOP of 16mmHg on 1 anti-glaucoma eyedrop. She underwent uneventful cataract surgery with 2 iStent W implantation. At post-operative month (POM) 5, it was noted that 1 iStent was dislodged in the inferior angle. The other iStent remained patent in the nasal quadrant. Patient was not keen for surgical intervention and opted for conservative management.

Results
Patient 1 has been followed up till POM24. Best-corrected visual acuity is 6/12 and IOP is 13mmHg without anti-glaucoma medication. Patient 2 has been followed up till POM30. Best-corrected visual acuity is 6/7.5 and IOP is 12mmHg without anti-glaucoma medication. In both patients, endothelial cell count remains stable with no cornea decompensation.

Conclusions
Post-operative dislodgement of iStent is rare and not known to be reported in the current literature. The two cases illustrated suggest conservative and surgical revision are both viable options with good outcomes. It is important to have open disclosure and include patients in the discussion. The decision for surgical intervention may be guided by IOP control and endothelial cell count.

P-1003

A CASE OF SYMPATHETIC OPHTHALMIA FOLLOWING PRESERFLO® MICROSHUNT IMPLANTATION

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Background

Sympathetic ophthalmia is a rare complication of intraocular surgery. Although cases of sympathetic ophthalmia have been reported following glaucoma surgeries such as trabeculectomy and trabeculotomy, to the best of our knowledge, no cases associated with the PRESERFLO® MicroShunt (PMS) have been documented. We report a case of suspected sympathetic ophthalmia following PMS implantation.

Methods

A 42-year-old woman with a history of atopic dermatitis was referred to our hospital for persistent elevated IOP in the left eye. Her right eye was blind with no light perception due to total retinal detachment secondary to rhegmatogenous retinal detachment (RRD). Her left eye had a history of RRD in 2015 and intraocular lens dislocation in 2022, necessitating two vitrectomies. In 2023, the patient was diagnosed with Graves' disease and thyrotoxicosis and began treatment. During this time, she experienced eye pain, with intraocular pressure (IOP) of 44 mmHg in the left eye. Due to insufficient reduction of intraocular IOP with conservative treatment, she received two sessions of micropulse laser cyclophotocoagulation (MPCPC) for elevated IOP. As sufficient IOP reduction was not achieved with MPCPC, she was referred to our hospital for glaucoma surgery one month after undergoing MPCPC. On her initial visit, her best-corrected visual acuity (BCVA) in the left eye was 0.6, and the IOP was 31 mmHg despite treatment with five anti-glaucoma medications. PMS implantation was performed, and postoperative findings were closely monitored.

Results

Following PMS implantation, the patient experienced a decrease in visual acuity to hand motion and a reduction in IOP to 6 mmHg on postoperative day 3. Examination revealed choroidal folds, choroidal detachment, and serous retinal detachment without keratic precipitates or significant intraocular inflammation. A diagnosis of hypotony maculopathy was made, and anterior chamber air injection was performed on postoperative day 6. Although the IOP subsequently increased, no improvement in fundus findings was observed, raising suspicion of sympathetic ophthalmia. Steroid pulse therapy was initiated on postoperative day 10 and administered for three days, resulting in improvement. A second course of steroid pulse therapy followed, along with maintenance therapy of oral prednisolone at 50 mg/day. Filtration bleb revision surgery was performed on postoperative day 30 due to elevated IOP. Temporary worsening of fundus findings occurred after IOP reduction, but subsequent improvement was noted. By five months postoperatively, the choroidal detachment and serous retinal detachment had resolved completely. The patient tested positive for HLA-DR4. At one year postoperatively, her BCVA improved to 0.2, and her IOP stabilized at 15 mmHg. Oral prednisolone was tapered to 8 mg/day without any recurrence of the condition.

Conclusions

Sympathetic ophthalmia may occur following PMS implantation, warranting close monitoring and prompt management.

P-1004

GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) IN 17 EYES WITH PSEUDOEXFOLIATION GLAUCOMA

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Background
Purpose: To describe a case series of pseudoexfoliation glaucoma (PXG) patients treated with gonioscopy-assisted transluminal trabeculotomy (GATT).

Methods
Retrospective case series of all PXG patients who underwent GATT with a single surgeon with at least 6 months of postoperative follow-up.

Results
A total of 17 eyes from 16 PXG patients were included. Mean age was 79.0 years (range 68 to 93 years). Phaco-GATT was performed in 10 eyes from 9 patients, and GATT-alone was performed in 6 pseudophakic eyes and 1 phakic eye. Mean follow-up was 17.1 months (range 6- 40 months). Overall, the mean preoperative IOP was 21.2 ± 6.2 mmHg on 3.3 ± 0.7 medications, and the mean postoperative IOP was 12.8 ± 3.4 mmHg on 1.6 ± 1.4 medications. In the GATT-alone group, mean preoperative IOP was 25.0 ± 6.1 mmHg on 3.3 ± 0.7 1.0 medications, and mean postoperative IOP was 12.4 ± 3.9 mmHg on 1.9 ± 1.6 medications. In the phaco-GATT group, mean preoperative IOP was 18.5±4.6 mmHg on 3.3±0.6 medications, and mean postoperative IOP was 12.7±3.2 mmHg on 1.4±1.3 medications.

Conclusions
GATT is effective in patients with pseudoexfoliation glaucoma; further studies are needed to directly compare the safety and efficacy of GATT versus traditional glaucoma surgery.

P-1005

CHANGES OF CENTRAL AND PERIPHERAL CORNEAL ENDOTHELIAL CELL DENSITY AFTER DIFFERENT GLAUCOMA SURGERIES

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Background
Corneal endothelial cell density (ECD) loss may occur due to intraoperative surgical trauma in glaucoma surgery or postoperatively through chronic endothelial cell trauma, inflammation, or irritation. While previous studies have examined corneal endothelial cell changes after glaucoma surgery using non-contact specular microscopy, peripheral endothelial cell changes using contact specular microscopy remain unexplored. This study evaluates central corneal ECD (CCECD) and peripheral corneal ECD (PCECD) changes following trabeculectomy (TLE), EX-PRESS® (EX), and PreserFlo MicroShunt (PFM) procedures using both contact and non-contact microscopy methods.

Methods
We retrospectively analyzed patients who underwent TLE, EX, or PFM at Miyata Eye Hospital from September 2017, excluding those with intraocular surgery within the previous 3 months. Patients had open-angle glaucoma, exfoliation glaucoma, or secondary open-angle glaucoma. ECD was measured preoperatively and at 1, 3, and 6 months postoperatively using both contact and non-contact specular microscopy (CellChek C® and SL®) for CCECD, and contact microscopy for PCECD in the bleb area. We compared ECD rates among different surgical groups at each corneal location.

Results
The study included 12 TLE, 29 EX, and 16 PFM patients. At 6 months postoperatively, CCECD loss was -0.7% (TLE), -3.9% (EX), and -6.3% (PFM), with no significant differences between surgical groups. PCECD loss in the bleb area was -22.8% (TLE), -6.5% (EX), and -16.3% (PFM), with a significant difference only between TLE and EX (p=0.012). While there was no significant difference in postoperative PCECD decline after EX and PFM between 1M and 6M, significant PCECD loss was observed after TLE at 6M compared to 1M.

Conclusions
Different glaucoma surgical techniques demonstrate varying impacts on ECD loss, with EX showing the least effect on peripheral endothelial cell density. Contact specular microscopy appears to be more sensitive in detecting PCECD loss compared to non-contact methods.

P-1007

AIR INJECTION THROUGH A SCLERAL APPROACH FOR REPAIR OF DESCEMET MEMBRANE DETACHMENT FOLLOWING TRABECULECTOMY: A CASE REPORT

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Background

Surgical management of large Descemet membrane detachment (DMD) includes injection of tamponading agents and transcorneal suture fixation through a clear corneal approach. We report an uncommon management for a case of severe DMD following scleral flap revision and anterior chamber (AC) reformation after trabeculectomy.

Methods

This is a case report presenting the repair of severe DMD through a scleral approach following AC reformation post-trabeculectomy.

Results

A 76-year old female with uncontrolled chronic angle closure glaucoma and cataract, with a pre-op visual acuity (VA) of 20/160, underwent trabeculectomy of the right eye. On the 2nd postoperative day, the eye was hypotonic with a shallow AC and choroidal detachment due to an overfiltering bleb. AC reformation through the existing scleral flap with revision was performed. However, DMD was observed three days after.

Repair of DMD was initially done by injecting air at the slit lamp using a gauge 30 needle through clear cornea, resulting in partial reattachment of the DMD. However, addition of more air resulted in further separation of the Descemet membrane (DM). After the intracameral air decreased over two days, the patient was brought to the operating room where air was injected into the AC using a gauge 30 needle through a new rectangular scleral flap 2 mm from the 9 o'clock limbus. Complete reattachment of the DM was visualized.

Two months post-operatively, the VA fluctuated to counting fingers, with an IOP of 10 mmHg and with complete resolution of the DMD and the choroidal detachment.

Image

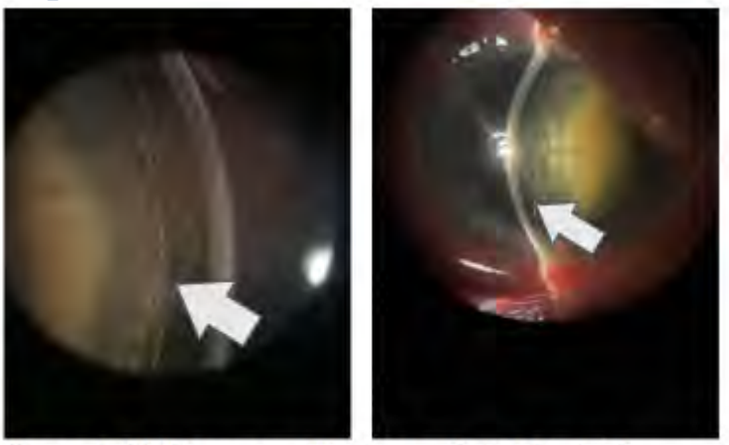

Figure 1. DMD seen on slit-lamp on Day 3 Post-AC reformation and Scleral Flap Revision; (a) under 25x magnification, (b) under 10x magnification. **(DM separated from corneal stroma, pointed by white arrows)**

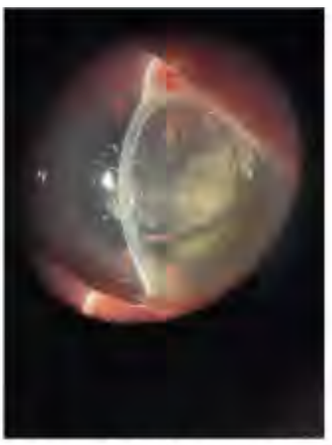

Figure 2. DMD resolution seen on slit-lamp at 2 months Post-trabeculectomy, under 10x magnification

Figure 3. Anterior segment - Optical Coherence Tomography (AS-OCT) demonstrated shallow AC **(pointed by blue arrow)** observed at Day 2 Post-trabeculectomy

Figure 4. AS-OCT showed DMD **(DM separated from corneal stroma, pointed by yellow arrow)** at Day 3 Post-AC reformation and Scleral Flap Revision

Figure 5. AS-OCT showed DM still separated from stroma **(pointed by yellow arrow)** following initial attempt at DMD repair

Figure 6. AS-OCT showed complete resolution of DMD, 2 months post-trabeculectomy

Conclusions

Patients with hypotonous globes following trabeculectomy are at risk of developing DMD resulting from inadvertent insertion of instruments between the DM and stroma. For severe DMD and a shallow to flat AC when AC reformation through a clear cornea is technically challenging, injection of air through a scleral flap incision may be considered.

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P-1008

EFFECTIVENESS AND SAFETY OF PRESERFLO MICROSHUNT TUBE COATING TECHNIQUE

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Background

Preserflo MicroShunt implantation is a glaucoma surgery classified as filtration surgery; Preserflo MicroShunt implantation can also be considered minimally invasive glaucoma surgery (MIGS). However, the Preserflo MicroShunt implantation can have complications that result in exposure of the device.We developed a simple method to cover the device during the Preserflo MicroShunt implantation and investigated its effectiveness and safety.

Methods

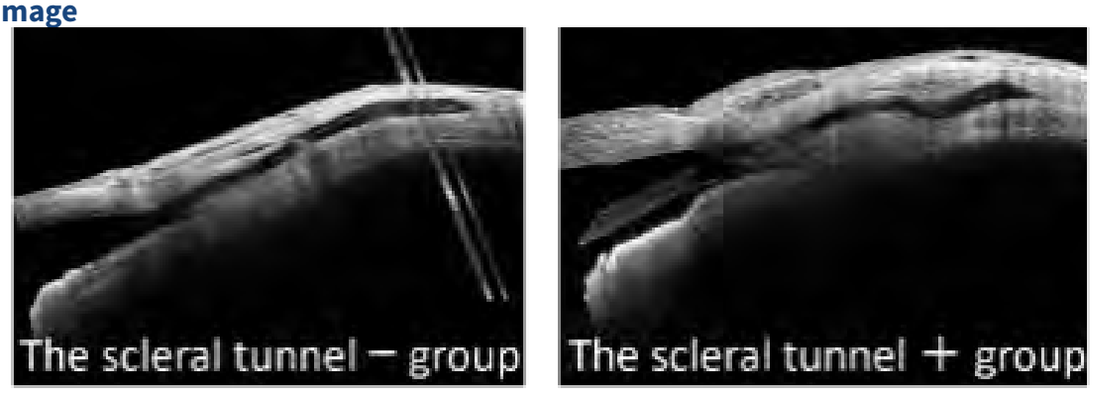
Ten patients with 20 eyes (62.5 years old) who had undergone Preserflo MicroShunt implantation standalone for open-angle glaucoma and were available for follow-up 12 months after surgery were included in the study. One eye had the posterior end of the tube implanted subconjunctivally and over the sclera (scleral tunnel - group), and the other eye had a scleral tunnel created and the posterior end of the tube implanted under it (scleral tunnel + group). Postoperative intraocular pressure, cumulative survival rate, and postoperative complications were compared. the location of the tube was evaluated by anterior segment OCT imaging.

Results

The scleral tunnel - group showed a significant decrease in IOP from 18.2 mmHg preoperatively to 12.0 mmHg at 12 months postoperatively. The scleral tunnel + group showed significant IOP reduction from 17.4 mmHg preoperatively to 12.7 mmHg postoperatively.

The cumulative survival rate was 70.0% in the scleral tunnel - group and 90.0% in the scleral tunnel + group, defined as a discontinuation of the procedure at 20 mmHg or greater, prolonged low IOP, or reoperation after one month postoperatively. In the scleral tunnel - group, there was one case of exposed scleral tube, but in the scleral tunnel + group, there were no cases of exposed scleral tubes.

Image



Conclusions

The results suggest that scleral tunnel method may be a safe and effective method for Preserflo MicroShunt implantation.

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P-1012

USE OF THE RESTRICTIVE MATRESS SUTURE DURING EXPRESS GLAUCOMA FILTERING PROCEDURE TO PREVENT THE EARLY HYPOTONY

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Background

Ocular hypotony might be serious early or late postoperative complication in filtering surgery in glaucoma patients. Hypotony leads to anterior chamber shallowing , small and big choroidal effusions followed by hypotonic maculopathy. All those conditions necessitate extra surgical care which makes the procedure less effective and more unconvenient to the patient.

Methods

Author describes surgical technique with the fornix-based conjunctival flap and the use of 10-0 Nylon restrictive matress suture over the scleral flap during Ex Press glaucoma implant placement. The suture suppose to bridge over the scleral flap and push on the external ostium of the implant under the flap.

Results

Use of this technique seems to minimise problem with early hypotony after this type of the glaucoma filtering procedure. Results of this prospective study will be presented at the Congress because it is currently ongoing.

Conclusions

Restrictive matress sutures seem to be a relatively easy way to prevent early hypotony in the patients who undergo Ex Press implant surgery. Meticulous conjunctival wound closure is quite important for the final success.

P-1013

["CHOROIDAL DETACHMENT DILEMMAS: INTEGRATING MEDICAL AND SURGICAL STRATEGIES"

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Background

Choroidal detachment (CD) is a rare yet critical condition often associated with ocular hypotony, trauma, or post-surgical complications. Managing CD can be challenging due to its multifactorial nature, requiring a nuanced understanding of pathophysiology and treatment modalities. While medical therapy often suffices in early or mild cases, persistent or severe detachments necessitate surgical intervention. Integrating both approaches is crucial for optimizing outcomes and minimizing complications.complete resolution of CD:

Methods

A retrospective review was conducted on 10 cases of choroidal detachment managed at a tertiary eye center. Patients were classified based on severity, underlying etiology, and initial response to medical treatment.

- Medical Management: Included cycloplegics, corticosteroids, and intraocular pressure (IOP)-raising medications.
- Surgical Approach: choroidal drainage

Key outcome measures were anatomical reattachment, visual acuity improvement, and complication rates.

Results

Out of 10 cases, 8 achieved complete resolution of CD:

- Medical Therapy Success (5 cases): Early-stage CD resolved within 2–4 weeks.
- Surgical Success (3 cases): Severe CD showed rapid reattachment post-surgery.
- Failure in 2 cases: Persistent detachment due to delayed presentation and underlying systemic disease.

Overall, integrated medical and surgical approaches demonstrated an 80% success rate.

Conclusions

Choroidal detachment management demands a tailored strategy, balancing conservative and surgical measures. Early identification and aggressive medical therapy yield favorable outcomes in most cases, while timely surgical intervention is pivotal for refractory or advanced detachments. A multidisciplinary approach is vital to addressing this complex dilemma effectively.

P-1014

COMPARATIVE LONG-TERM OUTCOMES OF TUBE FLUSHING VERSUS TRANSSCLERAL CYCLOPHOTOCOAGULATION IN REFRACTORY GLAUCOMA PATIENTS WITH PRIOR TUBE SHUNT

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Background
Transscleral cyclophotocoagulation (CPC) and tube flushing (TF) are two notable surgical options for managing refractory glaucoma despite the presence of a preexisting tube shunt. However, their long-term outcomes remain poorly characterized.

Methods
A single-center retrospective cohort study was conducted on patients with heterogenous and diverse types of refractory glaucoma despite medications and a tube shunt in their eye. Two interventions were considered: TF and CPC. The primary outcome was the reduction in IOP from baseline. Secondary outcomes included surgical success, best-corrected visual acuity (BCVA), number of glaucoma medications (NOM), oral acetazolamide use, cup-to-disc ratio, retinal nerve fiber layer thickness, visual field (VF) parameters, and the need for further glaucoma surgeries. The mean follow-up duration was 5.33 (1.83) years for TF and 9.38 (3.90) years for CPC.

Results
The study included 23 eyes of 21 patients (mean age 38.52 [22.42] years) treated with TF, and 8 eyes of 8 patients (mean age 37.25 [22.95] years) treated with CPC. At baseline, the TF cohort had a mean IOP of 21.26 (6.43) mmHg on 2.39 (1.27) medications, with a VF mean deviation (MD) of –19.12 (8.55). At final follow-up, IOP for TF patients was 16.95 (6.40) mmHg on 2.30 (1.46) medications, with a VF MD of –17.65 (9.80). Intra-ocular pressure was reduced by 19.65(42.12)%.BCVA in the TF group worsened from 0.76 (0.69) to 1.02 (0.82).

For the CPC cohort, baseline IOP was 32.5 (10.57) mmHg on 3.63 (0.92) medications, with a VF MD of –9.22 (9.90). At final follow-up, IOP significantly decreased to 17 (11.97) mmHg on 2.5 (1.20) medications, with a VF MD of –14.78 (9.09). Intra-ocular pressure was reduced by 45.88(37.07)%.BCVA worsened from 0.63 (0.37) to 0.82 (0.66).

Difference in intra-ocular pressure reduction between the two cohorts was non-significant (0.1859). Both cohorts experienced a significant reduction in IOP and number of medications at final follow-up, with no significant changes in VF parameters. Between the two groups, there were no statistically significant differences in final IOP (p=0.8640), BCVA (p=0.5871), or NOM (p=0.6562). Surgical success at final follow-up was achieved in 37.5% (3 eyes) of the CPC cohort and 14.29% (3 eyes) of the TF cohort, with no significant difference between groups. Additional glaucoma procedures were required in 33.3% (7 eyes) of the TF cohort and in 62.5% (5 eyes) of the CPC cohort.

Conclusions

Our findings indicate that both TF and transscleral cyclophotocoagulation offer limited long-term effectiveness in managing refractory glaucoma in the presence of a preexisting glaucoma drainage device. This data may inform clinical decision-making and highlight the need for more effective long-term solutions in this challenging patient population.

P-1016
TITLE A CASE SERIES TO PILOT A STEP LADDER MODEL TO MIGS

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Background
Glaucoma is characterized by chronic optic neuropathy with correlating visual field defects .Amongst the many Risk factors the most significant modifiable is the raised Intra Ocular Pressure. To Reduce the same is the Main stay of management for Glaucoma The Surgical armamentarium has the advent of the Microinvasive Glaucoma Surgery .In this case series we highlight a pilot as a Step ladder module to MIGS.

Methods
All the cases were performed by a Single Surgeon .The Step ladder approach was commenced with performing regular Intraoperative Gonioscopy to aid to stabilize the intraoperative coordination and Acquisition of skills .The cases were randomly grouped for the indicated Surgical procedure into Either group over a period of four months so BANG(Bent ab interno needle goniotomy)/Kahook Dual Blade goniotomy could be performed in the patients.The Groups were marked as A and B respectively .All Patients were evalued for the number of Anti Glaucoma Medications (AGM) before and after the Surgical procedures .Pre and post operative IOP was evaluated at post op day 1,Week 1,Month 1 and 18 months.The Structured template of quality of life was administered In the local language after validation.The Questionnaire had four items and an overall index which was recorded at all post op visits by grading response on Likert scale (1-5) With 1-much Worse, 2 -Worse,3,No change ,4-Better ,5-Very Much Better.

Results
Intragroup analysis demonstrated significant changes in the distribution of AGMs from preoperative to postoperative status within both groups with notable reduction .Pre-operatively, the mean IOP was 16.20 ± 4.32 mmHg in Group A and 15.00 ± 1.73 mmHg in Group B The control of Post operative IOP was significantly lower in the First post op week in the Group A followed by Group B in second third fourth weeks.For overall QOL, both groups consistently maintained a mean score of 4.00 ± 0.00 across all time points, with no significant intergroup or intragroup differences.The findings indicate that while pain and satisfaction showed some intergroup differences initially, most QOL components were consistently high across both groups throughout the follow-up period.

Conclusions
The comparitive parameters amongst BANG and KDB goniotomy does not reveal a significant difference in post Operative IOP control or quality of life . however BANG is more economical than the KDB goniotomy.We propose the skills Acquisition for MIGS from Beginner to being proficient to be achieved by deliberate practice and feedback .The competency ladder can be herald with Intraoperative Gonioscopy to BANG ,and KDB Goniotomies .The number for cases for each level of Competency can be assigned as the proficiency in the procedure is achieved .The horizon for Glaucoma Surgery is MIGS, this emphasizes the importance of Millennial Glaucoma Specialists to be proficient in the same to surgically manage Early to Moderate Glaucoma cases .

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P-1017

5FLUOROURACIL (5FU) INJECTION DURING CATARACT SURGERY FOR PATIENTS WITH PREVIOUS TRABECULECTOMY: A COMPARATIVE CASE SERIES

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Background
Trabeculectomy is the Gold Standard IOP lowering surgery. To prevent fibrosis and failure of the trabeculectomy, an anti-scaring agent such as MitomycinC or 5Fluorouracil (5FU), is used directly at the surgical area during surgery. Previously established 50% of patients will require cataract surgery within the first 5 years of trabeculectomy surgery. Furthermore, 33% of trabeculectomies fail after cataract surgery. One of the risk factors of trabeculectomy failure, is intra-ocular inflammation causing fibrosis of the filtration area. To decrease inflammation and consequent scarring, post cataract extraction, 5FU injections can be used during a cataract operation or thereafter. Only a few studies examined 5FU injection for patients having cataract surgery after a trabeculectomy, and only one study reviewed the injection of 5FU during cataract surgery.

Methods
A retrospective study reviewing patients with a functioning trabeculectomy and later cataract surgery. 12 cases received a 5FU sub-conjunctival injection during cataract extraction (5FU group), and 11 cases did not receive 5FU (non-5FU) at the point of cataract surgery. All surgeries were performed at Carmel Medical Center between 2013 and 2024. The duration of time taken from trabeculectomy to cataract extraction was noted. IOP, the usage of glaucoma medications, the optic nerve thickness were reveiwed.

Results
23 patients with a prior trabeculectomy underwent cataract extraction, 12 patients received a 5FU injection at the time of cataract extraction and 11 did not. Cataract extraction occurred 33 months on average after the initial trabeculectomy in the 5FU group (15-70 months) and 19 months on average (10-34 months) after trab in the non injected group (p=0.019). 55% (12) were male. The patients in the 5FU group were 73.5±7.8 years old, and in the non-5FU group ere 69.1±10.1 years old (p=0.23). 33% (4) of patients in the 5FU and 45.5% (5) of patients in the non-5FU group received topical medications prior to cataract extraction. All patients had an uneventful cataract extraction. 6 months following cataract extraction, the 5FU group had a 3.18mmHg reduction in IOP, while the non-5FU group had a 0.33mmHg increase in IOP. This however was not statistically significant (p=0.08). Also at 6 months after cataract extraction only 16% (2) patients in the 5FU group had an increase in medications to lower IOP compared to 27.2% (3) in the non-5FU group. At 12 months after cataract extraction only 16% (2 patients) in the 5FU group and 33% of cases in the non-5FU group had increased IOP above target level. No adverse events were reported during the post operative period with the usage of 5FU.

Conclusions
The 5FU group showed a 3.18mmHg IOP reduction at 6 months post op. This group also needed fewer medication to keep the IOP under control. Overall the injection of 5FU at the time of cataract extraction is effective in keeping a functioning trabeculectomy and the target IOP, and is safe without significant side effects.

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P-1018
XX

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Background
Paul Glaucoma Implant (PGI) requires initial flow restriction to prevent hypotony, which can be achieved by ligating it or placing an intraluminal stent in the tube. The most common approach is to use a Prolene 6-0 suture as a stent to reduce the effective lumen diameter. The Prolene stent can be removed at a later timepoint in an attempt to lower the intraocular pressure (IOP) if desired. Removing the stent early may induce hypotony, whereas there may be no effect if it is removed too late. When to remove the stent and what to expect in terms of pressure drop has not been tested in a standardized manner.

The purpose of this study was to investigate the effect on the intraocular pressure when the stent was removed after approximately 3 months after surgery.

Methods
Thirty-three consecutive patients that underwent mitomycin C (0.4mg/ml for three minutes) augmented PGI surgery was included in this study. An intraluminal Prolene 6-0 was placed in all PGI tubes. All patients had factors for surgical failure for trabeculectomy (previously failed trabeculectomy, oil filled eyes, neovascular glaucoma, uveitis or penetrating keratopasty).

Results
The stent was removed at a median of 105 days (interquartile range 91-129 days). The median IOP before stent removal was 22mmHg (interquartile range 18-24mmHg) on no glaucoma medications. After removal of the Prolene stent median IOP was 13mmHg (interquartile range 10-18). Median IOP reduction was 9.5mmHg (interquartile range 4 – 13.5mmHg). Three patients did not experience a drop in IOP. Maximal IOP drop was 20mmHg. One patient developed clinical hypotony (shallowing of the anterior chamber and choroidal effusions) that was resolved by ligating the tube with a Vicryl 7-0. After resolution of the suture hypotony did not reappear.

Conclusions
Removing the intraluminal Prolene 6-0 after three months from a PGI result in an IOP reduction in most patients while hypotony was rare and appears a safe yet effective timepoint.

P-1019

EFFICACY AND SAFETY OF XEN63 IMPLANT IN PATIENTS WITH OPEN-ANGLE GLAUCOMA: A TWO-CENTERS RETROSPECTIVE STUDY

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Background
The body of evidence assessing the efficacy of the new XEN63 implant remains sparse.

The current study aimed to evaluate the effectiveness and safety of XEN63 device, either alone or in combination with cataract surgery, in patients with OAG and PXG

Methods
This was a retrospective, open-label, bicentric study on consecutive patients with OAG or PXG undergoing a XEN63 implant, either standalone or in combination with phacoemulsification.

Patients aged ≥40 years with a clinical diagnosis of glaucoma who to achieve target intraocular pressure (IOP) despite MMT or were intolerant to ocular hypotensive treatments were included. The XEN was implanted ad interno with closed conjunctiva. Intraoperative needling was mandatory if the device was not free of Tenon's adhesions. The primary endpoint was complete success. Failure was defined as : (1) IOP < 6 mmHg with vision loss >two lines from preoperative, (2) IOP >18 mmHg, (3) < 20% IOP reduction, (4) use of ocular hypotensive medications, (5) need for surgical, or (6) no light perception vision.

Secondary outcomes included qualified success, mean IOP, ocular hypotensive medication usage, and BCVA. Complications, postoperative interventions, revisions, and reoperations were documented.

Results
104 patients were included. 68.3%underwent a standalone intervention, while 33 31.7% a combined procedure. 51.0% were treated at Center 1, whereas 49.0% were treated at Center 2. 89.4% eyes were diagnosed with POAG and 10.6% with PXG.

The success rate was 79.8% in the overall study sample, 81.7% in the XEN63 standalone group; and 75.8% in the Combined group (p=0.4851). Complete success rate was 58.7% ; 66.2% ; and 42.4% in the overall study population, XEN63 standalone group, and combined group, respectively; with a statistically significant difference between the groups (p=0.0224).

The mean IOP decreased significantly from 22.7±4.4 mmHg to 13.9±5.2 mmHg at month-12 (p<0.0001. Repeated ANOVA). There were no significant differences in the mean IOP decrease between the two centers. 30 eyes had numerical hypotony (IOP<6 mmHg) at postoperative day-1, which was successfully resolved without sequelae at month-1 in 24 eyes. Hypotony was subclinical, without maculopathy, in all cases except one, which was successfully resolved at month-6. Two eyes (1.9%) had endophthalmitis at month 6 and 9.

Conclusions

While the XEN63 implant effectively reduced intraocular pressure and decreased the need for ocular hypotensive medications in eyes with open-angle glaucoma, the incidence of hypotony was elevated. Nevertheless, it was transient and clinically insignificant in all cases except one.

Interestingly, the complete success rate was significantly higher in the XEN63 standalone group compared to the combined surgery group. Furthermore, a greater proportion of patients treated with XEN63 standalone achieved low intraocular pressures (≤ 14 mmHg and ≤ 12 mmHg) at month 12, compared to those in the combined surgery group.

P-1020

SURGICAL OUTCOMES OF PHACOEMULSIFICATION WITH OR WITHOUT GONIOSYNECHIALYSIS IN PRIMARY ANGLE CLOSURE DISEASE: A RETROSPECTIVE COHORT STUDY

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Background
With advancing technology and techniques in cataract surgery, the role of phacoemulsification in the management of angle closure has proven to be valuable not only in restoring visual acuity, but also lowering intraocular pressure (IOP) and restoring angle anatomy giving it an advantage over laser iridotomy and filtering surgery. There are differing opinions and evidence regarding the utility of goniosynechialysis (GSL) compared to plain phaco. The study determines the visual acuity, IOP, number of medications and refractive outcomes in patients with primary angle closure disease (ACD) managed with phaco with or without GSL. The study also determines the common complications encountered in these cases.

Methods
This retrospective cohort study followed 196 eyes diagnosed with primary ACD that underwent phaco or phaco-GSL for a minimum of 6 months. Their clinical profile, preoperative and postoperative best corrected visual acuity, IOP, and number of medications were recorded and analyzed. Postoperative refractions, intraoperative or postoperative complications were also compared between phaco and phaco-GSL groups and along the spectrum of angle closure disease (PACS, PAC, PACG).

Results
A total of 196 eyes were included (146 phaco and 50 phaco-GSL) with a mean follow-up period of 13.7 months. The median baseline visual acuity was logMAR 0.4 (IQR 0.5), and final was 0.08 (IQR 0.18). The median preoperative IOP was 17 (IQR 12), and final was 12 (IQR 4). The median medication count was 1, and on final follow up was 0. The phaco-GSL group had higher IOPs and more anti-glaucoma medications compared to the phaco group at baseline. The visual acuity, IOP, number of medications and refractive outcomes between the two patient groups are not significantly different. The average refraction in spherical equivalent at the most recent consult is -0.36 diopters. More patients in the phaco group (6.16% vs 2%) required additional IOP-lowering surgery within 6 months postoperatively, but this difference was not statistically significant. The rates of complications among the two groups are likewise not significantly different.

Conclusions
Phacoemulsification is a reasonable first-line treatment option in cataractous eyes with primary ACD, offering improved visual acuity, decreased IOP, reduced number of anti-glaucoma medications with minimal residual refractive error. Phaco-GSL may be considered for eyes with more significant degrees of synechial closure or more elevated IOPs.

P-1021

6-MONTH OUTCOMES OF COMBINED PHACOEMULSIFICATION AND ISTENT INJECTION IN CAMBODIAN GLAUCOMA PATIENTS

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Background
To evaluate the safety and efficacy of the iStent inject device combined with phacoemulsification in Cambodian eyes with glaucoma, Primary angle closure glaucoma (PACG) or Primary open angle glaucoma (POAG).

Methods
An observational study of combined phacoemulsification and iStent injection cases performed in Khmer-Soviet Friendship Hospital, Cambodia from June 2024 to December 2024 on patients with co-existing cataracts and glaucoma on at least one glaucoma medication. Postoperatively, patients were assessed on days 1 and 7, and months 1, 3, 6. Outcome measures included intraocular pressure (IOP), number of glaucoma eyedrop medications, and surgical complications.

Results
There were 6 eyes of 6 patients with a mean age of 56.6 ± 6.8 years underwent iStent inject implantation with phacoemulsification. Pre-operatively, mean IOP was 23±6.1mmHg and number of medications was 1.0 ±0.7. At 6 months the mean IOP reduction was 9.5 ± 7.3 with an addition reduction of glaucoma medications of 1.0±0.5. There was no complication intra-operatively occurred. One case of cystoid macular edema due to previous BRVO was observed.

Conclusions
Combined phacoemulsification and iStent inject surgery demonstrate a significant and sustained reduction in both IOP and number of glaucoma medications. Overall, there is a good safety profile for iStent inject.

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P-1022

THE ROAD LESS TRAVELED–CILIARY SULCUS IMPLANTATION OF PRESERVFLO MICROSHUNT

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Background

We describe a 64-year-old patient that, despite maximal tolerated medical therapy (MTMT) and two failed glaucoma surgeries, suffered from uncontrolled left eye intraocular pressure (IOP). The patient underwent implantation of the PRESERFLO MicroShunt. The shunt was placed nasally in an area of unscarred conjunctiva, with the anterior part of the shunt inserted into the ciliary sulcus. The location of the tube was verified using ultrasound biomicroscopy (UBM).

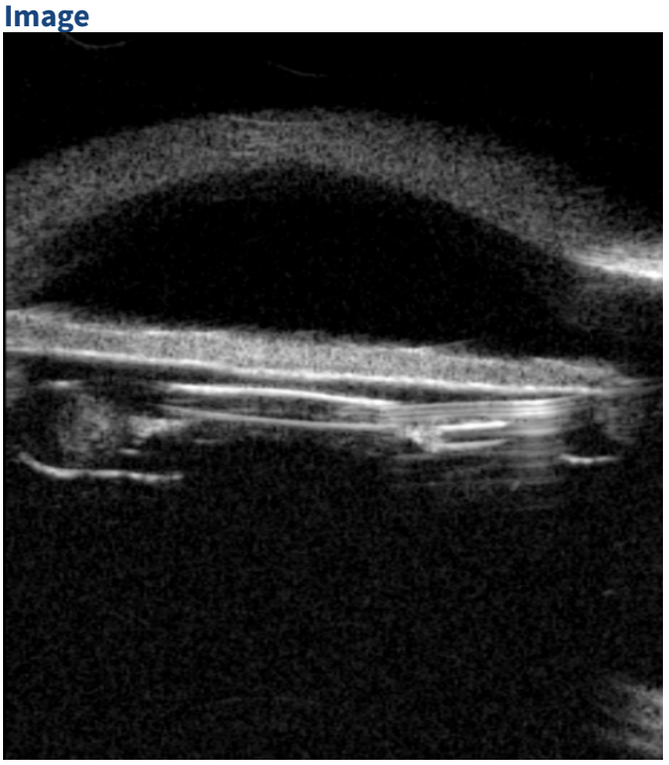
Methods

A fornix-based conjunctival flap was created in the superior-nasal quadrant of the left eye. The episclera and sclera were treated with three sponges soaked in 0.4 mg/mL mitomycin C (MMC) for 3 minutes, placed away from the corneal limbus, and then meticulously rinsed with balanced salt solution (BSS). A scleral tunnel was created starting 3 mm posterior to the limbus. A 25G angled needle was then used to enter the ciliary sulcus at a steeper angle than usual. The location was verified by elevating the tip of the needle and observing the imprint on the iris (Figure 2). The implant was inserted into the scleral tunnel with the device's fins fitting tightly into the tunnel's ostium. Patency was confirmed by the visible fistulation of aqueous humor at the end of the shunt. The Preservflo MicroShunt was then sutured to the sclera with a single 10-0 nylon suture. The Tenon's capsule and conjunctiva were reapproximated to the limbus and secured with two absorbable 10-0 nylon sutures and one 10-0 mattress suture, with the knots buried in the tissue. At the end of surgery Sub tenon injection of 0.1ml of Healaflow (Swiss Aptissen) at bleb location in addition to Subconjunctival steroids and antibiotics.

Results

Postoperatively, the patient's IOP dropped to 6 mmHg on the first day and stabilized at 11 mmHg by the six-month mark. An elevated, posteriorly located superior bleb was observed, and the patient no longer required additional topical medications. The endothelial cell count (ECC) remained stable, with no signs of corneal edema. The patient did not experience any serious post operative complications.

Image



Conclusions

Implantation of the PRESERFLO MicroShunt into the ciliary sulcus appears to be a viable option for patients at high risk of corneal decompensation, offering effective IOP control while minimizing endothelial cell loss. Further studies with larger patient groups are needed to better evaluate the safety and efficacy of this technique.

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P-1023

A STITCH IN TIME SAVES SIGHT: EARLY INTERVENTION IN CONGENITAL GLAUCOMA WITH STURGE-WEBER SYNDROME

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Background

To report the outcomes and challenges of performing a combined trabeculotomy-trabeculectomy on a 15-day-old infant diagnosed with congenital glaucoma and Sturge-Weber syndrome.

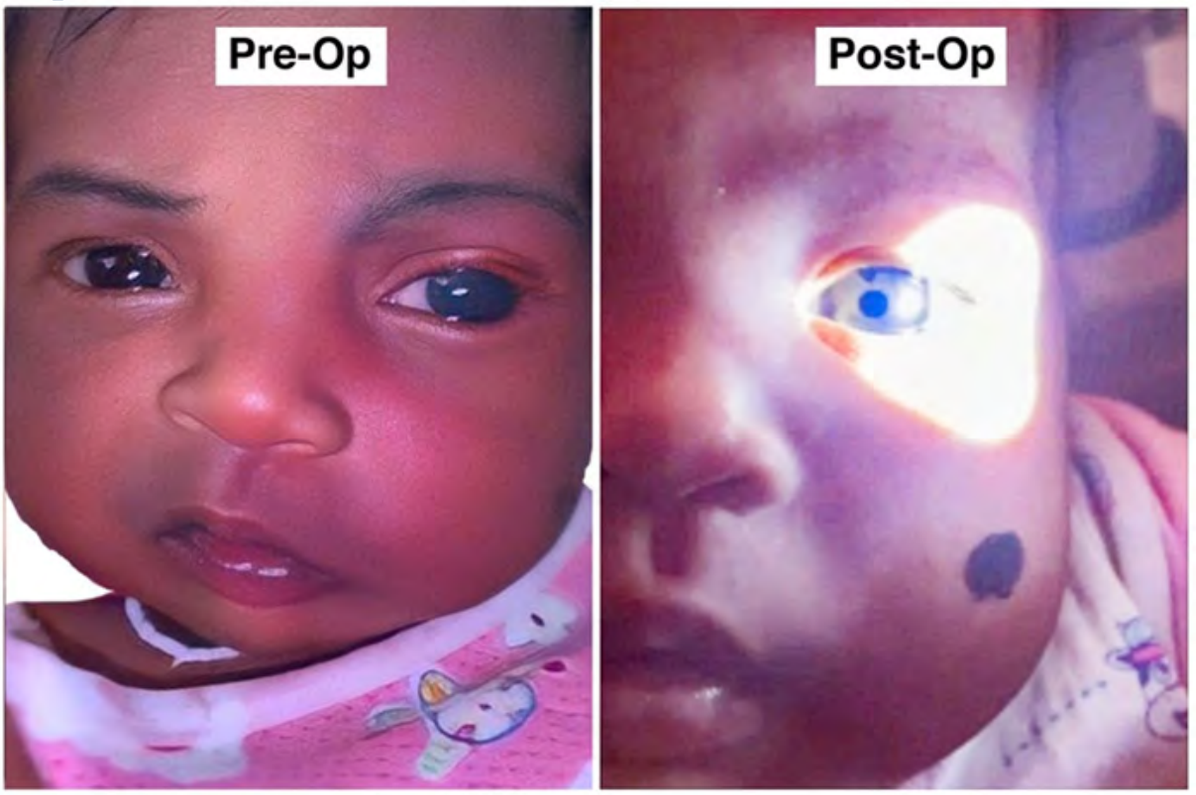
Methods

The patient presented with left-eye (OS) buphthalmos, congenital glaucoma, and a hazy cornea, along with port-wine stains indicative of Sturge-Weber syndrome. Preoperative measurements revealed an increased axial length (AL) of 19.23 mm in the OS, with vertical and horizontal corneal diameters of 12 mm and 13 mm, respectively, and an intraocular pressure (IOP) of 20 mmHg. In comparison, the right eye (OD) showed an AL of 17.70 mm, vertical and horizontal diameters of 10 mm and 9 mm, and an IOP of 12 mmHg. Under challenging anesthesia, a combined trabeculotomy-trabeculectomy was performed on the OS. The surgical procedure was demanding due to the infant's thin sclera, requiring precise flap creation and suturing techniques.

Results

At the two-month follow-up, corneal edema had resolved, and the patient responded to light, indicating significant visual improvement. Skin lesions related to Sturge-Weber syndrome also showed noticeable reduction. By the fourth month, patching of the non-operated eye was initiated to promote binocular visual recovery, resulting in clearer vision. At the six-month follow-up, the OS exhibited normalized measurements, with an AL of 20.75 mm, vertical and horizontal corneal diameters of 11.5 mm and 10.5 mm, respectively, and an IOP reduction to 10 mmHg. These values were comparable to the OD, which showed an AL of 20.53 mm, vertical and horizontal diameters of 11 mm and 10 mm, and an IOP of 11 mmHg.

Image



Conclusions

This case highlights the successful management of congenital glaucoma in a complex pediatric patient with Sturge-Weber syndrome.[1,2] The combination of trabeculotomy-trabeculectomy, though technically demanding, resulted in restored vision and improved ocular and skin outcomes, underscoring the importance of meticulous surgical technique and follow-up in tackling rare pediatric challenges, reinforcing that even the most delicate cases can have transformative outcomes when addressed with expertise and innovation.

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P-1025

APPLICATION OF PLATELET-RICH FIBRIN FOR THE REPAIR OF LEAKING BLEBS POST-GLAUCOMA SURGERY

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Background

Bleb leak is a common, yet unwanted complication of glaucoma surgery which can adversely affect the outcome. There are a number of techniques for bleb repair and no one technique may be applicable in all cases. We describe our experience on use of platelet-rich fibrin (PRF) in repairing the leaking blebs following antimetabolite augmented glaucoma surgery.

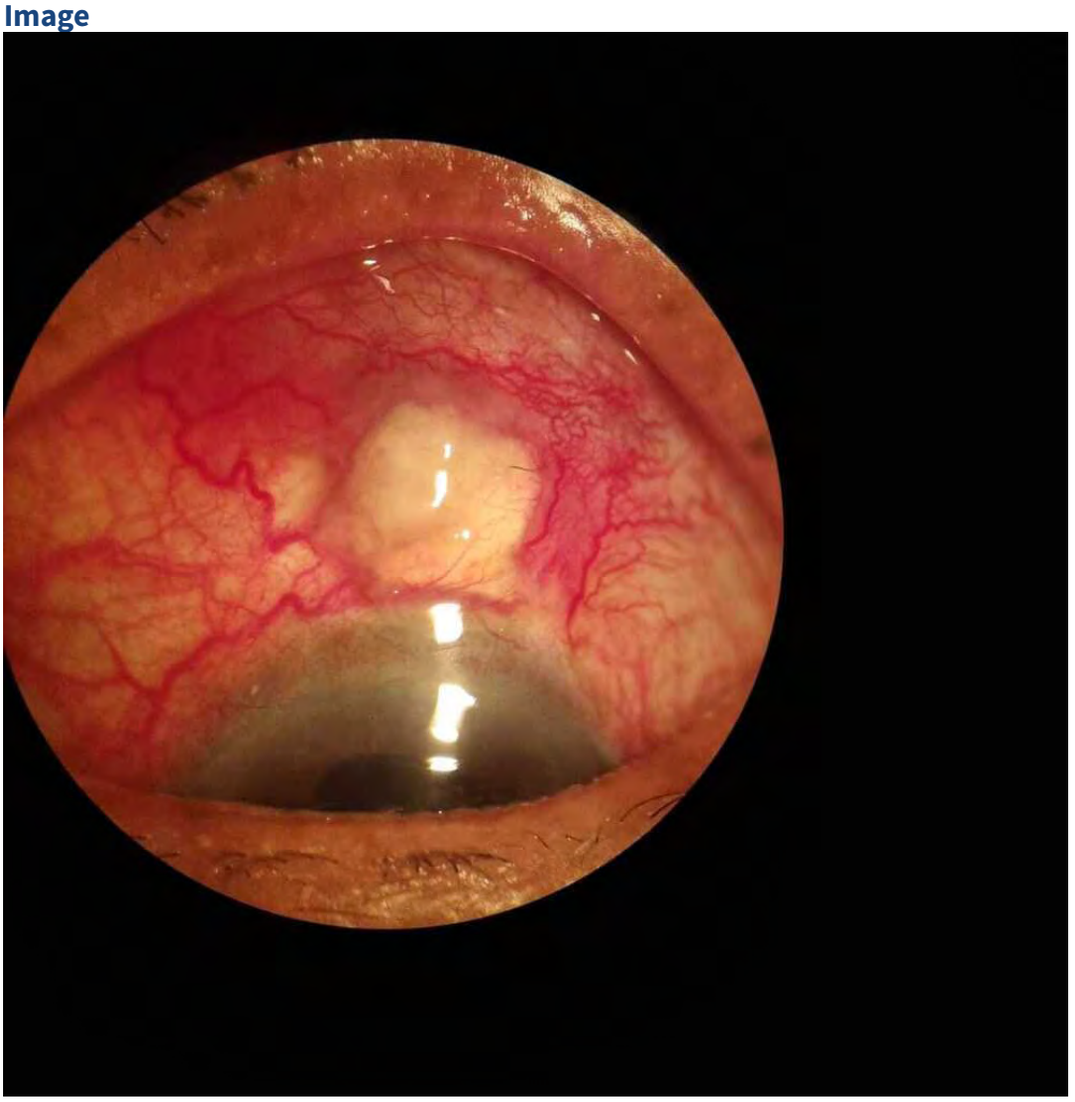
Methods

This is a prospective case series.

Results

4 patients with refractory glaucoma- 2 of whom had undergone glaucoma drainage device surgery, 1 phaco-trabeculectomy and 1 trabeculectomy, with intraoperative/ postoperative mitomycin C, developed bleb leaks between 1 to 12 weeks post operatively. Autologous PRF was used to repair the bleb leak successfully. All 4 patients were followed up for a period of one year.

Image



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Conclusions

Bleb leak after a seemingly successful glaucoma surgery in an only- seeing eye can be a nightmare to manage, especially in an elderly patient with a host of systemic issues notwithstanding friable conjunctiva seasoned with antimetabolites. Autologous PRF is an inexpensive, and easy to prepare healing biomaterial that provides the much needed scaffold for the friable conjunctiva to heal.

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P-1026
MODIFIED SCHOCKET PROCEDURE- TRIAL AND ERROR

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Background
It is quite a challenge for glaucoma surgeon for performing surgery in eyes that has previous ocular surgery involving conjunctiva.

In 1982, Schocket et al15 described an alternative method for preventing fibrosis at the distal end of the silicone tube by using an inverted, encircling No. 20 silicone band to cover the tube, in patients with neovascular glaucoma (Joseph and Hitchings, n.d.)

Methods
A 28 year young male presented with diminution of vision in Right Eye for 5 months. Past history revealed he was on anti-glaucoma drugs for 3 months.

The patient was managed with acetazolamide 250 mg for 3 days and combination of brimonidine and timolol topically. After control of IOP scleral buckling with cryotherapy was performed in OD. On first post-operative day, retina was attached with no sub retinal fluid and good buckle height. In 2 weeks follow-up, patient presented with pain, glare in OD. Even with 4 eye drops there was no improvement and patient was planned for Modified Schocket Procedure.

Results
On first operative day, ST was in-situ with shallow anterior chamber. IOP measured by GAT was 18 mm HG.

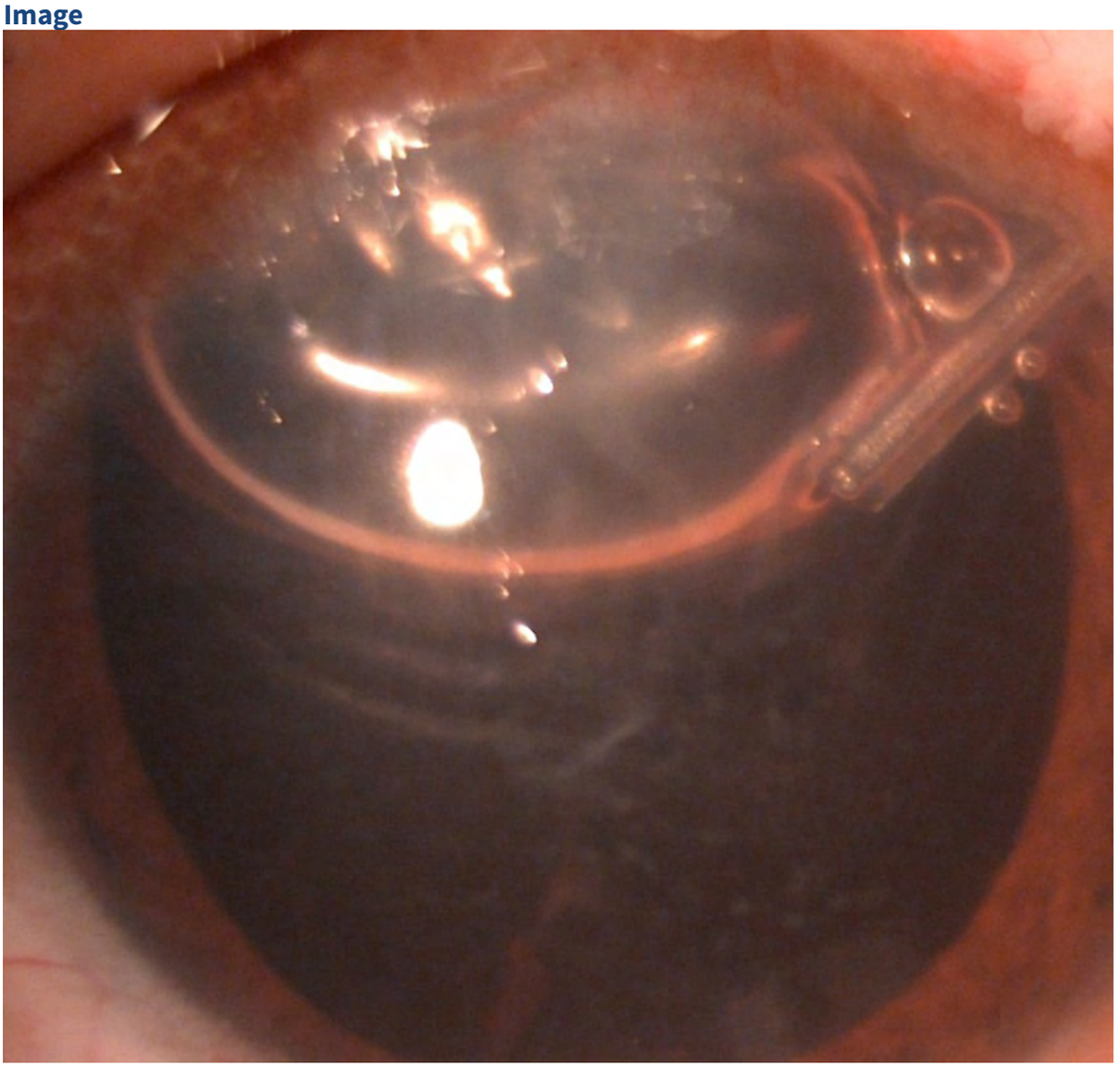
On third post-operative day, tube was in-situ with C3F8 in anterior chamber with IOP of 16 mm HG.

On 1 month follow-up, AC was well formed with IOP of 20 mmHG.

On 3 months follow-up, AC was wekk formed with IOP of 28 mmHG, and bimatoprost was added.

On 1 year follow-up, IOP was 16 mmHG with four anti-glaucoma drugs.

Image



Conclusions

The Anterior-Chamber Shunt-to-the-Encircling-Band (ACTSEB) procedure offers a high degree of success (65% to 96%) even in refractory glaucomas.

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P-1027

SHORT-TERM OUTCOMES OF TRABECULECTOMY WITH MITOMYCIN-C IN A TERTIARY EYE HOSPITAL IN NEPAL: A PROSPECTIVE STUDY

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Background
Glaucoma is a leading cause of irreversible blindness worldwide. (1)(2) Raised intraocular pressure (IOP) is the only modifiable risk factor. (3) Trabeculectomy, enhanced by Mitomycin-C (MMC), is a gold-standard surgical option for uncontrolled glaucoma(4) and can be particularly useful in low-resource settings.

This study aimed to evaluate the short-term outcomes of trabeculectomy with mitomycin-C (0.02%) in glaucoma patients at Tilganga Institute of Ophthalmology, Kathmandu, Nepal, between June 2021 and May 2022 offering insights into its efficacy in managing glaucoma in this population.

Methods
This was a prospective descriptive study, conducted on 56 eyes of 51 consecutive glaucoma patients who underwent trabeculectomy with mitomycin-C (0.02%). Follow-up assessments were carried out on postoperative day 1, week 1, month 1, month 3, and month 6. Our primary outcome was changes in intraocular pressure (IOP) at different post-operative visits and secondary outcomes included changes in the number of anti-glaucoma medications used, best corrected visual acuity, and complications. Surgical success was defined as complete success (IOP ≤21 mmHg without medications) or qualified success (IOP ≤21 mmHg with medications) and failure was defined as IOP >21 mmHg despite treatment. Statistical analysis was done using SPSS version 20 software and p value of less than 0.05 was considered statistically significant.

Results
The study included 56 eyes of 51 patients, out of which 38 were male (74.5%) with an average age of 43.50 ± 15.45 years. A significant reduction in median intraocular pressure (IOP) from 24.33 mmHg preoperatively to 12.00 mmHg at 6 months postoperatively was observed ($P < 0.01$). The median number of anti-glaucoma medications decreased from 3.0 preoperatively to 0.0 at all postoperative visits. The visual acuity slightly dropped in the early postoperative period but gradually improved to a near preoperative state by the last visit ($p = 0.045$. Complete surgical success, qualified success, and surgical failure was achieved in 85.7%, 5.36%, and 8.93% of eyes, respectively. Common complications included shallow anterior chamber, hypotony, and IOP elevation.

Conclusions
Trabeculectomy with mitomycin-C demonstrated a high surgical success rate with low complication rates in the short term, making it an effective and safe treatment option for glaucoma patients not medically controlled. It may benefit patients facing challenges with long-term anti-glaucoma medication use and frequent follow-up visits, especially in low-income settings, thus improving the management outcomes of this chronic condition.

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P-1028
PEARLS OF AHMED VALVE IMPLANTATION

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Background
Ahmed glaucoma valve surgery is indicated in cases of failed trabeculectomy or gonyiotomy in children. Implanation Ahmed valve in neovascular and uveitic eyes is controvercial. In primary gmaucomas with fluctuating IOP Ahmad valve implantation may be the first chice of surgery.

Methods
In classic Ahmad valve surgery paracentesis is performed and viscoelastic material injected in the anterior chamber, thereby changing natural architecture of the anterior chamber. Performing scleral tunel for valve tube with unchanged architecture give more central position on tube in the chamber postoperateveli. performing more long 2.5 mm scleral tunel for tube make its intrachamber portion more stable. cental stable position of the tube is essential for good postoperative resultes and corneal endothelium survival.

Results
Postoperatevely intracameral Ahmad valve position was more central between cornea and iris When tube tunel with 22 gauge needle was performed in intact anterior chamber, It was more stable with long 2.5mm tunel. releasing streching force in time of tube cutting resultes in more presice tube length in the chamber.

Image


Conclusions
20% of angle surgeries in childhood glaucoma fails requiring additional surgery. Ahmed glaucoma valve is one of the options. eFficasy of surgery depends on intraoperative precise positioning and inhibiting the capsulation.

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P-1030

A CASE OF PRIMARY ANGLE-CLOSURE WITH SHALLOW ANTERIOR CHAMBER PERSISTING AFTER CATARACT SURGERY

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Background

Primary angle closure disease (PACD) is caused by a combination of relative pupillary block, plateau iris, lens factors, and posterior lens factors. Lens extraction is effective for angle-widening in most PACD cases; however, shallow anterior chambers may persist in some patients even after cataract surgery. In these cases, the shallow anterior chamber is believed to be mainly caused by a posterior lens factor such as a ciliary block. We report on a patient who was treated with irido-zonulo-hyaloido-vitrectomy (IZHV) combined with goniosynechialysis (GSL).

Methods

A 48-year-old woman underwent phacoemulsification, aspiration, and intraocular lens implantation for primary angle closure (PAC) in both eyes eight years previously. The narrow angle in her right eye did not improve, so the patient underwent laser iridotomy. Her intraocular pressure (IOP) gradually increased, and she was referred to our hospital. Her IOP was 27 mmHg in the right eye and 10 mmHg in the left eye. Angle and ciliary processes were evaluated using anterior segment optical coherence tomography and ultrasound biomicroscopy. Both eyes showed a plateau iris configuration, and the angle in her right eye was significantly narrower than that in her left eye (anterior chamber depth: right, 2.15 mm; left, 2.92 mm). Extensive peripheral anterior synechiae was observed in the right eye.

Results

As the shallow anterior chamber in the patient's right eye was caused by a ciliary block, we performed IZHV and GSL. IZHV was performed using a 25-gauge vitreous cutter. After surgery, the patient's IOP decreased to approximately 10 mmHg and the anterior chamber in her right eye deepened (anterior chamber depth: 2.89 mm). The plateau iris configuration persisted even after surgery.

Conclusions

The presence of a shallow anterior chamber after cataract surgery indicates an association with posterior lens factors such as a ciliary block. The IZHV is an effective procedure for deepening anterior chambers.

P-1031

S-A-C-T : SEGMENTED ANTERIOR CHAMBER TRABECLUCTOMY , A NOVEL APPROACH OF HOW TO DO TRABECULECTOMY IN A MAINTAINED ANTERIOR CHAMBER

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Background

The most commonly used eye traction technique in trabeculectomies is the single-pass 12 o'clock corneal suture. However, this approach exerts significant tension on the cornea and distorts the scleral surgical site, leading to complications such as intraoperative athalamia, hypotony, positive vitreous pressure,and an increased risk of intraoperative or early postoperative suprachoroidal hemorrhage.

An alternative, and less commonly used eye traction technique, creates the reversed forces that allow to perform a trabeculectomy in a manner that keeps the anterior chamber maintained, by segmenting it, while providing a stable eye traction —The Segmented Anterior Chamber Trabeculectomy (S-A-C-T)—

Methods

The described technique involves a double corneal pass with a 6.0 silk suture on either side of the surgical site of the trabeculectomy, configured as 3 sides of an octagon in a circle: two intrastromal passes flanking the surgical site and one extracorneal pass parallel to the surgical site, near the limbus.Intraoperative optical coherence tomography (OCT) was used to have instant feedback and to dynamically compare corneal and scleral distortions, anterior chamber depth and iris configuration between the single-pass and double-pass corneal suture techniques during surgery.

Results

In the single corneal pass technique, traction forces are concentrated along a single meridian, causing a significant widening of the wound edges. Anterior chamber depth collapsed from 3 mm to 0.5 mm (83.3% loss) during trabeculectomy and iridectomy, with forward displacement of the lens-iris diaphragm. Athalamia persisted until the scleral flap was closed.

Conversely, in the double-pass technique, tension forces are decreased with a lateral transfer, thanks to the two intracorneal parts of the suture acting as pulleys. This converted the extracorneal suture into a compression force, keeping the wound edges together. Anterior chamber depth decreased from 3 mm to 2 mm (33.3% loss), and the extracorneal suture kept the anterior chamber stable throughout the procedure by creating two segments : a small segment at the trabeculectomy site and a larger, isolated segment maintained by the suture's compression force, even with full eye traction. No forward lens-iris diaphragm displacement was observed on OCT.

Additionally, the double-pass technique provides excellent sclero-conjunctival exposure (12 mm) and allows for hands-free hold of the scleral flap, improving surgical efficiency.

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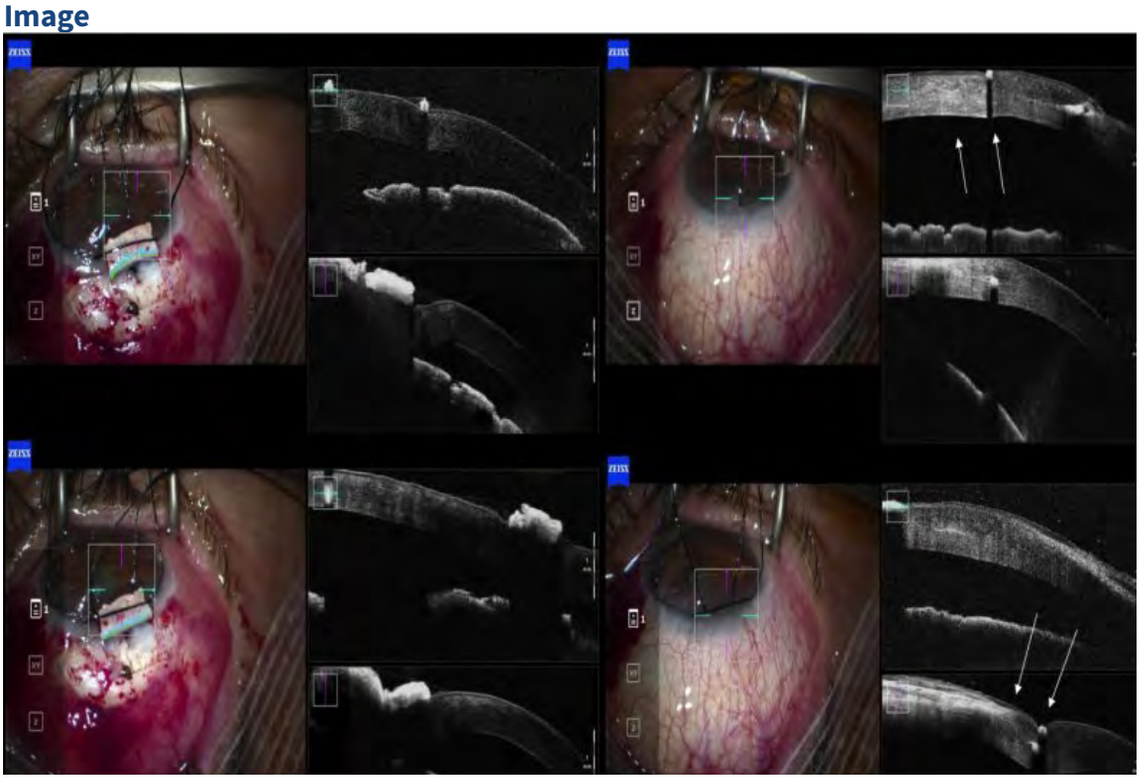

Conclusions

The Segmented Anterior Chamber Trabeculectomy (S-A-C-T) with the double-pass corneal suture is a safe and confortable technique that maintains the anterior chamber throughout the procedure. It significantly reduces complications compared to the single-pass corneal suture, which gathers the risk factors associated with suprachoroidal hemorrhage. Such hemorrhages observed in the early postoperative period may have been triggered intraoperatively by the instability caused by the single-pass approach.

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P-1032

CAN AN INFERIOR XEN IMPLANTATION REDUCE THE NEED FOR NEEDLE REVISION?

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Background

To evaluate inferior gel microstent (XEN, Aquesys, Inc) for treatment of primary open angle glaucoma (POAG) and the need for needle revision after surgery.

Methods

In this retrospective study, 30 eyes with POAG underwent inferior XEN implantation with subconjunctival mitomycin C. Follow-up visits included intraocular pressure (IOP), number of medications, complications, and needle revision and lasted for 6 mo. Complete success was defined as IOP reduction ≥20% from preoperative baseline at 6 mo without any glaucoma medications.

Results

IOP dropped from 21.2±6mmHg pre-op to 8.5±3, 10.4±3, 12.0±4, and 11.9±3mmHg at 1 week, 1, 3, and 6 months consecutively ($p<0.05$). Mean number of medications dropped from 3.0±1 preoperatively to 0.4±1 at 6 mo ($p<0.05$). 73% of eyes achieved complete success. Complications included corneal dellen in 6 eyes, shallow anterior chamber in 4 eyes, and 8 eyes underwent needle revision.

Conclusions

Inferior XEN implant is an effective surgical treatment for POAG, with significant reduction in IOP and glaucoma medications at 6 mo follow-up. Additionally, the frequency of needle revisions was relatively low.

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P-1033

A QUESTIONNAIRE SURVEY ON SURGICAL METHODS ON THE THERAPY OF PRIMARY ANGLE CLOSURE GLAUCOMA IN CHINA

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Background
To investigate the current situation of surgical therapy of primary angle closure glaucoma (PACG) in China.

Methods
We designed and released a questionnaire from November 8th to17th, 2024, then to analyze the surgical selections of PACG and the factors influencing decision making.

Results
There were 780 responses from 28 provincial administrative divisions in China, with 74.87% of the participants coming from tertiary hospitals, 67.82% of whom had worked for more than 15 years, and 23.85% were glaucoma specialists. For PAC with clear lenses, the most commonly treatment was laser peripheral iridotomy (64.62%), only 4% choosed clear lens extraction; if the PAC patients with opacified lenses, 41.41% of participants chosed LPI, and 39.74% chosed cataract extraction. For advanced PACG with clear lenses, 42.56% chosde trabeculectomy; if with advanced PACG with opacified lenses, the most commonly therapy was Phacoemulsification cataract extraction and intraocular lens implantation (PEI) combined goniosynechialysis(GSL) (56.03%). If the patient was doctor's family member, the proportion of trabeculectomy decreased (31.54% vs 42.56%). The main influencing factors to choose the surgical methods were the situation of the anterior chamber angle (67.05%), intraocular pressure levels (52.82%), and the patient's request (52.95%). Senior glaucoma specialists was defied as glaucoma specialists and monthly PACG surgical number more than 20 cases. They are more confident in the success rate of PEI combined GSL than the others. Senior glaucoma specialists had more controversy than others on the question of "the outcome of PEI+GSL combined GT is better than PEI+GSL"(54.61% vs. 81.1%,$p<0.05$).

Conclusions
Chinese ophthalmologists are cautious for clear lens exchange(CLE) to treat PACG. Senior glaucoma specialists have more confidence for the outcome fo PEI combined GSL to treat advanced PACG than comprehensive eye doctors.

P-1034

PARS PLANA FILTRATION FOR THE TREATMENT OF SECONDARY GLAUCOMA IN PATIENT AFTER BOSTON TYPE II KERATOPROSTHESIS

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Background

This report presents the initial results of a new surgical technique, Pars Plana Filtration, used to treat three cases of secondary glaucoma in patient after Boston type II keratoprosthesis.

Methods

Case series of three patients who presented at the Eye Hospital of Wenzhou Medical University with secondary glaucoma following Boston type II keratoprosthesis. All cases underwent PPF (Figure 1). The intraocular pressure, visual acuity, and complications for each patient were systematically recorded and analyzed.

Results

We summarized cases of secondary glaucoma after Boston type II keratoprosthesis treatment with PPF.The patients had been followed up for 16 months post-surgery. All patients quickly responded to PPF, resulting in a rapid decrease in IOP. During follow-up, 1 eye required bleb needling combined with an injection of 5-fluorouracil. All patients achieved reasonable IOP control and stable vision; none developed severe complications.

Image

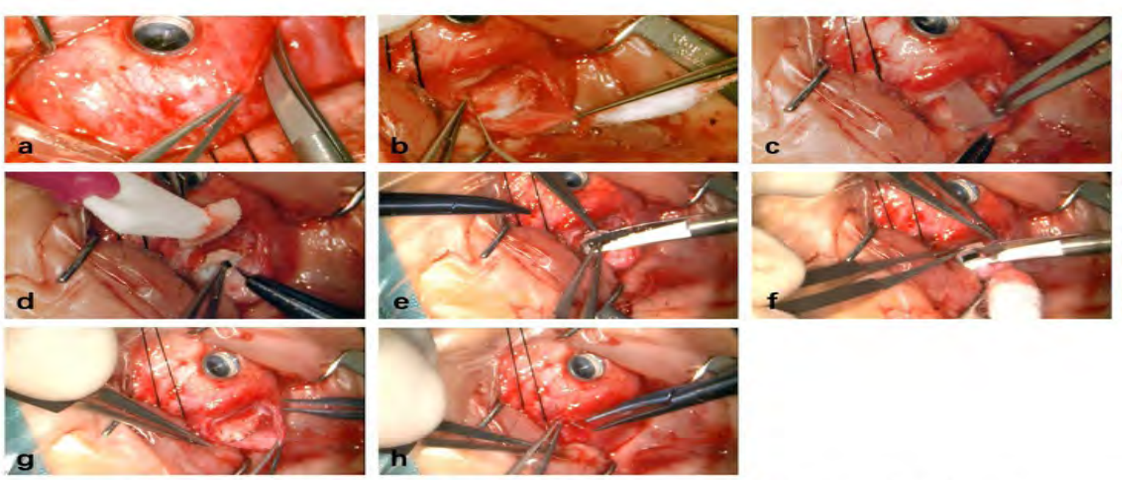

Figure 1 Surgical technique of the pars plana filtration. After conjunctival peritomy (a), a 4.0mm x 3.0mm scleral flap is performed (b). A sponge soaked with 0.04% mitomycin C (MMC) is used (c), then a 0.5mm x 1.5mm full-thickness sclerectomy is performed (d). Scissors are used to cut down the pigment tissue (e) and local vitreous (f). The scleral flap (g) and conjunctival flap (h) is sutured with 10-0 nylon.

Conclusions

PPF is a feasible procedure for treating secondary glaucoma in patients after Boston type II keratoprosthesis.

P-1035

MY EARLY EXPERIENCE WITH MINIMALLY INVASIVE GLAUCOMA SURGERY (MIGS) PROCEDURES

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Background

Numerous MIGS procedures are coming up adding to the armamentarium of our fight against Glaucoma of which Bent ab-interno Needle Goniectomy (BANG) and Kahook Dual Blade Goniotomy are economic and efficacious. These procedures are versatile and they are being increasingly tried out in varying spectrum of glaucoma. In this article authors study study outcomes of two new MIGS procedures - Bent ab-interno Needle Goniectomy (BANG) and Kahook Dual Blade Goniotomy in terms of reduction of intraocular pressure (IOP).

Methods

In this retrospective study, patients with Mild to Moderate grade of primary open angle glaucoma who had underwent Phacoemulsification plus either BANG or KDB goniotomy where included. After phacoemulsification, 120 degrees of goniotomy was performed nasally. Patients where followed up in week 1, week 2, week 4 and week 12. Main variable measured on every follow-up was IOP. Secondary variable measures were for any postoperative complications.

Results

Total of 14 eyes of 14 patients was evaluated. 8 eyes underwent Phaco plus BANG, 6 eyes underwent Phaco plus KDB. Male: Female ratio was 8:6. Mean age was 71.2 +/- 5.2 years. Mean baseline IOP was 27.1 +/- 9.9 mmHg. Mean IOP after surgery at week 4 and week 12 was 12 +/- 1.5 and 13.2 +/- 3.2 respectively. P value comparison between baseline and post-Surgery IOP at week 4 and week 12 was 0.000035883 and 0.0000229 respectively which was clinically significant ($p<0.05$). Significant reduction of IOP from baseline was noted at week 4 and week 12. Postoperatively 4 eyes had mild Hyphema <1mm at 4 hours after surgery during discharge which resolved at week 1 completely.

Conclusions

Our study shows, low cost MIGS (BANG / KDB) have adequate intraocular pressure (IOP) lowering effect, along with reducing the number of AGM and with good safety profile and is worth exploring in India.

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P-1037

COVERING AN EXPOSED TUBE WITH A TENON´S CAPSULE CYST GRAFT FROM THE OTHER EYE: CASE REPORT

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Background

Although the placement of banked sclera, pericardium, cornea, or other material over the tube has reduced the risk of erosion of the overlying conjunctiva, tube exposure can still occur[1]. Various methods of treatment of exposed tubes have been described, including debridement and placement of patch graft material, with or without repositioning the tube[2]. Different patch graft materials have been used. In developing countries, access to grafts is non-existent[3]. In Mexico, a scleral tunnel technique was described which has reduced the need for banked tissue[4], but when faced with exposed tubes and no available tissue, creativity is required to avoid removal of the GDD.

Methods

A 70-year-old female with a personal history of type 2 diabetes, ophthalmological history of NVG in both eyes, placement of Ahmed implant in 2013 in both eyes, with tube exposure in the right eye in 2023, that require a scleral patch coverage, with a second exposure 6 months later this time in both eyes. The left eye is in no light perception, and the right eye has 20/60 vision. A decision was made to remove the Ahmed implant in the left eye, but the question arises what to do with the right eye when we no longer have a tissue graft for a second coverage.

Results

We are posed with a difficult choice. Do we explant the tube, risking a loss of IOP control, or work with what we have and attempt to save it. As we find ourselves with a single functional eye, we must act quickly. We decided to cover the exposed tube by taking tissue from the tenon´s capsule cyst of the Ahmed implant in the other eye. The surgical challenge is to ensure sufficient tissue for an adequate cover.

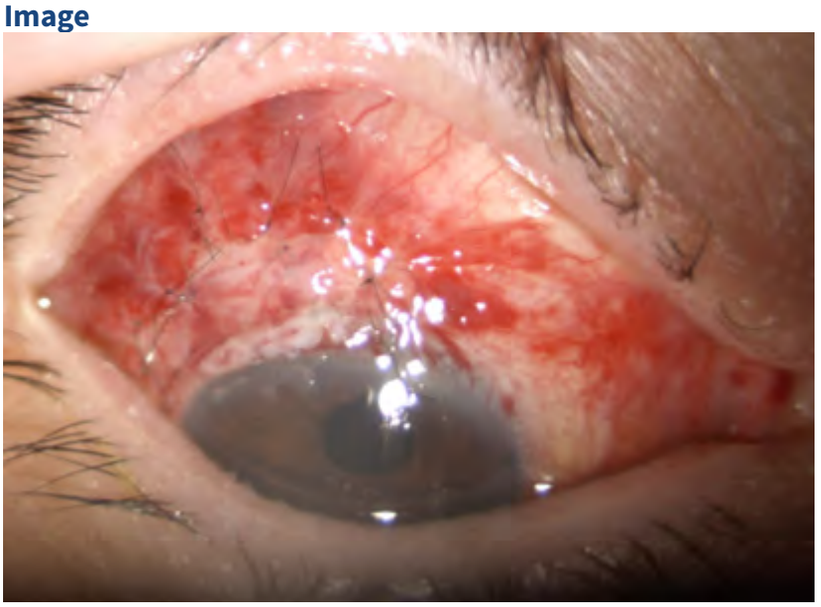
First, we perform the explant of the Ahmed implant in the left eye taking an adequate graft, and then proceeded to cover the tube on the right eye. We find the tube exposure at the limbus, as the back segment of the tube was already covered by the scleral graft from his previous tube covering surgery.

Now knowing that the tube is only exposed to 2mm in the limbus, the tenon´s capsule cyst patch is placed to cover the tube, but a second problem came, the conjunctiva could not cover the patch again. We decided to take a graft of the inferior conjunctiva to cover the patch.

At post-op day 1 the patient's the IOP was 12 and the patch was covered (Photo 1).

At post-op week 1 IOP was at 14, the tube remains covered. At the most recent visit and 4 months since the surgery, the tube remains covered.

Image



Conclusions

The placement of drainage devices in developing countries requires different techniques than those performed in first world countries. A complication such as tube exposure requires often heroic measures to avoid the removal of the implant. It is not unusual to use the tenon's capsule cyst of the same eye to cover erosions, but by removing the cyst we put the functionality of the drainage device at risk. In this case, access to tissue from the other eye allowed us to preserve the function of Ahmed implant and correct the erosion.

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P-1038

CLINICAL OUTCOMES OF GLAUCOMA DRAINAGE DEVICES{GDD} IN PATIENTS WITH REFRACTORY GLAUCOMA

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Background

Refractory Glaucoma are those which require a second surgical intervention after not responding to initial medical or surgical treatment.

They have impaired anatomical architecxture and physiology thereby making management challenging.

Glaucoma drainage devices divery aqueous humor from anterior chamber to an external reservoir whereby a fibrous capsule forms in 4-6 weeks after surgery and regulates flow.They can be useful in patients with previously failed trabeculecotmy, excessive scarred conjunctiva from previous surgery or injuries,neovascular glaucoma, traumatic glaucoma, uveitic glaucoma, congenital glaucoma.

We wanted to critically analyze and evaluate the safety and efficacy of these devices in patients with refractory glaucoma at our institute.

Methods

All patients with refractory glaucoma who underwent glaucoma drainage device implantation at our institute by a single surgeon between period July 2022- December 2022 were included in the study.Documentation for each patient was carried out regarding: demographic details,detailed clinical history along with physical and systemic examination after approval from ethical committee. All patietnts were evaluated on following parameters: Best Corrected Visual Acuity in LogMar,IOP ,noting post operative complications, no of pre and post surgery anti glaucoma medications.

Aim: To study outcome in terms of surgical success and failure in patients of refractory glaucoma who undergo these device implantation

Objectivbes: To determine long term IOP control, need of antiglaucoma medication, and assess post operative complications

Results

A total of 15 subjects were included in our study. Majority were males and were more than 60 years of age.Most of them had secondary glaucoma.Complete success was achieved in 5cases, Qualified success in 8 cases and failure in 2 cases. The common complications noted were hypotony,tube exposure, tube retraction, decline in visual acuity.There was a significantly decline in number of anti glaucoma medications at 6 months

Conclusions

IOP levels remain relatively post surgery in mid teens. This surgery provides an effective control of IOP with fewer complications in patients with refractory glaucoma. The use of these devices needs to be expanded beyond refractory glaucoma.

P-1039

VISCO-TAMPONADE FOR THE MANAGEMENT OF REFRACTORY PEDIATRIC GLAUCOMA SECONDARY TO RECURRENT HYPHEMA

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Background
Pediatric traumatic hyphemas that rebleed represent challenging clinical scenarios. In the wake of COVID-19, an increase in pediatric ocular traumas have been reported in the USA including our tertiary referral center, the University of Minnesota.

Methods
Retrospective case series. Cases will be presented with video demonstration and discussion.

Results
Two pediatric patients sustained traumatic injuries that resulted in recurrent hyphemas complicated by medically refractory glaucoma. One patient had sickle cell trait. After initial insufficient medical management, surgery was recommended. Immediately subsequent to anterior-chamber wash out, visco-tamponade was applied to these actively recurrent hyphemas which had poorly localized or diffuse sources of bleeding. The technique will be discussed and demonstrated with surgical video. In both patients, visco-tamponade successfully arrested intraoperative bleeding and prevented postoperative rebleed.

Conclusions
The technique described here is a technically simple and tissue-preserving alternative to other surgical techniques for the management of intraoperative bleeding and recurrent hyphemas previously described in the literature. To the authors' knowledge, sodium hyaluronate has not been described as an intraocular tamponade agent. It may be especially useful for sickle cell disease/trait and diffuse or poorly localized sources of anterior segment bleeding.

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P-1041

PRIMARY TUBE IN ADVANCED JUVENILE OPEN ANGLE GLAUCOMA: A CASE SERIES

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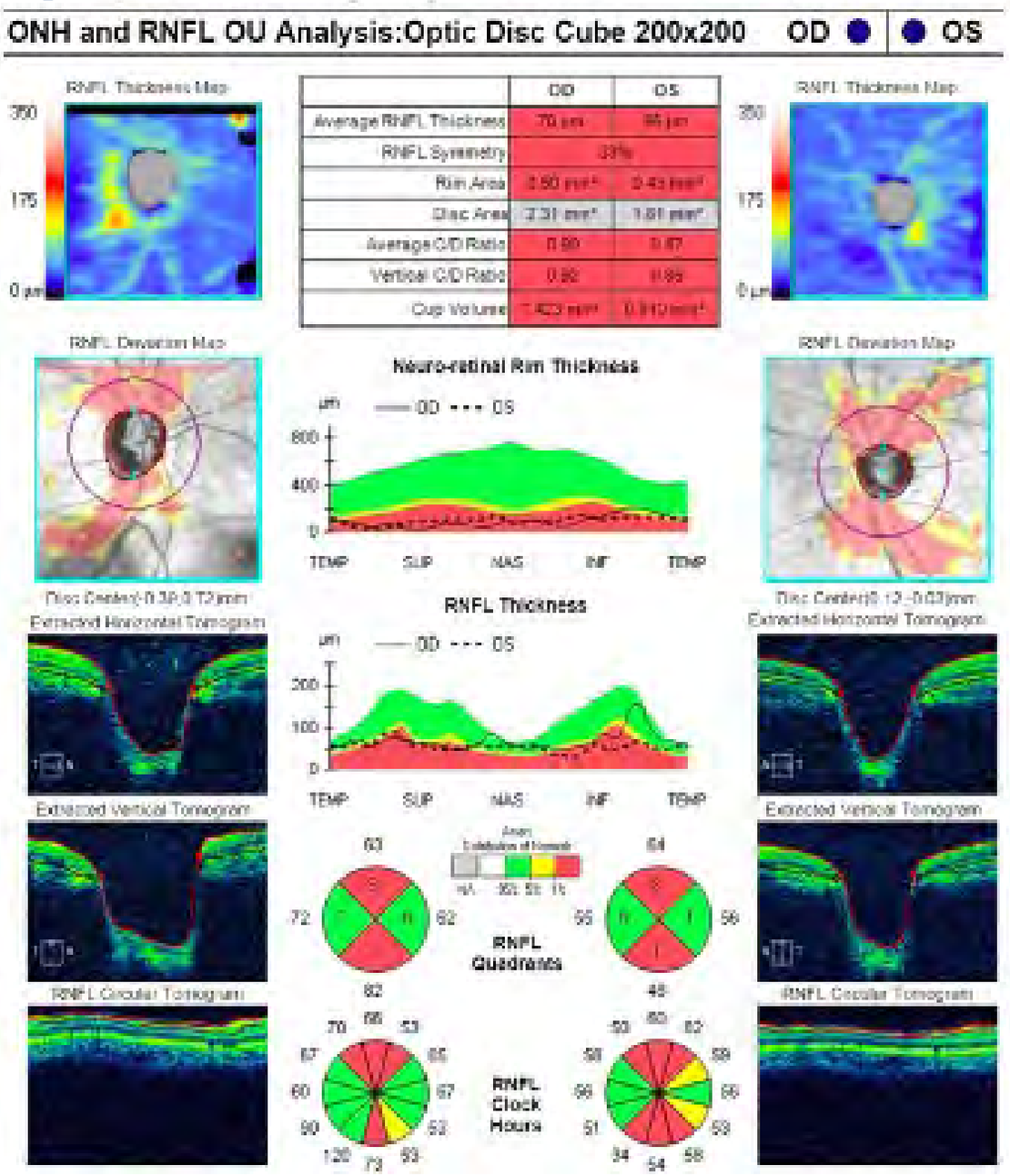
Background
To report a case series of management of advanced juvenile open angle glaucoma (JOAG) iwith primary Glaucoma Drainage Device (GDD) implantation.

Methods
A case series. Four eyes from 2 patients with advanced JOAG were included in the study. The first patient was male, 38 years old, came with blurred vision on the right eye. He has no history of steroid medication, systemic disease nor family history of glaucoma. On presentation the visual acuity (VA) were 0.3cc on right eye (RE) and 0.7cc on left eye (LE). The intraocular pressure (IOP) were 35 and 38 mmHg on RE and LE, respectively with 1 glaucoma medications. The anterior segment showed no abnormalities with open angle in all quadrants. The optic nerve showed glaucomatous cupping with 0.8-0.9 cup-to-disk ratio and very thin rim. The second patient was female, 24 years old, with similar chief complaint and history. The VA were 0.7cc on both eye and the IOP were 32 and 34 mmHg with 2 glaucoma medications. The rest of the examination were also similar to the first case. The perimetry examinations revealed advanced glaucomatuos defect on all eyes, with tunnel visions. Paul glaucoma implant were done on both eye on the first case and Ahmed glaucoma implant were done on both eye on the second case.

Results
After GDD procecures, the first case showed complete success on the RE and partial success on the LE. On the last follow up, 18 months after the procedure, the IOP were 15 and 16 mmHg. No hypertensive phase were recorded. The second case had hypertensive phase on both eye until 3 months after the procedure, the IOP were 18 on BE on the last follow up with 4 glaucoma medications.

Image



Conclusions

Patients presented with advanced glaucoma have higher risk of blindness and more progressive visual loss. Glaucoma filtration surgery, whether it's trabeculectomy or tube impants, are usually necessary to achieve lower target pressure needed in these patients. Nevertheless, the risk of complications, especially sudden visual loss in these patients with advanced glaucoma is higher. Meticulous surgical procedures including precautionary measure of IOP fluctuation intra and post operation and prevention of post operative flat anterior chamber and hypotony are required to prevent and minimize this risk. Education and thorough explanation followed by informed consent to the patient regarding the prognosis and risk of complication is imperative to manage their expectation

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P-1042

ENDOTHELIAL CELL SURVIVAL: UNRAVELING THE IMPACT OF GLAUCOMA DRAINAGE DEVICE IMPLANTATION IN SULCUS VS ANTERIOR CHAMBER

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Background

A critical factor in evaluating the success of such surgical interventions is the endothelial cell count (ECC), as the corneal endothelium plays a vital role in maintaining corneal transparency and regulating fluid balance. with significant loss potentially leading to corneal edema and vision impairment. The choice of implantation site for the Glaucoma Drainage Devices—either in the sulcus (behind the iris) or in the anterior chamber—can affect endothelial cell health post-surgery. Previous studies suggest that these different techniques may result in varying degrees of endothelial cell loss due to factors like mechanical stress and inflammatory response.

Methods

Study Design: This study utilized a prospective cohort design to compare the effects of Ahmed Valve implantation in two different locations: the sulcus and the anterior chamber.

Participants: A total of [22] patients diagnosed with refractory glaucoma were included. Inclusion criteria comprised adults aged [40-70] undergoing GDD surgery, while exclusion criteria included prior ocular surgeries or corneal diseases that could influence endothelial cell counts.

Data Collection: Endothelial cell counts were measured pre-operatively and at [insert follow-up time frame, 1 year post-surgery using a specular microscope. Data on intraocular pressure, complications, and visual outcomes were also recorded.

Results

In a study of 22 cases, specular microscopy showed that Glaucoma Drainage Device implantation into the sulcus preserved endothelial cell counts significantly better than implantation into the anterior chamber. On average, sulcus implantation preserved over 250 cells/mm^2 more than anterior chamber implantation.

Conclusions

The findings of this study highlight significant differences in endothelial cell counts following Ahmed Valve implantation in the sulcus versus the anterior chamber. Patients in the anterior chamber group experienced greater endothelial cell loss compared to those with sulcus implantation, which may indicate a higher risk of corneal complications post-surgery. Despite both techniques achieving similar reductions in intraocular pressure, the impact on corneal health underscores the importance of surgical site selection. These results suggest that sulcus implantation may be the preferable technique for preserving endothelial cell integrity, ultimately benefiting long-term visual outcomes for patients. Further research is warranted to explore the mechanisms behind these differences and to optimize surgical practices in glaucoma management

P-1043

TITLE: PEDIATRIC IRIDOCORNEAL ENDOTHELIAL SYNDROME: A RARE CASE REPORT AND CLINICAL INSIGHTS

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Background
The Iridocorneal Endothelial (ICE) syndrome is a rare ocular disorder that primarily affects adults and is characterized by abnormal corneal endothelial proliferation, iris changes, and secondary glaucoma. Its occurrence in pediatric patients is exceptionally rare, presenting significant diagnostic and therapeutic challenges. This report presents a unique case of ICE syndrome in a pediatric patient, emphasizing its clinical presentation, diagnostic approach, and management.

Methods
A detailed clinical evaluation was performed, including slit-lamp biomicroscopy, gonioscopy, anterior segment optical coherence tomography (AS-OCT), and intraocular pressure (IOP) measurements. Corneal specular endothelial microscopy was conducted to analyze endothelial morphology. The patient's clinical course, treatment strategies, and outcomes were documented.

Results
A pediatric patient presented with progressive unilateral visual deterioration, iris atrophy, and elevated intraocular pressure, consistent with features of ICE syndrome. AS-OCT revealed angle closure with peripheral anterior synechiae. The patient required aggressive intraocular pressure management, including topical therapy and surgical intervention, to control secondary glaucoma. Postoperative outcomes demonstrated stabilization of intraocular pressure and preservation of visual function.

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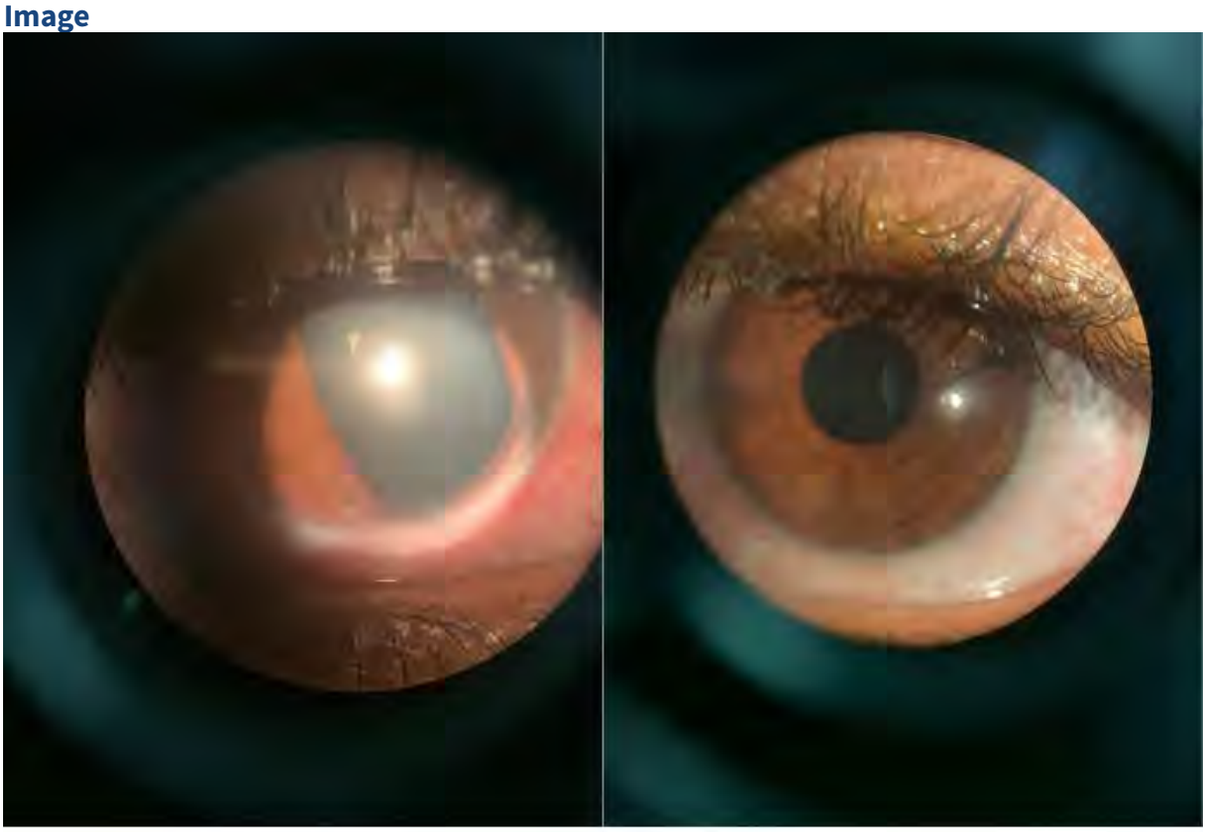

Visual Acuity:
- Right eye: Counts fingers at 2 meters
- Left eye: 20/20

Biomicroscopy:
- Right eye: Presence of Ahmed valve, cataract NO2, posterior synechiae (+++), and a retracted trabecular meshwork pressed by the iris.
- Left eye: Mild corectopia.

Intraocular Pressure (IOP):
- Right eye: 24 mmHg
- Left eye: 13 mmHg

Fundus Examination:
- Right eye: Optic nerve with total cupping.
- Left eye: Optic nerve with 0.6 cupping and a preserved neuroretinal rim.

Optic Nerve OCT:
- Right eye: Outside normal limits.
- Left eye: Within normal limits.

Conclusions

This case highlights the rare occurrence of ICE syndrome in the pediatric population. Early recognition, thorough clinical evaluation, and timely intervention are crucial for controlling secondary glaucoma and preventing vision loss. Further studies are needed to understand the pathophysiology and optimize treatment strategies for pediatric ICE syndrome.

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P-1044

A CASE OF MALIGNANT GLAUCOMA FOLLOWING PRESERFLO MICROSHUNT SURGERY

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Background
We report a case of exfoliation glaucoma that developed malignant glaucoma after Preserflo Microshunt surgery (PFM) and was difficult for treatment.

Methods
The patient was an 83-year-old female. PFM was performed on the left eye with exfoliation glaucoma (XFG). Intraocular pressure (IOP) before surgery was 38 mmHg. The anterior chamber was deep and IOP was 10 mmHg the day after surgery. The position of the tube was good and there was no choroidal detachment. On the 6th day after surgery, IOP was 11 mmHg and the anterior chamber was maintained to the peripheral area, although it was slightly shallow. On the 18th day after surgery, the patient visited the hospital for an unscheduled examination due to a foreign body sensation. IOP was 50 mmHg, the anterior chamber had disappeared, and the tube tip was embedded in the iris. Conservative treatment was started based on the diagnosis of malignant glaucoma, but there was no improvement in the patient's condition, and 20 days after the surgery, a pars plana vitrectomy (PPV) was performed. After surgery, the anterior chamber became sufficiently deep and the tube tip embedded in the iris was released, but a large amount of pigment was observed inside the tube and IOP remained at 31 mmHg. The best corrected visual acuity before surgery was 20/50, and it decreased to hand motion after the PPV. We proposed removing the tube and performing additional trabeculectomy, but the patient declined chose to continue with medication without undergoing another surgery.

Results
We experienced a case of severe visual impairement due to malignant glaucoma after PFM.

Conclusions
Preserflo Microshunt Surgery in elderly patients with high preoperative intraocular pressure is associated with a high risk of complications such as over filtration and malignant glaucoma, so it is necessary to pay close attention to the postoperative course.

P-1045
TWO CASES WITH A SECOND ADDITIONAL AB INTERNO TRABECULOTOMY

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Background
We experienced two cases with a second additional ab interno trabeculotomy

Methods
We present two cases in which twice additional microhook ab interno trabeculotomy (µLOT) were performed for re-increased intraocular pressure (IOP) after Trabectome (TOM) or µLOT.

Results
Case 1: 65-year-old male with exfoliation glaucoma (XFG) in Left eye. Preoperative IOP was 23mmHg. The IOP decreased to 12-18mmHg after the initial µLOT, while IOP re-increased to 28mmHg after 2 years, and 34mmHg after 4 years, and then an additional µLOT were performed. After the 2nd additional µLOT, IOP was maintained in 13-17mmHg for the next two years. Preoperative MD and latest postoperative MD were -0.34dB and 0.04dB, and best corrected visual acuity was maintained (1.2) in decimal acuity.

Case 2: 64-year-old male with XFG in right eye. Preoperative IOP was 24mmHg. The IOP decreased to 12-20mmHg after the initial TOM, while IOP re-increased to 35mmHg after 7 years, and 35mmHg after 9 years, and then an additional µLOT were performed. After the 2nd additional µLOT, IOP was maintained in 12-17mmHg. Best corrected visual acuity were (1.2) preoperatively and (0.9) latest postoperatively. No serious intraoperative or postoperative complications were observed in two cases.

Conclusions
A second additional ab interno trabeculotomy (AIT) may be an option for patients who have achieved IOP reduction for a period of time after the initial and first additional AIT.

P-1046

SECONDARY CHILDHOOD GLAUCOMA IN AN INFANT WITH STURGE WEBER SYNDROME: A CASE REPORT ON SURGICAL MANAGEMENT

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Background

Sturge Weber Syndrome (SWS) is a rare, sporadic disorder characterized by vascular anomalies involving the brain, skin, and eyes, with glaucoma being the most common ocular manifestation. Approximately 60% of SWS patients present with glaucoma at birth, hence early recognition and prompt intervention are crucial to preserve vision and control intraocular pressure (IOP). This report describes the course of management of glaucoma in a 6-week-old infant with SWS.

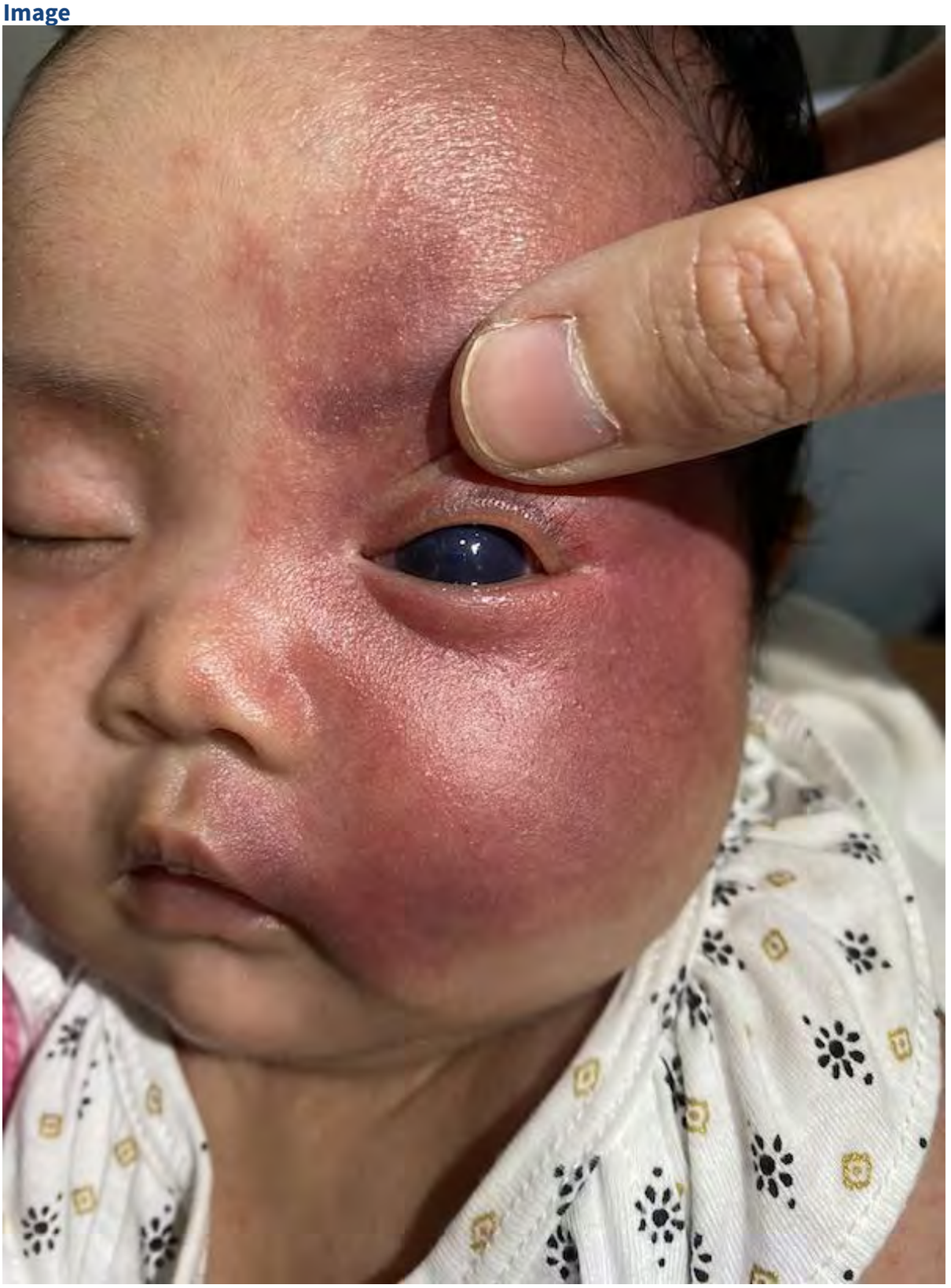
Methods

A 6-week-old infant diagnosed clinically with SWS presented with a buphthalmic left eye. In the absence of preoperative IOP measurements, the patient was empirically started on timolol eye drops and acetazolamide while awaiting clearance for an examination under anesthesia (EUA) from the Pediatrics service. Preoperative imaging, including magnetic resonance imaging (MRI), revealed no associated intracranial abnormalities. During EUA, the left eye demonstrated grade 1 corneal edema, enlarged vertical (11 mm) and horizontal (11.5 mm) corneal diameters, a Schiotz IOP of 11 mmHg (likely lowered by pre-EUA medical therapy), and an axial length of 21 mm. Combined trabeculotomy and trabeculectomy were performed under general anesthesia. Postoperative IOP was monitored the day after and at intervals of two weeks using a Schiotz tonometer.

Results

The surgical intervention was well-tolerated, with no intraoperative or immediate postoperative complications. Postoperatively, visual assessment of the left showed the eye is central and steady. IOP was reduced to 18 mmHg without anti-glaucoma medications and remained stable until the sixth month when IOP increased to 25 mmHg, requiring timolol therapy. The patient demonstrated normal developmental progress at subsequent visits, patient fixates and follows, the cornea is clear, and IOP was maintained at midteens with follow-up lasting two years.

Image



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Conclusions

This case highlights the importance of early detection and timely surgical intervention in managing glaucoma secondary to SWS. The combined approach of trabeculotomy and trabeculectomy effectively controlled IOP and preserved ocular function in this case. Regular monitoring and a multidisciplinary approach were essential in achieving favorable outcomes in this case.

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P-1047

A CASE OF HIGH MYOPIC GLAUCOMA WITH SEVERE VISUAL DYSFUNCTION AFTER GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY

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Background
Conventional filtering surgeries for glaucoma in highly myopic eyes carry significant risks, such as hypotony. Minimally invasive glaucoma surgeries are recommended as a safer alternative. Here, we report a case where gonioscopy-assisted transluminal trabeculotomy (GATT) successfully reduced intraocular pressure (IOP) in a highly myopic glaucoma patient but resulted in severe visual impairment.

Methods
A 58-year-old female patient with high myopia and a history of contact lens use was diagnosed with glaucoma 10 years ago. Her IOP was initially well-controlled with anti-glaucoma eye drops. However, nine months before surgery, her IOP increased, prompting the addition of more eye drops. While IOP temporarily decreased, it rose again two months before surgery, despite the introduction of oral carbonic anhydrase inhibitors. Surgical intervention was considered due to poor IOP control in her left eye. The preoperative visual acuity of the left eye was (0.6 x -8.0D) and the IOP was 40 mmHg. GATT was performed on the left eye, with three-fourths of the trabecular meshwork incised without intraoperative complications.

Results
Postoperatively, IOP decreased; however, the corrected visual acuity dropped to 0.08, with marked visual field constriction. MRI-STIR imaging revealed high signal intensity around the left optic nerve, suggesting inflammation and ischemia.

Conclusions
GATT is an effective and minimally invasive surgical option for glaucoma in highly myopic eyes. However, the rapid reduction in IOP may exacerbate optic nerve damage, emphasizing the need for careful patient selection and perioperative management.

P-PW-1049

THE LONG-TERM EFFECT AND INFLUENCING FACTORS OF PHACO-GSL IN ACUTE AND CHRONIC PACG PATIENTS: A 2-YEAR SINGLE-CENTER PROSPECTIVE COHORT STUDY

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Background
To compare long-term effect of phacoemulsification combined with goniosynechialysis (Phaco-GSL) in acute primary angle-closure glaucoma (APACG) patients and chronic primary angle-closure glaucoma (CPACG) patients, and to evaluate the influencing factors for surgical success in Chinese PACG patients.

Methods
Patients with APACG or CPACG who underwent Phaco-GSL at the glaucoma clinics of Eye & ENT Hospital were recruited consecutively from January 2019 to December 2022.Patients were scheduled to followed-up for 2 years with standardized evaluations in this prospective cohort study. Baseline clinical characteristics and potential influencing factors were collected preoperatively, intraoperatively, and postoperatively. Complete success was defined as IOP <=21 mmHg without IOP-lowering drugs. Qualified success was defined as IOP <= 21 mmHg with or without IOP-lowering drugs. Failure was defined as IOP > 21 mmHg with IOP-lowering drugs except the IOP spike within 1 month postoperatively. Risk factors for surgical failure were analyzed via the Cox proportional-hazards regression model, the Random Forest algorithm and the prognostic nomogram.

Results
A total of 213 patients, including 116 patients (116 eyes) with APACG and 97 patients (97 eyes) with CPACG were included. The average age was 64.5±7.2 years old and 153 (71.8%) were women. The complete success rates at 2 years were 76.72% in the acute group and 69.07% in the chronic group (*P=0.03*). The qualified success rates at 2 years were both 89.7 % (*P=0.54*). We identified risk factors for surgical failure to be ACD, baseline MD, sex, and **t**ype of glaucoma in all patients. Specifically, for acute PACG, the duration of high IOP was the most critical risk factor, while for chronic PACG, ACD was identified as the most significant risk factor.

Conclusions
Phaco-GSL demonstrated significant benefits for both APACG and CPACG, with more pronounced effects for APACG. Identifying patients with risk factors preoperatively provides valuable insights for better assessing the outcomes of GSL surgery in PACG.

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P-1050

OUTCOMES OF PRESERFLO MICROSHUNT IN NEW ZEALAND'S LARGEST TERTIARY OPHTHALMOLOGY CENTRE

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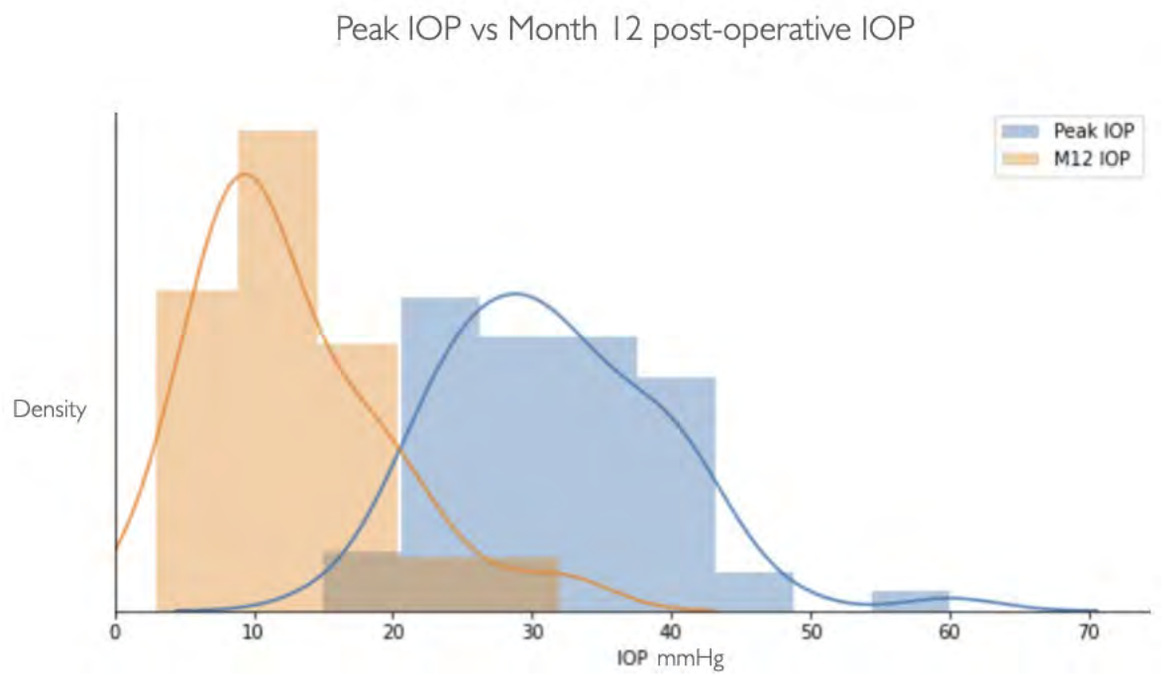
Background
To evaluate the efficacy and safety of the PreserFlo microshunt glaucoma device over 1 year followup at within the Greenlane Clinical Centre, NZ's largest tertiary ophthalmology service. We serve a catchment population of over 1.5million, approximately a quarter of New Zealand's population, with around 95,000 ophthalmology outpatient attendances per annum.

Methods
A retrospective analysis of patients receiving the PreserFlo microshunt from February 2022 to 2024 with minimum 1 year post-operative follow up. Primary outcome success was defined as a reduction in intraocular pressure (IOP) >20% from surgical listing and less than 21mmHg without additional glaucoma agents. Qualified success was the same but requiring medications. Failure was IOP >22mmHg or <5mmhg or clinical hypotony. Secondary outcomes included visual acuity (VA), glaucoma medications, complications, and further interventions.

Results
63 eyes were followed for 1 year, mean patient age was 71.8 years, with 52% males. The cause of glaucoma was predominantly primary open angle glaucoma (59% n=38) and 60% (n=38) of the patients were Caucasian. Mean pre-treatment IOP was 31.5 ±8.1 mmHg, which decreased to 12.0 ±5.7mmHg at 12 months. Complete success was achieved in 69.8%, with 76.2% qualified success, P <0.001. Mean glaucoma medication use from from 3±1 agents pre-operatively to 0.47±0.88 agents at 12 months. 72% were off all topical agents P<0.001 by 12 months. There was no significant change in logMAR VA postoperatively. Early complications occurred in 22.2% of cases, including hyphaema 14.3% (n=9), choroidal effusion 6.3% (n=4), bleb leak 3.2% (n=2), aqueous misdirection 1.6% (n=1) and hypotony 1.6% (n=1). Late complications occurred in 2 patients (diplopia and encapsulated bleb). Seven eyes had further procedures, including needling, washout, erosion and conjunctival resuturing. One patient had micropulse laser. There were no differences in success or complication rates when analysed according to ethnicity (p= 0.19, p=0.18) or visual field mean deviation (p=0.62, p=0.77, respectively).

Image



Conclusions

Preserflo surgery with MMC was successful in achieving a 20% or more IOP reduction that was sustained at 12 months post-operatively without the use of topical glaucoma agents for the majority of studied eyes. This study presents real-world data from a single-center, multi-surgeon experience, capturing the early learning curve within the New Zealand public healthcare sector.Given the demonstrated effectiveness within our patient population, we are already seeing greater adoption of Preserflo in our public service and look forward to more long term data to follow.

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P-1051

OUTCOMES FOLLOWING PAUL TUBE IMPLANT INSERTION IN NEW ZEALAND'S LARGEST TERTIARY OPHTHALMOLOGY CENTRE

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Background
To evaluate the efficacy and safety of all the Paul Tube glaucoma implants performed over a 2 year period at Greenlane Clinical center, New Zealand's largest tertiary ophthalmology center. All patients were followed up for a minimum of 1 year post-operatively.

Methods
A retrospective analysis of patients receiving the Paul Tube glaucoma implant between February 2022 and 2024 in Auckland. Primary outcome success is a reduction in intraocular pressure (IOP) >20% from baseline and 21mmHg without additional glaucoma agents. Qualified success was the same but requiring medications. Failure was IOP >22mmHg or hypotony <5mmhg or clinical hypotony. Secondary outcomes included visual acuity (VA), glaucoma medications, ethnicity, complications, and further interventions.

Results
71 eyes were followed for 1 year, mean age was 62, with 59% males. Mean pre-treatment IOP was 39.9mmHg±10.5, which reduced to 13.4 ±4.8mmHg at 12 months. 55.1% of patients achieved complete success, with 77.3 % qualified success P<0.001. Mean glaucoma medication use reduced from 3.4±0.9 agents pre-operatively to 0.96±1.3 agents at 12 months. 60% were off all topical agents at 12 months. The primary success rate of cases with no MMC, 0.2% MMC and 0.4% MMC were 52.4%, 63.6% and 54.9% respectively. The most common glaucoma types were uveitic (21.8%), neovascular (20.5%), primary open-angle (18%), secondary open angle (12.8%) and steroid reponders 7.7%. There was no significant change in LogMar VA postoperatively. 32.3% (n=23) experienced early complications, the most common were hyphaema (12.7%), hypotonous maculopathy 5.6%, leakage 2.8% and tube retraction 2.8%. 7% (n=5) had late complications, including diplopia, persistent hyphaema and chronic hypotony. Mean time of intraluminal stents removal was at 13.5 weeks.11.3% (n=8) underwent further surgery, such as tube repositioning or removal, restenting and vitrectomy. 5.6% (n=4) had further laser treatment with cyclodiode or micropulse. There were no differences in success or complication rates when analysed according to ethnicity (p= 0.14, p=0.18) or visual field mean deviation (p=0.42, p=0.55, respectively).

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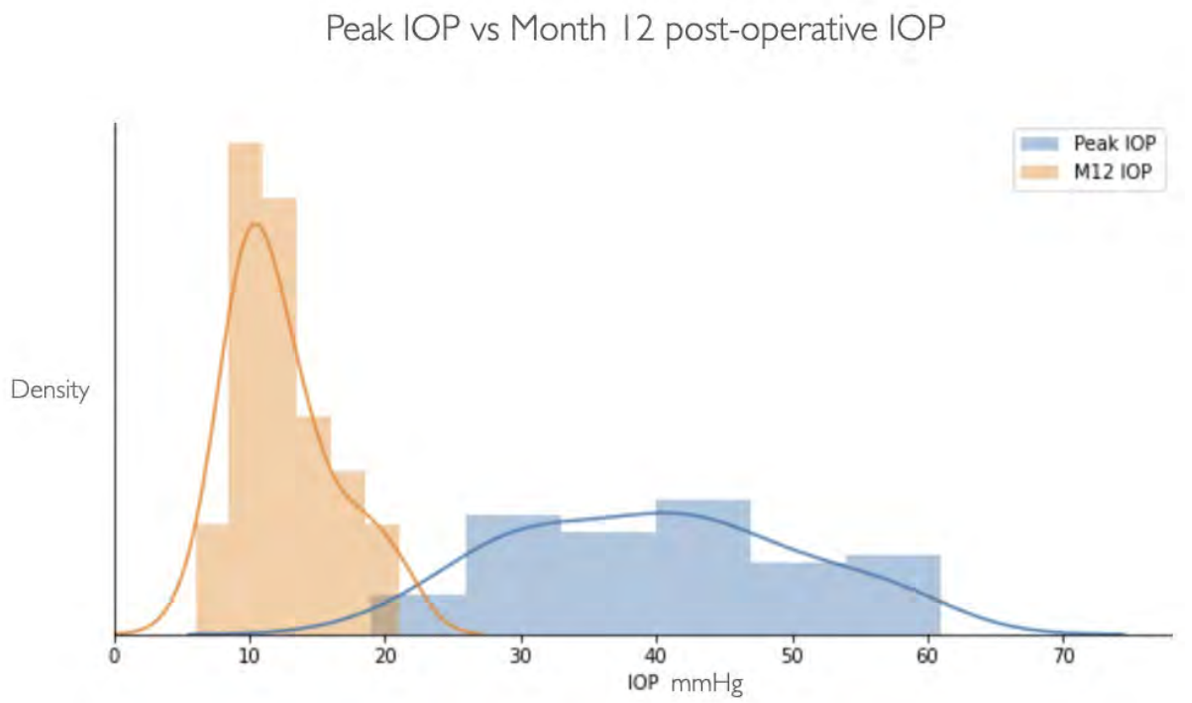

Conclusions

Real-world outcomes of Paul tube in a public service setting in New Zealand. The Paul Tube implant effectively lowered IOP and reduced the need for glaucoma medications postoperatively for patients with severe glaucoma and uncontrolled intraocular pressure on maximal medical therapy despite the local selection of more complex glaucoma cases for tube surgery.

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P-1052

ONE-YEAR OUTCOME OF STREAMLINE CANALOPLASTY IN AFRICAN-AMERICAN VERSUS CAUCASIAN PATIENTS

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Background

African Americans have a higher prevalence of open-angle glaucoma (OAG) compared to Caucasians. Previous studies have provided evidence of outcome disparities following glaucoma surgery between the two populations and higher rates of treatment failure in African American patients,[1] complicating clinician decision-making. As minimally invasive glaucoma surgery (MIGS) gains popularity, evaluating whether efficacy varies by race is important. Streamline canaloplasty, which allows implant-free canaloplasty, has previously only been studied in a clinical trial setting in Hispanic patients outside the U.S.[2] The goal of the procedure is to revive physiological aqueous humor outflow pathways.

Methods

In this retrospective chart review, we included records for 132 eyes of adult patients treated over a 1-year period in a U.S.-based practice. All subjects had ocular hypertension (OHTN) or open-angle glaucoma (OAG) and underwent canaloplasty and trabecular meshwork stripping over 3 to 4 clock hours with the Streamline device alone, or in combination with cataract surgery. Primary outcomes were compared by race and included intraocular pressure (IOP) and the number of IOP-lowering medications at each postoperative time period up to one year.

Results

Of the 132 eyes, 72 (54.5%) were African American, 53 (40.2%) were Caucasian, and 7 (5.3%) were of other races. Mean IOP for eyes in the African American and Caucasian groups was similar at baseline and throughout the follow-up period, with no statistically significant differences (Table 1). The mean number of medications was higher in the African-American group, with statistically significant differences at preop and postoperative 3 months.

Image

	Preop	1 Day	1 Week	1 Month	3 Months	6 Months	12 Months
Mean Intraocular pressure (IOP)							
African-American	17.1	13.1	16.0	15.1	14.0	14.5	13.5
Caucasian	17.2	13.0	16.5	14.8	12.5	13.8	13.0
P value (African American vs Caucasian)	p>0.05	p>0.05	p>0.05	p>0.05	p>0.05	p>0.05	p>0.05
Mean Number of Medications							
African-American	1.9	1.0	1.0	1.2	1.3	1.5	1.5
Caucasian	1.2	0.8	0.8	0.8	0.7	1.3	1.1
P value (African American vs Caucasian)	P<0.05	p>0.05	p>0.05	p>0.05	P<0.05	p>0.05	p>0.05

Table 1: Mean Intraocular Pressure and Number of Medications, by Race

Conclusions

The mechanism of action of Streamline canaloplasty combined with goniotomy with implant-free canaloplasty appears to be similarly effective in both African American and Caucasian patients. Clinicians can feel comfortable offering implant-free Streamline canaloplasty to both groups with an expectation of similar outcomes. African American patients on more IOP-lowering medications at baseline may receive additional benefits in the form of reducing the number of topical drops necessary postoperatively. Although we see an overall trend towards IOP improvement and medication usage in both cohorts at one year with Streamline, further studies need to evaluate the long-term efficacy of MIGS procedures.

References

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P-1053

HUMAN LIMBAL MESENCHYMAL STEM CELLS (HLMSCS) AUGMENTED TRABECULECTOMY IN HIGH-RISK GLAUCOMA: A PILOT STUDY

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Background

We conducted a pilot trial to evaluate the safety and efficacy of hlMSCs-augmented trabeculectomy in high-risk refractory glaucoma, particularly Neovascular Glaucoma (NVG), Acute Angle Closure (AAC) attack, and Iridocorneal Endothelial (ICE) Syndrome, where traditional trabeculectomy has a high failure rate. This study investigates the role of mesenchymal stem cells (hlMSCs) combined with fibrin glue in enhancing surgical success by modulating wound healing and reducing fibrosis.

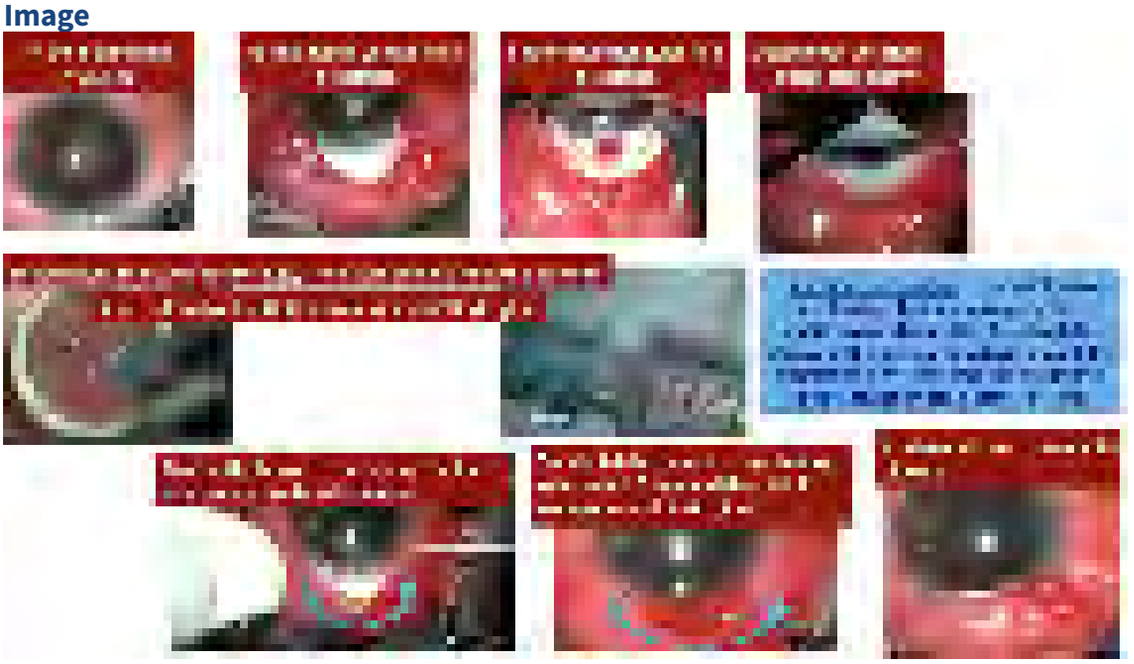
Methods

A prospective pilot study was conducted that included patients older than 30 years with medically uncontrolled glaucoma with high-risk for failure, including NVG, ICE syndrome, and non-resolving AAC. Standard fornix-based trabeculectomy was performed, and hlMSCs with fibrin glue was applied after scleral flap closure around the triangular flap in a U-shape, followed by conjunctival closure. The primary outcome measure was intraocular pressure (IOP) control. Secondary outcome were need for anti-glaucoma medication (AGM) and additional interventions.

Results

The pilot study included 7 male patients (mean age 42.7 ± 8.7 years) undergoing trabeculectomy with MSCs for IOP control, including 5 eyes with NVG, 1 with AAC, and 1 ICE syndrome. Preoperative IOP significantly decreased from 39.2 ± 10.2 mmHg to 13.8 ± 8.3 mmHg at last follow up($p < 0.05$), and AGM use dropped from 4.5 ± 0.5 to 0 (0,1) ($p < 0.05$). Visual acuity remained stable (0.7 ± 0.5 to 0.8 ± 0.6; p=0.58). The median follow-up was 13.7 months (IQR: 1.8–72.5). No surgery-related complications were observed and none needed any additional interventions like needling. None failed until last follow up.

Image



Conclusions

This pilot study using mesenchymal stem cells (hlMSCs) augmented trabeculectomy showed promising results with regards IOP control and success of trabeculectomy in eyes with high risk for surgical failure even with mitomycin augmented trabeculectomy. However, further large-scale studies would be needed to optimize treatment protocols.

References

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P-1055

PRELIMINARY RESULTS OF THE ARGENTINE MULTICENTER STUDY ON SAFETY AND EFFICACY OF THE PAUL IMPLANT DRAINAGE DEVICE

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Background
To report the preliminary results of the first Argentine study of the Paul Glaucoma Implant (PGI), analyzing parameters of safety and hypotensive efficacy.

Methods
Multicenter ambispective study, which included patients operated with the IGP by different specialists in Argentina, between November 2022 and July 2024. Hypotensive efficacy (decrease in intraocular pressure (IOP) of at least 20% concerning preoperative); use of hypotensive drugs and complications were evaluated.

Results
Fifty-three cases were included, but at the moment we have 45 eyes with 3 months of follow-up and 28 with 6 months of follow-up. At 6 months mean IOP decreased 15.5 ±11.4 mmHg (-7 to 46). The mean drug decrease was 2.1 ±0.4 (1 to 2). Of the 28 eyes, the surgery failed to achieve hypotensive efficacy in 2 eyes (7.1%), since the minimum decrease of 20% was not achieved 6 months after surgery. As for complications, most of them were mild, such as self-limited hypotonia in 4 of the 53 eyes (7.5 %). Of the 28 eyes with 6 months follow-up 3 (10.7 %) had late complications (ocular hypertension).

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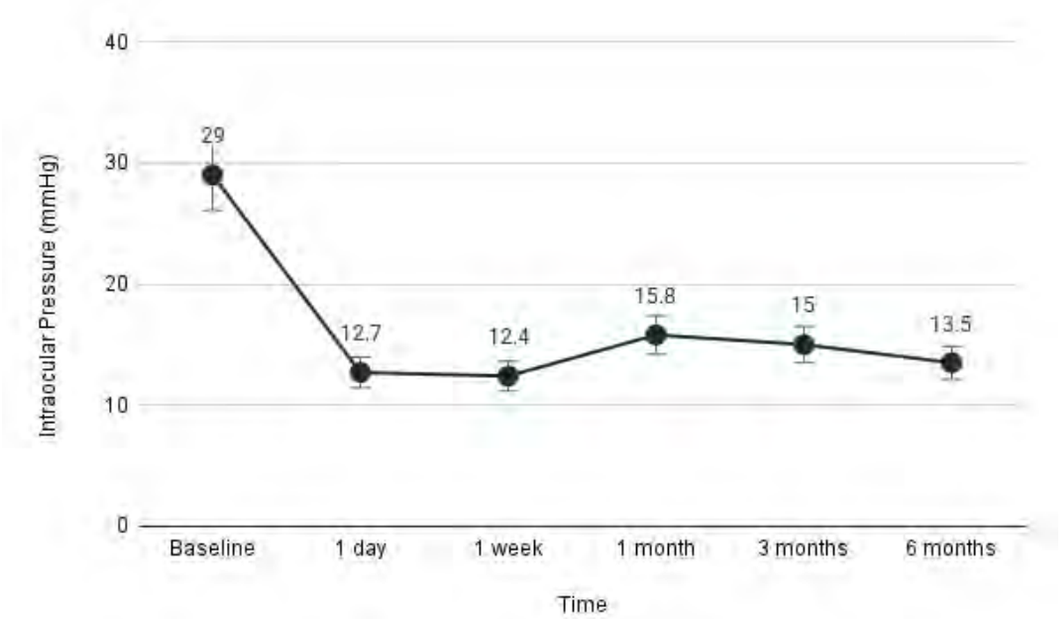

Conclusions
In a multicenter series of patients with the IGP in Argentina, ocular hypertension has been safely reduced (with or without the need of drops) in almost 93 % of the cases.

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P-1056

A COMPARATIVE STUDY OF THE EFFECTS OF 5FU NEEDLING VERSUS NO 5FU FOLLOWING AGV

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Background

Implantation of Ahmed glaucoma valve (AGV) is an effective surgical technique to reduce intraocular pressure in patients affected with glaucoma. The aim of the study was to compare the outcomes between two patient groups

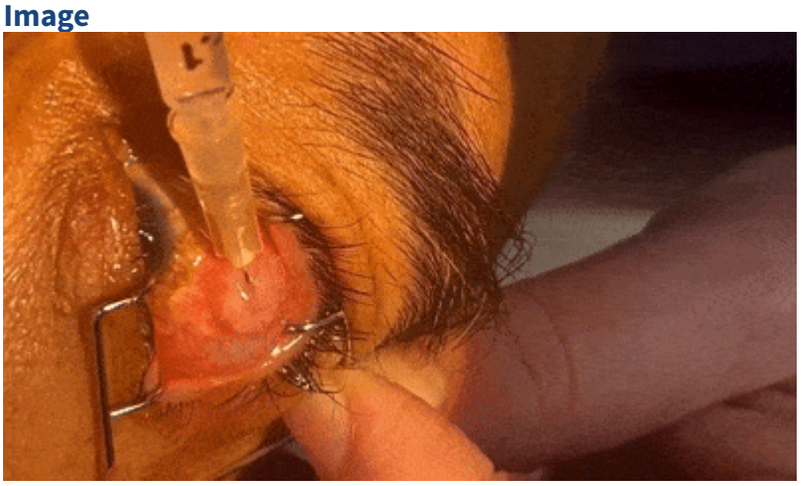
Methods

Thirty eyes who underwent 5FU post AGV implantation were recruited in this retrospective study as cases and compared with controls, which were thirty eyes with no 5FU needling post AGV. Cases were matched according to ethnicity, diagnosis, gender and age within 5 years using a 30 gauge needle, the tenon's capsule over the plate was needled and bleb reformed to restore aqueous flow. Patients were examined at day 1, 10 days, 3 months, 1 year and final visit. Procedure outcome was determined on the basis of the recorded IOP levels and number of AGMs used. Complete success was defined as having no further anti-glaucoma medications and no intervention within 2 years of follow up. Qualified success was the result of medications restarted and having no intervention within 2 years.

Results

The mean interval between AGV implantation and needling was 13 months. The mean follow up time was 24 months after needling. Both groups had statistically significant mean IOP at day 1, day 10, 3rd month and 1 year, but a similar mean IOP (5FU AGV: 16.8 mm Hg; AGV 14.8 mm Hg; $p = 0.324$) at the final visit. The difference in mean IOP pre and post needling was 7.5 mm Hg (34.5%). AGV -5FU group always had higher medication use, and also at the final visit (5FU AGV: 3.52 AGV 2.5; $p = 0.028$). The Kaplan-Meier survival analysis revealed 100%, 91%, and 70% cumulative predictive success rates in the 5FU AGV group versus 100%, 95%, and 95% in the AGV group at 1, 2 and 5 years respectively.The cumulative proportion of cases receiving either qualified or complete success at 24 months was 76.6 %. Failure was noted in 23.3% patients out of which 28.6 % was attributed due to retinal complications. No complications were noted after the procedure.Seven patients had repeated needlings in which 2 had 5FU needling twice and 5 had needling thrice. Hence, a qualified sucess of 71.4% and complete sucess of 28.6% was acheived in patients with repeated needling.

Image



Conclusions

Needling over the plate of an AGV supplemented with 5FU is an effective and safe choice in patients with elevated IOP due to encapsulation or fibrosis. Success rates were higher with repeated needling.

P-1057

BILATERAL TRABECULECTOMY: ASSOCIATIONS AND DIFFERENCES IN OUTCOME BETWEEN FIRST-OPERATED AND SECOND-OPERATED EYES

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Background
The purpose of this study was to evaluate the mid-term outcomes of bilateral trabeculectomy and assess the differences and associations in outcome between the first-operated and the second-operated eye.

Methods
Patients with different types of glaucoma who underwent bilateral trabeculectomy from 2006 to 2022 were included in this retrospective study. All patients were followed for at least 24 months after surgery in each eye. The main outcome measure was surgical success. Complete success was defined according to intraocular pressure (IOP)≤16mmHg and at least 20% reduction from preoperative baseline IOP without any IOP lowering medications. Cumulative success was defined according to IOP≤16mmHg and at least 20% reduction from preoperative baseline IOP, with or without IOP-lowering medications. Secondary outcome measures were IOP and the number of IOP-lowering medications.

Results
In total, 186 eyes of 93 patients were included. There was no statistically significant difference in terms of the baseline IOP and number of IOP-lowering medications between the first and second operated eyes before and after surgery (p-value>0.05). The mean follow-up time was 64.35±41.13 months and 57.13±38.41 months for the first operated and the second operated eyes, respectively. At the 24-month follow-up point, among patients whose first operated eyes were considered a complete success, 78.2% of surgeries in second eyes were successful (p-value=0.002). On the other hand, among patients whose first operated eyes were considered a cumulative success, 80.3% of surgeries in second eyes were successful (p value=0.012). In a multivariate analysis of factors affecting cumulative success, the outcome of the surgery in the first operated eye was the only factor that significantly impacted the outcome of surgery in the second operated eye. If the first operated eye achieved cumulative success, the odds of the second operated eye experiencing cumulative success were 6.5 (p-value=0.02). The rates of postoperative complications in the two eyes were similar and did not show statistically significant differences.

Conclusions
The present study demonstrates a significant correlation in surgical outcomes of trabeculectomy between the two eyes of the same patient in mid-term follow-up. Surgical success in the first-operated eye increases the odds of success in the second eye 6.5 fold.

P-1058

EFFICACY AND SAFETY OF DIFFERENT METHODS OF MITOMYCIN C ADMINISTRATION IN TRABECULECTOMY: A SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS

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Background
Multiple modes of mitomycin C (MMC) delivery during trabeculectomy have been shown to increase the surgical success rate through its antifibrotic action. However, evidence regarding the comparative efficacy and safety of different MMC administration methods was lacking.

Methods
The Ovid MEDLINE/Embase and Cochrane Library databases were systematically searched from inception through February 2025. A frequentist network meta-analysis (NMA) was conducted to evaluate the efficacy and complications associated with different modes of MMC administration. Subsequently, the surface under the cumulative ranking area (SUCRA) was calculated to determine the relative ranking of interventions.

Results
A total of six randomized clinical trials comprising 486 eyes were included in the analysis. NMA revealed that subconjunctival injection ranked first in the hierarchy for reducing antiglaucoma medications. Regarding bleb morphology, sub(intra)tenon injection demonstrated lower bleb height (mean difference [MD] = -0.31, 95% confidence interval [CI] = [-0.46, -0.17]) and more extensive blebs (MD = 0.31, 95% CI = [0.20, 0.43]) compared to sponge application. Moreover, it showed less bleb vascularity compared to sponge application and subconjunctival injection (MD = -0.46, 95% CI = [-0.62, -0.30] and MD = -0.40, 95% CI = [-0.79, -0.01], respectively). Intraocular pressure control, success rate, and complications were similar among the administration methods.

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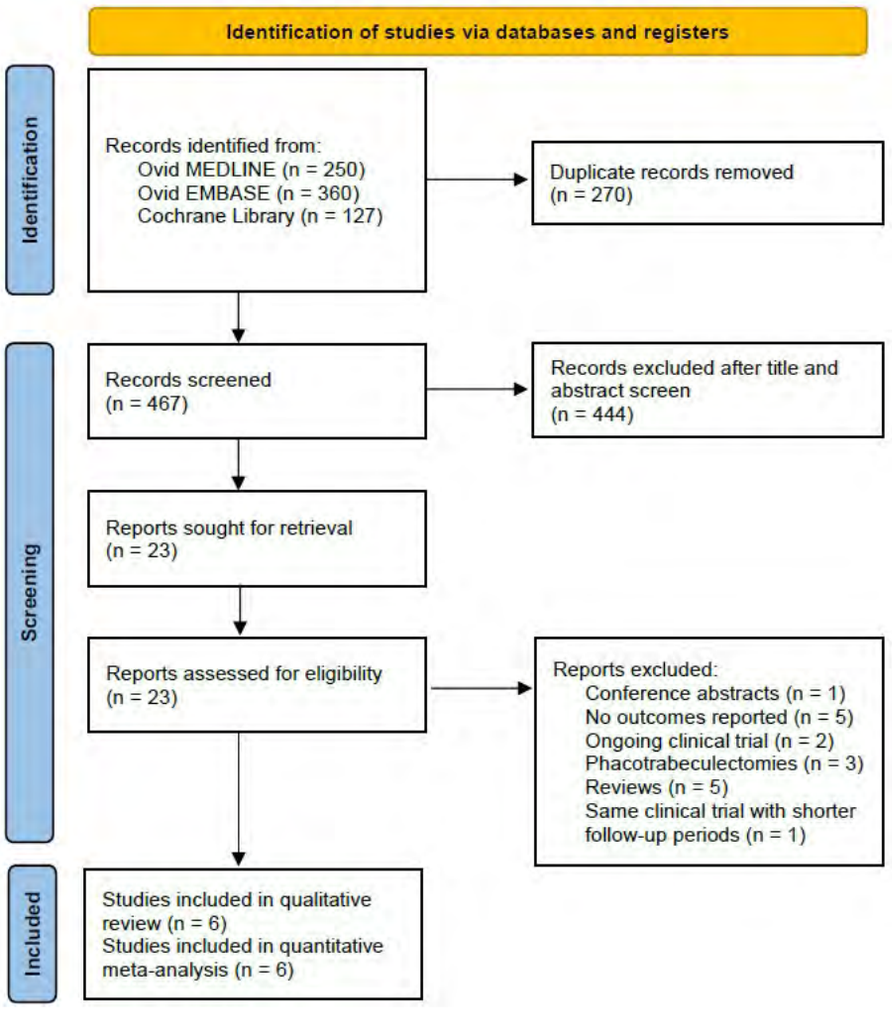

Conclusions

In summary, MMC injection results in a more significant reduction in antiglaucoma medications. Injection methods also lead to lower bleb height, more extensive blebs, and reduced bleb vascularity compared to sponge application. Future randomized clinical trials comparing different injection methods are needed to establish the optimal route for MMC administration.

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P-1059

THE INFLUENCE OF INTERNAL TRABECULOTOMY ON ABNORMALLY BULGING FILTERING BLEBS AFTER TRABECULECTOMY

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Background

There are various procedures for the bulging and ectopic or thin-walled filtering blebs after filtering surgery, and their outcomes vary. For a child with glaucoma, trabeculotomy combined with trabeculectomy was performed on one eye, and trabeculectomy was performed on the other eye. Both eyes were given eyeball massage after the operation. After 20 years of observation, intraocular pressure (IOP) of both eyes was normal; the eye with trabeculotomy combined with trabeculectomy presented almost no filtering bleb; the eye with trabeculectomy the filtering bleb was cystic and localized. It is hypothesized that when both internal and external filtration exist simultaneously, whether internal filtration has priority. Therefore the following internal filtration may reduce the aqueous outflow to the filtering bleb.

Methods

Two patients with abnormal filtering blebs after trabeculectomy or Express glaucoma shunt were selected. Internal trabeculotomy was performed under gonioscope, and the changes of filtering blebs and IOP were observed. For angle-closure glaucoma patient, goniosynechialysis(GSL) was performed first; for those with combined cataract, phacoemulsification and intraocular lens implantation were performed. The visual acuity, IOP, slit-lamp examination, fundus examination before and after the operation were recorded. Stereophotographs of the conjunctival filtering blebs and optic nerve papilla were conducted.

Results

The first case was a patient with advanced chronic angle-closure glaucoma and cataract. The filtering bleb was bulging, ectopic and diffused, with fluid accumulation in the nasal and inferior follicles, IOP was 12mmHg. Phacoemulsification and intraocular lens implantation combined with GSL and trabeculotomy under direct gonioscope were performed. After the operation, the filtering bleb flattened, IOP was 13mmHg. The second case was a patient with advanced open-angle glaucoma. The filtering bleb was bulging and thin-walled, and the intraocular pressure was 45mmHg with four eye drops. Trabeculotomy was performed. After the operation, the filtering bleb flattened, IOP was 15mmHg.

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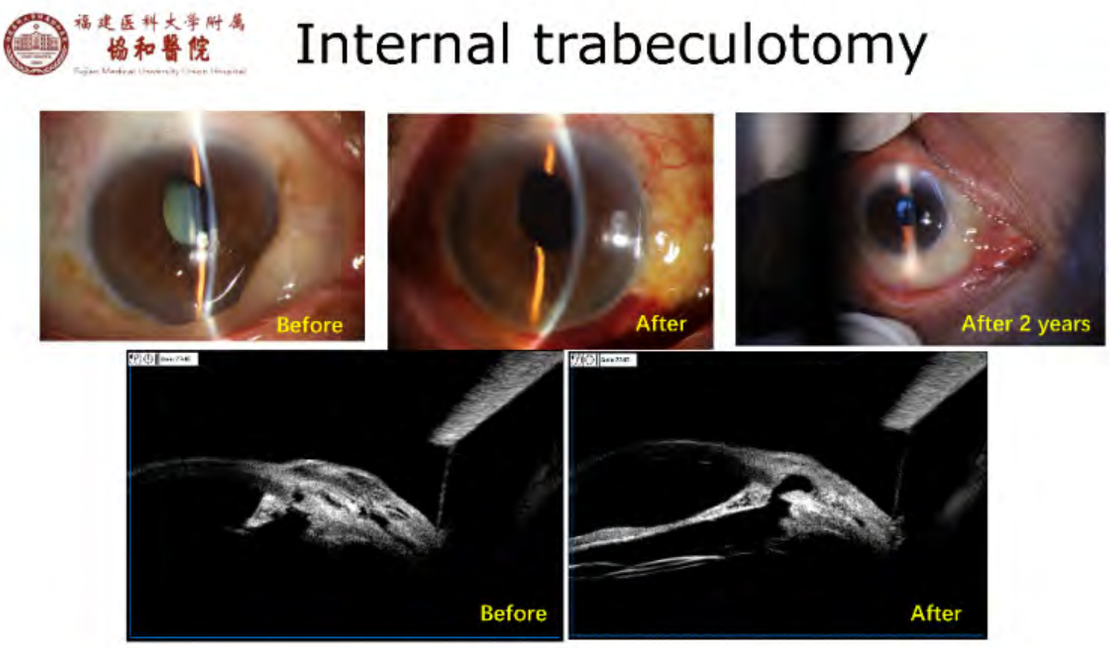

Conclusions

Internal trabeculotomy is a minimally invasive and effective method for treating abnormally bulging filtering blebs after external filtering trabeculectomy.

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P-1060
BAERVELDT-350 WITH ADJUNCTIVE GONIOTOMY: ONE-YEAR OUTCOMES

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Background
Non-valved aqueous shunts like the Baerveldt-350 implant (BGI-350) are often used in patients with refractory glaucoma where conventional treatments have failed. These devices create an alternative outflow pathway for aqueous humor, thereby lowering IOP. However, the postoperative period, particularly the first six weeks prior to spontaneous ligature dissolution, presents significant challenges in IOP management. The ligature delays onset of full shunt function in order to prevent early postoperative hypotony, but this technique carries a risk of transiently elevated IOP. There has been growing interest in combining non-valved shunt implantation with an angle-based procedure to protect against this risk; however, only a few case series detailing this strategy are available. The current study aims to report one-year outcomes of the novel approach of performing excisional goniotomy and BGI-350 implantation concurrently.

Methods
Retrospective chart review of 46 consecutive eyes undergoing first superotemporal BGI-350 implantation with concurrent goniotomy by a single surgeon between 3/12/2020 and 12/22/2022. Eyes were excluded for the following reasons: missing postoperative week 4 data (5 eyes); trauma or uveitis (9 eyes); less than one year of follow-up data recorded (5 eyes).

Results
27 eyes from 25 patients were included in the analysis. The mean age was 71 years, 56% were female, 96% were Black, and 85% had primary open-angle glaucoma. Concurrent cataract surgery was performed in 56% of eyes; all others were pseudophakic. The mean preoperative IOP was 21.9 mmHg on 4.2 medications and mean IOP at postoperative year 1 (POY1) was 10.8 mmHg (50.7% reduction) on 2.2 medications (47.7% reduction). The PTVT trial's definition of failure includes IOP > 21 mmHg, IOP ≤ 5 mmHg, reoperation for glaucoma, loss of light perception vision, or IOP reduced by < 20% from baseline. No eyes failed the first four criteria, but 3 of 27 eyes (11%) had an IOP reduction < 20% at POY1. Therefore, our failure rate was 11%; however, two of these three eyes had undergone surgery for the purpose of medication reduction. Our failure rate, IOP reduction rate, and medication reduction rates at POY1 (11.1%, 50.7%, and 47.7%) compare favorably to those of the PTVT study (17.3%, 40.8%, and 32.2%) as well as the ABC and AVB studies.

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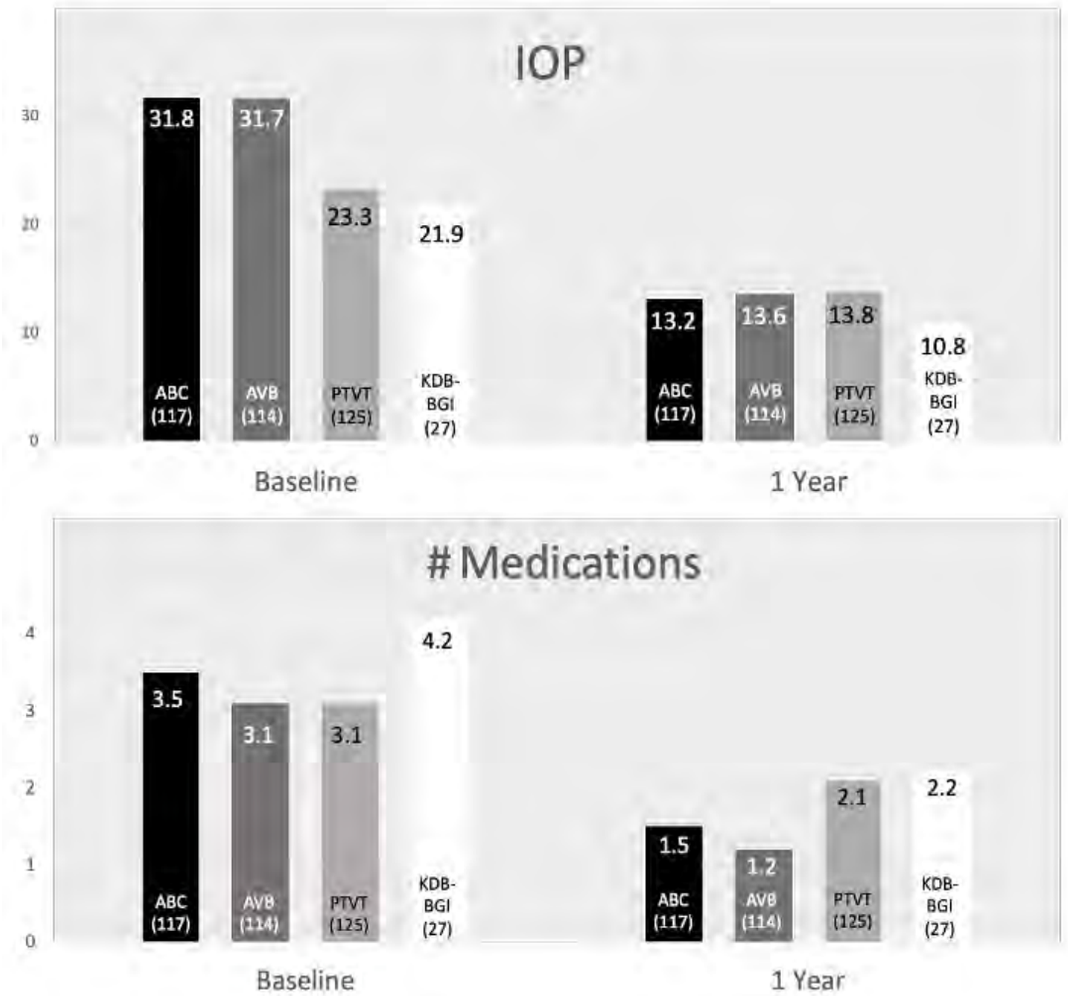

Conclusions

BGI-350 implantation with goniotomy is a safe and efficacious approach to improve IOP lowering prior to ligature dissolution, as well as one-year IOP and medication outcomes. This method compares favorably to previously reported BGI-350 results, but future studies with larger sample sizes and longer follow-up will be necessary to substantiate these findings.

References

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P-1061

CLINICAL FEASIBILITY ASSESSMENT OF A NEW LASER TITRATABLE AQUEOUS SHUNT

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Background
Evaluate the clinical safety, procedural success, and efficacy profile of a laser-adjustable sub-conjunctival aqueous shunt using a green laser to modify postoperative outflow resistance

Methods
The clinical profile of the Calibreye System (Myra Vision, Campbell, CA) was assessed at six months in 29 eyes with open-angle glaucoma. Procedural success of both shunt implantation with Mitomycin- C and postoperative laser outflow adjustment was evaluated. The shunt connects the anterior chamber with the equatorial subconjunctival space via three microfluidic channels, two of which are controlled by nitinol valves that can be opened or closed using a slit lamp mounted green laser with a single 0.1 second pulse at 300 mW power. Following implantation, the investigators opened and closed the valves to modulate device resistance as needed to modify IOP. Postoperative study visits were scheduled on days 1 and 3, weeks 1, 2, and 3, and months 1, 3 and 6. Adverse events, medication use, and IOP were assessed at each visit.

Results
The Calibreye shunt has been successfully implanted in 40 eyes across four clinical sites by 5 surgeons with no intraprocedural adverse events reported. 29 eyes have reached six-months of follow-up at the time of abstract submission, but it is anticipated that 36 eyes will be presented. The baseline IOP was 22.7 ± 4.8 mmHg (mean ±SD) on 3.17 ± 1.2 medications with a visual field mean deviation of -19.1 ± 10.1 dB in 29 eyes. At 6-months, the IOP was 13.6 ± 4.5 mmHg (mean ±SD) on 0.4 ± 1.0 medications, representing a 37.9% reduction in IOP from baseline in 29 eyes. 31 out of 40 eyes (97%) were titrated at least once by 6 different operators. No adverse outcomes related to the titration laser procedure were reported. One shunt was explanted due to unresolved hypotony maculopathy. No patient required needling and most did not need intervention apart from medication or laser titration. Transient mild adverse events were reported in 23 of 40 eyes, most of which occurred early and resolved with conservative management.

Conclusions
The clinical profile of the titratable Calibreye aqueous shunt in this feasibility trial demonstrated excellent procedural success, a significant IOP and medication reduction and an encouraging safety profile. The ability to adjust outflow resistance up or down in the early postoperative period offers a promising addition to the management of early postoperative IOP levels in glaucoma surgery.

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THE EFFECT OF EPIGALLOCATECHIN-3-GALLATE ON MMP-3 AND TGF-BETA EXPRESSION IN A POST TRABECULECTOMY MODEL

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Background
Subconjunctival fibrosis is the most common cause of failure in trabeculectomy. It can cause bleb dysfunction which further lead to surgical failure, raising the intraocular pressure, and cause the progression of glaucoma. Epigallocatechin-3-gallate (EGCG) has demonstrated anti-inflammatory, antioxidative, and antiangiogenic benefits in many models of ocular diseases. This study is aimed to evaluate the effects of Epigallocatechin-3-Gallate (EGCG) on Matrix Metalloproteinase-3 (MMP-3) and Transforming Growth Factor (TGF)-β expression in human tenon fibroblasts (HTFs) as a model for post-trabeculectomy wound healing *in vitro*.

Methods
This *in vitro* true experimental study involved HTF cell cultures divided into four groups: a negative control group (untreated HTFs), a positive control group (treated with MMC 0.4 mg/mL), an EGCG group (treated with 50 µM EGCG), and a combination group (treated with 50 µM EGCG and 0.3 mg/mL MMC). Antifibrotic effects were assessed by measuring MMP-3 and TGF-β expression using inverted immunofluorescence microscope and was analyzed using Fiji software at 24, 48, and 72 hours. The results between groups were analyzed using anova test and posthoc test.

Results
A significant difference in MMP-3 expression was observed among the four groups ($p < 0.001$). The combination group (50 µM EGCG and 0.3 mg/mL MMC) showed the lowest MMP-3 expression (19305.54 ± 1630.63), followed by the MMC 0.4 mg/mL group (22876.45 ± 1263.72), the EGCG 50 µM group (40182.18 ± 2498.39), and the control group (74654.72 ± 3269.02). There was a significant difference among the four groups at 24, 48, and 72 hours of observation ($p < 0.001$). Combination of EGCG 50 µM and MMC 0,3 mg/mL showed significant reduction in the expression TGF-β (28490,91 ± 1672,65) compared with other groups ($p<0,001$).

Conclusions
The findings suggest that both EGCG and MMC, individually and in combination, significantly reduce MMP-3 and TGF-β expression. The combination of EGCG and MMC demonstrated the greatest antifibrotic effect, supporting its potential as a safer alternative adjuvant therapy for reducing post-trabeculectomy fibrosis with minimized side effects.

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