CLINICAL GLAUCOMA: DEVELOPMENTAL AND CONGENITAL GLAUCOMAS
A CASE OF SUBACUTE BILATERAL ANGLE-CLOSURE GLAUCOMA CAUSED BY CONGENITAL PERIPHERAL CORNEAL THICKENING

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**Background:** Besides four major factors of angle-closure mechanism including relative pupillary block, plateau iris, direct lens block and retro-lenticular pressure, corneal structural disorder uncommonly causes narrow angle. Here we report a case of bilateral subacute angle-closure glaucoma developed in the eyes of congenital limbal thickening.

**Case:** A 10-year-old girl presented with gradual blurred vision especially in the right eye (RE). Corneal limbal clouding was pointed out in both eyes (BE) after birth, though her visual development was normal. She also had myocardial degeneration, MS+MR, Guillain-Barres’ syndrome and hypertrophic scarring. Lipidosis and chromosomal aberrations were ruled out. Her visual acuity was 20/60 and 20/20, and intraocular pressure was 44 and 32 mmHg in the RE and the left eye (LE), respectively. Corneal limbal haze was observed in BE, while corneal edema as well as neovascularization in the iris was noted in the RE. Gonioscopically, peripheral anterior synechia of 360 degree in the RE, and that of 240 degree in the LE were observed. Ultrasound biomicroscopy revealed prominent inward bulging of corneal tissue corresponding to the region of peripheral haze, as the cause of angle closure. After trabeculectomy, the swollen corneal tissue was ultra-structurally examined, and showed randomly arranged collagen layers with neither cellular infiltration nor vascular invasion.

**Conclusion:** Though the clinical course of this patient was progressive at the age of 10, the underlying mechanism of angle-closure was presumably due to the peculiar thickening of peripheral corneal tissue, resembling sclerocornea.
CORNEAL FEATURES IN CONGENITAL GLAUCOMA
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Goal: to assess the keratometry and pachymetry of the cornea in children with congenital glaucoma and their impact on tonometry.

Material: 18 children (32 eyes) with congenital glaucoma were examined at age between 6 months and 9 years, 8 boys (45%) and girls -10 (55%). In all cases the data including keratometry, corneal diameter, tonometry, slit-lamp examination. The central thickness of the cornea was assessed by optical coherent tomographer “Visante”.

Results: in 70 % of cases the congenital glaucoma was of advanced and far-advanced nature, which speaks about the progressive character of the disease.

Comparing the central thickness with keratometry, corneal diameter and intraocular pressure it was noted a paradox increase of central corneal thickness and decrease of keratometry with progression of congenital glaucoma.

Table 1.- Results of corneal examination in children with congenital glaucoma and intraocular pressure

<table>
<thead>
<tr>
<th>Stage of the disease</th>
<th>OCT, thickness in central zone</th>
<th>Keratometry</th>
<th>Corneal diameter (mm)</th>
<th>Intraocular pressure (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>early</td>
<td>558±23 mkm</td>
<td>42.08±2.67</td>
<td>11.5±0.05</td>
<td>17.5± 2.7</td>
</tr>
<tr>
<td>advanced</td>
<td>560±28 mkm</td>
<td>41.79±2.85</td>
<td>12.7±0.8</td>
<td>22.3±3.9</td>
</tr>
<tr>
<td>Far-advanced</td>
<td>580±56 mkm</td>
<td>38.6±1.13</td>
<td>13.9±1.4</td>
<td>26.7±3.6</td>
</tr>
</tbody>
</table>

This was explained by advanced changes in cornea as a result of its stretching and increase in its diameter, that was confirmed also by clinical signs and results of investigations (tears of the descemet membrane, marked oedema and corneal opacifications) The thickness of the central corneal zone was by 3.8% bigger comparing to early and advanced stages of glaucoma (Pic 1 a,b)

The mean intraocular pressure was 25.8 ± 3.7 mm. and was not correlated with clinical picture. However with disease progression the increase of IOP was noted that can be explained by an increase of thickness of central corneal zone and decrease of keratometry (steep cornea).

Conclusions: As a result of progression of congenital glaucoma and organical changes of the cornea the following features were noted: an increase by 3.8% of central corneal thickness and decrease of keratometric parameters (steep cornea), increase of diameter by its stretching and elasticity of external layer. These changes also influence on tonometry but do not reflect the exact increase of IOP.
CENTRAL CORNEAL THICKNESS IN IRANIAN INFANTILE GLAUCOMA PATIENTS

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Background: Glaucoma remains a major sight-threatening condition in children, accounting for 2.5% to 10% of cases of blindness in this group. Noticeably, the glaucoma is much more common in Middle East. We aimed to compare central corneal thickness (CCT) between controlled primary congenital glaucoma (PCG) cases and nonglaucomatous subjects and to investigate the correlation between CCT and intraocular pressure (IOP) in the study population. This is novel because of lack of similar studies in the region.

Patients and Methods: Twenty-three consecutive PCG cases were included in the study. Among patients with strabismus or lacrimal drainage insufficiency, twenty-one aged and sex-matched nonglaucomatous cases without history of previous intraocular surgery or trauma were selected as control group. None of the subjects had clinical corneal edema and all of the patients had a stable controlled IOP at the time of enrollment. Ultrasonic pachymetry and applanation tonometry along with a complete set of ophthalmic examination were performed for all subjects.

Results: Glaucomatous and nonglaucomatous subjects in the study were aged and sex-matched. Entering both eyes of glaucomatous subjects in the analysis, mean CCT was significantly higher than nonglaucomatous subjects (589.42 ± 53.44 µm vs. 556.14 ± 30.51 µm; p = 0.001). There was a significant correlation between CCT and IOP (r = 0.623, p < 0.0001). In one eye per subject re-analysis of data, the mean CCT in the study group was still significantly thicker than nonglaucomatous controls (587.86 ± 56.03 µm vs. 560.17 ± 27.17 µm; p = 0.04), and there was a strong correlation between CCT and IOP (r = 0.630; p = 0.001). In a multiple regression model, number of previous surgeries, number of drugs used and corneal diameter had no effect on correlation between CCT and IOP.

Conclusion: Iranian PCG cases have significantly thicker cornea than non-glaucomatous subjects and this could significantly affect IOP measurement with applanation tonometry. This is contrary to previous reports from other geographic regions and may reflects racial differences in disease nature. Pachymetry should be considered as an essential part of evaluation for PCG.
EVALUATION OF CONGENITAL GLAUCOMA CASES IN A TERTIARY MEDICAL CENTER
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Background: Congenital glaucoma is one important entity causing visual impairment in early years of life. Medical therapy has a limited success rate and surgery is still the primary therapeutic modality. Early diagnosis and treatment and a proper refractive correction with amblyopia therapy are important for an acceptable visual functional outcome.

Methods: A retrospective analysis of 45 eyes of 27 patients diagnosed as congenital glaucoma had been performed. Corneal diameter, preoperative and postoperative intraocular pressures were measured. The success rates of decreased intraocular pressure after different types of surgical interventions were evaluated.

Results: Sixteen patients were male (59.26%) and eleven patients were female (40.75%); the mean age at the admission was 9.23 ± 16.17 months (range 2 days and 5 years). Eighteen patients (66.67%) had bilateral and nine cases had monocular involvement. The mean intraocular pressure was 30.09 ± 11.14 mmHg (range 10-60 mmHg); the mean horizontal corneal diameter was measured as 12.69 ± 1.71 mm (range 11-18 mm). Five patients had not attended the control examinations and one case with systemic abnormalities had expired during general anesthesia. Thirty four eyes of 21 patients undergone surgical intervention. Some cases had surgeries more than once and 18 goniotomy, 17 trabeculectomy, 8 trabeculotomy and 5 viscotrabeculotomy interventions had been performed. The mean intraocular pressures during the first month, third month of the operation and the last examination had been found as 24.26 ± 9.37 (range 10-46) mmHg, 26.32 ± 8.92 (range 14-48) mmHg and 25.35 ± 11.16 (range 6-42) mmHg consecutively. Corneal abscess in two cases, optic atrophy and phitisis bulbi in one case were observed during the follow up of the cases.

Conclusion: Goniotomy, trabeculectomy, trabeculotomy and viscotrabeculotomy are amongst surgical alternatives for congenital glaucoma cases. Early diagnosis, convenient surgical modality including removal of opacities in optic media and an aggressive amblyopia therapy with good postoperative follow-up care are important factors for the restoration of good visual function.
FACTORS INFLUENCING LONG-TERM VISUAL OUTCOME OF CHILDHOOD GLAUCOMA
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Purpose: To evaluate factors influencing long-term visual outcome of childhood glaucoma treated intraocular pressure (IOP) reduction with surgery and amblyopia treatment with occlusion therapy.

Methods: Retrospective review of 24 children (35 eyes) treated for childhood glaucoma at a single center.

Results: Age at diagnosis was 149.5 ± 123.7 days, and follow-up was for 7.9 ± 3.3 years. Final IOP was 14.7 ± 4.1 mmHg. Final best-corrected visual acuity (BCVA) was ≥ 20/40 in 13/36 eyes (36.1%), and ≥ 20/50 in 17/36 eyes (47.2%). C/D ratio was found to be associated with final log MAR BCVA (Spearman’s rho = 0.412, p = 0.014). Eyes with anisometropia of 1.5 diopters or larger were found to have significantly worse final BCVA than eyes without anisometropia (p = 0.001). Age at diagnosis, type of glaucoma, initial corneal diameter, percentage of time of poor IOP control, additional surgery requirement, final IOP, presence of secondary strabismus, myopia or astigmatism were not associated with final visual outcome. On multiple linear regression analysis, presence of anisometropia was the only factor found to be significantly associated with poor visual outcome.

Conclusion: Anisometric amblyopia is the leading factor associated with decreased vision in childhood glaucoma with well-controlled intraocular pressure.
THE CLINICAL EXPERIENCE AND SURGICAL OUTCOME IN TREATING PATIENTS OF PHACOMATOSIS PIGMENTOVASCULARIS WITH GLAUCOMA AT A TERTIARY EYE CARE CENTRE

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Background: The term ‘Phakomatosis pigmentovascularis’ (PPV) is used to describe the association of a vascular nevus with an extensive pigmented nevus. It’s a combination of Oculodermal melanocytosis and Sturge-Weber syndrome. Glaucoma is seen in 10% of the patients with oculodermal melanocytosis. It is estimated that glaucoma affects 30% of patients with Sturge-Weber syndrome. The aim of this study is to describe the clinical experience and surgical outcome in treating the patients of Phacomatosis Pigmentovascularis with glaucoma at a tertiary care centre.

Methods: Retrospective analysis of the records of 24 patients presenting with glaucoma in Phacomatosis Pigmentovascularis was done and clinical manifestation and surgical results were analyzed. A total of 40 eyes were analyzed. The surgery was considered a complete success when the IOP was less than 21 mm Hg. All patients were examined 1, 2, and 3 days after surgery, followed by examination in the office at the end of 1, 3, and 6 weeks and at every 3 months thereafter.

Result: Median age of patients was 17 months (0 - 252 months, range). 62.5% of patients presented in less than 24 months of age. The distribution between males and females was in the ratio of 1:1. The children presented with enlargement of eyeball in 29.1% (n = 7) of cases, whitening of the cornea in 20.8% (n = 5), epiphora in 12.5% (n = 3). All the patients presented with a facial hemangiomas and ocular melanosis. Pigmentary nevi over the body were recorded in 100% of patients. Seizures were seen in 16.6% (n = 4). The mean IOP at the time of presentation was 26.47±9.23 mmHg (10 - 49 mmHg, range). 27 eyes underwent surgical management and 4 eyes underwent Transscleral cyclophotocoagulation at our centre. 5 eyes were continued on medical therapy. The IOP in cases undergoing surgical management at our centre reduced from 24.61±5.52 mmHg to 11.80±5.31 mmHg (p < 0.001). The mean corneal diameter was 13.21±0.99 (range, 11-16). Preoperative corneal edema was noted in 76.9% (n = 20) of patients. Persistent post operative corneal edema was noted in 7.6% (n = 2). Postoperatively 2 eyes had shallow anterior chamber, 6 cases were noted to have hyphaema, 1 case had Descemet’s detachment and 1 case had choroidal detachment. The success probability was 95% at the end of 84 months in case of patients who were managed by Incisional surgery.

Conclusions: Phacomatosis Pigmentovascularis is a condition with extensive cutaneous vascular malformation and Pigmentary nevi. It is often associated with congenital glaucoma. The management of glaucoma is challenging in these cases and surgical option in the form of combined trabeculotomy and trabeculectomy is safe and effective.
CLINICAL GLAUCOMA: OCULAR HYPERTENSION AND PRIMARY OPEN ANGLE GLAUCOMA
OCULAR PERFUSION PRESSURE IN PATIENTS WITH EARLY PRIMARY OPEN-ANGLE GLAUCOMA AND OCULAR HYPERTENSION
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**Background:** Blood flow in the tissues of the body depends on the perfusion pressure, which represents the difference between mean arterial pressure (MAP) and venous pressure (VP). Ocular VP should be minimally higher than intraocular pressure (IOP) in conditions of adequate blood circulation. For calculating the average perfusion pressure (AVP) of the eye, one can consider VP as equal to IOP. Legality of this was confirmed in several studies. Thus: AVP = 2/3 [diastolic AP + 1/3 (systolic AP - diastolic AP)] - IO In this study assessed perfusion pressure, calculated with systemic arterial pressure and Maklakov IOP, calculated with nomogram devised by A.P. Nesterov, M.B. Vurgaft, B.I. Vagin.

**Methods:** In accordance with the purpose and objectives of the study we conducted a comprehensive clinical examination on 55 patients with ocular hypertension, 110 eyes, 55 patients with early primary open-angle glaucoma (POAG), 79 eyes and 55 clinical healthy people, 110 eyes (control group) in design of cross-cohort comparative study. Of whom 82 men and 83 women. The average age of patients with ocular hypertension was 54.6 ± 13.7, with early POAG 62.0 ± 9.5, in control group - 56.3 ± 12.2 years. Observation period is 2 years. Results of clinical studies performed using SPSS 11.5. comparison of samples was performed using anova, the scheffe test. For statistical significance was accepted level of 0.05.

**Results:** Indicators of average ocular perfusion pressure in patients with ocular hypertension 44.94 ± 5.35 mmHg and early POAG 45.04 ± 5.38 mmHg is lower than in control group 47.65 ± 5.06 mmHg (p < 0.001). interest is the study not only mean perfusion pressure and diastolic perfusion pressure of the eye. Diastolic perfusion pressure of the eye in patients with ocular hypertension 62.36 ± 7.35 mmHg and patients with early stage POAG 60.49 ± 6.73 is lower than in control group 64.35 ± 6.43 mmHg (p < 0.001). Mean perfusion pressure and diastolic perfusion pressure of the eye depends on the level IOP, which in turn is correlated with the thickness of the cornea. In this regard, we have adjusted the figures tonometry of central corneal thickness (CCT) using the following formula: corrected IOP = Index Tonometry - (CCT-545) / 50 * 2.5. Diastolic perfusion pressure of the eye, after correction of the results of tonometry in patients with early stage POAG 60.40 ± 6.61 mmHg is lower than in patients with ocular hypertension 63.13 ± 7.92 mmHg and in control group 64.14 ± 6.54 mmHg (p < 0.002). It should be noted that this formula is designed for converting IOP for Goldmann tonometry and can not be fully correct for the conversion level IOP measured by Maklakov tonometer. The very existence of the relationship CCT and IOP difficult, as evidenced by recent studies. However, the diastolic ocular perfusion pressure important differential diagnostic criterion for hypertension and early POAG eyes only when taken into account the correction of IOP on the thickness of the cornea.

**Conclusions:** Ocular perfusion pressure in patients with ocular hypertension (63.13 ± 7.92 mmHg) do not have significant differences from those in the control group (64.14 ± 6.55 mmHg) due to higher levels of diastolic blood pressure and with only the adjustment of the level IOP of central corneal thickness. In primary open-angle glaucoma at an early stage there is a decrease of ocular perfusion pressure (60.40 ± 6.61 mmHg).
RANDOMIZED CLINICAL TRIAL OF THE EFFICACY AND SAFETY OF PRESERVATIVE-FREE TAFLUPROST AND PRESERVATIVE-FREE TIMOLOL IN PATIENTS WITH OPEN-ANGLE GLAUCOMA (OAG) OR OCULAR HYPERTENSION (OHT)

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Background: Prostaglandin analogs are first-line IOP-lowering therapy in patients with OAG and OHT. Most topical ocular hypotensives contain the preservative benzalkonium chloride, which may be associated with decreased ocular tolerability in some patients. We compared the efficacy and safety of tafluprost, a preservative-free (PF) prostaglandin analog, with PF timolol.

Methods: Randomized, double-masked, Phase III clinical trial (NCT01026831) in patients with OAG and OHT. After discontinuation and washout of existing ocular hypotensive treatment, patients who had IOP ≥ 23 and ≤ 36 mmHg in at least 1 eye at the 0800 hr time point were randomized 1:1 to 12 weeks of treatment with either PF tafluprost (PF TAF) 0.0015% or PF timolol (PF TIM) 0.5%. IOP was measured 3 times during the day (0800, 1000, 1600 hrs) at baseline and week 2, 6, and 12. The primary hypothesis was that PF TAF would be non-inferior to PF TIM in IOP change from baseline at all visits and time points (9 time points). The study was powered for a non-inferiority margin of 1.5 mmHg.

Results: A total of 643 patients were randomized and 618 completed (PF TAF = 306, PF TIM = 312). Baseline IOPs ranged from 23.8-26.1 mmHg in the PF TAF group and 23.5-26.0 mmHg in the PF TIM group. IOPs at the 12-week visit ranged from 17.4-18.6 mmHg for PF TAF and 17.9-18.5 mmHg for PF TIM. At all 9 time points, the upper limits of the 2-sided 95% CIs for the difference between treatments in IOP-lowering were less than the pre-specified non-inferiority margin; at 4 of the 9 time points, the upper limits of the CIs were < 0, in favor of PF TAF. Similar percentages of PF TAF and PF TIM patients reported ocular pain/stinging/irritation (4.4% vs. 4.6%) and pruritus (2.5% vs. 1.5%). The percentages of PF TAF and PF TIM patients reporting conjunctival hyperemia were 4.4% vs. 1.2% (nominal p = 0.016).

Conclusions: The IOP-lowering effect of PF tafluprost was non-inferior to that of PF timolol. PF tafluprost is an efficacious and generally well-tolerated ocular hypotensive agent.
AN UNUSUAL PRESENTATION OF JUVENILE OPEN ANGLE GLAUCOMA IN A CHINESE GIRL: A CASE REPORT
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Background: To report a case of Juvenile Open Angle Glaucoma (JOAG) with an unusual presentation.

Methods: Case report

Results: A healthy 19-year-old Chinese girl with high myopia presented with blurring of both vision and a mild headache for 4 months. Best corrected visual acuities (BCVA) at presentation were HM OD and 6/60 OS. IOP was 44mmHg OD and 42 mmHg OS. Both angles were open (Shaffers Grade IV). Both optic discs were fully cupped, with collateral vessels on the left disc. Perivascular sheathing of retinal vessels were seen in both eyes. No signs of uveitis were detected in either eye. There was advanced bilateral visual field loss with markedly reduced RNFL thickness on OCT. The optic disc vessels did not leak on Fundus Fluorescein Angiography. Myocillin gene screening failed to detect any possible mutation. However, substitution of G to A at IVS2 730+35 was found. The role of this polymorphism in susceptibility of JOAG is not known. There was no evidence of any systemic disease. After the IOP was controlled with augmented trabeculectomy, both BCVA improved to 6/12OD, 6/9OS.

Conclusions: Optic disc collaterals and retinal vessel sheathing are rarely documented in cases of primary glaucoma. Their presence in this case of JOAG may be due to chronic retinal ischemia from long standing high intraocular pressure.
THE EFFICACY AND SAFETY OF ADDING A BRINZOLAMIDE/TIMOLOL MALEATE FIXED COMBINATION TO PROSTAGLANDIN MONOTHERAPY
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Background: Prostaglandins are the most common first-line treatment for the reduction of intraocular pressure in patients with ocular hypertension or primary open-angle glaucoma. Despite the ocular hypotensive effect of prostaglandins, some patients require additional IOP-lowering therapy to reach target intraocular pressure. Recently, the fixed combination of brinzolamide/timolol received regulatory approval in the European Union. However, information on the adjunctive use of brinzolamide/timolol fixed combination in addition to a prostaglandin is lacking. The purpose of this study was to evaluate the efficacy and safety of adding brinzolamide/timolol fixed combination as a single agent to prostaglandin monotherapy in uncontrolled glaucoma patients.

Methods: In this prospective, open-label study, subjects at 5 centers in Germany received brinzolamide/timolol fixed combination in addition to their current prostaglandin monotherapy. Eligible subjects must have been receiving prostaglandin monotherapy for at least 4 weeks and have demonstrated a need for further reduction in intraocular pressure, which had to be ≥ 20 and ≤ 35 mmHg in at least 1 eye while on prostaglandin monotherapy. Enrolled subjects continued their prostaglandin monotherapy and were asked to use brinzolamide/timolol fixed combination twice daily in the study eye(s) for 12 weeks. At baseline, week 4, and week 12 visits, intraocular pressure and safety (slit lamp, visual acuity) evaluations were performed in study subjects. Study subjects completed a solicited symptom survey at both baseline and week 12 visits to evaluate ocular discomfort (pain, blurriness, stinging, gritty feeling, and redness) pre- and post-treatment. Treatment success, defined as subjects with at least a 1 mm Hg decrease in intraocular pressure from baseline, was evaluated in subjects who completed the study.

Results: Forty-seven subjects, out of 48 subjects enrolled, completed the study. Following 12 weeks of adjunctive brinzolamide/timolol fixed combination treatment, mean intraocular pressure at baseline decreased by an additional 24.4%, from 22.1 mmHg to 16.7 mmHg (p < .001; 95% CI: 15.9-17.5 mmHg). There were no differences in the solicited symptom surveys administered pre-and post-treatment (p ≥ .08). Treatment success was achieved in 97.9% of subjects following 12-week use of brinzolamide/timolol fixed combination in adjunct to prostaglandin monotherapy. There were no significant safety findings in any study subject.

Conclusions: This study demonstrated that brinzolamide/timolol fixed combination may be safely added as an adjunct to prostaglandin monotherapy and can provide further significant intraocular pressure reduction in uncontrolled patients with ocular hypertension or primary open-angle glaucoma. The addition of brinzolamide/timolol fixed combination to prostaglandin monotherapy provided an additional 24% reduction in intraocular pressure when compared to prostaglandin monotherapy.
CORNEAL HYSTERESIS (CH) AND CORNEAL RESISTANCE FACTOR (CRF) IN INTRA-OCULAR HYPERTENSION AND OPEN ANGLE GLAUCOMA, VERSUS NORMAL EYES
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Purpose: To compare mean values of corneal hysteresis (CH) and corneal resistance factor (CRF) measured by Ocular Response Analyzer (ORA) in intra-ocular hypertension (IOHT), open angle glaucoma (OAG) and normal subjects (NS), and to analyse correlations, reliability and age influence.

Methods: Comparative study of 275 eyes from 145 subjects, divided in three groups: 64 IOHT, 46 OAG and 165 control patient eyes (NS). Following variables were compared: Goldmann applanation tonometry (GAT), central corneal thickness (CCT), and ORA derived parameters including: CH, CRF, Goldmann correlated intra-ocular pressure (IOPg), and corneal compensated intra-ocular pressure (IOPcc). Statistical analysis used non-parametric tests and significant p value < 0.05.

Results: The higest mean CH was found in the NS group (10.2 ± 1.5), compared to IOHT (9.6 ± 2) and OAG (9.2 ± 1.8). The higest mean CRF was observed in IOHT group (10.9 ± 2.1), compared to NS (10.1 ± 1.6) and OAG (9.9 ± 1.5). CH, CRF and CCT are well correlated with each other, whatever the group. CH is correlated with IOPcc and not with IOPg and GAT; inversely for CRF. In all groups, there is a good reliability between CH and CRF (r = 0.49 to 0.77) and an strong reliability between IOPcc, IOPg and GAT (r = 0.5 to 0.8). Whatever the group, CH and CRF present no influence of age, that confirms results of previous study. IOPcc is independant of CCT, strongly correlated (negatively) with CH, and statistically different between the three groups, IOHT, OAG and NS, results in agreement with previous published data. CH mean value is lower in OAG eyes, and statistically different compared to IOHT and NS, but there is an overlap of values between groups.

Conclusions: ORA derived corneal biomechanical parameters are not influenced by age. IOPcc is independant of CCT and seems to be a good estimation of intra-ocular pressure. CH and CRF significantly differ between OAG and normal eyes and appears to be useful for an earlier diagnosis of glaucoma.
QUANTITATIVE MEASUREMENT OF MACULAR GANGLION CELL COMPLEX THICKNESS BY SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY
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Background: Glaucoma is characterized by loss of retinal ganglion cells and their respective axons, which comprise the retinal nerve fiber layer (RNFL) on pathologic examination. The time domain optical coherence tomography (TD-OCT) has proven to be useful for measuring circumpapillary RNFL for glaucoma diagnosis. The spectral domain OCT (SD-OCT) with higher resolution and scan speed compared with the TD-OCT, enables quantitative measurement the macular ganglion cell complex (GCC), which defined as the combination of the nerve fiber, ganglion cell, and inner plexiform layers, and that contain, respectively, the axons, cell bodies, and dendrites of the ganglion cells. In this study, we evaluated the value of SD-OCT for glaucoma detection by measuring GCC thickness.

Objective: To compare the macular GCC thickness measured with SD-OCT (RTVue-100) between normal subjects and glaucomatous patients, and evaluate the correlation between GCC thickness and RNFL thickness or visual field (VF) index.

Methods: A total 41 eyes of 41 normal subjects and 99 eyes of 61 primary open-angle glaucoma patients were enrolled in the study. All the subjects underwent RTVue-100 and TD-OCT (Stratus OCT) measurements of macular GCC thickness and peripapillary RNFL thickness respectively, and VF examination. The measurements of GCC parameters (GCC-Avg, GCC-Sup and GCC-Inf) were compared between normal subjects and preperimetric and early stage glaucoma patients, and also between each of the early, moderate and severe glaucoma patients. The correlations between GCC thickness and RNFL thickness, and between GCC thickness and mean deviation (MD) of VF, were evaluated by linear regression analysis.

Results: The average thickness of GCC-Avg, GCC-Sup and GCC-Inf in normal subjects was (97.16 ± 4.82) µm, (97.22 ± 5.19) µm and (97.12 ± 5.18) µm respectively. The measurements of the three GCC parameters were significantly different between normal subjects and preperimetric and early stage glaucoma patients (p<0.01), and also between each of the early, moderate and severe glaucoma patients. There were significant correlations between GCC-Sup, GCC-Inf, or GCC-Avg and RNFL-Sup, RNFL-Inf, or RNFL-Avg in all study eyes, and Pearson’s correlation coefficient were 0.802, 0.825, 0.856 respectively (p<0.01). Significant correlations between MD and GCC-Avg in glaucomatous patients was found with Pearson’s correlation coefficient of 0.601 (p<0.01).

Conclusions: SD-OCT can quantitatively measure and differentiate the GCC thickness between normal subjects and glaucomatous patients. The GCC thickness gradually decreases with the development of POAG, and shows the well correlation with visual field defect and RNFL thinning.

Key words: Optical coherence tomography; Retina; Ganglion cell; Nerve fiber; Glaucoma
THE ANALYSES OF RETINAL NERVE FIBER LAYER THICKNESS IN PATIENTS WITH OCULAR HYPERTENSION AND OPEN ANGLE GLAUCOMA

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Background: We aimed to compare the analysis of retinal nerve fiber layer (RNFL) thickness from the patient with ocular hypertension (OHT) and open angle glaucoma (OAG) with the analysis in normal population.

Methods: The 167 eye of 87 subjects were examined after pupiller dilatation with optical coherence tomography (Stratus OCT, model 3000). There were 3 groups; OHT group 1 (n = 36), OAG group 2 (n = 85), control group, group 3 (n = 46). The results of RNFL thickness (mean, superior, inferior, nasal, temporal) were recorded and compared statistically.

Results: There was no statistically significant difference between groups at demographical data of the patients. Central corneal thickness (CCT) was 577.7 ± 24.8 µ in group 1 where as 557.0 ± 34.6 µ in group 2 and 541.8 ± 32.3 µ in group 3. The measurement of CCT was significantly ticker in group 1 than group 2 and 3 (p < 0.05). The results of RNFL thickness (mean, superior, inferior, nasal, temporal) were 103.1 ± 9.3, 124.3 ± 15.8, 134.6 ± 14.5, 85.4 ± 19.6, 67.9 ± 11.8 µ respectively in group 1, where as 84.9 ± 17.0, 101.5 ± 25.6, 107.8 ± 26.0, 67.8 ± 18.9, 61.1 ± 16.6 µ in group 2 and 98.3 ± 11.3, 117.3 ± 25.6, 127.9 ± 24.1, 77.2 ± 16, 66.2 ± 11.4 µ in group 3. Although there was no statistically significant difference between group 1 and group 3 at the mean and all quadrant results. There was a significant difference between group 2 with group 1 and group 3 at all quadrants except temporal quadrant (p < 0.001).

Conclusion: RNFL thickness analysis with Stratus OCT is an effective and reliable method in detection and evaluation of glaucoma patients. It can provide a significant contribution to other diagnostic methods.
THE RELATIONSHIP BETWEEN CENTRAL CORNEAL THICKNESS AND RETINAL NERVE FIBER LAYER ANALYSIS IN GLAUCOMA PATIENTS

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Background: We aimed to evaluate the relationship between the analysis of retinal nerve fiber layer (RNLF) thickness and central corneal thickness (CCT) in glaucoma patients.

Methods: Forty seven glaucoma patients were examined after pupiller dilatation with optical coherence tomography (Stratus OCT, model 3000). The results of RNLF thickness (mean, superior, inferior, nasal, temporal) were recorded and compared statistically.

Results: There was a positive correlation between RNLF thickness (mean, superior and inferior quadrant) and CCT measurements in statistical analysis, but the degree of correlation was weak. There was no significant correlation at other quadrants (nasal and temporal).

Conclusion: There was a weak correlation between the analysis RNLF thickness and CCT in this study.
DOES THE DECREASE OF THE IOP LEAD TO AN IMPROVEMENT OF VISUAL FIELD DEFECTS IN GLAUCOMATOUS OPTIC NEUROPATHY?

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Background: To value the impact of a decrease of the intraocular pressure on the evolution of the glaucomatous optic neuropathy.

Methods: We achieved a survey of cohort carrying on 46 patients having a POAG. The estimated parameters were the IOP and the Mean Defect (MD) on the automated visual field. A first assessment has been done and then after 12 months repeated while all the patients had got drops to decrease the pressure. The levels of decrease pressure have been calculated in relation to a therapeutical target pressure of less twenty percent (-20%) of the PIO of beginning. The MD has been analyzed according to the level of the decreased pressure.

Results: The sample counted 46 patients of which 20 men and 26 women which represents respectively 43.5% and 56.5%. The ratio was 1.3 women for 1 man. The middle IOP for the entire sample during the survey was 18.6 mmHg for the right eye and 18.4 mmHg for the left eye. The average of the MD was -0.26 dB for the right eye and -6.82 dB for the left eye. A decreased pressure over 20% in the right eye drags an improvement of the MD in 33.3% of the cases and in 50% of the cases, stabilization. In the left eye, the values were respectively 28.1% of improvement and 31.3% of stabilization.

Conclusion: It is evident from this survey that the decrease of the order of 20% of the IOP is necessary for the improvement of the level of visual field defects among glaucomatous people.

Key words: target pressure, mean defect, glaucoma, melanoderm.
ABSTRACT WITHDRAWN
Nutrition and Eye Health: Nutrigenetic Study in Primary Open-Angle Glaucoma

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Purpose: to study the relationship between several genetic polymorphisms and primary open-angle glaucoma, and its possible modulation by diet in order to establish new diagnostic and therapeutic strategies for the prevention of glaucomatous blindness.

Method: we carried out a case-control study of 200 subjects, matched by age and sex, and classified into 2 groups: 1) glaucoma group (GG, n = 100), 2) control group (CG, n = 100). DNA was obtained from a blood sample of each patient by the phenol-chloroform method. The study of genetic polymorphisms (RBP1 rs176990 and rs190910, SLC23A1 rs10063949, SLC23A2 rs1279683) was performed by means of the TaqMan allelic discrimination technique, using a Real-Time thermalcycler (7900HT Fast Real-Time PCR, Applied Biosystems).

Results: the genotypes distribution in the glaucoma patients was as follows: RBP1-rs 176990: TT = 26.7%, TG = 40%, GG = 33.3%; RBP1-rs 190910: AA = 20%, AT = 52%, TT = 28%; SLC23A1-rs 10063949: CC = 24%, CT = 32%, TT = 44%; SLC23A2-rs 1279683: AA = 25%, AT = 29.2%, TT = 45.8%. In controls was: RBP1-rs 176990: TT = 14.8%, TG = 40%, GG = 33.3%; RBP1-rs 190910: AA = 14.5%, AT = 53.2%, TT = 32.3%; SLC23A1-rs10063949: CC = 21%, CT = 40.3%, TT = 38.7%; SLC23A2-rs 1279683: AA = 20.3%, AT = 45.8%, TT = 33.9%

Conclusions: the polymorphisms studied in RBP1 and SLC23A1 genes are not associated to glaucoma, because of genotypic proportion of it was similar in both groups. The genotypes distribution of the polymorphism studied in SLC23A2 gene was different in glaucoma group respect to control group, so this polymorphism might be related to the glaucomatous optic neuropathy.
ABSTRACT WITHDRAWN
CLINICAL GLAUCOMA: RISK FACTORS
ASYMMETRY OF RIGHT-LEFT EYE CENTRAL CORNEAL THICKNESS IN GLAUCOMA
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1
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Background: Recent studies have shown that thinner corneas are associated with larger and deeper optic disc cups. The purpose of this study is to assess whether the difference of corneal pachymetry between either eye in the same patient is a risk for developing asymmetrical optic disc cups.

Methods: Seventy one patients with an established diagnosis of glaucoma were enrolled in this cross sectional observational study. Ultrasound corneal pachymetry was done to measure central corneal thickness (CCT) in the right-left eyes of the enrolled patients. The average of ten CCT measurements were taken for each eye. The differences between right-left eyes were compared to cup/disc (C/D) ratios assessed clinically by slit lamb biomicroscopy. CCT measurements were analyzed for every 10 microns of difference between both eyes of the same patient. Asymmetrical C/D ratio was considered significant when the difference of 0.2 or more was found between either eye of the same patient. Results were considered statistically significant at 95% confidence interval.

Results: A positive correlation exist between the right-left eye CCT asymmetrical measurements and the corresponding asymmetry in C/D ratios, p = 0.03. This was only significant, p = 0.047, when assessing differences at more than 10 microns. At that point the odd ratio for obtaining an asymmetrical cup/disc ratio difference of 0.2 or more was 4.875

Conclusion: CCT asymmetry of more than 10 microns between right-left eye in the same patient exposes the patient to a high probability of developing asymmetrical cupping of the optic nerve head.
THE INCREASED LEVEL OF CIRCULATING AND FUNCTIONING TREG LYMPHOCYTES CORRELATES WITH VISUAL FIELD RATE OF PROGRESSION IN PRIMARY OPEN ANGLE GLAUCOMA

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Purpose: The aim of our study is to analyze regulatory T-cells (CD4+CD25+FOXP3+) and to test possible correlation with disease progression in patients affected by primary open-angle glaucoma (POAG) and age-matched controls.

Methods: 18 patients affected by POAG (14 males, mean age: 75 ± 9 yrs) and 15 age-matched controls (10 males, mean age: 76 ± 8 yrs) with negative history for neurodegenerative, autoimmune diseases, cancer, viral infection were selected for the study. Disease progression was estimated in glaucoma patients by retrospectively measuring visual field deterioration (24/2 SITA standard, Humphrey Field Analyzer) over a 5-year interval (at least 2 fields / year). Rate of field progression was calculated by (a) regression vs time of MD as measured by Glaucoma Damage Probability Trend in GMS3 software and (b) regression vs time of the GHT clusters mean sensitivity. Upon enrolment, whole blood was sampled from each patient. Flow cytometric analysis was used to determine the CD4+CD25+FOXP3 lymphocyte population. After magnetic cell separation (MACS) of CD4+CD25-(Tresp) and Treg cells, the suppression function of Tregs was assessed using the in vitro suppression test (Treg suppression Inspector, Miltenyi Biotec).

Results: The median value of Tregs (%) in POAG patients was 5.55 and 4.40 in controls. The Mann Whitney Test showed a significant difference (p = 0.027) between the two groups. No difference in the suppression activity of Tregs has been noted between the POAG and control groups (88 and 94% of suppression in the 1:1 co-culture, respectively). MD rate of progression (mean ± st. dev) was 0.8 ± 0.7 dB /year in glaucoma patients. The rate of MD progression was significantly correlated with the % Tregs in the individual patients (r = 0.574, p < 0.05).

Conclusions: Patients with POAG (a) express a higher amount of Treg (CD4+CD25+FOXP3) than age-matched controls, (b) the Tregs maintain their suppressive activity and (c) the Tregs level correlates with the 5-year visual field rate of progression.
EVALUATION OF OCULAR RISK FACTORS RELATED TO ASYMMETRIC VISUAL FIELD DEFECTS IN NORMAL TENSION GLAUCOMA

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Purpose: To evaluate ocular risk factors related to asymmetric visual field defects in normal tension glaucoma (NTG).

Methods: We retrospectively evaluated 92 NTG patients (184 eyes) with asymmetric visual field defects; these patients were classified as having more affected eye (ME) group or less affected eye (LE) group. The differences between ME and LE based on the intra-individual comparison were assessed with several ocular risk factors such as best corrected visual acuity, refractive error, intraocular pressure (IOP), the number of glaucoma medications, disc hemorrhage, central corneal thickness, zone β of peripapillary atrophy (PPA), and disc size. All subjects were divided into two groups according to the severity of bilateral mean deviation (MD, ∆6dB) and evaluated.

Results: The MD was -11.2 ± 6.5 in the ME group, and -5.9 ± 5.4 in the LE group (p = 0.00). The optic disc size was 2.62 ± 0.8 in the ME group, 2.48 ± 0.5 in the LE group (p = 0.00), and there were no statistically significant differences in the other factors. Regarding the difference in the MD, the optic disc size was statistically significant in the less different group, and the angle of PPA was statistically significant in the more different group (p = 0.00 and p = 0.01, respectively).

Conclusions: The optic disc size is a risk factor related to visual field defects in the ME group and the less affected patients, and the PPA is a risk factor, thought to be associated with ischemia, related to visual field defects in the more affected patients with asymmetric normal tension glaucoma.
Background: To investigate the risk factors of primary open-angle glaucoma (OAG) in the Namil study.

Methods: Seventy five eyes with OAG and 2813 control eyes of Namil study participants were included in analysis. Univariate and multivariate analysis were performed using generalized linear mixed models (GLIMMIX), to identify the ocular factors and systemic factors associated with OAG. Subgroup analysis were performed for normal-tension (IOP ≤ 21 mmHg) OAG and high-tension (IOP > 21 mmHg) OAG. Factors associated with OAG patients as a whole and a subgroup of normal-tension OAG and high–tension OAG patients, were identified and their odds ratio (OR) were calculated.

Results: Older age, history of diabetes mellitus and hypertension and intraocular pressure (IOP) differed between OAG patients and controls in univariate analysis. Multivariate analysis using GLIMMIX demonstrated that older age (OR = 1.032 [95% confidence interval (CI), 1.002 - 1.063]), history of thyroid disease (OR = 5.102 [95% CI, 1.060 - 24.390]) and higher IOP (OR = 1.374 [95% CI, 1.268 - 1.488]) were associated with an increased risk of having OAG. In the subgroup analysis, normal-tension OAG was associated with older age (OR = 1.030 [95% CI, 1.002 – 1.059]), history of thyroid disease (OR = 5.155 [95% CI, 1.087 - 24.390]), higher IOP (OR = 1.167 [95% CI, 1.059 - 1.286]) and history of diabetes mellitus (OR = 2.639 [95% CI; 1.325 - 5.263]). High-tension OAG was only associated with higher IOP (OR = 2.510 [95% CI, 1.822 - 3.458]).

Conclusions: In Namil Study, higher IOP, older age and thyroid disease were significant risk factors for having OAG. When analyzed separately, normal-tension OAG was associated with IOP, age, thyroid disease and diabetes mellitus, whereas high-tension OAG was only associated with IOP.
RISK FACTORS FOR PRIMARY OPEN-ANGLE GLAUCOMA IN JAPANESE SUBJECTS ATTENDING COMMUNITY HEALTH SCREENINGS
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Background: To describe risk factors associated with primary open-angle glaucoma in Japanese subjects who participated in community health screenings.

Methods: Residents of Akita, Japan, participating in a community health checkup were selected to undergo a comprehensive ophthalmic examination. Glaucoma was diagnosed based on optic disc appearance, perimetric results, and other ocular findings. Systemic blood pressure and intraocular pressure were measured and ocular perfusion pressure was calculated. Logistic regression analysis was performed to determine risk factors for primary open-angle glaucoma patients.

Results and Conclusions: Of the 710 subjects examined, 26 had primary open-angle glaucoma. The estimated prevalence of primary open-angle glaucoma was 3.7%. After adjusting for age, the prevalence of primary open-angle glaucoma was similar to that found in the Tajimi Study of Japanese subjects. Multivariate logistic regression analysis demonstrated that older age (≤ 60 years, odds ratio 3.49), lower diastolic blood pressure (≤ 58 mmHg, odds ratio 2.11), higher intraocular pressure (≥ 19 mmHg, odds ratio 4.12), and lower ocular perfusion pressure (≤ 34 mmHg, odds ratio 5.78) were associated with increased risk of having primary open-angle glaucoma. In addition to the established risk factors of age and intraocular pressure, we found that lower diastolic blood pressure and lower ocular perfusion pressure contribute to the risk of developing primary open-angle glaucoma. These findings indicate a multifactorial etiology of primary open-angle glaucoma that may be relevant for identifying groups at high risk.
BRIDGING THE MAJOR CLINICAL TRIALS AND EVERYDAY CLINICAL PRACTICE: CENTRAL CORNEAL THICKNESS AND VISUAL FIELD DAMAGE ARE INDEPENDENT RISK FACTORS FOR PROGRESSION IN A 6-YEAR RETROSPECTIVE EVALUATION OF PATIENTS' ELECTRONIC CHART RECORDS

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Purpose: To evaluate risk factors for progression in a population of open angle glaucoma patients routinely followed up in a Hospital-based Glaucoma Clinic.

Methods: The records of 131 eyes (75 patients) routinely followed in the years 2004-2010 in a single center Hospital-based Glaucoma Clinic were retrospectively evaluated. The data were recorded by using the software Glaucoma Management System® and were sorted by applying a query for eyes with (a) at least one visual field test / year HFA 24/2 SITA, (b) two IOP readings/year, (c) open angle on gonioscopy, (d) a central corneal thickness (CCT) evaluation before being started on therapy and (e) a minimum follow up of six years. Visual field damage was staged by using Brusini’s Glaucoma Staging System 2 (GSS2). Worsening by 1 stage / 10 years (i.e. 0.6 of a stage in 6 years) was considered to be significant to label an eye as “progressing”.

Results: 29/131 eyes (22/75 patients) met the criteria for progression. Mean rate of progression was 0.91 dB/year, meanwhile those eyes, who did not meet the criteria for progression, showed a 0.03 dB/year. Baseline IOP ranged between 22 and 28 mmHg. IOP during follow up ranged between 14 and 22. Mean IOP during follow up was 18.1 mmHg in the non-progressing and 18.4 in the progressing cohort (p > 0.4, unpaired two-tailed Student t test). The eyes were further stratified according to CCT: (a) < 510 μm, (b) between 510 and 550 μm, (c) > 550 μm. The percentage of progressing eyes among the three categories of CCT readings were 57% in (a), 45% in (b) and 10% in (c). A multivariate analysis (GBStat for Windows) dissected, as independent risk factors for progression, (a) CCT < 550 μm (OR 2.3-5.9, p < 0.0001) and (b) baseline MD > 4 dB (2.5% risk / 0.1 dB, p < 0.001).

Conclusion: This everyday data set confirmed that CCT < 550 μm and a Mean Defect > 4 dB can be considered as independent risk factor for progression in open angle glaucoma over a 6-year interval.
STUDY OF THE RETINAL NERVE FIBER LAYER THICKNESS IN PATIENTS WITH NEOVASCULAR AGE-RELATED MACULAR DEGENERATION TREATED WITH INTRAVITREOUS RANIBIZUMAB


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Background: The inhibitors of the vascular endothelial growth factor (anti-VEGF) have been located recently as the treatment of choice for the wet form of Macular Degeneration (AMD). But these treatments have aspects that are not completely clarified, like the effect that repeated intravitreal anti-VEGF drugs may have on other ocular structures such as nerve fiber layer of the retina (RNFL). Our main objective is to prospectively evaluate the changes in the retinal nerve fiber layer (RNFL) thickness and in the intraocular pressure (IOP) induced by repeated injections of ranibizumab intravitreally.

Methods: Prospective controlled and longitudinal trial with one year of follow-up including 54 eyes with neovascular age-related macular degeneration (AMD) susceptible to receive intravitreous ranibizumab and 29 contralateral eyes not requiring treatment. IOP was registered before and after each injection and the RNFL thickness with the RNFL thickness of the Spectralis® Fourier Domain Optical Coherence Tomography protocol was measured at baseline and months 1, 3, 6 and 12.

Results: 46 cases and 25 control eyes completed 6 months of follow-up. The average of intravitreal injections was 3.73 ± 0.9. Incidence of elevations in IOP (> 5 mmHg beside baseline IOP) one hour after intravitreal injections was 0.05%. Basal average RNFL thickness was 107.9 ± 17.0 microns in the study group and 103.5 ± 14.4 microns in the control group. At 6 months of follow-up average RNFL thickness was 101.9 ± 13.9 microns in the study group and 99.7 ± 11.6 in the control group. We have not found a significant difference between both groups in the follow-up (p = 0.292). The differences analyzing by quadrants were not statistically significant (superior p = 0.931, inferior p = 0.732, nasal p = 0.879, temporal p = 0.158).

Conclusions: Significant changes in the RNFL thickness after repeated injections of ranibizumab intravitreally in the treatment of AMD have been not found at 6 months of follow-up.
OCULAR BLOOD FLOW: A RISK FACTOR FOR GLAUCOMA PROGRESSION?
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Objective: To determine whether the baseline measurements of ocular blood flow (OBF) are predictive of glaucoma progression.

Methods: 262 eyes of 262 glaucoma suspect individuals were prospectively and consecutively recruited. All of them had normal standard automated perimetry results, glaucomatous optic disc appearance and/or elevated intraocular pressure (≥ 21 mmHg) at baseline. Topographic analysis of the optic nerve head was performed using the Heidelberg retina tomograph (HRT3; Heidelberg Engineering, Heidelberg, Germany) and blood flow velocities of retrobulbar vessels were measured by color Doppler imaging (Siemens Sonoline Sienna, Germany). Progression was assessed according to the changes in the color-coded Moorfields Regression Analysis classification of HRT3 during the four years follow-up. Hazard ratios (HRs) for the association between flow and clinical parameters and the development of a documented progression were obtained by multivariate Cox proportional hazards models.

Results: At the end of the study, 36 patients met the criteria for conversion to glaucoma (13.74%). The group of converters had reduced end-diastolic velocity (p < 0.001) and increased resistivity index (RI) and pulsatility index in the ophthalmic artery (OA) with respect to the group of non-converters (p < 0.001). The results of multivariate analysis of survival by Cox regression shows the predictive value of the vertical cup-to-disc (CD) ratio (p < 0.001) and RI of the OA (p < 0.004) as independent parameters for conversion to glaucoma.

Conclusions: Abnormal OBF parameters measured by color Doppler ultrasound may be a risk factor for glaucoma progression. CD ratio and RI of the OA were associated as independent risk factors for glaucoma.
CATARACT AND OCULAR HYPERTENSION IN CHILDREN ON INHALED CORTICOSTEROID THERAPY
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Purpose: To ascertain the incidence of posterior subcapsular cataract and ocular hypertension in a cohort of children ≤ 12 years on inhaled steroid therapy.

Patients and methods: In this prospective study, a detailed history regarding and corticosteroid therapy was obtained for children attending an asthma clinic. The presence and type of lens changes (cataract) was recorded and intraocular pressure (IOP) was measured. The children underwent another eye examination 2 years later.

Results: Ninety-five patients were enrolled in the study. Mean patient age was 7 ± 3 years, and a mean duration of inhaled steroid therapy was 2 ± 1 years. Thirty-six percent of patients received inhaled steroids exclusively, 61% received inhaled steroids with a short course of oral steroids, and 3% received inhaled steroids with a long course of oral steroids. Only 3 (3%) patients had cortical changes that were not visually significant, and none had posterior subcapsular or nuclear cataract. There was no significant differences between children with cataract and those without cataract with respect to age; duration of asthma; and duration; average daily dose of inhaled steroids. IOP ranged from 11 to 20 mmHg (mean, 16 ± mmHg). None of the children had ocular hypertension or glaucoma. Ninety patients underwent eye examination 2 years later; none was found to develop posterior subcapsular cataract or increased IOP.

Conclusion: This study indicates the use of inhaled steroids in children with asthma is probably safe as far as not inducing posterior subcapsular cataract or ocular hypertension.
RISK FACTOR FOR UNILATERAL CONSECUTIVE RETINAL NERVE FIBER LAYER DEFECT PROGRESSION IN NORMAL-TENSION GLAUCOMA

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Background: To determine ocular risk factors for the unilateral consecutive retinal nerve fiber layer (RNFL) defect progression in normal-tension glaucoma (NTG) patients.

Methods: The study included 55 NTG patients showing unilateral consecutive progression of localized RNFL defect on serial red-free fundus photographs. Mean follow-up period was 76.4 months (range, 32.0 - 156.0 months). There was no change in the localized RNFL defect of the contralateral eyes during follow-up period. Disc stereophotography, red-free fundus photography, and standard automated perimetry were performed annually. Univariate and proportional hazards models were used to evaluate the following potential risks factors: spherical equivalent of refraction, central corneal thickness, disc hemorrhage, peripapillary atrophy, baseline diurnal intraocular pressure (IOP), long-term mean IOP, short-term and long-term IOP fluctuations, and parameters of standard automated perimetry.

Results: Widening of the localized RNFL defect toward the macula was the most common one (n = 33; 60.0%). Only presence of disc hemorrhages (hazard ratio: 4.84; 95% confidence interval: 2.43-8.92) was significantly associated with the unilateral consecutive progression.

Conclusions: Presence of optic disc hemorrhages is an independent risk factor for the unilateral consecutive localized RNFL defect progression in NTG patients.
THE NUMBER NEEDED TO SWITCH: A CLINICALLY USEFUL TOOL FOR THE COMPARISON OF TWO TREATMENTS
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Background: Competing medications or treatments frequently offer marginal benefits over one another. The purpose of this study was to develop a new statistic. The Number Needed to Switch, to illustrate the clinical relevance of differences in treatment effect between two treatments.

Methods: A novel application of the Number Needed to Treat was applied to the difference in efficacy. as reported in a recent meta-analysis. between two topical prostaglandins (latanoprost 0.005% and bimatoprost 0.03%). Bimatoprost was reported to lower the intraocular pressure by an additional 0.78mmHg (average of weighted means across all time points) compared with latanoprost. We wanted to answer two questions (1) “If I give bimatoprost instead of latanoprost to a prostaglandin naïve patient. assuming the patient would respond to both treatments. how many patients would I need to treat to prevent 1 extra patient from progression of glaucoma?” and (2) “How many patients would I have to switch from latanoprost to bimatoprost to prevent 1 extra patient from progression of glaucoma. compared to leaving them on latanoprost.” Both questions are mathematically equivalent and we present an analysis that answers this question in a low-risk and a high-risk scenario. We have called this new statistic the Number Needed to Switch.

Results: The Number Needed to Switch is the inverse of the difference in absolute risk reduction of each of the two treatments. The difference in the absolute risk reduction can be obtained by multiplying the baseline risk of the patient (patient expected event rate or PEER) by the difference in risk reduction between the two treatments (RR_diff). We used the results of the Ocular Hypertension Treatment Study and the Early Manifest Glaucoma Trial to calculate the Number Needed to Switch in two situations. For a low risk patient with ocular hypertension at 10% risk of conversion to glaucoma over 5 years. 100 patients would need to be given bimatoprost in place of latanoprost to prevent 1 extra patient from developing glaucoma. This compares to a Number Needed to Treat (with any medication that can reduce intraocular pressure by at least 20%) of 20. For a high-risk patient with advanced glaucoma that is progressing despite medical treatment. only 10 patients would need to be given bimatoprost in place of latanoprost (or switched from latanoprost to bimatoprost) to prevent 1 extra patient from progressing compared to giving latanoprost alone.

Conclusion: The difference between the prostaglandins is small therefore the Number Needed to Switch is high compared with the Number Needed to Treat. Nevertheless it is clear that the higher the baseline risk of the patient. the more effective a switch in treatment becomes. On the other hand. for lower risk patients who are less likely to benefit from a marginal increase in treatment effect. other considerations such as side effects and cost are more important than simply treatment efficacy in itself. The Number Needed to Switch provides a useful illustration of the clinical effect of a difference in treatment efficacy and can help clinicians to make more informed treatment decisions.
WHAT DO WE KNOW ABOUT CENTRAL CORNEAL THICKNESS DISTRIBUTION IN TOGOLESE POPULATION?
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Introduction: Central corneal thickness (CCT) is considered more than ever as risk factor in primary open angle glaucoma development and its progression. In togolesse population, authors would like to describe characteristics and the distribution of central corneal thickness.

Material and Methods: It’s mater of retrospective study of patients glaucomatous and non-glaucomatous followed in the eye unit of Tokoin teaching hospital of Lomé from January to September 2005. All subjects underwent central corneal thickness with an ultrasonic pachymeter between 8 and 11 am with the same manipulator.

Results: A total of 1,205 subjects (609 men and 596 women) were involved in the study corresponding to 2410 eyes. The participants were 3 to 85 years old. The average central corneal thickness measurements is 532.94 ± 34.82 μm for the whole sample, 532.56 ± 36.25 μm in the right eye, 533.44 ± 35.96 μm in the left eye, 536.38 ± 34.67 μm in men and 529.41 ± 34.64 μm in women. The central corneal thickness is thick (542.94 μm) in subjects aged between 6 and 10 years and has gradually decreased after 35 years.

Conclusion: Black subjects had thin central corneal thickness that could be correlated with the higher prevalence of ocular hypertension and glaucoma. The coupling of corneal pachymeter with the intraocular pressure measurements is essential in the early taking care of high intracocular pressure and glaucoma, particularly with melanoderm subjects.

Key words: Central corneal thickness, Melanoderm, Togo.
THE DIAGNOSTIC VALUE OF THE BIOMECHANICAL COEFFICIENT IN PERSONS WITH SUSPECTED GLAUCOMA

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**Purpose:** to assess the diagnostic and prognostic value of the biomechanical coefficient in persons with glaucoma and suspected glaucoma.

**Material and Methods:** 26 patients aged 60.1 ± 3.4 with suspected glaucoma, 155 patients aged 67.0 ± 8.4 with POAG and 35 patients aged 62.8 ± 6.5 with no eye pathology have been examined. The central visual field was evaluated using SAP; structural changes of the optic disc were measured with HRT-II. Ocular Response Analyzer was used to measure corneal hysteresis (CH) and central corneal thickness (CCT). A new parameter, biomechanical coefficient (BC), was introduced: BC = CH/ CCT x 50. Collagen content in scleral samples obtained during glaucoma surgery was measured using aminoacid analysis, cross-linking level – by Differential Scanning Calorimetry.

**Results:** In normal patients, BC values varied between 0.82 and 1.12. As glaucoma progressed, BC showed a statistically significant decrease, which implies that biomechanical properties of the corneoscleral capsule change in glaucoma. It can be viewed as sclera remodeling, which aggravates as glaucoma progresses. This is corroborated by significantly growing scleral cross-linking and an increase of collagen content: in stage I, the level of scleral collagen was 47.0 ± 1.1% of dry tissue weight, in stage II, 50.8 ± 0.9% and in III, 53.3 ± 0.4%. 29% patients with suspected glaucoma had low BC (0.73-0.78) and CH within 8.1-9.9 mmHg. A detailed examination showed local visual field defects in the paracental area (MD of 4.2dB, PSD 3.3 dB) and a drop in volume and area of the neuroretinal rim. Accordingly, glaucoma was diagnosed and hypotensive treatment prescribed. Follow-up examinations after 6 and 12 months demonstrated no negative dynamics. In 36% patients with normal optic disc figures, BK was lower than 0.82 (0.63-0.81), being the only reduced parameter (p < 0.05). CH values lay within 7.1-9.8 mm Hg, CCT was 494-584 microns. In 6 and 12 months, 51% of such patients developed a depression of threshold photosensitivity and smoothing of the retinal surface profile, which underpinned the diagnosis of glaucoma and ascertained the diagnostic and prognostic value of BC. In 35% patients with suspected glaucoma, BK (0.89-1.16) and CH (10.1-13.6 mm Hg) were within the norm, CCT was high (576 to 602 microns). MD, PSD and optic disc parameters were within the norm, so the diagnosis of glaucoma was revoked. Examinations performed after 6 and 12 months showed no changes in the parameters or glaucoma symptoms.

**Conclusions:** The proposed biomechanical coefficient increases the effectiveness of diagnostics and prognosis if glaucoma is suspected.
PREVALENCE OF GLAUCOMA IN SLEEP APNEA. PROSPECTIVE STUDY
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Backgrounds: To determinate the prevalence of glaucoma in patients with sleep apnea. Methods: Prospective study, cross-sectional, of 118 patients with recent polysomnographic diagnosis of obstructive sleep apnea, in which a complete ophthalmologic examination was performed, including visual acuity, biomicroscopy, intraocular pressure (IOP), pachimetry, gonioscopy, optic nerve head assessment, and automated perimetry.

Results: The mean age was 38 years, 31 patients were female and 87 were males. Three patients have been previously diagnosed of glaucoma, one of them having normal pressure glaucoma. Twenty-six patients were found to have possible glaucoma due to the optic nerve head configuration (6 patients), perimetric anomalies (13 patients) or both (7 patients). Of these, two patients had also raised IOP, and were diagnosed of glaucoma, and another 8 patients were found to have glaucomatous optic nerve head changes or perimetric anomalies typical of glaucoma, with normal IOP, possibly having normal pressure glaucoma. Glaucoma, with raised or normal pressure, was present in 13 of 118 patients, this implies a prevalence of 11%. Normal pressure glaucoma was found in 9 patients, which represents a prevalence of 7.6%.

Conclusions: Several reports have dealt with the prevalence of glaucoma in patients with sleep apnea, which has been found to be as high as 27%, while others have found the same prevalence than in the general population. Normal pressure glaucoma also seems to be frequent, with a prevalence of 5.9%. In our study, 11% of patients had glaucoma (normal or elevated pressure), and 7.6% had normal pressure glaucoma, being these figures higher than it would be expected.
THE INVESTIGATING MANAGEMENT OF PRIMARY ANGLE CLOSURE AND TREATMENT STUDY- “IMPACT”: RATIONALE AND METHODOLOGY
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Background: To investigate the effect of two ocular laser treatments, peripheral iridotomy (PI) and argon laser peripheral iridoplasty (ALPI), in patients with an occludable anterior chamber angle (primary angle closure suspect, PACS), and eyes where this process has become more advanced with the development of a persistently raised intraocular pressure (IOP) and/or other secondary features (primary angle closure, PAC). The effect of the laser treatments will be measured by investigation of morphological and functional differences between the states of PACS and PAC over a period of 6 months. The study aims to explore the anatomical risk factors associated with PACS and PAC conditions, and how these risk factors can be modified by these laser treatments.

Methods: 70 patients diagnosed with PACS and/or PAC in either eye were invited to participate in the study. Participants receive PI to a randomly selected eye. If the anterior chamber angle remains open 3 months following PI, the eye is randomized to either observation only or ALPI. Patients are followed over a 6 month period post-PI. The baseline and final data was collected using the following tests/procedures: Visual Acuity, Subjective Refraction Visual Field, Slit-Lamp Examination (dilated and non-dilated pupil), Diurnal IOP Phasing, Supine IOP, Dark Room Provocation Test, A-Scan, 3-Dimensional Ocular Coherence Tomography of Anterior Chamber (light, dark and pharmacologically dilated pupil conditions), Specular Microscopy of Corneal Endothelium, Fundus Photography, Heidelberg Retinal Tomography (HRT) and posterior segment Ocular Coherence Tomography. Interim visits involved a combination of these tests.

Results: This study has been adopted onto the UK National Institute for Health Research portfolio and is currently in the recruitment phase, with baseline data of participants to be reported at the World Glaucoma Congress 2011 meeting.

Conclusions: Limited information exists regarding the response of Caucasian eyes to these laser procedures and the natural history of these conditions, which have a considerable impact on resources for patients and providers of healthcare in the United Kingdom. This study, while being relatively small for the purpose of studying the effect of laser on the natural history of these conditions, is expected to provide information on the investigations and outcome measures required for the design of a larger multi-centre study.
Infection as a Risk Factor of Relapse Development After Antiglaucomical Operations

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Actuality: There is an appreciable group of patients with relapses after spent antiglaucomical operations in spite of successes of glaucomas treatment reached in last years. We can see reason of excessive cicatrization of again framed outflow tracts which can support the infectious factor. Various hematogenic forms of ophthalmoxlamidioz which are connected with lesion of a vascular cover and diffusion of inflammatory process on a retina, an optic nerve and a cornea, and also are connected with the scleras bound to a lesion. Very often bacteria of sort Bacteroides are allocated from a conjunctival cavity. The purpose of our work was research of influence of the infectious factor (chlamydial, bacteroid and ureaplazmal infections) on repeatedly and unsuccessfully operated primary glaucoma. It was connected with considering pathogenic properties of the infections set forth above.

Materials and Methods: We investigate 18 patients with repeatedly operated glaucoma (I group) and 37 patients with unitary operated glaucoma (II group). Their age was from 61 till 84 years and has on the average made 70 years. Patients with acute and subacute conjunctivitises, blepharites, amotio of a retina, an age macular degeneration in research did not include. All patients were investigated by scrapes from conjunctiva, a blood, scrape from men urethra channel, an epithelium of women uterus neck, using a method of a direct immunofluorescence (DI). It is considered that sensitivity of the given method makes 95 %, specificity of 98 %. As it was used cultural method (cultivation on the admixed culture of cells L929 + WERO + LC-MK2).

Results: By results of laboratory diagnostics the mikst-infection in I group is diagnosed for 93%. The infection is taped at 86% in a conjunctiva, in a blood at 74%, in a genitourinary tract at 93%. In II group the mikst-infection is diagnosed for 52%. Including in a conjunctiva the infection is taped at 46%, in a blood at 41%, and in a genitourinary tract at 52% of patients that is authentic less, than in I group (p < 0.05). Thus the most appreciable share was made by chlamydial infection in a combination with bacteroides. Chlamydiias in a combination with bacteroides in an organism of patients of I group are taped at 73 %, in an organism of patients of II group at 36% (p < 0.05). The ureaplasma in both groups is taped all at 6%. Duringt 40% of patients of I group the infection is taped simultaneously in a conjunctiva, a blood and a genitourinary tract, and at patients of II group at 16 % of patients (p < 0.05).

Conclusions: Taking into account single-step revealing of studied infections in an urethra, a blue blood and a conjunctiva at the first group (40%), it is possible to assume that it is a question of system infectious process. The chlamydial infection in a combination with bacteroides, possibly, can be a risk factor of development of relapses after antiglaucomical operations and is bound to cicatrisation and an obliteration of the outflow tracts of a watery moisture generated during an intervention.
ASSOCIATION BETWEEN PRIMARY OPEN ANGLE GLAUCOMA AND DIABETES MELLITUS IN DIFFERENT ETHNIC GROUPS OF NEPAL

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Background: Glaucoma is the most common cause of irreversible blindness worldwide. The 1981 Nepal blindness survey quotes glaucoma as the fourth commonest cause of blindness. Overall glaucoma prevalence varies from 3-12% in Nepal depending on region and ethnic group. Primary open angle glaucoma (POAG) is the most common type of glaucoma followed by angle closure glaucoma. Several studies originating from different parts of the world demonstrate diabetes mellitus as an important risk factor for POAG. However, no such studies have been done in the Nepalese population. Therefore, we conducted a hospital based case-control study to investigate the association between POAG and diabetes mellitus in Nepal.

Methodology: We included individuals of all age groups who attended the ophthalmology outpatient department of two hospitals in the mid hills between February 2009 and July 2010. All newly diagnosed cases of POAG were registered as “study cases” and age, gender and ethnicity matched individuals without POAG were enrolled as “control cases”. All cases were subjected to visual acuity testing, refraction, anterior and posterior segment examination with slit lamp, binocular optic disc evaluation with 90D lens, intraocular pressure measurement, gonioscopy to visualize anterior chamber angle and Humphrey visual field test. POAG was diagnosed on the basis of presence of typical optic disc changes, open angle on gonioscopy and visual field changes with or without rise in intraocular pressure (IOP). After confirming the diagnosis, individuals with POAG and controls without POAG were interviewed by a blinded interviewer to determine history of presence or absence of diabetes mellitus.

Result: We obtained study subjects from the major ethnic populations Newar (44 cases/129 controls), Brahmin (42/123, respectively) and Gurung (35/103, respectively) living in the mid hills. The majority of them were between 45 and 75 years of age. POAG was seen more frequently in men in all ethnic groups; ranging from 63-69% (p = 0.33). A potential association between POAG and diabetes mellitus was evaluated separately for each ethnic group. In Newars, 36.4% among the cases and 7.7% among controls had diabetes mellitus with odds ratio 6.8 (95% CI 2.6:18.3, p < 0.001). In Brahmins, 30.9% among cases and 8.9% among controls had associated diabetes mellitus with odds ratio 4.6 (95% CI 1.7: 12.4, p < 0.001). Gurungs exhibited a similar pattern with 25.7% cases and 6.8% controls with diabetes mellitus; odds ratio 3.7 (95% CI 1.2: 11.5, p = 0.01).

Conclusion: Diabetes mellitus is a risk factor for primary open angle glaucoma in the Nepalese population irrespective of their ethnicity.
PREVALENCE OF GLAUCOMA IN OBSTRUCTIVE SLEEP APNEA SYNDROME AND FLOPPY EYELID SYNDROME
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BACKGROUND: To determine the prevalence of glaucoma in obstructive sleep apnea-hypopnea syndrome (OSAHS), an entity characterized by repetitive upper airway obstructions during sleep, inducing hypoxia with the risk of cardiovascular and neurologic sequelae, and to examine floppy eyelid syndrome (FES) as a risk factor of glaucoma in patients with OSAHS.

MATERIAL AND METHODS: 111 patients consecutively referred to polysomnographic evaluation of suspect OSAHS seen at Department of Sleep. The other group of study comprised 40 patients with FES seen at Department of Ophthalmology. All patients of the Department of sleep and 27 of 40 patients of Department of Ophthalmology underwent an overnight sleep study in an effort to diagnose and determine the severity of OSAHS; presence of OSAHS as defined by an apnea-hypopnea index (AHI) ≥ 10. All patients received an ophthalmological evaluation including visual acuity, slit-lamp examination, Goldmann application tonometry, gonioscopy, fundus examination, computerized perimetry and retinal fibre layer measurements with an optical coherence tomography. Presence of FES as defined by subjectively easy eyelid eversion, tarsal papillary conjunctivitis and lash ptosis.

RESULTS: 86 (77.4%) of 111 patients seen at Department of Sleep had an IAH ≥ 10, which indicates OSAHS. Seven of 86 OSAHS patients (8.9%) had glaucoma. No patient of the control group (AHI < 10) had glaucoma. The observed prevalence of glaucoma in patients with OSAHS (7 of 86, 8.9%) was significantly higher than expected in a white population (2%) (p = 0.001). Three patients had primary open-angle glaucoma (POAG), one had normal-tension glaucoma (NTG) and four patients had previously diagnose of glaucoma. 24 of 27 patients (88.8%) with FES seen at Department of Ophthalmology, had OSAHS (IAH ≥ 10) and 9 of 24 patients with FES and OSAHS, had glaucoma (37.5%). 5 of 9 patients (55.5%) with FES and OSAHS had NTG, 4 patients (33.3%) had POAG and 1 patient had previously diagnose of glaucoma. Prevalence of glaucoma in patients with FES and OSAHS were significant higher compared to prevalence of glaucoma in patients with OSAHS and without FES (p < 0.001).

CONCLUSION: Patients with obstructive sleep apnea-hypopnea syndrome constitute a high-risk population for glaucoma. Our study confirmed the association between floppy eyelid syndrome and OSAHS. Floppy eyelid syndrome in patients with OSAHS may be a risk factor for glaucoma and should therefore be screened for glaucoma.
CLINICAL GLAUCOMA: EXFOLIATION SYNDROME
PLASMA C-REACTIVE PROTEIN LEVELS IN PSEUDOEXFOLIATION (PXF) GLAUCOMA AND COMPARE WITH NORMAL POPULATION

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Background: Pseudoexfoliation glaucoma is a senile disease which affects anterior segment structures of eyes. Pseudoexfoliation material has also been found in heart, lung, liver, gall bladder, cerebral meninges, skin, and blood vessels and is thought to be a systemic disorder. C-reactive protein (CRP) is an acute phase reactant found to be an important and sensitive marker of systemic inflammatory states and disorders. The purpose of this study was to determine the plasma C-reactive protein levels in pseudoexfoliation (PXF) glaucoma and compare with normal people.

Methods: This case controlled study was performed on 73 cases that referred to Farabi eye hospital in Tehran. Patients were divided into two groups: 39 cases PXF glaucoma without any other ocular and systemic disorder and 34 controls, with no evidence of PXF glaucoma. In both groups, patients with blood pressure, CNS and cardiovascular diseases were excluded. Plasma CRP levels of all the study participants were determined and compared.

Results: The mean age was 68.4 ± 6.4 years in case group and was 65.3 ± 7.2 years in control group. The mean plasma CRP level in patients was 1.85 ± 2.52 and in normal people was 1.66 ± 1.64. Plasma CPR levels were not different in the PXF cases with controls. There was no relationship between CRP level and the disease in male and female groups in different ages.

Conclusion: Our findings suggest that PXF may not be associated with plasma CRP levels and inflammatory causes of PXF glaucoma is debate.
RISK FACTORS FOR FAILURE OF INFERIOR-APPROACH TRABECULOTOMY ON EXFOLIATION GLAUCOMA

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Background: Although trabeculectomy is effective in controlling intraocular pressure in exfoliation glaucoma patients, it is difficult to maintain good functional bleb over a long-term period because postoperative inflammation often breaks down the blood-aqueous barrier and leads to a decrease in aqueous production, which can easily cause stronger adhesions under the conjunctiva or around the scleral flap in the early post-operative period. Inferior-approach trabeculotomy is also known to be effective in some cases of exfoliation glaucoma, and does not influence the outcome of future trabeculectomy because it leaves the superior conjunctiva untouched. However, there are some cases in which trabeculotomy is completely ineffective. Therefore, we investigated the post-operative risk factors involved in inferior-approach trabeculotomy on exfoliation glaucoma.

Methods: We retrospectively evaluated 37 eyes of 37 exfoliation glaucoma patients who had undergone inferior-approach trabeculotomy with or without phacoemulsification and intraocular lens insertion between Jan 2005 and Dec 2007 and were followed up for at least 6 months. We studied the relation between intraocular pressure 6 months after trabeculotomy and various factors including age, sex, eye side, surgical procedure, pre-operative visual acuity, pre- and post-operative intraocular pressure, pre- and post-operative number of medicines, and transient increase in intraocular pressure, as well as the relation between visual field progression and all of those same factors, using t-test, χ² test, Fisher exact test or logistic regression analysis.

Results: Intraocular pressure significantly decreased from 24.7 ± 5.1 mmHg to 14.5 ± 2.8 mmHg 6 months after surgery (p < 0.01) and the number of medicines significantly decreased from 3.0 ± 1.4 to 0.8 ± 0.7 (p < 0.01) 6 months after surgery. Also at 6 months after surgery the intraocular pressure of 25 eyes (67.6%) was 15 mmHg or less, that of 11 eyes (29.7%) was 16-20 mmHg, and that of 1 eye (2.7%) was over 20 mmHg. Nineteen eyes (51.4%) had a transient intraocular pressure increase of 30mmHg or more. The risk factors significantly associated with intraocular pressure 6 months after surgery were age, surgical procedure, pre- and post-operative intraocular pressure, number of pre-operative medicines and number of medicines at 3 months after surgery. Logistic regression analysis revealed that two factors, age and numbers of pre-operative medicines, were significantly associated with intraocular pressure 6 months after surgery, and relative risk rates were 0.83 (p < 0.05) and 3.74 (p < 0.05), respectively. The risk factors significantly associated with visual field progression were pre-operative intraocular pressure and number of medicines at 1 month after surgery.

Conclusion: In this study, inferior-approach trabeculotomy on exfoliation glaucoma reduced intraocular pressure to less than 16 mmHg in about 60% of patients at 6 months after surgery, and the risk factors for failure identified in this study suggest that this procedure is suitable for patients with a pre-operative intraocular pressure of 25 mmHg or less who seem able to tolerate a transient increase in intraocular pressure.
PSEUDOEXFOLIATIVE GLAUCOMA: EPIDEMIOLOGY, CLINIC, TREATMENT PATTERNS
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Background: Pseudoexfoliative glaucoma (PEG) of patients with pseudoexfoliative syndrome (PES) is the most frequent variety of initial open-angle glaucoma (OAG). PES is the systemic disease characterized by presence of exfoliative grey-and-white material deposited in the eye tissue and other organs. The term “pseudoexfoliative” was first suggested by G. Dvorak-Theobald in 1954. The total number of patients with PES is about 50-70 mln in the world. To many authors judgment, PES one of the major reasons for developing OAG. The aim of the investigation is to study clinic peculiarities development of initial open-angle glaucoma in combination with PES, to compare the major parameters of PEG and OAG, the clinic peculiarities of PEG.

Materials and methods: The examination data of 120 (210 eyes) analyzed, who were under survey for progressive glaucomic process. The patients were from 43 to 85 years old. The average age was 70.51 ± 8.46 years. I stage glaucoma - 42 eyes, II stage - 115 eyes, III stage - 45 eyes, IV stage - 8 eyes. To examine the patients we used visometry, perimetry, electrotonography, ophthalmoscopy, gonioscopy, optical coherent tomography. The clinic analysis (biomicroscopy, gonioscopy) subdivided the patients into two groups. 1. patients with PEG - 85 persons. 2. patients with OAG - 35 persons.

Results and Discussion: In our material the fact is noteworthy that 70% of the patients were with PES. The comparative analysis of clinic glaucoma (PEG and OAG) showed that the disease is progressing faster with PEG patients. Gonioscopy showed more distinct changes of ACA with PEG patients, whose corneoscleral trabecules were noticeably sclerosised already at the first stage, as well as more vivid pigmentation of Shleme’s canal and other ACA zones, ACA asymmetry. The intraocular pressure also higher with PEG patients than with OAG ones. All the 30 patients diagnosed for surgical treatment had PES indications, medical therapy was not successful with them, which justified their surgical treatment without much delay. The most effective medicamental treatment is considered combination of timolol and travatan, which we often used to treat PEG patients. The efficacy of the given medicamental combination was determined by the PEG stage at the initial stage with IOP compensation was attained with 84.5% of the patients, at the developed stage - 65%, at the advanced stage – only with 17.5%. Comparing the results of treating PEG and OAG patients is should be noted that PEG is more difficult to be treated with local medicamental therapy than OAG, so it is more reasonable to use laser and surgical treatment at an earlier stage.

Conclusions: 1. In a large percent of cases (according to our findings – with two thirds of patients) OAG develops in combination with PES. 2. The glaucomatic process progresses faster with PEG patients. 3. PEG is more difficult to be treated by means of local medicamental treatment of glaucoma patients with PES. 4. In PEG cases, more early ACA changes are observed as caused by early pigmentation of ACA zones, manifested in early sclerosis of trabeculae, ACA asymmetry.
EARLY ONSET EXFOLIATION FOLLOWING MULTIPLE INTRAOCULAR SURGERIES
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Purpose: Exfoliation syndrome is exceedingly prevalent in the aging population. However, there are few reported cases of PEX younger than 50 years. Our purpose is to present early manifestation of exfoliative findings in young patients undergoing multiple intraocular surgeries.

Patients and Methods: A series of 4 glaucomatous patients undergoing multiple intraocular surgeries for glaucoma control are presented.

Case 1. A 28 year old, female physician was initially diagnosed with an advanced bilateral juvenile glaucoma in the year 1994. After 3 intraocular surgeries including posterior limbal sclerectomy and 2 trabeculectomies, and with an interval of 3 years to last operation, characteristic exfoliative materials appeared in the anterior segment of left eye, while the patient was 43 years old. The right eye underwent only one trabeculectomy and did not show exfoliation. The intraocular pressure was well controlled at last follow-up visit.

Case 2. A 27 year old housewife, without a glaucoma family history, was presented with intense headache in the year 1994. Three intraocular surgeries including two trabeculectomies and one shunting procedure was necessary to control intraocular pressure in the left eye. First evidences of exfoliation was noticed in the year 2007 at the age of 40. The contralateral eye did not demonstrate exfoliation.

Case 3. A 36 year old, male engineer was diagnosed with advanced glaucoma in the year 2002. Trabeculectomy was performed on both eye to control the glaucoma. One year later, while the patient was 37 year-old and had a well controlled intraocular pressure, typical exfoliative materials detected in the left eye.

Case 4. A 10 days old girl, with a strong family history of glaucoma, was diagnosed with primary congenital glaucoma in the year 1987. After 5 intraocular surgeries to control intraocular pressure in the left eye, including trabeculotomy, 3 trabeculectomies, and shunting procedure, exfoliation was evident at the age of 18 years. The right eye was visual lost and was enucleated because of intractable pain.

Results: All of reported cases demonstrated exfoliative manifestations unilaterally in the eye undergoing more intraocular surgeries. The age of diagnosis pseudoexfoliation was below 50 in all cases. The earliest manifestation of pseudoexfoliation was at the age of 18 in a primary congenital glaucoma case.

Conclusion: Pseudoexfoliation could develop earlier in patients undergoing multiple intraocular surgeries. Surgical trauma could accelerate the disease process in the genetically predisposed subjects.
EXFOLIATION SYNDROME (XFS) IN NIGERIA

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Background: XFS has been reported in many countries and regions of the world, but has been considered rare in sub-Saharan Africa. It has been found in the Bantu of South Africa (1), and in a few patients in the Gambia (2). However, there have been no reports of XFS from other nations of West Africa. It was not found in a series of glaucoma patients in Ghana (3). The aim of this study was to estimate the prevalence of XFS and its association with ocular disease in patients attending the eye clinic of the University College Hospital, Ibadan, Nigeria.

Methods: A total of 448 consecutive new patients, aged 30-90 years, who attended the eye clinic of the University College Hospital between December 2009 and November 2010 were included. Each patient had a complete ophthalmic evaluation, including relevant history, visual acuity testing, slit-lamp examination, applanation tonometry, gonioscopy, and dilated fundus examination. Patients with exfoliative material on the anterior lens surface and/or pupillary margin in either or both eyes were considered to have XFS.

Results: All the patients examined were from the southern part of Nigeria. The majority (94.2%) were of the Yoruba tribe from south-western Nigeria, while 5.8% of the patients were from south-eastern Nigeria. Of the 448 patients examined, mean age 58.5 (SD 13.8) years, 54.8% males, 12 (2.7%) had XFS. All patients with XFS were of the Yoruba tribe. Their mean age was 65.6 (SD 5.6) years. There was a male predilection (66.7%). All the eyes with XFS had lenticular opacities. XFS was bilateral in 8 patients (66.7%). Of the bilateral cases, 7 patients (87.5%) had glaucoma and lenticular opacities in both eyes. One patient with unilateral XFS had bilateral glaucoma which was worse in the affected eye. On gonioscopy, one patient (8.3%) had anatomically narrow angles, while 91.7% had open angles.

Conclusion: This is the first report of the existence of XFS in Nigeria. Larger studies need to be done in this population to further investigate the disease.

PECULIARITY OF IRIS IN PATIENTS WITH PSEUDOEXFOLIATIVE SYNDROME
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**Background:** to study peculiarities of iris in patients with pseudoexfoliative syndrome.

**Material and Methods:** Peculiarities of iris were studied in 186 patients (186 eyes) with cataract and pseudoexfoliative syndrome. Patients were divided into two groups: 1-group 94 patients (94 eyes) with cataract and pseudoexfoliative syndrome, 2-group 92 cataract patients (92 eyes) without pseudoexfoliative syndrome. In all patients with pseudoexfoliative syndrome there was destruction of pigment layer, loss of pigment and color changes. Among eyes with bright colored irises (blue or grey) there was specific lesion in pupil area best visualized in reflected light called as transillumination phenomena. In eyes with dark irises, mostly Asian ethnicity patients, there were dystrophic changes with abundant distribution of pigment on iris surface (dominantly in pupil area). In contrast to syndrome of pigment dispersion described for bright colored European eyes, in this case pigment dispersion was equal along surface and has not been found inside crypts. Pigment dots with diffuse distribution in lower part or anterior chamber were found in cornea endothelium in 38, 7% of examined patients (72 eyes). Another symptom described as a special feature of pseudoexfoliative syndrome: revealed or increased pigment dispersion after pupil dilation was noted only in 4, 3% (8 eyes).

**Conclusion:** The pupil evaluation is the important part of eye examination. In eyes with masked pseudoexfoliative syndrome pupil dilation was less in comparison to “intact” eye in 78% of patients.
QUANTATIVE ANALYSIS OF INTRINSIC PROTEINS EXPRESSED IN PSEUDOEXFOLIATION LENS CAPSULE EPITHELIUM

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Background: Pseudoexfoliation (PXF) is a very common reason for secondary glaucoma which is characteristic of pseudoexfoliation material, while the exact mechanism of it is still not clear. The purpose of this study is to compare the expression of intrinsic proteins expressed in the epithelium of lens capsule between normal and pseudoexfoliation patients.

Methods: Lens capsules (LC) were obtained from normal and pseudoexfoliation eyes during cataract extraction surgery through avascular cornea and without contamination by hemorrhage. Immunofluorescence (IF) of different proteins including histone H3, beta-crystallin, calpain 2 and keratin were used on folmaxin-fixed lens capsule sections. The staining signals were calculated by Image J and compared by SPSS 15.0 software. Western blotting of solubilized LC (pooled by minimum 7 specimens) was used to compare these proteins’ expression levels between normal and PXF eyes.

Results: All these four intrinsic proteins were higher expressed in PXF eyes than in normal eyes based on that the internal control of DAPI staining had no difference. The mean signal values of histone H3, beta-crystallin, calpain 2 and keratin in PXF eyes were 11.76 ± 6.15, 22.14 ± 6.95, 22.36 ± 12.52 and 14.47 ± 7.09 while those in normal eyes were 6.66 ± 3.37, 12.15 ± 4.48, 9.60 ± 9.18 and 8.49 ± 1.86 separately. The differences of each protein between two groups were all significant (p value < 0.05). The Western blotting results showed that the bands in PXF groups were bolder than those in normal groups.

Conclusions: PXF is associated with changes in cell intrinsic protein expression of lens capsule epithelium. Many of these differentially expressed proteins (such as histones) are expressed in most cell types and are not eye-specific. It suggests that PXF is a systemic multi-factorial disease process that is also associated with the local presence of intraocular PXF material that causes glaucoma.
CLINICAL GLAUCOMA: NORMAL TENSION GLAUCOMA
OPTIC NERVE SHEATH DIAMETER CORRELATES WITH INTRA-OCULAR PRESSURE IN NORMAL TENSION GLAUCOMA PATIENTS

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Background: Intra-cranial pressure (ICP) has been implicated in glaucoma damage. The need for invasive procedures to measure this ICP has limited the research on this field of non-IOP related mechanisms. Recently, the measurement of the optic nerve sheaths diameter by B-mode ultrasound has been validated for indirect measure of this ICP. Our purpose with this study is: (1) to characterize the Optic Nerve Sheath Diameter (ONSD) in glaucoma patients (2) to identify ocular factors relating to the ONSD.

Methods: A prospective, cross-sectional, observer-masked study was performed. Three groups consisting of primary open-angle glaucoma (POAG) and normal tension glaucoma (NTG) patients and healthy controls were defined. Each was subject to a B-scan ultrasound to measure the ONSD by an observer masked to the patient diagnosis. Intra-ocular pressure (IOP) and central corneal thickness (CCT) were determined in all patients and visual field defect in glaucomatous patients during the screening by a second observer.

Results: 119 patients were enrolled, amongst which 52 POAG, 33 NTG and 34 healthy. ONSD was 5.75 ± 0.81, 5.84 ± 0.64 and 6.09 ± 0.76 mm, respectively (POAG vs healthy: p = 0.05; NTG vs healthy: p = 0.23; POAG vs NTG: p = 0.63). Patient’s age did not relate to ONSD in any of the groups (p > 0.5 in all groups). Visual field damage and CCT were not correlated with ONSD in either of the glaucoma groups (POAG, p = 0.81 and 0.71; NTG, p = 0.57 and 0.99, respectively). However, ONSD did correlate with IOP in NTG (r = 0.45, p = 0.01), contrary to POAG and healthy controls (p = 0.87, p = 0.77 respectively).

Discussion: ONSD may be significantly different in POAG patients when compared to control population. As the optic nerve fibers are known to decrease with age and glaucomatous damage, our results point to a dynamic ratio between the optic nerve fibers and the cerebral spinal fluid inside the sheaths. The observation that ONSD is correlated to IOP only in NTG patients may indicate that, in keeping with previous reports, the translaminar pressure is involved in the pathogenesis of optic neuropathy in this type of glaucoma. Indeed lower intracranial pressure may result in a higher translaminar pressure (and thus stress on the ganglion cell axons at the level of the optic nerve head) in patients that develop glaucoma with low IOPs.
PSEUDO-NORMAL-TENSION GLAUCOMA DIAGNOSTIC UTILITY OF A NEW INTRAOCULAR PRESSURE DIURNAL CURVE METHODOLOGY
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Background: Normal-tension glaucoma (NTG) is a chronic progressive optic neuropathy with specific alterations in the optic disc and visual field defects, with open-angle and ocular pressure (IOP) values \( \leq 21 \) mmHg. The different frequencies reported (from less than 1% to 65%) could be related to the methodology of recording IOP. In general, records are made in the usual consultation schedules and with the patient in a sitting position. The 24-hour diurnal tensional curve (DTC) frequently detects hidden peaks and high fluctuations outside of normal office hours, but requires hospitalizing the patient. The aim of this study was to investigate the usefulness of a new DTC methodology in patients with suspect glaucoma, testing whether the frequency of NTG diagnosis is less when comparing the results of the new method vs. IOP measurements with the patient in the sitting position at the usual consultation times.

Methods: In a sample of 50 glaucoma suspect patients (26 women/24 men) with IOP < 21 mmHg at the first consultation, a DTC was performed using the methodology developed by the author (RB). The average age was 53 ± 14 years. The first record of the morning (08.00 am) was carried out with a hand-held applanation tonometer with patients supine after spending 45 minutes in that position in a darkened room and with prior instructions to the patient to avoid factors known to influence the IOP. The other records (12 am, 04.00 pm and 08.00 pm) were made with the Goldmann tonometer in the sitting position. The curve with 4 records was called "A", and curve "B" was with the first supine record excluded. Hypertension was considered to be values >21 mmHg. Structural damage was considered a rim volume < 0.320 mm\(^3\) (Heidelberg Retina Tomograph - HRT) and functional damage the detection of an altered MD index (> 2 dB) in the Standard Automated Perimetry (Octopus 1-2-3, Program G1X).

Results: In the 100 eyes examined, 30 had functional lesions. In 93.3% -28/30- (IC95 = 77.8 - 99.2) ocular hypertension was detected with curve A vs 23.3% -7/30- (IC95 = 9.8 - 42.3) with curve B (p-Fisher < 0.0001). According to curve B, 70% of these eyes (21/30) would be classified as NTG but, in the same eyes, curve "A" detected ocular hypertension. Of the 100 eyes examined, structural damage was detected in 42 eyes. In 92.8% of these (39/42), hypertension was detected with curve A vs 16.6% (7/42) with curve B (p-Fisher < 0.0001).

Conclusion: The new DTC methodology with the first IOP record with the patient supine allowed masked hypertension to be detected, avoiding overdiagnosis of NTG. This method allows DTC to be incorporated into the daily practice of the ophthalmologist since hospitalization of the patient is not needed.
COMPARISON OF THE OPTIC DISC RIM AREA TO RETINAL NERVE FIBER LAYER THICKNESS CORRELATION IN DIABETES AND IN NORMAL TENSION GLAUCOMA

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Background: To compare the correlation between neuroretinal rim area of the optic nerve head and retinal nerve fiber layer thickness (rim-RNFL correlation) in 12 clock hour sectors in diabetic eyes with non-progressive RNFL defect and normal tension glaucoma (NTG) eyes.

Methods: A retrospective cohort study with prospectively obtained data was performed on 79 eyes of 79 patients with preperimetric or early NTG and 25 eyes of 25 type II diabetes patients with a non-progressive RNFL defect over a period of at least 5 years. The rim-RNFL correlation of NTG eyes was analyzed using global and 12 clock-hour parameters using rim areas determined by Heidelberg retina tomography (HRT II) and RNFL thicknesses determined by optical coherence tomography (CirrusOCT). We sought to determine whether eyes with diabetes were above the 95 % prediction interval (PI) for the rim-RNFL correlation of NTG, for global and clock-hour parameters. Eyes with NTG or diabetes were also compared with respect to locations of involved clock hours on CirrusOCT.

Results: In NTG eyes, a significant linear rim-RNFL correlation was observed in global and all clock-hour sectors, except the 4 and 9 clock-hour sectors (0.08 < r² < 0.56, p < 0.05, respectively). Eighty four percent (21/25) of eyes with diabetes were above the 95 % PI of the rim-RNFL correlation of NTG in at least two clock-hour sectors, as compared with 36% (9/25) of eyes in terms of global parameter. Involved clock hours were observed more frequently in eyes with diabetes than in NTG eyes at 10 o’clock, but the opposite was observed at 6 and 7 o’clock (p < 0.05, respectively).

Conclusions: Type II diabetes patients with non-progressive RNFL were found to be relatively well differentiated from NTG patients by the rim-RNFL correlation, especially in clock-hour sectors. Furthermore, the two diseases differed in terms of the locations of RNFL defects, which suggests that the two disease entities have fundamental pathogenic differences.
PSYCHIATRIC AND COGNITIVE ASSESSMENT OF NORMAL TENSION GLAUCOMA PATIENTS AND IMPLICATIONS FOR PATIENT MANAGEMENT

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Background: Normal tension glaucoma patients have an increased frequency of psychiatric symptoms and cognitive impairment. Implications of this for ophthalmic practice need to be considered. This study aims to characterise the psychiatric profile in normal tension glaucoma patients as a significant proportion of these patients have psychiatric symptoms and cognitive dysfunction which has bearing on the management of glaucoma.

Method: A prospective study of 132 consecutive patients who presented between 2001 and 2006 with low tension glaucoma was performed. Normal tension glaucoma as verified by phasing with intraocular pressure ≤ 22 mmHg. Ophthalmic findings and progress from first presentation were documented as was medical and psychiatric history. Ninety nine patients had cognitive assessment to include the minimental state examination (MMSE), national adult reading test (NART), auditory verbal learning test (AVLT) and general health questionnaire (GHQ) performed by the senior registrars of the psychiatric department.

Results: Of the 132 study patients, 79.2% patients (107) were aged more than 60 at presentation with 54.8% (72) females and 45.2% (60) males. 81.8% (221) of eyes had vision better than 6/12 at presentation. 34.4% (91 eyes) had advanced visual field defect. 64 (48%) had peripheral vascular disease and 34 (25.7%) were smokers. 32.5% (43 patients) had neuroimaging (CT Scan/MRI brain). 9.8% (13 patients) of these patients showed generalised cerebral atrophy/ischemia of the small vessels of the brain. 18.5% patients had a positive family history of glaucoma. 59 had peripheral vascular disease and 32 were smokers. Of the 99 patients who had cognitive testing, 27.5% had a GHQ score ≥ 5 indicating a psychiatric disorder, 21% scored ≤ 26 on the MMSE indicating mild to moderate dementia, 25% showed significant short term memory loss and 24% had a history of psychiatric disease. Of the 33 patients who did not have cognitive testing 25 were very poor compliers and 8 had advanced psychiatric disease.

Conclusions: Significant cognitive impairment and psychiatric disorder was documented in normal tension glaucoma patients compared to the data available on age matched controls. Normal tension glaucoma patients may benefit from proactive psychiatric assessment and treatment. These findings may also have bearing on prescription regime, compliance with antiglaucoma medication, timing of glaucoma and cataract surgery and hospital attendances.
MORPHOLOGICAL AND FUNCTIONAL DIFFERENCES OF NORMAL AND HIGH TENSION GLAUCOMA

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Background / Aims: Despite modern technologies for examination of the optic nerve and visual field, there remains controversy about the functional and morphological differences between normal (NTG) and open angle high tension glaucoma (HTG). Aim of the study was to compare the visual field (VF) loss in normal tension (NTG) and high tension (HTG) glaucoma with the same glaucomatous structural damage of optic nerve.

Methods: The retrospective study included 126 eyes with NTG which were matched on a case-by-case basis to 126 eyes with HTG with same optic disc area and cup/disc-ratio. The glaucomatous damage of the optic nerve was verified by analysis of neuroretinal rim volume and rim area. The nerve fiber layer was measured by HRT (RNFL) and GDxVCC. Visual field (VF) was examined by Humphrey full threshold 30-2 program, calculating values for the mean deviation (MD), pattern standard deviation (PSD) and the probability scores.

Results: Eyes with NTG have significantly less visual field loss than those with HTG (mean ± SD: MD -3.69 ± 5.03 dB vs. -9.77 ± 7.99 dB, p = 0.0001; PSD 4.80 ± 4.47dB vs. 7.17 ± 4.41, p = 0.0001). There were no differences in the HRT parameter disc area (NTG 2.32 ± 0.25 mm² vs. HTG 2.32 ± 0.23 mm², p = 0.342), rim area (NTG 1.03 ± 0.26 mm² vs. HTG 1.00 ± 0.30 mm², p = 0.279) or rim volume (NTG 0.2 ± 0.08 mm³ vs. HTG 0.19 ± 0.11 mm³; p = 0.274). The NTG eyes have a better preserved retinal nerve fiber layer (RNFL: NTG 0.17 ± 0.05 mm vs. HTG 0.16 ± 0.07 mm², p = 0.099; GDx sup: NTG 57.2 ± 10.4 µm vs. HTG 49.9 ± 13.12 mm², p = 0.0001). Total and focal visual field loss is significantly correlated with the structural damage of the optic nerve in both glaucoma groups.

Conclusions: The cupping in eyes with NTG seems related to a primary loss of glial tissue compared to HTG, which results in a less affected retinal nerve fiber structure. This might be the reason for less visual field defects in this subgroup. The findings might support the classification of glaucoma as a primary neurodegenerative disease.
CONTINUOUS IOP FLUCTUATION RECORDING IN NORMAL TENSION GLAUCOMA PATIENTS
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Background: To perform 24-hour IOP fluctuations using a silicone lens embedding a strain gauge sensor in five normal tension glaucoma (NTG) patients in the presence or absence of anti-glaucomatous treatment and to show the clinical importance of this new diagnostic tool.

Methods: 24-hour continuous IOP fluctuation monitoring was performed on two occasions separated by at least 4 weeks in each patient. The continuous recordings were analyzed for differences between daytime and night-time data and for repeatability over time. Furthermore, profiles recorded in each patient in treated and non-treated conditions were compared.

Results: Highly individual and repeatable profiles were obtained. Data recorded during daytime portions of the recordings showed higher coefficients of variation (CV) than night-time data. Positive and significant linear slopes for the transition period from wake time to sleep time were detected in all patients in the absence of anti-glaucomatous treatment, while in three patients of five no significant slopes were detected under treated conditions.

Conclusion: Our data suggest that the continuous IOP fluctuation monitoring device is sensitive to individual IOP rhythms and to differences in such rhythms due to anti-glaucomatous drug therapy. This new measurement possibility have direct consequences for the glaucoma treatment strategies, which can be performed for each patient customize.
THE PREVALENCE OF OPTIC DISC HEMORRHAGES IN PATIENTS WITH OPEN ANGLE GLAUCOMA

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Background: The appearance of optic disc hemorrhages (ODH) in healthy individuals is negligible, and is quite often in patients with glaucoma. According to the level of IOP, open angle glaucoma is arbitrarily divided to high tension glaucoma (HTG) and normal tension glaucoma (NTG). The aim of our study was to determine the prevalence of optic disc hemorrhages in patients with NTG and patients with HTG at the time of testing.

Methods: We reviewed 60 patients: 30 with NTG and 30 with HTG. All patients had complete ophthalmic examination that included assessment of visual acuity, examination of anterior chamber angle with Goldmann goniolens, measurement of intraocular pressure (IOP) by Goldmann applanation tonometry, indirect ophthalmoscopy with Volk 90 D superfield lens and visual field examination with the Octopus program G1, full threshold strategy (Octopus 500 EZ, Interzeag, Switzerland).

Results: There were no statistically significant differences in the number of patients with ODH between two groups of patients: two patients with NTG (6.7%) and two patients with HTG (6.7%) had optic disc hemorrhages at the time of test ($x^2 = 0.001; p > 0.05$). All patients with ODH belonged to the group of patients with early (MD ≤ 6dB) or moderate visual field damage (6 ≤ MD ≤ 12dB).

Conclusion: An equal number of hemorrhage in patients with NTG and HTG in our study supports the fact that hemorrhage PNO are not directly related to the level of IOP and that vascular risk factors are significant only for NTG already have a role in the pathogenesis of HTG.
PRESSURE-INDEPENDENT RATE OF PROGRESSION IN NORMAL TENSION GLAUCOMA

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Background: Normal tension glaucoma (NTG) patients have progressive visual field (VF) loss with typical glaucomatous optic disc changes. Although intraocular pressure (IOP) is not elevated in NTG patients, it is a risk factor in this multifactorial disease and reduction of IOP has been shown to be effective in slowing this progressive disease. The fact that surgical reduction of IOP down to 10 mmHg could not completely stop VF progression in Japanese NTG patients indicates that not only pressure-dependent, but also pressure-independent factors are contributing to the progression of NTG. However, the rate of pressure-insensitive VF progression and whether it shows local or diffuse pattern of progression is not known at present. We aim to characterize pressure-independent rate of VF progression in NTG patients by comparing pre- and post- trabeculectomy rate of progression.

Methods: In our retrospective interventional case series, clinical records of 34 Japanese patients (12 male and 22 female) from two hospitals diagnosed with NTG with progressive VF loss who underwent successful trabeculectomy were recruited. All patients must have minimum of 3 years pre- and postoperative follow-up with Humphrey 30-2 Full Threshold Program with at least 6 reliable VF test results. The time course of the mean deviation (MD) and mean of total deviation (TD_mean) in six separate subfields were analyzed using a linear mixed effects model.

Results: Patient’s age, IOP and MD at operation was 57.7 ± 9.6 years, 15.7 ± 1.7 mmHg and –12.7 ± 5.5 dB, respectively. The mean pre and post-trabeculectomy follow-up, 4.6 ± 1.5 years and 5.7 ± 1.2 years respectively. IOP was lowered to 10.3 ± 2.7 mmHg over the postoperative period with post-operative change rate of MD of –0.25 dB/year (p < 0.0029) which was less negative than preoperatively (-0.70dB/year; p < 0.0001). The change rate of TD_mean improved postoperatively in the superior subfields and inferior paracentral subfields (p < 0.0001), while it remained unchanged in the inferior cecocentral and inferior arcuate subfields (p > 0.1). The postoperative change rate remained negative in all but superior cecocentral subfield.

Conclusions: IOP is a significant risk factor for NTG progression even with an IOP in the mid-teens. The current results suggest that pressure-independent VF progression in NTG was about -0.25 dB/year which almost uniformly affects the central 30° VF. The superior hemifield was more affected by pressure-dependent mechanism, while the inferior cecocentral and inferior arcuate subfields by pressure-independent mechanism.
PREPERIMETRIC NORMAL-TENSION GLAUCOMA STUDY: RISK FACTORS FOR FUNCTIONAL AND STRUCTURAL PROGRESSION

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Background: To determine risk factors for the development of visual field loss on standard automated perimetry or structural progression in preperimetric normal-tension glaucoma (NTG) patients.

Methods: The study included 72 eyes of 72 patients with preperimetric NTG. Mean follow-up period was 52.1 months (range, 24.0 -156.0 months). Preperimetric NTG was defined as diurnal intraocular pressure of < 21 mmHg without any medication, glaucomatous optic neuropathy, glaucomatous visual field defect not on Humphrey threshold perimetry but on frequency doubling technology (FDT) perimetry, open iridocorneal angle, and no evidence of nonglaucomatous cause of optic nerve damage. Disc stereophotography, red-free fundus photography, and Humphrey threshold perimetry were performed annually. Glaucoma progression was defined as development of glaucomatous visual field defects on Humphrey threshold perimetry or progression of retinal nerve fiber layer defect and/or glaucomatous optic disc damage. Univariate and proportional hazards models were used to identify factors for the predicted progression.

Results: Functional and structural progression was detected in 7 (9.7%) and 17 (23.6%) eyes, respectively. Presence of disc hemorrhages (hazard ratio [HR]: 9.75; 95% confidence interval [CI]: 3.02-28.54), female gender (HR: 3.75; 95% CI: 1.08-12.56), and baseline FDT abnormality (HR: 3.53; 95% CI, 1.04-12.05) were associated with glaucoma progression.

Conclusions: The study identified 3 independent predictive factors for the glaucoma progression in preperimetric NTG. Among them, presence of disc hemorrhages was a highly predictive one.
CALCULATED AGE OF ONSET FOR PATIENTS WITH PROGRESSIVE NORMAL TENSION GLAUCOMA

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Background / Purpose: To estimate the age of glaucoma onset, using field-progression rate in a cohort of progressive normal-tension glaucoma (NTG) subjects.

Methods: NTG and field-progression were defined according to the Collaborative NTG Study in this cross-sectional analysis of a prospective cohort. The main outcome was estimated age of NTG onset from field-progression rate. That was taken as the age when the mean deviation (MD) would have been zero decibel (dB). The same progression rate was used to estimate the degree of MD loss at 90 years old.

Results: We recruited 166 eyes of 166 NTG subjects with field-progression having 36-months of follow-up, where 13.3% and 30.1% of subjects had calculated age of onset < 40 years old and between 40-59 years old, respectively. On average, the NTG patients might have started their functional loss 13.7 years prior to being diagnosed. If untreated, by 90 years old, one-third of this progressive group will go into blindness (MD worse than -28 dB). The mean number of systemic medical diseases (p = 0.001), systemic hypertension (p = 0.022) and ischemic heart disease (p = 0.008) were significantly more in older calculated age of onset group.

Conclusions: Our results support the notion on screening for possible glaucoma from 40 years of age onwards. Further work on cost-effectiveness of such screening is warranted. The study suggested the importance of treatment for progressive NTG, as more than one-third may be blind by 90 years old.
NORMAL TENSION GLAUCOMA: FOLLOW-UP OF A 25 YEARS SERIES OF PATIENTS
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Background: The effect of intraocular pressure (IOP) lowering in normal tension glaucoma (NTG) is now evidence-based, but the rates of progression in long-term clinical care are unknown.

Methods: All patients with NTG, diagnosed from 1980 to 2005 in the glaucoma clinic and with an observation time of at least 3 years, were included in this retrospective study. The diagnostic criteria were: verified glaucomatous visual field defect (Octopus), glaucomatous optic disc and diurnal IOP curves (08, 12, 16, and 19 o'clock) with peak pressure ≤ 24 mmHg after 3 weeks washout of any existing medication. The eyes were treated with the aim of a target IOP ≤ 15 mmHg (peak pressure, diurnal curves). Thereafter, eye practitioners saw the patients every 4 months in combination with yearly control with Octopus in the clinic. In 2008 a follow-up was made. Progression was defined as a significant increase of mean deviation (MD) with time calculated by linear regression and rate of progression expressed as MD progression in dB/year.

Results: 52 patients were registered with NTG, but at follow-up 28 had died, leaving 6 men and 18 women with 47 eyes (one blind eye on inclusion). Mean age at diagnosis was 58 yr (range: 45-76 yr) and average follow-up 15 yr. Upon inclusion, slight, moderate, and advanced visual field defects (< 6, 6-12, > 12 dB) were observed in 23 (49%), 10 (21%), and 14 eyes (30%), respectively. Mean IOP during treatment was 15 mmHg (SD: 0.8) representing a reduction of 17%. Combination therapy (3 drugs) were used in 14 of the 24 patients (58%), Argon laser trabeculoplasty (ALT) carried out in 32 of the 47 eyes (68%) and trabeculectomy in only 3 eyes (6%). Significant MD progression was observed in 27 eyes (57%) with an average rate of progression of 0.49 dB/year (SD: 0.41). Twenty-three (85%) of these eyes had a mean rate of < 0.2 dB/yr, 3 eyes (11%) a rate ≥ 0.2 and ≤ 2.0 dB/year and only 1 eye (3.7%) a rate of > 2 dB/year. The remaining 20 eyes had non-significant MD progression with an average rate of 0.05 dB/yr (SD 0.18). The follow-up period was 12 years in contrast to 16 years for the eyes with significant progression. Eyes with measured IOP values < 15 mmHg in more or less than 50% of occasions had significantly different mean rates of progression of 0.16 and 0.39 dB/yr (p = 0.04), respectively. Conclusion: Most NTG eyes showed visual field progression after 15 years despite maximal medical treatment including ALT, but in most cases at a very slow rate, especially when IOP is lower than 15 mmHg.
CLINICAL GLAUCOMA: SECONDARY OPEN ANGLE GLAUCOMAS (OTHER THAN EXFOLIATION SYNDROME)
Background: Despite of vitrectomy and the combined intraoperative endolaser retinal photocoagulation for the treatment of proliferative diabetic retinopathy (PDR), vitrectomized eyes frequently encounter neovascular glaucoma (NVG). However, the characteristics of PDR patients with a high risk of NVG after vitrectomy remain unknown. Therefore, we investigated the characteristics of patients that encountered NVG after vitrectomy for PDR.

Methods: We retrospectively reviewed the medical records of consecutive patients who underwent vitrectomy for PDR at Kumamoto University Hospital between January 1st, 2003 and June 30th, 2009. The exclusion criteria were eyes with a history of glaucoma or intraocular pressure (IOP) ≥ 22 mmHg before vitrectomy and eyes treated with vitrectomy to reduce macular edema because PDR patients with macular edema frequently received triamcinolone acetonide which affects IOP. If both eyes were satisfied with the study criteria, only the eye that was treated first was included. NVG after vitrectomy for PDR was defined as postoperative neovascularization in the anterior segment including the iris or angle though slit-lamp and gonioscope examination, and the association with IOP ≥ 22 mmHg. The IOP ≥ 22 mmHg within 2 months was not counted for the analysis because of early postoperative IOP fluctuations. But, when the patient underwent an additional surgery to treat postoperative NVG within 2 months after vitrectomy, the eye was regard as NVG after vitrectomy for PDR. Kaplan-Meier survival analysis was applied to calculate the rate of NVG after vitrectomy for PDR. To reveal risk factors and their relative risks (RR) for NVG after vitrectomy for PDR, multivariable analysis was performed with the Cox proportional hazards model. The following variables were assessed as the potential risk factors; patient gender, patient age, preoperative vitreous hemorrhage, preoperative tractional retinal detachment, preoperative IOP defined as the average of three consecutive IOPs before vitrectomy, systemic hypertension, history of ischemic stroke in heart or brain, serum hemoglobin A1c concentration, serum creatinine concentration, preoperative panretinal photocoagulation, preoperative neovascularization in the anterior chamber angle, NVG in the fellow eye, combined phacoemulsification with vitrectomy, gas tamponade during vitrectomy, postoperative phakia and postoperative retinal detachment.

Results: In total, 512 patients (512 eyes) satisfied the study criteria. The mean follow-up period was 422 days. The Kaplan-Meier survival analysis revealed that the probability of the occurrence of NVG after vitrectomy at 6, 12, 24 and 36 months was 6.0%, 7.1%, 8.7% and 8.7%, respectively. The Cox proportional hazards model identified that male gender (relative risk; RR = 4.247; p = 0.0032), younger age (RR = 0.956 / year; p = 0.0237), higher preoperative IOP (RR = 1.203 / mm Hg; p = 0.0335), neovascularization in the anterior chamber angle (RR = 8.899; p < 0.0001) and NVG in the fellow eye (RR = 5.355; p = 0.0013) were the significant risk factors.
**Conclusions:** The present study demonstrates that male, younger age, higher preoperative IOP, preoperative neovascularization in the angle and NVG in the fellow eye are risk factors for NVG after vitrectomy in PDR eyes.
COMPARISON OF CYTOMEgalovirus-POSITIVE AND NEGATIVE EYES IN POSNER-SCHLOSSMAN SYNDROME
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**Background:** Posner–Schlossman syndrome (PSS) (glaucomatocyclitic crisis) was characterized in 1948 by recurrent episodes of hypertensive iridocyclitis. The aetiology is unknown but current theories favor an infective origin. In 2008, Chee and associates performed aqueous paracentesis on patients with presumed PSS, and more than 50% had cytomegalovirus (CMV) on polymerase chain reaction (PCR) testing. In their study, there were no clinically detectable differences between CMV-positive and negative presumed PSS eyes. The purpose of our study is to compare the characteristics of CMV-positive and negative eyes with presumed Posner-Schlossman syndrome (PSS).

**Methods:** Retrospective interventional case series. Eleven eyes of 11 patients with presumed PSS, seen at Nagoya City University Hospital from 2009 to 2010, underwent aqueous analysis for CMV by PCR. All patients received glaucoma surgery due to uncontrollable IOP. Their records were reviewed for clinical features and human immunodeficiency virus (HIV) status of the CMV-positive patients. The main outcome measures were age, gender, maximum intraocular pressure, endothelial cell count, endothelial changes, PCR results, and presence of glaucoma.

**Results:** Eleven eyes with presumed PSS were tapped, of which 3 (27.3%) were CMV-positive. All the CMV-positive patients were HIV negative. Significant corneal endothelial cells loss was noted in CMV-positive patients (p < 0.0001). All the CMV-positive patients did not show any sign of corneal endothelitis or anterior uveitis when glaucoma surgery was underwent. But one eye showed active corneal endothelitis after trabeculectomy, and systemic gancyclovir treatment has been administered.

**Conclusions:** There is a significant correlation between CMV-positive eyes and corneal endothelial cell loss in presumed PSS. From our results, despite without any clinical sign of corneal endothelitis or anterior uveitis, marked corneal endothelial cells loss might indicate CMV infection in presumed PSS patients.

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INCIDENCE AND MANAGEMENT OF SILICON OIL ASSOCIATED GLAUCOMA
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Purpose: To determine the incidence and clinical features of chronic elevated intraocular pressure after pars plana vitrectomy and silicone oil injection for complicated retinal detachment, and to evaluate the clinical management of eyes with secondary glaucoma.

Methods: This was an observational consecutive case series of 450 eyes in 447 patients who were treated with pars plana vitrectomy and silicone oil injection. Patients who developed secondary glaucoma were treated medically with antiglaucoma medications and surgically with glaucoma drainage implants placed in an inferior quadrant. Main outcome measures were intraocular pressure, number of glaucoma medications, surgical success, and complications.

Results: Fifty-one of 450 eyes (11%) developed elevated intraocular pressure after pars plana vitrectomy and silicone oil injection whereas 399 eyes (89%) did not have a rise in intraocular pressure. Of the 51 eyes that developed elevated intraocular pressure, 40 (78%) were treated only with glaucoma medicines. Medical therapy reduced the intraocular pressure from a mean ± SD of 26 ± 13.4 mmHg before treatment to 18 ± 9.1 mmHg after medical treatment (p = 0.002). The 11 of 51 eyes (22%) with elevated intraocular pressure that failed medical therapy were treated surgically with Ahmed Glaucoma Valve implantation within 12 months of silicone oil injection. In the surgical group, intraocular pressure was reduced from a mean ± SD of 44 ± 11.8 mmHg before surgery to 14 ± 4.2 mmHg at the most recent follow-up after surgery (p < 0.001). the number of antiglaucoma medications was reduced from 3.5 ± 0.7 before surgery to 1.2 ± 0.5 at the most recent follow-up after surgery (p < 0.001).

Conclusion: Chronic intraocular pressure elevation occurs in a minority (11%) of patients who are treated with silicone oil. Most of these eyes are effectively treated with antiglaucoma medications. Eyes that do not respond to medical therapy may be effectively managed with glaucoma drainage implant placement in an inferior quadrant.
SECONDARY PDS FOLLOWING PHACOEMULSIFICATION WITH IMPLANTATION WITHIN THE “CAPSULAR BAG” OF HYDROPHOBIC ACRYLIC INTRAOCULAR LENS (HOYA I-SERT)
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Background: The purpose is to report the case of a 36 yr old Indian myopic male with h/o radial keratotomy OU, who developed secondary PDS with severe elevation of IOP 14 days after unilateral uncomplicated phacoemulsification with implantation within the “capsular bag” of hydrophobic acrylic intraocular lens (Hoya i-sert).

Methods: Complete ophthalmological examination and Pentacam examination of anterior segment was performed.

Results: The patient developed severe anterior segment PDS in R/E with elevated IOP of 60 mmHg with deep AC post phacoemulsification. Gonioscopically, heavy trabecular meshwork pigmentation with open angles was observed. No evidence of pigment dispersion in the other eye was seen. IOP remained elevated despite topical and systemic antiglaucoma medication. Pentacam of anterior segment revealed irido-lenticular touch. Subsequently LI was done and IOP controlled on 2 antiglaucoma drugs.

Conclusion: Phacoemulsification with IOL implantation may lead to secondary PDS with IOP elevation, even with IOL correctly placed within the capsular bag.
CAROTID-CAVERNOUS SINUS FISTULA AND OCULAR HYPERTENSION
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Background: Carotid cavernous fistula (CCF) is an abnormal communication between the cavernous sinus and the carotid arterial system. A CCF can be due to a direct connection between the cavernous segment of the internal carotid artery and the cavernous sinus, or a communication between the cavernous sinus, and one or more meningeal branches of the internal carotid artery, external carotid artery or both. CCF is frequently accompanied by a variety of ocular symptoms and complications, such as conjunctival hyperemia, congestion of the retinal veins, occlusion of the retinal veins, vascular bruits, and external ophthalmoplegia, and it is known to frequently lead to ocular hypertension (OHT) and secondary glaucoma.

Methods: We report 2 cases of CCF complicated by IOP elevation.

Results: Tow female patients aged respectively 53 and 59 years, presented with unilateral proptosis with red eye, and orbital pain. For the first patient, visual acuity (VA) was 20/20. Ophthalmic examination showed conjunctival chemosis, IOP was 30 mmHg with normal cup/disc. For the second patient VA was 20/25, IOP was 50 mmHg. Fundus examination showed glaucomatous cupping. Magnetic resonance imaging with arteriography confirmed CCF in both patients. The first patient underwent intracranial embolization resulting in IOP control. The second patient was treated by topical antiglomatosous medication and systemic anticoagulant treatment. Two months after, deep sclerectomy was performed for uncontrolled OHT.

Conclusion: OHT and secondary glaucoma are common ocular manifestation of CCF. OHT occurred in over 64% of patients with ocular involvement, ranging from 22 to 55 mmHg. OHT and secondary glaucoma may be due to increased episcleral pressure and vortex venous pressure. Closure of the fistula is the primary condition to control the OHT, with some exceptions, in which case, filtrating surgery may be necessary.
CLINICAL PATHOLOGICAL ANALYSIS OF A CASE OF INTRAEPITHELIAL GLAUCOMA

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Objective: Exploring of the pathogenesis and risk factors of glaucoma secondary to trauma through analysis of clinical data and ocular pathological observation of one patient with traumatic glaucoma. Analysis of the mechanisms of high intraocular pressure through observation of the pathological and immunohistochemical changes of the Ahmed glaucoma valve encapsulation.

Method: One eye with traumatic glaucoma through several traumatic surgeries and twice Ahmed glaucoma valve implantations was observed with histopathology and immunohistochemical methods of TGF-1, TGF-2 and collagen (I, II, III and IV). Results: One to several layers of non-keratinized squamous epithelial cells were observed at the posterior cornea, anterior chamber angle and iris surface, which were Alcian blue staining positive and originated from conjunctiva. Pathological diagnosis: intraepithelial glaucoma. The encapsulation tissue above Ahmed valve was rich in neovascularization and focal lymphocytic infiltration at surface layer and dense collagen fibers at deep layer. Immunohistochemistry showed: TGF-β1 and collagen type I, III’s expression increased.

Conclusion: Multiple eye surgeries and continuing low intraocular pressure for half a month is the main reason for endogenous epithelium of the case, mechanism of glaucoma is the blocking drainage of aqueous humor by endogenous epithelial membrane covering the trabecular meshwork. Ahmed valve encapsulation is the main mechanism of high intraocular pressure after implantation and it is composed mainly of type I, III collagen. TGF-β1 plays an important role in filtering bleb scarring.
ASSOCIATION BETWEEN STEROIDS AND OCULAR SIDE EFFECTS, AN OVERVIEW

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Background: Steroid treatment has gained notoriety due to its tendency to induce multiple side effects, including a variety of ocular side effects. Administration of local, regional, inhalation or systemic steroids may induce the development of ocular hypertension, which might even result in subsequent open angle glaucoma. About one in every three people is considered a potential "steroid responder".

Method: Patients on local steroids must undergo a thorough ophthalmic examination including tonometry, visual fields and optic disc examinations. A significant elevation of intraocular pressure might result in these patients in response to steroid treatment. Included in this group are patients with first degree relatives suffering from open angle glaucoma.

Result: Morphologic changes in the trabecular meshwork (which serves as the site of aqueous humor drainage from the eye) are suggested as the proposed mechanism through which steroid treatment results in glaucoma. Steroids are said to induce the expression of a gene that is located on chromosome 1 and is known as TIGR or GLCIA. Its product is a protein called myocilin.

Conclusion: Ocular hypertension secondary to steroid treatment is usually reversible, when treatment is limited to a period of less than 12 months. The fear of ocular hypertension, which is usually unnoticed by the patient, obligates regular ophthalmologic follow-up examinations, including tonometry, visual fields and optic disc examinations.
BIOMETRIC ANALYSIS OF PIGMENT DISPERSION SYNDROME USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

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Background: To compare anterior chamber volume, iris volume and iridolenticular contact area before and after laser peripheral iridotomy (LPI) in eyes with pigment dispersion syndrome (PDS), using anterior segment optical coherence tomography (AS-OCT) and image processing software.

Methods: Cross-sectional study in 18 eyes of 18 patients with PDS and 30 eyes of 30 controls matched for age, sex and refraction. AS-OCT imaging was performed in all eyes before LPI and 1, 4 and 12 weeks after. At each visit, 12 cross-sectional images of the AS were taken: 4 in bright conditions with accommodation (accommodation), 4 in bright conditions without accommodation (physiological miosis) and 4 under dark conditions (physiological mydriasis). Biometric parameters were estimated using AS-OCT radial sections and customized image-processing software. Main outcome measures: Anterior chamber volume, iris volume to length ratio, iridolenticular contact area, AS-OCT anterior chamber depth and A-scan ultrasonography axial length.

Results: Before LPI, PDS eyes had a significantly greater anterior chamber volume and iridolenticular contact area than control eyes (p < 0.01), and a significantly smaller iris volume to length ratio than the controls (p < 0.05). After LPI, anterior chamber volume and iridolenticular contact area decreased significantly in PDS eyes, but iris volume to length ratio increased significantly (p < 0.02), and was not significantly different from that of controls. These biometric changes were stable over time. Iris volume to length ratio decreased significantly from accommodation to mydriasis and from miosis to mydriasis, both in PDS and control eyes (p < 0.01). In PDS eyes, iridolenticular contact area decreased significantly from accommodation to mydriasis, both before and after LPI (p < 0.01). On multivariate analysis, greater AC volume (p < 0.02) and larger AC depth (p < 0.05) before LPI were significant predictors of a larger iridolenticular contact area.

Conclusions: PDS eyes do not have an iris that is abnormally large, relative to the anterior segment size, but have a weakly resistant iris that is stretched and pushed against the lens when there is a pressure difference across the iris.
DIABETIC GLAUCOMA: FEATURES OF CLINIC AND TREATMENT

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The purpose: An estimation of efficiency of drainage surgery secondary new vascular the complicated (diabetic) glaucoma at patients with a diabetes mellitus (DM).

Methods: 44 patients (46 eyes) have been included in research with the diagnosis a diabetic glaucoma (24 men + 20 women), middle age - 62.6 ± 6.9 years, an average level glicohemoglobin - 8.0 ± 1.7%. The average level of intraocular pressure before operation has made 42.6 ± 3.3 mm rt. st. At all patients has been executed operation with implantation of valves of Ahmed (41 eyes) and Molteno (5 eyes).

Results: After operation at all patients the painful syndrome has been stopped and received proof intrapression tension (17.8 ± 2.1 mm rt. st.). In the early postoperative period have been marked: gifema (18 eyes - 39%), cataract (3 eyes of-6.5%), reduction of depth of the forward chamber of an eye (2 eyes - 4.3%), ablatio choroideus (1 eye of-2.1%). In the late postoperative period: «capture» of iris (2 eyes - 4.3%), a vascular corneal spot (1 eyes - 2.1%), a dystrophy of cornea (1 eyes - 2.1%).

The conclusion: The diabetic glaucoma is an objective reality. The drainage surgery diabetic (secondary newvascular) glaucoma and her complications should become «the gold standard» treatments of this pathology at patients with a diabetes.
SUSTAINED INTRAOCULAR PRESSURE ELEVATION IN PATIENTS UNDERGOING INTRAVITREAL ANTI-VASCULAR ENDOTHELIAL GROWTH FACTOR TREATMENT: A CASE SERIES
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Background: To document cases of unilateral sustained elevation of intraocular pressure (IOP) while receiving courses of intravitreal anti-vascular endothelial growth factor (VEGF) agents.

Methods: A retrospective analysis of all cases managed by the authors and colleagues was performed.

Results: Seven patients developed sustained IOP rises while receiving intravitreal anti-VEGF injections, four of whom required glaucoma filtering surgery. Ranibizumab was used in four cases while three received bevacizumab. Four patients received unilateral and three bilateral anti-VEGF agents. Two had a past history of primary open angle glaucoma and one of pseudoexfoliative glaucoma, all of whom had stable IOP on topical pharmacotherapy prior to anti-VEGF treatment. Angles were open with one exception of narrow angles but no pre-existing glaucoma or elevated IOP. Peak IOPs averaged 43 mmHg, ranging from 27-60 mmHg. Four patients required trabeculectomy, two SLT and the remainder multiple topical medication to control the IOP elevation.

Conclusions: A sustained rise in IOP requiring multiple glaucoma medications and/or glaucoma filtering surgery is a rare but potentially important treatment complication for patients receiving intravitreal anti-VEGF therapy, especially those with pre-existing glaucoma or glaucoma risk factors. Proposed mechanisms include direct toxicity to trabecular meshwork (TM) cells, TM obstruction by aggregates of anti-VEGF antibody or antibody fragments, and TM obstruction by silicone contaminants from the syringe or rubber stopper.
SECONDARY OPEN-ANGLE MEDICAMENTOUS GLAUCOMA WITH END-STAGE CAMPIMETRIC CHANGES IN NAIVE PATIENT


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**Background:** Cortisone glaucoma is classified in the secondary iatrogenic glaucoma group and clinically is indistinguishable from a simple primary open-angle glaucoma. Ocular hypertension in these patients occurs as a consequence of the increased resistance of aqueous outflow due to trabecular changes. Elevated intraocular pressure (IOP) usually is reversible if corticosteroids are withdrawn, but the anatomical changes in the drainage system may become irreversible if the use is prolonged. This fact indicates that sometimes the IOP may remain elevated despite discontinuation of the treatment and requires from the ophthalmologist to start administering medical therapy or even surgical - in some patients.

**Methods:** A 73 years old male patient underwent a first visit examination referring the “foreign body sensation” in both eyes over several months. The visual acuity (VA) was 0,4 in the right eye and 0,6 in the left eye. The IOP was 40 mmHg in both eyes. In the anterior segment there was a marked chronic posterior blepharitis and correct bilateral pseudophakia. To relieve the discomfort of the blepharitis, the patient was self medicated for 4 years with the treatment that prescribed his ophthalmologist at its last visit – a steroid treatment. The appearance of the optic nerve head revealed an advanced “edge to edge” cupping, very thin neuroretinal rim, beta parapapillary chorioretinal atrophy and marked double angulations of the blood vessels that followed the morphological lines of the excavation. The visual field (VF), with excellent reliability indices showed well established deep scotoma, leaving only a central isle of unaffected vision.

**Results:** Two weeks after the suspension of the steroid treatment the IOP decreased to 24 mmHg, and with the addition of topical hypotensive treatment – a prostaglandin analogue – the pressure stabilized at 12 mmHg. During the next two years deterioration in the VF appearance was not observed.

**Conclusions:** Cortisone glaucoma is a serious complication of the topical corticosteroid treatment which can lead to severe functional damage of the optic nerve. Physicians and patients should be educated and warned about the potential risks of the prolonged and not monitored use of the topical corticosteroid therapy.
CLINICAL GLAUCOMA: ANGLE CLOSURE
GLAUCOMA
Background: To investigate the effect of primary phacoemulsification on intraocular pressure (IOP) lowering in patients with acute primary angle-closure (PAC) and coexisting cataract.

Methods: 16 eyes of 14 patients with acute PAC received phacoemulsification and intraocular lens implantation as an initial management for medically uncontrolled IOP. The effect on IOP control, vision improvement, changes in the anterior chamber depth and the number of anti-glaucoma medications were evaluated.

Results: The post-operative IOP was reduced in 16 eyes (100%). The mean pre-operative IOP was 48.81 ± 16.83, which reduced to 16.46 ± 10.67 mmHg (one day, p < 0.001), 9.43 ± 3.03 mmHg (one week, p < 0.001), 9.49 ± 2.14 mmHg (two weeks, p < 0.001), 10.78 ± 3.56 mmHg (one month, p < 0.001), and 10.70 ± 2.80 mmHg (three months, p < 0.001) respectively. The mean number of anti-glaucoma medications decreased from 3.56 ± 1.14 to 0.13 ± 0.34 (p < 0.001). The averaged pre-operative ACD was 2.08 ± 0.35 mm, and increased to 3.59 ± 0.33 mm after the surgery (p < 0.001). Visual acuity (converted into logarithm of the minimum angle of resolution, logMAR) improved from 1.14 ± 0.71 to 0.73 ± 0.53 (p = 0.001).

Conclusion: Primary phacoemulsification plus IOL implantation lowered IOP, diminished the use of anti-glaucoma medications and improved vision in patients with acute PAC. It is a safe and effective way in IOP control and can be considered as a first treatment option in managing patients with acute PAC and coexisting cataract.
COMPARISON OF ACUTE PRIMARY ANGLE CLOSURE EYES WITH FELLOW EYES USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

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Background: To compare eyes with acute primary angle closure (APAC) with fellow eyes using anterior segment optical coherence tomography (ASOCT prototype, Carl Zeiss Meditec, Dublin, CA).

Methods: This was a prospective comparative case series. 27 consecutive patients with APAC were recruited from National University Hospital (Singapore). ASOCT imaging of the anterior segment was performed before treatment was administered, and the nasal-temporal scans were analyzed. Custom software (Anterior Segment Analysis Program, ASAP, National University Health System, Singapore) was used to measure the pupil diameter (PD), anterior chamber depth (ACD), anterior chamber width (ACW), anterior chamber area (ACA), iris curvature (I-Curv), and the angle opening distance (AOD500), angle recess area (ARA500), trabecular iris space area (TISA500), iris area (IA500) and iris thickness (IT500) at 500µm from the scleral spur.

Results: The mean age of the patients was 60.9 ± 7.5 years, and 11 patients (40.7%) were male. The mean IOP was 54.4 ± 10.0 mmHg in the APAC eye, and 12.7 ± 6.6 mmHg in the fellow eye. APAC eyes had a smaller I-Curv compared to fellow eyes (0.16 ± 0.08 vs 0.29 ± 0.10 mm, p < 0.001), but there was no significant difference in PD, ACD, ACW, ACA, AOD500, ARA500, TISA500, IA500 and IT500 between APAC eyes and fellow eyes (all p > 0.05).

Conclusion(s): APAC eyes had a smaller I-Curv compared to fellow eyes, but there were no significant differences in other anterior segment parameters between APAC eyes and fellow eyes.
Penetrating Ocular Trauma Presenting with Acute Angle Closure Glaucoma

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Background: Penetrating eye traumas are usually associated with ocular hypotony which is considered as an indirect open globe injury sign and can be evaluated during primary care. Ocular hypertension as presenting feature of penetrating ocular trauma has not been described. We report a case of penetrating eye injury presenting with shallow anterior chamber and hitherto undescribed paradoxical intraocular hypertension.

Methods: A case report.

Results: A 23-year-old man presented with an acute right eye pain and loss of vision following a right eyebrow injury with a palm tree spine. Slit lamp biomicroscopy of the right eye revealed a shallow anterior chamber. Intraocular pressure (IOP) was 46 mm Hg. The funduscopic examination and ultrasonography showed a vitreous hemorrhage and a choroidal detachment. A posterior scleral entrance wound with choroidal extruding was found out and has been sutured. One day later, IOP became normal and the anterior chamber deepened.

Conclusion: Post traumatic intraocular hypertension should not rule out a perforating ocular trauma.
EVALUATION OF BIOMETRIC VARIABLES IN DIFFERENT MECHANISMS OF PRIMARY ANGLE CLOSURE

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Background: Primary angle closure glaucoma (PACG) is a major cause of blindness in Asia. Early detection of the underlying mechanisms for primary angle closure (PAC) and PACG is vital in appropriate management of these patients. Studies have shown that anterior chamber depth (ACD), lens thickness and more anteriorly positioned lens have been considered as important biometric determinant in primary angle closure glaucoma. Also, it has been reported that lens thickness (LT)/axial length (AL) ratio in eyes with narrow anterior chamber angles is useful in establishing which eyes are more prone to develop angle-closure glaucoma. Hence, the aim of this study was to determine if the biometric variables such as ACD, AL, LT, Lens position (LP), relative lens position (RLP) and Lens Vault (LV) could be used to categorize PAC and PACG into different mechanisms of angle closure.

Methods: 148 patients (148 eyes) with PAC and PACG were recruited from National University Health System, Singapore. All patients underwent complete ophthalmic examination. Nasal-temporal images of the anterior segment were captured under dark conditions using Anterior Segment Optical Coherence Tomography (ASOCT). With consensus of 4 glaucoma experts the images were categorized into 4 groups based on the mechanism of angle closure. When images showed more than one mechanism the major mechanism of angle closure was established by majority of votes cast by the experts. 51 eyes with pupil block, 23 eyes with Plateau Iris (PI), 21 eyes with thick Peripheral Iris Roll (PIR) and 53 eyes with Large Antero-posterior Lens Diameter (LAPLD). ACD, AL and LT were measured by A-Scan. LP = ACD + LT/2 (mm), RLP = LP/AL, LV (perpendicular distance between the anterior lens surface and the mid-point of an imaginary line drawn through both scleral spurs) were calculated.

Results: The subjects were 87% Chinese and 65% females. Mean age was 68.3 ± 9.8 years. Using one-way ANOVA, significant difference in ACD (p = 0.033), AL (p = 0.017) and LV (< 0.001) was found between the groups. There was no difference in LT, LP, and RLP. Multivariate analysis showed that LV was thickest in eyes with exaggerated lens vault and thinnest in eyes with plateau iris and ACD was deepest in eyes with plateau iris and shallowest in eyes with exaggerated lens vault as compared to pupil block mechanism.

Conclusion: Biometric parameters such as ACD and LV may be useful in categorizing eyes into different mechanisms of angle closure. Lens position and relative lens position are not sensitive enough to categorize eyes into different mechanisms of angle closure.
Purpose: to determine the prevalence of appositional angle closure (AAC) after laser peripheral iridotomy (LPI) in Chinese patients with primary angle closure (PAC) and primary angle closure glaucoma (PACG) and to evaluate the pathogenesis by investigating anatomic characteristics.

Methods: In this cross-sectional observational study, consecutive patients with PAC and PACG after LPI underwent UBM in darkness. Darkroom provocative tests (DRPT) were performed for those with normal IOP. UBM imagine of each quadrant without peripheral anterior synechiae (PAS) under gonioscopy was qualitatively assessed.

Results: 134 eyes of 134 patients were enrolled. AAC was observed in at least 1 quadrant of UBM images in 85 subjects (63.4%), and in at least 2 quadrants in 39 subjects (29.1%). Plateau iris was found in at least 1 quadrant in 49 subjects (39.6%) and in at least 2 quadrants in 13 subjects (9.7%). There were 459 quadrants of 134 patients without PAS. Among these, AAC existed in 143 quadrants (31.2%). Of these 143 quadrants, plateau iris only accounted for 42.7% (61/143), distally inserted iris alone for 16.1% (23/143), thick iris alone for 11.1% (16/143), and anterior inserted iris combined with thick iris for 20.3% (29/143). 115 subjects underwent DRPT. Positive rate of DRPT of eyes with AAC in 2 or more quadrants (27.8%, 20/72) was significantly higher than those in 0 or 1 quadrant (14.0%, 6/43) (p = 0.018). However, no significant difference in DRPT positive rate was found between eyes with plateau iris in 0 or 1 quadrant (21.2%, 22/104) and those in 2 or more quadrants (36.4%, 4/11) (p = 0.251).

Conclusion: About two thirds of PAC and PACG eyes of Chinese patients after LPI had AAC based on UBM findings. Plateau iris only accounted for less than half for it. Other factors such as a thick peripheral iris and a distally inserted iris contribute much more to it. DRPT results suggested AAC may have more functional meaning than plateau iris. Longitudinal studies are required to determine its clinical significance.
EVALUATION OF ANTERIOR CHAMBER WIDTH AND LENS VAULT AS RISK FACTORS FOR ANGLE CLOSURE IN JAPANESE

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Background: Anterior Chamber Width (ACW) and Lens Vault (LV) were recently identified as new potential risk factors for angle closure in Chinese Singaporeans. The purpose of our study was to investigate the association of these parameters with angle closure in Japanese subjects.

Methods: Eighty-seven Japanese subjects with angle closure (consisting of 51 primary angle closure (PAC), 36 primary angle-closure glaucoma (PACG)) with laser peripheral iridotomy performed attending glaucoma clinics and 68 normal Japanese subjects with open angles and no evidence of glaucoma recruited from comprehensive ophthalmology services. All participants underwent gonioscopy and AS-OCT (Carl Zeiss Meditec, Dublin, CA). Customized software was used to measure LV and ACW. A-scan biometry (US-800; Nidek Co, Ltd, Tokyo, Japan) was used to measure LT and to calculate LP and RLP.

Results: There were significant differences between angle-closure and normal eyes were found for all the parameters. After adjusting for age, gender, ACD, LT, and RLP, increased LV was associated significantly with angle closure (odds ratio [OR], 78.8; 95% confidence interval [CI], 6.4 –965.3, comparing lowest to highest quartile). LV had the highest AUC (0.96), higher than any other parameters including ACW.

Conclusions: Eyes with angle closure have shown greater LV compared with normal eyes. The LV, which represents the anterior portion of the lens, is a novel parameter strongly associated with angle closure in Japanese after adjusting for age, gender, ACD, and LT.
A CASE REPORT OF MALIGNANT GLAUCOMA AFTER TRABECULECTOMY AND ITS ALTERNATIVE IMMEDIATE TREATMENT

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Background: To present a case report of malignant glaucoma which occurred six days after trabeculectomy in patient with primary angle closure glaucoma.

Methods: Case report.

Results: A 46 year woman with primary angle closure glaucoma was treated with local antiglaucomatous drops. Laser iridotomy and argon laser peripheral iridoplasty were performed as well. After all these procedures were done, during the last six months, the progression on perimetry with increased intraocular pressure has been observed. The patient described her troubles as hazy vision and a headache in the evenings. Following this finding we decided to perform a trabeculectomy. The procedure and postoperative period did not present any extraordinary findings. However elevated intraocular pressure (70 mmHg) was measured on the sixth day check. The anterior chamber was significantly flattened almost vanished and the patient had a headache. Malignant glaucoma was diagnosed. During hospitalization the infusions of mannitol with combination of local antiglaucomatous and mydriatic and cycloplegics drops were applied. During the second day of hospitalization laser cyclophotocoagulation with diode laser was performed. This procedure led back to normal findings, resulting in a deepening of anterior chamber and intraocular pressure stabilized at normal range levels.

Conclusion: These findings represent a very interesting case report of early treatment of malignant glaucoma with diode laser cyclophotocoagulation, which occurred as as the definitive, prompt and minimal invasive resolution in this case.
ACUTE BILATERAL ANGLE CLOSURE GLAUCOMA SECONDARY TO TOPIRAMATE USE
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Amongst drugs, sulphonamide and its derivatives have been documented to cause transient myopia, ciliary body edema, uveal effusions and anterior rotation of the lens-iris diaphragm causing secondary acute angle closure glaucoma. Topiramate, a sulfamate-substituted nature monosaccharide. We report a case of acute progressive myopia, uveal effusion and bilateral angle closure glaucoma due to Topiramate - a drug used for migraine prophylaxis. 33 year old female presented with severe headache and ocular pain associated with loss of vision for last 3 hours. The biomicroscopic examination showed conjunctival hyperemia in both eyes, narrowing of the anterior chamber, and closure of the iridocorneal angle. Intraocular pressure was 68 mmHg on the right and 70 mmHg on the left. Refractive error was -9.00 D in both eyes. Patient had no prior history of glaucoma but had a history of migraine and was started with topiramate acetate just one day prior to admission. The topiramate treatment was stopped. The patient was administered topical antiglaucomatous agents, topical cyclopentolat, and oral carbonic anhydrase inhibitors. On the third day of the treatment, visual acuity, intraocular pressure, gonioscopic and myopic findings returned to normal. Due to the potential ophthalmic side effects of topiramate, patients should be warned prior to drug initiation.
BILATERAL ACUTE ANGLE CLOSURE GLAUCOMA CAUSED BY FLUOXETINE. A CASE REPORT

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Background: Acute angle closure glaucoma (ACG) occurs in patients with narrow iridocorneal angle, being more prevalent in elderly, hyperopic and asian. Mydriasis, induced by factors such as darkness, stress or drugs, may be a triggering factor of this disease.

Methods: Case report of a 55 years old patient, female, black, with history of depressive mood that one month after initiation of oral fluoxetine therapy, appears in the emergency department with bilateral condition of intense eye pain, tearing, photophobia, decreased vision, nausea and vomiting. Ophthalmological exam showed corneal edema, conjunctival injection, mid mydriasis, narrow anterior chamber (AC) and IOP of 58 mmHg OD and 47 mmHg in OS. After systemic therapy with intravenous mannitol, oral acetazolamide and topical pilocarpine, the transparency of the cornea improved, allowing us to perform bilateral iridotomy. Later, the patient underwent Pentacam exam, OCT RNFL and computerized perimetry.

Results: After therapy, there was complete recovery of the symptoms, with stabilization of IOP at 10-12 mmHg OU. Gonioscopy revealed a narrow iridocorneal angle, grade II in Shaffer’s classification, corroborated by the Pentacam exam. The OCT showed a pathological decrease of the nerve fiber layer in the upper OD and suspicion in the upper OS. Perimetry also revealed changes in threshold sensitivity, especially in the right eye.

Conclusions: We concluded this to be a case of bilateral AACG, probably induced by fluoxetine, a selective serotonin reuptake inhibitor (SSRI). Some studies refer that there are serotonergic receptors in the iris-ciliary body complex which, once stimulated, could lead to pupil sphincter muscle relaxation. Thus, the increased serotonin levels associated with the anticholinergic effects inherent to these agents, appears to be an important factor in inducing mydriasis, triggering AACG in patients with predisposing ocular anatomy. The growing number of AACG cases associated with fluoxetine, paroxetine and venlafaxine reported in the literature in recent years, shows that may be important an ophthalmological exam before initiating treatment with SSRIs, to exclude a narrow angle AC in these patients.
DELAYED SEVERE ELEVATION OF IOP DUE TO BILATERAL SECONDARY ANGLE CLOSURE FOLLOWING INTRAOCULAR PROSTHETIC COLOURED IRIS IMPLANTATION
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Background: Single piece silicone iris implants, originally developed to correct congenital or traumatic aniridia, have recently been used in cosmetic procedures to change the eye colour in patients with normal intact irides. No long-term safety studies for this technique have been published. There have been case reports describing complications in the early postoperative period, but there have been no reports of delayed complications to date.

Methods: This is the first case report of delayed bilateral severe elevation of intraocular pressures (IOPs) due to secondary angle closure following intraocular prosthetic coloured iris implantation.

Results: A 41-year old woman was referred urgently for elevated IOPs to the Glaucoma Unit. The patient had previously undergone bilateral implantation of cosmetic prosthetic irides 18 months prior to presentation. She had no other ocular history. There was a family history of glaucoma and glaucoma blindness. Her visual acuities were 6/9 right and left with IOPs of 40 mmHg bilaterally. Horizontal corneal diameter measurements were reduced at 10.5 mm right and left. There were diffuse pigment deposits on both corneal endothelia. There was no active intraocular inflammation in either eye. Gonioscopy revealed complete secondary angle closure due to 360 degree implant-angle apposition. Fundal views were limited due to small pupil size of the implants (3 mm). The cup-disc ratios were 0.75 with superior rim thinning in the right eye, and 0.65 in the left. Ultrasound biomicroscopy (UBM) scan showed anterior iris insertion and marked iris stromal thinning associated with iris-implant contact. The axial length measurements were 22.3mm bilaterally. Despite maximally tolerated medical therapy (MTMT) including oral acetazolamide, IOPs remain elevated. Sequential bilateral surgical explantations were performed. The implants were found to be adherent to the iris. However they were removed without complications, though with great difficulty. There was marked fibrinous reaction despite intensive topical steroid therapy in the immediate postoperative period. At one month postoperatively, IOPs were 10mmHg bilaterally on g. latanaprost nocte, g. brinzolamide tds and oral acetazolamide 250mg bd. She was also on g. dexamethasone 0.1% preservative-free five times a day to control intraocular inflammation.

Conclusion: Intraocular prosthetic iris implantation in patients with normal intact irides can have serious and potentially sight-threatening complications. We report the first case of delayed severe IOP elevation due to secondary angle closure following the implantation. Some eyes are at higher risk for complications, particular those with a narrow drainage
angle, a small anterior segment or a short axial length. Removal of these implants in delayed cases is a high risk procedure as these implants are often adherent to intraocular structures such as the iris or the drainage angle. Patients need to be aware of potential complications of this elective intraocular cosmetic procedure.
REPORT OF A CASE OF DRUG RELATED BILATERAL ACUTE ANGLE CLOSURE GLAUCOMA

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Background: To report a case of acute attack of bilateral angle closure glaucoma in a patient receiving Topamax tablets 25 mg 12 hourly for 3 weeks

Methods: Patient presented to Emergency department complaining of bilateral sudden diminution of vision of 6 hours before presenting to Emergency department + bilateral eye pain. PH of HTN of 1 year duration on medication. PH of repeated attacks of migraine on treatment as well. Patient went to Attraction park 1 day before. On Examination: VR: 6/60; VL: 5/60; IOP: 36 - 44 mmHg; Cornea: mild epith edema mild epith edema; AC: shallow at the periphery (BE); Pupil: round, regular, slightly dilated, sluggish reaction; Fundus: C/D 0.3 0.3; Optic disc and macula: within normal PH of eye check up 1 year before revealed no abnormality with vision of 6/6 (OU), normal IOP and open angles by gonioscopy. Patient was admitted to hospital and received: Stat Diamox injection IV 500 mg; Pilocarpine eye drops ev 10 min for 5 times then 6 hourly; IV Mannitol 20% 200 ml twice; Dorzolamide + timolol eye drop 12 hourly; Travatan eye drop; once/day; Diamox tablets 250 mg 6 hourly; Pt was asked to stop and bring all systemic medications. Next day: IOP 28 - 32 mmHg; VR 6/36 VL 6/60; Cornea: clear clear; AC: severely shallow lost at the periphery both eyes; Pupil: narrow (BE); Gonioscopy: closed angle grade 0 (OU); Fundus: 0.5 0.5; Pt was using Bisoprolol 2.5 mg once daily for HTN for 1 year; Topamax TB 25 mg 12 hourly for 3 weeks (both stopped since admission); 2 day after treatment: VA same IOP 12 12 mmHG; AC: getting better, deeper; Treatment decreased 3 days after: VA 6/6 6/6; IOP: 12 12 mmHg; AC: normal depth. Gonioscopy was done and found to be open in both eyes.

Results: Bilateral acute angle closure glaucoma related to systemic medication Topamax (Topiramate) tablet.

Conclusion: Acute angle closure glaucoma has been identified as adverse reaction to Topiramate ,This syndrome may be associated with supraciliary effusion resulting in anterior displacement of the lens and iris, with secondary angle closure glaucoma. Symptoms typically occur within 1 month of initiating. We report a case of bilateral acute attack of angle closure glaucoma after Topamax Tablet for 3 weeks . It seems that the attack is not related to previously occludable angle as this patient had open angle before and after the attack. It is also important that all patients receiving this drug to have ophthalmological examination before and more important after commencement of treatment in the first 4 weeks and patient should be informed about ocular side effects, this is of great importance to avoid raised IOP with subsequent damage to optic nerve
OBJECTIVE ASSESSMENT OF PROGRESSION AFTER ACUTE PRIMARY ANGLE CLOSURE USING MULTIPLE MEASUREMENTS

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Background: Despite the development and establishment of state-of-the-art retinal imaging technology, there is a lack of good clinical studies assessing objective changes in patients following an attack of acute primary angle closure (APAC). The aim of this study was to prospectively assess, using different objective imaging parameters, the progression of patients following APAC.

Methods: Twenty patients with a single attack of APAC presenting to the Western Eye Hospital in London were prospectively enrolled in this study. Patients were assessed with Heidelberg Retinal Tomography (HRT3), Scanning Laser Ophthalmoscopy (GDx-VCC) and Spectral Domain Optical Coherence Tomography (SD-OCT) as well as Humphrey Visual Field (HVF) repeatedly from within a month of the acute attack to up to eighteen months follow-up.Progression for each imaging modality was assessed with multiple parameters including for HRT (5): rim area, rim volume, mean RNFL thickness, linear cup-to-disc ratio and Glaucoma Probability Score (GPS); for GDX (5): TSNIT, Superior and Inferior Averages, TSNIT Standard Deviation and Nerve Fiber Index (NFI); and for the OCT (2): RNFL thickness profile and retina thickness map. Repeated imaging was performed in all patients.

Results: All patients showed changes over time in both RNFL and optic disc assessment. At 18 months, 67% of patients showed progression in 4/5 GDx parameters, and 33% in all 5. HRT analysis similarly showed progression in 4/5 parameters in 70% of patients, and 30% in all 5. OCT showed similar results.

Conclusions: This study shows that progressive changes in both HRT and nerve fiber layer analysis occur following APAC. As far as we are aware, this is the first prospective longitudinal study where multiple imaging modalities have been used to provide objective measurements of changes. It confirms that APAC patients need long-term follow-up after the acute attack.
CORNEAL INDENTATION IN THE EARLY MANAGEMENT OF ACUTE ANGLE CLOSURE

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Background: Acute Angle Closure (AAC) is increasingly recognized as a major concern, particularly in our Asia Pacific region. Its management is crucial to long-term success in preventing glaucoma, aiming to relieve pain, lower IOP and enable further definitive treatment. We have trialed a simplified approach to early management with potential application in our region.

Methods: The management protocols for AAC in several hospitals and private clinics were reviewed to incorporate Corneal Indentation (CI) as an initial step, followed by conventional medical/laser/surgical techniques as appropriate. CI is performed according to our previously published method involving 3 cycles of 30 sec central or inferior indentation with glass rod or gonioscopy lens.

Results: CI was found to be easily added to the protocols with minimal training or additional resources required. The procedure was well tolerated and when successful in breaking the AAC the effect was dramatic. It was felt to be effective in relieving pain and achieving IOP reduction in a significant proportion of presentations, thus reducing the burden of standard topical and oral agents. Laser iridotomy was also able to be performed sooner in many as the corneal view improved.

Conclusion: CI is a useful addition to early AAC management protocols, being a simple, cheap and safe technique. It reduces, and may perhaps avoid, the need for protracted pharmaceutical treatment and may potentiate laser treatment. Further studies would be helpful in quantifying these perceived benefits, as this simple technique could be especially useful in developing nations with little additional cost.
CLINICAL GLAUCOMA: GLAUCOMAS ASSOCIATED WITH OTHER OCULAR AND SYSTEMIC DISORDERS
SECONDARY GLAUCOMA WITH CILIARY BODY TUMOR IN A PSEUDOPHAKIC EYE; MALIGNANT TRANSFORMATION OF A CILIARY BODY MELANOCYTOMA?: REPORT OF A CASE
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Background: To report a case in which melanocytoma of the ciliary body in a pseudophakic eye presented with elevated intraocular pressure (IOP).

Methods: A 62-year-old woman presented with increased IOP in her right eye. Visual acuity of the right eye was light-perception and the IOP was 44 mmHg. Slit-lamp examination and ultrasonography revealed a ciliary body mass with widespread pigment dispersion in the anterior segment. Because of no useful vision and uncontrolled pain, enucleation of the right eye was performed.

Results: The tumor had a gross finding of a heavily pigmented, soft, and smooth surface 1.0x0.8x0.7 cm in size. Histopathologic examination revealed a melanocytoma of the ciliary body and focal malignant transformation with extension of melanocytoma cells and macrophages into the trabecular meshwork and anterior chamber angle.

Conclusions: Melanocytoma of the ciliary body is a rare benign intraocular tumor. The association of glaucoma with melanocytoma may be suggestive of a malignant change in the tumor.
EFFECT OF INTRAVITREAL BEVACIZUMAB INJECTION ON TRABECULAR TISSUE OF NEOVASCULAR GLAUCOMA AND RETINAL FIBROVASCULAR MEMBRANE OF PROLIFERATIVE DIABETIC RETINOPATHY

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Background: Bevacizumab (Avastin®) is a full-length humanized anti-vascular endothelial growth factor (VEGF) monoclonal antibody that is approved for use in some countries, including Japan. It has also been increasingly used as an off-label therapy in ophthalmology. Recent clinical data of the intravitreal injection of bevacizumab (IVB) showed excellent results in the treatment of angiogenetic pathologies including neovascular glaucoma (NVG) and proliferative diabetic retinopathy (PDR). This injection may provide us with sufficient time to treat NVG patients with retinal photocoagulation. In addition, it may also be used as an adjunctive therapy for a mitomycin C (MMC) trabeculectomy to treat NVG. Bleeding from the retinal vessels or new vessels during a vitrectomy after IVB has been reported to occur significantly less frequently than that observed during a standard vitrectomy without bevacizumab therapy. IVB has also been reported to be effective in the regression of new vessels in PDR. The present study was carried out to examine the histology of the trabecular meshwork of NVG and fibrovascular membranes (FVMs) in PDR after an IVB.

Methods: A 1.25 mg (0.05 mL) IVB was given in the superotemporal quadrant 4 mm posterior to the limbus of the affected eyes. Three trabecular tissues obtained by a trabeculectomy and 6 fibrovascular membranes obtained during a pars plana vitrectomy were used as materials. Light and electron microscopic studies were carried out on surgical specimens. The presence and distribution of CD34 was assessed as a marker of vascular endothelium using immunostaining.

Results: The sections viewed under light microscopy contained Schlemm’s canal, juxtacanalicular connective tissue, and almost all parts of the corneoscleral meshwork in all 3 NVG tissues. Capillary-like structures with few red blood cells were observed in the trabecular meshwork. Capillary-like structures with few red blood cells and a fibrous matrix containing a large amount of collagen and fibroblasts were observed in the FVMs. CD34 positively stained in the vascular endothelial cells consisting of the capillary-like structure in the trabecular meshwork (Fig.1) and FVMs (Fig.2). The electronmicroscopic study showed that there were several capillary-like structures consisting of a single layer of vascular endothelial cells in both the trabecular meshwork and FVMs. The layer of vascular endothelial cells demonstrated junctional complex. No fenestration was observed in the vascular endothelial cells.

Conclusions: The vascular endothelial cells are still present in the trabecular meshwork of NVG and FVMs of patients with PDR following IVB. A reduced number of fenestrations of the vascular endothelial cells may be one of the factors contributing to the clinical effects of IVB.
A RARE COMPLICATION OF ZOLENDRONATE INFUSION LEADING TO GLAUCOMA FILTRATION SURGERY

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**Background:** To highlight a rare and potentially challenging, complication of zoledronate infusion: acute anterior uveitis (AAU) followed by raised intraocular pressure

**Methods:** Intervventional case report.

**Results:** A 69-year-old Caucasian lady was started on the bisphosphonate zoledronate, as prophylaxis against osteoporosis. Within 48 hours of receiving her first zoledronate infusion she developed a painful, red, photophobic left eye. She was diagnosed with a severe anterior uveitis with corneal oedema and plus three cells with a secondary rise in the intraocular pressure (IOP) to 40. She had a past history of left episcleritis and had been diagnosed with primary open angle glaucoma 11 years earlier with advanced cupping bilaterally. She had already had glaucoma surgery in her fellow right eye and was known to be a steroid responder. During follow-up, IOP remained high over a 4-month period, fluctuating between 26 and 42, despite being on four antiglaucoma medications. The challenge was that she required topical steroid to treat her uveitis in the background of known glaucoma and steroid response. She eventually underwent a left phacotrabeculectomy with 5-fluorouracil (5-FU 25 mg/ml). With a previous history of uveitis, not surprisingly, 4 weeks post-op she developed an encapsulated bleb with an IOP of 51 and underwent needling with 5FU. Four weeks post-needling an injected diffuse bleb was noted with persistently raised (26-33) IOP, with an element of steroid response. Her visual acuity remained stable at 6/6. Eventually IOP was controlled at 17 mmHg with no topical medication, careful post-op follow up, bleb massage and cessation for the need for topical steroids.

**Conclusions:** Caution should be exercised when prescribing bisphosphonates to glaucoma patients. A high index of suspicion is needed in patients with a red and painful eye after initiating bisphosphonate therapy.
P410

ABSTRACT WITHDRAWN
A LONGITUDINAL ASSESSMENT OF CENTRAL CORNEAL THICKNESS AND INTRAOCULAR PRESSURE AFTER BILATERAL CONGENITAL CATARACT SURGERY IN EYES WITH AND WITHOUT IOL IMPLANTATION

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Background: Measurement of intraocular pressure (IOP) is often one of the only way to diagnose and monitor pediatric glaucomas, and it is well known that the central corneal thickness (CCT) can influence the measured IOP. However, in pediatric eyes with glaucoma, particularly glaucoma in eyes operated for congenital cataracts the role of CCT is not well defined. The aim of this study was to observe longitudinal changes in CCT and IOP following congenital cataract surgery in eyes with and without IOL implantation.

Methods:
A Prospective, randomized observational study comprising 80 consecutive eyes of 40 children undergoing bilateral congenital cataract surgery before their 2nd birthday and performed by a single surgeon were included. The study population was randomized into two groups. In Group 1 (n = 20 patients), 40 eyes were left aphakic and in Group 2 (n = 20 patients), 40 eyes were pseudophakic. A detailed examination under anesthesia (EUA) was performed for every patient, both preoperatively, and at each follow-up visit. Corneal thickness, intraocular pressure (IOP) axial length (AL) was measured. Standardized surgical procedures were carried out in both the groups. The patients were examined for CCT at 1 month, 1 and 2 years postoperatively. The percentage change in CCT at 1 month and 2 years was analyzed and compared with the preoperative findings.

Results: The mean preoperative CCT in Groups 1 and 2 was not significantly different [OD: Group 1 (538.13 µm) versus Group 2 (538.73 µm), p = 0.60; OS: Group 1 (537.23 µm) versus Group 2 (522.46 µm), p = 0.17]. At each follow-up visit, the postoperative CCT was statistically significantly different between the two groups [2 years follow-up: OD: Group 1 (627.00 µm) versus Group 2 (583.13 µm), p = 0.03; OS: Group 1 (627.23 µm) versus Group 2 (564.66 µm), p < 0.001]. Between the two groups, the absolute difference in percentage change in mean CCT from the preoperative period to 1 month and 2 years postoperatively was statistically significant. The mean IOP and AXL were not significantly different between OD and OS at any follow-up.

Conclusion: All the eyes showed an increase in CCT following the removal of congenital cataracts during the first two years of life. Eyes remaining aphakic showed a larger increase in CCT than those receiving a primary IOL after cataract removal. The rate of change in CCT was significantly lower in eyes with pseudophakia as compared to those with aphakia. The mean IOP was not significantly different between 2 groups at any follow-up.
IRIDOCORNEAL ENDOTHELIAL SYNDROME. CLINICAL MANIFESTATIONS AND MANAGEMENT OUTCOMES AT A TERTIARY OPHTHALMIC CENTRE
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Background: A hospital-based prospective observational case series review to document and describe clinical manifestations and management approaches to patients diagnosed with ICE syndrome presenting at the Glaucoma Department, Chittagong Eye Infirmary and Training Complex, Chittagong, Bangladesh.

Method: 25 patients who were diagnosed from November 2007 to October 2009 were included in the study. Patient particulars, history with main causes of hospital presentations were recorded. Ophthalmic examination details including tonometry, slit lamp examination, gonioscopy, indirect ophthalmoscopy, visual fluid examination and management given were documented. Similar relevant details were recorded for three follow up periods on all patients extending over a total period of 12 months.

Results: 25 patients were included in the study. There were 15 female and 10 male patients. All 25 cases were unilateral. The mean age of the patients was $41 \pm 15.27$ years. Among them 15(60%) had pretreatment visual acuity between 6/9 - 6/18 and 10 (40%) had 6/24 - 6/60). Improved visual acuity was observed one year after starting treatment. 21 patients (84%) presented with eccentric pupil (corectopia), 9 patients (36%) with peripheral anterior synechiae, 6 patients (32%) with iris atrophy, 6 patients (24%) with mild corneal oedema, 3 patients (12%) with ectropion uveae, 2 patients (8%) with polycoria and 11 patients (44%) presented with pigmentary changes over iris (like diffuse iris naevus). Mean IOP at presentation was $24.08 \pm 14.3$ mmHg and that of last follow-up was $17.38 \pm 7.57$ mmHg. IOP was controlled with 2 - 3 topical antiglaucoma medications in 8 patients (32%); with only observation in 5 patients (20%) and with surgical intervention in 12 patients (48%).

Conclusion Although ICE syndrome is a refractory glaucoma, control of IOP and preservation of visual acuity were seen in 52% of cases which had conservative management with topical medications and observation. Patients not responding to medical management needed surgery for the control of intraocular pressure.
ANGLE CLOSURE GLAUCOMA IN YOUNG PATIENTS WITH GOLDMANN-FAVRE SYNDROME: REPORT OF TWO CASES
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Background: Goldmann-Favre Syndrome is a rare autosomal recessive retinal degeneration classically characterized by central and peripheral retinoschisis, and peripheral pigment deposition. On the other hand, angle closure is rare in young adults and is often associated with structural and/or developmental ocular anomalies rather than relative pupillary block.

Methods: Case reports of two young patients with Goldmann-Favre Syndrome who developed angle closure glaucoma.

Results: The two patients, 24 and 34 years old respectively, were sisters. The ophthalmologic, the optical coherence tomography, as well as the electrophysiologic findings were consistent with Goldmann-Favre Syndrome. Chronic primitive angle closure glaucoma with disk cupping was diagnosed in the four eyes. Ectopia, subluxation or forward movement of the lens, iridociliary cysts, other posterior segment causes of angle closure were ruled out. Glaucoma was controlled by peripheral iridotomy and medical treatment in one eye, and required trabeculectomy in three eyes.

Conclusion: Angle closure glaucoma may be associated with Goldmann-Favre Syndrome. To the best of our knowledge, this association has not been reported before. The pathophysiology remains not clear.
ALGORITHMIC CHOICE OF SECONDARY GLAUCOMA TREATMENT
METHOD IN CASES OF BLUNT EYE TRAUMA
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Background: Secondary glaucoma (hypertension) is an often earlier and later complication in cases of blunt trauma. There are exists different glaucoma blocks such as trabecular, block of Schlemm’s canal (bleeding, congestive trabeculopathy), angular, anterior chamber (total hyphema, lens luxation), pupillar (lens, vitreous body), and lens-ciliary body (phacomorphic) and even episcleral. Medicamental treatment (beta-adrenoblockers, carboanhydrase blockers, osmotic, haemoreologic, metabolic) often is not effective enough. Anterior chamber paracenthesis with repeating “burp” evacuation of blood and excessive intraocular liquid is effective, safe, cheap and quick procedure, especially in early period. Surgical treatment (Luxated lens removing, phacoemulsification, vitrectomy, antiglaucoma surgery with or without drainage device implantation) performs due to indication according to elaborated algorithm. The severity of visual functional loss, its prognosis and dynamic change depends on premorbid state, traumatic factor specifications and peculiarities, amount of damaged eye structures and also on timely and adequate ophthalmic care, involved resources and recovery potential. So, in some cases with primary “worse” state and prognosis there were much better functional outcome results and vice versa.

Methods: We investigated 54 patients (56 eyes) with secondary hypertension due to blunt and combined trauma (champagne cork (12 eyes), fist blow (24 eyes), wood or stone pieces (9 eyes), fireworks (6 eyes), car safety airbags (5 eyes, 2 patients - both eyes)). Earlier eye hypertension (1-3 hours – 1 day) appeared in 34 cases. Late eye hypertension (5-10 and more days) – 19 eyes. In most cases primary high levels of IOP were evaluated only approximately by palpation due to corneal or eyelids changes. Hyphema (39 cases), hemophthalm (22 cases), lens luxation (9 cases), and subluxation (12 cases), iris congestion, rupture and deformation (29 cases), retinal ruptures (9 eyes), edema (18 eyes) and detachment (6 eyes) diagnosis was confirmed by biomicroscopy, gonioscopy, ultrasound B-scan, anterior segment OCT, CT or MRT with video and/or photoregistration. Due to proposed algorithm of diagnostic-treatment tactic we achieved IOP decrease within 24 hours by means of medication in 29 eyes. In 18 cases we used anterior chamber paracenthesis with repeating “burp” procedure. In 14 cases early surgical treatment (luxated or subluxated lens removing - 4, phacoemulsification of subluxated lens (using ICR for capsular bag stabilisation in 2 cases), traumatic congestive cataract – 2 cases, vitrectomy – 3 cases, antiglaucoma surgery without drainage device implantation – 3 cases) was necessarily performed. Within following 3-6 month surgical treatment was performed due to eye hypertension in 8 cases of lens subluxation, and with extraocular implantation of glaucoma microdrainage device in 3 cases of refractory secondary glaucoma.

Results: All patients were followed up until steady improvement (1 month – 1 year). We got a distribution timeline of outcome of IOP levels. In cases with early hypertension without lens disposition we achieved IOP normalisation within 7-10 days. Most often reason for late hypertension was repeated haemorage or lens / iris disposition. IOP normalisation in these cases required more intensive medication treatment (combinations of pro- and anticoagulants, antioedematous, carboanhydrase inhibitors, osmotic agents, etc.). After 3 months from lens...
surgery operation IOP was below 20 mm Hg without medication in 18 eyes and in 7 cases with medication. Most of patients (49 eyes) had substantial improvements in central vision and visual field. In cases with posterior segment traumatic changes were performed vitreoretinal interventions in specialized clinic.

**Conclusion:** In cases of blunt trauma secondary glaucoma (hypertension) may appear due to different pathogenesis mechanisms, so needs a differential diagnosis and different individual treatment approaches. In some cases hypertension was temporary and so it not been transformed into glaucoma – unexpressed or subthreshold optic nerve changes. In other cases it became a major pathogenesis factor also in combination with direct traumatic damage of nerve fibres or supply mechanisms led to “true” secondary glaucoma – optic neuropathy. So, though the value, significance and importance of symptomatic hypertension in cases of blunt eye trauma may vary, it still have to be in focus of ophthalmologists for seeking of individual complex aproach.
THE GENETIC FINDINGS AND THE TREATMENT RESULTS IN A PATIENT WITH A BILATERAL COMPLETE LENS LUXATION AND SEVERE GLAUCOMA

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Background: The association between ectopia lentis and phacogenic glaucoma is well described in the literature. This condition can be associated with a connective tissue disorder like Marfan and Weil Marchesani syndrome or be an isolated feature related with one of more than 600 mutation described in FBN1 gene. We report the genetic findings and treatment results in a patient with bilateral complete lens dislocation and chronic glaucoma in which we diagnosed a clinical Marfan syndrome of a new FBN1 gene mutation.

Methods: A 41-year-old Caucasian woman with medical history of arterial hypertension and family history of blindness and cardiovascular diseases was referred to our hospital for evaluation of the ocular hypertension which could not be controlled despite of maximum topical treatment with dorzolamide, timolol and travaprost. The complete ophthalmological examination including visual acuity, gonioscopy, axial length, refraction, slit light biomicroscopy and funduscopy was performed. The systemic anamnesis and examination according to the Ghent nosology was performed by a clinical geneticist in order to discard connective tissue or metabolic disorders

Results: The best corrected visual acuity was 0.2 OD and no light perception in OS and the intraocular pressure (IOP) was 33 OD and 56 OS (mmHg). The refraction was 90º -1.5 -1 DP OD and could not be examined in OS. The axial longitude was 31mm in OD and 30 mm in OS. The patient presented bilateral miosis, aphaquia, myopic choroidopathy, cataract lenses luxated to the vitreous chamber and glaucomatous optic neuropathy of 0.8 disc / excavation ratio in OD and total atrophy in OS. She showed extensive anterior peripheral sinequia in both eyes. The further systemic evaluation showed tall body type with diminished superior/inferior body segment proportion and no augmented joints laxity. The genetic study disclosed heterozygote mutation consisting of c.504 C>G (Cys168Trp) in FBN1 gene which according to “The Human Gene Mutation Database at the Institute of Medical Genetics in Cardiff” has not been yet registered. Meeting 2 major (ectopia lentis and augmented axial longitud) and 1 minor (diminished superior/inferior body segment proportion) clinical criteria the patient was diagnosed of Marfan syndrome and is now controlled by Clinical Genetics Department. Regarding to the ophthalmological management we performed pars plana vitrectomy, lensectomy and implantation of Ahmed glaucoma drainage device in pars plana in OD. Since the patient had no visual function in the OS we decided to perform trans-scleral cyclophotocoagulation with diode laser in order to treat the pain she referred. At this time the patient’s IOP is maintained lower then 20 mmHg in both eyes although she still requires the topical treatment with timolol and brimonidine. The corrected VA is of 0.5 OD and NLP OS and IOP.

Conclusions: In the presence of bilateral lens luxation, the exhaustive systemic and genetic evaluation is obligatory in order to discard a connective tissue systemic disease and its potentially lethal cardiac complications. Furthermore In our experience the systemic disorders and a new mutation in a FBN1 gene was associated with the sever phacogenic glaucoma.
BILATERAL ANGLE CLOSURE WITH RAISED INTRAOCULAR PRESSURE FOLLOWING SNAKE BITE
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Snakebite is a common medical emergency in India, causing multisystem involvement. Of the poisonous snakes commonly found in India such as saw scaled viper, Russell's viper, common cobra and common krait, cobra venom is neurotoxic and viper venom is hemotoxic. Ocular complications with snake bite are rare. Ptosis, ophthalmoplegia, optic neuritis including uveitis have been described. But to our knowledge there has been no report of angle closure with raised intraocular pressure (IOP).

Methods/ Case description: This report describes three patients who developed bilateral angle closure after snake bite. All the three patients were young and were started on antisnake venom in our hospital. The anterior chamber was shallow OU and the IOP was in the late thirties. The second patient in addition had fibrinous uveitis and the third patient developed choroidal detachment which were related to the use of antisnake venom. One of the patients applied some form of native treatment over the eyes and as a result developed ocular pemphigoid like surface disorder.

Results: All patients were started on antiglaucoma medications. Intensive lubricants were given and glass rod sweeping was performed in the patient with ocular surface problem. Laser iridotomy was performed OU in one of the patients. The IOP and anterior chamber depth returned to normal within a week of treatment.

Conclusion: The three cases emphasize the need for ocular examination in the systemic evaluation of a patient with snake bite especially when the patient is too sick to complain. The occurrence of vision threatening complications following snake bite that are reversible with timely treatment should be borne in mind.
CASE REPORT: STURGE WEBER SYNDROME WITH CHOROIDAL HAEMANGIOMA AND SECONDARY RAISED INTRAOCULAR PRESSURE
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Background: 13 year old girl, with Sturge Weber syndrome presented with complaints of blurring of vision of the right eye associated with intermittent headaches for 7 months. There was a large haemangioma on the right side of the face involving the frontal region extending to the right maxillary region. Vision was 6/36, with the presence of relative afferent papillary defect (RAPD). There was an episcleral haemangioma inferotemporally and choroidal haemangioma during fundus examination. Intraocular pressure in the right eye was 26mmHg compared to 16 mmHg in the left eye. Gonioscopy did not reveal any haemangiomas obstructing the angle of the anterior chamber. She was started on topical beta blockers to reduce her intraocular pressure which bought her time in maintaining optic nerve viability while waiting for the choroidal haemangioma to be treated.

Method: Case report.

Results: The intraocular pressure during subsequent follow up had reduced to 20mmHg. Patient no longer complained of headache and was planned for further management by the medical retina team following conformation of the choroidal haemangioma by MRI.

Conclusion: The large choroidal haemangioma had led to secondary raised intraocular pressure in this patient. There were no disruptions to the aqueous outflow at the angle, although uveoscleral outflow may have been compromised due to the large haemangioma. The intraocular pressure was controlled by reducing aqueous production using a topical beta blocker and enabled patient to be symptom free and to maintain her optic nerve viability while waiting for her haemangioma to be treated.
THIRTEEN CASES OF CHORIORETINAL FOLDS ASSOCIATED WITH TILTED DISC SYNDROME
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Background: We experienced thirteen cases with both chorioretinal folds and optic disc dysplasia in the patients who were suspected glaucoma from fundus examination.
Material and Methods: Subjects were eighteen eyes of thirteen patients with both chorioretinal folds and optic disc dysplasia. The conventional glaucoma examinations including fundus photography and standard automated perimetry (SAP) with the Humphrey Field Analyzer II, optical coherence tomography (OCT) and ultrasonography (A and B-mode) were performed.
Results: All patients were female, with a mean age of 70.7 years, corrected visual acuity of 0.04 to 1.2, mean IOP of 14.7 mmHg, mean axial length of 24.95 mm, and mean MD of -7.84dB. The optic disc appeared hypoplastic and tilted in all eyes, and B-mode and OCT showed inferior staphyloma. Chorioretinal folds confirmed by OCT were observed in the upper temporal area, and orientated radially to the upper edge of the inferior staphyloma. Seventeen eyes showed visual field changes corresponding to inferior staphyloma, and eleven eyes revealed changes elsewhere in the visual field by SAP.
Conclusion: We experienced thirteen patients with chorioretinal folds which were possibly associated with morphological abnormality. The optic disc form and inferior staphyloma suggested tilted disc syndrome. Based on the chorioretinal folds radiating from the upper edge of the inferior staphyloma and the advanced age of all patients, we speculated that the inferior staphyloma became enlarged with aging, resulting in the traction of the thinned chorioretinal layer, leading to the development of chorioretinal folds.
SINGLE SESSION PAN-RETINAL PHOTOCOAGULATION WITH PATTERNED SCAN LASER: IS GLAUCOMA A COMPLICATION?
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Background: Single-session pan-retinal photocoagulation (SSPRP) for proliferative diabetic retinopathy (PDR) with current 532nm Nd:YAG laser settings has been routinely discouraged in view of dreaded complications especially elevations of intra-ocular pressure, narrowing of anterior chamber angle and aggravation of optic neuropathy. Patterned SCAn Laser (PASCAL) offers decreased energy delivery to retinal tissue and thereby lesser complications. We sought to compare safety profile of SSPRP using PASCAL with multiple-session pan-retinal photocoagulation (MSPRP) conventional laser.

Methods: We conducted a prospective randomised controlled trial in which 31 eyes of 24 patients with PDR with high risk characteristics recommended PRP as per ETDRS criteria were administered SSPRP using PASCAL (n = 15) or MSPRP using conventional laser (n = 16). In our clinical trial comprising follow up at 6, 12 and 24 weeks, retreatment with conventional laser was provided in case of non-regression or aggravation of neovascularisation at 12 weeks. Main outcome measures were intraocular pressure (IOP), anterior chamber depth (ACD) and gonioscopic assessment of anterior chamber angle. Laser parameters comprised fluence, pain using visual analogue scale and session duration. Following parameters were assessed before and after laser therapy: best corrected visual acuity (logMAR), +90D slit lamp bio-microscopy, indirect ophthalmoscopy, fundus fluorescein angiography (FFA), Optical Coherence Tomography (OCT), colour vision (using Nagel’s anomaloscope), Humphrey visual field (HVF) SITA standard 30-2 analysis and micro-perimetry.

Results: Baseline IOP was 14.3±1.8 mmHg for SSPRP group and 14.1 ± 1.5 mmHg in MSPRP group (p = 0.813). The IOP at 6, 12 and 24 weeks was 16.8 ± 1.5, 17.2 ± 1.3 and 17.5 ± 1.4 mmHg in SSPRP group and 17.0 ± 1.6, 17.9 ± 1.4 and 18.5 ± 1.1 mmHg in MSPRP group. Baseline ACD measurements were 2.7 ± 0.05 for SSPRP group and 2.72 ± 0.04 for MSPRP group (p = 0.686). The ACD at 6, 12 and 24 weeks was 2.64 ± 0.06, 2.65 ± 0.05 and 2.62 ± 0.06 mm in SSPRP group and 2.64 ± 0.06, 2.65 ± 0.05 and 2.62 ± 0.06 mm in MSPRP group. There was no significant difference in IOP (p = 0.813, 0.715 and 0.240 at 6, 12 and 24 weeks respectively) or ACD (p = 0.644, 0.529 and 0.477 at 6, 12 and 24 weeks respectively) during the follow up period between the two groups. Fluence, pain and session duration were found to be significantly lower for PASCAL (p = 0.001).

Conclusion: Single session panretinal photocoagulation with PASCAL does not lead to elevation of intra-ocular pressure or narrowing of the anterior chamber in the immediate post laser period and at 24 weeks follow up as has been previously noted with single session conventional laser pan-retinal photocoagulation.
HIGH RISK OF OPTIC NERVE ATROPHY AND VISION LOSS DUE TO GLAUCOMA AMONG AFRICAN TYPE 2 DIABETICS

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Background: Systematic screening for diabetic ocular complications such as blindness and its major causes including glaucoma is not yet established in our setting. This study was undertaken to determine the prevalence of glaucoma in Black Africans with type 2 diabetics and to examine its association with low vision, cup-disc ratio > 0.6 and severe optic nerve atrophy.

Methods: A cross-sectional study of 150 type 2 diabetics was carried out.

Results: Of the 150, 57% of patients were female and 17.3% had glaucoma. 13% were blind. Blindness was due to Diabetic retinopathy (20%), glaucoma (19.2%), cataracts (18.3%) and optic nerve atrophy (7.3%). Of the patients with glaucoma, 50% had a cup to disc ratio of > 0.6, 34.6% had visual impairment and 50% had optic nerve atrophy. Only 11.5% of the 17.3% were known to have glaucoma prior to the screening. Diabetics with glaucoma had a higher risk of optic nerve atrophy (OR = 24.1, 95% CI 6.2-92.9; 44.4% vs. 3.3%; p < 0.0001) in comparison with those without glaucoma.

Conclusions: Glaucoma remains highly prevalent. It is the second most common cause of blindness. It confers a high risk of optic nerve atrophy in these African type 2 diabetics of whom almost 90% were unaware of glaucoma. Screening for early diagnosis and treatment of glaucoma are recommended for type 2 diabetes at primary care level.
EFFICACY OF SURGICAL TREATMENT OF POST-INFLAMMATORY GLAUCOMA IN SIX MONTH OBSERVATION
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Purpose: To evaluate the efficacy of surgical treatment in patients with secondary glaucoma due to uveitis.

Material and methods: Retrospective analysis of the results of surgical treatment in cases of post-inflammatory glaucoma. Sixteen patients- 9 females and 7 males, aged 43-65 years (mean 55 years) were included to the study: 6 patients suffering from uveitis in arthritis, 3 patients with Posner-Schlossman syndrome and 7 patients with idiopathic non-specific uveitis. All patients underwent trabeculectomy with MMC performed in Department of Ophthalmology Medical University of Warsaw between January and June 2010 year. Preoperative IOP during topical treatment with 3 or more antiglaucoma drugs was on level of 22 mmHg.

Results: The IOP was low approx. 14 mmHg without topical treatment at the 3 month follow-up period. 6 months after surgery the same value of IOP (14 mmHg) without antiglaucoma drops, was obtained in 50% and with one drug in 50% cases. Complications such as cataract occurred in 30% cases, which were qualified to facoemulsification procedure with pharmacologic anti-inflammatory protection. No recurrence of inflammation was observed during follow-up period.

Conclusions: Filtering surgery with use MMC is an effective method of lowering IOP in patients suffering from secondary post-inflammatory glaucoma.
GLAUCOMA IN PATIENTS WITH AMYLOIDOTIC FAMILIAR POLYNEUROPATHY TYPE 1 AFTER LIVER TRANSPLANTATION

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Purpose: To evaluate the natural course of glaucoma among patients with amyloidotic familial polyneuropathy type 1 (PAF-1)

Settings: Serviço de Oftalmologia, Hospital de Santo António, Centro Hospitalar do Porto, Porto, Portugal

Methods: Retrospective, non-comparative study which included 98 patients with ocular manifestations of amyloidotic familial polyneuropathy type 1. Analysed data included: time since diagnosis of PAF-1, history of liver transplant, presence of ocular symptoms, ocular manifestations (namely, ocular surface disorders, iris and other anterior chamber structures anomalies, ocular hypertension, vitreous opacities and retinal / choroid alterations) and history of ocular surgery (namely vitrectomy for vitreous opacities and / or glaucoma surgery for uncontrolled ocular hypertension).

Results: All patients were submitted to a liver transplant. Minimum follow-up time was 12 months. The ocular symptoms presented were mostly related with ocular surface disorders (severe dry eye was the most common ocular manifestation found) and with vitreous opacities (the main cause of visual acuity loss found in this patients). Ocular hypertension was more frequent in patients with longer course of the disease and with iris and / or anterior chamber structures anomalies. Most patients required maximal medical therapy and a significant number needed one or more glaucoma surgeries to control the intraocular pressure. Glaucoma surgery outcomes were worse in this population, probably related to changes in trabecular meshwork and conjunctiva and with the continuous production of amyloid fibrils by the eye. The authors found also a positive correlation between vitrectomy for vitreous opacities and ocular hypertension worsening.

Conclusions: Liver transplant neither alters nor prevents the ocular manifestations of amyloidotic familial polyneuropathy. Ocular hypertension is a common complication of this disorder and frequently is of difficult control.
Changes in Intraocular Pressure After Phacoemulsification in Patients with Behcet’s Disease

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Background: To investigate the changes in intraocular pressure (IOP) after phacoemulsification in uveitic eyes with cataract due to Behcet’s disease.

Methods: In this study, thirty-five eyes of 29 patients with uveitis and cataract that had phacoemulsification with foldable intraocular lens implantation (IOL) implantation between 2004 and 2009 were analyzed. All uveitic eyes were in remission for at least 3 months before surgery. Any specific pre-operative preparation protocol was not used. All surgery was performed using a standardized protocol: clear corneal incision, capsulorhexis, phacoemulsification, and in-the-bag monoblock foldable hydrophilic acrylic IOL implantation. Postoperative IOP’s were evaluated in first week every day, in first month every week and then every month after surgery. The degree of postoperative inflammation were determined.

Results: The mean age of the patients was 41.34 ± 15.8 years (range 17 to 67 years). The mean postoperative follow-up was 31.9 ± 8.5 months (range 6 to 72 months). The mean IOP before surgery was 15.12 ± 3.9 mmHg, postoperative first day was 19.58 ± 4.3 mmHg, second day was 19.91 ± 4.9 mmHg, third day was 19.12 ± 3.3 mmHg, fourth day was 19.79 ± 4.1 mmHg, fifth day was 19.13 ± 4.4 mmHg, sixth day was 18.95 ± 3.1 mmHg, seventh day was 18.57 ± 3.9 mmHg, second week was 16.13 ± 2.8 mmHg, third week was 16.19 ± 3.1 mmHg, fourth week was 16.01 ± 2.9 mmHg, second month was 15.94 ± 2.5 mmHg, third month was 15.84 ± 2.0 mmHg, fourth month was 15.56 ± 2.4 mmHg, fifth month was 15.29 ± 2.7 mmHg, sixth month was 15.39 ± 2.4 mmHg. The mean IOP changes on postoperative first week in every day were significantly higher than the preoperative IOP’s. But subsequent IOP changes were not significant than preoperative IOP’s. IOP elevation was seen in patients with inflammatory attacks. Age, sex and axial length were not significantly related to IOP changes. Eleven eyes had mild one eye had severe fibrinous uveitis post-operatively.

Conclusions: With careful patient selection, diligent surgery and close post-operative supervision, phacoemulsification with in the bag intraocular lens implantation is safe and effective in patients with uveitic cataract. In this study, IOP elevation after phacoemulsification in uveitic eyes seems associated with inflammatory attacks.
ARGON LASER PHOTOCOAGULATION IN TWO CASES OF NEOVASCULAR GLAUCOMA IN PATIENTS WITH AMYLOIDOTIC FAMILIAR POLYNEUROPATHY TYPE 1
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Purpose: To evaluate the results of treatment with Argon Laser Photocoagulation in two neovascular glaucoma patients with amyloidotic familiar polyneuropathy type 1 (PAF-1).

Methods: Retrospective study of two patients with neovascular glaucoma, not controlled with medical therapy alone, that performed panretinal argon laser photocoagulation after diagnostic of retinal ischemia with fluorescein angiography. The neovascular glaucoma is a rare but possible ocular manifestation of Amyloidotic Familial Polyneuropathy Type 1. Analysed data included: time since diagnosis of PAF-1, history of liver transplant, presence of ocular symptoms, ocular manifestations, and the control of intraocular pressure (IOP) with the Laser Treatment.

Results: The IOP was controlled with the panretinal argon laser photocoagulation and medical therapy, with no need for another type of glaucoma surgery. Minimum follow-up was 6 months. Both patients were submitted to liver transplant. Images data of retinal angiography before and after pan-photocoagulation will be presented.

Conclusions: Liver transplant neither alters nor prevents the ocular manifestations of Amyloidotic Familial Polyneuropathy. Glaucoma is a common complication of this disease, but neovascular Glaucoma is rare. In these cases, the authors achieved good IOP control with medical therapy and Argon Laser Photocoagulation.
Glaucoma, the world’s leading cause of irreversible blindness, was not included in the initial Vision 20/20 list. The main reasons include the inability to restore lost vision and the need for upgrading the substandard clinical skill levels of many developing country ophthalmologists. Additional barriers include some, or all, of the following: poverty; limited or absent follow-up visits because of transportation problems and/or patient indifference; limited medical treatment because drugs are unavailable, unaffordable or not taken; and the necessity of time consuming case-based rather than community-based screening. Because insufficient past clinical education has resulted in present knowledge gap, the solution is that of upgrading the knowledge levels of all health care personnel (including primary care physicians and ophthalmology residents where indicated). In addition, the medical school curriculum should include training in an appropriate level of basic clinical ophthalmology.

An example of what can be accomplished by repeated 2-week glaucoma workshop visits will be discussed. The country is Nigeria: 140 million people, a higher prevalence of primary open angle glaucoma and less than 150 ophthalmologists who, with few exceptions reside in the cities. There are approximately 8 teaching centers scattered throughout the country. Over a period of 12 years the speaker has conducted eight 2-week glaucoma workshops and numerous presentations at national meetings resulting in a Nigerian Glaucoma Society and a glaucoma sub-specialty day preceding the annual meeting of the Ophthalmological Society of Nigeria. Repeat visits to Vietnam, Pakistan and Nepal have also resulted in a significant improvement in glaucoma care.

Although one-on-one teaching is ideal, it is not always possible. However, the Internet, which is now essentially available to all health-care personnel worldwide, contains free and an incredible variety of eye-care teaching material including gonioscopy tutorials, basic clinical ophthalmology teaching programs, individual study programs, videos of glaucoma surgery, CME possibilities and much more.
MYOCILIN EXPRESSION IN UVEITIC, FUCHS HETEROCHROMIC IRIDOCYCLITIS AND NON-UVEITIC TRABECULAR MESHWORK AND AQUEOUS HUMOR
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Purpose: To compare the concentration of myocilin in aqueous humour (AH), and mRNA expression in trabecular meshwork (TM) in 3 groups of patients: Fuchs Heterochromic Cyclitis (FHC), other types of uveitic glaucoma (± steroid response), and primary open angle glaucoma (POAG).

Methods: Thirty-nine patients who were due to undergo trabeculectomy surgery at one institution were recruited, consented according to the Declaration of Helsinki, and divided into the following groups: A. 9 FHC, B. 16 Uveitic Glaucoma (without FHC) with or without significant steroid exposure, C. 14 POAG. A sample of AH was collected at the beginning of surgery. During the procedure a 2x1mm TM block was excised. AH samples were processed by SDS-PAGE and Western Blot (WB) analysis using anti-myocilin antibodies (Santa Cruz Biotechnology, 1:2000). For normalization of myocilin bands, blotted membranes were stained with Coomassie and digitized. The intensity of the albumin signal was determined using appropriate software and used to normalize the signal intensity of the myocilin band. RNA was isolated from TM samples, cDNA prepared and quantitative real time RT-PCR performed with primers specific for myocilin and GAPDH and GNB2L as housekeeping genes. Mean expression levels were compared using Student’s t-test.

Results: There was no significant difference between groups B and C in WB analysis of the AH. Nevertheless, there was a trend towards higher values in group B. Interestingly, group A showed significantly higher values of myocilin in AH than those in group B (p < 0.04). When groups A and C were compared, this remained true (p < 0.003). Again, no significant differences were observed between groups B and C in RT-PCR of the TM samples. However, significant differences were found between groups A and B (p < 0.05), and A and C (p < 0.05).

Conclusions: We have not found specific evidence of a pathogenic role for myocilin in patients with non-FHC uveitic glaucoma, as expression levels are similar to POAG. We would speculate that the high levels of myocilin in AH of FHC patients are likely released from affected iris tissues, as the iris is often profoundly affected by FHC. The increased myocilin mRNA expression in TM specimens may indicate either a pathogenic process in the TM outflow pathways or a higher sensitivity to steroid treatment than is observed in other types of uveitic glaucoma or POAG.
CLINICAL GLAUCOMA: OTHER
ISOLATED TRAUMATIC ANIRIDIA AFTER TRABECULECTOMY
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Background: The consequences of blunt trauma on an operated eye far differs from that on a virgin eye. Unoperated eyes usually rupture at the limbus or behind the insertions of the rectus muscles while the disruption of intraocular structures is limited in operated eyes. Aniridia as an isolated injury has been described following phacoemulsification with foldable intraocular lens through a corneal or a scleral tunnel which is the standard of care for cataract. But that occurring with blunt trauma in an eye that had both trabeculectomy with antifibrotic agents for primary open angle glaucoma and phacoemulsification has not been reported. The effects of blunt trauma in our patient were reduced considerably due to the dissipation of the force of trauma through the trabeculectomy fistula and partly from the absorption of the forces by the flexible intraocular lens inside the eye.

Methods: This is a single case report of an elderly patient who had blunt trauma in an eye that had multiple surgeries. Details of mode of injury and surgeries done previously were noted. Slit lamp and fundus examination and intraocular pressure by applanation tonometer were performed.

Case description/Results: A 70 year old Chinese lady sustained blunt trauma to her right eye 4 months prior to her follow up visit to the glaucoma clinic. She had undergone trabeculectomies with 5FU in both eyes 10 years ago for primary open angle glaucoma. Three years later, she had undergone phacoemulsification with foldable IOL implantation through a 2.8 mm corneal tunnel in the right eye. On examination, the globe was intact but the whole of iris was missing. The capsular bag and zonules were intact and the intraocular lens was centred and stable and was visualised in their entire extent due to the absence of iris. The best corrected visual acuity was 6/9 in the injured right eye. The trabeculectomy bleb was low, diffuse, vascularised and there was no leak. The sclera underlying the bleb was pigmented and the pigmentation extended upto the fornix. A + 90 D examination of the disc revealed a cupping of 0.85 and the rest of the fundus and macula were normal. Gonioscopy revealed iris pigments at the fistula but no iris tissue fragments or areas of angle recession was noted. The intraocular pressure was 26 mm Hg in the traumatised eye without medications.

Conclusion: Trabeculectomy and phacoemulsification in the right eye had limited the severity of blunt trauma to 360 degree iridodialysis.
ABSTRACT WITHDRAWN
CHANGES IN THE RETRO BULBAR ARTERIC CIRCULATION AMONG MEN AND WOMEN AFTER DECREASE OF THE ELEVATED INTRAOCULAR PRESSURE IN PRIMARY OPEN ANGLE GLAUCOMA

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Background: To evaluate changes of the hemodynamic parameters in the retrobulbar arteric circulation after decrease of the elevated intraocular pressure (IOP) in patients with primary open angle glaucoma (POAG).

Methods: 60 patients were examined, 33 men and 27 women, all up to 25 years old, all with diagnosed and treated POAG, all examined at the Eye clinic Clinical Centre of Serbia. IOP was measured both with Goldmann Aplanation (GAT) and Dynamic Contour tonometer (DCT). Imaging of the retrobulbar arteric circulation, with color doppler (CDI), was performed at the Neurology clinic Clinical Centre of Serbia, measuring hemodynamic parameters in the: Ophthalmic Artery (OA), Central Retinal Artery (CRA), and Posterior Ciliary Arteries (PCA). Peak systolic (PSV), end-diastolic (EDV) velocities were measured, and resistance (RI) and pulsatility indexes (PI) were calculated.

Results: Among women hemodynamic arteric parameter PSV increased in CRA, but decreased in OA and PCA; EDV increased in all three retrobulbar vascular levels; Ri increased, but Pi decreased in all vessels. Among men, PSV, EDV and Pi decreased in all three vessels; Ri increased in OA, but decreased in CRA and PCA. Statistically significant change appeared in Pi of the OA among women; and in EDV of the OA among the men.

Conclusion: In our study there was a difference between women and men in the retrobulbar arteric circulation after decrease of the elevated IOP in POAG. Changes in retrobulbar circulation are of importance for approach and treatment, but the role of vascular factors in the supplementation of the optic disc neuroretinal rim, could be a key for progression backlash of glaucoma and the radix of neuroprotection.
TEAR FILM OSMOLARITY IN PATIENTS TREATED FOR GLAUCOMA OR OCULAR HYPERTENSION
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Background: Chronic use of topical intraocular pressure (IOP)-lowering drugs and their preservatives is known to cause significant changes on the ocular surface. The purpose of the current study was to evaluate tear film osmolarity in patients treated with intraocular pressure-lowering medications.

Methods: Forty patients treated for glaucoma or ocular hypertension (OHT) and followed at the Quinze-Vingts National Ophthalmology Hospital were consecutively recruited for the study. Each patient was asked to complete an evaluation of ocular surface disease (OSD) symptoms and underwent a complete evaluation of the ocular surface including tear film osmolarity, Schirmer test, tear film breakup time (TBUT) and, corneal and conjunctival staining. Demographic information and glaucoma treatment were obtained from patient’s medical records.

Results: Twenty eight patients (70%) had chronic glaucoma and 12 (30%) had OHT. There were 20 women and 20 men with a mean ± SD age of 63.9 ± 10.8 years. Twenty four patients (60%) reported OSD symptoms according to the OSDI. Nineteen patients (47.5%) had a tear osmolarity ≤ 308 mOsms/L, 11 (27.5%) between 309-328 mOsms/L and 10 (25%) > 328 mOsms/L. According to Schirmer test, a tear deficiency was observed in 20 patients (50%). Twenty seven patients (67.5%) had an abnormal tear quality analyzed with tear breakup time (TBUT) and 16 patients (40%) showed positive staining using the Oxford schema.

There was a statistically significant correlation between tear osmolarity and the number of molecules (r = 0.409, p = 0.009), the number of instillations (r = 0.405, p = 0.01) and the number of instillations of preserved eyedrops (r = 0.629, p < 0.0001). Using the multiple regression method, tear osmolarity remained significantly correlated to the number of instillations of preserved eyedrops (p = 0.004). Tear osmolarity was significantly correlated to OSDI (r = 0.486; p = 0.002) and TBUT (r = -0.49; p = 0.009).

Conclusion: Tear osmolarity was increased in patients treated for glaucoma or OHT, particularly in those using multiple preserved eyedrops. The evaluation of the ocular surface of patients treated for glaucoma or OHT may benefit from such analysis and future trials for new intraocular pressure-lowering eyedrops should thus evaluate tear osmolarity.
CLINICAL CHARACTERISTICS OF GLAUCOMA IN PATIENTS UNDER FORTY YEARS OLD

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Background: Although clinical feature of glaucoma appeared in elder people has been studied thoroughly, that in younger people is behind in investigation. We herein examined the clinical characteristics of glaucoma in the Japanese young people whose ages were 40 years or younger.

Methods: The medical records of 265 cases with either glaucoma or ocular hypertension who visited our clinic of University of Occupational and Environmental Health Hospital more than twice from January 2003 to December 2007 were reviewed. We examined the type of glaucoma in all 265 cases, and then in patients with either developmental glaucoma (DG) or secondary glaucoma (SG) we studied clinical characteristics including a chief complaint at the first consultation, therapy and the prognosis of visual acuity. In this study, we defined DG as glaucoma that had goniodygenesis with a glaucoma-related optic nerve change or ocular hypertension, normal tension glaucoma (NTG) as glaucoma having intraocular pressure (IOP) of 21mmHg or less with glaucoma-related optic nerve changes and the corresponding visual field disorders, and SG as glaucoma secondary to ocular or systemic disorders.

Results: Out of 265 cases, SG, DG, NTG, ocular hypertension, primary open angle glaucoma, primary angle closure glaucoma and others were 148 (55.9%), 45 (17.0%), 18 (6.8%), 17 (6.4%), 17 (6.4%), 3 (1.1%), and 17 cases (6.4%). Seventy-six eyes out of 198 (38.3%) 148 cases with SG showed corticosteroid associated IOP elevation. In the rest of eyes with SG, increase in IOP was caused by an ocular injury in 47 (23.7%), ocular inflammation in 41 (20.7%), an eye surgery in 25 (12.6%) and neovascular glaucoma in 2 eyes (1.0%). IOP elevation was transient in 155 eyes (78.3%) with SG, and the IOP has been controlled without any medications. Out of 62 eyes with DG, 10 eyes (16%) were early-onset DG, 36(58%) were late-onset DG, and 16(26%) were DG with other congenital anomalies. The eyes with early-onset DG showed poor prognosis with respect to the visual acuity, although those with late-onset had good one.

Conclusion: The clinical features of variable types of glaucoma in the Japanese younger people are quite different than those in the elder ones.
EFFECT OF NSAID ON PROSTAGLANDIN-INDUCED IOP REDUCTION
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Purpose: The effect of NSAID on intraocular pressure (IOP) reduction by prostaglandin (PG) analogues has been reported but still controversial. This study aimed to investigate the effect of NSAID on IOP reduction by a short- and long-term concomitant use of travoprost in a double-masked randomized comparative study.

Methods: A short- (Study1) and a long-term (Study2) use of NSAID and PG analogues were conducted in normal subjects by a double-masked manner. Subjects of Study1 and Study2 were required to visit consecutive 2 days and 5 days in a month respectively for ophthalmic examinations under application of NSAID and travoprost 0.004%. In each visit, IOP was measured at 8:00, 14:00, and 20:00. IOP of day0 was measured for baseline and diurnal variation of IOP with NSAID and vehicle solution. In day0 and day1 of Study1 and day0, 1, 2, 7, and 28 of Study2, diclofenac and bromfenac Na was applied respectively 3 times a day to a randomly selected one of two eyes (NSAID eye), and vehicle solution was to the contralateral eye (control eye). From day1 of Study1 and 2, travoprost 0.004% was dropped into both eyes once daily at 8:00. IOP reduction at each measurement time was calculated in comparison with the IOP measured at the same time of day0 in consideration of diurnal variation of IOP.

Result: Study1. IOP reduction in control eye was 24.2 ± 7.5, and 25.8 ± 9.9% at 6 and 12 hours after a single application of travoprost, respectively. IOP reduction in NSAID eye was 24.2 ± 9.3, and 27.2 ± 9.5% at 6 and 12 hours, respectively. There was no significant difference between two groups after a single application of travoprost (n = 30). Study2. At day7 of control eye, IOP reduction from baseline at 8:00, 14:00 and 20:00 was 13.0 ± 14.4, 13.3 ± 12.3, and 18.8 ± 10.5%, respectively. At day7 of NSAID eye, IOP reduction at 8:00, 14:00 and 20:00 was 15.3 ± 13.5, 14.0 ± 11.9, and 18.5 ± 9.6%, respectively. At day28 of control eye, IOP reduction from baseline at 8:00, 14:00 and 20:00 was 17.2 ± 14.1, 14.0 ± 12.9, and 21.0 ± 11.1%, respectively. At day28 of NSAID eye, IOP reduction at 8:00, 14:00 and 20:00 was 18.0 ± 14.1, 15.2 ± 13.0, and 21.8 ± 9.8%, respectively. There was no significant difference between two groups (n = 28) in each IOP measurement time of 7 and 28 days after continuous application of travoprost, excepting at the morning of day7 (p = 0.047).

Conclusion: There was no significant effect of NSAID on IOP reduction by a short- and long-term application of PG analogues.
RELATIONSHIP BETWEEN STRUCTURAL AND FUNCTIONAL DAMAGES IN EYES WITH OPEN-ANGLE GLAUCOMA AT AN EARLY STAGE
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Purpose: To investigate relationship between macular ganglion cell complex area (GCCA) and visual field defect in eyes with open-angle glaucoma (OAG) at an early stage.

Subjects and Methods: This study included seventy eyes of 70 OAG patients, who had a mean deviation better than -6.0 dB by the HFA C30-2 program. The morphological impairment was assessed by Cirrus spectral-domain optical coherence tomography. Based on the SD-OCT images measured perpendicularly through fovea using the 5-line raster mode, GCCA was calculated via a computerized software. HFA test points were first separated into 5 areas: the innermost 4 points and 4 symmetrical areas divided by two oblique lines each 45 ° angled against the x-axis. The correlation between GCCA and the threshold in the sectorial visual field area was evaluated by a linear regression analysis.

Results: GCCA was calculated to be 11404.9 ± 1772.3 (arbitrary unit: range; 5599-15435). There was a statistically significant correlation between demonstrable smaller GCCA in either the superior or the inferior quadrant and the threshold in the innermost points (p < 0.0001, Spearman rank correlations). Additionally, the difference in GCCA between superior and inferior quadrants was significantly correlated with the difference in threshold between superior and inferior quadrants (p = 0.0019, Spearman rank correlations).

Conclusions: The central area showed structural and functional damages even at an early stage in OAG. Both damages are significantly correlated.
CORRELATION BETWEEN STRUCTURAL AND FUNCTIONAL CHANGES IN GLAUCOMATOUS EYES
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Purpose: To determine the correlation between the morphological and functional changes in the macular region of eyes with open-angle glaucoma (OAG).

Methods: Twenty-eight eyes of 28 OAG patients were studied. The morphological parameters were obtained by optical coherence tomography (OCT), and the functional parameters were acquired by automated Humphrey Field Analyzer (HFA) and multifocal electroretinograms (mERGs). All of the tests were performed in less than 6 months of each other. The retinal thickness was determined by OCT in nine sectors of the macula; the fovea, an inner ring and an outer ring with each divided into four quadrants. The amplitudes of the second order kernel of the mERGs in the central 5 degrees including the amplitude ratio of the nasal to temporal hemispheres (N/T ratio) were analyzed. The total mean deviation of the HFA corresponding to each OCT region was measured and averaged. The correlations among the parameters were determined by coefficients of correlation and linear regression analysis.

Results: The N/T ratio was significantly correlated with the retinal thickness in the inferior quadrant ($r^2 = 0.264; p = 0.0138$). There was a significant correlation between the N/T ratio and the pattern standard deviation measured by the HFA central 10-2 program ($r^2 = 0.229, p = 0.0155$) and the nasal quadrant ($r^2 = 0.123, p = 0.0452$). The retinal thickness in each quadrant including the fovea was significantly correlated with the total deviation in the corresponding area ($p < 0.05$) except the inferior quadrant ($p > 0.05$).

Conclusion: Functional glaucomatous damage assessed by mERGs and perimetry, and morphological retinal changes determined by OCT are significantly correlated.
CORRELATION BETWEEN CENTRAL CORNEAL THICKNESS AND INTRAOCULAR PRESSURE MEASURED WITH GAT AND DCT IN GLAUCOMA PATIENTS OLDER THAN 60 YEARS
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Background: Previous studies proposed that central corneal thickness (CCT) is important for intraocular pressure (IOP) measurements with Goldmann applanation tonometer (GAT) and not for Pascal Dynamic Contour Tonometer (DCT). The aim of this study was to compare IOP results obtained with Goldman applanation tonometer (GAT) with results obtained with Pascal Dynamic Contour Tonometer (DCT) and to correlate them with central corneal thickness in patients with glaucoma older than 60 years.

Methods: Fifty eight patients (116 eyes) older than 60 years (age range 60-88), 24 male and 34 female were enrolled in this study. The patients were divided into six groups: healthy subjects (group I), normaltension glaucoma patients (group II), ocular hypertension patients (group III), primary open angle glaucoma patients (group IV), primary closure angle glaucoma patients (group V), exfoliative glaucoma patients (group VI). The glaucoma diagnosis was made using the Heidelberg Retina Tomography II (HRT II) and Visual Field Test (Humphrey automated perimetry) and that patients were treated medically. Statistical analysis was done with commercially available SPSS program, Wilcoxon Signed Ranks Test and Pearson Correlation. Values of p < 0.05 were considered of statistical significance.

Results: Statistically significant difference between measurements of IOP with the GAT and DCT was determined in all groups: I group mean diff. 1.03 ± 0.98 mmHg, p < 0.01; II group mean diff. 1.12 ± 0.7 mmHg, p < 0.01; III group mean diff. 1.31 ± 1.56 mmHg, p < 0.01; IV group mean diff. 1.5 ± 1.57 mmHg, p < 0.01; V group mean diff. 1.46 ± 1.48 mmHg, p < 0.01; VI group mean diff. 0.79 ± 1.24 mmHg, p < 0.01. CCT was in direct correlation with the IOP values obtained both with GAT and DCT in the first and fifth group, while it was in the indirect correlation with these values in the other studied groups.

Conclusion: In our study CCT had no influence on IOP measurements both with DCT and GAT in none of the groups. DCT cannot replace GAT, but it is a reliable device for the measurement of IOP particularly in corneal deformations (keratoconus, after corneal refractive surgery, corneal scars, etc.).

Keywords: central corneal thickness; dynamic contour tonometry; Goldmann applanation tonometry; glaucoma
ANTERIOR MOVEMENT OF THE LAMINA CRIBROSA AFTER TRABECULECTOMY IN SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY IMAGE SERIES
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Background: The purpose of the study was to investigate the changes in the location of lamina cribrosa and the thickness of prelaminar neural tissue after glaucoma surgery using spectral domain optical coherence tomography (SD-OCT).

Methods: Optic discs of the 31 glaucoma patients who underwent trabeculectomy were scanned using enhanced depth imaging SD-OCT before surgery and 1 week, 1 month, 3 months, 6 months and 9 months postoperatively. The pre- and postoperative magnitude of the lamina cribrosa bowing and the thickness of the prelaminar tissue were determined on B scan images which contains the mostly depressed lamina cribrosa.

Results: Intraocular pressure (IOP) decreased from 28.1 ± 9.2 mmHg (range: 14 to 47 mmHg) to 10.0 ± 3.1 mmHg (range: 4 to 21 mmHg) over a mean follow-up of 4.7 ± 2.6 months. The amount of posterior bowing of the lamina cribrosa was significantly decreased from a mean preoperative level of 646.48 ± 171.10 µm to 541.90 ± 141.17 µm at the end of follow-up (p < 0.001). There was no significant change in the prelaminar neural tissue thickness (119.14 ± 50.46 µm preoperatively, and 122.67 ± 50.43 µm postoperatively, p = 0.070). The magnitude of the lamina cribrosa movement was significantly associated with greater percent IOP reduction (p = 0.003) and younger age (p < 0.001).

Conclusions: Using enhanced depth imaging SD-OCT of the optic nerve head, the anterior movement of lamina cribrosa following glaucoma surgery was demonstrated. No significant thickness change was observed in the prelaminar neural tissue thickness.
Figure. Pre- (Left) and postoperative (Right) SD-OCT images of three cases. Noticeable forward shifting of the lamina cribrosa is observed. (B) The thickening of prelaminar tissue was also recognizable (insets, arrows).
CENTRAL CORNEAL THICKNESS IN DIFFERENT TYPES OF GLAUCOMA, OCULAR HYPERTENSION AND NORMALS

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To evaluate the central corneal thickness (CCT) in patients with primary open angle glaucoma (POAG), pseudoexfoliative glaucoma (PXFG), normal tension glaucoma (NTG), ocular hypertension (OH) and normal subjects. Three hundred seventy two eyes (186 patients) were enrolled. Ninety were eyes with POAG, 36 with PXFG, 69 with NTG, 50 were suspects, 47 with OH and 80 eyes were normal. CCT was measured by means of ultrasound pachymetry with Tomey AL 2000. Correlation of mean CCT with age, gender, glaucoma stage and IOP was estimated. The mean CCT of all eyes was 549 ± 36 µm. The CCT of eyes with NTG was significantly less than that of the other groups (p < 0.001). Eyes with OH had significantly thicker corneas than all the other groups. Among patients with POAG, PXFG and NTG decreasing values of CCT were significantly related to older age. There was positive relation between CCT and IOP in normal eyes. The results of this study suggest that differences in CCT exist in NTG and OH. Glaucoma patients with thin CCT are more likely to be found at a progressive stage of the disease and among those with NTG. There is a possible correlation among CCT and type and stage of glaucoma.
**CHANGES OF INTRAOCULAR PRESSURE AFTER PHACOEMULSIFICATION DONE IN EYES WITH PRIMARY OPEN ANGLE AND PRIMARY ANGLE CLOSURE GLAUCOMA**

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Material and Methods: Retrospective analysis of changes in intraocular pressure in 84 patients with POAG and PCAG after uncomplicated cataract surgery; 57 with POAG, 27 with PCAG. Patients were treated with 2 or 3 antiglaucomatous drops. The follow-up ranged from 6-12 months.

Results: The mean VA before surgery was 0.4, the mean IOP was 17 mmHg. The mean number of glaucoma drops before cataract surgery was in POAG - 2.9, and in PCAG - 2.4. After 6 months follow-up the mean VA was 0.8, the mean IOP (with medications) was in POAG 18 mmHg, in PCAG 14 mmHg. The mean number of glaucoma drops 6 months after cataract surgery was in POAG - 3.1, in PCAG - 1.7. An increased IOP was noticed in 35% of cases in early postoperative period requiring oral and topical maximal hypotensive treatment. 12 patients (14%) were operated due to uncontrolled glaucoma within 6 months after cataract surgery.

Conclusions: Phacoemulsifications procedures performed in glaucomatous eyes treated with more than 2 kinds of drops imply higher risk of postoperative elevation of IOP levels. The number of antiglaucomatous drops has decreased in most of patients with PCAG.
OPERATION OF UPPER EYELID AS A RARE CASE OF INCREASED INTRAOCULAR PRESSURE
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Background: The authors present a rare case of unilateral elevated intraocular pressure after resection of major part of upper eyelid.

Methods: Retrospective review.

Results: The next day after the resection of basalioma of upper eyelid we found a large haematoma and swelling of upper eyelid, dilated episcleral vessels, edematous cornea, physiological anterior chamber and reaction of pupil, but blood in Schlemm´s canal and high intraocular pressure (35 mmHg). We successfully used the combination of local antiglaucoma drops in the treatment (timolol maleat 0,5% + dorzolamid 2%), but dilated episcleral vessels remained. Dilated episcleral vessels and blood in Schlemm´s canal disappeared after reduction of swelling and haematoma of the upper eyelid. The intraocular pressure returned to normal even without medication.

Conclusion: The above described venous compression caused by swelling and shortening of the upper eyelid is an unusual case of elevated episcleral venous pressure and intraocular pressure. Elevated episcleral venous pressure is diagnosed by the clinical find of dilated episcleral vessels and blood in Schlemm´s canal.
VISUAL FIELD DEFECTS AND THE RISK OF MOTOR VEHICLE ACCIDENTS IN ADVANCED GLAUCOMA PATIENTS
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Background: The driving license in Japan requires 1) binocular visual acuity of 0.7 or more and 2) monocular visual acuity of 0.3 or more. If the subject has monocular vision of less than 0.3, a horizontal visual field of 150 degrees or more is required in the better eye. Therefore, even an advanced glaucoma patient can retain a driver’s license if visual acuity is good. The relationship between visual field loss and motor vehicle accidents (MVAs) has not yet been established. In this report, we determined whether glaucomatous damage, assessed using binocular integrated visual field (IVF), correlates with MVAs.

Methods: Thirty-five advanced glaucoma patients with a mean deviation (MD) in both eyes less than -12 dB using the Humphrey field Analyzer 30-2 program (HFA30-2) underwent HFA30-2 and Esterman visual field testing. The binocular integrated visual field (IVF) was calculated by merging the results from the monocular HFA30-2. For IVF, we evaluated mean sensitivity within the superior and inferior hemifields. We also divided the central 10 degrees of the fixation point into six clusters (A, B, C, D, E, and F), and we evaluated the mean sensitivity for each cluster (Figure). We retrospectively studied the MVA history for the past five years, and we compared these visual field measures those who had had MVAs and those who had not had MVA.

Results: Of these 35 patients, 11(31%) of the driving glaucoma patients had had MVAs. Patients who had had MVAs exhibited lower MDs in the better (p = 0.005) and worse eyes (p = 0.01) than the patients who had not had MVAs but no significant differences with regard to the esterman points and scores. Retinal sensitivity for the superior clusters were relatively low in both groups, but IVF sensitivities in the lower hemifield within 5° and 10°of the fixation point significantly different (p = 0.01 and 0.03) between those who had had MVAs and those who had not had MVA.

Conclusions: IVF defects in the lower hemifield within 5° and 10° of the fixation point might be a predictive indicator of involvement in MVAs.
Binocular Integrated visual field (IVF)

1. Mean sensitivity within the superior hemifield
2. Mean sensitivity within the inferior hemifield
3. Clustered test points (A–F) within the central 10° of the fixation.

*Sumi I et al.: Ophthalmology 2003*
Background: There are concerns that high intraocular pressure (IOP) may cause sudden visual loss, for example due to retinal vein occlusion. When the IOP rises gradually patients are often asymptomatic or may have only minor symptoms. Thus, some patients may present with very high IOP during a routine optometrist’s test, despite having few or no symptoms. In the UK, glaucoma screening is mainly performed by optometrists based in the community. The cases of high IOP are referred to the local hospital for further assessment by the ophthalmologist. National guidelines recommend that these cases should be referred within one week or sooner if IOP is over 45mmHg. After careful review of the published literature we could find no evidence to support the recommended timescale.

Aim: To determine short-term visual outcomes during the waiting period for an assessment of patients presenting to an optometrist with intra-ocular pressure measuring 40 mmHg or over, without ‘acute glaucoma’.

Methods: Retrospective case note review. In clinic, patients were identified who had presented to an optometrist with an initial IOP of 40mmHg or more. Patients with any form of ‘acute glaucoma’ were excluded. Outcome measures: IOP at optometrist and at first ophthalmologist assessment, symptoms, time to assessment, diagnoses, visual loss while waiting for the ophthalmologist appointment, and central corneal thickness.

Results: 42 patients (51 eyes) have met our criteria, between 1998 and 2011. 29 patients (33 eyes) had IOP 40 mmHg or more at both the optometrist and the ophthalmologist. In 51 eyes IOP ranged 40-60 mmHg at optometrist, and 18-70 mmHg at ophthalmologist. Central corneal thickness averaged 554 µm, SD ± 33 µm. The waiting period between the referral from optometrist and the assessment by ophthalmologist ranged between the same day and 84 days. At the optometrist 40% of patients were asymptomatic, 50% were complaining of gradual deterioration of vision and the rest had minor ocular symptoms (grittiness, glare, intermittent redness). In 51 eyes initial diagnosis at the ophthalmologist were: primary open angle glaucoma 43.1% (n = 22), combined mechanism glaucoma 15.6% (n = 8), ocular hypertension 17.6% (n = 9), pseudoexfoliation glaucoma 7.8% (n = 4), pigment dispersion glaucoma 5.8% (n = 3), neovascular glaucoma 1.9% (n = 1), Posner Schlossman syndrome 2% (n = 1), narrow drainage angle 2% (n = 1), glaucoma suspect 2% (n = 1), normal 2% (n = 1). There was no record of any patient losing any vision while waiting, eg from retinal vein occlusion.

Conclusion: The findings of the present study can be considered novel in determining short-term outcomes for patients who present with very high IOP. The present study does have some limitations: there are small numbers of patients and the data had been collected retrospectively. Based on our results we can conclude that these patients are not at high risk of sudden visual loss in the short term.
REVERSAL GLAUCOMATOUS DISC CUPPING AFTER TRABECULECTOMY IN AN ADULT PREGNANT WOMAN
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Background: The objective of this work is to document a case of partial reversal of glaucomatous cupping in a pregnant adult patient after trabeculectomy. Additionally, to elucidate the frequency of presentation, possible causes and factors related to its appearance, its clinical behavior and the overall treatment of glaucoma in pregnancy, in the light of several articles on the subject have been published.

Method: The review of the patient’s medical history and the search for some articles published about glaucoma, pregnancy and reversal of glaucomatous cupping. The type of this study is observational, descriptive case report type

Discussion: The regression of glaucomatous cupping rarely occurs in adults, being the key factor for its occurrence the decrease of intraocular pressure with medical or surgical treatment. It is hypothesized that it originates in the disappearance of the mechanical deformation, tissue changes, improve on fluids behavior or secondary to trabeculectomy. It is unclear when it occurs, its persistence over time or the associated visual function improvement. There are a lack of studies with sufficient numbers of patients and extended follow up. Additionally, The clinical course of glaucoma during pregnancy is variable, there are a lack of evidence-based protocols for its treatment, its approach is currently a challenge and the ophthalmologist should be consider individually various elements like the maternal fetal risk - benefit, the behavior of intraocular pressure in the mother and the progression of glaucomatous damage.

Conclusions: It’s required a larger number of studies, with populations of a size more representative and more observing time to solve the many mysteries surrounding the phenomenon of regression of glaucomatous cupping of the optic nerve, and its persistence over time the time of presentation after introduction of treatment (early or late), the dependence of their appearance with age or stage of glaucoma at the time of onset of therapeutic intervention or involvement in a tangible improvement at an apparent cellular functional anatomical improvement of the optic nerve. This also applies and as to the evolution and treatment of glaucoma in pregnancy.
MRA: Outside normal limits
LONG-TERM MANAGEMENT AND OUTCOME OF SILICONE OIL INDUCED GLAUCOMA

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Background: Silicone oil is an important adjunct for internal tamponade in the treatment of complicated retinal detachment. One of important complications of its use is the development of secondary glaucoma. We investigated the management and outcome of silicone oil induced glaucoma.

Methods: Twenty-six eyes of 26 patients (averaged age 57.3 years old) with silicone oil induced glaucoma were investigated. Primary disease, intravitreal silicone oil duration, change of intraocular pressure (IOP), modality of treatment were reviewed retrospectively.

Results: Mean observation duration was 797.9 ± 418.1 days. Twenty-two eyes of Rhegmatogenous retinal detachment (84.6%) and 4 eyes of proliferative diabetic retinopathy (15.4%) comprised the primary diseases of proliferative vitreous retinopathy (PVR). Mean IOP before initial surgery was 16.0 ± 4.5 mmHg, and mean IOP at 3±1 weeks after silicon oil injection was 17.9 ± 4.6 mmHg. Mean duration from the silicone oil injection to the time of IOP > 21 mmHg was 221.7 ± 196.8 days. Silicone oil removal was performed in 14 eyes, and IOP was reduced in 10 eyes after silicone oil removal. High IOP persisted in 4 eyes after silicone oil removal and trabeculectomy was performed in these eyes. Mean intravitreal silicone oil duration was 550.5 ± 328.4 days. Mean IOP after silicone oil removal was 22.3 ± 11.5 mmHg, and mean IOP at final observation was 19.5 ± 8.3 mmHg.

Conclusions: Secondary glaucoma induced by silicone oil injection is often difficult to manage and careful observation is needed for appropriate treatment.
REPRODUCIBILITY AND ACCURACY OF TONO-PEN TONOMETER
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Purpose To evaluate the reproducibility and accuracy of Tono-pen tonometer by repeated measurements intraocular pressure (IOP).

Methods Eight-four patients (150 eyes) with cataract, retina detachment, or glaucoma and 2 healthy cases were enrolled in the study. Tonometry was performed on each patient using Tono-pen tonometer and Goldmann applanation tonometer (GAT). Each tonometry was performed three times by two experimenters continuously. The patients were divided into three groups according to the their IOP readings: Group A with IOP < 11 mmHg, Group B with IOP between 11 and 21 mmHg, Group C with IOP > 21 mmHg. The intra-observer and inter-observer reproducibility of the tonometry was analyzed. The accuracy of Tono-pen tonometer was compared with that of GAT.

Results The intra-observer mean fluctuations measured by Tono-pen tonometer were 1.533 mmHg for Group A, 1.673 mmHg for Group B, and 3.474 mmHg for Group C. The mean measurement differences between the two experimenters were 1.59 mmHg for Group A, 1.50 mmHg for Group B, and 2.51 mmHg for Group C using Tono-pen tonometer. The measurement differences between Tono-pen tonometer and GAT ranged from -20.33 mmHg to 7 mmHg, with absolute values ≤ 2 mmHg in 78 eyes (52.0%), ≤ 3 mmHg in 109 eyes (72.7%), and ≥ 7 mmHg in 9 eyes (6.0%). Compared with GAT, Tono-pen tonometer underestimated a mean reading of 0.86 mmHg for Group A and 5.76 mmHg for Group C. There was no significant measurement difference between the two tonometers for Group B (p > 0.05).

Conclusion Tono-pen tonometer provides similar readings to those of GAT for individuals with normal IOP (11 - 21 mmHg) but lower than those of GAT for individuals with high (> 21 mmHg) or low IOP (< 11 mmHg).