Management of Glaucoma Capsulare: Outcomes and Complications of Trabeculectomy

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ABSTRACT
Purpose: To analyze the results of filtration surgery in cases of Glaucoma Capsulare.
Study Design: Interventional case series.
Place and Duration: Al-Ibrahim Eye Hospital, Karachi, from January 2018 to December 2018.
Methods: Forty eyes of forty patients, between 50 to 80 years of age, with Glaucoma Capsulare, not controlled with topical medication were included in the study. Patients not willing for filtration surgery and those who had any other ocular disease were excluded. Pre-operative examination, including visual acuity, retinoscopy, intra ocular pressure and fundus examination was done. Complete blood count, blood sugar and urine complete were also carried out to rule out any other illness. All collected data was analyzed through software SPSS version 20.
Results: There were 26 (65.0%) males and 14 (35.0%) females. Mean age was 62.1 ± 12.44 years. Mean preoperative IOP was 34.0 ± 2.43 mm Hg. At first follow-up visit mean IOP (mm Hg) was 11.44 ± 3.2 and at 12 weeks follow-up, the IOP was 10.14 ± 4.1. Angle 0 – I (closed angle) was seen in 6 (15.0%), Angle grade II – III (Open angle) was seen in 10 (25.0%) and grade III – IV (open angle) was seen in 24 (60.0%) patients. Base line visual acuity was 6/9 in 4 (10.0%), 6/12 – 6/18 in 10 (25.0%), 6/18 – 6/24 in 12 (30.0%) and 6/36 – 6/60 in 14 (35.0%) patients. Early complications were flat anterior chamber in 4 (10%) and corneal edema in 4 (10%) patients. However late complications were hyphema and cataract in 2 (5%) and 25 (62.5%) patients respectively.
Conclusion: Trabeculectomy significantly lowers the intraocular pressure in patients with Glaucoma Capsulare.
Key Words: Glaucoma Capsulare, Trabeculectomy, Gonioscopy, Hyphema, Pseudoexfoliation glaucoma.

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INTRODUCTION
Glaucoma is one of the leading causes of irreversible blindness. Pseudo-exfoliation glaucoma (PXG)/Glaucoma Capsulare is the most common secondary open-angle glaucoma, which occurs in elderly population.¹

Five to six million people are affected with PXG globally. In a report of WHO, it has been notified that glaucoma accounts for 15 percent of total global blindness (43 percent after cataract).² In Pakistan the prevalence of Glaucoma Capsulare is 6.45%.³

Many people of East Asia, due to shallower anterior chamber depth are prone to develop angle closure glaucoma.⁴ Initially, optic nerve head and visual fields are normal regardless of the measurement.
of intraocular pressure (IOP). In comparison, patients with PXG, have elevated IOP with glaucomatous damage to the optic nerve head along with the pseudoexfoliation. In 1954, Georgiana Dvorak-Theobald, pathologist and ophthalmologist, named this abnormal condition as “Pseudo-exfoliation syndrome” by finding deposits of pseudo-exfoliation material on the ciliary body, zonules and lens capsules. Glaucoma is classified into primary and secondary. Amongst the main pathophysiological features of PXG are elastosis, i.e. a disturbance of elastin metabolism and abnormal synthesis and degradation of components of the extracellular material. Several studies suggested that males are three times more prone than females and the disease itself is not restricted to middle-aged and elderly people.

Pseudo-exfoliation glaucoma is a clinical diagnosis. Most patients are asymptomatic and diagnosis is incidental. It is not unusual for PXG patients to present in one eye with advanced disease, in which case they may be conscious of a gradual reduction in vision. Rarely, there is a sudden increase in IOP that can cause eye pain, blurring of vision, and seeing haloes.

Assessment of glaucoma should include tonometry, anterior chamber angle examination, Gonioscopy and Fundoscopy to look for any visible damage to optic nerve. Visual field test should also be carried out. Imaging techniques such as optical coherence tomography, laser polarimetry scanning and/or laser ophthalmoscopy scanning (Heidelberg retinal tomogram) can be used to assess the retinal nerve fiber layer.

Trabeculectomy is considered as a useful procedure for the management of Glaucoma Capsulare. The purpose of this study was to observe the reduction of intraocular pressure (IOP) after trabeculectomy in cases of glaucoma capsulare.

METHODS
This was an interventional case series conducted at Al-Ibrahim Eye Hospital, Postgraduate Institute Malir, Karachi, from January 2018 to December 2018. Approval from ethical review committee was taken. Patients were selected using convenient sampling technique. Total forty eyes of forty patients were enrolled in this study with age ranging from fifty to eighty years. All patients with PXG not controlled with medication were included in the study. Patients with PXG, not willing for filtration surgery; those who had undergone previous filtration surgery and those with complications like cataract, corneal opacity or any other ocular pathology were excluded from the study.

Pre-operative examination included unaided visual acuity for distance and near, best spectacle-corrected visual acuity, tonometry, Gonioscopy, anterior segment examination and fundus examination. Other investigations like blood pressure, blood glucose, urine complete and blood complete were also carried out to rule out chronic illness or foci of infection in the body. Written consent was taken from each patient regarding the surgical procedure and complications. All the surgeries were conducted under local anesthesia by administration of 2% lidocaine in the retrobulbar space. The surgeon dissected fornix-based conjunctival flap and created one half-thickness scleral flap at corneo-scleral junction. During trabeculectomy, peripheral iridectomy was performed and a block of trabecular meshwork tissue was removed at the edge of corneo-scleral bed. Using monofilament 10/0 nylon sutures (around 6 – 7), scleral flap was sutured which was adjusted for ensuring small amounts of leakage to be observed around margins of scleral flap without causing any shallowing of anterior chamber.

Post-operatively after 24 hours, the dressing was removed followed by several tests including distance visual acuity with and without pinhole and near vision. Slit lamp examination was done to assess the condition of the wound and bleb formation, anterior chamber, for depth, cells, flare and hyphema, iris for any damage, pupillary reaction, patency of peripheral iridectomy and membrane formation. Intraocular pressure was noted by Goldman Applanation tonometer while visual acuity was measured unaided and with glasses. All patients were followed up post-operatively after one week, third week, sixth week and twelfth week during the entire study period.

Pre-operatively, visual acuity was categorized from 6/9 to 6/60 and IOP was categorized into 3 groups including; 28 – 30 mm Hg, 36 – 38 mm Hg and 40 – 42 mm Hg. Data analysis was done using SPSSS version 20.

RESULTS
A total of 40 eyes of 40 patients were included in the study. There were 26 (65.0%) males and 14 (35.0%) females. Mean age of the patients was 62.1 ± 12.44
years. Mean pre-operative IOP (mm Hg) was 34.0 ± 2.43 mm Hg. Range of IOP was 28 – 30 mm Hg in 20 (50.0%), 36 – 38 mm Hg in 10 (25.0%) and 40 – 42 mm Hg in 10 (25.0%) patients. Grade 0 – I (Closed Angle) was seen in 6 (15.0%) patients, grade II – III (Open Angle) in 10 (25.0%) and angle grade III – IV (Open Angle) in 24 (60.0%) patients. Visual acuity was 6/9 in 4 (10.0%), 6/12 – 6/18 in 10 (25.0%), 6/18 – 6/24 in 12 (30.0%) and 6/36 – 6/60 in 14 (35.0%) patients (Table 1). For further details, see table 2.

Table 1: Showing Intraocular Pressure Range and Visual Acuity at Baseline.

| Variable | Range | Mean ± SD n (%) |
|----------|-------|-----------------|
| IOP      | 28 – 30 mmHg | 20 (50.0%) |
|          | 36 – 38 mmHg | 10 (25.0%) |
|          | 40 – 42 mmHg | 10 (25.0%) |
| Grading of the Angle | Grade 0 (Closed Angle) | 6 (15.0%) |
|          | Grade II – III (Open Angle) | 10 (25.0%) |
|          | Grade III – IV (Open Angle) | 24 (60.0%) |
|          | 6/9 | 4 (10.0%) |
| Visual Acuity | 6/12 – 6/18 | 10 (25.0%) |
|          | 6/18 – 6/24 | 12 (30.0%) |
|          | 6/36 – 6/60 | 14 (35.0%) |

Table 2: Showing Intraocular Pressure Ranges and Visual Acuity at 1st and 12th Week of Treatment.

| Follow-up | Variable | Range | Mean ± SD n (%) |
|-----------|----------|-------|-----------------|
| At First Week | Range of IOP | 4 – 8 mm Hg | 8 (20.0%) |
|          | 10 – 14 mm Hg | 20 (50.0%) |
|          | 16 – 20 mm Hg | 12 (30.0%) |
|          | 6/9 | 4 (10.0%) |
|          | Visual Acuity | 6/12 – 6/18 | 8 (20.0%) |
|          | 6/18 – 6/24 | 8 (20.0%) |
|          | 6/36 – 6/60 | 20 (50.0%) |
|          | 4 – 8 mm Hg | 26 (65.0%) |
| At Twelve Week | Range of IOP | 10 – 12 mm Hg | 10 (25.0%) |
|          | 14 – 16 mm Hg | 4 (10.0%) |
|          | 6/12 – 6/18 | 9 (22.5%) |
|          | Visual Acuity | 6/18 – 6/24 | 6 (15.0%) |
|          | 6/36 – 6/60 | 22 (55.0%) |
|          | H.M – PL +ve | 3 (7.5%) |

IOP = Intraocular pressure
PL= Perception of light
HM = hand movement

Early complications were flat anterior chamber in 4 (10%) and corneal edema in 4 (10%) patients. However late complications were hyphema and cataract in 2 (5%) and 25 (62.5%) patients respectively.

DISCUSSION

Association of pseudo-exfoliation to increased IOP has been well documented and proposed that patients with bilateral pseudo-exfoliation, are usually older and have higher prevalence of glaucoma or ocular hypertension in comparison to patients with unilateral involvement. Genetic factors are also linked as a predisposing factor, however the results are still not clear and studies are still on-going in this respect. In our study, patients had either unilateral or bilateral disease.

In a study 37 patients with mean age of 62.1 ± 10.4 years were analyzed. Mean baseline IOP was 18.16 ± 5.91 mm Hg. They underwent trabeculectomy and the IOP at final follow up decreased significantly to 15.37 ± 2.90 mmHg. Similarly, in our study the baseline IOP was 34.0 ± 2.34 mm Hg which decreased significantly to 11.44 ± 3.2 mm Hg at 1st week and to 10.14 ± 4.1 mm Hg at the final follow-up at 12th week of treatment.

In Normal Tension Glaucoma (NTG), glaucoma filtration surgery has been well-documented. Aoyama reported that visual field progression among NTG patients was arrested in majority of patients after filtration surgery. In our study, significant decrease in IOP was observed post-operatively.

Jampel et al. reported hypotony in 15 – 20% patients undergoing trabeculectomy with anti-neoplastic agents. There are also reports which show that hypotony did not have any effect on visual acuity. Similarly, Goodkin et al observed that eyes with post-operative hypotony and absence of foveal disruption often retained good central visual acuity. However, hypotony was not reported as a post-operative complication in our study. Flat or shallow anterior chamber, corneal edema and hyphema were...
the post-operative complication found in 04, 04 and 02 patients.

Another study by Hirooka et al. determined to evaluate the vision-related quality of life following glaucoma filtration surgery on 103 glaucoma patients, the baseline IOP was 19.0 ± 8.1 mm Hg while the post-operative IOP was 9.7 ± 3.9 mm Hg showing a significant decrease in IOP (p < 0.001). The study also reported that glaucoma filtration surgery in combination with cataract filtration surgery was found to have higher significant improvement in vision-related quality of life. Although in our study, similar significant decrease in IOP from 34.0 ± 2.34 mm Hg at baseline to 10.14 ± 4.1 mm Hg at the final follow up at 12th week was observed.

Francis et al in a study on 23 patients of glaucoma undergoing trabeculectomy reported a baseline IOP of 23.0 ± 10.7 mm Hg and post-operative IOP of 11.0 ± 5.7 mm Hg. However, significant complications were also reported such as hypotony and choroidal detachment. Similarly, Rao et al in a study on 72 patients with baseline IOP of 20.3 ± 7.2 mm Hg and post-operative IOP of 15.5 ± 3.5 mm Hg also reported significant post-operative complications of posterior capsular retraction, bleb leakage and endophthalmitis. Difference in study design, genetic variation among countries and surgical technique might play a role in different findings of results in our study as compared with the above mentioned researches.

The limitations of our study are small sample size and single-centred study. Further multi-centred studies should be considered for comparing the different treatment options of glaucoma in terms of IOP and post-operative complications.

CONCLUSION
Glaucoma filtration surgery in patients of glaucoma capsulare is safe and it significantly lowers the intraocular pressure between baseline and at subsequent post-operative follow-ups.

Ethical Approval
The study was approved by the Institutional review board/Ethical review board.

Conflict of Interest
Authors declared no conflict of interest.

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Authors’ Designation and Contribution
Abdul Rafio Soomro; Consultant Ophthalmologist: Concept, design & write up of study.

Fayaz Ahmed Soomro; Senior Consultant Ophthalmologist: Concept, design & final approval of study.

Munawar Hussain; Assistant Professor: Concept, design & corrections of the study.

Abdul Qadeem Soomro; Associate Professor: Concept & design of study.

Asif Mashood Qazi; Associate Professor: Concept & final approval of study.

Anas Bin Tariq; Lecturer: Data collection, data analysis & write-up.

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