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ORIGINAL ARTICLE

A HOSPITAL BASED PROSPECTIVE STUDY TO EVALUATE THE RESULTS OF TRABECULECTOMY IN PATIENTS WITH EXFOLIATION GLAUCOMA

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ABSTRACT: INTRODUCTION: Exfoliation syndrome (XFS) is characterized by production and excessive accumulation of a fibrillar material in many ocular tissues. It leads to both open angle and closed angle glaucoma. Elevated intraocular pressure (IOP) with or without glaucomatous damage occurs in approximately in 25% of persons with XFS, or about 6 to 10 times the rate in eyes without XFS. **OBJECTIVE:** The aim of this study was to analyze the effectiveness of trabeculectomy in controlling IOP in cases of XFS glaucoma. **MATERIAL AND METHODS:** The present prospective study was conducted in the post graduate department of ophthalmology SKIMS MC Bemina Srinagar. Fifty diagnosed cases of exfoliation glaucoma underwent trabeculectomy. Postoperative follow up was done 1st week, 3rd week, 6th week and at 6 months. IOP, visual acuity, slit lamp examination, visual field analysis and development of early and late postoperative complications were recorded. **RESULTS:** The mean age of the studied subjects was 58.76±9.06 years. Mean preoperative IOP was 27.96±4.25mmHg. Mean postoperative IOP at 1st week was 14.75±3.72mmHg, at 3rd week was 14.12±3.67mmHg, at 6th week 14.05±3.28mmHg and at 6th month 14.32±3.5mmHg. The difference between mean IOP preoperatively and postoperatively at all stages was statistically significant (p value 0.000) success rate of trabeculectomy in relation to postoperative IOP at 6th month was 94%. Visual acuity at 6th month remained same in 86% of the cases. Similarly visual fields remained same in 86% of the cases at 6 months of follow up. Main complications were progression of cataract (8%), striate keratitis (8%), hyphaema (8%), shallow anterior chamber (6%) and iritis (2%). **CONCLUSION:** The study concludes that exfoliation glaucoma responds favourably to trabeculectomy and a lasting control of IOP is usually attained.

KEYWORDS: Exfoliation, Glaucoma, Intraocular pressure, Trabeculectomy.

INTRODUCTION: Glaucoma is a type of optic neuropathy associated with characteristic optic disc damage, which may result in certain visual field loss patterns. The clinical examination is vital to make this diagnosis.[1] although our modern understanding of glaucoma dates back only to the mid-19th century, this group of disorders was apparently recognized by the Greeks as early as 400 B.C. In Hippocratic writings it appears as 'glaucosis' in his book named 'Athorism' in reference to the Bluish-green hue of the affected eye.[2] Glaucoma affects more than 67 million people worldwide of whom about 10% or 6.6 million are estimated to be blind. Glaucoma is the leading cause of irreversible blindness worldwide.[3] Glaucoma is the second leading cause of blindness worldwide.[4]

Glaucoma have been classified by several systems. According to classification based on initial events, glaucoma has been classified as:

1. Open angle, Angle closure, 2. Developmental, and 3. Glaucomas associated with other ocular and systemic disorders.[5]

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Exfoliation syndrome belongs to the last group of above classification.

Exfoliation syndrome (XFS) is characterized by the production and progressive accumulation of a fibrillar extracellular material in many ocular tissues. It leads to both open angle glaucoma and angle-closure glaucoma, and has been causatively associated with cataract, lens dislocation, and central retinal vein occlusion. Eyes with XFS have a greater frequency of complications at the time of cataract extraction, such as zonular dialysis, capsular rupture, and vitreous loss. Based on the identification of accumulations in orbital tissues, skin specimens, and visceral organs, exfoliation syndrome appears to be a generalized disorder of the extracellular matrix.[6] the potential ramifications of this disorder appear to be far more important than ever before realized.

Exfoliation syndrome (XFS) occurs worldwide, although reported prevalence rates vary extensively. This reflects a combination of true differences due to racial, ethnic, or other as-yet-unknown reasons; the age and sex distribution of the patients or population group examined; the clinical criteria used to diagnose XFS; the ability of the examiner to detect early stages; the thoroughness of the examination; and the awareness of the observer.[7] In Scandinavia, where XFS was first described, the highest rates in studies of persons over age 60 have been reported from Iceland (about 25%),[8] and Finland (over 20%).[9] XFS increases in prevalence with age.[10] Men and women are probably equally affected. No clear hereditary pattern has been identified.

Glaucoma occurs more commonly in eyes with exfoliation syndrome than in those without it. Elevated IOP with or without glaucomatous damage occurs in approximately 25% of persons with XFS, or about 6 to 10 times the rate in eyes without XFS. Exfoliation glaucoma has a more serious clinical course and worse prognosis than primary open angle glaucoma. There is a significantly higher frequency and severity of optic nerve damage at the time of diagnosis, worse visual field damage, poorer response to medications, more severe clinical course, and more frequent necessity for surgical intervention.

Persons with elevated IOP and XFS are much more likely to develop glaucomatous damage on long-term follow-up than are those without XFS. XFS is the only common glaucoma which usually affects only one eye or affects one eye long in advance of the other. As a rule of thumb, anyone over age 50 with unilateral glaucoma should be suspected of having XFS. Since early pigment-related signs of XFS are found in the majority of unaffected fellow eyes, and since exfoliation fibers may be detected on conjunctival biopsy in virtually all unaffected fellow eyes, these cases are actually asymmetric.[11,12]

Treatment modalities of Glaucoma consist of topical and systemic medication, laser treatment.[13] and conventional surgical procedures.[14] its prognosis on medical treatment is worse in comparison with other glaucoma.[15,16] traditionally maximum tolerated medical therapy has been used before laser trabeculoplasty or conventional surgery. Trabeculectomy involves the creation of a fistula connecting the anterior chamber and the subconjunctival space. This provides an alternative method of aqueous humor filtration when the natural trabecular outflow pathway is blocked or poorly functioning in cases of glaucoma. The goal is to create the right amount of flow without causing over-filtration.

MATERIAL AND METHODS: The study was conducted in the Postgraduate Department of Ophthalmology, SKIMS Medical College Bemina, Kashmir, India. In this study 50 diagnosed cases of exfoliative glaucoma were included prospectively and subsequently subjected to trabeculectomy after proper workup was done. Data was collected concerning patients' age, sex, glaucoma type,

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preoperative treatment as well as intraocular pressure (IOP), best corrected monocular visual acuity (VA), occurrence of cataract, and results of visual field analysis before operation. Identification of the glaucoma type was made clinically by preoperative slit lamp examination and by gonioscopy. Exfoliation glaucoma was diagnosed if exfoliation material was seen on the corneal endothelium, iris surface, angle structures of the anterior chamber, pupillary margin, or lens capsule. No histopathological analysis of iris specimens was done.

The Criteria for Inclusion in the Study was as follows:

- Patients with exfoliation glaucoma.
- No surgery performed in the operated eye before trabeculectomy.
- In cases where both eyes were operated only the first operated eye was included in the study.

Patients with a history of trauma or uveitis in the operated eye was excluded from the study.

Preoperative Assessment Included:

1. Visual Acuity-Snellen's test types.
2. IOP - Goldmann applanation tonometry.
3. Slit lamp examination - For presence of exfoliation.
4. Gonioscopy-For presence of any exfoliation material, and to rule out other causes of glaucoma.
5. Fundus examination - By direct ophthalmoscopy for cup disc ratio and other changes on disc.
6. Visual field investigation-On Humphery's visual field analyser.

The major indications of trabeculectomy were as follows:

- Unsatisfactorily controlled IOP (>21mm Hg) despite maximum tolerable medical treatment,
- Progression of visual field defects despite good control of IOP,
- Side effects of medical treatment,
- Progression of optic disc cupping,
- Unsatisfactory compliance with treatment.

All the patients were admitted one day prior to surgery. The patients were given anti-glaucoma treatment for the reduction of the increased intraocular tension. For this purpose oral acetazolamide, oral glycerol or inj. mannitol by I/V infusion were given in addition to their routine antiglaucoma drugs, depending upon the level of intraocular pressure. After taking informed consent, all patients were operated under local anaesthesia by peribulbar block using 2% xylocaine.

Procedure: Trabeculectomy was performed in the following manner:

- After insertion of the superior rectus bridle suture, a fornix based conjunctival flap was fashioned, and a 0.3mm thick limbus based triangular or rectangular scleral flap was raised.
- Light cautery was applied to the bleeding vessels where necessary.
- Paracentesis was done at the 9 o'clock position; a little volume of the aqueous escapes without visible shallowing of the anterior chamber. In this way the risk for sudden intraocular pressure decrease and flattening of the anterior chamber during the next phase was minimised.
- The anterior chamber was then penetrated under the scleral flap and an approximately 1x3mm block of limbal tissue was excised.

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- An iridectomy was performed.
- Scleral flap was reposed back. Triangular based scleral flap was reposed back by giving one suture, and two sutures were applied in rectangular based scleral flap. Conjunctiva was reposited back by giving one suture.
- Subconjunctival gentamicin and dexamethasone were given at the end of operation.
- The operated eye was bandaged and patients were instructed to rest in the bed for a period of 4-5 hours, after which they were free for minor movements without making much strain.
- The bandage was removed after 24 hours and the eye was examined. Particular attention was paid to condition of filtering bleb, cornea for striate keratopathy or edema, anterior chamber for depth and contents, pupil for reaction and shape, and lens. Intraoperative and postoperative complications and any additional surgery (Resuturing, Reformation of anterior chamber) were recorded.
- Postoperatively, after 24 hours patients were put on antibiotic-steroid eye drops every 2hrs and topical cyclopentolate 1% qid for one week. Then the antibiotic/steroid eye drop tapered gradually over following 4-6 weeks.

Follow Up: Postoperative follow up was done on 1, 3rd and 6th week, followed by 6 months after operation. On each of these visits patient was evaluated for the following:

- Intraocular pressure.
- Visual acuity (BCVA –Best Corrected Visual Acuity).
- Slit lamp examination–status and type of bleb.
- Results of visual field.
- Development of early and late complications.

RESULTS:

Age: The patients ranged in age from 24 years to 76 years. The maximum number of cases were in the 51–60(48%) years age group. Mean age of patients was 58.76 with SD of 9.06 years (Table – 1).

Preoperative Intraocular Pressure: Preoperative intraocular pressure was taken as intraocular pressure of the patient one day prior to surgery whether on medical treatment or not. Almost all patients were on medical treatment before trabeculectomy. Preoperatively maximum number of cases (62%) were in the range of 21-30mmHg (on medical treatment). 30% of cases were in the range of 31-40mmHg. 8% of cases were in the range of >15-20mmHg, who though medically controlled had to undergo trabeculectomy either due to progressive loss of field or intolerance to medical therapy (Table-2).

Preoperative type of exfoliation (on slit lamp and gonoiscopic examination):-

Maximum number of patients (42) had exfoliation material on pupillary border. 22 cases had exfoliation material present on the anterior lens capsule at the time of diagnosis. More than one site was involved at the time of diagnosis in many patients (Table – 3).

Indications for Filtration Surgery: Patients with exfoliation glaucoma were mainly subjected to filtration surgery due to failed medical therapy; which was either due to continued raise in

intraocular pressure (>21mmHg) despite maximal tolerable medical treatment (60%); or due to both increased intraocular pressure and continued field loss (16%); or intolerance to medical therapy (12%); or due to progression of visual field loss despite intraocular pressure being <21mmHg (8%); or due to poor compliance (4%) (Table–4).

Postoperative Intraocular Pressure: Postoperative reduction of intraocular pressure was very satisfactory for the whole group with about 86% of cases having postoperative intraocular pressure in the range of 10-20mmHg in the first week. Moreover, further 8% cases had postoperative intraocular pressure of less than 10mmHg, making the total percentage of controlled cases as 94% in the first week. However, in overall follow-ups 5 cases showed unsatisfactory postoperative intraocular pressure reduction. Two among them showed controlled intraocular pressure on postoperative medical treatment and 3 cases maintained a postoperative intraocular pressure >21mmHg, despite continuation of postoperative medical treatment.

Six months postoperatively, 47 cases (94%) maintained satisfactory intraocular pressure reduction in the range of 10-20mmHg, although 2 cases among them needed postoperative medical treatment. Three cases remained uncontrolled with postoperative intraocular pressure >21mmHg (Table 5 and 6).

Changes in Mean Intraocular Pressure from Preoperative level at different follow ups of all Cases: Statistically, mean postoperative intraocular pressure showed highly significant reduction from its preoperative levels at all follow-ups (Table 7 and 8).

Postoperative Visual Acuity status at 6 months: Postoperative visual acuity at 6 months when compared with preoperative visual acuity showed deterioration in 30% of patients. However, visual acuity remained same in 70% of cases. Deterioration was either due to progressive damage to optic nerve or cataract formation. No improvement in visual acuity was found at any stage of follow up.

Postoperative Fundus Examination (Cup-Disc Ratio) at 6 months (Optic Nerve Status): Postoperative cup-disc ratio remained same in 86% of cases, whereas it deteriorated in 14% of cases. However, it showed improvement in none.

Postoperative Visual Field Status: Postoperative visual field status at 6 months when compared with preoperative visual fields showed the same visual field status in 86% of cases. Deterioration was observed in 14% of cases.

Complications and Further Surgical Interventions: No serious complication was encountered in the present series, but some minor complications were observed. Cataract progression was found in 8% of cases postoperatively. In 8% of cases striate keratitis was noted, 8% cases had hyphaema, 6% cases had shallow anterior chamber and 2% developed iritis in postoperative period (Table-9). Cataract extraction was done in 3(6%) cases during the course of the study. Rest all the complications were managed conservatively. No other complication was noted per or postoperatively in the present study.

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DISCUSSION: Trabeculectomy has proved itself a safe and simple filtering procedure (Cairns, 1968; Watson, 1969; Thyer and Wilson, 1972). As per our study, its pressure reducing effect in exfoliation glaucoma is striking (90% without medication), and as far as can be judged by the period of observation (6 months mainly) the effect is lasting. Our success rate of intraocular pressure reduction post-trabeculectomy in exfoliative glaucoma cases is 90% without medication and 94% with medication at 6 months is close to success rate published by Tord Jerndal and Viiu Kriisa (1974, 96%). Our success rate of 90% is however much higher than reported by Jerndal T and Lundstorm M (1977). Postoperatively intraocular pressure control rates shown by KB Mills, 1981 (71.3% with and without treatment) are also lower than our success rates.

The mean postoperative intraocular pressure of all cases in our study was 14.32 with SD of 3.51mmHg at 6 months, which is close to the results by Vladislav Popovic (1999), in whose study the mean postoperative intraocular pressure at last follow up visit (46.2 months) was 15.3 SD 5.1 in exfoliation glaucoma cases. However our mean postoperative intraocular pressure of 14.32mmHg at 6 months is slightly higher as compared with the results given by Kontas et al (1993) i.e., 11.8 SD 4.4mmHg at the same duration of follow up.

The mean intraocular pressure at operation in our study was 27.96 SD 4.25mmHg. This is in accordance with the study conducted by Popovic, Sjostrand (1999) where mean intraocular pressure at operation was 28.2mmHg in exfoliation glaucoma cases. In their study, they concluded that this is certainly higher when compared with simplex glaucoma cases, however our study did not include a comparison with simplex glaucoma. Our mean treated intraocular pressure at the time of surgery is however slightly lower than the study done by Kontas et al (1993) where it was 34.2 SD 10.3mmHg.

The mean age of the patients included in our study is 58.76 SD 9.06 years for both males and females, and this coincides with the mean age of 52 exfoliative glaucoma cases study done by Tord Jerndal and Viiu Kriisa (1974). This is also at par with other studies–Aasved H (1969), Forsius H (1988), Kontas et al (1993). Postoperative visual acuity in our study remained same at 6 months in about 70% of cases, however it deteriorated in 30% of cases.

Both of these rates are higher as compared to rates given by Jerndal (1974). Our postoperative visual acuity did not improve in any patient. This may be because most of the patients included in our study had advanced cupping and low vision which has very less chances of improvement. Moreover progressive optic atrophy and cataract formation postoperatively were additional reasons for higher rates of vision deterioration as compared to other studies.

Visual field examination has an essential role in diagnosis and follow up of glaucoma. Results are influenced by many factors for example, patient age, media opacities, visual acuity, perimetry technique and patient reliability. Postoperative changes in visual field in our study are same as observed by Jerndal and Kriisa (1979).

In our study of 50 cases, 43 cases had no change in visual field at 6 months; 7 cases showed deterioration. Similarly in their study of 52 cases, Jerndal and Kriisa observed 42 cases with same visual fields at 2 years; 9 showed deterioration while 1 case showed improvement. In the study by Popovic (1999) about two thirds of the cases showed visual field deterioration. However these cannot be compared accurately due to different perimetric techniques used in all these studies as compared to our study.

Complications: Postoperative shallow anterior chamber was the most common immediate postoperative complication. In our study cataract progression was found in 8% of cases, which is

much lower than reported by Jerndal and Lundstorm (1980)–25%; K.B. Mills (1981)–35.4%. Our incidence of cataract progression is still lower than reported by Tord Jerndal and Viiu Kriisa (1974)–13%. In the study by Vladistav Popovic (1999) and Eija Vesti (1997) cataract progression was found to be most common late complication after trabeculectomy in exfoliation glaucoma case as compared to primary open angle glaucoma cases.

Another complication postoperatively seen in our study was hyphaema (8%) which is much lower than reported by Ridgway (1972)–15%; Watson and Grierson (1981)–23%. In our study postoperative shallow anterior chamber occurred in 6% of cases. This incidence varies slightly from those reported by Watson and Barnett (1975)–12.2%; Zaidi (1980)–11.6%; K.B. Mills (1981)–9.2%.

A prospective study of 50 cases of exfoliation glaucoma was done to analyse the effectiveness of trabeculectomy in controlling the intraocular pressure. The patients were followed up for a period of six months and besides intraocular pressure, several other attributes were evaluated like visual acuity, visual fields, surgical complications and postoperative medical therapy. Preoperatively mean intraocular pressure was 27.96mmHg. It included all those cases whose intraocular pressure was not controlled despite on maximal medical therapy and also those cases who though showed a control of intraocular pressure (<21mmHg) on medical treatment, were subjected to trabeculectomy, either because of progressive field loss or intolerance to medical therapy.

Postoperatively the mean intraocular pressure at 6 months was 14.32mmHg. Average postoperative fall of intraocular pressure from initial level was 13.64mmHg at 6 months (About 48.7%). The fall in intraocular pressure was statistically significant ($p<0.001$). Also, the percentage of patients with controlled intraocular pressure without additional medical therapy at 6 months was 90%, and percentage of patients requiring postoperative medical therapy for intraocular pressure control was 4%, making the overall percentage of patients with controlled intraocular pressure (With and without additional treatment) as 94%.Visual acuity at 6 months remained same in 70% of cases.

Similarly, visual fields remained same in 86% of cases at 6 months. The complications were seen in 32% of cases. Main complications were progression of cataract (8%), striate keratitis (8%), hyphaema (8%), shallow anterior chamber (6%), and iritis (2%).

CONCLUSION: The study concludes that exfoliation glaucoma responds favourably to trabeculectomy, and a lasting control of the intraocular pressure is usually attained. In cases in which the postoperative reduction of the intraocular pressure is unsatisfactory, medical treatment has a better effect than when it is given preoperatively.

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