

Merits of trabeculectomy in advanced and end-stage glaucoma

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Introduction

Glaucoma is the second leading cause of blindness in general population.^[1] The glaucoma disease is characterized by progressive optic neuropathy, which has many risk factors including increased intraocular pressure (IOP).^[2] Although the elevated IOP is the most common causative risk factor for glaucomatous optic atrophy, it is not the only factor. However, IOP is presently the only factor which is modifiable. End-stage glaucoma is a stage of glaucoma, which has progressed to a stage where visual acuity is severely decreased.

In end-stage glaucoma, visual field is <10 or a visual acuity of 20/200 which is attributed to glaucoma.^[3] Besides, the patients with end-stage glaucoma have a high risk of further disease progression. Although peripheral vision is seriously affected, these patients may maintain good central vision sufficient enough to perform simple daily task.

ABSTRACT

Objectives: The aim of the study was to evaluate intraocular pressure (IOP) control, potential benefits, and associated complications in advanced cases of glaucoma (visual acuity of <6/60) after trabeculectomy. Although many studies of trabeculectomy in glaucoma patients have been done, very few in such advanced cases.

Methods: The study was done on 60 cases of advanced primary open-angle glaucoma (POAG). Trabeculectomy was done and IOP control was assessed. Pre-operative workup included a detailed history, slit lamp biomicroscopy, Goldmann applanation tonometry, gonioscopy using Goldmann 2 mirror lens, and detailed fundus examination with the 78D lens. All the patients were to undergo optical coherence tomography and Humphrey automated perimetry.

Results: Out of 60 patients with POAG, 48 were males and 12 were females with a ratio of 4:1. Of all the 60 cases, 36 had a visual acuity of 20/200, 16 had a visual acuity of hand movements, and eight patients had a visual acuity of perception of light. The mean pre-operative IOP was measured as 37.01 mmHg with standard deviation (SD)± 8.82. The mean post-operative IOP was found 17.92 mmHg with SD ± 3.17. There was a mean drop of 19 mmHg of IOP postoperatively. *P* value was highly significant (*P* < 0.000).

Conclusion: Trabeculectomy is a successful method of controlling IOP in patients with advanced glaucoma. Trabeculectomy is the method of reducing IOP in medically uncontrolled patients. A pain-free eye was associated with better quality of life in patients. A successful trabeculectomy helps to preserve the residual vision in such patients.

Keywords: Glaucoma, intraocular pressure, trabeculectomy

Many factors have been proved to increase the risk of glaucoma progression in end-stage glaucoma. Among these most important is elevated IOP, IOP fluctuation, male gender, less formal education, severity of disease, pseudoexfoliation syndrome, worsening visual field, and possibility of systemic disease.^[4]

Late presentation is seen in glaucoma^[5,6] a large number of patients reach a stage of advanced glaucoma having a vision of 20/200 or hand movement (HM) in the affected eye either due to lack of treatment, non-compliance, ignorance, misdiagnosis, deprivation, and/or non-accessibility to specialist eye care facility.^[7] Many patients with glaucoma are being treated for some other ocular disorder like a refractive error in the hands of an unqualified person in remote areas,^[8] and as a result, basic glaucoma progresses unchecked which basically occurs because of lack of awareness of this disease.^[9,10]

Achieving an individually fashioned target IOP is supposed to minimize the risk of glaucoma progression and pain-free eye if not any improvement in visual acuity. Trabeculectomy has become the standard technique of filtering surgery for glaucoma.^[11] In this procedure, a fistula is made which is covered by a partial thickness scleral flap. External filtration occurs around or through this scleral flap.^[12] The result of which is the decrease in the IOP of the eye, hence, less risk of glaucomatous damage. A subjective feeling of decreased pain has also been noticed in post successful trabeculectomy. Although many studies of trabeculectomy in glaucoma patients have been done, very few in such advanced particular cases. Our study evaluates, outcome of trabeculectomy in 60 patients of advanced open-angle glaucoma.

Aim of the study

Our aim of the study was to evaluate IOP control and associated complications in 60 advanced cases of primary open-angle glaucoma (POAG) which were followed over a period of 1 year.

Methods

A total of 60 cases of primary open-angle (end-stage) glaucoma were taken. The visual acuity of these patients was 20/200 or less than that. Our study is based on pressure control trabeculectomy in advanced glaucoma (visual acuity 20/200 or less). The optic cup was of ratio 0.8–0.9 in 60% cases and in 40% cases complete optic atrophy was observed. Some of the patients were already on antiglaucoma medication and some not. Among the studied group, the patients were largely unaware of their high intraocular pressure levels, some even first time detected. The complaint for which patients sought medical advice was the diminution of vision and/or ocular pain.

No of patients using antiglaucoma medication	21 patients were on two drug combination	24 patients three drug combination	15 patients were using no medication
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Our first initial goal was to lower the high IOP. In most patients, topical antiglaucoma medication and oral systemic carbonic anhydrase inhibitors for few days were effective in lowering the IOP to normal levels, whereas in some other patients having IOP in the range of 4050 mmHg, intravenous mannitol or oral glycerol had to be used.

IOP up to 40 mmHg (40) patients	Topical antiglaucoma+oral acetazolamide
IOP more than 40 mmHg (20) patients	Topical antiglaucoma+oral acetazolamide+systemic mannitol or glycerol

Pre-operative workup included a detailed history, slit lamp biomicroscopy, Goldmann applanation tonometry, gonioscopy using Goldmann 2 mirror lens, and detailed fundus examination

with the 78D lens. All the patients were to undergo optical coherence tomography and Humphrey automated perimetry. The patients were explained the relative risk of losing the residual vision from the surgical procedure.

After proper counseling and information, the patients were subjected to trabeculectomy. The patients were made to understand the nature and prognosis of the surgery. Trabeculectomy was performed. All patients received topical antibiotic and steroid combination in the post-operative period. Post-operative assessment of the patients was done to look for the condition of the bleb, anterior chamber (AC), and most importantly IOP. IOP was assessed at follow-up visits at day 1, 7th day, 30th day, 90th day and 180th day, and 270th and 360th day of surgery. Neovascular glaucoma, acute angle glaucoma, secondary glaucoma, pseudophakic glaucoma, and any previous history were excluded.

A large number of patients reach a stage of advanced glaucoma having a vision of 20/200 or HM in the affected eye either due to lack of treatment, non-compliance, ignorance, misdiagnosis, and/or non-accessibility to specialist eye care facility. Many patients with glaucoma are being treated for some other ocular disorder like a refractive error in the hands of an unqualified person in remote areas and as a result, basic glaucoma progresses unchecked.

Our study proves that trabeculectomy should not be denied even in the advanced cases of glaucoma, where the visual acuity is very less for the fact that a pain-free eye leads to good quality of living, and even if we can preserve a minimal amount of vision in the affected eye, the procedure is compulsorily indicated.

The target patients were those who presented to our outpatient department with painful glaucomatous eyes, first time detected glaucoma, or those patients who were on antiglaucoma medication but had persistent high IOP. Data were analyzed on SPSS version 26 software. The study abides by the ethics laid down in the tenets of Helsinki. The ethical clearance for the same was provided by institutional review board.

Results

Out of 60 patients with POAG, 48 were males and 12 were females with a ratio of 4:1. The participants' age range was 55–83 years with the mean of 66.13 years [Table 1].

Distribution of visual acuity shown in Table 2.

Distribution of intraocular pressure in patients shown in Table 3.

Table 1: Male to female ratio

Gender	Male	Female
Number (n)	48	12

Table 2: Distribution of visual acuity

20/200 (<i>n</i> =36)	Hand movement (HM) (<i>n</i> =16)	Perception of light (PL) (<i>n</i> =8)
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Table 3: Intraocular pressure range in patients

Up to 40 mmHg (40 patients)	40–50 mmHg (12 patients)	>50 mmHg (8 patients)
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Table 4: Early postoperative complications

Flat bleb (<i>n</i> =8)	Hypotony (<i>n</i> =8)	Bleb leak (<i>n</i> =4)	Shallow AC (<i>n</i> =20)	Raised IOP (<i>n</i> =4)
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Table 5: Late postoperative complications

Vascularized bleb (<i>n</i> =12)	Fla bleb (<i>n</i> =4)	Shallow anterior chamber (<i>n</i> =0)	Hypotony (<i>n</i> =0)	Tenon cyst (<i>n</i> =0)
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The mean pre-operative IOP was measured as 37.01 mmHg with standard deviation (SD) \pm 8.82. The mean post-operative IOP was found 17.92 mmHg with SD \pm 3.17. There was a mean drop of 19 mmHg of IOP postoperatively during the follow-up over a course of 1 year. *P* value was highly significant (*P* < 0.000). *P* value was calculated using Pearson *t*-test. In 30% of our patients, IOP was on a higher side than mean which was controlled well with the addition of topical antiglaucoma medication during the 1 year period.

Early post-operative complication noted in some patients was as show in Table 4.

Late post-operative complications which were noted were as show in Table 5.

Discussion

Various glaucoma studies show that despite treatment the risk over 20 of developing unilateral and bilateral blindness is 27% and 9%, respectively.^[13] There is good evidence that rigorous IOP lowering can help control POAG.^[14,15] Males were in the ratio of 4:1 in our study. As such no consistent association of sex with POAG has been associated, but many studies show POAG is more common in males.^[16,17] The visual acuity in our group of patients was 20/200 or lower, as could be expected in cases of advanced glaucoma, which were our target patients. IOP was lowered and then trabeculectomy was planned in our patients, as sudden decompression is associated with complications.^[17] In this study, we performed trabeculectomy in advanced glaucoma in POAG type, having very high IOP. We evaluated their IOP control for a mean follow-up of 12 months and also monitored any complication in early and late post-operative period. There was a mean drop of 19 mmHg of IOP in the patients. A significant drop in IOP was achieved. Surgery definitely has a very potential role. Although post-operative, shallow AC was noted in some patients, but no intervention was needed in most patients who formed AC well with conservative

management, only a few patients needed resuturing. The shallow AC is a common complication as has been seen in various studies.^[17,18] In addition to the decrease in pain, there was a subjective improvement in the visual acuity of patients. In three of our patients, mean IOP remained higher than 21 mmHg in the post-operative period, which was controlled with the addition of topical antiglaucoma medication. 30% of our patients had IOP higher than mean which still needed topical antiglaucoma medication. Most of these patients were those whose pretrabeculectomy IOP was also in higher range. Akafo *et al.*^[19] in his study of trabeculectomy in POAG found an IOP control of <21 mmHg in 67% of his subjects. No patient in our study suffered from wipe-out phenomenon. The shallow AC was seen in only a few patients which is in agreement with the study conducted by Singh *et al.*^[20] For cases of advanced glaucoma target, IOP is likely to be very low.

The message delivered was that trabeculectomy is a successful method of controlling IOP in patients with advanced glaucoma. Trabeculectomy is the method of reducing IOP in medically uncontrolled patients. IOP was largely controllable with formation of cataract being the cause of decreased vision in subsequent follow-ups in some patients. A pain-free eye was associated with better quality of life in a patient. There is a decrease in the antiglaucoma medication needed by the patient, which are costly medications thereby having good financial implications in the long term. Preserving even a minimal amount of vision in such patients can aid in their rehabilitation.

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