

Effect of trabeculectomy on corneal astigmatism

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Abstract

Background: Most human eyes show at least a small degree of corneal astigmatism and it can arise from both surfaces of the cornea. Trabeculectomy has been shown to control intraocular pressure especially in cases of open angle glaucoma. These procedures altered visual function by changes in corneal curvature. **Objectives:** We evaluate to detect the incidence of corneal astigmatism and to analyze factors responsible for corneal astigmatism following trabeculectomy. **Methods:** This is a Prospective Study conducted in Department of Ophthalmology at multiple centre and concluded at SS Institute of Medical Sciences and Research centre, Davanagere, Karnataka. A total 50 eyes of 40 patients were included in these study and their preoperative keratometry readings was recorded by manual keratometry. After trabeculectomy, keratometry readings were recorded at the end of 1st day, 1st week, 1st month, 3rd month, 6th month and 12th month and also the effect of various factors like use of cautery and suturing in inducing corneal astigmatism were studied. **Results:** the present study showed that trabeculectomy induces corneal curvature changes resulted in with the rule astigmatism in majority of cases which maximum at the end of 1st week and 1st month post operatively. Thereafter those corneal curvatures decayed progressively, almost disappearing at the end of 12th postoperative month.

Conclusion: the present study conclude that excessive cautery and suturing of the scleral flap were the factors responsible for the astigmatism at the end of 1st postoperative week and 1st postoperative month.

Key words: Glaucoma, Astigmatism, Trabeculectomy and Cautery.

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INTRODUCTION

Astigmatism is a optical condition that can cause different visual functions like decreased vision, epiphora, unilateral diplopia, asthenopia and distortion¹. Astigmatism may be regular or irregular, in regular Astigmatism, if vertical meridian is more curved than horizontal, it is with rule Astigmatism. If horizontal meridian is more curved than vertical meridian, it is against rule Astigmatism. This can corrected by prescription glasses, lenses, corneal relaxing incisions, astigmatic keratotomies, limbal relaxing incisions, excimer laser ablation and IOL implantation⁶. Trabeculectomy is a gold standard surgical procedure for progressive open angle glaucoma and also

it is helpful for primary angle closure and certain secondary glaucomas in which medical line of treatment has failed⁸⁻⁹. It has been showed to control intraocular pressure especially in cases of open angle glaucoma. The basic mechanism of filtering surgery is to create a new drainage path way that allows aqueous to pass from the anterior chamber into the sub conjunctival space or directly into the tear film¹⁰. But this procedure resulted in altered visuval function induced by changes in corneal curvature¹¹. This may be distressing to the patients particularly when changes are marked and continued beyond the few post operative months. Hence the present study evaluate the corneal astigmatism following trabeculectomy and analysis of factors responsible for corneal astigmatism in patients with glaucoma.

MATERIALS AND METHODS

This is a Prospective Study conducted in Department of Ophthalmology at multiple centre and concluded at SS Institute of Medical Sciences and Research centre, Davanagere, Karnataka. A total 50 eyes 40 subjects are included in this study and all the subjects were recruited in the study after obtaining their informed consent after obtaining of ethical clearance from the institute. The inclusion criteria includes patients with primary open

angle glaucoma uncontrolled with maximum medical therapy and chronic primary angle closure glaucoma. Patients with congenital glaucoma, all secondary glaucoma's, patients requiring combined procedures along with trabeculectomy, primary angle closure glaucoma and whoever not willing to participate are excluded from these study. Detailed patients medical history was obtained and ocular examination include detailed anterior segment examination was carried out with slit lamp biomicroscope, Assessment of anterior chamber depth by oblique flash light test and van herick test technique. IOP was measured with goldmann applanation tonometer. Gonioscopy was performed using Goldman's single mirror contact lens.

Statistical Analysis: The normal distribution of data checked by using Kolmogorov Smirnov test. All the characters descriptively summarized. The mean and standard deviation about the arithmetic mean were used. Dependent variables should be normally distributed. The Data was compiled in Microsoft excel spread sheets and analyzed using SPSS for windows version 21.0. A p value <0.05 was considered statistically significant.

RESULTS

Table 1: Shows the Pre-Trab Intraocular Pressure 29 eyes (58%) had IOP between 26-30 mmHg preoperatively. Significantly more number of eyes were observed to have an IOP between at 26-30 mmHg, followed by 21-25 mmHg and least in 16-20 mmHg. CChi-square test

Table 1: Shows the Pre-Trab Intraocular Pressure

IOP (mmHG)	No. of Eyes	Percentage
16-20	1	2
21-25	10	20
26-30	29	58
31-35	6	12
36-40	4	8
Total	50	100

revealed a significant difference among these frequencies ($X^2= 49.40:P<0.0001^{**}$).

Table 2: Shows the first postoperative month keratometry readings compared to preoperative readings, at the end of 1st postoperative month showed with the rule change in 20 (80%) males and 17 (73.9%) females, against the rule change was seen in 2 (8%) males and 1 (4.4%) females. No change was observed in 3 (12%) males and 5 (21.7%) females, on comparing to their preoperative keratometry readings.

Table 3: shows the third postoperative month keratometric readings compared to preoperative readings, keratometry readings recorded at the end of 3rd postoperative month showed with the rule change in 16 (69.6%) males and 16 (72.7) females. Against the rule change was seen in 3 (13%) males and 4 (18.2%) females and no change was observed in 4 (17.4%) males and 4 (18.2%) females, on comparing to their preoperative keratometry readings.

Table 4 shows sixth postoperative month keratometric readings compared to preoperative readings, with the rule change in 12 (52.2%) males and 9 (45%) females. Against the rule change was seen in 6 (26.1%) males and 9 (45%) females and no change was seen in 5 (21.7) males and 2(10%) females, on comparing to their preoperative keratometry readings.

Table 2 : Showed first month postoperative month keratometric readings compared to preoperative readings

Type of astigmatic change	Males	Females	Total
	No. of Cases (%)	No. of Cases (%)	No. of Cases (%)
With the rule change	20 (80%)	17(73.9%)	37(77.1%)
Against the rule change	2(8%)	1(4.4%)	3 (6.2%)
No change	3(12%)	5 (21.7%)	8(16.7%)
Total	25(100%)	23 (100%)	48 (100%)

Table 3:Showed third month postoperative month keratometric readings compared to preoperative readings

Type of astigmatic change	Males	Females	Total
	No. of Cases (%)	No. of Cases (%)	No. of Cases (%)
With the rule change	16 (69.6 %)	16(72.7%)	32 (71.1%)
Against the rule change	3 (13 %)	4 (18.2 %)	7 (15.6%)
No change	4 (17.4 %)	2 (9.1 %)	6 (13.3%)
Total	23 (100%)	22 (100%)	45 (100%)

Table 4: Showed sixth month postoperative month keratometric readings compared to preoperative readings

Type of astigmatic change	Males	Females	Total
	No. of Cases (%)	No. of Cases (%)	No. of Cases (%)
With the rule change	12 (52.2%)	9 (45%)	21 (48.8 %)
Against the rule change	6 (26.1%)	9 (45%)	15 (34.9%)
No change	5 (21.7%)	2 (10 %)	7 (16.3 %)
Total	23 (100%)	20 (100%)	43 (100%)

DISCUSSION

This study demonstrated that filtration surgery has a distinct effect on altered visual function induced by changes in corneal curvature, which can be distressing to the patient particularly when changes are marked and continued beyond first few postoperative months¹². There was a trend towards transient trabeculectomy induced astigmatism in the meridian of surgery¹³. Since trabeculectomy produce a form of wound gap, ATR would be expected postoperatively¹⁴. However this study as well as other studies have found a with the rule astigmatism following trabeculectomy. Similar studies found that this difference in behaviour might be the result of partial thickness scleral flap created during trabeculectomy. In trabeculectomy, a scleral flap overlies the surgically produced gap¹⁵⁻¹⁶. This is capable of spreading any support from the suture inserted into it, over the whole of the wound gape¹⁷.

In the present study, a triangular flap with an identical flap size was used in all the cases and thus the effect of variable flap shape and size could not be assessed. Thermal cautery was used instead of the presently used wet-field cautery. Releasable sutures were not used in this study. Manual keratometry was used instead, in the absence of the art technique of videokeratography. Despite these shortcomings, the present study has showed, mean change of keratometry readings after trabeculectomy at 1st, 3rd, 6th and 12th month were 0.74, 0.58, 0.23, and 0.23 dioptre respectively. With maximum detectable change found at the end of 1st postoperative month and thereafter the changes were almost decaying and disappearing at the end of 12th postoperative month. The present study showed at the end of 12th postoperative month, the keratometry readings were stabilized.

CONCLUSION

The present study concluded that excessive cautery and tight suturing of the flap are the main factors responsible for the with the rule astigmatism seen at the end of first postoperative month, and were not found significant at the end of 12th postoperative month. Hence restricting the use of cautery and avoiding tight suturing of the flap goes a long way in reducing the postoperative corneal astigmatism.

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