FREQUENCY OF CORNEAL ASTIGMATISM AFTER PRIMARY TRABECULECTOMY

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ABSTRACT

This study was conducted in the Department of Ophthalmology; Eye A, Khyber Teaching Hospital, Peshawar.It started from 15th July 2010 and finished on 6th October 2011.This was a descriptive cross sectional study. Non-probability purposive sampling technique was applied.

Results: The study was conducted on 44 patients. There were 29 males (65.9%) and 15 females (34.1%). Their ages ranged from 25 to 78 years. The mean age of the patients was 47.30 years with standard deviation of 15.30

Corneal astigmatism after trabeculectomy was found to be 100%. Out of 44 eyes of 44 patients who undergone primary trabeculectomy, 41(93%) had"with the rule" corneal astigmatism, while the rest of the three patients (7%) had "against the rule" astigmatism. in 23 cases left eye and in 21 cases right eyes was operated.

Conclusion: The trabeculectomy procedure results in significant change of corneal curvature in both meridians. This effects post operative visual acuity which in turn may adversely effect the compliance of patients towards surgical treatment.

INTRODUCTION

Glaucoma is considered as the second leading cause of blindness after cataract[1] and fourth commonest cause of blindness in Pakistan.[2] Amongst the glaucomas, primary open angle glaucoma (POAG) is the most prevalent type of glaucoma, affecting approximately 1% of the general population over the age of 40 years.[3]

Trabeculectomy is the surgical procedure of choice if the medical therapy fails. Trabeculectomy is the most common operative procedure for the treatment of medically uncontrolled glaucoma [4], and is a better option than medical treatment in many cases[5]. It lowers intraocular pressure by creation of a new channel for aqueous outflow between the anterior chamber and sub-tenon space[6]. The filtering procedure most commonly used is the guarded trabeculectomy[7]. It is successful between 86% and 90% of cases of primary open angle glaucoma[8]. Recently surgery for glaucoma is being performed at an early stage of the disease when the vision is still fairly good. Many patients report subjective changes in vision following trabeculectomy.

Surgically induced astigmatism beside the other complicationis becoming an important issue because it delays visual rehabilitation and exerts a negative effect on the final visual outcome. For astigmatism we didkeratometry. Keratometry is done on a machine which is known as keratometer, it measures the curvature of anterior surface of the cornea in different meridians. When the keratometry reading is more in vertical meridian than horizontal meridian, it is called "with the rule astigmatism" and if keratometry reading is more in horizontal meridian than vertical meridian, it is called "against the rule astigmatism". These two types of astigmatic changes are usually found following trabeculectomy. In a recent study 87% of patients showed 'with the rule' astigmatism, while 13% patients showed 'against the rule' astigmatism[9] postoperatively. Irregular corneal astigmatism after trabeculectomy is an annoying problem for both patient and surgeon[10].Previous reports have also shown that there is induced corneal astigmatism after trabeculectomy[11]. The surgically induced astigmatism is more in the early post operative period and it decreases with the passage of time.

Trabeculectomy is not free of postoperative complications but if managed properly visual acuity in majority of cases is shown to be good[12]. The complications of trabeculectomyreported are shallow anterior chamber, anterior uveitis, choroidal detachment and uncontrolled intraocular pressure[13,14].

We designed this study to evaluate any change in corneal astigmatism after trabeculectomy in patients presenting to our Department. As astigmatism delays visual rehabilitation and it is ignored during trabeculectomy, so our aim to do this study is to highlightthis problem so that the patients have less post operative visual problem after trabeculectomy.

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OBJECTIVE

To determine the frequency of "with the rule" and "against the rule" astigmatism after trabeculectomy.

MATERIALS AND METHODS

The study was conducted in the Department of Ophthalmology; Eye A, Khyber Teaching Hospital, Peshawar, Pakistan.It started from 15th July 2010 and finished on 6th October 2011.This was a descriptive cross sectional study. Non-probability purposive sampling technique was applied.

Approval from ethical committee was taken before starting the study.Informed written consent was taken from each patient included in this study.A proforma was designed to gain different information from the patient, in which strict Inclusion and exclusion criteriaof the cases of this study were described.

Inclusion criteria

Adult patients of both gender from 25 years and above.

All patients with diagnosis of primary open angle glaucoma uncontrolled with maximal medical therapy i.e. IOP >22 mmHg and needing filtration surgery.

Exclusion criteria

Congenital /juvenile glaucoma because in these patients cornea is excessively thin and astigmatism will be much variable.

Previous intraocular surgery, as in these patients astigmatism will be due to that previous surgery.

Significant corneal opacification, due to which keratometry will not be possible.

Patients needing combined surgery, as astigmatism will be more as compared to trabeculectomy alone.

All types of lens induced & neovascular glaucoma's , as in all such cases complications will be more.

All the above mentioned conditions act as confounders and if included in the study will induce bias in the study results.

DATA COLLECTION PROCEDURE

44 patients were recruited from Eye unit of Khyber Teaching Hospital Peshawar for this study. The patients who fulfilled the inclusion criteria coming for primary trabeculectomyto the eye department were included in this study. Complete ocular and relevant systemic history was taken. The pre-operative assessment of the patient regarding intra ocular pressure, visual acuity, subjective refraction and manual keratometry readings was recorded. The Shin Nippon Keratometer was used for manualkeratometry. Alltheses information were entered & recorded in the proformaof each patient.

The surgery was performed with local anesthesia by a single surgeon who is Fellow of CPSP. The incision for trabeculectomy was given at 12 o clock position with fornix based conjunctival approach.

The patients were followed at 1stpost operative day for detection of astigmatism. The confounders and bias were controlled by following strictly the exclusion criteria.

DATA ANALYSIS

Data was analyzed by using the software SPSS version 10.0. Mean $\pm$ Standard deviation were calculated for quantitative variables like age and keratometry readings. Frequency and percentages were calculated for categorical variables like sex and post operative astigmatism. Astigmatism has been stratified among the age, eye and sex, so that to see the effect modifiers. Results have been presented as tables and charts.

KEY WORDS

Trabeculectomy, with the rule astigmatism, against the rule astigmatism,

RESULTS

A sample of 44 individuals (44 eyes) was taken from inpatients department of Ophthalmology eye A, Khyber Teaching Hospital Peshawar. The results of our study i.e. corneal astigmatism after primary trabeculectomy wereanalyzed in term of keratometry readings. The mean age of the patients was 47.30 years with standard deviation of 15.30 as given in

TABLE I

Mean age

	No	Minimum	Maximum	Mean	Std. Deviation
Age	44	25	78	47.30	15.263

TABLE 2

Age Distribution

Age in years	Frequency	Percent
<40	17	38.6
41 – 55	15	34.1
56 – 70	8	18.2
71+	4	9.1
Total	44	100.0

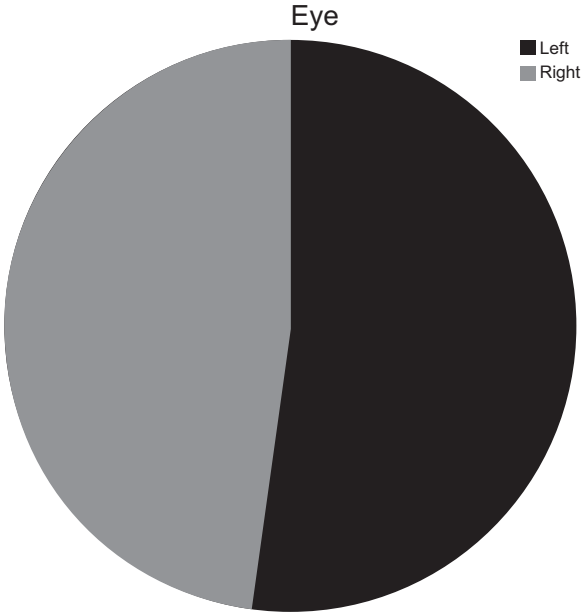

Figure 1

TABLE 3

ASTIGMATISM FREQUENCY

Astigmatism	Frequency	Percent
With the rule	41	93.2
Against the rule	3	6.8
Total	44	100.0

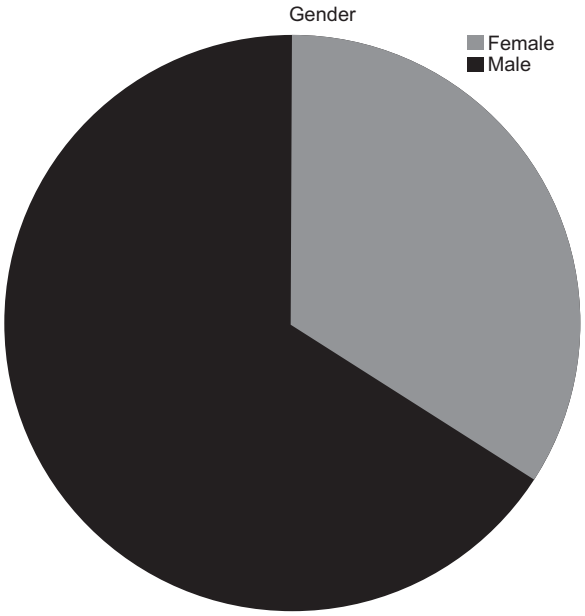

Figure 2

TABLE 4

Gender Astigmatism Crosstabulation

		Astigmatism		Total
gender		With the rule	Against the rule	
Female	Count	14	1	15
	% within gender	93.3%	6.7%	100.0%
Male	Count	27	2	29
	% within gender	93.1%	6.9%	100.0%
Total	Count	41	3	44
	% within gender	93.2%	6.8%	100.0%

Table 5

Mean k-readings

k-readings	Mean	Std. Deviation
Pre op k1	43.6857	1.5908
Pre op k2	43.8057	1.4610
post op k1	44.8068	1.7216
post op k2	42.7491	1.7497

TABLE 6

Age (in years) Astigmatism Crosstabulation

		Astigmatism		Total
age (in years)		With the rule	Against the rule	
<= 40	Count	17	0	17
	% within age (in years)	100.0%	.0%	100.0%
41 – 55	Count	13	2	15
	% within age (in years)	86.7%	13.3%	100.0%
56 – 70	Count	7	1	8
	% within age (in years)	87.5%	12.5%	100.0%
71+	Count	4	0	4
	% within age (in years)	100.0%	6.8%	100.0%
Total	Count	41	3	44
	% within age (in years)	93.2%	6.8%	100.0%

table No I. Minimum age in our study was 25 while maximum age was 78 years. Maximum of the patients presented to us were below 55 years of age. The frequency of age distribution has been shown in **table 2**.

The sex distribution is given in **figure 1**. Which were 15 (34.1%) females and 29 (65.9%) males.

In this study, 23 (52.3%) were left while 21 (47.7%) were right eyes. 22(95.7%) out of 23 left eyes and 19(90%) out of 21 right eyes had with the rule astigmatism **figure 2.**

In our study corneal astigmatism after trabeculectomy was found to be 100%. Out of 44 patients who undergone primary trabeculectomy, 41 (93%) had with the rule corneal astigmatism and the remaining 3 (7%) patients had against the rule astigmatism on the follow up day. In those 41 patients who had with the rule astigmatism, 14(93.3%) were females and 27(93.1%) were males, showing no gross difference in sex **table 3&4**.

Pre operation mean K 1 reading was 43.69 with standard deviation of 1.59. While mean pre operation K 2 reading was 43.81 with standard deviation of 1.46. Post operations mean K1 raised to 44.81 with standard deviation of 1.72. Post operation mean K 2 reading was 42.75 with standard deviation of 1.75 as shown in **table 5** and **graph 1**.

Age group between 25 and 40 years had 100% with the rule astigmatism, while age group between 41 and 55 years, 86.70% had with the rule while 13.3% had against the rule astigmatism. In this age group the incidence of with the rule astigmatism was lowest. From 56 to 70 years age group the incidence of with the rule astigmatism was 87.5% and above the 70 years age group the incidence of with the rule astigmatism was again 100% **table 6.**

DISCUSSION

Glaucoma is a progressive optic neuropathy with characteristic changes in the optic nerve head and corresponding loss of visual field. Glaucoma is considered as the second leading cause of blindness after cataract worldwide[1] and fourth commonest cause of blindness in Pakistan.[2] Amongst the glaucomas, primary open angle glaucoma (POAG) is the most prevalent type of glaucoma, affecting approximately 1% of the general population over the age of 40 years.[3]

The numbers of patients included in this study were 44 with primary open angle glaucoma, which is consistent with other study carried out by Farah Akhtar. In her study she included 50 patients.[10]

Trabeculectomy affects the corneal curvature. According to MehmoodaAshai et alin 87% patients the vertical corneal radius of curvature wasreduced with a trend towards 'with the rule' astigmatism. The horizontal radius of curvature was increased. Thus there was steepening in the vertical meridian. In 13% of patients the vertical radius of curvature of cornea was increased and horizontal radius of curvature was decreased, causing 'against the rule' astigmatism[9]. There was flattening in the vertical meridian. These changes were marked in the early post-operative period and decreased by the third post-operative month. Rosen et al (1992) found that five of eight eyes developed 1.50 to 2.50 diopters of steepening in the 90-degree meridian following trabeculectomy[15]. These finding are in accordance with our study.

Cunliffe IA et al (1992) discovered that the change in vertical corneal curvature after trabeculectomy is consistent with the with-the-rule change in corneal astigmatism[16]. This supports our finding. Similarly Corneal curvature changes has been reported by Claridge et al (1995) [17], Dietz et al (1997)[18] etc.

Various explanations have been given regarding the effect of trabeculectomy on corneal curvatures. In trabeculectomy the surgically produced gap is overlaid by a scleral flap. This is capable of spreading any support from the sutures inserted into it over the whole of the wound gap.

In addition the more posterior placement of the incision in trabeculectomy may also explain the observed behaviour as the size and location of the incision have a profound impact on the postoperative visual results.[19]

The cause of induced astigmatism may be related to the use of cautry during surgery, producing a contraction of the sclera. [20]

Small flap trabeculectomy (micro trabeculectomy) is recommended by S.A Vernon et al [21] as it produces smaller changes in corneal curvature that resolve sooner than previous reports of larger flap technique.

CONCLUSION

The conclusions that can be drawn from this study are as follows.

Corneal astigmatism after trabeculectomy does occur, and is an annoying problem for both patient and surgeon. The impact of the procedure on the visual prognosis of glaucoma patients must therefore be carefully evaluated.

Full counseling of the patient should be done and informed consent be made. Patient should be warned of changes pre- operatively as many will have normal vision prior to surgery and may be distressed by the significant changes that occur. This effects post operative visual acuity which in turn may adversely affect the compliance of patients towards surgical treatment.

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