

Pre and post-operative effects on corneal astigmatism in patients with glaucoma

Jyothi V¹, Arunkumar B Malladad^{2*}

¹Assistant Professor, ²Senior Resident, Department of Ophthalmology, SS Institute of Medical Sciences and Research Centre, Davanagere, Karnataka, INDIA.

Email: nandanajyothi2009@gmail.com

Abstract

Background: Glaucoma is a condition that damages optic nerve of the eye's and it gets worse overtime. It's often linked to a buildup of pressure inside the eye's. The increased pressure of the eye, called intraocular pressure, can damage optic nerves, which send images to your brain. If the damage worsens, glaucoma can cause permanent vision loss or even total blindness. For understanding pathophysiology of glaucoma is important to physician do ophthalmic examination and active treatment in according to condition of the patients. We aimed to evaluate the pre and post operative effects on corneal astigmatism in patients with glaucoma. **Methods:** This is a multicenter study conducted in department of ophthalmology at SSMC and JJMC. Total 80 subjects and all the subjects included after informed consent, inclusion and exclusion criteria by simple random sampling method. A detailed medical history like precipitating factors, history of refractory error, frequent change and use of spectacle, ocular or systemic medications and other any illness, family history were also obtained from all the patients. **Results:** Total 80 patients were undergone for trabeculectomy and their pre operative and postoperative keratometry were studied. The pre-trab intraocular pressure were statistically analysed by using chi square test (49.40 ± 10.24) respectively P – Value < 0.0001 are highly significant. The post operative keratometry readings were recorded significantly disappearing after operation. By restricting the use of cautery and avoiding tight suturing of the flap goes a long way in reducing postoperative corneal astigmatism. **Conclusion:** We concluded that trabeculectomy on corneal astigmatism in majority of the cases, which is maximum at the end of first postoperative week and first postoperative month, decaying thereafter progressively, almost disappearing at the after post operation.

Key Words: Glaucoma, Cautery, Astigmatism and Trabeculectomy.

*Address for Correspondence:

Dr Arunkumar B Malladad, Senior Resident, SS Institute of Medical Sciences and Research Centre, Davanagere, Karnataka, INDIA.

Email: nandanajyothi2009@gmail.com

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INTRODUCTION

Glaucoma is a complex and multifactorial ocular disorder that are unified by an optic neuropathy with characteristic loss of retinal ganglion cells and their axons.¹ Glaucoma is a worldwide one of the leading disorder with irreversible blindness and visual impairment, Intraocular pressure

(IOP) is the most consistent and currently the only modifiable risk factor for glaucoma progression and although individual susceptibility to IOP varies considerably.²⁻⁴ It is estimated that by the year 2020, 79.6 million people will develop primary glaucoma with 11.2 million having bilateral blindness throughout the world. Current treatment strategies targeting the reduction of IOP often fail to prevent disease progression.⁵⁻⁶ Early diagnosis and early treatment are the primary method to prevent blindness from glaucoma. It is therefore likely that both the baseline state of the sclera and its dynamic alteration could affect the manner in which IOP is translated into a damaging stimulus in glaucoma.⁷ The transforming growth factor β (TGF β) pathways are activated in experimental and human glaucoma in trabecular meshwork and ONH.⁸ There is a critical need for deeper understanding of the cellular and molecular pathology of glaucoma, in order to develop more effective therapeutic strategies for patients

with this common neurodegenerative disease. Astigmatism is a very common refractive error but its etiology remains elusive. Uncorrected astigmatism not only degrades the contrast of retinal image at both distance and near, the presence of significant astigmatism with specific orientation has also been associated with amblyopia and myopia development.⁹⁻¹⁰ These problems are posing a challenge for the patient and the physician. Some studies have shown that age, sex, environment and genetic factors are important points that affect type and amount of astigmatism.¹¹ Astigmatism occurs when our visual system does not have a good perception of a point from a point source due to the fact that there are different powers in the different meridians of the cornea.¹² Total corneal astigmatism is made by both the anterior corneal surface and the posterior corneal surface. This study was to evaluate the pre and post operative effects on corneal astigmatism in patients with glaucoma.

MATERIALS AND METHODS

This is a Prospective Study conducted in Department of Ophthalmology, SS Institute of Medical Sciences and Research centre, Davanagere, Karnataka. A total 80 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 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 require combined procedures along with trabeculectomy, primary angle closure glaucoma and whoever not willing to participate 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 applantation 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 data distribution of Age and Gender in all the subjects and the data was expressed in percentage. Hence, data was logarithmically transformed before applying parametric statistical tools.

Table 1: Showed a demographic characteristic's of two groups of study subjects

Age (Years)	Males	Females	Total
	N (%)	N (%)	N (%)
30 - 39	6 (5)	7 (9)	13 (5)
40 - 49	10 (10)	16 (40)	26 (38)
50 - 59	9 (25)	10 (25)	19 (35)
60 - 69	8 (30)	7 (31)	15 (20)
+ 70	7 (30)	0	7 (2)
Total	40 (100)	40 (100)	80 (100)

Table - 2 shows the pre- trab intraocular pressure and the data expressed in mm/Hg and percentage by using chi square test 49.40 respectively P < 0.0001**. Statistically significant more number of eyes were observed to have an a IOP between at 26-30 mm/Hg and followed by 21-25 mm/Hg.

Table 2: shows the pre- trab intraocular pressure all the study subjects

IOP (mm Hg)	No. of. eyes	Percentage
16-20	4	2
21-25	18	20
26-30	39	58
31-35	9	12
36-40	6	8
Total	80	100

Table 3 shows the Postoperative month keratometry readings compared to Preoperative readings. In these keratometry readings are taken at postoperative month, significantly the rule change in 31 (53%) males and 9 (45%) females. Against the rule change was observed in 16 (26 %) males and 9 (45%) females and no change was seen in 12 (21%) males and 3 (10%) females, on comparing to their preoperative keratometry readings.

Table 3: shows the Postoperative month keratometry readings compared to Preoperative readings

Type of astigmatic change	Males	Females	Total
	N. of Cases (%)	N. of Cases (%)	N. of Cases (%)
With the rule change	31 (53%)	9 (45%)	35 (48%)
Against the rule change	16 (26%)	9 (45%)	30 (36%)
No change	12 (21%)	3 (10%)	15 (16%)
Total	54 (100%)	26 (100%)	80 (100%)

DISCUSSION

The glaucoma's are a group of optic neuropathies characterized by progressive degeneration of retinal ganglion cells.¹³ These are central nervous system neurons that have their cell bodies in the inner retina and axons in the optic nerve.¹⁴ Degeneration of these nerves results in cupping, a characteristic appearance of the optic disc and visual loss. Glaucoma affects more than 70 million people worldwide with approximately 10% being bilaterally blind, making it the leading cause of irreversible blindness in the world.¹⁵ Glaucoma can be classified into 2 broad categories: open-angle glaucoma and angle-closure glaucoma. In the United States, more than 80% of cases are open-angle glaucoma; however, angle-closure glaucoma is responsible for a disproportionate number of patients with severe vision loss.¹⁶ Both open-angle and angle-closure glaucoma can be primary diseases. Secondary glaucoma can result from trauma, certain medications such as corticosteroids, inflammation, tumor, or conditions such as pigment dispersion or pseudo-exfoliation. A large proportion of patients with preexisting cataracts have some degree of corneal astigmatism.¹⁷ Correcting astigmatism improves quality of life, provides spectacle independence, and improvement in visual outcomes. In recent years, toric IOLs are increasingly used as firstline measures for correcting corneal astigmatism of 41.5 D at the time of phacoemulsification. In these study also have statistically significant more number of eyes $P < 0.0001^{**}$. Similarly, the mean corneal astigmatism of 1.08 D was higher. Patients with 41 D of astigmatism should be considered for surgical correction of astigmatism at the time of surgery for improvement of visual outcomes postoperatively.¹⁸⁻¹⁹ The development of astigmatism depends on extraocular muscle tension, visual feedback and eye lids pressure were observed. Modern technologies such as wavefront sensors and videokeratoscopes have led to a better understanding of astigmatism. Our results also supports previous study's and trabeculectomy on corneal astigmatism and factors responsible for producing corneal astigmatism and the complications encountered during the procedure were not of serious nature and could be easily managed.

CONCLUSION

On the basis of the present observation it can be concluded that the trabeculectomy induces a with the rule corneal

astigmatism in majority of the cases, which is maximum at the postoperative, decaying there after progressively, almost disappearing post operation.

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