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Assessment of Preoperative and Postoperative Changes in Corneal Astigmatism after Pterygium Excision by Different Techniques

Madhavi Chevuturu

Professor and HOD, Department of Ophthalmology, ESIC Medical College, Hyderabad, Telangana, India.

Abstract

Background: Pterygium causes visual problems due to induced corneal astigmatism or direct encroachment onto the visual axis. The present study was conducted to compare preoperative and postoperative changes in corneal astigmatism after pterygium excision by different techniques. **Subjects and Methods:** The present study was conducted from May 2018 to August 20018 on 69 patients of age range 20-55 years of primary Pterygium. Patients were divided into three groups of 23 each. Group I was treated with bare sclera (BS) technique, Group II with conjunctival autograft (CAG) technique and Group III with amniotic membrane graft (AMG) technique. All the patients were preoperatively assessed for visual acuity, anterior and posterior segments, autorefraction, and autokeratometry. After surgery, the patients were recalled on day 5, 1 month, and 3 months for the analysis. **Results:** Uncorrected visual acuity (UCVA) preoperatively was 0.57, on the 5th day was 0.45 after 1 month was 0.34 and after 3 months was 0.35. The mean preoperative astigmatism value in group I was 3.45, in group II was 3.52 and in group III was 3.49. Postoperative astigmatism value in group I was 1.60, in group II was 0.92 and in group III was 0.81. The difference was significant ($P< 0.05$). **Conclusion:** Authors found that amniotic membrane graft and a conjunctival autograft is better surgical techniques than bare sclera in reducing astigmatism.

Keywords: Amniotic Membrane Graft, Conjunctival Autograft, Pterygium

Corresponding Author: Madhavi Chevuturu, Professor and HOD, Department of Ophthalmology, ESIC Medical College, Hyderabad, Telangana, India.
E-mail: chandrasekhar1728@hotmail.com

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Introduction

Pterygium is an elevated, superficial, external ocular fibrovascular connective tissue overgrowth of bulbar conjunctiva mass and extends onto the corneal surface.[1] Pterygia can vary from a small atrophic quiescent lesion to a largely aggressive, rapidly growing fibrovascular lesion that can distort the corneal topography, and in advanced cases, they can obscure the optical center of the cornea. Pterygium is a very common degenerative condition seen in many countries.[2]

Pterygium causes visual problems due to induced corneal astigmatism or direct encroachment onto the visual axis.[3] The reasons for astigmatism are (a) the pooling of the tear film and (b) the mechanical traction exerted on the cornea and (c) the size of Pterygium, especially the double-headed Pterygium. This has been measured by keratometry, corneal topography, and refraction. Corneal astigmatism can be reduced by pterygium excision surgery, which involves the use of several techniques.[4]

Astigmatism is the unequal refraction of the same eye in two different meridians. Unlike the basic types of refraction-emmetropia, myopia and hyperopia- where all the light rays enter one focus (on the retina, behind it, or in front of it), in astigmatism, there is no a single focus.[5] In basic types of refraction, the cornea is spherical and it refracts equally in all the meridians. There are different surgical techniques for the correction of corneal astigmatisms such as bare sclera, conjunctival autograft, and amniotic membrane transplantation.[6] The present study was conducted to compare preoperative and postoperative changes in corneal astigmatism after pterygium excision by different techniques.

Subjects and Methods

The present study was conducted in the Department of Ophthalmology Mediciti institute of medical sciences from May 2018 to August 20018 on 69 patients of age range 20-55 years of primary Pterygium. Ethical approval was obtained from the institute prior to the study. All patients were informed

regarding the study and written consent was obtained.

General information such as name, age etc. was recorded. Pterygium was graded depending on the extent of corneal involvement as follows:

- Grade I: Just crossing the limbus,
- Grade II: Midway between limbus and pupil,
- Grade III: Reaching up to the papillary margin, and
- Grade IV: Crossing the papillary margin.

Patients were divided into three groups of 23 each. Group I was treated with bare sclera (BS) technique, group II with conjunctival autograft (CAG) technique and group III with amniotic membrane graft (AMG) technique. All the patients were preoperatively assessed for visual acuity, anterior and posterior segments, autorefraction, and auto keratometry. After surgery, the patients were recalled on day 5, 1 month, and 3 months for the analysis. Results thus obtained were subjected to statistical analysis. A P-value of less than 0.05 was considered significant.

Results

Table 1: Distribution of patients

Groups	Group I	Group II	Group III
Technique	Bare sclera	Conjunctival autograft	Amniotic membrane graft
Number	23	23	23

Table 1 shows the type of technique used and the number of patients in each group.

Table 2: Comparison of Pre and Postoperative Uncorrected Visual Acuity.

Duration	Mean	P-value
Pre- operative	0.57	0.01
5^{th} day	0.45	
1 month	0.34	
3 months	0.35	

Table 2 shows that uncorrected visual acuity (UCVA) preoperatively was 0.57, on 5th day was 0.45, after 1 month was 0.34 and after 3 months was 0.35. The difference was significant (P< 0.05).

Table 3, Figure 1 shows that mean preoperative astigmatism value in group I was 3.45, in group II was 3.52 and in group III was 3.49. Postoperative astigmatism value in group I was 1.60, in group II was 0.92 and in group III was 0.81. The difference was significant (P< 0.05).

Table 3: Comparison of preoperative and postoperative corneal astigmatism at 3 months in groups

Groups	Preop astigmatism	Postop astigmatism	P-value
Group I	3.45	1.60	0.04
Group II	3.52	0.92	0.02
Group III	3.49	0.81	0.01

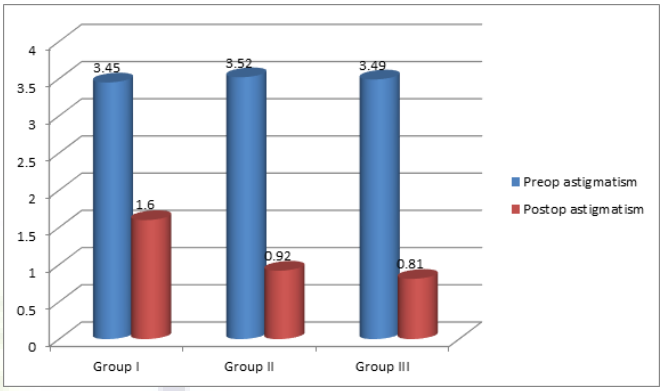

Figure 1: Preoperative and postoperative corneal astigmatism at 3 months in groups

Discussion

In astigmatism, variations in the curvature of the cornea or lens along different meridians prevent the light rays from focusing onto a single point. Corneal refraction depends on the corneal curvature. If the cornea is more curved, the power of refraction is higher and vice versa. Corneal and lenticular astigmatism can complement or cancel each other. Their summation represents the so-called "total astigmatism".[7] Due to the lack of a single focus, an astigmatic eye is not able to see clearly without correction. Astigmatic patients complain of visual disturbances in both far (in myopia) and near vision (in hyperopia), which causes asthenopia problems (headache, dizziness, fatigue etc). Additionally, regular, symmetric objects might seem to them irregular, and /or elongated.[8] The present study was conducted to compare preoperative and postoperative changes in corneal astigmatism after pterygium excision by different techniques.

In the present study, we recruited 69 patients with astigmatism. Patients were divided into three groups of 23 each. Group I was treated with bare sclera (BS) technique, group II with conjunctival autograft (CAG) technique and group III with amniotic membrane graft (AMG) technique. Garg et al,[9] included 71 patients with primary Pterygium who underwent surgery. The reduction in the mean preoperative astigmatism

of 3.47 ± 1.74 Diopters (D) to 1.10 ± 0.78 D 3 months after surgery was statistically significant. Bare sclera, conjunctival autograft, and amniotic membrane graft techniques exhibited changes in astigmatism amounting to 1.85 ± 0.88 D, 2.55 ± 1.26 D, and 2.67 ± 1.44 D, respectively. Pterygium excision surgeries using amniotic membrane graft and conjunctival autograft techniques were more effective than pterygium excision surgery using bare sclera technique in reducing astigmatism.

We found that uncorrected visual acuity (UCVA) preoperatively was 0.57, on 5th day was 0.45, after 1 month was 0.34 and after 3 months was 0.35. The mean preoperative astigmatism value in group I was 3.45, in group II was 3.52 and in group III was 3.49. Postoperative astigmatism value in group I was 1.60, in group II was 0.92 and in group III was 0.81.

Zaida et al,[10] conducted a study on 60 eyes of 60 patients. Ages were between 34 and 56 years, divided randomly into 3 groups; group A included 20 patients that were treated with pterygium excision with bare sclera technique plus MMC application for 3 minutes at site of excision. Group B: 20 patients that were treated with pterygium excision with conjunctival autograft. Group C: 20 patients that were treated with pterygium excision with limbal/conjunctival autograft. The postoperative assessment included refraction and pentacam on visits at 1, 3, and 6 months after surgery. In all groups, BCVA changes 6 months postoperatively were statistically significant, while Spherical and Cylindrical error changes were statistically insignificant. Average K and corneal thickness changes were statistically insignificant, while anterior corneal astigmatism changes were statistically insignificant in group A, and significant in groups B and C.

Pterygium grade also affects corneal astigmatism. Several studies conducted previously prove that the amount of induced corneal astigmatism increases with the increase in the size of Pterygium. Gumus et al,[11] found a significant correlation between the size of Pterygium and induced corneal astigmatism. Misra et al,[12] concluded that with the size of Pterygium extending from 2.5mm, preoperative astigmatism increases.

Conclusion

The authors found that amniotic membrane graft and a conjunctival autograft is better surgical techniques than bare sclera in reducing astigmatism.

References

1. Yasar T, Ozdemir M, Cinal A, Demirok A, Ilhan B, Durmus AC. Effects of fibrovascular traction and pooling of tears on corneal topographic changes induced by pterygium. Eye. 2003;17(4):492–496. Available from: https://dx.doi.org/10.1038/sj.eye.6700377.
2. Xu Z, Li W, Jiang J, Zhuang X, Chen W, Peng M. Characteristic of entire corneal topography and tomography for the detection of sub-clinical keratoconus with Zernike polynomials using Pentacam. Sci Rep. 2017;2:16486. Available from: https://dx.doi.org/10.1038/s41598-017-16568-y.
3. Seitz B, Gutay A, Kuchle M, Kus MM, Bucher AL. Impact of pterygium size on corneal topography and visual acuity-A prospective clinical cross-sectional study. Klin Montasbl Augenheilkd. 2001;218(9):609–615.
4. Yagmur M, Özcan AA, Sari S, Ersöz TR. Visual Acuity and Corneal Topographic Changes Related With Pterygium Surgery. J Refractive Surg. 2005;21(2):166–170. Available from: https://dx.doi.org/10.3928/1081-597x-20050301-12.
5. Cinal A, Yasar T, Demirok A, Topuz H. The Effect of Pterygium Surgery on Corneal Topography. Ophthalmic Surg Lasers Imaging. 2001;32(1):35–40. Available from: https://dx.doi.org/10.3928/1542-8877-20010101-08.
6. Errais K, Bouden J, Mili-Boussen I, Anane R, Beltaif O, Ouertani AM. Effect of Pterygium Surgery on Corneal Topography. Eur J Ophthalmol. 2008;18(2):177–181. Available from: https://dx.doi.org/10.1177/112067210801800203.
7. Oltulu R, Demirel S, Sarac O, Ozer MD. Evaluation of Corneal and Anterior Chamber Changes Following Pterygium Surgery Using a Pentacam Scheimplug System: A Prospective Study. Seminars Ophthalmol. 2013;28:206–209. Available from: https://dx.doi.org/10.3109/08820538.2012.760617.
8. Maheshwari S. Effect of pterygium excision on Pterygium induced astigmatism. Indian J Ophthalmol. 2003;51:187–205.
9. Garg P, Sahai A, Shamshad MA, Tyagi L, Singhal Y, Gupta S. A comparative study of preoperative and postoperative changes in corneal astigmatism after pterygium excision by different techniques. Indian J Ophthalmol. 2019;67(7):1036–1040. Available from: https://dx.doi.org/10.4103/ijo.ijo_1921_18.
10. Ziada HE. Corneal refractive changes after pterygium surgeries with different techniques; a comparative study. Al-Azhar Assiut Med J. 2015;13(2):49–57.
11. Gumus K, Erkilic K, Topaktas D, Colin J. Effect of Pterygia on Refractive Indices, Corneal Topography, and Ocular Aberrations. Cornea. 2011;30(1):24–29. Available from: https://dx.doi.org/10.1097/ico.0b013e3181dc814e.
12. Misra S, Craig JP, McGhee CNJ, Patel DV. A Prospective Study of Pterygium Excision and Conjunctival Autograft With Human Fibrin Tissue Adhesive. Asia-Pacific J Ophthalmol. 2014;3(4):202–206. Available from: https://dx.doi.org/10.1097/apo.0000000000000006.

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