International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

Astigmatism in Pterygium Pre and Post Operative

Dr. Daggula Devi Bharathi[1], Dr. A. Santhi Sri[2], Dr. K. Vamsi Krishna Reddy[3]

[1]MS Ophthalmology Fellow in Medical Retina, Assistant Professor, Indira Medical College and Hospital, Thiruvallur, Tamil Nadu, India
Email: *d.devibharathi[at]gmail.com*

[2]MS Ophthalmology, Consultant Ophthalmologist, PHACO Surgeon, Dr. Ramalinga Reddy Maxivision Super Speciality Eye Hospital, Narasaraopet, Andhra Pradesh, India
Email: *santhi.appireddy[at]gmail.com*

[3]MD Paediatrics, Assistant Professor, Indira Medical College and Hospital, Thiruvallur, Tamil Nadu, India
Email: *vamsiuia[at]gmail.com*

Abstract: ***Purpose*: The study aims in comparing pre and post-op astigmatism in pterygium cases following excision and autografting by sutures. *Methods*: It is a prospective study conducted on 100 patients. *Results*: Pterygium leads to a significant high corneal astigmatism, which hampers vision of the patient. As the size of pterygium encroaching on cornea increases, the amount of induced astigmatism increases. The type of pterygium excision surgery plays a major role in modifying the induced astigmatism in patients with pterygium. Excision of pterygium leads to statistically significant reduction in astigmatism, which improves vision significantly.***

Keywords: pterygium, astigmatism, pre and post-op comparison

1. Introduction

Numerous different theories were explained that substantiate occurrence of pterygium induced astigmatism.[1,2,3] A few of them are:

a) Tear film pooling at the pterygium apex.
b) Mechanical traction on the cornea that is exerted by the pterygium.

Flattening was seen majorly in the horizontal meridian, which resulted in distortion of normal corneal curvature and resulted in astigmatism. Though exact flattening mechanism is not clearly understood, it is mainly thought was caused by tear meniscus formation between the elevated pterygium and corneal apex causing apparent normal corneal curvature flattening.[4]

This abnormality in corneal curvatures is measured by corneal topography, keratometry, and refraction. It was also suggested that pterygium results in an increased degree of astigmatism that extends equal to or more than 45% of the corneal diameter. [5] A corneal astigmatism of >2 D is contributed by pterygium extending greater than 2.2mm was reported by authors.It was found that with an increase in size of the pterygium astigmatism also significantly increases.[6]

Mohammad-Salih and co-workers studied the extension, total area and width of pterygium and investigated corneal astigmatism in relation to these parameters. Among the 3 parameters, extension had the strongest and most significant correlation with astigmatism ($\rho = 0.462$, $P < 0.001$, Pearson correlation analysis).[7]

2. Methods

A prospective where study was conducted on 100 patients utilizing the outpatient department selected by non-probability convenient sampling method where each patient was thoroughly examined pre-operatively for visual acuity, slit lamp examination of the anterior segment with an emphasis on pterygium grading, morphology, vascularization and progression; manifest refraction, fundus examination and keratometry. The patient was advised regular follow up on postoperative day as well as on1st week and 6th week after surgery. The tests were repeated on the 6th postoperative week.

Surgical Procedure
Procedure employed for the removal of pterygium was EXCISION AND AUTO GRAFTING WITH SUTURES.

Calculation Of Net Decrease In Astigmatism
The net decrease in astigmatism post-operatively was done by subtracting the amount of astigmatism prior to and after surgery which is here done by excision and autografting with sutures, regardless of the change in axis.The follow up was done till six weeks post-operative as a few studies demonstrated stabilisation of refraction to a maximum at six weeks after surgery. This can be substantiated by the study mentioned below:

The refractive components were demonstrated to stabilize at 1.5 months following pterygium surgery in our study which is consistent with study done by Tomidokoro A et al in which there was a demonstrable stabilization of the refractive components at 1.5 months following pterygium surgery.[19] Keratometry readings were taken using Bausch and Lomb manual keratometer.

3. Results

Table 1: Astigmatism according to Grade of Pterygium

Grade of Pterygium	Number of Patients	Pre-OP Mean Astigmatism/-SD	Post-Op Mean Astigmatism+/-SD	pValue
I	6	2.13 +/- 1.43	0.83 +/- 0.54	>0.05
II	35	2.88 +/- 0.44	1.49 +/- 0.84	<0.05
III	39	4.28 +/- 0.60	1.61 +/- 0.69	<0.05
IV	20	6.57 +/- 0.92	2.74 +/- 1.15	<0.05

Grade of pterygium has a significant correlation with astigmatism. Pre-operatively as the grade of pterygium increased there was an increase in astigmatism

Table 2: Astigmatism following pterygium excision

	Pre-op mean Astigmatism +/- SD	Post-op mean Astigmatism +/- SD	p value
Change in Astigmatism in the Study Population	4.61 +/- 1.70	1.93 +/- 1.1	<0.05

There was a significant change in astigmatism postoperatively which was calculated at 6 th postoperative week.

4. Discussion

Pterygium is a common external eye disease affecting population worldwide especially in the tropical and the subtropical areas. It remains an enigma, as actual pathogenetic mechanism of this condition remain unknown.

There are several options for surgical management of pterygium. Surgical excision is the only satisfactory treatment.[8] The most preferred surgical procedure is pterygium excision with conjunctival limbal autografting using sutures mainly because of its lower recurrence and complication rate. [9]

The limbus may also be a source of conjunctival stem cells. The limbal stem cells are solely responsible for corneal epithelial renewal and regeneration, and functioning as a barrier, thus preventing conjunctival epithelium from growing onto cornea.[10]

The present study covered a total of 100 patients who underwent planned elective surgery for primary pterygium which was excision followed by autografting with sutures. Astigmatism assessment was done both pre and post-operatively mainly based on keratometry and refraction testing.

Age:
The prevalence of pterygium increases with age [11] Mackenzie et al [12] found that individuals in their third decade of life who work outdoors in environments with high surface reflectance have a higher risk of developing pterygium compared to those who work indoors.

In the present study, we had 5 patients in the 21–30 years age group, 32 patients in the 31–40 years age group, 25 patients in the 41–50 years age group, and 38 patients in the 51–60 years age group.

This suggests that the working-age population, particularly those exposed to external environments and dust, may be more prone to developing pterygium.

Sex:
In the present study, among 100 patients we had 54 males and 46 females. Males due to greater exposure to wind, dust, heat and sunlight in outdoor activities have higher incidence of pterygium. Therefore, the chief factor which is atmospheric irritants exposure described in etiology leads to chronic conjunctival irritation. Parthasarthy &Gupta [13] also concluded that males suffered more than females. In this study the male female ratio difference was not much due to small study size.

Grade of pterygium:
In the present study, among 100 patients grade I pterygium was found in 6 cases, grade II in 35 cases, grade III in 39 cases and grade IV pterygium in 20 cases. As the grade of pterygium increased there was an increase in astigmatism. The change in postoperative astigmatism was also higher as the grade of pterygium increased due to high initial grades of astigmatism. Yaycioglu et al. concluded that, increased preoperative astigmatism is directly related to an increase in pterygium size. [14]

Laterality:
In our present study 37 cases presented with pterygium in the right eye and 53 cases in the left eye and in both eyes in 10 cases. Of these 73 cases presented with nasal pterygium and 27 cases with temporal pterygium (double headed pterygiums were excluded from the study sample). Higher incidence of nasal pterygium was due to tear flow towards the medial canthus carrying along with it dust particles and sand towards the nasal side.

Another theory of nasal predominance explained by Archilla et al [15] was due to UV light transmission on to the nasal aspect of the eye from the temporal side of the cornea through stroma.

Astigmatism:
The type of astigmatism that pterygium causes in most of the cases is with the rule. This astigmatic mechanism is due to mechanical pulling which results in a localized flattening of corneal horizontal meridian occurring up to leading apex of pterygium. [16]

However, pterygium can induce both against the rule and also oblique astigmatisms.[17] In this present study, preoperative mean refractive astigmatism was 4.61 +/-1.70 D which reduced postoperatively to 1.93 +/-1.10 D after pterygium

excision (having a significant p value of <0.05). These results were consistent with that of Sejal Maheshwari.[18]

An analysis of 36 eyes having primary pterygium with a pre-operative astigmatism of 2D and more was done by Sejal Maheshwari [18] and were observed after pterygium excision. There was a decrease in pre-operative cylinder from 4.60+/-2D to 2.20+/-2.04D after pterygium excision.

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Author Profile

Dr. Daggula Devi Bharathi an ophthalmologist specializes in medical retina, refractive surgeries, intravitreal injections, and glaucoma treatment. She holds an M.B.B.S. from Dr. Pinnamaneni Siddhartha Institute of Medical Sciences (2015), an M.S. in Ophthalmology from Katuri Medical College (2019), and a Fellowship in Medical Retina from Sri Kiran Institute of Ophthalmology (2020). Her expertise includes LASIK, PRK, and advanced retinal procedures, with notable research on Apert’s Syndrome and Retinitis Pigmentosa with Bilateral Irido-Fundal Coloboma. Dedicated to innovation in ophthalmic care, she continues to advance vision science through research and surgical excellence.