

Alteration in corneal astigmatism and tear stability in patients undergoing surgical excision of pterygium- a prospective study undertaken in a tertiary centre in south Kerala

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Abstract

Alterations in corneal astigmatism and tear stability in patients undergoing surgical excision of pterygium: a prospective study undertaken in a tertiary centre in south Kerala.

Objective: To analyse the effect of surgical intervention on corneal astigmatism & tear stability in patients with pterygium.

Methodology: In this prospective observational study conducted in ophthalmology department, Dr. SMCSI Medical College, Karakonam, 39 eyes with primary pterygium enrolled between January 2016 to May 2017 for pterygium excision with conjunctival autograft, were analysed. Preoperatively and one month post operative. Uncorrected & best corrected visual acuity, keratometry readings (K1, K2) was recorded. Pterygia were graded as grade I, II, III & IV. TBUT and Schirmer's test used to measure tear function. Descriptive measures were calculated using percentage or mean (SD). Pre-operative and post-operative difference in values of astigmatism and tear function tests were assessed using test of significance, paired t-test.

Results: Of the patients enrolled with primary pterygium, 56.4% (22) were females and 43.6% (17) males. 42% had right eye pterygium and 58 % in the left. 84.3 % (33) were nasal, 12.8% (5) temporal and 2.6 % (1) double pterygium. 76.9 % (30) were grade II, 10.3% (4) grade III, 12.8% (5) grade IV. There was a reduction in astigmatism from 2.29 +/- 1.4D to 1.02 +/- 0.74D (p<0.001). However, the alteration in preoperative and post operative tear function tests was insignificant.

Conclusion: Surgical intervention proved beneficial for patients with pterygium in terms of reduction of refractive astigmatism. A statistically significant change was not observed in tear function.

Keywords: Astigmatism, Conjunctival autograft, Pterygium, Tear function.

Introduction

Pterygium is a wing shaped fold of fibro vascular tissue that arises from the interpalpebral conjunctiva which may encroach onto the cornea.¹⁻² Prevalence rates for pterygium are seen to change from place to place,³⁻⁸ and are more common within 300 above and below the equator, making it fairly common in India, which is located within the tropics.² An epidemiological study undertaken in one of the tropical islands in the Indonesian archipelago, revealed the overall prevalence rate of pterygium to be 17%,⁹ and the prevalence was as high as 11.7% in a recent population based study conducted in Andhra Pradesh.¹⁰

Although pterygium continues to be an enigma and various theories have been postulated regarding its origin, one of the current beliefs is that pterygium is a growth disorder characterized by conjunctivalisation of the cornea due to localized ultraviolet induced damage to the limbal stem cells.¹¹⁻¹² Ultraviolet light and environmental factors do play an important role in the pathogenesis of pterygium but interestingly only some people, not all, living under the same conditions develop pterygium, suggesting role for other factors as well. Inadequate tear film stability in Pterygia patients has been documented by Kadayifcilar¹³ and Ishioka¹⁴ in their study on changes in tear film after primary pterygium excision, suggesting that abnormal tear function may be, yet another risk factor related to

pterygium development. However, in a more recent study on Tear function and goblet cell density after pterygium excision, Li M et al, have been able to demonstrate that it is the pterygium that alters the tear film and not the other way round.¹⁵

The commonly accepted treatment for pterygium is its excision and multiple surgical approaches have been developed over the years. Surgery is undertaken either when the pterygium threatens the visual axis, induces corneal astigmatism, causes irritation and inflammation and for cosmesis.¹⁻²

Pterygia are notorious in distorting the corneal contour thereby disturbing the visual axis and causing astigmatism. It has been suggested that the pterygium induces astigmatism by various mechanisms. These include (a) mechanical traction exerted by the pterygium on cornea, (b) pooling of the tear film at the leading edge of the pterygium.¹⁶⁻¹⁸ Pterygium-induced astigmatism can be the cause of subjective visual complaints, including decreased visual acuity, glare sensitivity and monocular diplopia.¹⁹ Rana, Altan-Yaycioglu et al, in their study comparing astigmatic changes using 5 techniques for excision of pterygium, concluded that irrespective of which technique is being used, successful surgical excision results in reduction of corneal astigmatism to an acceptable level.²⁰

It is known that pterygium exert mechanical traction onto the cornea there by distorting its surface

and inducing corneal astigmatism. Pterygium has also been closely linked with tear film instability. Though common 30⁰ above and below the equator, making it common in India, published Indian studies on the effect of pterygium on astigmatism and tear function are limited.

Objective

To analyse the effect of surgical intervention on corneal astigmatism & tear stability in patients with pterygium.

Materials and Methods

Study Design: Descriptive (prospective observational).

Study Setting: Ophthalmology department of Dr. SMCSI Medical College, Karakonam, Thiruvananthapuram.

Study Period: January 2016 to May 2017.

Tools Used: Snellen's chart with trial set, autokeratometer (Topcon Kr 8800), streak retinoscope, slit lamp bio-microscope (Zeiss), fluorescein sodium strip for measuring the tear film break up time (TBUT) and Schirmer's tear test strips for the Schirmer's test were tests for analyzing the tear function, Proforma: patient data vital to the study will be entered by the examiner.

Study Population: All patients visiting the Ophthalmology outpatient department.

Inclusion Criteria: Patients above 20yrs of age with pterygium, willingness for surgery.

Exclusion Criteria: Ocular pathologies like cataract, glaucoma or retinal disease that have an effect on their visual acuity, other corneal pathology causing corneal astigmatism, prior ocular surgeries within last 2 months, Extensive contact lens wear, pemphigoid, Sjögren's syndrome, and conditions causing dry eye.

Data Collection: Tools & technique: a semi-structured questionnaire was utilized for entry of data. Patients underwent a comprehensive eye examination preoperatively and one month post operatively. This comprised visual acuity assessment both uncorrected (UCVA) and best corrected (BCVA) using Snellen's Chart for distant vision, wet streak retinoscopy and Auto Refractometer (AR). Astigmatism measurement as cylindrical correction obtained based on subjective and objective refraction. Keratometric values K1, K2 using auto keratometer. Slit lamp biomicroscope for anterior segment, pterygium grading and dilated fundus examination. Pterygia were graded accordingly: Grade I (crossing limbus), Grade II (midway between limbus and pupil), Grade III (reaching up to pupillary margin) Grade IV (crossing pupillary margin)

Tear function evaluation: Tear film break-up time measurement with fluorescein and the Schirmer test without topical anaesthesia was performed. The Schirmer test result was expressed as the wet length of the Schirmer strip measured after 5 minutes when inserted on the junction of middle and outer 3rd of lower

lid and expressed in millimetres (less than 10 mm of wetting after 5 minutes was considered abnormal).

Surgical procedure. Patients underwent pterygium excision with CAG (conjunctival autografting). The head and cap of the pterygium grasped with Collibri's forceps and pterygium dissected from the cornea up to the limbus. Subconjunctival pterygium tissue and superficial conjunctiva in the area of the head of the pterygium excised. Superficial conjunctiva in the superotemporal area of the eye ball is raised with a subconjunctival injection of saline and conjunctival graft of the appropriate size to cover the scleral defect will be cut out. The graft placed on the area of the bare sclera and anchored using 10-0 nylon sutures.

Data Analysis: Statistical data were entered into excel sheet and was analyzed using SPSS version 22. Descriptive measures were calculated using percentage or mean (SD). Pre-operative and post-operative difference in values of astigmatism and Tear Function tests were assessed using test of significance, paired t-test.

Results

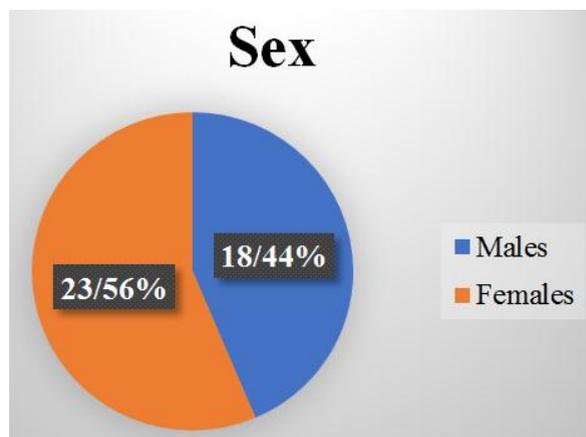


Fig. 1: Male to female ratio

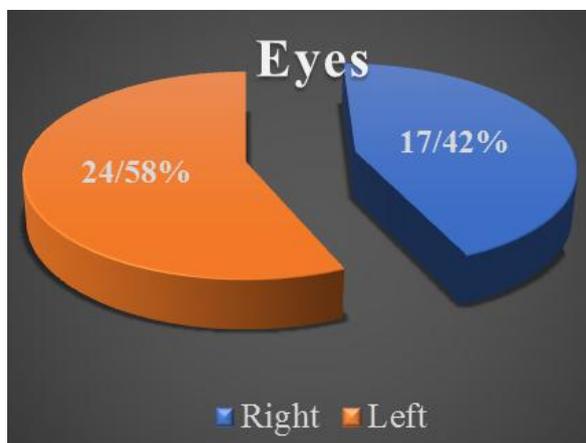


Fig. 2: Laterality

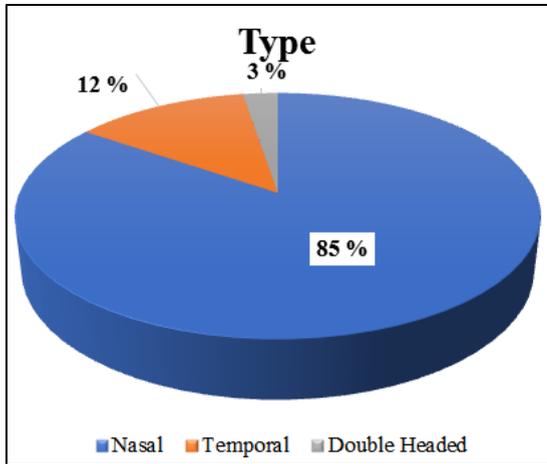


Fig. 3: Nasal/ temporal/double pterygium

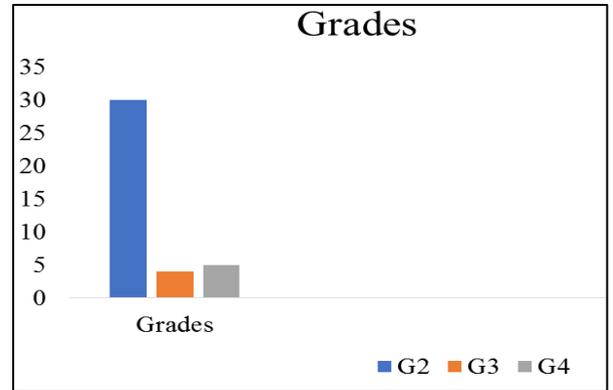


Fig. 4: Grading of pterygium

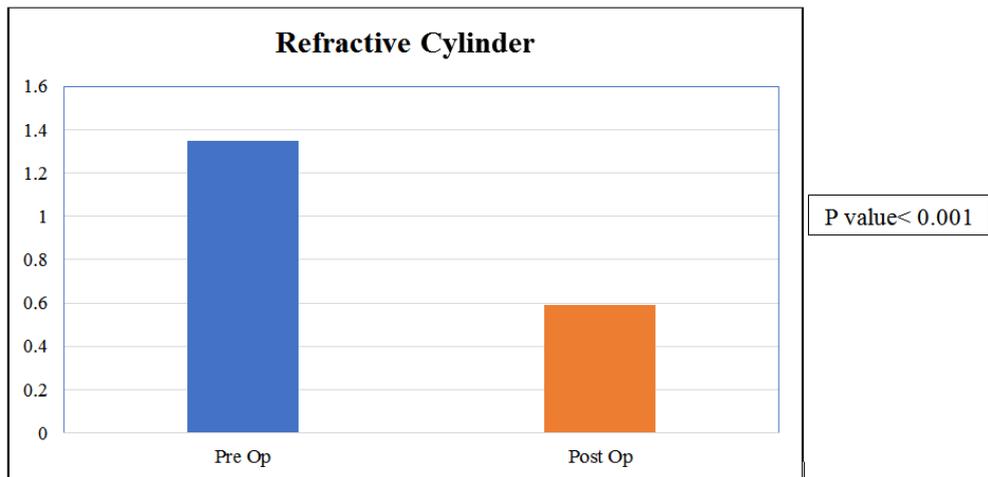


Fig. 5: Reduction in refractive cylinder following surgery

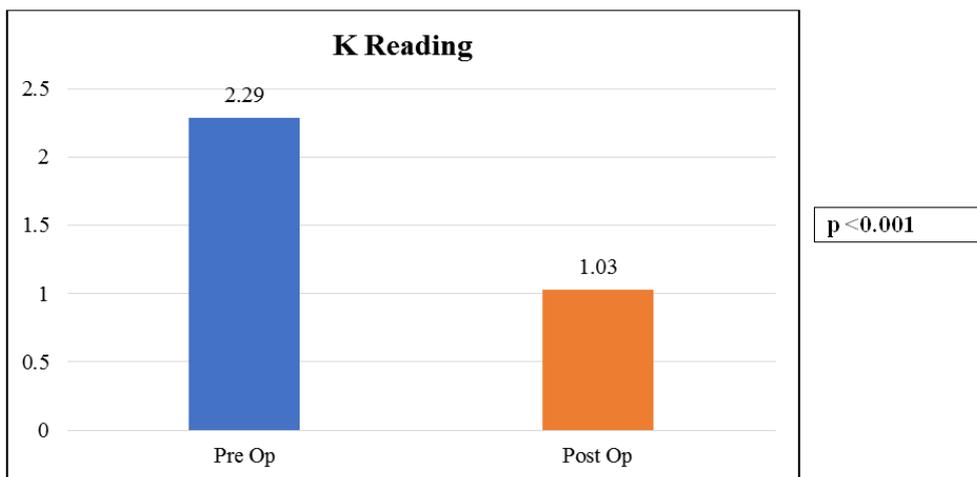


Fig. 6: The reduction in keratometric value following surgery

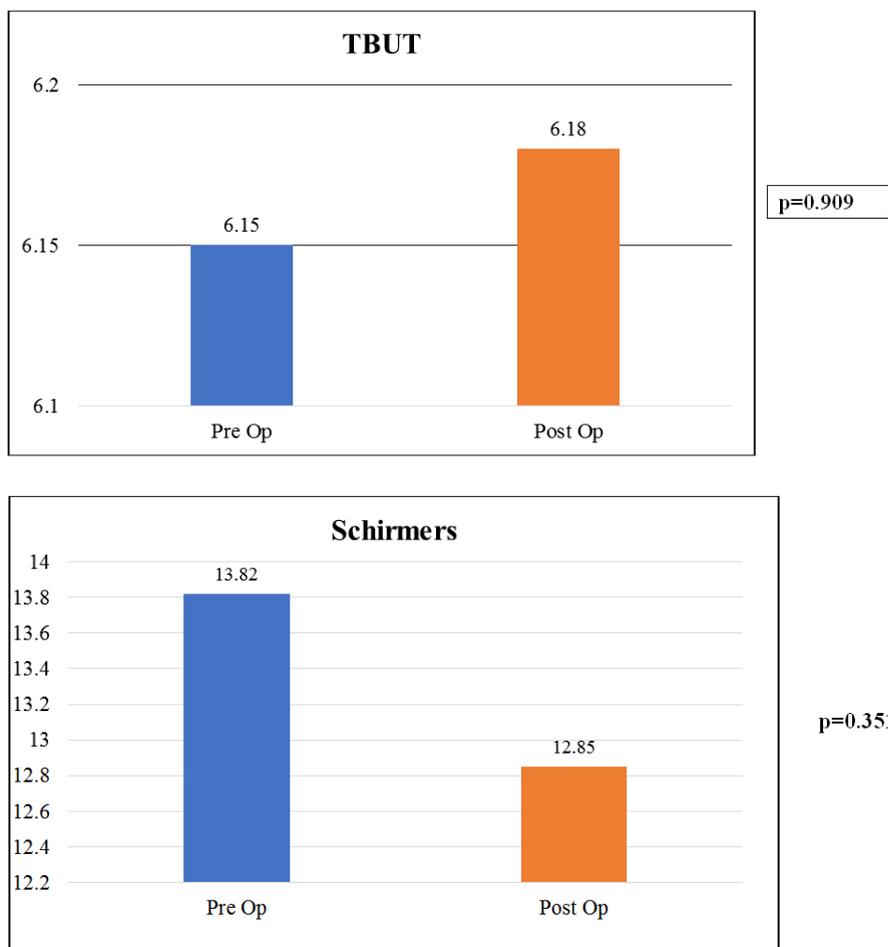


Fig. 7: Change in TBUT following surgery

Discussion

Pterygium is known to distort the corneal contour and thereby disturb the visual axis and causing astigmatism. It has been suggested that the pterygium induces astigmatism by various mechanisms like exerting mechanical traction on the cornea and pooling of the tear film at the leading edge of the pterygium.

Pterygium induced astigmatism can be the cause of subjective visual complaints, including decreased visual acuity, glare sensitivity and monocular diplopia.

The present study was able to demonstrate a statistically significant reduction in refractive cylinder following excision. The mean pre operative refractive cylinder was 1.34D which reduced to 0.58 D post operatively (p<0.001).

This followed a similar trend to the following Indian Studies.

S. Maheshwari et al: preoperative refractive cylinder was 4.60 ± 2 D, which improved to 2.20 ± 2.04 D.¹⁸

R. Kujur et al: The mean preoperative refractive cylinder decreased from 3.29±1.46 D to 1.49±0.82 D postoperatively.²²

Rana Altan et al: Preoperatively, the mean astigmatic value was 3.47 ± 2.50 D decreased to 1.29 ± 1.07 D.⁵

However, a similar pattern could not be established with regard to tear film stability.

Despite extensive literature review, similar studies from India examining the effect of pterygium on tear functionality were not found. Stating below international studies conducted with this regard.

Kadayifcilar et al (1998): 70 eyes; case control study (cases=patients with pterygium; controls: healthy subjects)- showed significant alteration in the case group.¹

Ergin a et al (2001): 84 eyes; case-control study; were not able to show any difference in tear function between cases and controls.²¹

M.Li et al (2007): 70 eyes with primary pterygia underwent a bare-sclera procedure. TBUT, Schirmer’s, and tear-ferning tests and conjunctival goblet cell density obtained by impression cytology were evaluated before and 1 month after surgery. The TBUT (11.493.76 s) one month after surgery was significantly prolonged compared to the pre operative period (9.743.43 s, P=0.002) but Schirmer values remained unchanged.^{3,15}

The small sample size, single post-operative evaluation at one month was some of the limitations of this study. Larger sample size and long term follow up would have been more conclusive. Inaccessibility of corneal topography was yet another shortcoming which would have helped in measurement of corneal astigmatism in an improved manner.

Conclusion

Successful pterygium surgery reduces the pterygium-induced refractive astigmatism thereby improving visual acuity. On the other hand, a statistically significant change could not be noticed with tear function in the one month post-operative period.

Further follow ups and similar studies will have to be undertaken to confirm or refute our findings.

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