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ASTIGMATISM AND VISUAL ACUITY BEFORE & AFTER PTERYGIUM EXCISION FOLLOWED BY SUTURELESS AND GLUEFREE CONJUNCTIVAL AUTOGRAFT

Ophthalmology

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ABSTRACT

Background: Pterygium is a common disorder of ocular surface in many parts of world described as ophthalmic enigma & is a potentially blinding disease in the advanced stage when it encroaches visual axis which can have significant impact on vision and require surgery for visual rehabilitation.

Aim: To compare change in refractive astigmatism and visual acuity before & after pterygium excision followed by sutureless and gluefree conjunctival autograft.

Materials & Methods: The prospective, comparative study was carried out on 90 primary unilateral pterygium patients.Visual acuity & refractive astigmatism were assessed pre-operatively & post–operatively on 2nd month follow up.Pterygium excision followed by sutureless & gluefree conjunctival autograft was the surgical technique used.

Results: Grade II pterygium comprised 32 (35.56 %) patients followed by 30 (33.33 %) patients which were of grade I.The pre operative mean refractive astigmatic value was more in grade IV pterygia i.e. 4.25 ±0.59 D which was decreased to 1.83 ±0.83 D postoperatively followed by grade III pterygia which had preoperative mean astigmatic value 4.02 ±0.51 D reduced markedly up to 1.38 ±0.58 D postoperatively.

Conclusion: The present study concludes that reduction in refractive astigmatism occurs after pterygium excision followed by sutureless & gluefree conjunctival autograft with improvement in visual acuity with additional benefit of lowest recurrence rate.

KEYWORDS

Astigmatism, Pterygium, Visual acuity

Introduction:

Pterygium is a slightly elevated peribulbar lesion for which thousands of years of struggle had been done by physicians.[1] The word pterygium derives from Greek word "Pteryx". Due to its resemblance to a nail in its shape, in Hindi it is called 'Nakoona' in India.[2] Pterygium which leads to significant astigmatism is actually a wing shaped, triangular, degenerative, fibrovascular connective tissue of bulbar conjunctiva which moves towards & onto the cornea. Pterygium is attributed to dry, dusty and hot climate. Recent studies suggests that damage to limbal stem cells & activation of matrix metalloproteinase due to UV rays triggers pterygium occurrence. The pterygium leads to destruction of bowman's layer & the superficial corneal lamellae by invading the superficial peripheral cornea.[3] Pterygium induce a significant amount of astigmatism by causing corneal distortion. The effect of pterygium on the corneal refractive status has been measured by refraction, keratometry & corneal topography. A pterygium generally causes localized flattening central to its apex along the horizontal meridian, it usually causes with-the-rule corneal astigmatism.[4] Pterygium induced astigmatism and involvement of the visual axis by the invading pterygium is one of the leading indications for pterygium surgery as this result in significant visual impairment. Pterygium excision usually induces a reversal of pterygium-related corneal flattening. Consequently, successful pterygium surgery should reduce pterygium induced refractive astigmatism & improve visual acuity.[3] To reduce astigmatism, improvement in visual acuity with additional benefit of low recurrence rate pterygium excision followed by sutureless & gluefree conjunctival autograft can be considered as a better technique.[5] To see change in refractive astigmatism & visual acuity before and after pterygium excision the present study had been done.

Material and method:

It is a hospital-based prospective, comparative study conducted in the department of Ophthalmology of a tertiary care hospital in Jammu over a period of 1 year on 90 patients having primary pterygium. Informed written consent was obtained from all the patients before inclusion in the study.

Inclusion criteria: Patients of either sex presenting with pterygium during study period.

Exclusion criteria: Subject with systemic diseases\syndromes associated with dry eye, subject on systemic medication that leads to ocular drying, contact lens users, subjects having other adnexal disease, anterior or posterior segment disease which alters tear secretion and stability, patients having recent ocular surgery, patients on topical antiglaucoma medications that leads to ocular drying, recurrent pterygium, patients with scarred superior conjunctiva, patients with pseudopterygium or signs of malignancy over pterygium, those who did not gave consent. After obtaining ocular and systemic history, ocular examination was done which included Snellen's visual acuity, manifest refraction and slit lamp anterior segment examination. The size of the pterygium was measured using the slit lamp biomicroscope by projecting a horizontal slit beam from the limbus to the apex of the pterygium and recording the length in millimeters.

Pterygium is graded[6] as follows:
Grade I: Apex crossing limbus.
Grade II: Apex midway between limbus and pupil.
Grade III: Apex reaching up to pupillary margin.
Grade IV: Apex crossing pupillary margin.

Following tests were performed:Tear film break up time (TBUT) ,Schirmer's test, Rose Bengal Staining.

Manual keratometry (Bausch and Lomb) was performed preoperatively. All the patients underwent pterygium excision followed by conjunctival autograft surgery.[6] Surgeries were performed by same surgeon. Keratometry was performed 2 months post operatively by same keratometer .

Statistical Analysis: Data analysed with the help of computer softwere MS Excel/SPSS version 19.0 for windows. Pre & post astigmatic values are reported as mean±standard deviation & their statistical significance was evaluated using mixed method repeated measures analysis of variance. Post-hoc comparison between grades were assessed by bonferroni t test. P value < 0.05 was considered as statistically significant. All P values reported are two tailed.

Observation & Results:
Following observations were made during study period:
Table No. 1 shows that grade II pterygium comprised 32 (35.56 %) patients while 30 (33.33 %) patients were of grade I followed by 22 (24.44%) patients had grade III and 6 (6.67%) had grade IV pterygium.

Table-1 & Fig.1 displays the amount of pterygium induced astigmatism preoperatively and postoperatively. In grade I pterygia mean preoperative astigmatism was 1.13 ± 0.34 D which reduced postoperatively 0.37 ±0.22 D whereas in grade II pterygia the mean preoperative astigmatism was 2.51 ±1.35 D & postoperative value was 0.57 ±0.51 D. In grade III pterygia preoperative mean value was 4.02 ±0.51 D which reduced markedly up to 1.38 ±0.58 D postoperatively while in grade IV pterygia pre operative mean refractive astigmatic value was 4.25 ±0.59 D decreased to 1.83 ±0.83 D postoperatively.

Table No. 2 shows preoperative visual acuity of 6/6-6/12 was seen in 52(57.78%) patients, 6/18-6/60 in 38(42.22%) patients whereas postoperatively 82(91.11%) patients had visual acuity of 6/6-6/12 & 8 (8.89%) had 6/18-6/60.

Discussion:
Pterygium is a very common degenerative condition seen in the Indian subcontinent. It results with-the- rule astigmatism by causing mechanical flattening of the horizontal axis. Also, the size of pterygium is directly propotional to the amount of corneal astigmatism induced by it i.e. larger is the size more will be astigmatism. Moreover, it is the length of pterygium on the cornea and its total area that have the strongest correlation with the induced astigmatism in comparison to its width & area.[6] Several mechanisms have been suggested to explain the induced astigmatism which include (a) pooling of the tear film at the leading edge of the pterygium (b) mechanical traction exerted by the pterygium on cornea.[3] In the present study an attempt was made to assess the effect of pterygium excision followed by sutureless & gluefree conjunctival autograft on the pterygium induced astigmatism.
In the present study grade II pterygium comprised 32(35.56 %) patients followed by grade I which comprised 30 (33.33 %) patients. Gahlot A et al in their study found maximum number of patients 21 (52.5%) belonged to Grade II pterygium which severely effects vision.[6] This observation was also seen by Maheshwari S. in a study on 36 eyes where Grade II type pterygium comprised 44.45%.[7] Shelke et al. also found maximum number of patients (33 eyes) belonged to Grade II pterygium (51.4%) in their study which has a significant impact on vision.[4] Bhargava P et al found 23.07 % patients had grade II pterygium in their study.[3] Large number of patients reporting in grade I pterygium in present study was due reason that maximum patients belonged to younger age group who were coming to hospital for cosmetic purpose.

As seen in the present study, the mean preoperative astigmatism in grade I pterygia was 1.13 ± 0.34 D which reduced to 0.37 ±0.22 D postoperatively. In grade II pterygia the mean preoperative astigmatism was 2.51 ±1.35 D and postoperatively was 0.57 ±0.51 D. In grade III pterygia preoperative mean value was 4.02 ±0.51 D which reduced markedly up to 1.38 ±0.58 D postoperatively while in grade IV pterygia preoperative mean refractive astigmatic value was 4.25 ±0.59 D decreased to 1.83 ±0.83 D postoperatively. In grade I pterygia sample size was good in the present study as compared to other studies.[3,4] Moreover large sample size in grade I & grade II gives adequate power. Hansen et al. reported that pterygium greater than 3.0 mm induced 1.97 D of astigmatism versus 1.11 D in less than 3 mm.[8] Astigmatism of 2 D or more in pterygium with length greater than 2.25 mm had been reported by Kampitak in a study.[9] Sadhu J et al found that preoperative average astigmatism was 2.50±1.92 D and post operative avg. astigmatism 0.99±0.91 D in their study.[1] Gahlot A et al in their study found preoperative mean astigmatism was maximum in Grade IV pterygium i.e. 5.58 ± 0.42 diopter and post-operatively it was found to be decreased significantly (P < 0.001) i.e. 2.86 ± 0.75 diopter. In Grade III pre-operative mean astigmatism was 4.25 ± 0.54 diopter & postoperatively it was found to be decreased significantly (P < 0.001) i.e. 1.79 ± 0.76 diopter. In Grade II type pre-operative mean astigmatism was 2.54 ± 0.57 diopter, which was reduced postoperatively up to 0.87 ± 0.37 diopter significantly(P < 0.001).[6] Bhargwa P et al in their study found preoperative mean astigmatism was high in grade IV pterygium 4.28 ±2.534 D & post operatively it was 1.847±1.714 D (p value was very significant). The preoperative mean astigmatism observed in grade III pterygium was 2.72 ±1.470 D while post operative astigmatism was 0.76 ±0.487 D (significant p value). In grade II pterygium preoperative mean astigmatism value was 1.104 ±0.711 D & post operatively astigmatism was 0.333 ±0.492 D (significant p value). Grade I pterygium preoperative mean astigmatism value was 1.12 ± 1.23 D while post operatively value reduced to 0.36 ±0.46 D. Patients with grade I pterygium underwent surgery for cosmetic purpose.This shows that as the grade of pterygium increases, the amount of astigmatism also increases in the same proportion.[3] Similar observations were found in the study of Maheshwari S.[7] Shelke E. al in their study found preoperative mean astigmatism was maximum in Grade IV pterygium i.e. 9.58 ± 0.62 diopter & post-operatively it was found to be decreased significantly ($P < 0.001$) i.e. 2.66 ± 0.75 diopter. In Grade III, pre-operative mean astigmatism was 4.00 ± 0.57 diopter & postoperatively it was found to be decreased significantly ($P < 0.001$) i.e. 1.89 ± 0.64 diopter.In Grade II type, pre-operative mean astigmatism was 2.46 ± 0.54 diopter, which was reduced postoperatively up to 0.97 ± 0.27 diopter significantly ($P < 0.001$).[4]

Present study shows preoperative visual acuity of 6/6-6/12 was seen in 52(57.78%) patients which was improved to 82(91.11%) postoperatively while 8 (8.89%) did not showed any improvement due to cataract/ARMD/ astigmatism. Shelke E. al in their study found that 23 cases (75.68%) reported improved visual acuity on Snellen's chart, while 8 cases (21.62%) showed unchanged & 1 case (2.70%) showed decline in vision.[4] Gahlot A et al in their study found that 31 cases (77.5%) reported improved visual acuity on Snellen's chart while 9 cases (29.03%) showed unchanged vision.[6] Bhargwa P et al found improvement in vision in 61.53 % and in 38.46 % the vision was unaltered in their study.[3] Allan et al in their study compared unaided preoperative visual acuity with post-operative visual acuity (3 months) & found that unaided visual acuity have either unchanged or improved in 86 cases while 7 eyes showed no change in unaided visual acuity.[10]

No serious intra operative and post operative complications attributed to pterygium excision following sutureless and gluefree conjunctival autograft was seen.

Conclusion:
From present study, we may conclude that pterygium induced refractive astigmatism reduces after pterygium excision followed by sutureless and gluefree conjunctival autograft with lower recurrence rate and improved the visual acuity either by reducing the astigmatism or by removal of the pterygium from the visual axis as seen in Grade IV

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Declaration:
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Table no. 1 Comparison of pre-operative & post-operative astigmatism.

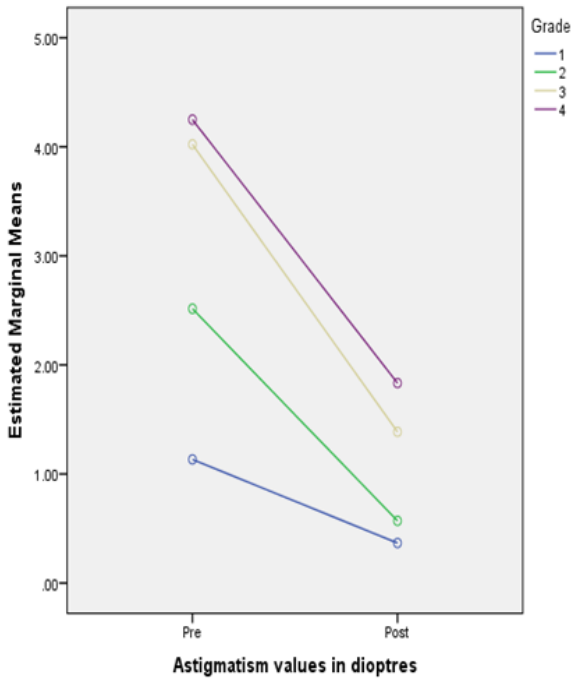
Grade of pterygium	No.of patients (%)	Pre-operative Mean astigmatism ± S.D	Post-operative Mean astigmatism ± S.D	Statistical Inference*
I	30 (33.33)	1.13±0.34	0.37±0.22	F(1,86) 472.8 P value <0.0001
II	32 (35.56)	2.51±1.35	0.57±0.51	
III	22 (24.44)	4.02±0.51	1.38±0.58	
IV	6 (6.67)	4.25±0.59	1.83±0.83	

*Mixed method repeated measures ANOVA

Table no. 2 Comparison of pre-operative & post-operative visual acuity

Visual acuity	No. of patients (Pre-operative)	No. of patients (Post-operative)
6/6-6/12	52(57.78%)	82(91.11%)
6/18-6/60	38(42.22%)	8(8.89%)
total	90	90

Fig.No.1 Comparison of pre-operative & post-operative astigmatism in all grades graphically.



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