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RELATIONSHIP OF PTERYGIUM MORPHOLOGY AND SIZE TO ASTIGMATIC CHANGES AND EFFECT OF EXCISION OF PTERYGIUM ON INDUCED ASTIGMATISM.

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ABSTRACT

Aim : To study the effect of size of pterygium and pterygium excision on pterygium induced astigmatism.
Methods: Retrospective study involving 52 eyes undergoing pterygium excision with conjunctival grafting with 6 month follow up.
Results: 86.53% eyes had nasal pterygium with Grade II pterygium was noted in >50% cases. Primary pterygium induced with the rule astigmatism (WTA). The amount of astigmatism varied signifiactly with the grade of pterygium. (P< 0.0005). Mean astigmatism with grade II pterygium was 1.72D, grade III pterygium was 4.52D and 6.5D in grade IV pterygium cases. 13.77% eyes with double pterygium had mean astigmatism of 2.87D WTA. At one month postoperative follow up,mean astigmatism improved significantly in all the 52 eyes from 3.9D WTA to -0.26D (Against the rule astigmatism). (P< 0.0005).
Conclusion: This study confirms that Pterygium excision surgery significantly reduces induced astigmatism which is proportional to the size of pteryium.

KEYWORDS : pterygium, pterygium induced astigmatism, pterygium excision

Introduction:
Pterygium, from the Greek pterygos meaning "wing", is a common ocular surface lesion originating in the limbal conjunctiva with a characteristic wing-like fibrovascular conjunctival growth within the palpebral aperture and extending onto the corneal surface. The lesion occurs more frequently at the nasal limbus than the temporal. It has triangular shape with the apex, or head, extending onto the cornea.

Pterygium is graded into four types as follows: Grade I –crossing limbus, Grade II - head of the pterygium present between a point midway between limbus and pupillary margin (nasal pupillary margin in case of nasal pterygium and temporal margin in case of temporal pterygium), Grade III - crossing pupillary margin and Grade IV – crossing the whole pupil[1].

The indications for pterygium surgery are (a) pterygium either invading or threatening visual axis; (b) visual impairment due to astigmatism; (c) irritative symptoms and inflammation; (d) restricted movements; and (e) cosmesis [2] . Vision may be reduced due to direct invasion of the visual axis or astigmatism induced by the pterygium.

Several mechanisms have been suggested to explain the induced astigmatism. These include (a) pooling of the tear film at the leading edge of the pterygium,[3] and (b) mechanical traction exerted by the pterygium on cornea. This effect has been measured by keratometry [4] . In the present study an attempt was made to assess the relationship between the size of pterygium and the amount of astigmatism induced and the effect of pterygium excision on the induced astigmatism.

Material and methods:
Present retrospective case study was conducted in the outpatient department (OPD) of Ophthalmology of a tertiary care hospital and medical college in Western Maharashtra from 01/07/2018 to 31/12/2018.The study included 52 walk-in patients, examined in the Ophthalmology OPD.

Examination included Best corrected visual acuity, keratometry and slitlamp examination pre-operatively, and then at one and six months postoperatively.

The exclusion criteria included recurrent pterygium, corneal opacity or irregularity due to diseases other than pterygium, connective tissue disorders, systemic vasculitis, glaucoma, and diabetes mellitus. History of any prior ocular trauma, ocular procedure such as surgery or laser therapy was also asked for so as to exclude these patients from the study as they could confound ocular findings.

In each case, the pterygium excision and limbal conjunctival autograft were performed under topical anesthesia using 0.5% proparacaine hydrochloride. Briefly, the body of the pterygium was dissected and excised using Westcott scissors, and the head was dissected with a disposable Beaver surgical blade. Subconjunctival fibrovascular tissue was thoroughly removed. An autologous limbal conjunctival graft harvested from the supero-temporal bulbar conjunctiva was transferred onto the site where the pterygium had been removed. The graft was then anchored to the adjacent conjunctiva with fibrin glue.

Details of 52 such patients who fulfilled the inclusion and exclusion criteria were collected, analyzed and subsequently the results and conclusions were presented.

Continuous data has been expressed as mean(Standard deviation) and categorical data is summarised as frequencies and percentages. The normality of the data is tested by Shapiro-Wilk test. Bivariate comparisons are made by Paired t test. The continuous variables with repeated measures have been analysed by the Repeated measure ANOVA test. The paired t test is performed as a post hoc test for significant findings. p< 0.05 (2-tailed) was used to identify statistical significance. All analyses have been performed using IBM SPSS Version 21.0 and Microsoft Office Excel 2007.

Results:
Out of 52 patients, 25 were female patients and 27 were male patients with mean age of presentation as 50.6 years. (Table 1)

Table 1: Age and sex distribution of patients in study.

Age (yrs)	Male (n = 27)	Female (n = 25)	All participants (n = 52)
Mean (Standard deviation)	53.4 (2.2)	47.5 (2.3)	50.6 (1.6)
Range(Minimum – Maximum)	24 - 75	30 - 66	24 - 75

Nasal pterygium was present in 45 (86.53%) eyes with mean

preoperative astigmatism was 3.9 D WTA. None of the eyes had grade 1 pterygium. Grade II pterygium was most commonly noted in study which was found in 29 (55.8%) eyes. 14 (26.9%) eyes had grade III pterygium and only 2 (3.81%) eyes had grade IV pterygium. Whereas 7 (13.53%) eyes had double headed pterygium. (Table 2)

Table 2: Distribution of patients according to grades of pterygium

Grade of pterygium	No. of patients [n (%)]
II	29 (55.8)
III	14 (26.9)
IV	2 (3.8)
Double headed	7 (13.5)
All Cases	52 (100)

Pterygium induced with the rule astigmatism (WTA) in all the cases. The amount of astigmatism varied and increased with the grade of pterygium. Mean astigmatism with grade II pterygium was least i.e 1.72D +/- 0.86D WTA, 4.51D +/- 1.26D WTA in grade III pterygium and maximum i.e 6.5D +/- 0.07D WTA in grade IV pterygium cases where pterygium head covers pupillary axis.13.77% eyes with double pterygium had mean astigmatism of 2.87D +/- 3.38D WTA. The Grade of pterygium and pre-operative astigmatism are seen to have a strong positive correlation.Spearman's correlation coefficient is calculated. [N = 45. Spearman's rho = 0.794, **p <0.0005]**. The double headed pterygium cases are excluded.(Table 3)

Table 3: Corelation between grade of pterygium and pterygium induced astigmatism

Grade of pterygium	Mean pre operative astigmatism +/- SD	Mean pre operativeastigmatism vs grade of pterygium P value N= 45
II	1.72+/- 0.86	**P<0.0005**
III	4.51+/- 1.26	
IV	6.5+/- 0.07	

One month post pterygium excision astigmatism was calculated in all the patients. Astigmatism in Grade II pterygia improved to 0.03D +/- 1.1D and to 1.35D +/- 0.9D in grade III pterygium cases. In grade 4 pterygium after excision astigmatism improved from 6.5D +/- 0.7D WTA to 1.81D +/- 0.69D ATA. 13.77% eyes with double pterygium had mean astigmatism of 2.87D +/- 3.38D WTA which improved postoperatively to by 0.63D +/- 1.04D ATA at the end of 1 month.(Table 4) (ATA i.e against the rule astigmatism values are considered negative). Astigmatism was evaluated 6 months after pterygium excision surgey but no significant change in corneal astigmatism values was noted at 1st month and 6th month keratometry evaluation.

Table 4: Compaison between pre and post operative astigmatim with statistical significance

Grade of pterygium	Pre operative astigmatism Mean (SD)	Post operative astigmatismMean (SD)	p value
II	1.8 (0.9)	0.03 (0.7)	<0.0005*
III	4.5 (1.3)	1.3 (0.9)	<0.0005*
IV	6.5(0.1)	-1.18 (0.7)	<0.0005*
Double headed	2.87(3.4)	-0.63 (1.0)	<0.0005*
All Cases	3.9 (3.6)	-0.26 (0.7)	<0.0005*

*Significant at 0.05 level of significance

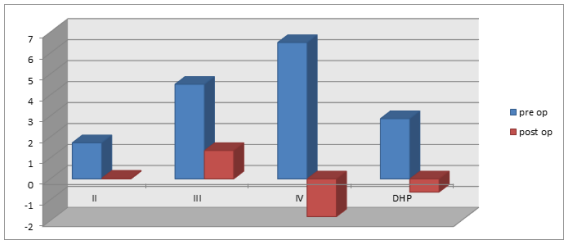
Discussion:

Pterygium-induced astigmatism can lead to visual complaints. Previous studies have shown pterygium induces WTA [5,6] . Lin et al [7] have reported that the pterygium begins to induce significant degrees of hemi-astigmatism once it reaches up to 45% of the distance from the limbus to the visual axis or within 3.2mm of visual axis. Such an observation was also made in the present series. With increase in the degree of corneal involvement, the induced astigmatism increased. The maximum degree of astigmatism was noted in eyes with grade IV pterygium (6.5 ± 0.7D) and least was noted in eyes with grade II pterygium (1.72 ± 0.86D). Strong statistical correlation was seen between grade of pterygium and induced astigmatism.(**P= <0.0005**). Eyes with double-headed pterygium had 3D of astigmatism; due to the increase in corneal involvement in double-headed pterygium resulting in higher induced astigmatism.

As observed in table 3, a statisticallysignificant decrease in induced astigmatism was observed in all grades of pterygium excision surgery. **(p < 0.0005).**

The present study verifies that as the size of pterygium increases, the amount of induced astigmatism increases in direct proportion. Successful pterygium surgery reduces the pterygium-induced refractive astigmatism and consequently improves the visual acuity.

Fig. 1: Change in Astigmatism following excision of pterygium



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