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Comparitive Study of Astigmatism before and After Pterygium Excision.

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Abstract*: Objective:To study the reversal of induced astigmatism by pterygium following its excision and conjunctival limbal autograft with no suture and no glue technique. Methods: 33 patients with nasal pterygium were included. All patients were examined and graded for the degree of pterygium, keratometry and visual acuity before and after the procedure. All patients underwent pterygium excision with conjunctival limbal autograft with no suture no glue technique by the same surgeon.Results :Amoung 33 patients ,16 patients with grade 1 and 17 with grade 2 were included.There was significant reduction of astigmatism post operatively in the form of reduction in the difference between K1 and K2 for Grade 1 (p= 0.001) and Grade 2 ptergia. (p< 0.001)The post operative difference of K1-K2 stabilizes at 1 month.Conclusion: There is significant improvement in post op visual acuity and induced astigmatism following pterygium excision .*

Key words: *Pterygium, Astigmatism.*

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I. Introduction

Pterygium is a fibroelastic degeneration of the conjunctiva with encroachment onto the cornea.It is a wingshaped overgrowth of fibrovascular connective tissue of the bulbar conjunctiva toward and onto the cornea. A pterygium generally causes localized flattening central to the apex of the pterygium. As this flattening is along the horizontal meridian, it usually causes with-the-rule corneal astigmatism.(1)

Once pterygia reach a critical size, they induce visually significant central with-the-rule astigmatic changes that may not be apparent by subjective refraction. (2)

The definitive treatment for pterygium at present is surgical excision, for which there are various techniques. These include the bare sclera, excision with conjunctival autografting or amniotic membrane transplantation and beta irradiation.(3)

Pterygium excision is indicated if it is progressive, visual axis is threatened; diplopia is induced due to extreme fibrosis, prior to LASIK. Early surgical intervention can, therefore, reduce effects of corneal morbidity due to pterygium induced corneal distortion and visual disturbance arising from the encroachment of the pterygium into the visual axis(1)

II. Materials and Method

This was a retrospective study of 33 patients with nasal pterygium were. Information obtained included age, sex, visual acuity before and after surgery, laterality of disease, position of pterygium on the cornea and keratometry readings before and after surgery. Patients had unaided and pinhole visual acuity tested at a distance of 6 m using Snellen's or tumbling "E" charts. Anterior segment examination was done using a slit lamp biomicroscope. Patients known to be using spectacle correction for high refractive error, and other ocular surface diseases ,pre-existing corneal opacities/scarring ,previous corneal surgeries, recurrent pterygium were excluded from the study.

On slit-lamp examination with slit beam focused on the nasal limbus, pterygium was graded depending on the extent of corneal involvement:

Grade I - between limbus and a point midway between limbus and pupillary margin i.e 0-2 mm area on the cornea.

Grade II - head of the pterygium present between a point midway between limbus and pupillary margin and pupillary margini.e Pterygium encroaching 2-4 mm area on the cornea.

Grade III - crossing pupillary margin i.e encroaching > 4 mm area on the cornea.

All patients underwent procedure by same surgeon under peribulbar block .After preparation of the eye, Neck of pterygium was cut and head was dissected gently off the cornea.Subconjunctival tissue was excised and bare sclera area was measured with callipers. The required amount of graft to cover the bare sclera was taken from

supertempoaral conjunctiva and placed on it maintaining limbus to limbus orientation.No suture or glue was used . Mild to moderate bleeding was allowed and not cauterised so it could act as a natural bioadhesive.
Post-operatively patient was put on a lubricant for six times and antibiotic steroid combination which was tapered over 4 weeks. Written and informed consent was taken from all the patients.
Visual acuity and keratometry was recorded pre-operatively. postoperative day 1, week1 and at the end of 1 month.Keratometry values were recorded using automated refractometer.
Statistical analysis:Was done using SPSS Software. Data analysed were mean, S.D , Paired t test

III. Results

A total of 33 subjects- 13 males and 20 females were included . The mean age was 47.6 years ± 11.25 years. 16 patients had Grade 1 and 17 had grade 2 pterygium.
There was significant improvement in Logmar visual acuity pre op and at post operative period at the end of 1 month.($p < 0.001$)

Table 1

Vision	Mean	Std. Deviation
Log(preop)	.1758	.24242
Log(postopday1)	.0727	.24402
Log(postop week1)	.0727	.24402

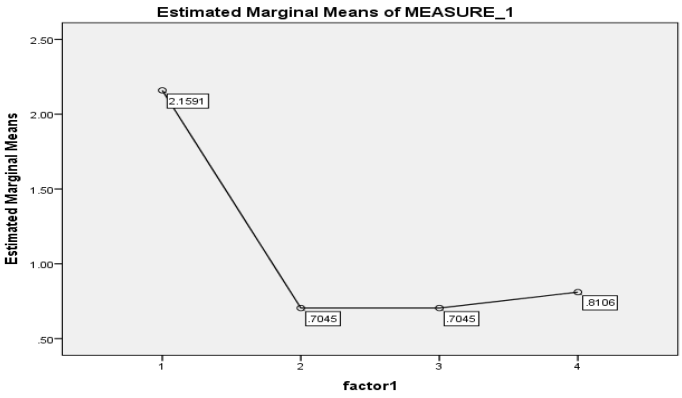
There was significant reduction of astigmatism post operatively in the form of reduction in the difference between K1 and K2 for Grade 1 ($p= 0.001$) and Grade 2 ptergia. ($p< 0.001$)

Table 2 showing the mean K1-K2 difference pre op and post operatively on day1, 1 week and 1 month.

Difference K1-K2	Mean	Std. Deviation
Pre op	2.1591	0.79750
Post op Day1	0.7045	0.32146
Postop Week 1	0.7045	.25353
Post op Month 1	.8106	.41940

Table 3: Shows grade wise difference in the mean K1-K2 difference pre op and post operatively on day1, 1 week and 1 month.

GRADE Difference K1-K2	Mean	Standard deviatoin
GRADE 1:		
Pre op	1.8594	0.83151
Post op day1	0.7344	0.33502
Post op 1 week	0.7344	0.28090
Post op 1 month	0.8906	0.56250
GRADE 2:		
Pre op	2.4412	0.67041
Post op day1	0.6765	0.31579
Post op 1 week	0.6765	0.22989
Post op 1 month	0.7353	0.20673



y axis – Difference K1 and K2
X axis – Time period (1,2,3,4- Pre op, post op day 1, post op 1 week, post op 1 month respectively)

IV. Discussion

A significant degree of corneal astigmatism can be induced by the encroachment of a pterygium onto a cornea. The pterygium generally causes with-the-rule corneal astigmatism that is hemimeridional on the side of the pterygium. In a study of 140 eyes conducted by Maheshwari et al., in which refractions were recorded, there was poor correlation between the magnitude of refractive cylinder and topographic cylinder. This can be due to the hemi-astigmatic nature of the induced changes.[4] Hence only keratometric topographic astigmatism was taken into account in our study.

Cinal et al used corneal topography to measure astigmatism in patients of pterygium. They found that corneal topographical changes caused by the pterygium are almost reversible after surgical treatment, and postoperatively the cornea becomes steeper [5] .Lin and Stern found a significant correlation between the pterygium size and corneal astigmatism; they reported pterygium to induce significant degrees of astigmatism once it exceeded> 45% of the radius.[2]

In our study the mean difference between K1-K2 pre-operatively and at the end of 1 month was 2.15±0.79D and 0.81±0.41D which was statistically significant.We also found that the degree of astigmatism decreased significantly following its excision, and this decrease was related to the size of the pterygium.This was consistent with study conducted by Tomidokoro *et al* . where evaluation of percentage extension of pterygium on cornea was done and they found larger pterygia to adversely affect astigmatism, asymmetry and irregularity of the cornea.[6]

The refractive components were demonstrated to stabilize at 1.month following pterygium surgery in our study which is almost consistent with study done by *Tomidokoro A et al* in which the refractive components were demonstrated to stabilize at 1.5 months following pterygium surgery.Alison L and George AS also co-related the size of pterygium, extension of pterygium over cornea and degree of astigmatism induced by it . [7]

Kampitak concluded that the amount of induced corneal astigmatism and timing for pterygium excision are related to the pterygium size, and reported that 2.25 mm pterygium resulted in astigmatism of 2 D, and should be considered in the limits of surgery [8].In our study also we found that reversal of astigmatism following its excision was more significant for Grade 2 compared to grade 1 pterygia. Therefore it can be concluded that any nasal pterygia 2mm or greater in horizontal diameter from limbus could be an early indication for surgery to prevent pterygium induced astigmatism.Surgical removal of pterygium can improve the changes; however,it was found that in eyes with advanced pterygium, corneal distortion does not normalize completely and irregular changes may persist if the lesion has reached the paracentral cornea [9]

Reversal of pterygium induced astigmatism also indirectly reflects in improvement of visual acuity postoperatively.A study conducted by Soriano JM et al also confirms that pterygium excision induces a reversal of pterygium-related corneal flattening. A significant decrease in astigmatism and improvement in visual acuity is observed postoperatively [10] .Meitel et al also conducted a study to assess the effect of pterygium excision on induced astigmatism,showed that surgical excision reduces pterygium-induced astigmatism with improvement in visual acuity.[11]

V. Conclusion

Excision of pteryium causes reversal of the astigmatism induced by the pterygium significantly and also causes significant improvement in visual acuity.Early surgical excision of the pterygium when it has crossed 2mm or cornea should be considered to prevent pterygium induced astigmatism.

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