

Effect of Pterygium Excision on Pterygium Induced Astigmatism and Visual Acuity

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ABSTRACT

Objective: To evaluate the effect of pterygium excision on the pterygium induced astigmatism.

Methods: Hospital based study conducted in the Department of Ophthalmology in S.R.T.R. GMC Ambajogai during August 2012-March 2013. A total of 37 patients of pterygium was underwent pterygium excision with conjunctival autografting. Detailed pre-operative and post-operative assessment was done.

Result: Majority of the patient were from 41 to 50 years of age i.e. 16 (43.2%). 19 (51.84%) of patients were having Grade II pterygium while 14 (37.84%) were having Grade III pterygium. There was a significant reduction in both astigmatism (mean \pm standard deviation [SD]) and visual acuity (mean \pm SD) post-operatively.

Conclusion: The present study verifies that successful pterygium excision surgery reduces the pterygium induced refractive astigmatism and improves the visual acuity.

Keywords: Astigmatism, Pterygium, Visual acuity

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INTRODUCTION

Pterygium is a fibroelastic degeneration of the conjunctiva with encroachment onto the cornea.¹ It is a wing-shaped overgrowth of fibrovascular connective tissue of the bulbar conjunctiva toward and onto the cornea causing significant astigmatism. It is located in the interpalpebral fissure horizontally, commonly on the nasal side, but and/or temporally also. Pterygium cause corneal distortion and induce a significant amount of astigmatism.^{2,3} The effect of pterygium on the corneal refractive status has been measured by refraction, keratometry and corneal topography.^{2,4-7}

Astigmatism and surface phenomena in pterygium was studied and found increased astigmatism with the rule (>0.5 D in 46%, ≥ 4 D in 13%) without associated impairment of vision.⁸

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. Early or late surgical intervention for excision of pterygium surgery leads to reduction in astigmatism, which leads to significant improvement in vision.^{9,10} This study was carried out to evaluate the corneal astigmatism before and after pterygium excision.

Objective

To evaluate the effect of pterygium excision on the pterygium induced astigmatism.

METHODS

It is a hospital-based study conducted in the Department of Ophthalmology in S.R.T.R. Medical College and Hospital, Ambajogai. The study was conducted from August 2012 to March 2013. A total of 37 patients of pterygium was selected from the Out Patient Department of Ophthalmology. All the patients underwent pterygium excision with conjunctival autografting. Detailed history and ocular examination were done in all the 37 patients. All the patients were admitted in the ward one day prior to surgery, and preoperative assessment was done. Patients were discharged on the 3rd post-operative day.

Pterygium is graded as follows:

Grade I: Apex crossing limbus

Grade II: Apex midway between limbus and pupil

Grade III: Apex reaching up to papillary margin

Grade IV: Apex crossing papillary margin.

RESULTS

There were in a total 37 patient studied out of them 22 (59.5%) were male, and remaining 15 (40.5%) were female. Majority of the patient were from 41 to 50 years of age i.e., 16 (43.2%).

Table 1 shows that 19 (51.84%) of patients were having Grade II pterygium, while 14 (37.84%) were having Grade III pterygium and 03 (8.11%) were having Grade IV pterygium which covers the visual axis of eye.

Table 2 shows the amount of astigmatism varied with various grades of pterygium. In Grade II, the preoperative mean astigmatism was 2.46 ± 0.54 diopter, postoperatively the astigmatism reduced up to 0.97 ± 0.27 diopter. In Grade III, 14 patients (37.84%) were there. The mean preoperative astigmatism was 4.00 ± 0.57 , after surgery it reduced up to 1.89 ± 0.64 diopter. In Grade IV, preoperative mean astigmatism was 6.58 ± 0.62 diopter, after surgery it reduced up to 2.66 ± 0.75 diopter.

Table 3 shows change in visual acuity after pterygium excision. In Grade II pterygium patients, the preoperative mean visual acuity was 0.52 ± 0.16 , which has improved to 0.71 ± 0.2 post-operatively. In Grade III pterygium patients, the mean preoperative mean visual acuity was 0.31 ± 0.09 , which has improved to 0.47 ± 0.22 postoperatively. In Grade IV pterygium patients, the preoperative mean visual acuity was 0.05 ± 0.007 , which has improved to 0.092 ± 0.07 postoperatively. *P* value in each grade is <0.001 , which is statistically significant.

Preoperative unaided visual acuity was compared with 3 months post-operative visual acuity on Snellen's chart. Visual acuity was improved in 28 (75.68%). Of 28 patients,

Table 1: Grades of pterygium

	Number of patients (n=37)	Percentage
Age (years)		
≤40	9	24.4
41-50	16	43.2
>50	12	32.4
Sex		
Male	22	59.5
Female	15	40.5
Grade		
I	01	02.7
II	19	51.4
III	14	37.8
IV	03	08.1

Table 2: Pre and post-operative astigmatism with grades of pterygium

Grade of pterygium	Number of patients	Astigmatism (mean±SD)		P value*
		Pre-operative	Post-operative	
Grade I	1	0.75	0.75	
Grade II	19	2.46 ± 0.54	0.97 ± 0.27	$P < 0.001$
Grade III	14	4.00 ± 0.57	1.89 ± 0.64	$P < 0.001$
Grade IV	3	6.58 ± 0.62	2.66 ± 0.75	$P < 0.001$

*Paired t-test, SD: Standard deviation

Table 3: Pre and post-operative visual acuity with grades of pterygium

Grade of pterygium	Number of patients	Visual acuity (mean±SD)		P value*
		Pre-operative	Post-operative	
Grade II	19	0.52 ± 0.16	0.71 ± 0.2	$P < 0.001$
Grade III	14	0.31 ± 0.09	0.47 ± 0.22	$P < 0.001$
Grade IV	3	0.05 ± 0.007	0.092 ± 0.07	$P < 0.001$

*Paired t-test, SD: Standard deviation

17 (44.85%) cases visual acuity was improved by two lines and 11 (30.83%) cases by one line of Snellen's chart. The visual acuity was unchanged in 8 (21.62%) cases, whereas declined by one line in one case.

DISCUSSION

The development of a pterygium can lead to significant astigmatism. A pterygium generally causes localized flattening central to the apex of the pterygium.¹¹ As this flattening is along the horizontal meridian, it usually causes with-the-rule corneal astigmatism.¹² Fong *et al.* in 1998 observed that pterygium excision usually induces a reversal of pterygium-related corneal flattening.¹³ Consequently, successful pterygium surgery should reduce pterygium induced refractive astigmatism and improve visual acuity.¹¹

In the present study, maximum number of patients (33 eyes) encountered in the study belonged to Grade II and III pterygium (89.19%). About 2.70% cases of Grade I and 8.11% cases of Grade IV pterygium seen, which has

a significant impact on vision. This observation was also seen by Maheshwari. In that study, 36 eyes belonged to primary pterygium, in which maximum number of patients were of Grade II type pterygium i.e., 44.45% and Grade III pterygium patients were 33.33%, which were closely matched to this study.⁶

In this study preoperative mean astigmatism was maximum in Grade IV pterygium i.e. 9.58 ± 0.62 diopter, and 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 and 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 ($P < 0.001$). This shows that as the grade of pterygium increases, the amount of astigmatism also increases in the same proportion. Similar observations were found in the study of Maheshwari, Fong *et al.*, Avisar *et al.*^{6,13,14}

In this study, the improvement in the visual acuity after successful pterygium excision surgery, which was significantly seen in Grade II and Grade III pterygium ($P < 0.001$) and in Grade IV, the visual acuity was improved but it was not statistically significant ($P > 0.05$). These observations were matched with studies carried out by Maheshwari in India.⁶ Lindsay and Sullivan from the University of Melbourne, Australia, also found similar significant correlation between successful pterygium excision surgery and improvement in the visual acuity.¹⁵

In the present study, after comparing the preoperative unaided visual acuity with postoperative visual acuity found that 23 cases (75.68%) reported improved visual acuity on Snellen's chart, while 8 cases (21.62%) showed unchanged and 1 case (2.70%) showed decline in vision. This decline was not due to surgery, but it was because due to senile cataract. Similar observations were seen in Allan *et al.* study, were they have compared preoperative unaided visual acuity with 3 months post-operative unaided visual acuity on Snellen's chart in 93 eyes. They have found that unaided visual acuity have either unchanged or improved in 86 out of 93 cases, while 7 eyes showed decline which was not related to surgery but was either due to astigmatism, cataract or retinal pathology (Table 4).¹⁶

Table 4: Post-operative visual acuity

Postoperative vision	Number of patients	Percentage
Improved	28	75.68
Unaltered	8	21.62
Deteriorated	1	2.70
Total	37	100

CONCLUSION

The astigmatism seen in the patients with pterygium represents both naturally occurring astigmatism and induced astigmatism. It may be incorrect to label the entire astigmatism as induced. Present study verifies that as the size of pterygium increases, the amount of induced astigmatism also increases in the direct proportion. The present study also verifies that successful pterygium excision surgery reduces the pterygium induced refractive astigmatism and improved the visual acuity either by reducing the astigmatism or by removal of the pterygium from the visual axis as in Grade IV pterygium.

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