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Comparison of Pre and Post Operative Corneal Astigmatism following Pterygium Excision and Conjunctival Autograft

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ABSTRACT

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

Methods: Hospital based study conducted in a tertiary care centre in Western Maharashtra from August 2014 to March 2015. A detailed evaluation of the pre and post-operative status of patients was done. 40 patients underwent pterygium excision with conjunctival autograft.

Results: Most of the patients belonged from 41-45 years of age group i.e 42.5% (17 patients). 52.5% (21) patients had grade II pterygium and 37.5 % (15) patients had grade III pterygium. Pterygium excision showed a significant decrease in amount of corneal astigmatism post operatively as well as improvement in visual acuity (mean \pm SD).

Conclusion: This study verifies that pterygium excision with conjunctival autograft can result in significant decrease in corneal astigmatism and thus improve visual acuity of patients post operatively.

Keywords: Pterygium, corneal astigmatism, visual acuity

INTRODUCTION

Pterygium is described as a fibroelastic degenerative condition of the conjunctiva ⁽¹⁾. Recent evidence suggests that it is a proliferative condition. It results in encroachment of this tissue over the cornea, thus, resulting in significant amount of induced corneal astigmatism ⁽²⁾. Pterygium is located within the inter- palpebral area. It can be both medial and lateral, medial being more common. This medial predominance can be explained by unobstructed exposure of medial limbus to sunlight as compared to the

lateral limbus which is less exposed to sunlight due to the shadow of nose ⁽³⁾.

Refraction, keratometry and corneal topography are various methods used to measure the corneal astigmatism induced by pterygium ⁽⁴⁻⁷⁾.

Some of the molecular level alterations reported with pterygium are loss of heterozygosity, point mutations of proto oncogenes, alteration in expression of tumor suppressor genes such as p53 or p63, ocular surface changes like over expression of defensins and phospholipase d and up regulation of growth factors ⁽⁸⁾.

Pterygium causes ocular symptoms like lacrimation, blurred vision, congestion and foreign body sensation⁽⁸⁾.

Pterygium excision is indicated in cases where it is progressive, if visual axis is threatened, prior to other surgeries like LASIK, due to cosmetic purposes. Early intervention can reduce corneal distortion^(9,10).

Definitive treatment of pterygium is surgical removal with conjunctival or amniotic membrane transplantation with glue or suture application.

Conjunctival autograft: Conjunctival graft is taken from superior or supero-temporal bulbar conjunctiva and placed over the bare sclera left after pterygium excision. It is the most popular method used for pterygium excision⁽¹¹⁾.

MATERIAL AND METHODS

It is a hospital-based interventional study conducted in the Department of Ophthalmology of a tertiary care hospital in Western Maharashtra. The study was conducted from August 2014 to March 2015. A total of 40 patients of pterygium were selected from the out Patient Department of Ophthalmology.

Inclusion criteria:

- Patients of either sex greater than 18 years of age
- Patient with at least 2 mm of cornea covered with pterygium.

Exclusion criteria

- Patients with recurrent pterygium
- Patients with scarred superior conjunctiva
- Patients with history of glaucoma
- Patients with cicatricial ocular surface disease
- Patients with pseudopterygium or signs of malignancy over pterygium.

A written informed consent was obtained from all the patients. 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. An automated keratometry was performed. All the patients were admitted in the ward one day prior to surgery, and preoperative assessment was done. Patients were discharged on the 2nd 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 pupillary margin

Grade IV: Apex crossing pupillary margin

All surgeries were performed by the same surgeon and a free conjunctival autograft was sutured in all cases. Same automated keratometer was used pre and post operatively.

RESULTS

There were total 40 patients studied, out of them 26 (65.0%) were male, and remaining 14 (35.0%) were female. Majority of the patient were from 41 to 45 years of age i.e., 17 (42.5%).

Table 1 shows that 21 (52.5%) of patients were having Grade II pterygium, while 15 (37.50%) were having Grade III pterygium and 04 (10.0%) 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 and also the reduction in corneal astigmatism post pterygium surgery.

Table 1

	Number of patients <i>n</i> =40	Percentage (%)
Age(in years)		
<40	9	22.5
40-45	17	42.5
>45	14	35.0
Sex		
Male	26	65.0
Female	14	35.0
Grade		
I	0	-
II	21	52.5
III	15	37.5
IV	4	10.0

Table 2

Grade of pterygium	Number of patients	Astigmatism Pre- op (Mean± SD)	Astigmatism Post- op (Mean±SD)	P value (paired t- test)
I	0	-	-	-
II	21	2.54±0.57	0.87±0.37	P<0.001
III	15	4.25±0.54	1.79±0.76	P<0.001
IV	4	5.58±0.42	2.86±0.75	P<0.001

Preoperative unaided visual acuity was compared with 1 month post-operative visual acuity on Snellen's chart. Visual acuity was improved in 31 (77.5%) patients. Of 31 patients, 17 (54.83%) cases visual acuity was improved by two lines and 14 (45.16%) cases by one line of Snellen's chart. The visual acuity was unchanged in 9 (29.03%) cases.

DISCUSSION

Pterygium is a very common ocular disease especially in tropical and sub-tropical regions of the world like India. Pterygium occurs in the horizontal plane in the inter-palpebral area. It causes mechanical flattening of the horizontal axis and thus results in With-the- rule astigmatism. Also, larger the size of pterygium more is the amount of corneal astigmatism induced by it. Among the three parameters which include length, width and area of the pterygium, it is the length of pterygium on the cornea and its total area that

have the strongest correlation with the induced astigmatism⁽¹²⁾.

In the present study, maximum number of patients (36 eyes) encountered in the study belonged to Grade II and III pterygium (90.0%) and 4 (10.0%) cases of Grade IV pterygium which severely affects vision. This observation was also seen by Maheshwari⁽⁶⁾. 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.

In this study 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 and 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 ($P < 0.001$). 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⁽⁶⁾, Fong et al⁽¹³⁾ and Avisar et al⁽¹⁴⁾. 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⁽¹⁵⁾.

Kampitak reported a 2 D or more of astigmatism with length greater than 2.25 mm⁽¹⁶⁾.

In the present study, after comparing the preoperative unaided visual acuity with postoperative visual acuity found that 31 cases (77.5%) reported improved visual acuity on Snellen's chart, while 9 cases (29.03%) showed unchanged vision. Similar observations were seen in Allan et al⁽¹⁷⁾ study, where 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 no change in unaided visual acuity.

CONCLUSION

Pterygium causes corneal astigmatism due to flattening of the horizontal axis. The present study confirms that surgical removal of pterygium tissue results in significant reduction of corneal astigmatism and improves vision by correcting the astigmatism induced by pterygium tissue and/or by removing pterygium from visual axis.

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