Astigmatic change after pterygium excision with autologous limbal conjunctival graft

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Abstract

\textbf{Background:} Pterygium induces a significant amount of astigmatism. Pterygium excision with conjunctival limbal autograft results in significant reduction in astigmatism by inducing a reversal of pterygium induced corneal flattening thereby improving the vision.

\textbf{Objectives:} The aim of this study was to investigate the amount of corneal astigmatism in patients with pterygium before and one month (4 weeks) after surgery.

\textbf{Methodology:} The prospective observational study was conducted in 31 patients who underwent pterygium excision with limbal autograft in Kathmandu Medical College Teaching Hospital during the study period of 12 months duration. Patients with recurrent pterygium, pseudopterygium, history of ocular trauma, history of ocular surgery, corneal scarring were excluded from the study. After surgery, patients were followed for four weeks. Findings were recorded in the proforma and statistical analysis was done in SPSS version 19.

\textbf{Results:} Pterygium was seen in all age groups with majority being in the active age range of 41-50 yrs. Females were most commonly affected. Significant difference in corneal astigmatism was noted postoperatively with a p value being 0.01.

\textbf{Conclusion:} The technique of pterygium excision with limbal conjunctival autograft not only reduces the chances of recurrence but also helps in reducing the induced corneal astigmatism which is responsible for decreased vision in patients with pterygium.

\textbf{Key words:} Astigmatism; Autologous; Graft; Pterygium.

INTRODUCTION

A wing-shaped fibrovascular growth of conjunctival tissue over cornea is called pterygium\textsuperscript{1}. Prevalence rate of pterygium is 0.7 % to 31% in various populations around the world\textsuperscript{2}. It is a benign lesion more frequently located nasally than temporally. The disease is more common in hot, dry, and sunny climate\textsuperscript{3}. Other than causing irritative symptoms and having cosmetic implications, pterygium can cause decreased vision because of induced astigmatism and encroachment to the pupillary area. Several mechanisms have been suggested to explain the induced astigmatism, which include pooling of tear film at the leading edge of the pterygium, and mechanical traction exerted by the pterygium on the cornea\textsuperscript{4}. Different methods are available for the measurement of astigmatism like refraction, keratometry and corneal topography. Measurement of astigmatism cannot be done accurately either by refraction or keratometry. Corneal topography is one of the best methods for estimating the amount of astigmatism.

Several different surgeries such as bare sclera technique, conjunctival autografting, limbal conjunctival autograft, amniotic membrane grafting is being performed these days\textsuperscript{1}. The main indications for pterygium surgery...
are decreased vision caused by the astigmatism and involvement of pupillary axis, pterygium causing frequent irritative symptoms like foreign body sensation, ocular discomfort, redness etc and for cosmetic purposes.

Pterygium surgeries also significantly reduce the amount of corneal astigmatism. It is said that the technique of limbal autologous conjunctival graft is mainly effective in preventing recurrence of the pterygium after surgery, but there is insufficient data regarding effect of this surgery on corneal astigmatism in our settings like general public hospital where accurate measurement of the corneal astigmatism cannot be done with corneal topography because of its unavailability. In this study, we used a keratometer, which is readily available in our ophthalmology department for measuring astigmatism and we investigated the effect of limbal autologous conjunctival graft on astigmatism following pterygium excision.

**METHODOLOGY**

This prospective observational study was conducted from September 15 2017 to August 14, 2018 for a period of one year after obtaining ethical clearance from the Institutional Review Committee of Kathmandu Medical College Teaching Hospital. The sampling technique was convenience sampling. All patients posted for surgical management of primary pterygium in the Department of Ophthalmology, Kathmandu Medical College Teaching Hospital, fulfilling the inclusion criteria were enrolled. Patients with recurrent pterygium, pseudopterygium, history of ocular trauma, ocular surgery, corneal scarring were excluded from the study. A written consent was obtained from all the participants. Preoperatively a complete ophthalmologic examination including best corrected visual acuity, slit lamp examination and funduscopy was performed. Keratometry was done by Bausch and Lomb keratometer.Keratometric readings from the principal corneal meridians were averaged for analysis. The pterygium was graded according to following criteria using a caliber in slit lamp5, 6.

Grade 1- extending less than 2mm on the cornea
Grade 2- involving upto 4mm on the cornea
Grade 3- encroaching onto more than 4mm and involving the visual axis.

Pterygium excision was done either under peribulbar anaesthesia or topical anaesthesia wherever possible. It was excised by removing the body first followed by blunt dissection of the head of the pterygium from the cornea. Wet field cauterity was done for achieving haemostasis. The autograft was taken from the superior bulbar conjunctiva of the same eye adjacent to the limbus. The graft was prepared by leaving the tenon tissue intact. The graft was then placed on the bare sclera and sutured with 8-0 vicryl. Padding of the involved eye was done with ciprofloxacin ointment. On the first postoperative day, eye pad was removed, slit lamp examination was done and steroids, antibiotic eye drops were given for 6 weeks in tapering doses along with antibiotic ointment. Patients were followed up at week 1 and week 4. At week 4 repeat keratometry was done and the amount of postoperative astigmatism was recorded. Statistical analysis was done in SPSS version 19. Preoperative and post-operative astigmatism was compared using the paired t test. The level of significance was p value less than 0.05.

**RESULTS**

The total number of surgeries done was 31. Age of the patients ranged from 29 to 72 years with the mean age of the patient being 50.70 ± 11.43 years. Maximum number of patients were in the age group of 41-50 years (n=11, 35.49%).

Eighteen (n=18, 58.06%) cases were female and thirteen (n=13, 41.94%) cases were male.

Three(n=3, 9.68%) patients had grade 1 pterygium and twenty eight(n=28, 90.32%) patients had grade 2 pterygium. None of the patients had grade 3 pterygium.

Right eye was involved in 17(54.83%) cases and the left eye in 14(45.17%). All the patients (n=31, 100%) had nasal pterygium. Table 1 shows the baseline characteristics of the patients.

The mean pre operative and post operative (4th week) astigmatism as measured by the keratometer was 1.72±1.18D and 1.26±0.64D respectively. This mean difference was found to be statistically significant with p value being 0.01.(<0.05). Table 2 shows the amount of astigmatism preoperatively and postoperatively at 1st month.

Figure 1 shows the change in astigmatism of the 31 patients preoperatively and postoperatively.
Table 1: Baseline characteristics of the patients

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number (n=31)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (in years)</td>
<td></td>
</tr>
<tr>
<td>&lt;30</td>
<td>2 (6.45%)</td>
</tr>
<tr>
<td>31-40</td>
<td>4 (12.90%)</td>
</tr>
<tr>
<td>41-50</td>
<td>11 (35.49%)</td>
</tr>
<tr>
<td>51-60</td>
<td>7 (22.59%)</td>
</tr>
<tr>
<td>61-70</td>
<td>5 (16.12%)</td>
</tr>
<tr>
<td>71-80</td>
<td>2 (6.45%)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>13 (41.94%)</td>
</tr>
<tr>
<td>Female</td>
<td>18 (58.06%)</td>
</tr>
<tr>
<td>Grading of pterygium</td>
<td></td>
</tr>
<tr>
<td>Grade 1</td>
<td>3 (9.68%)</td>
</tr>
<tr>
<td>Grade 2</td>
<td>28 (90.32%)</td>
</tr>
<tr>
<td>Laterality</td>
<td></td>
</tr>
<tr>
<td>Right eye</td>
<td>17 (54.83%)</td>
</tr>
<tr>
<td>Left eye</td>
<td>14 (45.17%)</td>
</tr>
</tbody>
</table>

Table 2: Amount of astigmatism

<table>
<thead>
<tr>
<th></th>
<th>Pre-operative</th>
<th>Post-operative</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Astigmatism</td>
<td>1.72±1.18D</td>
<td>1.26±0.64D</td>
<td>0.01*</td>
</tr>
</tbody>
</table>

*p-value less than 0.05 is considered as statistically significant.

DISCUSSION

Pterygium is the most common degenerative conjunctival disease. It is often the cause of complaints like decreased visual acuity, glare and also other irritative symptoms. As keratometer is readily available to the ophthalmologist compared to the other instruments, estimating the amount of astigmatism has become easier. The type of astigmatism that pterygium causes is ‘with the rule’ 8,9. Surgical excision with limbal autologous graft not only reduces astigmatism but also reduces other associated symptoms 10.

Many studies have found that prevalence of pterygium increases with the age 11,12,13. In this study pterygium was seen in the age range of 29 to 72 years which shows that pterygium can be seen in all age groups. We found that pterygium was most common in the age group of 41-50 years, similar to the study from Peru and Tamil Nadu 14,15. Early old age patients were more likely to develop pterygium because this is the active age range when people are involved in outdoor activities that exposes them to UV radiations thereby leading to degenerative changes on the conjunctiva and also in this age range pterygium might be in more aggressive form causing more irritative symptoms.

![Figure 1: Change in astigmatism preoperatively and postoperatively](image-url)
The mean age of the patient in our study was 50.70 ± 11.43 years similar to the study done by Manandhar LD et al, Maharjan et al, and Varsano et al. However, other studies have shown a different mean age. Like a study by Bastola et al has shown a mean age of 35±18 yrs and Sharma et al has given the mean age to be 43.88±9.19 yrs, which is quite low than ours.

In our study, there were more females (58.06%) than males and similar were the findings observed by Manandhar LD et al, Bastola et al, Sharma et al, and Dhakwa et al. This may be due to the fact that females in Nepal still use wood fire for cooking, emitting a lot of smoke which causes irritation of the conjunctiva. Another cause for showing female preponderance may be due to the prevalence of dry eyes in menopausal women due to the fluctuations in estrogen and androgen hormones, also due to the high aesthetic concern of females. However, several other studies have shown males are at higher risk of developing pterygium. These studies showed more male patients suggesting they have more exposure to external environment, which plays an important role in pterygium formation.

In our study, the maximum number of patients belonged to grade 2 (90.32%). Similar to this, Gahlot A et al Maheshwari S et al and Shelke et al also found the maximum number of patients belonging to Grade II pterygium. These studies showed more male patients suggesting they have more exposure to external environment, which plays an important role in pterygium formation.

In our study, the preoperative astigmatism was 1.72±1.18D. Avisar et al also found pterygium extension of more than 1.1 mm from the limbus produced increasing degrees of induced astigmatism of more than 1 diopters which is similar to our study. However, the amount of astigmatism was quite low in our study, may be because of the use of keratometer or due to lower grade lesions.

We found that corneal astigmatism decreased from 1.72±1.18D preoperatively to 1.26±0.64D postoperatively which was found to be statistically significant. These findings were similar to the results of other studies. In our study, 90.32% (n=28) patients had pterygium length ≥2mm. Only 9.68% (n=3) patients had pterygium <2mm length. With this finding in our study, we can conclude pterygium excision with limbal autologous graft significantly reduces astigmatism if pterygium length is >2mm. This finding is in accordance with Altan-Yaycioglu et al too. In contrast to other studies, we did not calculate the amount of the astigmatism according to the grade of pterygium because there were a negligible number of patients with grade 1(<2mm length) pterygium. However accurate results could have been generated with the use of corneal topography instruments as the keratometer measures only the astigmatism induced by the central cornea ignoring the peripheral cornea.

This study has some major limitations too. It is a single hospital-based study with a small sample size. Better results would have been generated with a large sample size.

**CONCLUSION**

From this study, we can conclude that pterygium is prevalent in all age groups. It is most commonly seen nasally and females are most commonly affected. Various literatures have suggested that the technique of limbal autologous graft only reduces the chances of recurrence but this study showed it also significantly helps in reducing the induced astigmatism, which is responsible for decreased vision in patients with pterygium.

**Conflict of interest:** None

**Source(s) of support:** None
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REFERENCES


27. Bhargava P, Kocular A, Khan NA, Chandak A, Kumawat S, Garhwal J. Comparison of pre-operative and post-operative astigmatism and visual acuity after pterygium excision followed by sutureless and...
Sharma D et al.


