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Research Article

Refractive Changes After Pterygium Surgery

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Abstract

Introduction: Pterygium is a triangular-shaped, degenerative mass growing from the conjunctiva to the cornea, which leads to corneal astigmatism or impairs vision if grows to the pupillary area. Reduction in astigmatic changes can be seen after the excision of pterygium and conjunctival autograft.

Aim: To study the changes in refractive errors in the case of pterygium excision with conjunctival autograft.

Materials And Methods: The prospective, hospital-based, analytical study was conducted in the upgraded department of ophthalmology in GMC, JAMMU for a period of one year from July 2021 to June 2022. All the cases operated during this period were included in the study.

Observations And Results: A total of 112 patients were operated. Out of 112 patients, 68 were males and 44 were females. The mean age of presentation was 48.19 years. Following surgery, the mean astigmatic value decreased from 1.108929± 0.346619 to 0.826339 ±0.354378and the change in astigmatism (0.282143 ±0.101088) was statistically significant ($p < 0.001$, paired t-test).

Conclusion: A change in refractive error reveals corneal flattening due to Pterygium. The improvement in refractive error can be used as one of the indicators of the success of Pterygium surgery.

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1. INTRODUCTION

The word Pterygium is derived from the Greek word “Pterygos”, which means ‘Wing’. So, Pterygium is a triangular wing-shaped structure. It is a degenerative mass of fibrovascular tissue that grows gradually from the conjunctiva to the cornea, crossing the limbus. As per the anatomy, Pterygium can be divided into three parts i.e., head, neck, and body. The hyperplasia of connective tissue leads to the formation of this conjunctival mass. The extent of pterygium is covered by an epithelial layer similar to atrophic conjunctival epithelium [1]. It is thought that the pterygia that develop at a slow rate are chronic. The preceding part of the apex originates from the pooling of tears where iron settles inside the bowman’s membrane, causing the Stokers' line to form.[2]

Pterygium development is assumed to have several etiologies, while the actual cause is unknown. One important element is exposure to ultraviolet B rays [3], which triggers essential signaling pathways and releases mediators that encourage the formation of pterygium. As ultraviolet light is reflected off the

nose, the nasal side of the bulbar conjunctiva is exposed to more actinic light. However, light that strikes the temporal side of the limbus is directed intracamerally onto the nasal limbus. This explains why nasal pterygium is more frequent than temporal pterygium. Any sun protection strategy, such as wearing sunglasses, hats, or spectacles with a wide brim reduces the development of pterygium in the eyes, as well as wearing protective elements [4]. Elderly people tend to experience pterygium the most, whereas younger age groups experience a larger annual incidence. People who are younger than 20 and those who wear glasses are less likely to experience it. Between 20 and 40 years old, there has been a dramatic increase in occurrences. Due to greater industrial exposure, pterygium is two times more common in male patients than in female patients [5].
A pterygium with a higher proportion of underlying fibrotic tissues might result from a focal limbal stem cell deficit caused by improper conjunctival transdifferentiation or conjunctivoplasties of the cornea [6]. Genetic research suggests that certain molecular changes, such as loss of heterozygosity, point mutations of protooncogenes, microsatellite insufficiency, and altered tumor suppressor genes, are implicated in the etiology of pterygium [7]. It has also been discovered that the conjunctiva's regular apoptotic process if disturbed, can result in the development of pterygium, which greatly increases the levels of p53, Bax, and Bcl-28. One of the hypotheses for the mechanism of pterygium is the overexpression of angiogenic factors like vascular endothelial growth factor (VEGF) and an abundance of CD31-positive microcapillaries. Angiogenesis inhibitors, such as thrombospondin-19, whose expression is typically absent from pterygium tissues, are simultaneously downregulated. Small Pterygium is merely an aesthetic imperfection and has no symptoms. With-the-rule astigmatism of up to 1.5 D is caused by a remarkably large pterygium, which flattens the corneal curvature in its horizontal meridian. Peripheral vision is first affected, then central vision, as it develops to cover the pupillary area.

2. AIM

To study the changes in refractive errors in the case of pterygium excision with conjunctival autograft.

3. MATERIALS AND METHODS

The prospective, hospital-based, analytical study was conducted in the upgraded department of ophthalmology in GMC, JAMMU for a period of one year from July 2021 to June 2022. All the cases which were operated during this period of one year were included in the study. This study was performed following the tenets of the Declaration of Helsinki. The study comprised 112 patients who were planned for surgery, Pterygium excision with conjunctival autografting under local anesthesia.

The following patients were included in the study:
1. Primary Pterygium
2. Progressive Pterygium
3. Both genders
4. Age ≥ 18 years

The following patients were excluded from the study:
1. Atrophic Pterygium
2. Recurrent Pterygium
3. Severe dry eye
4. History of ocular trauma or ocular surgery.

The patients of Pterygium attending ophthalmology OPD with satisfying inclusion criteria were included in the study. The study was explained to all patients and their written informed consent was taken. Particulars of patients were taken, and detailed past, present, personal, and ocular history was recorded. A complete ocular and systemic examination was done. Uncorrected and corrected distance visual acuity of each eye was assessed and recorded with Snellen's chart/ objective refraction. Detailed anterior segment examination was done using a slit lamp, and detailed posterior segment examination using indirect ophthalmoscopy after full dilatation of the pupil using eye drops tropicamide 1%. The patients in eye OPD selected for the study were thoroughly assessed. Data were collected and entered on a Microsoft Excel 2019 sheet and analyzed.
The surgical procedure of Pterygium excision and conjunctival autografting:
The surgery was performed under local anesthesia by peribulbar block using 2% lignocaine and 0.5% bupivacaine which was followed by cleaning and draping. After that Pterygium was excised and cotton buds were used to stop the bleeding. The autograft was taken from the bulbar conjunctiva, superiorly of size measuring 1 mm greater than the conjunctival defect produced during excision of pterygium, flipped over the cornea, and using proper orientation the conjunctival limbal autograft was secured in place properly and wait for 10 minutes, the lid was closed carefully, pad and bandage done. Postoperatively oral antibiotics were started and after removal of the pad and bandage antibiotics with steroids were started topically and tapered for six weeks.

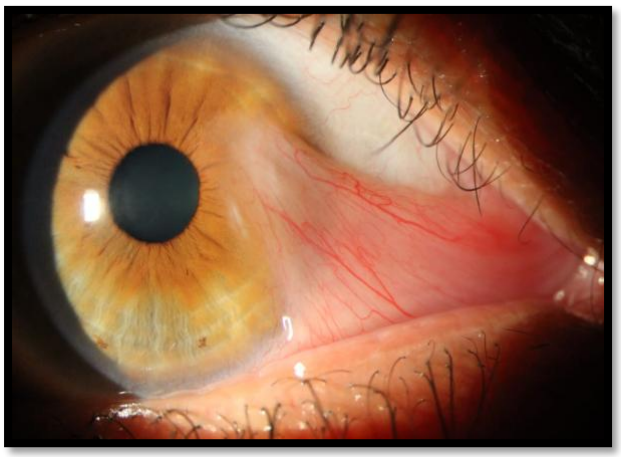


Fig. 1: Primary Pterygium Before Excision

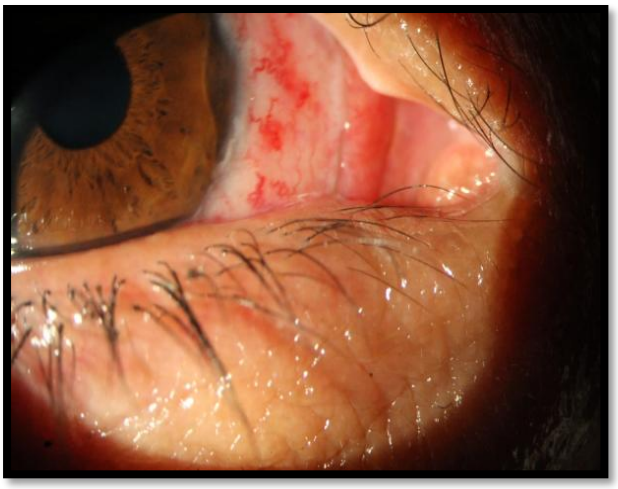


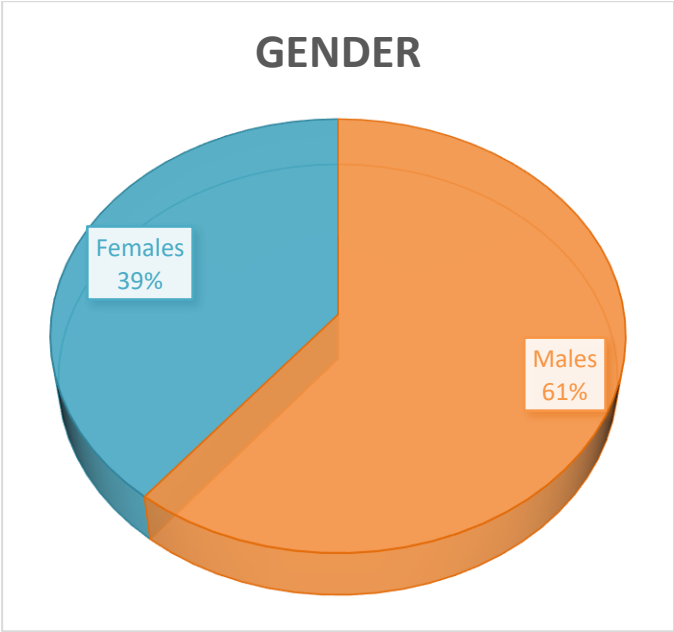
Fig. 2: After Pterygium Excision with Conjunctival Autografting

Statistical incidence

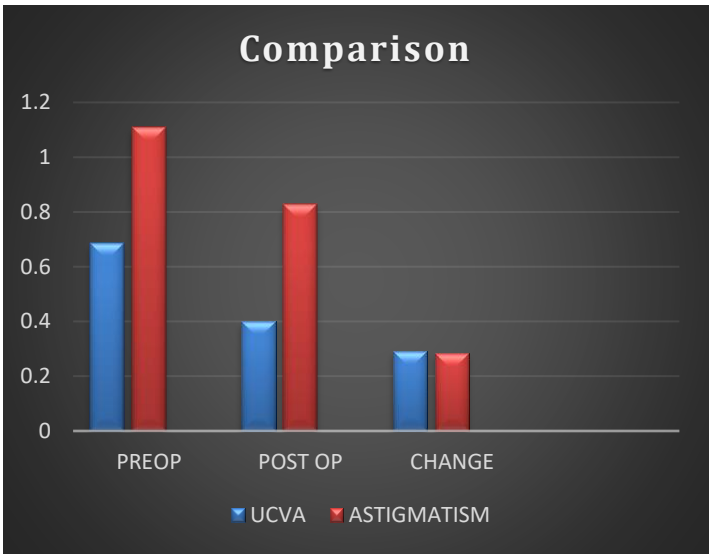
Statistical analysis will be done by using SPSS software for Windows version 25. Qualitative data will be depicted as numbers and percentages whereas quantitative as mean ± standard deviation.

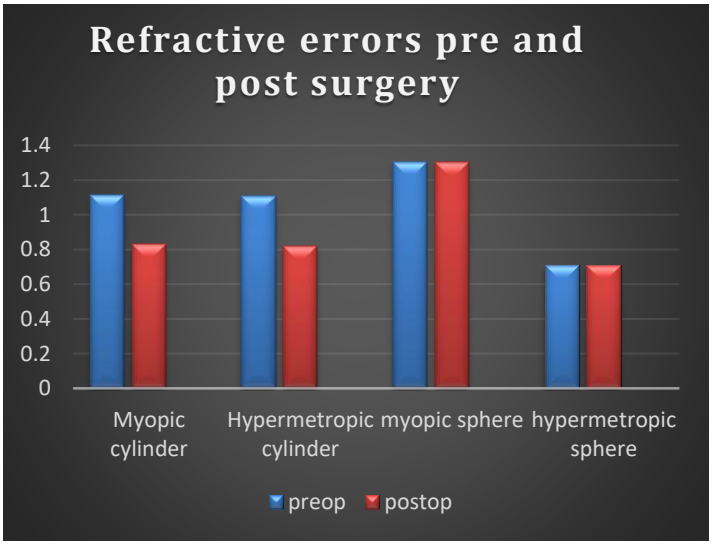
4. RESULTS

Among the patients, a total of 112 patients were operated on during the one-year duration, out of which 68 were males and 44 were females with a male: female ratio of 1.54. The mean age of presentation was 48.19 ± 7.36 years.



Three months after the procedure, corneal astigmatism before and after surgery was also evaluated. At the visit done on 3rd month postoperatively, the variations in corneal astigmatism were statistically significant. Three months following surgery, the mean corneal astigmatism was reduced from 1.108929 ±0.346619 to0.826339 ±0.354378 and the change in astigmatism (0.282143 ± 0.101088) was statistically significant ($p < 0.001$, paired t-test). Out of 112 patients, 3 (2.67%) patients visual acuity remained unchanged. 109 (97.32%) demonstrated a 1 or 2-line improvement in vision. The preoperative mean UCVA (in LogMAR) was 0.68571 D± 0.20262 D which was significantly reduced to 0.39911± 0.17111 after surgery ($p <0.001$).





5. DISCUSSION

By causing astigmatism or by affecting the visual axis, pterygium induces refractive alterations that result in visual impairment [10]. After pterygium excision surgery employing conjunctival autograft, our study was created to examine how corneal astigmatism changed. Pterygium is primarily treated with surgery. Visual acuity can be improved by successful pterygium excision surgery during which astigmatism is reduced and pterygium is removed from the visual axis [10]. The study by Maheswari *et al.* found significant improvements in visual acuity after pterygium excision surgery in all the grades

of pterygium ($P < 0.05$). Similarly, Misra *et al*. observed that the mean BCVA significantly improved from 6/7.5 preoperatively to 6/6 at 1 month ($P = 0.001$) after pterygium surgery [11].

In our study also, we have found that visual acuity was improved significantly after pterygium excision surgery. UCVA significantly improved from 0.56 ± 0.49 preoperatively to 0.32 ± 0.29 postoperatively (at 3 months; $P < 0.0001$).

Several studies have proved that pterygium excision surgery significantly reduces pterygium-induced astigmatism. In the study by Mohite *et al*. there was a significant reduction in mean keratometric astigmatism from 3.046 ± 1.20 D to 1.486 ± 0.63 D ($P < 0.001$) after pterygium surgery [12]. So, they concluded that pterygium-induced corneal astigmatism can be reduced by pterygium surgery. These results were comparable to our study as we have also found significant reduction in mean corneal astigmatism after pterygium surgery. The preoperative mean astigmatism of 3.47 ± 1.74 D was significantly ($P < 0.0001$) reduced to 1.10 ± 0.78 D postoperatively at 3 months which can be attributed to the fact that the regularity and symmetry of corneal surface improved after pterygium surgery, thus reducing astigmatism [13]. A study conducted by Lin *et al.* noted in their study, more the cornea is involved by the Pterygium, more is the induced astigmatism. In eyes with grade IV Pterygium, the astigmatism noted was of highest degree i.e. 9.42 ± 2.64D and least was noted in eyes with grade II pterygium which is 2.92±0.65D (P = 0.000001). The astigmatism decreased significantly following pterygium excision. The mean preoperative refractive cylinder decreased from 4.60±2D to 2.20±2.04D postoperatively (P=0.00001). Visual improvement was noted in 15 eyes (41.67%). The improvement in vision may be due to two causes - a) reduction in astigmatism, and b) removal of pterygium from the visual axis as in grade IV pterygium. The astigmatism seen in the patients represents both naturally occurring astigmatism and induced astigmatism. It may be incorrect to label entire astigmatism as "induced". I would like to believe that the majority of the astigmatism seen in the study was caused by the pterygium itself since it was always "with-the-rule" whereas naturally occurring astigmatism can occur at any of the axes. 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 improves the visual acuity.

6. CONCLUSION

Pterygium is associated with significant astigmatism in most cases. So, a change in refractive error reveals corneal flattening due to Pterygium. Our study reveals that Pterygium-induced astigmatism can be significantly reduced by surgical excision and conjunctival autografting. This results in improvement of visual acuity as well. The improvement in refractive error can be used as one of the indicators of success of Pterygium surgery.

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