*Original Article*

Ophthalmology and Allied Sciences
Volume 10 Number 2/May - August 2024
DOI: http://dx.doi.org/10.21088/oas.2454.7816.10224.1

# Effect of Pterygium Excision Surgery on Corneal Astigmatism in Patients Undergoing Pterygium Excision Surgery at Tertiary Eye Care Hospital

**Anupama Raju Taklikar[1], Kedarnath Uday Patil[2], Syeda Zeba Fatima[3], Pavan MK.[4]**

**How to cite this article:**

Anupama Raju Taklikar, Kedarnath Uday Patil, Syeda Zeba Fatima, *et al.*. Effect of Pterygium Excision Surgery on Corneal Astigmatism in Patients undergoing Pterygium Excision Surgery at Tertiary Eye Care Hospital. Ophthalmol Allied Sci. 2024;10(2):39–43.

**Abstract**

***Aim:*** This study aims to evaluate the extent and nature of astigmatism following pterygium excision surgery in a sample of 50 patients at a tertiary eye care center. Astigmatism is assessed using manual keratometry and refraction.

***Setting & Design:*** This was a prospective Observation study conducted between August 2023-2024 over a period of 12 months at Tertiary Care Hospital. A total of 50 patients who underwent pterygium excision surgery were included in the study. All patients were followed up postoperatively at regular intervals to assess changes in astigmatism.

***Methods:*** Patients with pterygium who met the inclusion criteria were thoroughly examined and underwent pterygium excision with Limbal Conjunctival Autografting surgery.

***Statistics:*** Changes in astigmatism were evaluated using paired t-tests to compare preoperative and postoperative measurements.

***Conclusions:*** Pterygium excision with conjunctival autografting significantly reduces astigmatism and improves visual acuity in patients with primary pterygium.

**Keywords:** Pterygium, Astigmatism; Pterygium Excision Surgery; Conjunctival Autograft; Tertiary Eye Care; Keratometry.

## INTRODUCTION

Pterygium is a degenerative, fibrovascular growth originating from the conjunctiva and extending onto the cornea. It predominantly occurs nasally, though it can occasionally present temporally. This condition is associated with environmental factors such as chronic exposure to ultraviolet (UV) light, dust, wind, and dry conditions. Clinically, pterygium can cause irritation, redness, and tearing. When the growth invades the corneal region, it can induce significant refractive changes, notably astigmatism, due to the mechanical traction it exerts on the corneal surface.

Astigmatism refers to a refractive error where the eye does not focus light evenly on the retina, often due to an irregularly shaped cornea. The presence of a pterygium alters the corneal curvature, leading to astigmatism, which may persist or even be exacerbated after surgical removal. The tension from the fibrovascular growth induces with-the-rule astigmatism (more curvature along

**Author Affiliation:** [1]Professor, Head of Department, [2-4]Second Year Postgraduate, Department of Ophthalmology, Navodaya Medical College Hospital & Research Centre, Mantralayam Road, Raichur 584103, Karnataka, India.

**Corresponding Author: Kedarnath Uday Patil,** Second Year Postgraduate, Department of Ophthalmology, Navodaya Medical College Hospital & Research Centre, Mantralayam Road, Raichur 584103, Karnataka, India.

**Email:** Kedarnathpatil49@gmail.com

**Received on:** 03.09.2024 **Accepted on:** 14.10.2024

the vertical meridian) and may persist or change to against-the-rule (more curvature along the horizontal meridian) post-operatively.

Understanding the pattern and degree of astigmatism after surgery is crucial for improving visual outcomes and patient satisfaction.

While corneal topography is a precise tool for assessing changes in corneal shape and astigmatism, it is not always available in all clinical settings. This study evaluates post-surgical astigmatism in a tertiary care setting using manual keratometry and subjective refraction, offering insights into the changes in refractive status induced by pterygium surgery.

## METHODS

### Study Design and Setting

This is a prospective observational study conducted over a period of 12 months at a Department of Ophthalmology, Navodaya Medical College Hospital & Research Center, Raichur, Karnataka. A total of 50 patients who underwent pterygium excision surgery were included in the study. All patients were followed up post-operatively at regular intervals to assess changes in astigmatism.

### Patient Selection

#### Inclusion Criteria

- Adults aged 20-60 years with primary pterygium.
- Patients willing to provide informed consent.
- No history of ocular surgery or trauma.
- No other significant ocular surface diseases.

#### Exclusion Criteria

- Patients with recurrent pterygium.
- Patients with corneal pathology unrelated to pterygium.
- Systemic diseases known to affect wound healing, such as diabetes.
- Contact lens wearers.

#### Preoperative Assessment

- Visual Acuity
- Thorough Slit Lamp Biomicroscopy
- Retinoscopy
- Fundus Examination
- Astigmatism was assessed pre-operatively and post-operatively using manual keratometry and refraction. Measurements were taken at baseline (preoperative) and at 1 month, 3 months, and 6 months post-surgery. The type (with-the-rule, against-the-rule, or oblique) and degree of astigmatism were documented. Visual acuity was also assessed at each follow-up visit using Snellen's chart.
- **Manual Keratometry:** Used to measure the curvature of the anterior corneal surface along the principal meridians.
- **Refraction:** Conducted by an experienced optometrist to determine the refractive status and best-corrected visual acuity.

### Surgical Technique

All surgeries were performed by experienced ophthalmic surgeons using a standardized procedure. Pterygium excision was carried out using a bare sclera technique, followed by conjunctival autografting. The head and body of the pterygium were excised meticulously, and a conjunctival graft, harvested from the superior bulbar conjunctiva, was secured in place using absorbable sutures. This method is widely accepted due to its lower recurrence rates and favorable cosmetic outcomes.

### Statistical Analysis

Data were analyzed using statistical software. Changes in astigmatism were evaluated using paired t-tests to compare preoperative and postoperative measurements. A p-value of $<0.05$ was considered statistically significant.

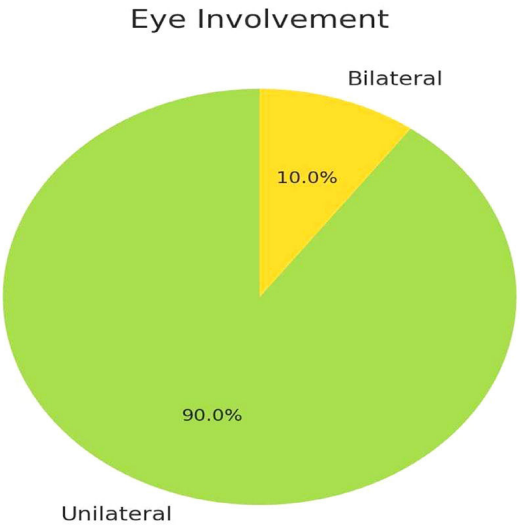
## RESULTS

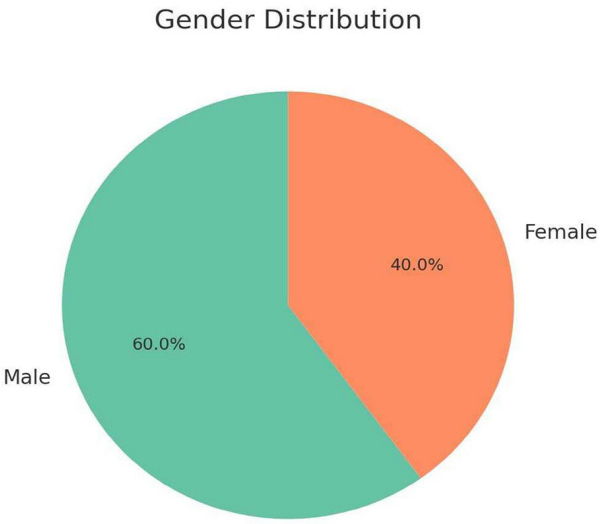
### Demographic and Clinical Characteristics

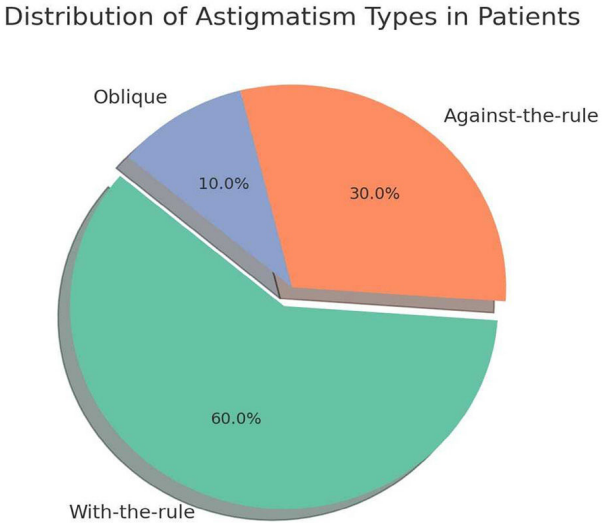
- Mean Age: 45.3 years (range: 20-60 years).
- Gender Distribution: 60% male, 40% female.
- Pterygium Location: 70% nasal, 30% temporal.
- Eye Involvement: 90% unilateral, 10% bilateral (only the worse affected eye was considered for bilateral cases).

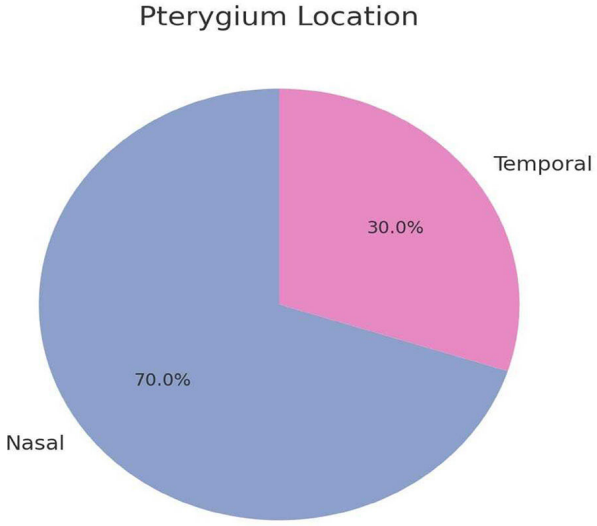
**Preoperative Findings**

- Mean Preoperative Astigmatism: 2.6 diopters (D).
- Astigmatism Type:
  - With-the-rule: 60% of patients.
  - Against-the-rule: 30% of patients.
  - Oblique: 10% of patients.
- Mean Visual Acuity: 6/18 preoperatively.




**Postoperative Findings**

**1 Month Postoperative:**

- Mean astigmatism reduced to 1.9 D.
- Significant reduction in with-the-rule astigmatism cases.
- Visual acuity improved in 80% of patients (mean: 6/12).

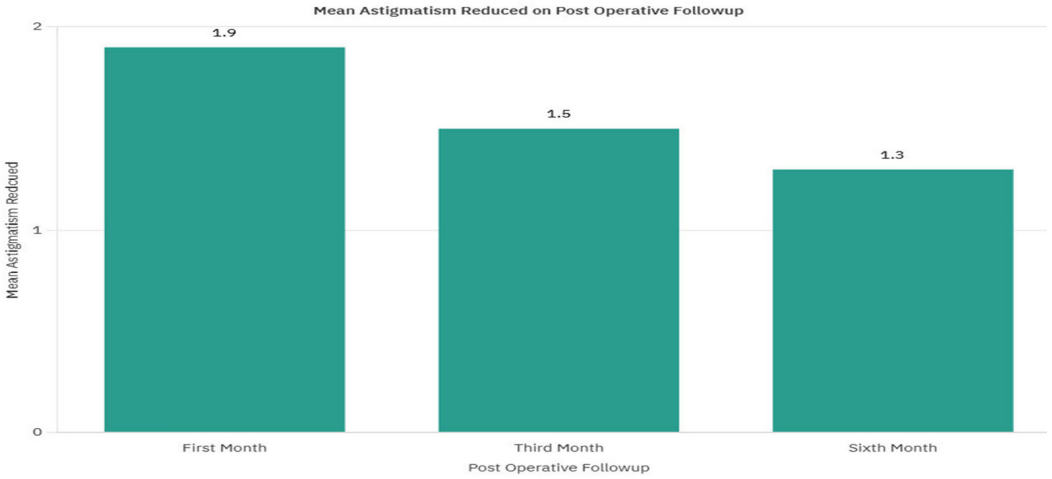
**3 Months Postoperative:**

- Mean astigmatism further reduced to 1.5 D.
- Shift toward against-the-rule astigmatism in some patients (20%).
- Continued improvement in visual acuity (mean: 6/9).

**6 Months Postoperative:**

- Mean astigmatism stabilized at 1.3 D.
- Predominantly with-the-rule astigmatism (65%), against-the-rule (25%), and oblique (10%).
- Visual acuity achieved 6/6 in 50% of patients, with 40% achieving 6/9.

| Follow ups | Mean Visual Acuity on Snellens Chart |
|---|---|
| 1st Month | 6/12 |
| 3rd Month | 6/9 |
| 6th Month | 6/6 |




**Statistical Analysis**

- Significant reduction in astigmatism from preoperative to postoperative measurements ($p < 0.01$).
- Visual acuity improvement was significantly correlated with astigmatism reduction ($p < 0.05$).

**Complications and Management**

Complications: Minimal complications were noted. Two cases of graft dehiscence were managed with resuturing.

Recurrence Rate: No recurrences were observed within the 6-month follow-up period.

## DISCUSSION

The findings of this study demonstrate a significant reduction in astigmatism following pterygium excision surgery with conjunctival autografting. Preoperative astigmatism was mainly due to the mechanical traction exerted by the pterygium on the cornea, causing a steepening of the vertical meridian (with-the-rule astigmatism). Post-surgical relaxation of this tension resulted in a reduction of astigmatism and improved corneal symmetry.

The shift observed in some patients toward against-the-rule astigmatism postoperatively may be attributed to changes in corneal biomechanics and wound healing processes. The stabilization of astigmatism at 6 months suggests that the cornea adapts over time following the surgical intervention, leading to more regular curvature.

This study did not utilize corneal topography, which is often considered the gold standard for assessing corneal surface changes. However, manual keratometry and subjective refraction provided valuable data on refractive changes, demonstrating their utility in clinical settings where advanced diagnostic tools may not be available. Regular follow-up and early detection of refractive changes are crucial for timely intervention and optimization of visual outcomes.

1. Zaida *et al..*, conducted a study on 60 eyes of 60 patients. Ages were between 34 and 56 years, divided randomly into 3 groups; group A included 20 patients that were treated with pterygium excision with bare sclera technique plus MMC application for 3 minutes at site of excision. Group B: 20 patients that were treated with pterygium excision with conjunctival autograft. Group C: 20 patients that were treated with pterygium excision with limbal/conjunctival autograft. The postoperative assessment included refraction and pentacam on visits at 1, 3, and 6 months after surgery. In all groups, BCVA changes 6 months postoperatively were statistically significant, while Spherical and Cylindrical error changes were statistically insignificant. Average K and corneal thickness changes were statistically insignificant, while anterior corneal astigmatism changes were statistically insignificant in group A, and significant in groups B and C. Pterygium grade also affects corneal astigmatism. Several studies conducted previously prove that the amount of induced corneal astigmatism increases with the increase in the size of Pterygium.
2. Gumus *et al..*,found a significant correlation

between the size of Pterygium and induced corneal astigmatism.

3. Misra *et al..*, concluded that with the size of Pterygium extending from 2.5mm, preoperative astigmatism increases. The mean best corrected visual acuity preoperatively was 6/7.5, improving significantly to 6/6 at 1 month (P = 0.001) with this improvement remaining stable at 3 months postoperatively (P = 0.34). There was no significant change in subjective astigmatism, however, mean topographic astigmatism decreased significantly at 1 month (4.36 diopter, P < 0.01) and remained unchanged at 3 months (P < 0.01).
4. Maheshwari S. *et al..*, Concluded that the amount of astigmatism varied with the grade of pterygium. Mean astigmatism in eyes with grade II pterygium was 2.92D ± 0.65D. In eyes with grade III pterygium the mean astigmatism of 3.83 ±1.75D. 9.42 ± 2.64D of mean astigmatism was noted in eyes with grade IV pterygium. The amount of astigmatism was seen to increase with the grade of pterygium (P = 0.000001). The preoperative refractive cylinder was 4.60 ± 2 D, which improved to 2.20 ± 2.04 D (P = 0.00001) postoperatively. Visual acuity remained the same in 21 (58.33%) eyes. 15 eyes (41.67%) showed 1 or 2-line improvement in vision. The mean visual acuity preoperatively was 0.53 ± 0.35 D which improved to 0.68 ± 0.34 D (P = 0.001) postoperatively.

## CONCLUSION

Pterygium excision with conjunctival autografting significantly reduces astigmatism and improves visual acuity in patients with primary pterygium. The findings of this study, based on keratometry and subjective refraction, underscore the effectiveness of this surgical approach. Regular monitoring of astigmatism postoperatively is essential to ensure optimal visual rehabilitation and patient satisfaction.

Future research incorporating corneal topography and long-term follow-up may provide a more comprehensive understanding of corneal changes and the impact of surgical techniques on refractive outcomes.

## REFERENCES

1. Ziada HE. Corneal refractive changes after pterygium surgeries with different techniques; a comparative study. Al-Azhar Assiut Med J. 2015; 13(2):49–57.
2. Gumus K, Erkilic K, Topaktas D, Colin J. Effect of Pterygia on Refractive Indices, Corneal Topography, and Ocular Aberrations. Cornea. 2011; 30(1):24–29. Available from: https://dx.doi.org/10.1097/ico.0b013e3181dc814e.
3. Misra S, Craig JP, McGhee CNJ, Patel DV. A Prospective Study of Pterygium Excision and Conjunctival Autograft With Human Fibrin Tissue Adhesive. Asia-Pacific J Ophthalmol. 2014; 3(4):202–206. Available from: https://dx.doi.org/10.1097/apo.0000000000000006.
4. Maheshwari S. Effect of pterygium excision on Pterygium induced astigmatism. Indian J Ophthalmol. 2003; 51:187–205.
5. Kanski JJ, Bowling B. *Clinical Ophthalmology: A Systematic Approach.* 7th ed. Edinburgh: Elsevier Saunders; 2011. Conjunctiva; pp. 4–163. [Google Scholar]
6. Maheshwari S. Pterygium-induced corneal refractive changes. *Indian J Ophthalmol.* 2007; 55:383–6. [PMC free article] [PubMed] [Google Scholar]