International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

A Study on to Evaluate Effect on Corneal Astigmatism before and after Excision of Pterygium at a Tertiary Care Centre of Jharkhand

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Abstract: ***Introduction: Pterygium, derived from the Greek word "pterygos" meaning "wing, " is a triangular, wing - like growth of degenerative, fibrovascular tissue that extends from the conjunctival limbal region onto the cornea. This condition can affect up to 22% of people in equatorial regions, while its prevalence drops to below 2% in regions situated above 40 degrees latitude. Methods: A prospective observational study was conducted in the ophthalmology department over a 12 - month period, involving 42 patients. Informed written consent was obtained from all participants, who were then interviewed about their symptoms and detailed medical history. A thorough clinical examination was also performed to assess the presenting illness. These findings were documented on a predesigned form. Results: The average preoperative astigmatism in the study group was 2.98 ± 1.52D. On the first postoperative day, the average astigmatism was 1.58 ± 1.06D. After one month, there was a statistically significant decrease in astigmatism to 0.93 ± 0.99D (p<0.001). Additionally, there was a correlation between the size of the pterygium and the degree of corneal astigmatism, indicating that as the pterygium area increased, so did the amount of corneal astigmatism. It was noted that as the percentage extension of the pterygium onto the cornea increased, so did the level of corneal astigmatism. Conclusion: There is a notable association between the size of the pterygium and the extent to which it extends onto the cornea with the development of corneal astigmatism. Furthermore, surgical intervention for pterygium leads to a significant reduction in corneal astigmatism.***

Keywords: Pterygium, Corneal astigmatism, Surgical intervention, Observational study, Prevalence

1. Introduction

Pterygium, originating from the Greek word "pterygos, " meaning "wing, " refers to a triangular, wing - shaped tissue characterized by degeneration, fibrovascular composition, and hyperplastic proliferation. It develops actively from the conjunctival limbal region onto the cornea. Pterygium is frequently found in tropical regions, with its occurrence heightened by outdoor activities in environments with intense light reflection, such as sandy or watery areas. In equatorial regions, its prevalence can reach 22%, while it drops to below 2% in latitudes above 40 degrees. India, being part of the Pterygium belt identified by Cameron, commonly experiences occurrences of this condition.

Aim

The aim of this study was to utilize keratometric measurements from automated kerato refractometry to assess the alteration in astigmatism caused by pterygium before and after surgical removal. Additionally, the study aimed to investigate the correlation between the size of the pterygium (both total area and percentage extension onto the cornea) and corneal astigmatism.

Objectives

- Primary Objective: To assess the difference in corneal astigmatism pre and post pterygium removal.
- Secondary Objective: To examine the relationship between the size of the pterygium and corneal astigmatism.

2. Material and Methods

This research comprised a prospective observational study conducted at a tertiary care center in Jharkhand over a one - year period from September 2022 to September 2023, involving a sample of 42 patients.

Inclusion Criteria

Participants with astigmatism of 1D or higher, as determined by automated keratometry, and pterygium extending at least 2mm onto the cornea.

Exclusion Criteria

Severe dry eye
Recurrent pterygium
Double pterygium
Pseudopterygium
Acutely inflamed pterygium
Patients with ocular trauma, ocular surgery
Presence of any corneal abnormalities like scarring
Corneal degenerations and dystrophies.

Following obtaining informed written consent, patients were interviewed regarding their concerns and provided detailed medical history, followed by a clinical examination focusing on the presenting illness. The results were documented using a predetermined form.

Surgical Technique

Aneasthesia: peribulbar anesthesia

Surgical Procedure: All patients underwent pterygium removal accompanied by conjunctival autografting using sutures. The surgical techniques were uniform and conducted by the same surgeon.

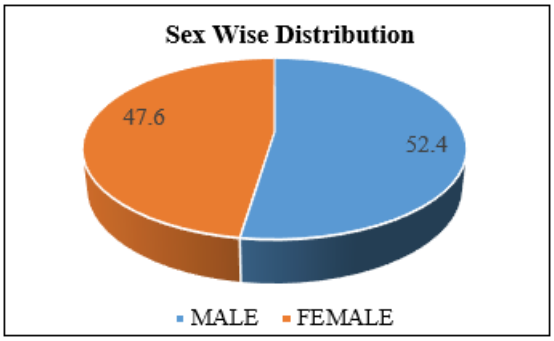
All patients received follow - up appointments on the first day post - surgery and one month later. During each follow - up visit, patients were evaluated for the following:

Visual acuity
Detailed anterior segment examination
Automated keratometry readings
Corneal astigmatism was determined by subtracting K1 from K2 values. The data were collected on a standardized form and analyzed using SPSS 23 software.

3. Observation

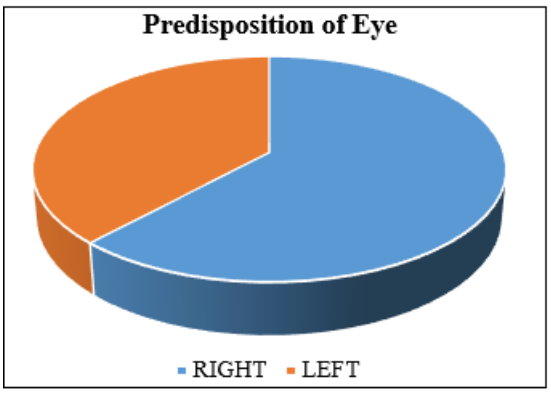
Sex Distribution

Gender	No. of Cases	Percentage
Male	22	52
Female	20	47
Total	42	100



Eye Involvement

Eye	No. of Cases	Percentage
Right Eye	26	61.9
Left Eye	16	38.09
Total	42	100



Comparison of Preoperative and Postoperative K1 Value

	Mean	SD	Range	P - Value
Pre - Operative	44.28	1.38	41.25 - 46.75	
Post- Operative Day 1	43.77	1.35	41.25 – 47.75	<0.001
Post- Operative 1 Month	43.33	1.35	41.0 – 46.0	<0.001

Comparison of Preoperative and Postoperative K2 Value

	Mean	SD	Range	P - Value
Pre - Operative	41.29	2.12	36.25 – 45.25	
Post- Operative Day 1	42.19	1.74	37.50 – 45.75	<0.001
Post- Operative 1 Month	42.70	1.77	37.75 – 46.25	<0.001

Comparison of Astigmatism Pre - Operatively and Post - Operatively

	Mean	SD	Range	P - Value
Pre - Operative	2.98	1.52	1.0 – 8.0	
Post- Operative Day 1	1.58	1.06	0.25 – 5.5	<0.001
Post- Operative 1 Month	0.93	0.99	0.25 – 5.0	<0.001

Comparison of Pterygium area with Astigmatism

Pterygium Area (mm^2)	Pre - Operative Astigmatism (Mean +/_ SD)	Post - Operative Day 1 Astigmatism (Mean +/_ SD)	Post - Operative 1 Month Astigmatism (Mean +/_ SD)	P - Value
<8	1.52+/ - 0.49	0.85 +/ - 0.38	0.44 +/ - 0.19	<0.001
08-Dec	2.69 +/ - 0.69	1.31 +/ - 0.49	0.65 +/ - 0.40	<0.001
>12	5.32 +/ - 1.24	3.09 +/ - 1.23	2.23 +/ - 1.48	<0.001

4. Results

The average preoperative astigmatism in the study group was 2.98 ± 1.52D. On the first day post - surgery, the average astigmatism was 1.58 ± 1.06D. After one month, there was a statistically significant decrease in astigmatism to 0.93 ± 0.99D ($p<0.001$). Additionally, there was a positive correlation observed between the size of the pterygium and the level of corneal astigmatism, indicating that larger pterygium areas were associated with increased corneal astigmatism. Furthermore, an increase in the percentage extension of pterygium onto the cornea corresponded with an increase in corneal astigmatism.

5. Conclusion

There is a significant correlation between the size of the pterygium and the extent to which it extends onto the cornea with the development of corneal astigmatism. Additionally, surgical removal of pterygium leads to a significant reduction in corneal astigmatism.

6. Discussion

An increase in the percentage extension of pterygium onto the cornea is associated with higher preoperative corneal astigmatism. Additionally, the degree of reduction in postoperative astigmatism is greater with a higher percentage extension of pterygium onto the cornea.

In contrast to prior research, this study takes into account both the size of the pterygium and the percentage extension of the pterygium onto the cornea to measure its magnitude.

In our study we found that both the overall size and the extent to which the pterygium extends onto the cornea are crucial

factors in evaluating the corneal astigmatism caused by pterygium. Given that pterygium contributes significantly to astigmatism, its removal results in a decrease in pterygium - related corneal astigmatism.

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