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ORIGINAL RESEARCH

To compare the changes in visual acuity and refractive astigmatism before and after pterygium excision followed by conjunctivolimbal autograft

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ABSTRACT

Background: Pterygium is a degenerative condition of the subconjunctival tissue, which proliferates as vascularised granulation tissue to invade the cornea, destroying the superficial layer of the stroma and bowman's membrane. As the pterygium advances induced irregular astigmatism can cause decreased visual acuity. **Purpose:** To compare changes in visual acuity and refractive astigmatism before & after pterygium excision followed by sutureless glueless conjunctival limbal autograft and assess amount of induced corneal astigmatism in different grades of pterygium. **Methods:** The prospective, comparative study was carried out on 100 primary Pterygium patients. Visual acuity & refractive astigmatism was assessed pre-operatively & post operatively on 1st day, 7th day and 1 month. Pterygium excision followed by sutureless & glueless conjunctival autograft was the surgical technique used. **Results:** The preoperative mean keratometric astigmatism of 0.825D was reduced to 0.20D postoperatively at 1 month. It was statistically significant ($P < 0.0001$) .The preoperative mean refractive astigmatism value was more in grade 4 preoperatively 2.5D which decreased to 0.58D postoperatively, followed by grade3 pterygium which had preoperative mean astigmatic value 2.04 D reduced to 0.56D postoperatively. **Conclusions**: The present study concludes that reduction in refractive astigmatism occurs after pterygium excision followed by sutureless and glueless conjunctival autograft with improvement in visual acuity with additional benefit of lowest recurrence rate. There is directly proportional relation between pterygium grade and the amount of induced astigmatism.

INTRODUCTION

Pterygium is degenerative condition of the subconjunctival tissue, which proliferates as vascularised granulation tissue to invade the cornea, destroying the superficial layer of the stroma and Bowmans' membrane. As the pterygium advances, induced irregular astigmatism can cause decreased visual acuity.

The reasons for astigmatism are:

1. Mechanical traction exerted on cornea.[1][2][3][4][5][6][7].
2. Pooling of the tear film.

MATERIAL AND METHODS

Individuals of age more than 18 years with primary pterygium who presented in the outpatient department of our centre were included in this prospective interventional study. The study was approved by the Institutional Ethical Committee and Scientific Committee. Patients with recurrent pterygium, double headed pterygium, and those with history of ocular morbidity were excluded from our study. Written informed consent was obtained from all patients after explaining the prognosis about recurrence of the pterygium and changes in Astigmatism. Each and every patient taken for SNELLENS chart calculation and NIDEK ARK calculated Pre operatively. Same was done postoperatively.

Study Design: Prospective And Interventional Study.
Sample Size: 100 Primary Pterygium Cases.

GRADING OF PTERYGIUM:

- Grade1- Pterygium Extending To Limbus

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- Grade2- Extending Between Limbus And Pupillary Margin To A Point Halfway Between The Limbus And Pupillary Margin
- Grade3- Pterygium Head That Extends Beyond The Point Halfway Between The Limbus And Pupillary Margin, But Does Not Cross The Pupillary Margin
- Grade4-Pterygium Crosses The Pupillary Border.

Surgical Technique Used*:* Conjunctivolimbal Autograft.

- After topical anaesthesia, eye was cleaned, draped and exposed using universal eye speculum.
- Head of the pterygium was then lifted and dissected off the cornea.
- Main mass of pterygium was then separated from the sclera underneath and the conjunctiva superficially.
- Pterygium tissue was then excised taking care not to damage the underlying medial rectus muscle.
- Conjunctival limbal autograft was taken from the Superotemporal/Inferotemporal site and spread over the bare sclera with help of repositor.
- Follow up was done on day 1, day 7 and 1 month.
- Visual acuity was taken from Snellen chart and astigmatism reading was noted using Automated Keratometer.

Statistical Analysis

Statistical Analysis Was Performed Using Spss For Windows (Version 16.0,2007; Spss Inc, Chicago, Il, Usa). Paired And Unpaired T-Test Were Used To Compare The Variables.The Probability Level Of 0.05 Was Set As The Statistically Significant Value.

RESULTS

THE pre and postoperative were compared on day 1, day 7, and 1 month. The preoperative UCVA of 6/6-6/12 was significantly improved to P<.001),6/6-6/9,6/6-6/9,6/6-6/6p (P<0.001) on day 1, day 7, and 1 month after surgery.

Table: Comparison of pre and postoperative uncorrected visual acuity (UCVA).

Grades	Preop Visual Acuity	Number Of Patients	Visual Acuity On Day 1	Visual Acuity On Day 7	Visual Acuity On 1 Month	P Value
GRADE 1	6/6-6/12	18	6/6-6/9	6/6-6/9	6/6-6/6p	.0001(S)
GRADE 2	6/9-6/18	26	6/6-6/9	6/6-6/9	6/6-6/9	0.001(S)
GRADE 3	6/18-6/60	35	6/9-6/12	6/9-6/12	6/6-6/9p	0.0001(S)
GRADE 4	6/18-6/60	21	6/9-6/18	6/9-6/18	6/9-6/12	0.0001(S)

The Pre And Postoperative Corneal Astigmatism Were Also Compared On Day 1, Day 7, And 1 Month.The Changes In Corneal Astigmatism Were Statistically Significant At All Visits.The Preoperative Corneal Astigmatism Of 2.5 D Was Reduced To 0.58 D 1 Month After Surgery.

Table: Comparison Of Pre And Post Operative Corneal Astigmatism (In Diopter)

	Mean Keratometric Astigmatism (D)	Std.Dev.	Std.Error	P Value
Preop	2.5	2.00	0.20	.0001(S)
Post Op Day 1	1.6	1.23	0.14	.0001(S)
Post Op Day 7	1.1	0.79	0.09	.0001(S)
Post Op 1 Month	0.58	0.78	0.09	.0001(S)

The preoperative astigmatism varied with the grade of pterygium.the preoperative mean astigmatism was 1.72 ± 0.50 d, 2.04± 0.51d and 2.5± 0.61d in eyes with grade 2, 3 and 4 respectively.the amount of corneal astigmatism induced by pterygium increased with grade of pterygium.the post operative mean astigmatism at 1 month in eye with grade 2, 3, 4 were 0.33 ± 0.31 d (p<.0001) and 0 .56 ± 0.90d (p<.0001) 0.58 respectively.thus a significant reduction in corneal astigmatism 1 month after surgery was observed for all the 3 grades of pterygium.but maximum changes were seen in grade 4 >grade3 >grade2. Changes in astigmatism increased with increase with in grade of pterygium.

Table: Comparison of preoperative and postoperative corneal astigmatism (in diopter)

Grades of pterygium	Preoperative Mean Keratometric astigmatism (D)	Postoperative astigmatism(D) (at 1 month) Mean ± SD	P value
GRADE 1	0.825	0.20	0.0001(S)
GRADE 2	1.752	0.33	0.0001(S)
GRADE 3	2.04	0.56	0.0001(S)
GRADE 4	2.5	0.58	0.0001(S)

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DISCUSSION

- The present study concludes that significant reduction in refractive astigmatism occurs after pterygium excision followed by sutureless and glueless conjunctival autograft with improvement in visual acuity.
- There is direct proportion relation between grading of the pterygium and induced astigmatism.

Pterygium causes refractive changes by inducing astigmatism or by involving visual axis which leads to visual impairment.[8] Our study was designed to study the change in corneal astigmatism after pterygium excision in glue less sutureless conjunctival limbal autograft.

Surgery is the primary treatment of pterygium. Visual acuity can be improved by successful pterygium excision surgery during which pterygium is removed from the visual axis.[8] 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.[9] 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 keratometry astigmatism from 3.046 ± 1.20 D to 1.486 ± 0.63 D ($P < 0.001$) after pterygium surgery.[1] So, they concluded that pterygium-induced corneal astigmatism can be reduced by pterygium surgery. A similar study was carried out by Cinal et al. and they concluded that pterygium surgery causes partial reversal of pterygium-related corneal topographical changes, though some changes might remain due to scarring.[10]

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.[11]

Pterygium grade also affects the corneal astigmatism. Several studies conducted previously prove that the amount of induced corneal astigmatism increases with the increase in the size of pterygium. Gumus et al. found a significant correlation between the size of pterygium and induced corneal astigmatism.[5] Seitz et al. concluded that with the size of pterygium extending from 2.5mm, the preoperative astigmatism increases.[12] In our study, mean astigmatism was more in higher grades of pterygium. Preoperative mean astigmatism was minimum in grade II pterygium, that is, 2.19 ± 0.50 D and maximum in grade IV pterygium 6.50 ± 0.61 D. These results were comparable with results of the above-mentioned studies.

As compared to the bare sclera technique, changes in astigmatism were significantly more with conjunctival autograft technique mainly due to better healing and less granulation tissue formation.[11],[13],[14]

Altan-yaycioglu et al. have used different surgical techniques: conjunctival autograft with sutures (CAG-s) or fibrin glue (CAG-g), conjunctival rational flap (CRF), or amniotic membrane transplantation with either suture (AMT-s) or with glue (AMT-g) on the postoperative astigmatism.[15] They found that changes in astigmatism were significantly related to the preoperative size of the pterygium and were not related to the type of grafting or the use of suture or glue. Similarly, in a study conducted by Gangadhar et al., pterygium-induced astigmatism was compared by using conjunctival autograft and amniotic membrane graft.[16] They concluded that early excision of pterygium reduces the pterygium-induced astigmatism and that the type of grafting does not have a significant effect on change in astigmatism. Though the above studies , their comparison results between conjunctival autograft and amniotic membrane graft groups were similar to our results of no significant difference between conjunctival autograft and amniotic membrane graft in terms of change in corneal astigmatism.

Although a larger sample size would have helped in a better analysis, our study has a small sample size (71). Moreover, the follow-up period of our study was 1 month. Larger follow up period would have helped in better evaluation of long-term complications.

CONCLUSION

Pterygium is associated with significant astigmatism in most cases. Our study verifies that with increase in the amount of induced astigmatism also increases with increase in the size of pterygium. Pterygium-induced astigmatism can be significantly reduced by surgical excision. This results in improvement of visual acuity as well. There was significant reduction in corneal astigmatism, by sutureless, glueless conjunctival autograft technique.

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