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Comparative Study of Keratometry and Refractive Status in Pre and Post Pterygium Surgery

Dr . Surya Meena ,[1]MBBS, Resident
Dr.(Prof)Vivek Jain ,[2]MBBS, M.S., DNB, MNAMS
Dr.Charul Jain ,[3]MBBS, DNB ,Senior Resident
Dr.Rakesh Kumar Mehra, ,[4]MBBS,Resident
Department of Ophthalmology, SMS Medical College and Hospital, Jaipur, Rajasthan India.
Corresponding Author- Dr. Surya Meena ,Department of Ophthalmology SMS Medical College and Hospital Jaipur, Rajasthan, India .

ABSTRACT:
Background: *Pterygium is one of the most frequent eye surface abnormalities. Immune mechanisms, genetic predisposition, and chronic environmental irritation, such as UV (ultraviolet) rays, hot and dry weather, wind, dusty atmosphere, and the duration of exposure to such conditions, are all established risk factors. The current study was designed to evaluate the effect of pterygium excision on pterygium-induced refractive alterations and to compare the mean corneal curvature before and after pterygium excision.*
Material and methods:
This was a hospital based prospective interventional study was conducted in Department of ophthalmology, S.M.S medical college and attached group of hospitals, Jaipur. The study population consist of 40 patients with 40 eyes posted for pterygium surgery. All the patients undergone detail history and investigation and full clinical, ophthalmological work up was done. Patients fulfilled the inclusion and exclusion criteria were posted for the uneventful pterygium surgery with conjunctival autograft with 8-0 vicryl suture performed by same surgeon. Follow up examination on post-operative 1ST day, 1st week and 3rd week. Data analysis was done using licensed SPSS software version 21.0 (Chicago, Illinois). Paired t test and Anova test was used to compare the variable at different time intervals. A p-value <0.05 was considered as statistically significant.
Results: *In our study, pre-op, post-op 1 day, post-op 1 week and post-op 3 week Keratometry reading in horizontal (KH), was 42.8±0.76, 43.3±0.56, 43.5±0.98 and 43.7±1.3 respectively, Keratometry reading in vertical (KV) was 45.4±0.2.2, 45.3±2.1, 44.7±2.1 and 44.5±2.2 respectively, cylindrical error was 1.9±2.9, 1.3±1.2, 1.15±1.3 and 1.17±1.2 respectively and axis was 94.8±33.5, 78.9±30.2, 82.7±29.8 and 95.2±40.9 respectively. In the current study, a statistically significant increase in KH, a statistically significant decrease in KV, cylindrical error and axis was found from pre-op to post-op day-1, post-op 1 week and post-op 3 week.*
Conclusion: *Our study concluded that pterygium excision on time can significantly decreases the vertical corneal meridian, cylindrical error and axis while it increases the horizontal corneal meridian.*
Keywords: *Pterygium, keratometry, refractive error*

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I. INTRODUCTION

Pterygium is one of the most frequent eye surface abnormalities. Immune mechanisms, genetic predisposition, and chronic environmental irritation, such as UV (ultraviolet) rays, hot and dry weather, wind, dusty atmosphere, and the duration of exposure to such conditions, are all established risk factors.[1]

A pterygium could also signify a location with a limited limbal stem cell deficit, resulting in conjunctival invasion of the neighbouring cornea.[2] The reactivation of the inflammatory process, which is present in the initial form, is the pathophysiology of recurrence. Surgical trauma can sometimes be used to boost the inflammatory response. If the limbal stem cells remain engaged, proliferative cytokines and growth factors (including vascular endothelial growth factor or VEGF) might increase following surgery, and fibroelastic tissue is also involved.[3-5] As a result, fibrovascular proliferation is accelerated, and metalloproteinase synthesis increases, destroying the Bowman membrane and stromal collagen, perhaps speeding up the progression of pterygium.

Many surgical procedures have been employed throughout history, but none is universally acceptable due to varied recurrence rates. Most studies have found that 90 percent of recurrences develop between the first and third month.[6] The reason for the recurrence may be related to the surgery or to the patient and environmental

factors. Incomplete primary surgery, including incomplete removal of affected tissue, presence of fibrotic tissue debris left in the cornea and limbus, presence of sclera-corneal rough surface with irregularities, tension in conjunctival suture edges, conjunctival edge dehiscence, or poorly controlled inflammatory reaction, may be the cause of surgery-related causes. Male patients under the age of 40, patients of Asian, African, American, and Hispanic descent, persistent exposure to a dry and dusty environment, and the existence of a dry eye condition are among the patient and environment-related factors.[7]

The current study was designed to evaluate the effect of pterygium excision on pterygium-induced refractive alterations and to compare the mean corneal curvature before and after pterygium excision.

II. MATERIAL AND METHODS

This was a hospital based prospective interventional study was conducted in Department of Ophthalmology, S.M.S medical college and attached group of hospitals, Jaipur. Approval from Institutional Ethical Committee of SMS medical college & Hospital was taken before the start of the study. Patients with unilateral and bilateral Nasal pterygium patient, age between 20-70 years were included in the study while patients with temporal pterygium, pterygium patients with previous history of spectacles, Pterygium patients with history of recurrent pterygium and pseudoterygium and other anterior segment pathology, Patient with history of ocular trauma, ocular surgery ,corneal infection or scarring and Patient with cataract and retinal diseases were excluded from the study. The study population consist of 40 patients with 40 eyes posted for pterygium surgery.

All the patients undergone detail history and investigation and full clinical, ophthalmological work up was done. Patients fulfilled the inclusion and exclusion criteria were posted for the uneventful pterygium surgery with conjunctival autograft with 8-0 vicryl suture performed by same surgeon. Follow up examination on post-operative 1ST day, 1st week and 3rd week for parameters:

- Ocular examination included recording of visual acuity with Snellen's chart .
- Keratometry value obtained by using manual Bausch and lomb type keratometer .
- Refractive status obtained by using retinoscope

Data analysis was done using licensed SPSS software version 21.0 (Chicago, Illinois). Paired t test and Anova test was used to compare the variable at different time intervals. A p-value <0.05 was considered as statistically significant.

III. RESULTS

In our study, mean age of study participants was 46.3±17.1 years and out of the 40 participants, maximum 19 were ≤40 years age followed by 13 participants in age group of 41-60 years, 28 were male and 12 were female participants and 23 were have right sided pterygium and 17 were have left sided pterygium. In the present study maximum19 were belongs to pterygium grading 2 followed by 10 belongs to grade 3 and 10 had 6/6 visual acuity and 10 participants had 6/9 visual acuity. (Table 1)

In our study, pre-op, post-op 1 day, post-op 1 week and post-op 3 week Keratometry reading in horizontal (KH), was 42.8±0.76, 43.3±0.56, 43.5±0.98 and 43.7±1.3 respectively, Keratometry reading in vertical (KV) was 45.4±0.2.2, 45.3±2.1, 44.7±2.1 and 44.5±2.2 respectively, cylindrical error was 1.9±2.9, 1.3±1.2, 1.15±1.3 and 1.17±1.2 respectively and axis was 94.8±33.5, 78.9±30.2, 82.7±29.8 and 95.2±40.9 respectively. (Table 2)

In the current study, a statistically significant increase in KH, a statistically significant decrease in KV, cylindrical error and axis was found from pre-op to post-op day-1, post-op 1 week and post-op 3 week. (Table 3)

Table 1: Sociodemographic and baseline characteristics of study participants (N=40):

Gender	Frequency	Percent
Age (Mean±SD)	46.33±17.1 years	
Age group:		
≤40 years	19	47.5
41-60 years	13	32.5
>60 years	8	20.0
Gender:		
Male	28	70.0
Female	12	30.0
Side of pterygium		
Right	23	57.5
Left	17	42.5
Grading of pterygium:		
I	7	17.5
II	19	47.5
III	10	25.0
IV	4	10.0
Visual acuity:		

2/60	2	5.0
3/60	4	10.0
6/12	2	5.0
6/18	7	17.5
6/36	5	12.5
6/9	10	25.0
6/6	10	25.0

Table 2: Distribution of different measurements at different time intervals:

	Pre-op	Post-op 1 Day	Post-op 1 week	Post-op 3 week
KH	42.80±0.76	43.32±0.56	43.51±0.98	43.71±1.33
KV	45.36±2.2	45.07±2.1	44.67±2.2	44.55±2.3
Cylindrical error	1.91±2.9	1.29±1.2	1.15±1.3	1.17±1.2
Axis	94.80±33.5	78.90±30.2	82.70±29.8	95.25±40.9

Table 3: Comparison of pre-op reading with post-op

	Paired Differences					t-value	p-value
	Mean	SD	SE Mean	95% CI			
				Lower	Upper		
Pre-op KH vs Others							
Day-1	-.520	.854	.135	-.793	-.246	-3.85	.0001
Week 1	-.715	1.063	.168	-1.05	-.375	-4.254	.0001
Week 3	-.915	1.255	.198	-1.31	-.513	-4.610	.0001
Post -op KV							
Day-1	.30	.35	.06	.18	.41	5.27	.0001
Week 1	.69	.60	.10	.49	.88	7.18	.0001
Week 3	.81	.76	.12	.57	1.06	6.79	.0001
Post-op cylindrical error							
Day-1	.621	1.967	.311	-.007	1.250	1.999	.043
Week 1	.759	1.972	.312	.128	1.390	2.434	.020
Week 3	.737	2.082	.329	.071	1.402	2.237	.031
Post-op axis							
Day-1	15.900	34.86	5.513	4.750	27.050	2.884	0.006
Week 1	12.100	34.84	5.510	.955	23.245	2.196	0.034
Week 3	-.450	38.72	6.122	-12.83	11.934	-.074	0.942

IV. DISCUSSION

This was a hospital based prospective interventional study was conducted in Department of Ophthalmology, S.M.S medical college and attached group of hospitals, Jaipur. This study designed to evaluate the effect of pterygium excision on pterygium-induced refractive alterations and to compare the mean corneal curvature before and after pterygium excision. The study population consist of 40 patients with 40 eyes posted for pterygium surgery.

In our study, mean age of study participants was 46.3±17.1 years and our study had male preponderance. Similarly Vadodaria B et al[8] did a similar study and mean age 43.16, ranged from 24-65 years, however this study had female preponderance. In. Popat KB et al[9] study, Mean age of study participants was 34.16 ± 8.24.

In the current study, a statistically significant increase in KH, a statistically significant decrease in KV, cylindrical error and axis was found from pre-op to post-op day-1, post-op 1 week and post-op 3 week.

Similarly, Garg P et al[10] revealed that the reduction in mean preoperative astigmatism from 3.47± 1.74 D to 1.10 0.78 D three months after surgery was statistically significant (P 0.0001). Astigmatism was reduced by 1.85 ±0.88 D, 2.55± 1.26 D, and 2.67 ±1.44 D using the bare sclera, conjunctival autograft, and amniotic membrane graft procedures, respectively.[55] Gumber A et al[111] conducted a study to determine the precise time point after pterygium excision with a modified sutureless, glueless limbal-conjunctival autograft. The keratometric value for the flatter meridian approached the final keratometric reading at 4 months at 2-month follow-up, but the difference was not significant (t = 1.185, P = 0.245). Vadodaria B et al[8] revealed that there was a significant difference in mean KV and KH pre-operatively, on post-operative day 1 after pterygium excision surgery with conjunctival autograft with or without suture, and on regular follow up (p = 0.000), such that KV (43.84±1.01 decreases to 43.08±1.01) decreases following surgery and serial follow up, while KH (41.30±0.96 increases to 42.56±0.79) increases.

Popat KB et al[9] revealed that preoperative median and quartiles (25% -75%) horizontal and vertical keratometric values were 43.00 (42.50 - 44.00) D and 44.25 (43.75 - 44.50) D , respectively and both reduced significantly to 42.50 (42.50 - 42.94) D and 42.50 (42.50 - 43.00) D , respectively after four months postoperatively. According to Shukla D et al[12] Median keratometric astigmatism before surgery was 1.37 (1.25-

1.93) D which reduced significantly to 0.50 (0.32 - 0.75) D after four months of pterygium excision . Similarly, BCVA improved significantly [0.20(0.16-0.25) vs 0.53 (0.50-0.80)] when assessed postoperatively after four months.

V. CONCLUSION

Our study concluded that pterygium excision on time can significantly decreases the vertical corneal meridian, cylindrical error and axis while it increases the horizontal corneal meridian.

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