Original Article

Mean Change in Pterygium Induced Astigmatism in Patients Undergoing Pterygium Excision with Conjunctival Autograft

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ABSTRACT

Purpose: To determine the mean change in pterygium induced astigmatism in patient undergoing pterygium excision with conjunctival auto graft.

Study Design: Quasi Experimental Study.

Place and Duration of Study: Department of ophthalmology Dow University of Health Sciences/CHK from March 2018 to November 2018.

Methods: Thirty patients with pterygium were selected through non-probability consecutive sampling. All patients meeting inclusion criteria were enrolled after taking written consent. History of duration of symptoms and co-morbidity was taken. All surgeries were performed by consultant with more than 5 years experience with conjunctival auto graft under topical anesthesia. Patient was followed up after one week, 15 days and then monthly for four months with the final outcome at the end of fourth month. Difference between preoperative and postoperative astigmatism was taken as mean change. Data was analyzed on SPSS version 21. Mean and Standard deviation were calculated for all quantitative variables like age, astigmatism (keratometric reading) and duration of symptoms. Frequency and percentage was calculated for gender and grade of pterygium. $P < 0.05$ was considered significant.

Results: Mean age of the patients was 50.07 ± 12.48 years. There were 19 (63.33%) males and 11 (36.67%) females. Preoperative mean astigmatism was 3.70 ± 1.36 and postoperative mean astigmatism was 1.91 ± 0.97. Post-operative mean astigmatism was significantly low as compare to preoperative astigmatism ($p = 0.0005$).

Conclusion: This study concludes that successful pterygium excision surgery reduces the pterygium induced refractive astigmatism and improves the visual outcome either by reducing the astigmatism or by removal of the pterygium from the visual axis as in Grade IV pterygium.

Key Words: Pterygium, Astigmatism, Conjunctival autograft.

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INTRODUCTION

Pterygium is a triangular fibro vascular growth of degenerative bulbar conjunctiva progressing towards the cornea.[1]Pterygium causes significant amount of astigmatism which is caused either by mechanical traction on cornea, exerted by pterygium or due to accumulated tears at the edge of pterygium.[2] The astigmatism produced in the majority of cases is with-the-rule astigmatism.[3] Larger the pterygium greater the amount of astigmatism. Pterygium causes decrease of vision by inducing astigmatism.[4]

The standard management option for pterygium is surgical excision which significantly reduces

astigmatism and hence improvement in vision.[5,6] Surgical excision with conjunctival autograft is safe and effective technique and it carries less recurrence rate as compared to scleral bare technique.[7,8]

With the use of refraction and automated keratometry we were able to measure effect on astigmatism before and after pterygium excision.[910] The purpose of this study is to determine the mean change in pterygium induced astigmatism after conjunctival autograph in patients undergoing pterygium surgery.

METHODS

It was a Quasi Experimental Study, done from March 2018 to November 2018 at Department of Ophthalmology, Dow University of Health Sciences/ CHK. Sample size was calculated through PASS version-11, taking preoperative and postoperative difference of astigmatism 3.92 ± 0.13 for grade-IV pterygium and 5% alpha and 10% power.[19] Thirty patients with pterygium were selected through non-probability consecutive sampling. Patients with pterygium induced astigmatism of more than four weeks duration, progressive type (more vascularized and complaints of foreign body like sensation and interference in vision), grade of II, III and IV pterugium, age between 20 and 70 years and either gender were included. Patients with pseudo-pterygium, recurrent pterygium, ulceration or scaring of cornea, poor wound healing from any ocular or other diseases as dry eye, rheumatoid arthritis and eyes with previous surgery were excluded.

Keratometric reading greater than 0.75 diopters astigmatism was taken as pterygium induced astigmatism. Grading of Pterygium was as follows:

Grade-I: presence of triangular red mass crossing and reaching on corneo-scleral margin.

Grade-II: presence of triangular red mass reaching in between corneo-scleral margin and pupil.

Grade-III: presence of triangular red mass reaching upto pupil margin.

Grade-IV: presence of triangular red mass reaching at the centre of cornea and blocking the vision.

All patients meeting inclusion criteria were enrolled after taking written consent. History of duration of symptoms and co-morbidity was taken. All surgeries were performed by consultant with more than 5 years experience with conjunctival auto graft under topical anesthesia. Patient was followed up after one week, 15 days and then monthly for four months with the final outcome at the end of fourth month. Keratometric data was obtained with (HUBITZ HRK-7,000) Automated keratometer and difference between preoperative and postoperative astigmatism was taken as mean change.

Data was analyzed on SPSS version 21. Mean and Standard deviation were calculated for all quantitative variables like age, astigmatism (keratometric reading) and duration of symptoms. Frequency and percentage was calculated for gender and grade of pterygium. Paired sample t-test was applied to check the difference of preoperative and postoperative astigmatism. P value of less than 0.05 was considered as significant. Stratification was done with respect to age, gender, and duration of symptoms, comorbidity (hypertension and diabetes mellitus) and grades to see the effects of these variables in outcome. Post stratification independent sample t test was applied and $p < 0.05$ was considered significant.

RESULTS

A total of 30 patients with pterygium induced astigmatism were included in this study. Age distribution of the patients is shown in figure 1. The average age of the patients was 50.07 ± 12.48 years (median = 49.5 with interquartile range of 21) and mean duration of symptoms was 3.73 ± 1.64 months (median 3.5 months with inter quartile range of 3). There were 19 (63.33) male and 11 (36.67%) female as shown in figure 2. Out of 30 cases, 76.67% were diabetic and 60% were hypertensive as presented in figure 3 and 4 respectively. Regarding type of pterygium, 13 (43.33%) had grade II pterygia, 10 (33.33%) had grade III pterygia, 7 (23.33%) had grade IV pterygia as shown in figure 5.

Pre and post mean comparison of change in pterygium induced astigmatism in patient undergoing pterygium excision with conjunctival autograft is shown in figure 6. Preoperative mean of pterygium was 3.70 ± 1.36 and postoperative mean of pterygium was1.91 ± 0.97.Post-operative mean pterygium was significantly low as compare to pre pterygium ($p = 0.0005$).

The amount of astigmatism varied with the grade of pterygium. Postoperative mean astigmatism difference was significantly low as compare to preoperative for all grade of pterygium. The amount of

astigmatism was seen to increase with the grade of pterygium as shown in table 2. Similarly postoperative mean astigmatism difference was significantly low as compare to pretreatment for age groups, gender, diabetes mellitus, hypertension and duration of symptoms as shown in table 3 to 7 respectively.

Table 1: *Comparison of Pre and Post Astigmatism with Respect to Grade of Pterygium.*

Grade of Pterygium	N	Pre-operative Astigmatism Mean ±SD	Post-operative Astigmatism Mean ±SD	P-Value
Grade II	13	2.58 ± 0.51	1.42 ± 0.59	0.0005
Grade III	10	3.70 ± 0.14	1.44 ± 0.29	0.0005
Grade IV	7	5.77 ± 0.97	2.47 ± 0.13	0.001
Age Groups				
≤40	7	3.40 ± 1.15	1.33 ± 0.99	0.0005
41 to 50	11	3.15 ± 0.91	1.82 ± 0.92	0.0005
>50	12	4.37 ± 1.61	2.31 ± 0.90	0.0005
Gender				
Male	19	3.94 ± 1.32	1.95 ± 0.96	0.0005
Female	11	3.28 ± 1.39	1.81 ± 1.04	0.0005
Diabetes Mellitus				
Yes	23	3.61 ± 1.14	1.85 ± 0.96	0.0005
No	7	4.00 ± 2.03	2.06 ± 1.07	0.004
Hypertension				
Yes	18	3.71 ± 1.21	1.84 ± 0.99	0.0005
No	12	3.69 ± 1.62	2.00 ± 0.98	0.0005
Duration of Symptoms				
2-4	19	3.96 ± 1.60	2.08 ± 1.03	0.0005
>4	11	3.24 ± 0.65	1.60 ± 0.82	0.0005

DISCUSSION

Pterygium is a fibro elastic degeneration of the conjunctiva with encroachment towards the cornea.[1] Pterygium can lead to significant astigmatism. Due to flattening along the horizontal meridian. Pterygium excision surgery is advised if it is growing towards cornea and visual axis is blocked. Surgical excision decreases pterygium induced corneal distortion and improves visual symptoms caused by encroachment of pterygium into the visual axis. Fong et al, observed that pterygium excision often results in reversal of pterygium induced corneal flattening.[9] We performed conjunctival autograft surgery which resulted in decrease in pterygium.

Our results are in consistence with other studies using different surgical techniques in pterygium and improving astigmatism.[11-12] Consequently, successful pterygium surgery can improve visual acuity which is also supported by the different techniques used for evaluation of corneal astigmatism.[13,14,15]

According to a report by American Academy of Ophthalmology, bare sclera excision of pterygium resulted in a grossly higher recurrence ratio compared with excision along with the use of conjunctival auto graft.[16] This is the reason that bare sclera technique is very rarely performed in the treatment of pterygium. Nowadays variety of surgical procedures has been done to decrease chances of recurrence. The common surgical management options include primary closure with conjunctival autograft, amniotic membrane transplantation, use of Mitomycin C, etc.[17,18,19]

Eknath Shelke et al, in their study of 37 patients of pterygium reported that 51.84% of patients had Grade II pterygium, while 37.84% had Grade III and 8.11% had Grade IV pterygium.[11] This observation was also seen by Maheshwari et al, in which, 36 eyes were diagnosed as primary pterygium.[5] Most of their patients belonged to Grade II (44.45%) and 33.33% had Grade III. This is very much consistent with our findings.

Stern and Lin reported improvement in topographic indices in 16 eyes; they reported corneal astigmatism to reduce from 5.93 ± 2.46D to 1.92 ± 1.68D.[20] In the current study all the topographic parameters were seen to improve significantly following pterygium excision. Preoperative mean of pterygium was 3.70 ± 1.36 and postoperative mean of pterygium was1.91 ± 0.97. Post-operative mean pterygium was significantly low as compare to pre pterygium (p = 0.0005). Postoperative mean astigmatism difference was significantly low as compare to preoperative for all grade of pterygium. Lindsay and Sullivan also concluded same significant correlation between successful pterygium excision surgery and improvement in the visual acuity.[21] The quantity of astigmatism depends on the grade of pterygium. In our study the postoperative mean astigmatism difference was significantly low as compare to preoperative for all grade of pterygium. The quantity of astigmatism was seen to increase with the grade of pterygium. It was also reported earlier that a significant correlation existed between the size of pterygium and corneal astigmatism.[20] It was also seen that pterygium covering more than 45% of corneal diameter resulted in higher degrees of astigmatism.

Mohammad-Salih and co-workers concluded relationship with corneal astigmatism with the pterygium extension, width and total area. In these parameters, an extension had the strongest and the most significant correlation with the astigmatism (ρ =

0.462, $P < 0.001$, Pearson correlation analysis).[4]

Limitations of our study are the single center study, small sample size and absence of control group.

CONCLUSION

The patients with pterygium along with astigmatism include both naturally occurring astigmatism and pterygium induced astigmatism. The size of pterygium is directly proportional to the amount of induced astigmatism. The present study also verifies that successful pterygium excision surgery reduces the pterygium induced refractive astigmatism and improved the visual acuity either by reducing the astigmatism or by removal of the pterygium from the visual axis as in Grade IV pterygium.

Ethical Approval

The study was approved by the Institutional review board/Ethical review board **(CPSP/REU/OPL-2015-183-1661).**

Conflict of Interest: Authors declared no conflict of interest.

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Authors' Designation and Contribution

Asghar Ali; Medical Officer: *Concepts, Design, Literature search, Data acquisition, Manuscript preparation, Manuscript review.*

Muhammad Adnan; Assistant Professor: *Literature search, Data acquisition, Statistical analysis, Manuscript preparation, Manuscript review.*

Sajida Parveen Shaikh; *Associate Professor: Literature search, Data analysis, Statistical analysis, Manuscript preparation, Manuscript editing, Manuscript review.*

Abdul Sami; Consultant Ophthalmologist: *Concepts, Design, Literature search, Data acquisition, Data analysis, Manuscript editing.*

Hafiza Riffat; FCPS Trainee: *Design, Data acquisition, Statistical analysis, Manuscript editing, Manuscript review.*