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Astigmatic change after pterygium excision with autologous limbal conjunctival graft

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Abstract

Background: Pterygium induces a significant amount of astigmatism. Pterygium excision with conjunctival limbal autograft results in significant reduction in astigmatism by inducing a reversal of pterygium induced corneal flattening thereby improving the vision.

Objectives: The aim of this study was to investigate the amount of corneal astigmatism in patients with pterygium before and one month (4 weeks) after surgery.

Methodology: The prospective observational study was conducted in 31 patients who underwent pterygium excision with limbal autograft in Kathmandu Medical College Teaching Hospital during the study period of 12 months duration. Patients with recurrent pterygium, pseudopterygium, history of ocular trauma, history of ocular surgery, corneal scarring were excluded from the study. After surgery, patients were followed for four weeks. Findings were recorded in the proforma and statistical analysis was done in SPSS version 19.

Results: Pterygium was seen in all age groups with majority being in the active age range of 41-50 yrs. Females were most commonly affected. Significant difference in corneal astigmatism was noted postoperatively with a p value being 0.01.

Conclusion: The technique of pterygium excision with limbal conjunctival autograft not only reduces the chances of recurrence but also helps in reducing the induced corneal astigmatism which is responsible for decreased vision in patients with pterygium.

Key words: Astigmatism; Autologous; Graft; Pterygium.

INTRODUCTION

A wing-shaped fibrovascular growth of conjunctival tissue over cornea is called pterygium[1]. Prevalence rate of pterygium is 0.7 % to 31% in various populations around the world[2]. It is a benign lesion more frequently located nasally than temporally. The disease is more common in hot, dry, and sunny climate[3]. Other than causing irritative symptoms and having cosmetic implications, pterygium can cause decreased vision because of induced astigmatism and encroachment to the pupillary area. Several mechanisms have been suggested to explain the induced astigmatism, which include pooling of tear film at the leading edge of the pterygium, and mechanical traction exerted by the pterygium on the cornea[4]. Different methods are available for the measurement of astigmatism like refraction, keratometry and corneal topography. Measurement of astigmatism cannot be done accurately either by refraction or keratometry. Corneal topography is one of the best methods for estimating the amount of astigmatism.

Several different surgeries such as bare sclera technique, conjunctival autografting, limbal conjunctival autograft, amniotic membrane grafting is being performed these days[1]. The main indications for pterygium surgery

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are decreased vision caused by the astigmatism and involvement of pupillary axis, pterygium causing frequent irritative symptoms like foreign body sensation, ocular discomfort, redness etc and for cosmetic purposes.

Pterygium surgeries also significantly reduce the amount of corneal astigmatism. It is said that the technique of limbal autologous conjunctival graft is mainly effective in preventing recurrence of the pterygium after surgery, but there is insufficient data regarding effect of this surgery on corneal astigmatism in our settings like general public hospital where accurate measurement of the corneal astigmatism cannot be done with corneal topography because of its unavailability. In this study, we used a keratometer, which is readily available in our ophthalmology department for measuring astigmatism and we investigated the effect of limbal autologous conjunctival graft on astigmatism following pterygium excision.

METHODOLOGY

This prospective observational study was conducted from September 15 2017 to August 14, 2018 for a period of one year after obtaining ethical clearance from the Institutional Review Committee of Kathmandu Medical College Teaching Hospital. The sampling technique was convenience sampling. All patients posted for surgical management of primary pterygium in the Department of Ophthalmology, Kathmandu Medical College Teaching Hospital, fulfilling the inclusion criteria were enrolled. Patients with recurrent pterygium, pseudopterygium, history of ocular trauma, ocular surgery, corneal scarring were excluded from the study. A written consent was obtained from all the participants. Preoperatively a complete ophthalmologic examination including best corrected visual acuity, slit lamp examination and funduscopy was performed. Keratometry was done by Bausch and Lomb keratometer.Keratometric readings from the principal corneal meridians were averaged for analysis. The pterygium was graded according to following criteria using a caliber in slit lamp[5,6].

Grade 1- extending less than 2mm on the cornea
Grade 2- involving upto 4mm on the cornea
Grade 3- encroaching onto more than 4mm and involving the visual axis.

Pterygium excision was done either under peribulbar anaesthesia or topical anaesthesia wherever possible. It was excised by removing the body first followed by blunt dissection of the head of the pterygium from the cornea. Wet field cautery was done for achieving haemostasis. The autograft was taken from the superior bulbar conjunctiva of the same eye adjacent to the limbus. The graft was prepared by leaving the tenon tissue intact. The graft was then placed on the bare sclera and sutured with 8-0 vicryl. Padding of the involved eye was done with ciprofloxacin ointment. On the first postoperative day, eye pad was removed, slit lamp examination was done and steroids, antibiotic eye drops were given for 6 weeks in tapering doses along with antibiotic ointment. Patients were followed up at week 1 and week 4. At week 4 repeat keratometry was done and the amount of postoperative astigmatism was recorded. Statistical analysis was done in SPSS version 19. Preoperative and post-operative astigmatism was compared using the paired t test. The level of significance was p value less than 0.05.

RESULTS

The total number of surgeries done was 31. Age of the patients ranged from 29 to 72 years with the mean age of the patient being 50.70 ± 11.43 years. Maximum number of patients were in the age group of 41-50 years (n=11, 35.49%).

Eighteen (n=18, 58.06%) cases were female and thirteen (n=13, 41.94%) cases were male.

Three(n=3, 9.68%) patients had grade 1 pterygium and twenty eight(n=28, 90.32%) patients had grade 2 pterygium. None of the patients had grade 3 pterygium.

Right eye was involved in 17(54.83%) cases and the left eye in 14(45.17%). All the patients (n=31, 100%) had nasal pterygium. Table 1 shows the baseline characteristics of the patients.

The mean pre operative and post operative (4th week) astigmatism as measured by the keratometer was 1.72±1.18D and 1.26±0.64D respectively. This mean difference was found to be statistically significant with p value being 0.01.(<0.05). Table 2 shows the amount of astigmatism preoperatively and postoperatively at 1st month.

Figure 1 shows the change in astigmatism of the 31 patients preoperatively and postoperatively.

Table 1: Baseline characteristics of the patients

Characteristics	Number (n=31)
Age group (in years)	
<30	2 (6.45%)
31-40	4 (12.90%)
41-50	11(35.49%)
51-60	7 (22.59%)
61-70	5 (16.12%)
71-80	2 (6.45%)
Sex	
Male	13 (41.94%)
Female	18 (58.06%)
Grading of pterygium	
Grade 1	3 (9.68%)
Grade 2	28 (90.32%)
Laterality	
Right eye	17 (54.83%)
Left eye	14 (45.17%)

Table 2: Amount of astigmatism

	Pre-operative	Post-operative	p- value
Mean Astigmatism	1.72±1.18D	1.26±0.64D	0.01*

*p- value less than 0.05 is considered as statistically significant.

DISCUSSION

Pterygium is the most common degenerative conjunctival disease. It is often the cause of complaints like decreased visual acuity, glare and also other irritative symptoms[7].As keratometer is readily available to the ophthalmologist compared to the other instruments, estimating the amount of astigmatism has become easier. The type of astigmatism that pterygium causes is 'with the rule' [8,9]. Surgical excision with limbal autologous graft not only reduces astigmatism but also reduces other associated symptoms[10].

Many studies have found that prevalence of pterygium increases with the age[11,12,13]. In this study pterygium was seen in the age range of 29 to 72 years which shows that pterygium can be seen in all age groups. We found that pterygium was most common in the age group of 41-50 years, similar to the study from Peru and Tamil Nadu[14,15]. Early old age patients were more likely to develop pterygium because this is the active age range when people are involved in outdoor activities that exposes them to UV radiations thereby leading to degenerative changes on the conjunctiva and also in this age range pterygium might be in more aggressive form causing more irritative symptoms.

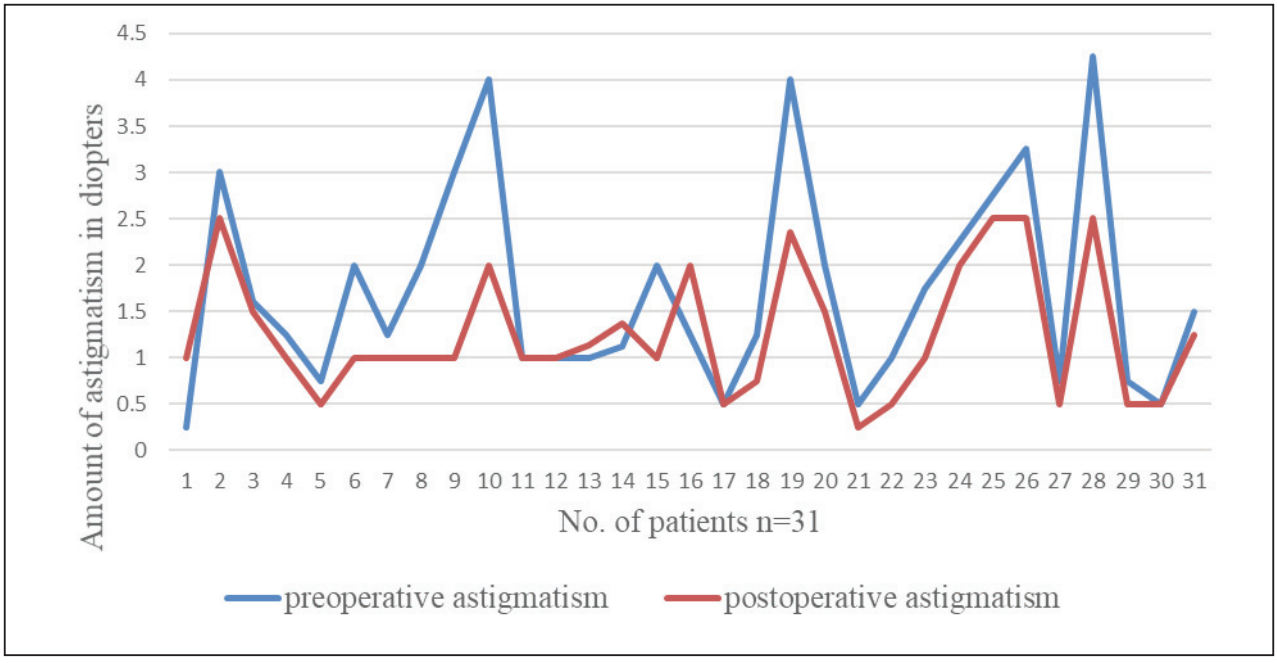

Figure 1: Change in astigmatism preoperatively and postoperatively

The mean age of the patient in our study was 50.70 ± 11.43 years similar to the study done by Manandhar LD et al, Maharjan et al, and Varsano et al[3,16,17]. However, other studies have shown a different mean age. Like a study by Bastola et al has shown a mean age of 35±18 yrs and Sharma et al has given the mean age to be 43.88±9.19yrs, which is quite low than ours[18,19].

In our study, there were more females (58.06%) than males and similar were the findings observed by Manandhar LD et al, Bastola et al, Sharma et al, and Dhakwa et al[3,18-20]. This may be due to the fact that females in Nepal still use wood fire for cooking, emitting a lot of smoke which causes irritation of the conjunctiva. Another cause for showing female preponderance may be due to prevalence of dry eyes in menopausal women due to the fluctuations in estrogen and androgen hormones, also due to the high aesthetic concern of females. However, several other studies have shown males are at higher risk of developing pterygium[13,19,21-24]. These studies showed more male patients suggesting they have more exposure to external environment, which plays an important role in pterygium formation[19].

In our study, the maximum number of patients belonged to grade 2(90.32%). Similar to this, Gahlot A et al Maheshwari S et al and Shelke et al also found the maximum number of patients belonging to Grade II pterygium[25, 26,10]. However, Bhargava P et al found only 23.07 % of patients had grade II pterygium in their study[27]. Grade 2 means horizontal pterygium 2-4mm in length. All 3(9.68%) patients with grade 1 pterygium underwent surgery in our study purely for the cosmetic purpose.

All cases (100%) of pterygium in this study were on the nasal side similar to the study done by Rohatgi S et al (92%)[28]. Higher incidence of nasal pterygium may be due to flow of tears carrying sand & dust particle towards nasal side and also according to Chavan WM et al nasal is common because of the transmission of UV light from temporal side of cornea through stroma to nasal part of the conjunctiva[29].

Decreased vision in pterygium is due to astigmatism and involvement of visual axis. Various studies have suggested that the corneal astigmatism decreases following pterygium excision with limbal conjunctival autograft transplantation[30,31].

In our study, the preoperative astigmatism was 1.72±1.18D. Avisar et al[30] also found pterygium extension of more than 1.1 mm from the limbus produced increasing degrees of induced astigmatism of more than 1 diopters which is similar to our study. However the amount of astigmatism was quite low in our study, may be because of the use of keratometer or due to lower grade lesions.

We found that corneal astigmatism decreased from 1.72±1.18D preoperatively to 1.26±0.64D postoperatively which was found to be statistically significant. These findings were similar to the results of other studies[32-35]. In our study, 90.32 % (n=28) patients had pterygium length ≥2mm. 0nly 9.68% (n=3) patients had pterygium <2mm length. With this finding in our study, we can conclude pterygium excision with limbal autologous graft significantly reduces astigmatism if pterygium length is >2mm. This finding is in accordance with Altan-Yaycioglu et al too[31]. In contrast to other studies, we did not calculate the amount of the astigmatism according to the grade of pterygium because there were a negligible number of patients with grade 1(<2mm length) pterygium. However accurate results could have been generated with the use of corneal topography instruments as the keratometer measures only the astigmatism induced by the central cornea ignoring the peripheral cornea.

This study has some major limitations too. It is a single hospital-based study with a small sample size. Better results would have been generated with a large sample size.

CONCLUSION

From this study, we can conclude that pterygium is prevalent in all age groups. It is most commonly seen nasally and females are most commonly affected. Various literatures have suggested that the technique of limbal autologous graft only reduces the chances of recurrence but this study showed it also significantly helps in reducing the induced astigmatism, which is responsible for decreased vision in patients with pterygium.

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REFERENCES

1. Rana AY, Cem K, Aylin K, Fatma C, Yonca A A. Astigmatic changes following pterygium removal: Comparison of 5 different methods. Indian J Ophthalmol. 2013 Mar; 61(3): 104-8.[DOI]
2. Shrinivasan S, Dollin M, McAllum P. Fibrin glue versus sutures for attaching the conjunctival autograft in pterygium surgery, a prospective observer masked clinical trial BJO 2009:93, 215-8. [DOI]
3. Manandhar LD, Rai SKC, Gurung S, Shrestha K, Godar M, Hirachan A, et al. Prevalence of pterygium and outcome of pterygium surgery in hilly western Nepal: a hospital based study. Journal of Lumbini Medical College. 2017;5(1):18-22. [DOI]
4. Chourasia P, Mehta AD, Kumar P. Comparison of astigmatism before and after pterygium surgery. Int J Health Sci Res. 2014;4(3):97-102.[FullText]
5. Frutch-Perry J, Charalambos SS, Isar M. Intraoperative application of topical mitomycin C for pterygium surgery. Ophthalmology. 1996;103: 674-77. [DOI]
6. Bhandari V, Rao CL, Ganesh S, Brar S. Clinical Ophthalmology 2015:9 2285-90. [FullText]
7. Jaffar S, Dukht U, Rizvi F. Impact of pterygium size on corneal topography. RMJ 2009; 34:145-7. [FullText]
8. Lin A, Stern GA. Correlation between pterygium size and induced corneal astigmatism. Cornea 1997; 17: 22-7. [DOI]
9. San Francisco: American Academy of Ophthalmology; 2013. American Academy of Ophthalmology. Basic and Clinical Science Course. Sec. 3; pp. 114-7.
10. Shelke E, Kawalkar U, Wankar R, Nandedkar V, Khaire B, Gosavi V. Effect of pterygium excision on pterygium induced astigmatism and visual acuity. Int J Adv Health Sci. 2014;1:1-3.[FullText]
11. Liu L, Wu J, Geng J, Yuan Z, Huang D. Geographical prevalence and risk factors for pterygium: A systematic review and meta-analysis. BMJ Open. 2013;3:e00378. [DOI]
12. Alqahtani JM. The prevalence of pterygium in Alkhobar: A hospital-based study. J Family Community Med. 2013;20:159-61. [DOI]
13. Tan CS, Lim TH, Koh WP, Liew GC, Hoh ST, Tan CC, et al. Epidemiology of pterygium on a tropical island in the Riau Archipelago. Eye (Lond) 2006;20:908-12. [DOI]
14. Rojas JR, Malange DVM(1986) Pterygium in Lima,Peru. Ann Ophthalmol;18:147-149. PMID: 3592471
15. Kalanchiarani S, Kannan V, Ghouse NF.A study on corneal astigmatism in pterygium cases before and after surgery.J.Evid.BasedMed. Healthc.2018;5(9),830-5. [DOI]
16. Maharjan IM, Shreshth E, Gurung B, Karmacharya S. Prevalence of and associated risk factors for pterygium in the high altitude communities of Upper Mustang, Nepal. Nepal J Ophthalmol. 2014;6(11):65-70. [DOI]
17. Verssano D, Michaeli A, loweinstein A. Excision of pterygium and conjunctival autograft: IMAJ. 2002;4:1097- 1100. PMID: 12516899 [FullText]
18. Bastola P. An experience of Limbal autologous free conjunctival grafting in cases of pterygium in rural Western hilly region of Nepal. Nepal Journal of Medical Sciences. 2012;1(1):11-4. [DOI]
19. Sharma R, Marasini S, Nepal BP Conjunctival autograft transplantation in pterygium Nepal J Ophthalmol 2012; 4(8):242-7. [DOI]
20. Dhakhwa K, Patel S, Sharma M, Rai S, Bhari A. Results of conjunctival autograft in pterygium surgery in Lumbini Eye Instititue, Nepal. Journal of Universal College of Medical Sciences. 2014;2(1):2-6. [DOI]
21. Cajucom-Uy H, Tong L, Wong TY, Tay WT, Saw SM. The prevalence of and risk factors for pterygium in an urban Malay population: The Singapore Malay Eye Study (SiMES) Br J Ophthalmol. 2010;94:977-81. [DOI]
22. Liang QF, Xu L, Jin XY, You QS, Yang XH, Cui TT, et al. Epidemiology of pterygium in aged rural population of Beijing, China. Chin Med J (Engl) 2010;123:1699-701. [FullText]
23. Shiroma H, Higa A, Sawaguchi S, Iwase A, Tomidokoro A, Amano S, et al. Prevalence and risk factors of pterygium in a Southwestern Island of Japan: The Kumejima study. Am J Ophthalmol. 2009;148:766-71. [DOI]
24. Sherwin JC, Hewitt AW, Kearns LS, Griffiths LR, Mackey DA, Coroneo MT, et al. The association between pterygium and conjunctival ultraviolet autofluorescence: The Norfolk Island Eye Study. Acta Ophthalmol. 2013;91:363-70. [DOI]
25. Gahlot A, Maheshgauri RD, Kumari P, Datta D. Comparison of Pre and Post Operative Corneal Astigmatism following Pterygium Excision and Conjunctival Autograft 2015 JMSCR; 03(09) 7413-7417. [DOI]
26. Maheshwari S. Effect of pterygium excision on pterygium induced astigmatism. Indian J Ophthalmol 2003;51:187-8 [FullText]
27. Bhargava P, Kochar A, Khan NA, Chandak A, Kumawat S, Garhwal J. Comparison of pre-operative and post-operative astigmatism and visual acuity after pterygium excision followed by sutureless and

gluefree conjunctival autograft. International Journal of Biomedical Research 2015; 6(10): 800-4. [DOI]

28. Rohatgi S. Pterygium: an epidemiological study in India. Int J Healthcare Biomed Res. 2013;1(4):297-301. [FullText]
29. Chavan WM, Kamble MG, Giri PA. Study of prevalence and socio-demographic determinants of pterygium patients attending at a tertiary care teaching hospital of Western Maharashtra, India. Int J Res Med Sci 2015;3:846-848. [FullText]
30. Avisar R, Loya N, Yassur Y, et al. Pterygium-induced corneal astigmatism. Isr Med Assoc J. 2000;2(1):14-5. [FullText]
31. Altan-Yaycioglu R, Kucukerdonmez C, Karalezli A, et al.Astigmatic changes following pterygium removal: comparison of 5 different methods. Indian J Ophthalmol. 2013;61(3):104-8. [DOI]
32. Misra S, Craig JP, McGhee C, et al. A prospective study of pterygium excision and conjunctival autograft with human fibrin tissue adhesive: effects on vision, refraction and corneal topography. Asia Pacific Jounal Of Ophthalmoly. 2014;3(4):202-6. [DOI]
33. Tamidokoro A, Miyata K, Sakaguchi J, et al. Effect of pterygium on corneal power and astigmatism. Ophthalmology. 2000;107:1568-71. [DOI]
34. Maheshwari S. Pterygium induced corneal refractive changes. Indian J Ophthalmol. 2007; 55:383-6. [DOI]
35. Bahar I, Loya N, Wenberger D, et al. Effect of pterygium surgery on corneal topography: a prospective study. Cornea. 2004;23(2):113-7 [DOI]