

Comparative Study of Pre - Operative and Post Operative Changes in Corneal Astigmatism in Pterygium Patient Operated with Conjunctival Autograft

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Abstract: ***Background:** Pterygium is seen to affect refractive status of the eye, cause astigmatism and can thus have significant impact on vision. **Aim:** To study changes in astigmatism before and after pterygium surgery with conjunctival autograft. **Methods:** The prospective cross - sectional study was conducted in department of Ophthalmology, in a Tertiary care center in 200 cases of pterygium of age 20 - 75 years attending O. P. D. over a period of 2 years. Data will be analysed using appropriate software. **Results:** Maximum occurrence of pterygium was in the 41 - 50 years age group. 49 % of the affected male and 51 % affected females in the entire study group. Left eye was more involved and also nasal side. Among the study group, 13 patients had grade 1 pterygium, 164 patients had grade 2 pterygium and 23 patient had grade 3 pterygium. Majority were farmers. In the present study, pterygium was more common in persons engaged in outdoor occupations like farmers and they make upto 108 out of the total 200 cases (54 %). Mean astigmatism was more in higher grades of pterygium. Visual acuity was improved significantly after pterygium excision surgery. **Conclusion:** Pterygium is associated with significant astigmatism in most cases. that can be reduced by surgical excision. resulting in improvement of visual acuity with less complications in conjunctival autograft techniques*

Keywords: Astigmatism, Autograft, Pterygium excision, Visual acuity

1. Introduction

Pterygium was studied 3000 years ago and was described by Susrutha back in 1000 B. C. in India. It was also noted by great physicians of ancient times like Hippocrates, Galen, Celsius etc. A Pterygium is a wing shaped growth of fibro vascular conjunctiva on to the cornea. Pterygium incidence also varies across geographical sites. Pterygium is a growth disorder characterised by conjunctivalisation of the cornea due to localized ultraviolet stimulated damage to the limbal stem cells. Destructive pterygial fibroblasts also cause corneal invasion Several surgical techniques including bare sclera excision with or without the use of adjuncts like beta irradiation, thio tepa eye drops, intra - operative or post - operative mitomycin - C (MMC) or anti neoplastic agents, amniotic membrane transplantation, conjunctival autograft (CAG) with or without limbal stem cells have been shown to be available.

The optimum mode of treatment for symptomatic pterygia would combine efficacy with safety, and would not affect visual acuity badly. The efficacy of pterygium excision with conjunctival autografting in a sun exposed population in

which pterygia are prevalent has previously been questioned. Higher recurrence rate may exist in populations with ongoing exposure to high levels of ultraviolet light. Because of the risk of visually disabling complications associated with adjunctive chemotherapy and radiotherapy and the high recurrence rate after simple excision, pterygium excision with conjunctival autografting has been seen as the treatment of choice for primary, as well as recurrent, pterygia. Some studies demonstrate recurrence rate for 5.3% for conjunctival graft and 46% for other graft.^{1,2}

Pterygium surgery is common in India situated within the tropics. Several surgical techniques including bare sclera excision with or without the use of adjuncts like beta irradiation, thio tepa eye drops, intra - operative or post - operative mitomycin - C (MMC) or anti neoplastic agents, amniotic membrane transplantation, conjunctival autograft (CAG) with or without limbal stem cells have been illustrated Accounted rates of recurrence range from 2% for excision with CAG to 89% for bare sclera excision.^{2,3}

Surgical Steps

Anesthesia is achieved with a peribulbar block with mixture of lidocaine 2% and bupivacaine 0.75%.

Superior rectus bridle suture was used in every case as it helps in obtaining a good conjunctival graft from superotemporal position. The body of the pterygium is dissected 4 mm from the limbus, down to the bare sclera, and reflected over the cornea. Careful dissection between donor graft conjunctiva and Tenon's layer is used to obtain a conjunctivolimbal Tenon's free graft from the superotemporal bulbar conjunctiva. Care was taken to obtain the autograft as thin as possible without Tenon's tissue.

The limbal edge of the graft was cut to contain a thin rim of corneal epithelium.

The graft was quickly flipped over to the sclera. Proper orientation was maintained, with the epithelium side up and the limbal edge toward the limbus

After the graft was positioned, about 2–3 min was used to smooth out the graft and press it gently to the scleral bed, attaching the graft firmly.

The scleral bed is viewed through the transparent conjunctiva, and to prevent relift of the graft due to residual bleeding, direct compression of the small central hemorrhages using needle holder or Mcpherson forceps was done until hemostasis was achieved.

Once the conjunctival autograft has been cut from its attachment, do not irrigate the ocular surface until the two limbal sutures have been placed. This will prevent washing out of the graft and will ensure that proper orientation of the graft is maintained.

The autograft is sutured into position using 10–0 ethilon in simple interrupted fashion.

The anterior (limbal) corners of the autograft are first sewn into place to stretch the tissue, taking an episcleral bite to anchor the graft. Subsequent, equidistant sutures are more superficial to allow for some mobility.

The lid speculum is carefully removed.

Topical antibiotic ointment is applied predominantly in the area of the graft, and the eye is covered tightly with a double patch. Postoperatively, a combination antibiotic–steroid ophthalmic solution is used four times daily, and tapered over a 1 - month period.

Liberal use of viscous artificial tears or lubricating gels is advised.

Follow up visits were scheduled for post - operative days 1st, 7th, 30th Recurrence of any fibrovascular tissue past the limbus onto the clear cornea in the area of previous Pterygium established treatment failure.

2. Methods

The prospective cross - sectional study was conducted in department of Ophthalmology, in a Tertiary care center in 200 cases of pterygium of age 20 - 75 year attending O. P. D. over a period of 2 years. Data was collected, entered in Microsoft excel, coded and analysed using SPSS software version 25. Results were expressed as an arithmetic mean \pm standard deviation. Values were compared against the grades of pterygium using one - way analysis of variance (ANOVA), corneal astigmatism amongst various grades was compared using one - way analysis of variance

3. Results

Table 1: Demography of patients:

Age in years	No. of patients (N)	Percentages (%)
21 - 30	13	6.5
31 - 40	34	17
41 - 50	56	28
51 - 60	43	21.5
61 - 70	36	18
71 - 75	18	9
Gender	No. of patients (N)	Percentages (%)
Male	116	58.00
Female	84	42.00
Occupation	No. of patients (N)	Percentages (%)
Farmer	108	54
Teacher	10	5
Housewife	68	34
Shopkeeper	2	1
Private Job	3	1.5
Student	9	4.5

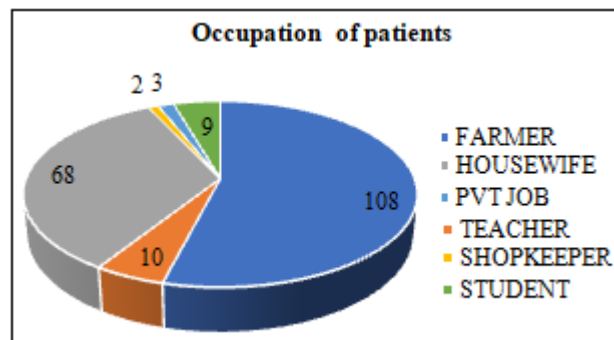


Figure 1: Occupation of patients

Maximum occurrence of pterygium was in the 41 - 50 years age group. 49 % of the affected were males and 51 % were females. Left eye was more involved. Among the study group, 13 patients had grade 1 pterygium, 164 patients had grade 2 pterygium and 23 patient had grade 3 pterygium. Majority were farmers. . In the present study, pterygium was more common in persons engaged in outdoor occupations eg. farmers, coolies, vendors and they account for upto 108 out of the total 200 cases (54 %) as seen in Table 1

184 (92 %) of the patients had pterygium on the nasal aspect and 11 (5.50 %) on the temporal aspect and 5 (2.50 %) on both side (diamorphic pterygium).

Table 2: Distribution of patients according to the grade of pterygium

Grade	No. of patients (N)	Percentages (%)
Grade 1	13	6.5
Grade 2	164	82
Grade 3	23	11.5
Total	200	100

Visual acuity was improved significantly after pterygium excision surgery. UCVA significantly improved from preoperatively to 0.115 to 0.092 in grade 1 pterygium, 0.27 to 0.20 in grade 2 pterygium, 0.39 to 0.39 in grade 3 pterygium postoperatively at 1 month. Mean astigmatism was more in higher grades of pterygium. Preoperative mean astigmatism was minimum in grade I pterygium, that is - .576, and maximum in grade III pterygium - 4.652. Maximum number of patient were in grade 2. Pterygium induced astigmatism was high in grade 3 pterygium and post operatively astigmatism in K1 is 0.54D and K2 is 3.31D with significant P value. In grade 2 postoperative astigmatism in K1 is 0.61 D and K2 1.65D with significant P value. In grade 1 pterygium postoperative astigmatism in K1 is 0.712 D and K2 is 1.02 D.

4. Discussion

Pterygium is more common in adults in the middle age group. In the present study, most of the patients were found to be in the age group of 41 - 50 years (28 %) followed by 51 - 60 years age group (21.5 %). The high incidence seen among these age groups may be attributed to occupational exposure. In Salagar study the highest incidence was seen in fourth decade and Pterygium is more common in men than women probably due to greater exposure to dust and environmental factors. But if the individuals are involved in the same kind of occupation, this sex difference disappears. In the present study, out of 200 patients, 99 (49 %) were males and 101 (51 %) were females.²

Mishra study it is seen that the mean age of participants was 49.3 ± 12.1 years.⁴ Occupation plays a major role in the etiopathogenesis of pterygium. In the present study, pterygium was more common in persons engaged in outdoor occupations like. Farmers and they are seen representing upto 108 out of the total 200 cases (54 %) as seen in Salagar study.²

Mishra study the mean best corrected visual acuity preoperatively was 6/7.5, improving significantly to 6/6 at 1 month remaining stable at 3 months postoperatively. There was no significant change in subjective astigmatism but mean topographic astigmatism decreased significantly at 1 month and remained stable at 3 months.⁴

In the present study, 195 (97.50%) patients had unilateral pterygium of which right eye was affected in 95 (47.5%) and left eye in 105 (52.50%) of the patients.

In the present study 184 (92 %) of the patients had pterygium on the nasal aspect and 11 (5.50 %) on the temporal aspect and 5 (2.50 %) on both side (dimorphic pterygium). The nasal aspect of pterygium has been attributed to the fact that tears carrying dust particles flow

from the temporal to the nasal aspect and accumulate thus causing greater irritation and scarcity of the subconjunctival tissue in the temporal region. The temporal region is also exposed to lesser extent to UV radiation due to greater amount of bowing of outer 2/3 of the upper lid and it is in accordance with studies done by Salagar.²

In our study also, it is seen that visual acuity was improved significantly after pterygium excision surgery. Mean astigmatism was more in higher grades of pterygium. Preoperative mean astigmatism was minimum in grade I pterygium, that is - .576, and maximum in grade III pterygium - 4.652. These results were comparable with results of the other studies

In the present study, maximum number of patients were in grade 2. Pterygium induced astigmatism was high in grade 3 pterygium and post operatively astigmatism in K1 is 0.54D and K2 is 3.31D with significant P value. In grade 2 postoperative astigmatism in K1 is 0.61 D and K2 1.65D with significant P value. In grade 1 pterygium postoperative astigmatism in K1 is 0.712 D and K2 is 1.02 D.

In Ram Kumar study it is seen that Pterygium excision results in significant reduction in astigmatism which leads to improvement in visual acuity. Amniotic membrane graft and conjunctival autograft are better surgical techniques than bare sclera as far as reducing astigmatism is concerned.⁵

In Poonam B study it is seen that the magnitude of astigmatism increases with the grade of pterygium and maximum numbers of patient were of grade III. in Poonam B study Pterygium induced astigmatism was high in grade IV pterygium and post operative mean astigmatism was 1.847 ± 1.714 D and the p value was very significant. Post operative astigmatism observed in grade III pterygium was 0.76 ± 0.487 D with a significant p value. In grade II pterygium the mean post operative astigmatism was 0.333 ± 0.492 D with a significant p value. Grade I pterygium patient had post operative mean astigmatism of 0.36 ± 0.46 D.⁶

Similar observations were found in the study of Maheshwari, et al.⁷ Fong et al,⁸ Avisar et al⁹

Lin and Stern study found a significant correlation was seen between the pterygium size and corneal astigmatism and concluded that corneal changes are seen to improve significantly following pterygium excision.¹⁰

Vadodaria et al study reported that drastic changes in keratometry readings pre - operatively and post surgical excision of pterygium tissue. After pterygium excision surgery astigmatism was reduced, in compound astigmatic type of refractive error¹¹

In Avisar et al study it is seen that when primary pterygium reaches more than 1.0 mm in size from the limbus it induces with - the - rule significant astigmatism and tends to increase with the increasing size of the lesion and thus early surgical intervention in the pterygium may be indicated.⁹

Sujithra H study majority of the patients were found to have with the rule astigmatism (56%) preoperatively with a mean of 0.88. There was a significant reduction in astigmatism postoperatively in 39 eyes with only 15.4% having clinically significant astigmatism. Pterygium excision with auto conjunctival graft results in significant reduction in astigmatism which leads to improvement in visual acuity.¹²

5. Conclusions

Significant improvements and early stabilization of visual acuity and topographic astigmatism confirm the optical benefits of pterygium excision. Autogenous conjunctival grafting is a safe, uncomplicated, quick procedure and does not involve loss of tissue and prevents recurrence of pterygium. It also reduces the risk of granuloma formation, scleral thinning and necrosis.

References

- [1] Allan BD, Short P, Crawford GJ, Barrett GD, Constable IJ. (1993) Pterygium excision with conjunctival autografting: an effective and safe technique. *Br J Ophthalmol*. Nov; 77 (11): 698 - 701. doi: 10.1136/bjo.77.11.698. PMID: 8280682; PMCID: PMC504627.
- [2] Salagar KM, Biradar KG. (2013) Conjunctival autograft in primary and recurrent pterygium: a study. *J Clin Diagn Res*. 2013 Dec; 7 (12): 2825 - 7. doi: 10.7860/JCDR/2013/7383.3767. Epub 2013. PMID: 24551648; PMCID: PMC3919382.
- [3] Garg P, Sahai A, Shamshad MA, Tyagi L, Singhal Y, Gupta S. (2019) A comparative study of preoperative and postoperative changes in corneal astigmatism after pterygium excision by different techniques. *Indian J Ophthalmol* 2019; 67: 1036 - 9
- [4] Misra S, Craig JP, McGhee CNJ, Patel DV. (2014) A prospective study of pterygium excision and conjunctival autograft with human fibrin tissue adhesive: Effects on vision, refraction, and corneal topography. *Asia Pac J Ophthalmol*; 3: 202 - 6.
- [5] Kumar R, Kumar H. (2014) Comparison of change of corneal astigmatism in pre and post operated pterygium excision. *Indian J Clin Exp Ophthalmol* 2020; 6 (3): 329 - 332
- [6] Poonam Bhargava et al (2015) *International Journal of Biomedical Research*; 6 (10): 800 - 804
- [7] Maheshwari, SejalMS. (2007) Pterygium - induced corneal refractive changes. *Indian Journal of Ophthalmology* 55 (5): p 383 - 386,.
- [8] Fong KS, Balakrishnan V, Chee SP, Tan DT, (1998) Refractive change following pterygium surgery. *CLAO J*; 24 (2): 115 - 7. PMID: 9571272.
- [9] Avisar R, Loya N, Yassar Y, Weinberger D. (2000) Pterygium - induced corneal astigmatism. *Isr Med Assoc J*; 2 (1): 14 - 5. PMID: 10892364.
- [10] Lin A, Stern G. (1998) Correlation between pterygium size and induced corneal astigmatism. *Cornea*; 17 (1): 28 - 30. DOI: 10.1097/00003226 - 199801000 - 00005. PMID: 943687
- [11] Vadodaria B, Thakre A, Maheshgauri R, Motwani D, Mishra A, (2019) Changes in keratometry and

refractive status pre and post pterygium surgery. *IP Int J Ocul Oncol Oculoplasty*; 5 (4): 205 - 216

- [12] Sujithra H, Shah KN, ThansiA. (2023) Comparative study of changes in corneal astigmatism after pterygium excision with conjunctival auto graft and effect of demographics on the incidence and surgical outcome. *Indian J Clin Exp Ophthalmol*; 9 (1): 84 - 88.

Footnotes

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