

## TO EVALUATE CHANGES IN TEAR FILM BEFORE AND AFTER PTERYGIUM SURGERY WITH CONJUNCTIVAL AUTOGRAFT

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### ABSTRACT

**Background:** A pterygium is a triangular fibrovascular subepithelial outgrowth of degenerative bulbar conjunctival tissue that often crosses the limbus and extends on to the corneal surface. Impaired lid movement, pathological conjunctival, corneal, or eyelid changes in pterygium lead to disturbed functioning of tear film. The gold standard treatment is pterygium excision with conjunctival autograft due to its lower (1.9–8%) recurrence rate. This study aimed to see the tear film changes associated with pterygium surgery with conjunctival autograft procedure.

**Materials and methods:** This comparative study was conducted on 66 diagnosed patients of pterygium enrolled after fulfilling the inclusion and exclusion criteria. They were subjected to the Tear breakup time (TBUT) test and Schirmer's test with a pre-sterilized Whatman 41 filter paper. Pterygium excision with conjunctival autograft was done. TBUT, schirmer's test was done at each follow up at 1 month, 3 months and 6 months.

**Results:** Mean age of the patients was  $57.95 \pm 12.41$  years. 36 out of total 66 (54.54%) patients were males. The number of patients with deranged TBUT and schirmer's test decreased drastically after pterygium surgery with conjunctival autograft and the number further reduced at each follow up visit. The patients had significantly higher TBUT values ( $p=0.0001$ ) 1 month after pterygium surgery with conjunctival autograft as compared to the TBUT values before the

surgery. The Schirmer's test results changed insignificantly over the follow-up period of 1, 3 and 6 months.

**Conclusion:** Abnormal tear film function is associated with development of pterygium. Pterygium excision improves tear film function, TBUT significantly, although the improvement in schirmer's test is insignificant.

**Keywords:** Pterygium, Autograft, TBUT, Schirmer's

## **INTRODUCTION**

A pterygium is a triangular fibrovascular subepithelial outgrowth of degenerative bulbar conjunctival tissue that often crosses the limbus and extends on to the corneal surface.[1] A pterygium is mostly predominant on the nasal side. Sunlight, which passes from lateral side of the eye unobstructed gets focused more on the medial limbus after passing through the cornea.[2] It mainly develops due to hot and dry climatic conditions, ultraviolet light exposure, chronic ocular surface dryness, increasing age and male gender.[3,4,5] It can cause chronic ocular irritation, astigmatic changes, tear film disturbances and decreased vision which is secondary to growth over the visual axis. It can cause chronic ocular redness irritation, astigmatic changes, tear film disturbances and decreased vision which is secondary to growth over the visual axis.[6] A pterygium is also thought of as an insignificant problem, as it does not threaten visual acuity unless it approaches the visual axis. However, it can have serious adverse effects on vision of the patient if proliferating conjunctival tissue approaches or reaches the visual axis. In cases with pterygium, normal movement of lid may be compromised and this may lead to secondary changes in the desiccated epithelium, resulting in less wettable areas in TBUT.[7] Some authors suggest that pathological conjunctival, corneal, or eyelid changes in pterygium lead to disturbed functioning of tear film.[8] Pterygium is initially treated by conservative measures, such as lubricants and sunglasses. Surgery is usually performed for symptomatic, optical, or cosmetic improvement. Options after excising the pterygium include, primary conjunctival closure, conjunctival autograft, limbal-conjunctival autograft (LCAG), conjunctival rotational graft, conjunctival flaps, and amniotic membrane graft.[6] The gold standard is excision with conjunctival autograft due to its lower (1.9–8%) recurrence rate.[9] Conjunctival autograft involves removing conjunctiva in one piece from another part of the person's eye and using that conjunctival graft tissue to cover the area from which the pterygium was excised. The orientation of the autograft tissue is such that the limbal side of the graft is fixed to the limbal area from where the pterygium is excised.[10] The method has been modified over time to include adjunctive use of Mitomycin C (an alkylating agent that crosslinks DNA and thus inhibits mitosis) or use of tissue adhesive or glues instead of sutures to attach the conjunctival autograft to the underlying bare tissue. Surgical excision of pinguecula or pterygium and conjunctival autograft using fibrin glue is an effective and safe method to improve symptoms of dry eye syndrome.[11] This study aimed to see the tear film changes associated with pterygium surgery with conjunctival autograft procedure.

**MATERIAL AND METHODS**

This comparative study was conducted on 66 diagnosed patients of pterygium who visited Department of Ophthalmology, Government Medical College Patiala. Ethical approval was obtained from the Institutional Ethics Committee. Patients aged 18 to 80 years diagnosed with pterygium on the basis of signs and symptoms confirmed by clinical examination were included. Exclusion Criteria was pregnant females, patients with recurrence of pterygium and undergoing treatment for it, ocular or extraocular diseases other than pterygium, ocular allergy, thyroid disease, lacrimal system disease, diabetes, collagen vascular disorder and use of any topical or systemic drug in 3 months period before the examination. A written and informed consent was taken from the patients. A detailed history was taken including age, sex, ocular symptoms, detailed history of pterygium with duration and treatment, history of allergy, ocular dryness, drug intake, joint pain, chemical injury & Steven Johnson syndrome. The presence of any systemic disease, ocular surgeries, trauma or contact lens use and ocular medications was noted. Ophthalmic examination included visual acuity measurement with snellen's chart, Slit lamp examination for any anatomic abnormalities that will interfere with normal spread of tear film. Meibomian orifices were examined for pouting, presence of foam, secretion and plugging. Tarsal conjunctiva was examined for presence of papillae. Presence of mucous threads in the tear film and corneal filaments were noted. Anterior segment of eye was also examined for any abnormality. The diagnosed cases of pterygium were subjected to the Tear breakup time (TBUT) test and Schirmer's test. Schirmer's test was performed with a strip of commercially available pre-sterilized Whatman 41 filter paper measuring 5mm x 35mm without anesthesia. A value less than 10 mm was taken as dry eye. Tear break up Time (TBUT) was tested by instilling a 2% fluorescein dye into the inferior conjunctival fornix and measuring the time taken for the appearance of the first randomly distributed dark spot in the pre-corneal tear film under broad beam of cobalt blue light of slit lamp biomicroscope. A value less than 10 seconds was taken as abnormal.

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Patient was made to lie on the operating table and betadine painting and draping of eye to be operated upon was done. A peribulbar or retrobulbar anesthesia or block was given. The pterygium was transected, including the conjunctiva and underlying tenon's fascia. The head of the pterygium was stripped from the corneal surface, removing all involved bowman's membrane using the crescent knife. The free conjunctival edge, originally adjacent to the limbus, retracted without any conjunctival excision, leaving a bare area larger than 8×10 mm. The superior bulbar conjunctival graft was then harvested at least 3 to 5 mm from either edge of the exposed bare sclera defect. The graft conjunctiva was incised with scissors, leaving the underlying tenon's fascia intact taking care to sharply dissect these edges free of the underlying tenon's fascia. The donor graft was then transferred to the recipient bed. The limbal corners of the graft were sutured to the edge of the recipient conjunctiva, using 9-0 Vicryl suture. The graft was sutured very superficially to the recipient conjunctiva.

Postoperatively, follow up was done at 1 month, 3 months and 6 months. The patients were subjected to same TBUT and schirmer’s test at each visit. During each follow-up, patients were examined for recurrence of pterygium in the same eye. Data was entered in MS-excel and analyzed using SPSS version 20. Student t test and Wilcoxon signed rank test was used for assessment of level of significance. P-value of less than 0.05 was taken as significant.

**RESULTS**

**TABLE 1: AGE DISTRIBUTION**

Age Groups (in years)	No. of Patients	%age
30-39	2	3.03
40-49	19	28.79
50-59	15	22.73
60-69	16	24.24
70-79	11	16.66
>80	3	4.55
Total	66	100
Mean±SD	57.95±12.41	
p value	0.7309	

22.73 and 24.24 percent of the patients belonged to the age group of 50 to 59 years and 60 to 69 years. Mean age of the patients was 57.95±12.41 years.

**TABLE 2: GENDER DISTRIBUTION**

Gender	No. of Patients	%age
Male	36	54.54
Female	30	45.45
Total	66	100

36 out of total 66 (54.54%) patients were males while the remaining were females.

**TABLE 3: NO. OF PATIENTS WITH DERANGED TEAR BREAKUP TIME (<10SECONDS)**

	Preoperatively	Post-operatively		
		1 month	3 months	6 months
<b>No. of Patients</b>	46	31	28	22

The number of patients with deranged TBUT decreased drastically after pterygium surgery with conjunctival autograft and the number further reduced at each follow up visit.

**TABLE 4: NO. OF PATIENTS WITH DERANGED SCHIRMER TEST (<10 mm)**

	Preoperatively	Post-operatively		
		1 month	3 months	6 months
<b>No. of Patients</b>	33	28	21	20

The number of patients with deranged Schirmer's test decreased after pterygium surgery with conjunctival autograft and the number further reduced at each follow up visit.

**TABLE-5: THE COMPARISON OF THE MEAN TEAR BREAKUP TIME (TBUT) AND SCHIRMER TEST RESULTS PREOPERATIVELY AND POSTOPERATIVELY [MEAN±SD]**

	Baseline	1 month	1 month	3 months	3 months	6 months
<b>TBUT</b>	8.26 (2.37)	10.06 (2.36)	10.06 (2.36)	10.27 (2.24)	10.27 (2.24)	10.77 (2.23)
<b>p-value</b>	0.00001		0.18024		0.06288	
<b>SCHIRMER's</b>	10.68 (3.18)	10.96 (3.30)	10.96 (3.30)	11.18 (3.14)	11.18 (3.14)	11.51 (2.96)
<b>p-value</b>	0.05118		0.25848		0.07346	

The TBUT results changed significantly over the follow-up period. The patients had significantly higher TBUT values ( $p=0.0001$ ) 1 month after pterygium surgery with conjunctival autograft as compared to the TBUT values before the surgery. The TBUT values at 3 and 6 months also showed improvement over TBUT values at 1 month postoperatively ( $p$  value insignificant).

The Schirmer's test results changed insignificantly over the follow-up period of 1, 3 and 6 months ( $p$  value insignificant).

## DISCUSSION

Pterygium, even after thousands of years since its recognition, still maintains its status as an 'ophthalmic enigma'. Number of theories have been proposed without any unanimous consensus.[12] In pterygium, a rapid thinning of surface tear film occurs as water evaporates from it, which causes changes in the surface tension causing break up phenomenon. The reduced TBUT can be caused by numerous mechanisms in such eyes; normal eyelid blinking may be compromised in the eyes with pterygium, which may lead to dry epithelium, and may result in decreased water stability and shorter TBUT. Also, the presence of irregularity in the surface epithelium, like in pterygium, can compromise the surface tension and cause instability of tears. This present study was undertaken for assessing the tear film functions in an eye with pterygium

and also comparing it with tear film functions after excising the pterygium along with conjunctival autografting in the same eye.

In the present study, a total of 66 patients with pterygium were examined for tear film functions both preoperatively and postoperatively. Mean age of the patients was 57.95 years. Our results were in concordance with Kampitak K et al (56.9 years), Antony AT et al (51.5 years) and Türkyılmaz K et al (50.5 years) who have also reported similar age range of patients in their respective studies.[13,14,15] In the present study, 36 out of total 66 (54.54%) patients were males while the remaining were females. Our results were in concordance with the results obtained by Antony AT et al, Türkyılmaz K et al who also reported male preponderance in their respective studies.[14,15] Males spend more time in the outdoor activities and they are more exposed to damaging effects of UV rays of sunlight.

In our study, the mean±SD of preoperative tear breakup time (TBUT) in eyes with pterygium was 8.26±2.37 seconds. Study conducted by Rajiv et al in pterygium showed mean tear film TBUT of 10.4 seconds in normal healthy eyes, while in eyes with pterygium it was reduced to 5.6 seconds.[16] A study conducted by Manhas A et al in pterygium showed mean tear film TBUT of 9.9 seconds in pterygium eyes preoperatively.[17] Our results were in concordance with the results obtained by Antony AT et al who also reported decreased TBUT (less than 10 seconds) i.e. 7.6 ±2.6 seconds in his respective study.[14] Tear breakup time was compared before and after pterygium excision. TBUT was significantly different before & after pterygium excision surgery with conjunctival autograft (p=0.00001). This is in agreement with Li M et al who found that before surgery, the average TBUT was 9.74±3.43 seconds which was significantly prolonged to 11.49 ± 3.76 seconds 1 month postoperatively.[18] The marked abnormality of TBUT, which was found more frequently in eyes with pterygia suggests that either there may be an abnormality of mucin which may be a predisposing factor for the pathogenesis of pterygium (UV light may also cause initiation of the abnormality), or that pterygium itself causes abnormalities of mucin.[19]

In our study the mean±SD of Schirmer's test in pterygium eyes was 10.68±3.18 mm. A study conducted by Manhas A et al in pterygium showed mean schirmer's test as 13.2 mm in pterygium eyes preoperatively.[17] Our results were in concordance with the results obtained by Türkyılmaz K et al who also reported borderline schirmer's test in his study.[15] In our study, the Schirmer's results changed over the follow-up period of 1 month, 3 months and 6 months but this change was statistically insignificant (p value insignificant). Studies like that of Goldberg and David and Chaidaroon and Pongmoragot showed significant decrease in Schirmer's test values in pterygium.[20,21]

Hence, the TBUT test results improved after surgical treatment of pterygium with conjunctival autografting, the Schirmer's test results did not change significantly. Therefore, we can speculate that the quantity of the tear film in patients with pterygium is adequate but its quality or composition is abnormal.

**CONCLUSION**

This study revealed that abnormal tear film function is associated with development of pterygium. Pterygium excision improves tear film function, TBUT significantly, although the improvement in schirmer's test is insignificant. Therefore, this study infers that pterygium seems to cause symptoms of dry eye and that surgical removal of pterygium reduces the dry eye related symptoms. However, further research should be conducted with larger sample size for better understanding.

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