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ORIGINAL RESEARCH

To evaluate changes in tear film before and after pterygium surgery with conjunctival autograft

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Abstract

Introduction: Pterygium can cause impairment of vision through altered tear film, induced astigmatism, photophobia, epiphora, and binocular diplopia due to contraction tenon's capsule, which limits eye movements therefore, 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. Surgery is the only effective treatment for pterygium.

Material and method: This comparative study was conducted on 75 diagnosed patients of pterygium who visited Department of Ophthalmology, Government Medical College Patiala after fulfilling the inclusion criteria. A written and informed consent was taken from the patients. The diagnosis of pterygium was done after thorough clinical examination and the diagnosed cases were subjected to Tear breakup time (TBUT), Schirmer's test - 1 (Without topical anaesthesia), Schirmer's – 2 Basal Tear Secretion (with topical anaesthesia).

Observation and results: Out of total 75 patients who underwent pterygium excision along with conjunctical autografting, 9 (12%) patients showed recurrence between 3 to 6 months.Following pterygium surgery with conjunctival autograft, the TBUT increased from 8.26 ± 2.37 secs to 10.06 ± 2.36 secs 1 month postoperatively among patients who showed no recurrence. Among the patients who showed recurrence later on TBUT values also increased from 8.33 ± 2.12 secs preoperatively to 10.44 ± 2.0 secs 1 month postoperatively. Both these changes were statistically significant. The values of schirmer-1 and schirmer-2 showed some improvement following pterygium surgery among all patients but those changes were not statistically significant

Conclusion: This study revealed abnormal tear film function are associated with development of pterygium. Pterygium excision improved tear film function, TBUT significantly, although the improvement in schirmers was insignificant.

Introduction

Pterygium is derived from a greek word pterygion meaning 'wing'. A pterygium is a triangular fibrovascular subepithelial ingrowth of degenerative bulbar conjunctival tissue. It is a benign proliferation of local conjunctiva that often crosses the limbus and extends on to the corneal surface .[1] . It mainly develops in patients who have been living in hot and dry

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climatic conditions and may represent a response to ultraviolet light exposure. Patients who present with a history of recent enlargement of the growth require early excision. Aggressive growth or an atypical appearance should prompt excision biopsy.[2] Pterygium can cause impairment of vision through altered tear film, induced astigmatism, photophobia, epiphora, and binocular diplopia due to contraction tenon's capsule, which limits eye movements.[3] Pterygium does not threaten visual acuity unless it approaches the visual axis. However, it is a cause of concern to the patients because of the abnormal cosmetic appearance and the ocular irritation. Although the growth is benign in the sense, that pterygium is not cancerous, but it can have serious adverse effects on vision of the patient if proliferating conjunctival tissue approaches or reaches the visual axis.[4] Tear function abnormalities have also been proposed as an etiological cause because it has been observed that a pterygium is intensified by elevation of pterygium head, dryness and dellen formation.[5] Tear film stability depends on various factors like lipid, aqueous, mucin layers and hydrodynamic factors like corneal sensitivity and mechanical factors viz eyelid blinking. 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.[6] Surgery is the only effective treatment for pterygium and many techniques have been described for its removal. Different surgical techniques for removal of pterygium have different recurrence rate. Recurrence, if occurs is often associated with more ocular morbidity than the primary occurrence. The most common technique in use is bare sclera excision,[7] and tissue grafting. These surgeries can also be combined with adjunctive radiation or chemotherapy agents such as Mitomycin C (MMC).[8] The aim of present study was to evaluate the changes in tear film of eye before and after pterygiumsurgery (conjunctival autograft)

Material and method

This comparative study was conducted on 75 diagnosed patients of pterygium who visited Department of Ophthalmology, Government Medical College Patiala after fulfilling the inclusion criteria. A written and informed consent was taken from the patients. Patient included were between ages of 18 to 80 years. Patients diagnosed with pterygium on the basis of sign and symptoms confirmed by clinical examination. Patients who were free from any ocular or extraocular disease other than pterygium that could affect tear film function, such as blepharitis, ocular allergy, thyroid disease, lacrimal system disease, diabetes, collagen disorder and use of any topical or systemic drug in the 3 months' period before the examination. Patients excluded from the study who were not willing for enrolment, Ages <18, >80 years, Pregnant females, Patients with recurrence of pterygium, Patients who had ocular or extraocular diseases other than pterygium that could affect tear film function, Patients who were on steroid medication. Informed consent was obtained from all the participants after explaining them the purpose of the study. Every patient was subjected to a detailed history and ophthalmic examination as Visual acuity (both distance & near vision), slit lamp examination, The diagnosis of pterygium was done after thorough clinical examination and the diagnosed cases were subjected to Tear breakup time (TBUT), Schirmer's test - 1 (Without topical anaesthesia), Schirmer's – 2 Basal Tear Secretion (with topical anaesthesia). The diagnosed cases of pterygium were subject to various routine investigations and pterygium surgery with conjunctival autograft procedure was done. Postoperatively follow up was done at 1 month, 3 month and 6 month respectively. The patients were subjected to same TBUT, schirmer's 1 & schirmer's 2 test at each visit. During each follow-up patients were examinedfor recurrence of pterygium in the same eye.

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Statistical analysis

The data were collected from patients using a case report form. Data was entered in excel and analysed 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. The patients were also checked for development of recurrence of pterygium, if any at each follow-up visit.

Observation and results

Tear Break Up Time		**No Recurrence (n=66)**		**With Recurrence (n=9)**	
		No. of Patients	**%age**	**No. of Patients**	**%age**
Preoperatively	<10 seconds	46	69.70	6	66.67
	>10 seconds	20	30.30	3	33.33
Total		66	100	9	100
Schirmer-1		**No Recurrence (n=66)**		**With Recurrence (n=9)**	
		No. of Patients	**%age**	**No. of Patients**	**%age**
Preoperatively	<10 mm	33	50.00	2	22.22
	>10 mm	33	50.00	7	77.78
Total		66	100	9	100
Schirmer-2		**No Recurrence (n=66)**		**With Recurrence (n=9)**	
		No. of Patients	**%age**	**No. of Patients**	**%age**
Preoperatively	<10 mm	36	54.54	5	55.56
	>10 mm	30	45.46	4	44.44
Total		66	100	9	100

Table 1: Tear Breakup Time, Schirmer-1, Schirmer-2Test Preoperatively

Above table showed that the group showing no recurrence of pterygium following pterygium surgery with conjunctival autograft (n=66) 69.70 percent showed TBUT of less than 10 seconds preoperatively while remaining 30.30 percent showed TBUT of more than 10 seconds and according to Schirmer-1 of less than 10 mm preoperatively while remaining 50 percent showed schirmer-1 of more than 10 mm. while in Schirmer-2 (n=66) 54.54 percent showed less than 10 mm preoperatively while remaining 45.46 percent showed schirmer-2 of more than 10 mm.

While in the group showing recurrence of pterygium following pterygium surgery with conjunctival autograft (n=9) 66.67 percent showed TBUT of less than 10 seconds preoperatively while remaining 33.33 percent showed TBUT of more than 10 seconds and (n=9) 22.22 percent showed Schirmer-1 of less than 10 mm preoperatively while remaining 77.78 percent showed schirmer-1 of more than 10 mm. while in Schirmer-2 (n=9) 55.56 percent showed Schirmer-2 of less than 10 mm preoperatively while remaining 44.44 percent showed schirmer-2 of more than 10 mm.

	no recurrence(n=66)	**With recurrence (n=9)**
TBUT		
Baseline	8.26 (2.37)	8.33 (2.12)

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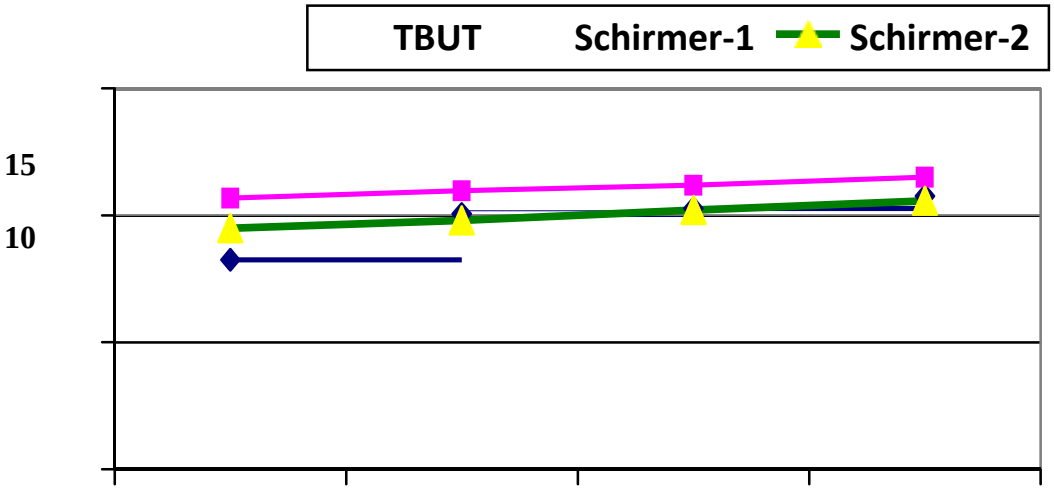
1 month	10.06 (2.36)	10.44 (2.01)
3 months	10.27 (2.24)	8.56 (2.01)
6 months	10.77 (2.23)	8.89 (1.83)
SCHIRMER-1		
Baseline	10.68 (3.18)	10.67 (3.74)
1 month	10.96 (3.30)	11.56 (3.05)
3 months	11.18 (3.14)	11.67 (2.78)
6 months	11.51 (2.96)	11.56 (2.79)
SCHIRMER-2		
Baseline	9.50 ((3.02)	9.33 (2.78)
1 month	9.80 (2.63)	10.00 (2.24)
3 months	10.22 (2.33)	10.33 (2.18)
6 months	10.57 (2.59)	10.33 (2.12)

TABLE 2: The comparison of the mean tear breakup time test (tbut), schirmer-1 and schirmer-2 test results during followup period [mean (sd)]



Patients without recurrence (n=66)

	Pre operatively	**1 month Post operatively**	**1 month Post operatively**	**3 months Post operatively**	**3 months Post operatively**	**6 months Post operatively**
with no recurrence (n=66)	8.26 ± 2.37	10.06 ± 2.36	10.06 ± 2.36	10.27 ± 2.24	10.27 ± 2.24	10.77 ± 2.23
p value**	0.00001*		0.18024		0.06288	
with recurrence (n=9)	8.33 ± 2.12	10.44 ± 2.01	10.44 ± 2.01	8.56 ± 2.01	8.56 ± 2.01	8.89 ± 1.83
p value**	0.00690*		0.02772*		1.00000	

*significance level is p value <0.05

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**The Wilcoxon Signed-Ranks Test

Table-3 Comparison of mean tear breakup time testpreoperatively and postoperatively

The comparisons of mean TBUT results preoperatively and postoperatively at 1 month, 3 months and 6 months are shown in Table 3. The TBUT results changed significantly over the follow-up period within group with no recurrence of pterygium (n=66). 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 showed insignificant improvement over TBUT values at 1 month postoperatively (p value insignificant).While in the group showing recurrence of pterygium following pterygium surgery with conjunctival autograft, the results of TBUT showed significant improvement (p=0.00690) initially at 1 month postoperatively however TBUT showed significant decline at 3 months and 6 months (p=0.02772).

Discussion

The aim of the present study wast to diagnose the presence of abnormal tear function test related to specific abnormality of ocular surface i.e. pterygium. A rapid thinning of surface tear film occurs as water is evaporates from it, which causes changes in the surface tension causing break up phenomenon. Also the development of dry spots in the surface tear film which occurs in the same location may indicate a local corneal surface abnormality rather than an intrinsic instability or abnormality of tear film.[2] The mean +/- standard deviation of preoperative tear breakup time (TBUT) in eyes with pterygium was 8.26 +/- 2.37 seconds among patients who showed no recurrence postoperatively (n=66). A study conducted by **Rajiv et al [9]** in pterygium showed mean tear film TBUT of 10.4 secs in normal healthy eyes, while in eyes with pterygium it was reduced to 5.6 secs. A study conducted by **Manhas A et al [10]** in pterygium showed mean tear film TBUT of 9.9 secs in pterygium eyes preoperatively. Our resultswere in concordance with the results obtained by **Antony AT et al[11]** who also reported decreased TBUT (less than 10secs) i.e. 7.6 +/- 2.6 seconds in his respective study. Tear breakup time test 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 [12]**. who found that before surgery, the average TBUT was 9.74 ± 3.43 s which was significantly prolonged to 11.49 ± 3.76 s 1 month postoperatively. In this study it was found that before surgery, the average TBUT in group of patients who showed recurrence(n=9) was 8.33 +/- 2.12 secspreoperatively which was significantly (p=0.00690) prolonged to 10.44 ± 2.01secs 1 month postoperatively. The patients had significantly higher TBUT values (p=0.00690) 1 month after pterygium surgery with conjunctival autograft as compared to the TBUT values before the surgery. The results ofTBUT showed improvement among these patients initially at 1 month postoperatively however TBUT showed significant decline at 3 months and 6 months in patients showing recurrence of pterygium after primary pterygium surgery with conjunctival autograft. As compared to mean TBUT at 1 month postoperatively (10.44 secs), mean TBUT at 3 months postoperatively showed a decline (8.56 secs) suggesting disturbance in tear film stability again following recurrence. This may be attributed to the fact that development of recurrence at 3 months starts interfering in the spread of normal tear film. This is in agreement with **Turkyilmaz K et al [13]. (2013)** who also found that tear function tests improved after pterygium excision and deteriorated again in the recurrent cases. In our study the mean +/- standard deviations of Schirmer 1 test results in pterygium eyes were 10.68 ± 3.18mm**.** A study conducted by **Rao VP[14]** in pterygium showed mean schirmer-1 of 12.5 mm in pterygium eyes postoperatively. A study conducted by **Manhas A et al[10]** in

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pterygiumshowed mean schirmer-1 as 13.2 mm in pterygium eyes preoperatively. Our results were in concordance with the results obtained by **Türkyılmaz K et al**[13] who also reported borderline schirmer-1 test in his respective study.

In our study the comparisons of mean schirmer-1 results preoperatively and postoperatively at 1 month, 3 months and 6 months are shown in Table 17. The Schirmer-1 results changed over the follow-up period of 1 month, 3 months and 6 months within group with no recurrence of pterygium (n=66) and the group which showed recurrence but this change was statistically insignificant (p value insignificant).

In our study the mean +/- standard deviations of Schirmer 2 test results in pterygium eyes were 9.50 ± 3.02 mm preoperatively. Our results were in concordance with the results obtained by **Roka N et al**[15] who also reported similar schirmer-2 results preoperatively (10.01mm) in his respective study. Reports regarding abnormal Schirmer's values in pterygium have been conflicting. While studies by **Rahman A et al**[16]. suggest no significant relationship between the two, other studies like that of **Goldberg and David**[17] **and Chaidaroon and Pongmoragot**[18]**.** showed significantdecrease in Schirmer's test values in pterygium. The present study has shown that although the TBUT test results improved significantly after surgical treatment of pterygium with conjunctival autografting, the Schirmer test results did not change significantly.

The reason why these inconsistent results were obtained in different studies might be because the methods that were used to evaluate tear function tests were not objective and quantitative. This present study has shown that although the TBUT test results improved significantly after surgical treatment of pterygium with conjunctival autograft, the Schirmer test results did not change significantly postoperatively. This can be attributed to the fact that the quantity of the tear film in patients with pterygium is adequate but that its quality or composition is abnormal. In patients with pterygium, who showed recurrence it was seen that TBUT improved significantly after initial surgery which remained stable for some time long as the pterygium did not reoccur.

Conclusion

This study revealed abnormal tear film function are associated with development of pterygium. Pterygium excision improved tearfilm function, TBUT significantly, although the improvement in Schirmers was insignificant. However, tear breakup time (TBUT) deteriorated again with the recurrence of pterygium. 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.

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