A Comparison of Precorneal Tear Film Pre and Post Pterygium Surgery

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Background: *Precorneal tear film was altered in pterygium eye and may be improved after pterygium removal.*
Objective: *To compare Schirmer's test results and tear breakup time before and after pterygium surgery.*
Material and Method: *Forty patients, aged between 30 and 77 years were enrolled in this study; one pterygium surgery eye was observed per patient. A paired t-test was used to compare Schirmer's test results and tear breakup time pre pterygium excision and one-month post-operation.*
Results: *There were no statistically significant differences in Schirmer's test results and tear breakup time between pre and one-month post-operation. The mean ± standard deviations of Schirmer's test results before and one-month after pterygium surgery were 9.2±4.3 and 10.0±6.3 millimeters, respectively (p = 0.30), and those results for tear breakup time were 7.5±3.0 and 7.9±3.1 seconds, respectively (p = 0.44).*
Conclusion: *Pterygium removal may not have any effect on Schirmer's test results and tear breakup time one-month post-surgery.*

Keywords: *Pterygium surgery, Precorneal tear film, Tear breakup time, Schirmer's test*

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There have been many studies that revealed the relationship between pterygium and dry eye. Symptoms of pterygium are similar to dry eye symptoms such as dryness and irritation. Many studies showed abnormal precorneal tear film in pterygium patients[1-8]. However, changes in precorneal tear film quality and quantity after pterygium surgery were inconclusive[2,9,10]. Some studies found improved tear film function after surgical removal of pterygium, whereas some studies did not find any difference. The objective of this study was to compare pre-operative and one-month post-operative results of Schirmer's test results and tear breakup time.

Material and Method

This research has been approved by the Ethics Committee at Thammasat University, Thailand. Informed written consent forms were obtained from all participants. The authors verified that all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed during this research, adhering to the tenets of the Declaration of Helsinki.

A prospective comparative study was designed. Forty patients were enrolled in this study: one pterygium-operative eye per patient. Mean age ± standard deviation was 53.5±11.6, ranged between 30 to 77 years of age. There were 20 men and 20 women. The patients all had their pterygium excision operations at Thammasat Hospital from December 2011 to January 2013. Pterygium excision was done with amniotic membrane graft in all patients.

Only patients who had primary pterygium were included in the present study. Patients previously diagnosed as dry eye, contact lens users, patients who used drugs that caused dry eye, and patients having operative complications were excluded from the present study.

Tear breakup time is a convenient and useful indicator of tear film stability. After staining with fluorescein on the inferior fornix, patients were asked to blink several times, then stop blinking and look forward. The tear breakup time was measured from the last blink to when the first dry spot appeared on the corneal surface. The value was recorded in seconds.

Schirmer's test with anesthesia is correlated

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with basic tear secretion. After administration of topical anesthesia, a standard Schirmer's test filter strip was inserted at the lateral one third of the lower fornix, and then the patients closed their eyes. Five minutes later, the length of the tear moisture on the test paper, in millimeters, indicated the value of Schirmer's test.

A paired t-test was used to compare Schirmer's test results and tear breakup time in the pre and one-month post-operation group of pterygium patients. The statistical significance was defined at 95% confidence intervals.

Results

In the present study there were no statistically significant difference in Schirmer's test results and tear breakup time between the pre-operative and one-month post-operative results. The mean $\pm$ standard deviation of Schirmer's test results before and one-month after pterygium surgery were 9.2 ± 4.3 and 10.0 ± 6.3 millimeters, respectively ($p = 0.30$), and those results for tear breakup time were 7.5 ± 3.0 and 7.9 ± 3.1 seconds, respectively ($p = 0.44$).

Discussion

There has been some controversy regarding the effect of pterygium operations on tear film function. Some studies found that only tear breakup time was prolonged after surgery, but there was no effect in Schirmer's test results[2,9]. Li's research showed that the mean tear breakup time before and one-month after pterygium surgery were 9.74 ± 3.43 and 11.49 ± 3.76 seconds, respectively ($p = 0.002$). Yet, there was no statistical significance in the difference of mean Schirmer's test results before and after excision ($p>0.05$)[9]. Similarly, Wang reported that after 4 weeks post-operation, the mean tear breakup time significantly increased from 9.89 ± 3.93 to 12.78 ± 4.12 seconds ($p<0.001$). Incontrast, the mean Schirmer's test results showed an increase from 8.21 ± 2.60 to 9.87 ± 3.87 millimeters, but there was no statistical significance ($p = 0.164$)[2].

However, Kilic found that there was no difference in Schirmer's test results and tear breakup time at one-month after pterygium removal compared with pre-operative results[10]. The findings of the present study agreed with Kilic's report.

Decreased tear breakup time may result from abnormal mucin tear film. There have been many studies reporting that mucin tear film was less apparent in the presence of pterygium. In eyes with pterygium, the mucus fern test demonstrated a decrease in normal crystallization (mucus fern pattern type I, II) and showed an increase in abnormal crystallization (mucus fern pattern type III, IV)[6,11]. After pterygium removal, there was a significant increase in normal mucus fern pattern (type I, II)[9]. Goblet cell density was lower in pterygium eye[12]. Li found that goblet cell density in conjunctival impression was significantly higher after pterygium excision, from 41.82 ± 18.29 per 10 fields to 50.67 ± 18.71 per 10 fields ($p<0.001$)[9]. The increase in goblet cell density may cause some improvement in tear breakup time post-surgery.

The results of Schirmer's test did not significantly change after operation. It may be because the pterygium had no effect in aqueous tear film[2].

Conclusion

According to the present study, pterygium removal may not have any effect in Schirmer's test results and tear breakup time one-month after surgery. Further investigation is needed with a larger sample size and longer post-operative observation period to verify the conflicting results.

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What is already known on this topic?

Schirmer's test results and tear breakup time may be changed after pterygium removal.

What this study adds?

Pterygium removal may not have any effect on Schirmer's test results and tear breakup time one-month post-surgery.

Potential conflicts of interest

None.

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การเปรียบเทียบสภาพน้ำตาก่อนและหลังการผ่าตัดต้อเนื้อ

โกศล คำพิทักษ์, วันวิสาข์ ตันศิรเจริญกุล, วิชัย ลีละวงค์เทวัญ

ภูมิหลัง: *สภาพน้ำตามีการเปลี่ยนแปลงในตาที่เป็นต้อเนื้อและอาจดีขึ้นภายหลังลอกต้อเนื้อ*

วัตถุประสงค์: *เพื่อเปรียบเทียบค่า Schirmer's test และค่า tear breakup time ก่อนและหลังผ่าตัดต้อเนื้อ*

วัสดุและวิธีการ: *ผู้ป่วยที่เข้าร่วมการศึกษามี 40 ราย อายุระหว่าง 30 ถึง 77 ปี ผ่าตัดต้อเนื้อ 1 ตา ต่อผู้ป่วย 1 คน เปรียบเทียบค่า Schirmer's test และค่า tear breakup time ก่อนและหลังผ่าตัด 1 เดือน ด้วยวิธี paired t-test*

ผลการศึกษา: *ไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติในค่า Schirmer's test และค่า tear breakup time ระหว่างก่อนและหลังผ่าตัด 1 เดือน ค่าเฉลี่ย ± ส่วนเบี่ยงเบนมาตรฐานของค่า Schirmer's test ก่อนและหลังผ่าตัด 1 เดือน เท่ากับ 9.2±4.3 และ 10.0±6.3 มิลลิเมตร ตามลำดับ (p = 0.30) และสำหรับค่า tear breakup time คือ 7.5±3.0 และ 7.9±3.1 วินาทีตามลำดับ (p = 0.44)*

สรุป: *การผ่าตัดลอกต้อเนื้ออาจไม่มีผลต่อค่า Schirmer's test และ ค่า tear breakup time 1 เดือนหลังผ่าตัด*