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ИЗДАНИЕ НА БЪЛГАРСКОТО ДРУЖЕСТВО ПО ОФТАЛМОЛОГИЯ

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## ОЦЕНКА НА СЛЪЗНИЯ ФИЛМ НА ОЧИ С ПТЕРИГИУМ И СЛЕД НЕГОВАТА ЕКСЦИЗИЯ ЧРЕЗ ПРИЛАГАНЕ СВОБОДНА ЛИМБАЛНА ДОЛНО-ЛАТЕРАЛНА КОНЮНКТИВАЛНА АВТОТРАНСПЛАНТАЦИОННА ПРОЦЕДУРА

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### Evaluation of the tear film in eyes with pterygium and after its surgical excision using the limbal inferior-lateral conjunctival autotransplantation procedure

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#### Резюме

**Цел:** Да се определи състоянието на слъзният филм при пациенти с едностранен птеригиум преди и след хирургичното му отстраняване с прилагане на конюнктивален свободен автотрансплантат от долната темпорална конюнктива.

**Метод:** Изследвани са 60 пациента с едностранен първичен птеригиум. Слъзният филм е изследван предоперативно и един месец след оперативното отстраняване на птеригиума чрез модификация на реконструктивния метод на свободна конюнктивална автотрансплантация с прилагане на графт от долната темпорална булбарна конюнктива.

Schirmer-тестът с и без локален анестетик и тестът за разкъсване на слъзния филм са тестовете с които се определи състоянието на слъзният филм на здрави очи, очи с птеригиум и постоперативно на същите пациенти.

**Резултати:** Средното време за разкъсване на слъзният филм (BUT) е 13,4 сек (10,7 сек -16,2 сек) на здравото око. При пациентите с птеригиум това време беше значително покъсо до 5,6 сек (9,7 сек  $\pm$  4,7 сек), докато, постоперативно един месец след хирургичната намеса средното време за разкъсване на слъзният филм беше значително удължено (11,7 сек  $\pm$  2,7 сек).

При Schirmer-тестът с употреба на локален анестетик навлажняването на Whatman-филтърната показваше 14мм (12 мм - 16 мм) за здравите очи и 4,5мм (3,0мм - 6,0мм) при очите с птеригиум. Постоперативно, навлажняването при Whatman-филтърната хартия се увеличи и показваше 14,8мм (12,7мм - 16,9мм). При Schirmer-тестът без употреба на локален анестетик навлажняването на Whatman-филтърната хартия преди операция на птеригиум показваше 4,80мм (3,50мм - 6,1мм), след операцията 15,50мм (13,5мм - 17,50мм) и на здрави очи 16мм (15,0мм - 17,0мм).

**Заклучение:** Състоянието на слъзният филм при пациенти с първичен птеригиум се подобрява постоперативно след ексцизия чрез свободна конюнктивална автотрансплантация от долно-темпоралната булбарна конюнктива, което показва близката корелация на птеригиума със сухото око.

**Ключови думи:** птеригиум, лимбална автотрансплантация, сухо око

#### Abstract

**Aim:** To determine the eventual abnormalities of the tear function in patients with unilateral pterygium and after its surgical excision using conjunctival autotransplantation from the limbal inferior-lateral conjunctiva.

**Method:** The tear function was examined in 60 patients with unilateral pterygium before and after surgical

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excision of the pterygium with conjunctival autotransplantation using the graft from the limbal inferior-lateral conjunctiva.

Schirmer test with and without local anesthetic and the break-up time of the tear film were used on the healthy eye, the eye with pterygium and after the pterygium surgery on the same patient.

**Results:** The mean time of the tear film break-up time (BUT) is 13.4 sec (10.7 sec - 16.2 sec) on the healthy eye. This mean time was significantly shorter, 5.6 sec (9.7 sec = 4.7 sec), in the same patients but measured at the eye with pterygium. After 1 month of the operation and excision of the pterygium the mean time of the BUT was significantly longer (11.7sec  $\pm$  2.7 sec).

Measured by the Schirmer test, the size of the wet area on the Whatman filter paper with local anesthesia was 14mm (12mm - 16mm) on the healthy eye and 4.5mm (3.0mm - 6.0mm) on the eye with pterygium. Postoperatively, the size of the wet area increased, i.e. the area was 14.8mm (12.7mm - 16.9mm). The wet area's size measured by the Schirmer test without local anesthesia before the surgery of pterygium was 4.80 mm (3.50 mm - 6.1mm), after the surgery 15.50mm (13.5mm -17.50mm) and on the healthy eye 16mm (15.0mm-17.0mm).

**Conclusion :** The tear function in patients with primary pterygium improves after its surgical excision with the conjunctival autotransplantation using the graft from the limbal inferior-lateral conjunctiva. Thus it can be concluded that pterygium has a close relationship with the dryness of the eye.

**Key words:** Pterygium, limbal autotransplantation procedures, dry eye

### Introduction

Pterygium is a common disease on the ocular surface only observed in humans. The exact causes of pterygium's formation are unknown.

The pterygium and ocular surface form a complex and stable system that can lose its equilibrium through numerous disturbing factors. The pathogenesis of cornea and conjunctiva's degenerative conditions, such as pterygium and pinguecula, still cannot be clearly stated or proved in the science. It has been postulated that exposure to environmental factors, for example ultraviolet (UV) rays and chronic irritation to dust, cause corneal and conjunctiva dryness by tear film disruption. Even though the ultraviolet exposure is emphasized, there are other factors such as dust, wind, low humidity, lifestyle behaviors (outdoor activities), micro-trauma on the conjunctiva and cornea (trichiasis, meibomian glands' cysts), genetic attributes, viral infections, immunological theory, TGF (tumor growth factor), disruption in the tear film, etc.

There is a theory about the etiology of pterygium that states tear film abnormalities

cause the local dryness of cornea and conjunctiva, leading to dellen formation and trigger pterygium growth.

### Aim

To determine the eventual abnormalities of the tear function at patients with unilateral pterygium and after its surgical excision using conjunctival autotransplantation from the limbal inferior-lateral conjunctiva.

### Method

The tear function was examined in 60 patients with unilateral pterygium before and after surgical excision of the pterygium with conjunctival autotransplantation using the graft from the limbal inferior-lateral conjunctiva.

The dry eye is defined as being either a quantitative or qualitative dysfunction of the tear film. In this study, 3 tests were undertaken for the purposes of revealing the connection between pterygium and eye dryness: Schirmer test with and without topical anesthesia, and tear film break-up time test (BUT).



Schirmer test, with and without local anesthetic, and the break-up time (BUT) of the tear film were used on the healthy eye, the eye with pterygium and after the pterygium excision on the same patient.

The tear film break-up time (BUT) test was used to measure the stability of precorneal tear film. Firstly, fluorescein was installed into the lower fornix of the eye. Secondly, the patient was asked to blink several times and then stop. Lastly, the tear film was examined using the cobalt blue filter and broad beam on the Haag-Streit 900 slit-lamp. BUT is the interval between the last blink in the second step of the test and the first dry spot formation in the third step. An abnormal BUT happens when it occurs in less than 10 seconds.

The Schirmer test was used to determine the quantitative tear formation. A normal result using the Schirmer test is a size of the wet area corresponding to 15 mm or more on the Whatman filter paper without the topical anesthesia. This size is smaller when tested with anesthesia, i.e. interval between 10mm and 15mm. Size of the wet area below 5mm indicates impaired secretion, while size between 5mm and 10mm acts as a borderline.

All of the above tests were done when there was no clinical evidence of infection or other irritation which could predispose excess tearing.

A recognized questionnaire template consisting of six questions related to dry eye symptoms was undertaken by the 60 surveyed patients. These questions were as follows:

1. Do your eyes ever feel dry?
2. Do you ever feel a gritty or sandy sensation in your eye?
3. Do your eyes ever have a burning sensation?
4. Are your eyes ever red?
5. Do you notice a lot of crusting on your lashes?
6. Do your eyes ever get stuck shut?

Additional questions were added to the above questionnaire, including queries about some environmental sources of irritation (smoke, dust, wind and sun) that were not presented in the above questionnaire template.

The presence of a symptom from the dry eye questionnaires was further graded as never, rare (at least once in 3-4 months), occasional (once in 2-4 weeks), frequent (at least once a week) or all the time.

#### Data analysis

For the subsequent statistical analysis, a patient with eye dryness is the one who responded positively to one or more of the dry eye symptoms that occurred often or all the time.

#### Results

All of the 60 surveyed patients completed the dry eye questionnaire. Their average age was 48.0 years. From the 60 patients, 36 patients were men and 24 patients were women (Table 1, Chart 1 and Chart 2).

The mean time of the tear film break-up time (BUT) is 13,4 sec (10,7 sec - 16,2 sec) on the healthy eye. This mean time was significantly shorter, 5,6 sec ( $9,7 \text{ sec} \pm 4,7 \text{ sec}$ ), in the same patients but measured at the eye with pterygium. After 1 month of the operation and excision of the pterygium the mean time of the BUT was significantly longer ( $11,7 \text{ sec} \pm 2,7 \text{ sec}$ ).

Measured by the Schirmer test, the size of the wet area on the Whatman filter paper with local anesthesia was 14mm (12mm - 16mm) on the healthy eye and 4,5mm (3,0mm - 6,0mm) on the eye with pterygium. Postoperatively, the size of the wet area increased, i.e. the area was 14,8mm (12,7mm - 16,9mm). The wet area's size measured by the Schirmer test without local anesthesia before the surgery of pterygium was 4,80 mm (3,50 mm - 6,1mm), after the surgery 15,50mm (13,5mm - 17,50mm) and on the healthy eye 16mm (15,0mm - 17,0mm) (Table 2 and Chart 3).



### Discussion

In our study, the percentage of surveyed patients reporting occurrence of at least one symptom of eye dryness was 56.67 %, which further confirms the role of pterygium in increasing the eye dryness. The patients with pterygium reported significant association with one or more of the dry eye symptoms occurring frequently or all the time.

Also, age adjusted prevalence was noted; namely, the elderly patients reported one or more of the dry symptoms occurring frequently or all the time. As well as, symptoms of eye dryness were noted to a bigger degree in male patients, in patients with current smoking history and outdoor workers (farmers, construction workers and similar).

The Salisbury Eye Evaluation Study used the same recognized questionnaire template that was used in our study, to evaluate and define dry eye symptoms. This study found that 14% of participants reported one or more of the dry eye symptoms occurring frequent or all the time. In the Beaver Dam Study, an overall prevalence of dry eye was found in 14,4% and in the study conducted in Melbourne, Australia, the percent is 5.5% of the patients, reported a severe symptom of dry eye. In the above studies, occurrence of dryness symptoms increased with age, male sex, current smoking history and presence of pterygium. In the population based study in Indonesia the authors found twofold increase risk of dry eye symptoms in participants with pterygium.

In this study, 3 tests were undertaken for the purposes of revealing the connection between pterygium and eye dryness; Schirmer test with and without topical anesthesia, and tear film break-up time test (BUT).

The measurements by the Schirmer test of the wet area's size with and without topical anesthesia have significant difference before and after the pterygium excision. Postoperatively, the

size of the wet area increased, which means that the basic secretion of the tears decrease in the eyes with pterygium. However, the eye secretion does not differ in patients with pterygium after its surgical excision and the healthy eye.

While some researchers have found tear film dysfunction in eyes with pterygium and pinguecula, others have not found such abnormalities. In our study the mean time of the tear film break-up time (BUT) was shorter at the eye with pterygium and longer after its excision; no significant difference was observed between the mean BUT on the eye after the pterygium's excision and the healthy eye.

The above mentioned results from our study, collected by the Schirmer test with and without topical anesthesia and the BUT test, have clearly shown the link between pterygium's incidence and lower stability of the precorneal tear film. The signs and symptoms of dry eye occur more often in the eye with pterygium compared with the healthy eye because pterygium mechanically initiates ectopic tear meniscus and/or dysfunction. Hence, the resection of excess conjunctiva and abnormal pterygium tissue is an effective procedure for normalizing the tear film function. If the pterygium excision results with cicatrizing conjunctivitis and tear film instability due to conjunctival inflammation and squamous metaplasia, reconstruction of ocular surface epithelium is vital for its resolution. In order to effectively attend dry eye triggered by conjunctival inflammation, it is important to understand not only the surgical procedure but also the pathomechanisms of conjunctival changes leading to signs and symptoms of tear film dysfunction.

### Conclusion

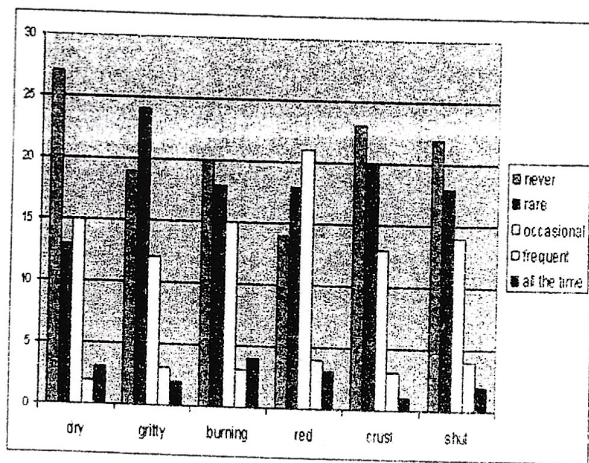
Tear function in patients with primary pterygium improves after pterygium excision with the limbus conjunctival autotransplantation using the graft from the infero-temporal bulbar

conjunctiva, which indicates that pterygium has a close relationship with dry eye.

**Table I. Symptom frequency.**  
 Representation of each dry symptom's distribution by frequency of occurrence (never, rare, occasional, frequent, or all the time) in the examined group.

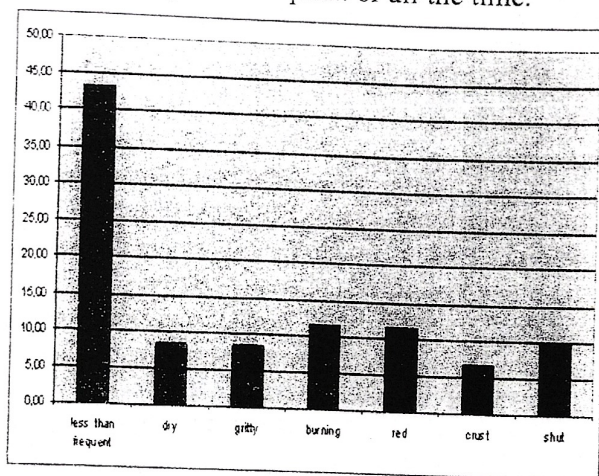
Table I. Symptom frequency.					
	never	rare	occasional	frequent	all the time
dry	27	13	15	2	3
gritty	19	24	12	3	2
burning	20	18	15	3	4
red	14	18	21	4	3
crust	23	20	13	3	1
shut	22	18	14	4	2

**Chart 1. Illustration of the symptom frequency of occurrence.**



**Chart 2. Illustration of the symptoms' occurrence frequent or all the time.**  
 8.33%, 8.33%, 11.67%, 11.67%, 6.67% and 10% of the patients reported 1, 2, 3, 4, 5 and 6 of the six dry eye symptoms occurring frequent or all the time respectively. Thus 56,67 % of the patients reported occurrence of at least one of the

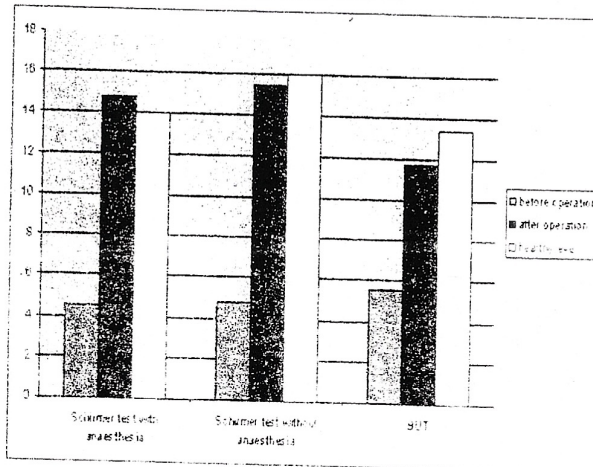
dry eye symptoms frequent or all the time.



**Table II. Results of the Schirmer test with and without anaesthesia and BUT.**

Table 2. Results of the Schirmer test with and without anaesthesia and BUT			
	before operation	after operation	healthy eye
Schirmer test with anaesthesia	4,50	14,80	14,00
Schirmer test without anaesthesia	4,80	15,50	16,00
BUT	5.60	11.70	13.40

**Chart 3. Results of the Schirmer test with and without anaesthesia and BUT.**





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