Tear function and ocular surface after muller muscle-conjunctival resection

Suat Hayri Ügürbaş, Atilla Alpay, Burak Bahadır, Silay Cantürk Ügürbaş

Muller muscle-conjunctival resection (MCR) is a surgical technique to correct mild and moderate ptosis. In this study, tear function tests and ocular surface were evaluated in patients who underwent unilateral surgery. Sixteen patients with normal preoperative tear function who underwent unilateral MCR were evaluated prospectively. The fellow eyes of the patients were taken as the control group. A dry eye assessment questionnaire, Schirmer testing, tear film break-up time, fluorescein stain, Rose-Bengal stain, and conjunctival impression cytology were used to assess the tear film functions and ocular surface changes in the operated and non-operated eyes. There was no statistically significant difference in the tear function tests and goblet cell densities between the operated and non-operated eyes. The results indicate that an MCR procedure has no apparent effect on tear function tests and goblet cell density in patients with normal preoperative tear function.

Key words: Blepharoptosis surgery, conjunctiva, tear

Materials and Methods

Thirty-two eyes of 16 patients who underwent unilateral ptosis surgery were enrolled in the study. The fellow eyes of the patients were taken as the control group. A complete ophthalmologic examination of patients was performed including preoperative Schirmer and TBUT tests. The patients with other ocular disease, dry eye, history of a systemic disease that would affect ocular surface, history of contact lens use, and prior conjunctival surgery were excluded from the study. All patients underwent ptosis repair by an MCR with a technique similar to the described by Putterman.[1]

A subjective dry eye questionnaire was given to the patients questioning various dry eye symptoms, frequency of dryness, grittiness, burning, redness, crust formation on lashes and stickiness of eyelids in the morning.[3] Responses were graded as follows: 0 - never; 1 - rare; 2 - sometimes; 3 - frequently; or 4 - always. The total score was calculated with the sum of symptom grades in each eye.

Schirmer and TBUT tests were performed after an application of a drop of proparacaine hydrochloride 0.5%. The procedure was repeated 3 times, and the average of measurements was recorded.

Fluorescein staining was recorded for 5 regions of the cornea (superior, inferior, nasal, temporal, central) and 4 regions of the conjunctiva (superior, inferior, nasal, temporal). Each region was graded from 0 to 4. The total staining score was the sum of the scores of all regions. Rose-Bengal staining (RBS) of the conjunctiva was performed by using a Contacare Rose-Bengal ophthalmic Strip (Contacare, Baroda, India); initially wetted with non-preserved buffered saline and then instilled on the inferior bulbar conjunctiva. An evaluation of RBS was similar to fluorescein staining.

The eyelid margin was checked for meibomian gland disease (MGD) with slit lamp examination. Grade-0 indicated that all glands were unblocked. Grade-1 indicated 1 to 2 blocked glands. Grade-2 indicated 3 to 4 blocked glands with thick secretions but without expression of glands. Grade-3 indicated that half of the glands were blocked. Grade-4 indicated more than half of the glands were blocked with viscous secretions. Grade-1 or higher was considered as MGD positive.[3]

Impression cytology specimens were collected from the temporal and nasal conjunctiva of each eye using Nitrocellulose (Sartorius, Göttingen, Germany) filter paper. Specimens were stained with periodic acid-Schiff stain. The quantitative studies of conjunctival goblet cells and squamous metaplasia of conjunctival epithelial cells were conducted by taking photographs with a calibrated grid under a light microscope. Five non-overlapping areas of each randomly-selected sample were photographed and averaged for a single score. The Goblet cell densities were reported as cells per square millimeter with standard deviations. The specimens were also assigned a grade of conjunctival epithelial squamous metaplasia according to Nelson’s grading scheme.[4]

The results were analyzed by using paired t-test and Wilcoxon matched pair test. P < 0.05 was considered statistically significant.
**Results**

The patients consisted of 11 women and 5 men. The mean age was 51.4 ± 19.5 (range 14 - 76) years. Patients were followed-up for mean 18.5 ± 10.2 (4 - 40) months. The mean subjective dry eye questionnaire score was 2.68 ± 3.98 points in operated eyes and 2.00 ± 2.63 points in control eyes. There was no significant difference between 2 groups (P = 0.54).

There was no difference in the ST and TBUT scores before and after surgery in both operated and in the control eyes (P = 0.79, P = 1.00, respectively). The mean fluorescein and RBS scores, meibomian gland disease score and squamous metaplasia grading score of operated and non-operated eyes of each patient also showed no significant differences [Table 1].

An impression cytology analysis showed no statistically significant change in goblet cell densities between operated and the control eyes (> 0.05).

**Discussion**

Conjunctival epithelium contains goblet cells that secrete mucin and the glands of Krause and Wolfring, which are responsible for basal tear secretion. TBUT demonstrates the stability of the tear film. ST determines whether the eye produces enough tears to keep it moist. We found no significant difference between the values of the tests.

Any damage in tear film leads to epithelial defects in the cornea, and these defects are stained with fluorescein.[5] RBS only devitalized epithelial cells of the ocular surface. This stain is blocked by tear proteins such as albumin and mucin, which cover the ocular surface. Decreased mucin production plays a major role in ocular surface staining with Rose-Bengal.[6] In comparison of operated and control eyes in terms of fluorescein and RBS, no significant difference was found between the eyes. The pathological examination of samples taken from upper and lower bulbar conjunctiva of patients revealed no statistically significant difference in goblet cell density and grade of conjunctival metaplasia between operated and control eyes.

Conjunctival fornix shortening due to conjunctival resection has more impact on dry eye states with conjunctival deficiency such as, anophthalmic socket and conjunctival cicatrizing diseases. The suture used in MCR may abrade into the filtration area and may be problematic in patients with trabeculectomy. Therefore, it may not be advisable to perform an MCR in these patients.[7]

Some investigators believe that an excision of conjunctiva may damage the accessory lacrimal glands of Wolfring, located in the upper tarsal border, which may aggravate dry eye states.[8] Others[9] do not agree. We have incorporated all the frequently applied clinical and laboratory tests to evaluate the effects of MCR surgery on tear film stability. Our results conclude that an MCR surgery does not have any adverse effects tear film production and stability.

The limitation of present study is small sample size. Further studies with a larger patient population might shed light on the effect of an MCR on tear film and ocular surface.

**References**


**Table 1: Tear function and ocular surface examinations**

<table>
<thead>
<tr>
<th></th>
<th>Operated eye</th>
<th>Control eye</th>
<th>P</th>
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<tbody>
<tr>
<td>Schirmer test (mm)</td>
<td>15.00 ± 6.59</td>
<td>14.68 ± 7.40</td>
<td>0.75*</td>
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<tr>
<td>Tear film Break-up Time (sec)</td>
<td>14.25 ± 3.56</td>
<td>13.75 ± 3.51</td>
<td>0.50*</td>
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<tr>
<td>Fluorescein score</td>
<td>0.63 ± 1.03</td>
<td>0.63 ± 0.89</td>
<td>0.102**</td>
</tr>
<tr>
<td>Rose-Bengal score</td>
<td>0.88 ± 1.03</td>
<td>0.94 ± 1.29</td>
<td>0.257**</td>
</tr>
<tr>
<td>Meibomian gland disease</td>
<td>0.44 ± 0.81</td>
<td>0.56 ± 0.63</td>
<td>0.157**</td>
</tr>
<tr>
<td>Goblet cell density (cells/mm²)</td>
<td>419 ± 172</td>
<td>427 ± 85</td>
<td>0.055*</td>
</tr>
<tr>
<td>Squamous metaplasia grade</td>
<td>1.03 ± 0.59</td>
<td>0.72 ± 0.58</td>
<td>0.655**</td>
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*Paired t-test, **Wilcoxon test