



Evaluating the Effects of Upper Eyelid Blepharoplasty on Tear Film Quality and Intraocular Pressure

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Abstract

Objectives: To evaluate tear film quality and intraocular pressure (IOP) changes after upper eyelid blepharoplasty.

Methods: This retrospective study included 42 eyes of 21 patients who underwent upper eyelid blepharoplasty for dermatochalasis between January 2018 and June 2018 in our clinic. Schirmer's and tear break-up time (TBUT) values and IOP were measured preoperatively and postoperatively at first day, 1 month, and 3 months in all patients. The ocular surface staining pattern was evaluated according to Oxford scale. Effects of upper eyelid blepharoplasty on tear film quality and IOP were evaluated.

Results: All patients were female and their mean age was 53.28 ± 7.98 . The postoperative Schirmer's test scores at postoperative 3 months were significantly ($p < 0.01$) lower than all previous preoperative measures. Similarly, the postoperative 1-week measurements were significantly ($p < 0.01$) higher than the postoperative 1-month and 3-month measurements. In terms of TBUT, the postoperative 1-week measurement was significantly ($p < 0.05$) higher than the postoperative 1-month measurement and the preoperative value than the postoperative 1-month measurement. There was no significant ($p > 0.05$) difference between the measurements in terms of IOP values. Of the 42 eyes evaluated according to Oxford scale, 28 (66%) had mild symptoms, 10 (23%) had moderate symptoms, and 4 (9%) had marked symptoms. No patient with severe symptoms was detected.

Conclusion: Upper eyelid blepharoplasty may have a negative effect on tear film quality in early postoperative period; however, it does not affect IOP at any period. Understanding the effects of surgery performed specifically on ocular surface through larger case series may necessitate ophthalmologic examination for preoperative evaluation and postoperative follow-up of dermatochalasis cases.

Keywords: Intraocular pressure, tear film quality, upper eyelid blepharoplasty.

Introduction

Ageing process, genetic factors, as well as effects of ultraviolet exposure and gravity cause the eyelid to lose elasticity and, as the septum surrounding the periorbital fat tissue loosens, the orbital fat tissue herniates. This process creates anatomic and functional changes in the eyelids, such as sagging and bagging. It may be accompanied by other pathologies such as sagging eyebrows and/or dehiscence of the levator aponeurosis. As a result of the anatomic and functional changes

formed, patients experience narrowing of the visual field and psychological problems caused by aesthetic concerns, which affect the overall quality of life of individuals (1-3).

At present, noninvasive methods are used in the treatment of dermatochalasis; however, upper eyelid blepharoplasty has become a commonly preferred method, as it is a permanent and effective treatment modality. On the other hand, although the postoperative rehabilitation stage of such surgery is rapid and comfortable, care should be taken to avoid ocular surface problems that may develop.

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In this study, we aimed to evaluate the effect of upper eyelid blepharoplasty on tear film and intraocular pressure (IOP) changes.

Methods

The study included 42 eyes of 21 patients diagnosed with dermatochalasis at the Ophthalmology Clinic of Istinye State Hospital between January 2018 and June 2018. All patients were given full ophthalmologic examination.

Visual acuity testing by a Snellen chart, IOP measurements by a pneumatic tonometer, as well as anterior segment and fundus examinations were performed on the patients. Pachymetry values were measured to calculate the corrected IOP values. All patients were given a preoperative Schirmer's test and tear break-up time (TBUT) test. For evaluating TBUT, 1 drop of fluorescein was applied on the lower fornix and patients were instructed to keep their eyes open after 1 blink. Breakup time of the precorneal fluorescein dye was measured with a biomicroscope. This parameter, which has a normal value of 15–35 seconds, was considered pathologic below 10 seconds. Following the evaluation of TBUT, Schirmer's test was performed. Following the application of topical anesthetics (proparacaine eye drops), Schirmer's test was performed by placing a filter paper (5 mm wide, 3.5–5.0 cm long, and folded 5 mm) at the 1/3 outer edge of the eyelid and the amount of wetting in 5 min was measured. Values below 10 mm were considered within the spectrum of dry eye. In evaluation of the ocular surface, fluorescein papers were placed in the lower bulbar conjunctiva, enabling the dye to spread across the ocular surface. Following dye application, the dyeing pattern of the cornea and conjunctiva was examined according to Oxford scale. The Ocular Surface Disease Index scoring was not used in this study.

Those who had a history of previous eyelid surgery, congenital or acquired eyelid abnormality, glaucoma or ocular hypertension, as well as those under dry eye treatment or having a local or systemic disease that may affect the ocular surface were excluded from the study.

Preoperatively, the patients' skin tissue was marked at 8 mm above the edge with eyelashes and 10 mm below the eyebrow curve in a way that would not cause postoperative lagophthalmos. Following sedation and local lidocaine anesthetic application, a scalpel was used to incise the marked area and the skin and about 5 mm of the orbicularis oculi muscle were removed. In patients with orbital fat prolapse, the fat tissue was excised and local bleeding control was achieved. The skin was separately sutured with a 6.0 vicryl suture. Postoperatively, topical eye drop treatment was not initiated, considering that it could affect the ocular surface score, and a topical antibiotic pomade and oral antibiotics were prescribed.

Results

This study included 42 eyes of 21 patients who underwent upper eyelid blepharoplasty for dermatochalasis in our clinic between January 2018 and June 2018. All patients were female and their mean age was 53.28 ± 7.98 .

An evaluation of the patients' Schirmer's test results revealed that, in the preoperative period, the mean measurement was 15.71 ± 2.02 mm; whereas, for postoperative measurements were 16.47 ± 2.29 mm at 1 week, 15.04 ± 1.65 mm at 1 month, and 14.14 ± 1.31 mm at 3 months (Fig. 1). The Schirmer's test scores at postoperative 3 months were significantly ($p < 0.01$) lower than all the previous measurements. For the measurements at postoperative 1 week, the Schirmer's test scores were significantly ($p < 0.01$) higher than the postoperative 1-month and 3-month measurements. Based on these results, an increase in the tear volume was determined in the post-blepharoplasty acute period; whereas, in the 3rd month of follow-up, a decrease in the tear volume was observed when compared to the preoperative period.

The evaluation of the patients' TBUT scores revealed a preoperative score of 15.42 ± 3.05 seconds; whereas, postoperatively, it was 15.47 ± 3.47 seconds at 1 week, 14.80 ± 2.85 seconds at 1 month, and 15.00 ± 2.46 seconds at 3 months. Accordingly, it was observed that the measurement conducted at postoperative 1 week was significantly ($p < 0.05$) higher than that of the postoperative 1 month. The preoperative TBUT values were significantly ($p < 0.05$) higher than the measurements of the postoperative 1 month (Fig. 2). An extension was determined in TBUT measurements in the early period; however, no significant differences were observed in the late period when compared to the preoperative measurements.

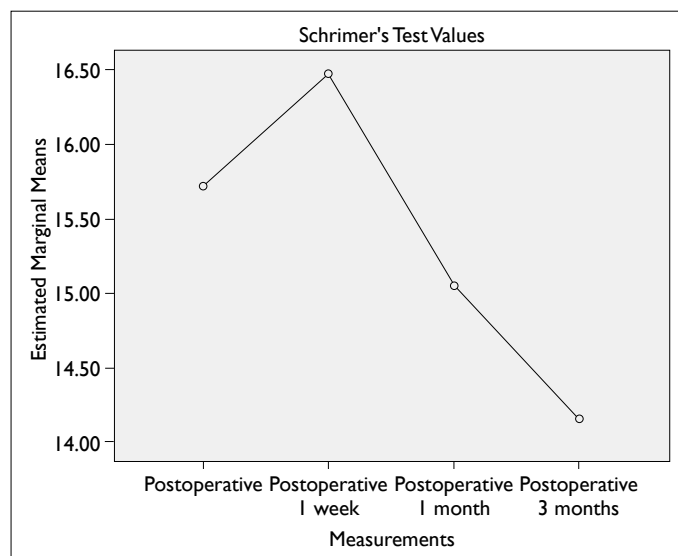


Figure 1. Baseline and postsurgical schirmer's test results..

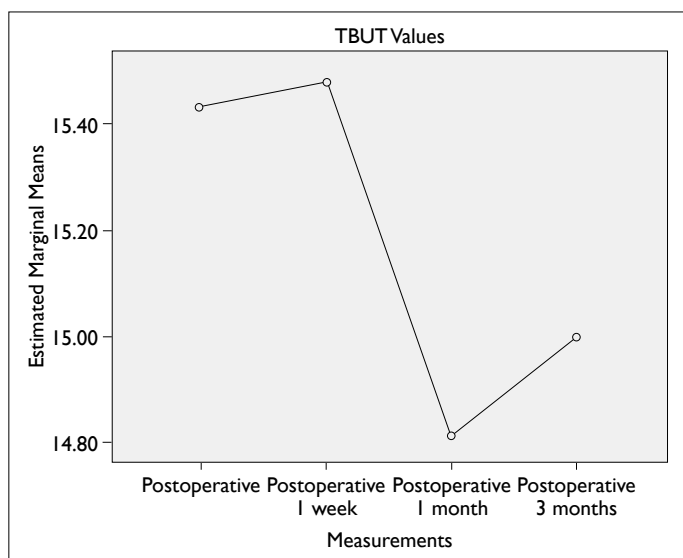


Figure 2. Baseline and postsurgical TBUT values.

In the final follow-up examinations of the 21 patients in our study, the respective Oxford scales were examined for clinical staging classification into oral definitions of mild, moderate, marked, and severe stages. Accordingly, an evaluation of the 42 eyes of 21 patients revealed that 28 (66%) had “mild” symptoms, 10 (23%) had “moderate” symptoms, and 4 (9%) had “marked” symptoms. However, no patients with severe symptoms were detected.

An evaluation of the IOP test results of the cases revealed that, in the preoperative period, the mean measurement was 13.57 ± 2.19 Hg; whereas, postoperatively, it was 13.97 ± 3.27 Hg at 1 week, 13.45 ± 1.99 Hg at 1 month, and 13.47 ± 1.90 Hg at 3 months (Fig. 3). There were no statistically significant differences between the preoperative and postoperative IOP measurements. Thus, it was determined that blepharoplasty did not cause any changes in IOP ($p > 0.05$).

In the postoperative follow-up of the patients, no complications, such as lagophthalmos, abnormal scar tissue formation, ectropion or entropion, were found.

Statistical Analysis

The preoperative, postoperative 1-week, postoperative 1-month, and postoperative 3-month Schirmer’s, TBUT, and IOP results were evaluated by one-way repeated measures MANOVA. Although the normal distribution assumption of the one-way repeated measures MANOVA was satisfied ($p > 0.05$), it was observed that the assumption of sphericity was not met for any of the three variables. (For Schirmer’s, Mauchly’s $W = 0.265$, $p < 0.001$, for TBUT, Mauchly’s $W = 0.321$, $p = 0.001$ and for IOP, Mauchly’s $W = 0.424$, $p = 0.007$) Therefore, in evaluation of the ANOVA findings obtained, Wilk’s λ was used as the multivariate test result. (Wilk’s $\lambda = 0.466$, $F_{9, 12} = 85.783$, $p = 0.001$, partial $\eta^2 = 0.23$) According to the

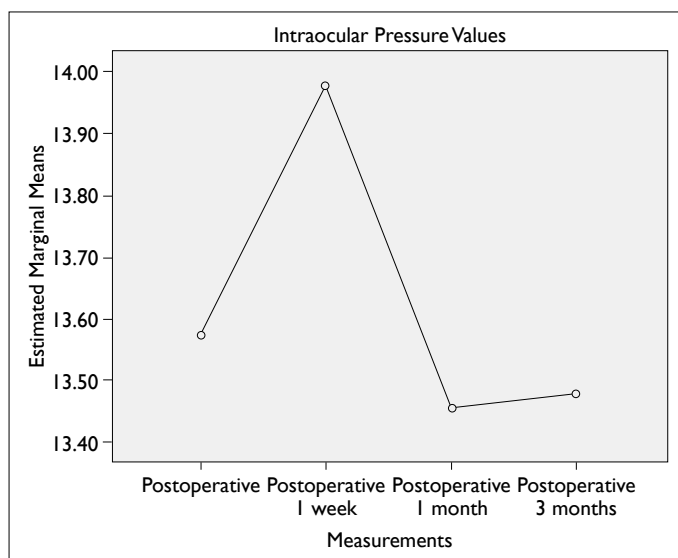


Figure 3. Baseline and postsurgical IOP changes.

result obtained, in at least one of the variables measured, there was a significant difference among the measurements.

In order to determine the origin of the difference among the variables and measurements, results of the bonferroni correction comparison table were analyzed. Accordingly, the Schirmer’s test values at postoperative 3 months were significantly ($p < 0.01$) lower than all the previous measurements. Similarly, the postoperative 1-week measurement was significantly ($p < 0.01$) higher than the postoperative 1-month and 3-month measurements. For TBUT results, it was observed that the measurement conducted at postoperative 1 week was significantly ($p < 0.05$) higher than that of postoperative 1 month. The preoperative TBUT values were significantly ($p < 0.05$) higher than the postoperative 1-month measurement. There were no significant ($p > 0.05$) differences among the IOP measurements.

Discussion

Excess skin and fat tissue developing with age in upper eyelids create an old and tired look. Sagging of the upper eyelid skin due to the effect of gravity and anatomic changes, as well as the loosening of the orbicularis oculi muscle and orbital septum, can cause blepharochalasis. At present, blepharoplasty is a common treatment modality of blepharochalasis and has become one of the surgical operations that has yielded the highest patient satisfaction, with an advantage of the cosmetic and functional recovery it provides.

Ageing brings about a loss of elastic fibers, even though the skin of the upper eyelid does not necessarily thicken, which creates increased skin laxity and an aged look (4,5). The histologic studies conducted have shown that the orbicularis oculi muscle remains intact during ageing and is not subject to atrophy; whereas, the main reason for eyelid sag-

ging is separation of the skin and orbicularis oculi muscle, which are normally in adhesion at the upper eyelid (6). In addition, age-related loosening of the orbital septum also affects the process by causing subcutaneous prolapse of the preaponeurotic fat (7,8).

Although blepharoplasty is a surgical method that renders positive results, rare complications can nevertheless be encountered. Patients should be informed about such complications preoperatively. Following surgery, unwanted conditions may be observed, such as ischemic optic neuropathy, orbital hemorrhage, keratoconjunctivitis sicca, epiphora, ptosis, ectropion or entropion, lagophthalmos, enophthalmos, and recovery with a scar tissue (9). Some of these complications can be taken under control through treatment whereas others may cause consequences that may lead loss of vision.

Ocular surface problems, which constitute one of the leading complications that may be controlled by early diagnosis and correct treatment, may develop due to the surgery itself or secondary to lagophthalmos, which is another rare complication that typically occurs due to excessive correction. The underlying cause should be treated in ocular surface problems that develop secondary to a complication, including the exposure of the eye. However, care should be taken in the preoperative and postoperative periods to prevent dry eye symptoms caused by surgery. TBUT and Schirmer's tests, which can be readily performed under polyclinic conditions, may give an idea about tear film quality thereby facilitating the physicians' work. Effective therapies may provide precaution in the preoperative period and may further prevent ocular surface problems caused by the surgery itself. The optic coherence tomography study of Shao C et al reported that ocular surface disorders that may develop following upper eyelid blepharoplasty are temporary and may alleviate at the early stage (10).

Our study did not detect any of the complications reported in literature, such as vision loss or anatomical, or functional eyelid disorders. Detailed preoperative examinations for preventing permanent complications were performed and those patients who were likely to develop a postoperative dry eye pathology or were under the risk of experiencing aggravation of an existing dry eye pathology were not given surgery indications; however, the necessary treatment was performed. Nevertheless, it was observed that the patients had dry eye symptoms as the most common postoperative complaint, but such symptoms did not cause severe complaints or corneal problems due to the care taken in this matter preoperatively. Symptomatic artificial tear preparations for dry eye proved to be sufficient as treatment, while topical cyclosporine therapy did not become necessary.

Various hypotheses have been put forward about the ocular surface problems frequently encountered after eyelid sur-

geries. The studies analyzing tear film quality by TBUT and Schirmer's test in those cases who underwent Muller's muscle resection during ptosis surgery reported that the surgery did not create any changes that would cause dry eyes (11,12). Lima CG et al.,(13) in a series of 29 cases that underwent blepharoplasty, there were no significant changes in the postoperative testing involving Schirmer's, TBUT, and rose bengal tests except for the Schirmer's test > This can be attributed to the changes that occurred in the palpebral fissure. Espinoza GM et al.(14) reported that tear tests performed after blepharoplasty may not be adequate in evaluating dry eye.

Lee WB et al.(15) suggested a minimum period of 6 months between a refractive surgery to be planned and the eyelid surgery, due to ocular surface disorders that may develop post-blepharoplasty. Various studies have emphasized that care should be taken in terms of dry eye development in cases who had undergone refractive surgery, since blepharoplasty itself may create ocular surface problems (16).

Ocular surface abnormalities and tear film quality disorders may be encountered also after ptosis surgery. Unlucu et al emphasized the negative changes that may occur qualitatively and quantitatively in tear film layer in the postoperative period of levator surgery (17).

In our study, in consideration of the Schirmer's test results, an increase in the tear volume in the post-blepharoplasty acute period and decrease in the 3rd month of follow-up when compared to the preoperative period were detected. For TBUT measurements, an extension in the early period was determined; however, in the final follow-up, there were no significant differences in comparison to the preoperative measurements. We consider that the outcome of these tests in the acute period may be related to the reflex tear secretion increase associated with postoperative inflammatory reactions such as eyelid edema and chemosis. Various studies have reported that the resection of orbicularis oculi muscle may play a role in the development of dry eye symptoms observed after eyelid surgeries, particularly the upper eyelid blepharoplasty (11,17,18). We also consider that the dry eye symptoms we encountered postoperatively may be related to excision of the orbicularis oculi muscle.

Elevated episcleral venous pressure (EVP) is a clinical finding that develops due to many primary pathologies. Elevated EVP causes an increase in IOP that is independent of aqueous production and outflow rate. Periocular edema and chemosis caused by upper eyelid blepharoplasty may be severe in some cases. In cases accompanied by severe periocular inflammation, increased EVP may emerge with chemosis and orbital congestion (19).

In our study, we recorded postoperative IOP changes of the patients by considering that postoperative intensive eyelid edema and chemosis may cause an increase in EVP, which may

cause an elevated IOP; however, we did not find a significant difference between the preoperative and postoperative IOP measurements. In literature, IOP change has not been reported after upper eyelid blepharoplasty or eyelid surgeries.

This study had various limitations. The number of the cases included in our study was limited. In addition, regarding the surgical technique, there are different surgical approaches pertaining to what extent the orbicularis muscle excision will be performed. Another limitation of the study is the lack of histological studies regarding dry eye and ocular surface change, which is a common condition especially after upper eyelid blepharoplasty. There is a need to for long-term and controlled studies in large case series to reach a consensus regarding the amount of optimal orbicularis muscle excision, as well as histological studies that would reveal the mechanisms that may cause dry eye.

Upper eyelid blepharoplasty is a leading surgery in terms of patient satisfaction for postoperative results (20). Rapid recovery process, functional and cosmetic gains, applicability by physicians of varied branches, and low complication rates are the most significant advantages. On the other hand, possible complications that will negatively affect patients' short-term or long-term quality of life may develop. Under the present conditions of highly prevalent dry eye syndrome, blepharoplasty may cause an increase in the existing symptoms by disrupting the tear film quality and may further trigger such a pathology in asymptomatic individuals. Therefore, we believe that, in the preoperative period, full ophthalmologic examination should be diligently made; surgery should be planned after the performance of the appropriate treatment in patients with ocular surface problems, and surgical steps should be determined in a patient-specific manner.

Disclosures

Ethics Committee Approval: Retrospective study.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Involved in design and conduct of the study (ICT); preparation and review of the study (ICT); data collection (ICT); and statistical analysis (CUT, ICT).

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