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Change in brow position following upper blepharoplasty in patients with dermatochalasis coexisting only cosmetic complaint

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Abstract

Purpose: Study aims to assess the effect of pure blepharoplasty on the eyebrow position in patients with Grade 1 lateral dermatochalasis causing cosmetic complaints.

Methods: This retrospective study includes patients undergoing upper eyelid blepharoplasty between December 2019 and November 2021. Patients with prior eyebrow or eyelid surgery and neurotoxins treatment were excluded from the study. Photographs were investigated using NIH ImageJ program to measure eyebrow position from medial canthus, mid pupillary level, and lateral canthus measured before and 6 months after the operation.

Results: The mean pre-operative distance between the pupillary light reflex and the lowest eyebrow hair was 16.95 mm, and the mean post-operative height was 16.79 mm. This difference was not statistically significant ($P=0.29$). The mean pre-operative lateral canthus to the lowest eyebrow hair (LBH) was 17.75 mm, and the mean post-operative height was 17.60 mm. This difference was not statistically significant ($P=0.18$). The mean pre-operative medial canthus to the LBH was 18.72 mm, and the mean post-operative height was 18.59 mm. This difference was not statistically significant ($P=0.24$).

Conclusion: The present study represents that the position of the eyebrow may not be influenced significantly following a blepharoplasty procedure among female patients with Grade 1 lateral dermatochalasis and coexisting cosmetic complaints.

Keywords: Blepharoplasty; brow position; dermatochalasis; upper eyelid blepharoplasty.

The periorbital area and eyes are the focal point during interpersonal communication. Aging of the eyelids shows itself most often as excess and prolapse of the eyelid skin. Changes in the eyelids due to aging can cause a tired, sad, and esthetically undesirable facial appearance.^[1,2] Besides esthetic complaints, redundant eyelid skin may cause various visual complaints, such as visual field narrowing.^[1] Removing the redundant eyelid skin helps improve these

visual and cosmetic problems. Today, with the contribution of communication tools and social media, patients' surgery request and their demands for better cosmetic results are increasing. Therefore, blepharoplasty remains the most widely performed cosmetic surgery on the face, but the influence of upper eyelid blepharoplasty on eyebrow level is still controversial.^[1-6]



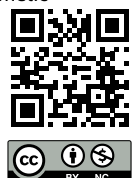
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Some authors insist that the eyebrow levels do not change following surgery. They notice that removing the redundant eyelid tissues does not change the vertical distance between the eyebrow and lid margin. They also notice that lid elevation will be seen rather than eyebrow displacement when the excess tissue is removed.^[3,4]

On the other hand, there are some opinions that the eyebrow level changes after surgery. They notice that after redundant skin removal, the distance between the lower part of the eyebrow and the edge of the lid will decrease even more. They argue that all these changes will minimize the effect of cosmetic blepharoplasty.^[5,6] Most studies reporting changes have reported decreased eyebrow levels. A low eyebrow level is due to lowering the eyebrow position due to the blepharoplasty surgery itself or may be present preoperatively.^[1-3] Removal of a wide amount of redundant eyelid skin causes mechanical lowering in the eyebrow.^[4-6] In the other opinion, a decreased necessity for elevating the frontal muscle as a compensatory response to elevate the eyebrows may cause eyebrow lowering after an upper eyelid blepharoplasty surgery.^[1,5,7]

Upper eyelid blepharoplasty is mainly applied to patients with severe aesthetic concerns. It is becoming more critical to identify the influence of the upper eyelid blepharoplasty on eyebrow level to evaluate the possibility of encountering unpredictable eyebrow levels after surgery. To the best of our knowledge, several studies of brow position after blepharoplasty can be found in the literature.^[1-7] However, we could not find any study in the literature that included either patients with cosmetic complaints, without visual complaints, and Grade 1 lateral dermatochalasis patients undergoing blepharoplasty, in which the orbicularis muscle is preserved.^[8] The present study aimed to evaluate the effect of orbicularis oculi preserved upper eyelid blepharoplasty on eyebrow position in patients with the cosmetic complaint.

Materials and Methods

The study was carried out with the permission of the İzmir Bakırçay Training and Research Hospital, Clinical Researches Ethics Committee (Date: July 29, 2022, Decision No: 670). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Thirty-two patients who underwent skin-only excision during upper eyelid blepharoplasty operation between December 2019 and November 2021 were included in the present study. The electronic medical record of the Ophthalmology Clinic at İzmir Bakırçay Training and Research

Hospital was reviewed to identify all patients who underwent upper eyelid blepharoplasty for uncomplicated dermatochalasis. We reviewed files retrospectively; after 6 months, 32 female patients (mean age 39.8, range 26–51) were evaluated from a single group. All had Grade 1 lateral dermatochalasis, according to Silva et al.^[8] new classification.

Each patient underwent pre-operative evaluation. Only those patients with a follow-up of at least 6 months were included in the study. Patients who underwent upper lid blepharoplasty surgery after the diagnosis of Grade 1 lateral dermatochalasis with cosmetic complaints and without visual complaints were included in the study. Only patients with cosmetic complaints were selected to avoid frontal activation secondary to narrowing of the visual field.

Patients with a history of coagulation problems and those taking anticoagulants or salicylates were excluded from the study. In addition, patients were excluded if they had a history of prior eyebrow or eyelid surgery, neurotoxins treatment within the past 4 months, or any condition that could influence eyelid position, such as thyroid-associated orbitopathy, neuromuscular dysfunction, or neurodegenerative disease. Patients in which an orbicularis strip resection were performed and patients with visual complaints were also excluded from the study.

Demographic data, clinical measurements, and intraoperative and post-operative complications data were collected. All photographs were taken with the frontalis muscle in a fully relaxed position. Photos were designed to obtain a picture of the upper face and include the area from ear to ear centered on the mid-brow. Measurements of pre-operative and post-operative eyebrow height were accomplished using ImageJ software (US National Institutes of Health, Bethesda, MD, USA). The white-to-white corneal diameter for women (11.64 mm), previously described by Rüfer et al.,^[9] was used to achieve a scale to convert image pixels to millimeters. Brow height was described as the vertical distance from the center of the pupil to the lowest eyebrow hair. This method prevented the measurement of eyebrow height, influenced by upper eyelid level changes. Measuring the distance between the pupillary light reflex and the lowest eyebrow hair (MPBH), lateral canthus to the lowest eyebrow hair (LBH), and medial canthus to the LBH (MBH), the method primarily described by Chang et al.,^[7] repeated by the following authors, was used.^[8-11] Measurements were performed identically for each photograph using this protocol. The same individual carried out all the photographic analysis and data collection. No com-



Fig. 1. Preoperative (A) and postoperative (B) photographs of a typical patient grade 1 lateral dermatochalasis who underwent upper eyelid blepharoplasty.



Fig. 2. Preoperative (A) and postoperative (B) photographs of a typical patient grade 1 lateral dermatochalasis who underwent upper eyelid blepharoplasty.

plications were encountered during the surgical procedure and post-surgery follow-up period. Photographs taken at 6th months postoperatively were evaluated.

All procedures for upper blepharoplasty were performed by the same surgeon (E.M.). All surgeries were performed with a similar technique: 8–9 mm over bilateral eyelid margins were marked as a lower margin of skin tissue resected. As upper margin, approximately 10 mm below the lower border of the eyebrow, was marked. To avoid excessive resection, we used forceps for the pinch test. Local anesthesia was administered to both lids with 1–2 mL 0.5% lidocaine and 1:100,000 epinephrine. The superficial incision was carried out with 15 blade scalpel. Redundant skin was dissected from subcutaneous tissue with curved tissue scissors. Hemostasis was achieved using electrocautery. The skin was closed with continuous intradermal non-absorbable sutures (nylon 7/0).

Statistical Analysis

Data were analyzed using SPSS software version (version 22; Chicago, IL, USA). Statistical analysis was conducted to assess change in mean eyebrow heights before and after blepharoplasty using the student's t-test. P-value of <0.05 was considered statistically significant.

Results

After reviewing, 32 patients (64 eyes) who underwent bilateral upper blepharoplasty from December 2019 to November 2021 were included in the study. Of those 32 female patients (mean age 39.8, range 26–51) who underwent

upper lid blepharoplasty surgery after diagnosing dermatochalasis with only cosmetic complaints were included in the study. Pre- and post-operative pictures of two individuals are shown in Figures 1a-b and 2a-b. No complications were observed during the surgery and the post-operative follow-up period.

Preoperatively, the mean MPBH was 16.95 mm, and postoperatively, mean height was 16.79 mm, for an average alternation of height was -0.16 mm after blepharoplasty. This difference was not statistically significant ($P=0.29$). Preoperatively, the mean LBH was 17.75 mm, and postoperatively, mean height was 17.60 mm, for an average alternation of height was -0.15 mm after blepharoplasty. This difference was not statistically significant ($P=0.18$). Preoperatively, the mean MBH was 18.72 mm, and postoperatively, mean height was 18.59 mm, for an average alternation of height was -0.13 mm after blepharoplasty. This difference was not statistically significant ($P=0.24$) (Table 1).

Discussion

With regard to eyebrow height, our findings represent no statistically significant alternation in eyebrow height after upper eyelid blepharoplasty alone. The eyebrow height following upper eyelid blepharoplasty had been assessed previously with some controversy. Although the value of eyebrow height on the visual and cosmetic efficacy of the upper eyelid blepharoplasty procedure, the impact of upper eyelid blepharoplasty on eyebrow height remains controversial. Although several studies have showed an

Table 1. Change in eyebrow height

	MPBH	LBH	MBH
Pre-operative, mm	16.95	17.75	18.72
Post-operative, mm	16.79	17.60	18.59
Change, mm	-0.16	-0.15	-0.13
P value	0.29	0.18	0.24

MPBH: Distance between the pupillary light reflex and the lowest eyebrow hair; LBH: Distance between lateral canthus and the lowest eyebrow hair; MBH: Distance between and medial canthus and the lowest eyebrow hair

eyebrow to decrease the following blepharoplasty, others suggested that upper eyelid blepharoplasty does not affect eyebrow position.^[3-6,12-17]

Prado et al.^[14] and Lee et al.^[18] had shown alterations in eyebrow height after upper eyelid blepharoplasty. Lee's study assessed eyebrow height using some parameters: margin to eyebrow, mid-pupil to eyebrow height, and eyebrow distance from the lateral and medial canthus. Results of the study demonstrate a statistically significant difference in pre-post-operative eyebrow position when measured from the eyelid margin. The other results of brow height did not indicate a statistically significant difference. Their findings support our results. Prado et al.^[14] evaluated pre-operative and post-operative eyebrow height after blepharoplasty using the lateral and medial canthus as a beginning point. From the canthus, complicated angular calculations were used to evaluate eyebrow height. In the present study, we prefer to use pupil, lateral, and medial cantus as references point. We think the pupillary light reflex, medial, and lateral cantus, which are a more common reference point when measuring eyebrow height. Pool and Van der Lei.^[19] noticed a statistically significant descent in brow position about 0.6 mm in 365 patients with upper eyelid blepharoplasty. However, it is not certain if such a small quantity of descent is clinically significant. Research plans and differences between research individuals, primarily esthetic versus more visual function, might cause the inconsequence in the decrease of eyebrow height following upper eyelid blepharoplasty.

Frankel et al.^[3] evaluated 54 individuals and reported no brow descent following upper eyelid blepharoplasty procedure. Starck et al.^[4] assessed the photographs of 15 female individuals after upper eyelid blepharoplasty and said that eyebrow position was not significantly changed after blepharoplasty procedure. Both researchers reported that blepharoplasty does not affect eyebrow height postoperatively. The present study supports these results in female patients with cosmetic and without visual complaints. We have performed a similar technique in the current research,

including skin excision without resectioning a narrow 2 mm orbicularis strip. During blepharoplasty, only the skin was resected. Hence, the orbicularis oculi muscle, which is the eyebrow depressor, was tried to be preserved. In this way, we planned to evaluate only the effect of blepharoplasty on the eyebrow level by preventing frontal muscle contraction and preserving orbicularis oculi. We had not assessed the influence of orbicular strip resection in another way, but one can debate that it may affect the balance of brow depressors and elevators. However, on the other hand, the orbicular muscle is a tissue extending to a large area with a strong power compared to its mass and has agonist muscles. Therefore, we think that the only 2 mm muscle strip excision may not lead to any loss in its eyebrow depressor function. For this reason, even beyond the content of present research, it may be valuable to analyze and, in a further study, compare different upper eyelid blepharoplasty methods, in which the amount of resected orbicularis oculi muscle is altered.

Moore et al.^[20] evaluated the post-operative eyebrow position in patients with blepharoptosis surgery and patients with coexisting upper eyelid blepharoplasty and blepharoptosis surgery. They reported a <1 mm lowering on two categories which was not a significant difference between both of these two samples. While the alternation of eyebrow position was statistically significant for both samples, but the clinically significancance <1 mm alternation on brow position is uncertain. Thus, results do not support the debate on which blepharoplasty affects eyebrow position, as the alternation in eyebrow position did not differ between both groups. Furthermore, Lee et al.^[18] found that the influence on post-operative distance of between pupil and brow was not significant for patients after upper eyelid operation. Their findings support our results. In some other studies, it was recorded that the frontal muscle is relaxed, but in this study, took care photographs without frontal muscle relaxation. Only patients with cosmetic complaints were selected to avoid frontal activation secondary to narrowing of the visual field.

Huijing et al.^[21] showed in their study that 140 patients were visual compliant due to dermatochalasis after upper eyelid blepharoplasty, eyebrow height did not alter significantly in the mean follow-up time of 8 weeks. The height of the eyebrow is not descend significantly following a blepharoplasty among females with dermatochalasis and visual complaints. Male individuals showed a mild descent of the eyebrows postoperatively but could achieve no constant consequence due to the small sample size. Our study consisted of only female patients, and we did not observe

a significant change in the post-operative eyebrow levels of female patients, as reported in this study. Male patients may have heavier eyelid and eyebrow strain and elevation preoperatively due to dermatochalasis. The eyebrow no longer would need to maintain an elevated position postoperatively and might observe eyebrow descent. The outcomes of the present research must be analyzed in light of some limitations affecting our results. It is just a coincidence, but there was no male patient included in this study; it is too small to draw inferences from these results; for this reason, we could only guess about the influence of a blepharoplasty on eyebrow height in male patients. Further studies must explain whether the height of the male eyebrow is lowering following a blepharoplasty.

To consider any differences in size between the pre-operative and post-operative pictures, several techniques have been defined. White-to-white corneal diameter is a constant character of the face.^[22,23] Another choice is using the intercanthal distance,^[4] demonstrating a more considerable distance but due to less described borders of the medial canthus, finally, more sensitive for measurement mistakes. Consequently, we used white-to-white corneal diameter as a reference point to provide equivalent distances. Furthermore, the ImageJ program presents a safe way to assess face digital pictures with high.

The limitations of this study include the relatively small sample size, its retrospective design, including only female patients, and potential mistakes in digital measurements. Although our sample size is small and all are females, it is the first study that evaluates only females' eyebrow alternation. We expect that a significant part of healing is acquired the first 4 months after blepharoplasty, but a nominal rate of recovery continues all year. Further, prospective studies that include a more significant number of participants and with longer follow-up would provide that the results we have reported here are persistent. Furthermore, further prospective studies on evaluating and comparing the topographic anatomy of male and female eyebrows may be valuable.

Conclusion

The present study represents that the height of the eyebrow is not significantly lower following a blepharoplasty procedure among female patients with Grade 1 lateral dermatochalasis and coexisting cosmetic complaints. Therefore, this shows no need for routine intervention of the eyebrow previous to the upper eyelid blepharoplasty to achieve better cosmetic results in females without brow ptosis.

Ethics Committee Approval: This study was approved by İzmir Bakırçay University Faculty of Medicine Ethics Committee (29.07.2022; number: 670).

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept: E.M.; Design: E.M.; Supervision: E.M.; Resource: E.M.; Materials: E.M.; Data Collection and/or Processing: E.M.; Analysis and/or Interpretation: E.M.; Literature Search: E.M.; Writing: E.M.; Critical Reviews: E.M.

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