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ORIGINAL ARTICLE

Comparison of post-operative outcomes and patient-surgeon satisfaction with a needle-tipped electrocautery incision and a cold scalpel incision in upper eyelid blepharoplasty: Cohort study

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Abstract

Purpose: The objective of the study is to compare post-operative outcomes and patient-surgeon satisfaction between a needle-tipped electrocautery incision and a cold scalpel incision in upper eyelid blepharoplasty

Methods: The data from 247 patients who underwent bilateral upper eyelid blepharoplasty were retrospectively analyzed. Patients who underwent upper eyelid blepharoplasty with ptosis surgery or fat pad removal were excluded. The patients were divided into 2 groups, Group 1 - needle-tipped electrocautery incision and Group 2 - a cold scalpel incision. Pre-operative skin types of the patients, perioperative hemorrhage, and surgical time were observed. Post-operative ecchymosis on days 1 and 7 and scar cosmesis at months 1 and 6 were evaluated. Patients were asked about the level of satisfaction at 6 months.

Results: One hundred and fifty-five patients, 75 patients in Group 1 and 80 patients in Group 2, were included in the study. No statistical differences were detected between the two groups for age, sex, and skin type. No serious complications were recorded. For surgeon satisfaction, surgical time and hemorrhage amount were statistically significantly lower in Group 1. Post-operative ecchymosis on days 1 and 7, scar cosmesis at months 1 and 6, and patient satisfaction at 6 months, the scores were similar between the groups.

Conclusion: The clinical difference between needle-tipped electrocautery and cold scalpel incision was not observed after upper eyelid blepharoplasty. Needle-tipped electrocautery should be used conveniently and reliably for skin incisions in upper eyelid blepharoplasty for good cosmetic results.

Keywords: Needle-tipped electrocautery; patient satisfaction; scalpel incision; surgeon satisfaction; upper eyelid blepharoplasty.

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Blepharoplasty is one of the most common surgical procedures in facial rejuvenation around the world.[1] Although blepharoplasty is generally performed to look younger, this surgery is indicated to upper visual field defect and discomfort of asthenopia.[2] Surgery must perform careful dissection techniques for the best surgical outcomes and to maintain an optimal status in the surgical field. If bleeding control is poor, the surgical time will be prolonged, post-operative complications can develop, and consequently bad surgical results can occur.[3]

In blepharoplasty, skin incisions have been performed with different instruments such as a cold scalpel, a carbon dioxide laser, and an electrocautery.[4] Thanks to its simple use, the minimal damage to nearby tissues, and the good final surgical result, the scalpel has long been considered the main method in surgical procedures. However, the disadvantage of a scalpel is incisional bleeding that makes the incision more uncomfortable. The advantage of using electrocautery for skin incisions is minimal incisional bleeding; however, the heat from the instrument will probably damage the edges of the surrounding skin to cause unpleasant scars.[5] Newer needle-tipped electrocautery instruments enable less energy to reduce tissue damage around the incision compared to conventional large-tipped instruments.[6]

The aim of this study is to compare surgical results and patient-surgeon satisfaction between a cold scalpel and a needle-tipped electrocautery incision in upper eyelid blepharoplasty.

Materials and Methods

Data from 247 patients who had bilateral upper eyelid blepharoplasty at Sakarya University Training and Research Hospital from March 2018 to January 2022 were retrospectively analyzed in the study. The study was confirmed by Ethics Committee of Sakarya University Faculty of Medicine following the Declaration of Helsinki (date: November 07, 2022; number: 289). An informed assent form detailing the risk of the procedure was obtained from all participants before they agreed to participate in the study.

Patients with bilateral excess upper eyelid without a history of eyelid surgery were included in the study. Patients who had blepharochalasis with ptosis or fat pad, took antiplatelet and anticoagulant medications, had bleeding disorders or diabetes were excluded. The skin types of the patients were recorded using the Fitzpatrick skin type scale.[4,7] Patients were divided into 2 groups. Skin incisions were performed with a needle-tipped electrocautery in Group 1 and with a cold scalpel in Group 2. A senior ophthalmic surgeon (AAEB) performed all surgeries. Using a scale (0: None, 1: Slightly, 2: Moderate, 3: Severe), the surgeon assessed the amount of perioperative bleeding. Surgical time was recorded for bilateral upper eyelid surgery for each patient. The masked senior ophthalmic surgeon (MA) evaluated the patients on post-operative days 1, 7, and at months 1 and 6. Ecchymosis was evaluated using a Likert scale (1: None; 10: Severe) on post-operative days 1 and 7. As a result of adding the scores for wounds assigned 0 or 1 point each for step-off borders, asymmetry of contours, differentiation of margins, edge inversion, excessive distortion, and total looks, a Hollander score[8] (0: Worst; 6: Best) was calculated at post-operative months 1 and 6. At 6 months, patients assessed their satisfaction levels as follows: 0: Not satisfied, 1: Moderately satisfied, 2: Satisfied, and 3: Very satisfied with it and recommend it to others.

Surgical Technique

The eyelid crease and excess skin were marked in the patient in a sitting position. Blood pressure was measured in all patients and sedation was performed by an anesthesiologist. After sedation, local anesthesia (lidocaine and epinephrine) was applied. In Group 1, skin incisions were performed with monopolar electrocautery. Needle tipped was connected to an electrocautery device set on cutting mode, and a power of 10 W was used. The excess skin was removed using electrocautery. Bleeding control was performed with the same surgical device (Figures 1a-c). In Group 2, skin incisions were performed with a cold scalpel and excess skin was removed with scissors. Bleeding control was performed using monopolar cautery. Skin closure was performed continuously with a 7–0 polypropylene suture without knots. The same suture and technique were used in two groups. Each patient's polypropylene sutures were removed bilaterally on post-operative day 10. The antibiotic ointment was administered 2 times for 10 days.

Statistical Analysis

Statistical analyzes were performed with SPSS version 24, Statistical program (SPSS Inc., IBM, Chicago, IL, USA). First, the distribution was checked. In a normal distribution, the parametric test (independent sample t-test) and in an abnormal distribution, the non-parametric test (Mann–Whitney U-test) were used for the evaluation of different parameters on the outcome. A $P < 0.01$ was considered as statistically significant.

Results

Of the 247 patients, 155 patients were included in the study. There were 75 patients in Group 1 and 80 patients

Fig. 1. **(a)** The skin was cut with needle-tipped electrocautery without bleeding. **(b)** Excess skin was removed with the same surgical device. **(c)** The skin was closed with a 7–0 polypropylene suture without knots.

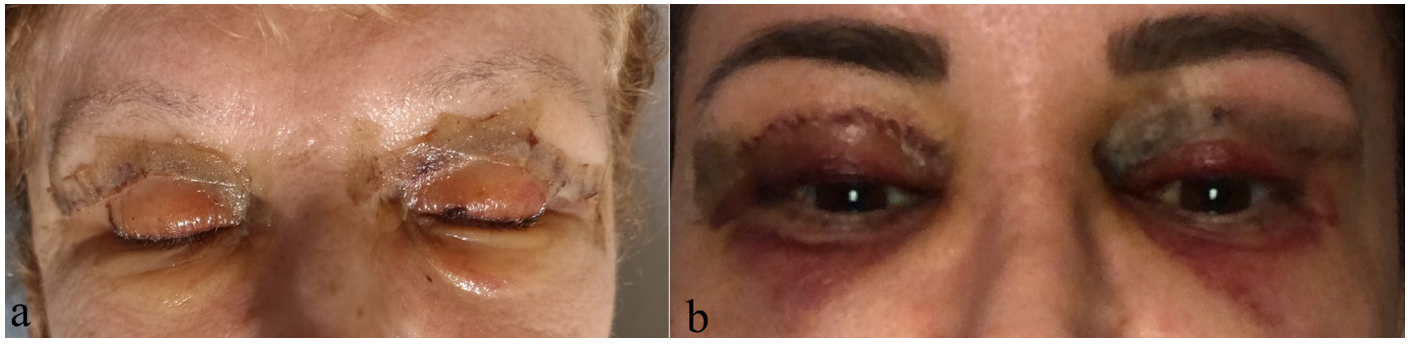

Fig. 2. External photograph of the patient who underwent bilateral upper eyelid blepharoplasty on post-operative day 1. **(a)** The Likert score was 6 with a needle-tipped electrocautery incision. **(b)** The Likert score was 8 with a cold scalpel incision.

in Group 2. The mean age of the patients was 54.13±5.04 years in Group 1 (24 male, 51 female) and 53.51±5.21 in Group 2 (26 male, 54 female). According to Fitzpatrick's skin type, in Group 1, there were 20 patients with type 1, 32 patients with type 2, 17 patients with type 3, 6 patients with type 4, and in Group 2, there were 10 patients with type 1, 46 patients with type 2, 18 patients with type 3, and 6 patients with type 4. Statistically significant difference was not observed between the two groups based on age, sex, or skin type (Table 1). Acceptable cosmetic results were observed in all patients. No serious complications such as orbital hemorrhage, wound infection, or wound dehiscence were recorded.

For surgeon satisfaction, the surgical time was shorter in Group 1 (22.21±3.6 min) than in Group 2 (28.91±3.5 min), and the amount of hemorrhage during surgery according to surgeon observation was lower in Group 1 (0.83±0.62 mean score) than in Group 2 (1.83±0.56 mean score). Statistically significant differences were observed between the two groups for surgery time and hemorrhage (P<0.01).

Post-operative ecchymosis was lower in Group 1 (mean Likert scale 4.09±0.96 on day 1 and 2.19±0.88 on day 7)

Table 1. Demographic characteristics of patients

	Group 1 (n: 75)	Group 2 (n: 80)	P-value
Sex, n (%)	Male: 24 (32%)	Male: 26 (32.5%)	0.947[a]
	Female: 51 (68%)	Female: 54 (67.5%)	
Age, years	54.13±5.04	53.51±5.21	0.536[b]
Skin type(n)*	type 1: 20	type 1: 10	0.126[a]
	type 2: 32	type 2: 46	
	type 3: 17	type 3: 18	
	type 4: 6	type 4: 6	

[a]Chi-squared test; [b]Mann–Whitney U test; *Fitzpatrick skin type scale.

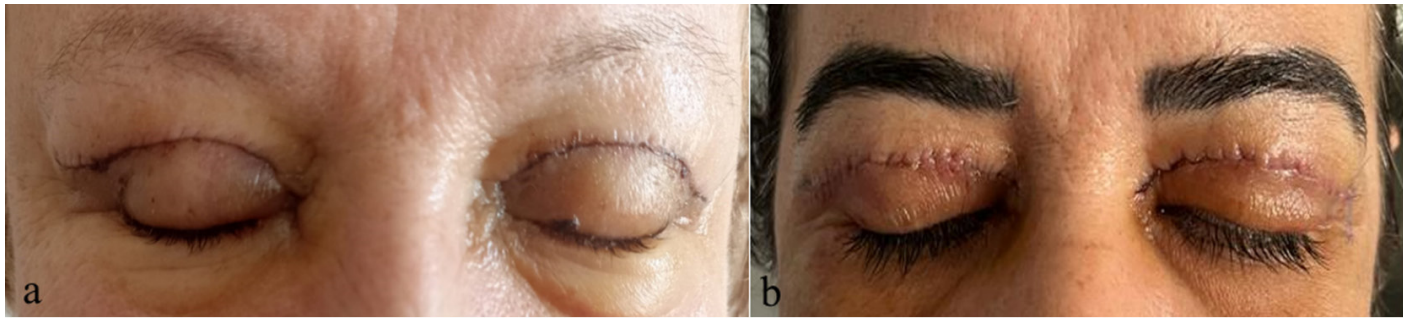

Fig. 3. External photograph of the patient who underwent bilateral upper eyelid blepharoplasty on post-operative day 7. **(a)** Likert score was 2 with a needle-tipped electrocautery incision. **(b)** The Likert score was 3 with a cold scalpel incision.

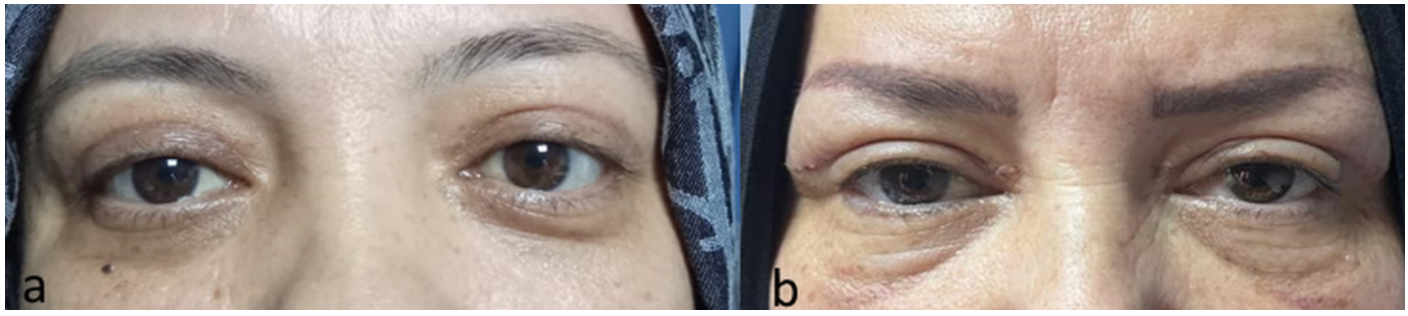

Fig. 4. External photograph of the patient who underwent bilateral upper eyelid blepharoplasty on post-operative month 1. **(a)** Hollander score was 5 with a cold scalpel incision. **(b)** The Likert score was 4 with a needle-tipped electrocautery.

than in Group 2 (mean Likert scale 4.31±0.93 on day 1 and 2.36±0.71 on day 7). However, no statistical differences were observed between the groups in post-operative ecchymosis on day 1 (P=0.04) and day 7 (P=0.08) (Figures 2a-b and 3a-b). Scar cosmesis was found to be similar in months 1 and 6 between the two groups according to the Hollander scar scale (P=0.44 in month 1 and 0.93 in month 6) (Figures 4a-b and 5a-b). When the Fitzpatrick skin types were compared, no statistically significant difference was detected in terms of the post-operative ecchymosis and scar cosmesis.

For patient satisfaction at 6 months, 65 (86.7%) patients responded I am very satisfied in Group 1 and 65 (81.3%) patients responded I am very satisfied in Group 2. According

Fig. 5. External photograph of the patient who underwent bilateral upper eyelid blepharoplasty on post-operative month 6. **(a and b)** Hollander score was 6 with a needle-tipped electrocautery and with a cold scalpel incision.

Table 2. Comparison of surgeon-patient satisfaction and scar cosmesis

	Group 1	Group 2	P-value
Surgery time (minutes)	22.21±3.6	28.91±3.5	<0.01[a]
Amount of hemorrhage*	0.83±0.62	1.83±0.56	<0.01[b]
Post-operative ecchymosis¥			
Day 1	4.09±0.96	4.31±0.93	0.06[b]
Day 7	2.19±0.88	2.36±0.71	0.08[b]
Scar cosmesisα			
Month 1	5.60±0.61	5.69±0.46	0.447[b]
Month 6	5.56±0.54	5.68±0.46	0.938[b]
Patient satisfactionβ	2.87±0.34	2.81±0.39	0.361[b]

aIndependent sample t-test, bMann–Whitney U-test, *Per-operative hemorrhage, 0: none, 1: slightly, 2: moderate, 3: severe, ¥Likert scale: 1-no hemorrhage, 2-4-only upper eyelid ecchymosis, 5-upper eyelid and minimal lower eyelid ecchymosis, 10-severe upper and lower eyelid ecchymosis which causes the eyelids to close, α Hollander score: 0–6 (best). β Patient satisfaction at 6 months after surgery, 0: I am not satisfied, 1: I am moderately satisfied, 2: I am satisfied, 3: I am very satisfied.

to the mean patient satisfaction scale, no significant differences were found between the groups (P=0.36). Table 2 shows the comparison of the surgeon-patient satisfaction scores and the statistical values.

Discussion

Although skin incision is performed with a cold scalpel produces good cosmetic results, it does not provide simultaneous hemostasis because the periorbital region has deep vascularity. The bleeding masks the surgical plane, and therefore, surgical time can be extended. In addition, postoperative edema, ecchymosis, and discomfort can increase and major complications such as retrobulbar hematoma can occur. Cosmetic results are associated with minimal tissue damage, edema, and ecchymosis. The surgeon can perform more precise and less stressful surgery in a bloodless surgical field.[9] Electrocautery has been used in most surgical procedures due to its advantages in hemostasis.[10] However, it was found to be cosmetically inferior to a scalpel for the scar formation due to thermal burn, especially in blepharoplasty.[11] These decisions were based on various reports from clinical studies.[12,13] However, recent studies have shown that electrocautery can be used with confidence for skin incisions, so that skin incisions can be performed more quickly and to less blood loss compared to the scalpel without increasing the rate of wound complications and pain scores.[14] Skin incision with electrocautery was founded similarly to compare the skin incision with scalpel for the final cosmetic outcome.[15-17]

Newer needle-tipped electrocautery instruments enable less energy to reduce tissue damage around the incision compared to conventional large-tipped instruments. Electrocautery instruments with a needle-tipped enable less energy over the cautery tip[5] and provide faster incisions that reduce the time to cauterization.[18,19] González-López et al. found similar esthetic results to compare the skin incision with needle-tipped cautery and the skin incision with a scalpel in oculoplastic surgery and informed no significant differences in post-operative ecchymosis between the two techniques.[6] Upper eyelid blepharoplasty samples were histopathologically investigated and necrosis was found on the cautery sides; however, needle-tipped cautery incisions were observed similar to a cold scalpel incision in early post-operative ecchymosis and scar cosmesis.[4] The results of our study were comparable to previous studies.

Skin types can be important factor in terms of the post-operative ecchymosis and the esthetic outcomes.[4] However, when the Fitzpatrick skin types were compared, no statistically significant difference was detected in terms of the post-operative ecchymosis and scar cosmesis. Furthermore, in terms of skin types, the two groups were found similar to each other.

Amount of perioperative bleeding was found to be lower in the skin incision with needle-tipped cautery due to simultaneous hemostasis with cautery incision. There has been no study in the literature comparing the amount of bleeding in blepharoplasty surgery. However, studies have been reported that the amount of perioperative bleeding was less when skin incision was performed with cautery.[10] Hence, the surgical time was shorter in the skin incision with needle-tipped cautery than in the skin incision with scalpel. According to us, since bleeding is less, the surgical

field is better seen, and the shorter surgical time increases surgeon satisfaction. With the exact hemostasis achieved using electrocautery, a bloodless operation field can be maintained during the full operation. Therefore, the operator will not have to spend too much time on additional and repeated hemostasis procedures.

Plastic esthetic surgery operations have increased in the past 20 years. Surgeons have focused on post-operative physical outcomes in the past,[20] unlike patient satisfaction is so important in blepharoplasty for quality of life. We observed similar results in terms of post-operative ecchymosis on days 1 and 7 and scar cosmesis at months 1 and 6 between the two techniques. Furthermore, no statistical differences were found in patient satisfaction scores between the two groups. Needle-tipped electrocautery was as successful as a cold scalpel in upper eyelid blepharoplasty.

Study Limitations

There were several limitations, including retrospective nature, small number of cases, short-term follow-up, lack of assessment of ocular surface parameters, visual field analysis, and scoring post-operative pain of the patient. Furthermore, scoring the amount of perioperative bleeding and ecchymosis scoring with a Likert scale by the surgeon were subjective assessment.

Conclusion

No clinical differences were observed between skin incision with needle-tipped electrocautery and skin incision with a cold scalpel with regard to post-operative ecchymosis and scar cosmesis after upper eyelid blepharoplasty. Electrocautery with a needle tipped should be conveniently and reliably used for skin incisions in upper eyelid blepharoplasty for good cosmetic results.

Ethics Committee Approval: This study was approved by Sakarya University Training And Research Hospital Faculty of Medicine Ethics Committee (date: 07.11.2022; number: E-71522473-050.01.04-186638-289).

Peer-review: Externally peer-reviewed.

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Conflict of Interest: None declared.

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