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Comparison of Colorado Needle Electrocautery and Traditional Scalpel for Upper Eyelid Blepharoplasty Incision: A Randomized Controlled Trial and Systematic Review

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Background: Upper eyelid blepharoplasty is a popular aesthetic surgery. Electrocautery provides a hemostatic benefit for skin incision; however, its effect on scar cosmesis remains unclear, especially in Asian skin types. We aimed to compare the Colorado needle electrocautery pure cutting mode and the traditional scalpel to determine their efficacy, complications, and cosmetic outcomes.
Methods: A systematic review was performed to review the outcome with the conventional method (scalpel) and other methods in upper blepharoplasty procedures. Further, a prospective intraindividual randomized controlled trial was conducted to compare the efficacy of Colorado needle electrocautery and the scalpel in upper blepharoplasty. Study outcomes included scar quality at different times until 1-year postoperation, bleeding during incision, and postoperative ecchymosis.
Results: Five articles met the inclusion criteria for this systematic review. The prospective randomized controlled trial study included 30 patients; the average incisional time on the electrocautery side was significantly longer than that on the scalpel side, and the electrocautery side had less blood loss during incision than the scalpel side (2.4 versus 3.27 using average cotton bud sticks, respectively) ($P < 0.001$). Hypopigmented scarring occurred more frequently on the scalpel side; however, the difference was not statistically significant.
Conclusions: Colorado needle electrocautery pure cutting mode can be an alternative to traditional scalpel for upper eyelid blepharoplasty skin incision because of long-term scar quality. Electrocautery use has hemostatic benefits, leading to a decrease in bleeding that can obscure the incision site. However, the incision time on the electrocautery side was significantly longer than the scalpel side, which may be owing to an adaptation of surgical technique. *(Plast Reconstr Surg Glob Open 2023; 11:e5045; doi: 10.1097/GOX.0000000000005045; Published online 9 June 2023.)*

INTRODUCTION

Upper eyelid blepharoplasty is a popular aesthetic surgery globally and in Thailand.[1] In 2019, the International Society of Aesthetic Plastic Surgery report revealed that eyelid surgery is the third most common aesthetic surgical procedure. Moreover, eyelid surgery is the most popular aesthetic surgical procedure in Thailand. In 2019, more than 92,597 surgical procedures were performed in Thailand. Of these, 20,286 procedures were eyelid procedures.[2]

The functional and cosmetic benefits of blepharoplasty have been described previously; successful blepharoplasty leads to vision improvement, a more aesthetic appearance, and patient satisfaction.[3,4] Careful patient evaluation, proper surgery selection, precise performance, and

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empathetic postoperative care can affect functional and cosmetic outcomes. The upper eyelid blepharoplasty procedure is quite detailed, and incision is one of the most important steps that can affect the surgical outcome.[5,6]

Several instruments and techniques can be used for upper eyelid blepharoplasty incisions, including scalpels, electrocautery, and lasers.[7,8] Surgeons still seek the best instrument that can achieve optimal skin incision. The instrument should be easy to handle; make incision easy with little pressure, tissue stretching, or minimal slant; and achieve good hemostasis during incision, less lateral tissue damage, less scar formation, and faster sensory recovery. Using the scalpel, a traditional instrument offers a relatively fast healing time, fewer scars, and almost no lateral tissue damage.[9] However, it does not provide hemostasis, causing difficulty in visualization during incision. Moreover, incision using a scalpel requires skin stretching and handheld pressure to ensure minimal slanting in complicated cases, especially in older patients with fragile outer skin layers, a thin and translucent epidermis, minimal dermis, and a hypodermis with weakened tissue support.[9,10]

Heat-producing incisional techniques such as electrocautery are better than scalpels in terms of hemostasis function; however, their effect on lateral tissue damage and scar formation remains a concern. Ammar et al[11] conducted a systematic review and meta-analysis review that compared cutting electrocautery with the scalpel in surgery. They concluded that surgical incision using electrocautery can be quicker with lesser blood loss than when using the scalpel; however, no statistically significant difference was found between the two techniques in terms of postoperative wound complications. However, among all 41 articles included in this study, there were no reports on upper eyelid blepharoplasty.

Thus, this study aimed to compare the Colorado needle electrocautery pure-cutting mode and the traditional scalpel to determine their efficacy and cosmetic outcomes. We studied both patient and physician views using the Vancouver Scar Scale (VSS),[12,13] POSAS observer scale,[14,15] and Hollander Wound Evaluation Scale (HWES).[16] A systematic review and randomized controlled trial were conducted. Our primary objective was to compare the efficacy and cosmetic outcome of the two methods; our secondary objective was to compare the results of our study with those in the existing literature.

PATIENTS AND METHODS

This prospective, randomized controlled trial was conducted from June 2018 to June 2021 at Phramongkutklao Hospital, Thailand. The study was approved by the institutional review board of the Royal Thai Army Medical Department and Ethical Committee. The study protocol was registered with the Thai Clinical Trials Registry (TCTR20200222002).

The following inclusion criteria were applied: Asian individuals aged 60–85 years who were planning to undergo upper blepharoplasty with an American Society of Anesthesiologists Classification class of I–II. Only individuals aged 60 years and older were enrolled due to the hypothesis that scar quality in older adults may cause less complications than in those who are younger. The exclusion criteria were as follows: patients who underwent previous upper blepharoplasty procedures, were allergic to anesthetic agents, were immunocompromised, had an underlying bleeding disorder, currently undergoing antiplatelet or anticoagulant therapy, had a history of hypertrophic scar and keloid, and American Society of Anesthesiologists Classification class III–V. Preoperative photographs were taken, and demographic data were recorded. Sample sizes were calculated before the study participants were enrolled using the clinical superiority design formula.

Takeaways

Question: Can Colorado needle electrocautery be an alternative choice of traditional scalpel for upper eyelid blepharoplasty incision?

Findings: Using Colorado needle electrocautery pure cutting mode for upper eyelid blepharoplasty incision showed long-term scar quality and had hemostatic benefits.

Meaning: Colorado needle electrocautery pure cutting mode can be an alternative to traditional scalpel for upper eyelid blepharoplasty skin incision.

RANDOMIZATION

The incision of upper blepharoplasty was divided into left and right sides; one side underwent Colorado electrocauterization (study group), and the other underwent the procedure using scalpel no. 15 (control group). Simple randomization was performed in an operating room preoperatively. The randomization sequence was generated by coin toss. After obtaining the side from the central center, the first assistant informed the surgeon to begin the surgery.

PROCEDURE PREPARATION

The surgical site was prepared under sterile conditions. The operation was performed under local anesthesia; a local injection of 1% xylocaine with adrenaline (equal volume between both eyelids) was administered to each site 5–7 minutes before incising the site. For electrocautery incision, we used a Valleylab force Fx electrical generator (Colorado, United States), heat level 8–15, with a Colorado needle electrocautery device. On the other site, we used the traditional surgical scalpel (no. 15) under standard upper eyelid surgical methods using the full-incision technique. Blepharoplasty was performed by five senior surgeons at the Plastic and Reconstructive Surgery Department, Phramongkutklao Hospital. [**See Video 1 (online),** which shows a demonstration of the incision method.]

OUTCOME MEASUREMENT

Intraoperative data, including incisional time (time from the start of skin incision until all skin was extracted or until the terminal edge of the incisional line was

reached) in patients who did not require eyelid skin extraction or show intraoperative bleeding during skin incision, were recorded. Intraoperative blood loss was measured by counting the number of cotton buds used in each surgical field. Postoperative ecchymosis was evaluated on days 3 and 7 and 1 month by using the Wound Doc application (Dalian Orientech Company, Liaoning, China) to measure the ecchymosis area as a centimeter square. Patients underwent follow-ups at 1 month, 3 months, and 1 year after surgery for scar evaluation using the VSS, POSAS scale, and HWES. Any complications, including hematoma, surgical site infection, asymmetry, proptosis, ectropion, and entropion, were recorded.

SYSTEMATIC REVIEW

We searched the electronic databases of PubMed, MEDLINE, EMBASE, and Google Scholar (September 2021), using search terms related to the incidence of electrocautery or Colorado and blepharoplasty, electrocautery or Colorado, and eyelid. The inclusion criteria were full-length articles with sufficient data. The exclusion criteria were incomplete or interim data, abstract-only studies, and nonEnglish language articles. Two authors screened the titles and abstracts of the retrieved articles. Reference lists were imported into Endnote software, version 9 (Thompson Reuters, Calif.), and duplicate articles were removed.

We included articles that only used Colorado needle electrocautery for incision in upper eyelid surgery studies. Articles published between 1987 and 2021 were evaluated using the preferred reporting items for systematic reviews. Two authors independently evaluated the eligibility of all the studies identified using predetermined selection criteria.

RESULTS

Part I

Systematic Review

Five articles met the inclusion criteria (Fig. 1). All studies involved Colorado needle electrocautery in the upper eyelid incision (Table 1). Three articles compared Colorado needle electrocautery and the scalpel, two of which were cross-sectional studies, and one was a randomized controlled trial study (RCT). Two articles, both RCTs, compared electrocautery with short-pulse CO_2 lasers.

Laurence et al[17] conducted an RCT to compare the efficacy of CO_2 laser blepharoplasty with that of cold steel and electrocautery. Thirteen cases were included, and the results showed less bleeding on the laser side and a good correlation between decreased operative time and decreased bleeding when compared with the cold steel surgery side. However, it was similar to the electrocautery side. Scars appeared to be equal in quality, color, size, and texture in all electrocautery lasers and scalpel incisions.

Cameron et al[18] studied 12 cases in the United States and conducted an RCT within-subject comparison between electrocautery and short-pulse CO_2 laser. The results showed that Colorado-needle-assisted blepharoplasty took lesser time than did CO_2 laser-assisted blepharoplasty (26.9 min versus 31 min, $P < 0.05$). Using a CO_2 laser seemed to cause more thermal damage than did the Colorado needle in a microscopic histological study. There was no significant difference in overall scar width at postoperative day 30 (1.03 mm versus 1.08 mm, $P > 0.05$).

Julio et al[19] conducted a cross-sectional study of 80 patients to compare the long-term outcomes between Colorado needle (40 patients) and cold blade (40 patients) used for oculoplastic surgery. There were no statistically significant differences between scar outcomes: PSAS scale 9.5 versus 8, *P* more than 0.05, OSAS scale 8 versus 9, *P* more than 0.05, POSAS scale 17.5 versus 16, *P* more than 0.05, VSS 2 versus 2, *P* more than 0.05.

Yonga et al[20] conducted an RCT of 254 eyelids of 101 patients to compare ecchymosis and scar cosmesis between a Colorado microdissection needle and cold scalpel. There were no significant differences in postoperative ecchymosis on day 1 ($P = 0.909$), day 7 ($P = 0.889$) or scar evaluation at month 1 ($P = 0.647$) and 6 ($P = 1.000$).

Jordan et al[21] conducted a histological case study comparing upper blepharoplasty skin excision using scalpel incision versus a microdissection electrocautery needle tip versus continuous wave CO_2 laser. The microdissection electrocautery needle resulted in a quick excision and a relatively bloodless surgical field; histology of the skin showed a fulguration artifact with loss of cellular polarity. The keratinocyte nuclei were spindled, and the cells were palisaded through the epidermis; however, no necrosis or separation of keratinocytes from the basement membrane was observed. The histology after the CO_2 laser procedure demonstrated the greatest number of heat artifacts and thermal injury, and there were sections of full epidermal necrosis with separation of the epidermis from the basement membrane. The side treated with a scalpel had more ecchymosis at 1, 4, and 12 weeks postoperatively.

Part II

Prospective Study

Thirty patients were enrolled in this study; none were excluded, and every patient remained until the end point of this study, with no loss to follow-up (Fig. 2). The average age of the patients was 66.67 years (range, 60–84 years), with 19 women (63.3%) and 11 men (36.7%). The mean weight, height, and body mass index were 63.9 ± 10.45 kg, 164.1 ± 7.88 cm, and 23.57 ± 2.19 kg/m^2, respectively. The number of patients with blepharoptosis who underwent upper eyelid surgery was four (13.3%): one with mild blepharoptosis (3.3%), and three with moderate blepharoptosis (10%). All four patients received blepharoplasty with levator advancement surgery; another 26 patients (86.7%) received only blepharoplasty surgery (Table 2).

The average incisional time on the electrocautery side was 75.57 ± 13.52 seconds, which was significantly longer than that on the scalpel side (66.3 ± 6.3 seconds, $P < 0.001$). Intraoperative bleeding was significantly lower on the electrocautery side than on the scalpel side (2.4 ± 0.97 sticks versus 3.27 ± 0.136, $P < 0.001$). The area of ecchymosis on day 3, day 7, and day 30 on the electrocautery

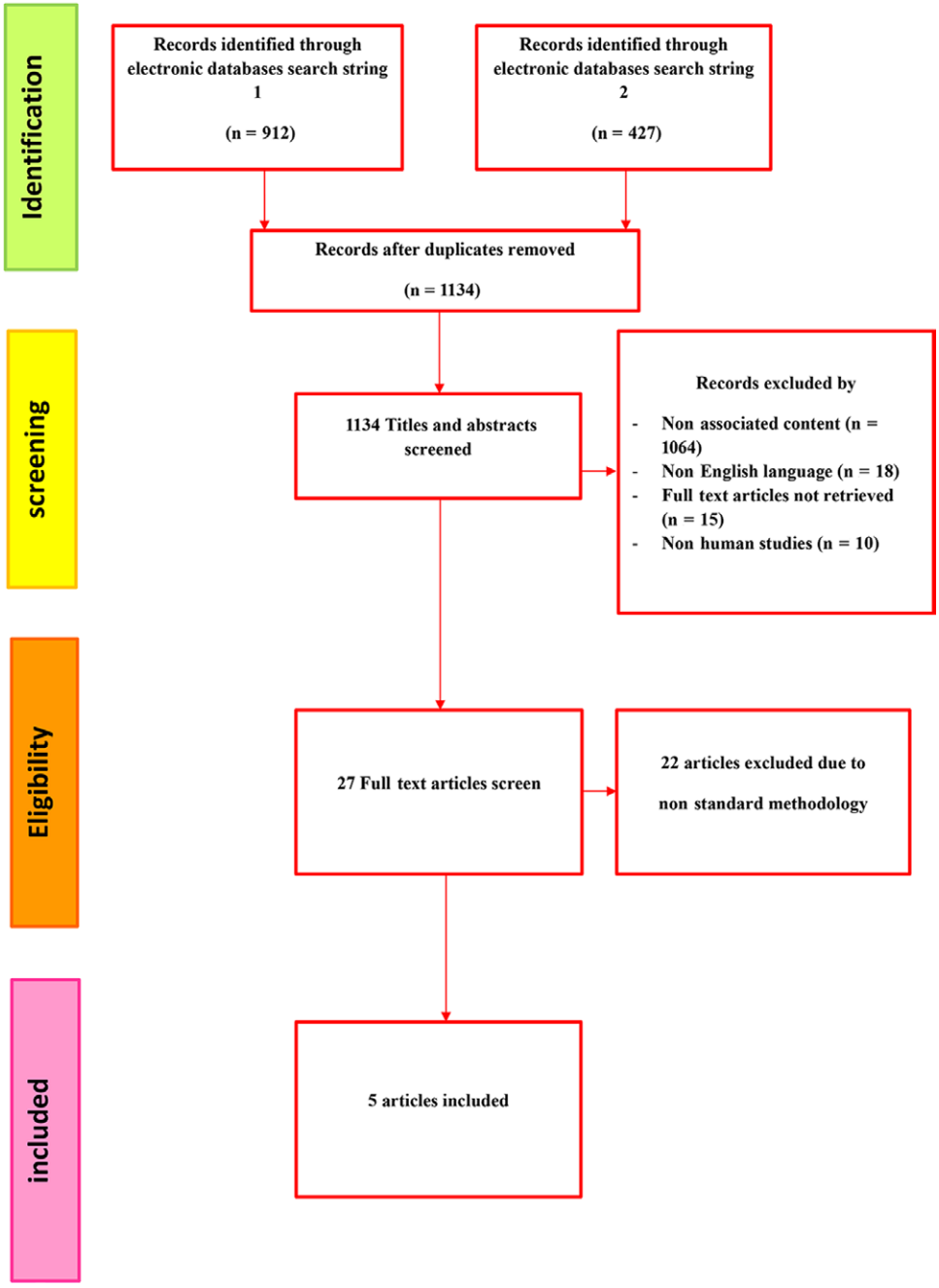

Fig. 1. Flow diagram depicting the screening and selection of the studies included in the systematic review.

side was $0.81 \pm 0.42\,cm^3$, $0.38 \pm 0.34\,cm^3$, and 0, respectively, whereas the area of ecchymosis on day 3, day 7, and day 30 was $0.81 \pm 0.37\,cm^3$, $0.4 \pm 0.31\,cm^3$, and 0, respectively. There were no statistically significant differences between the groups (Tables 3, 4; Figs. 3–8).

In terms of scar quality results when using VSS, only vascularity, pigmentation, and itching can be observed, whereas when using the POSAS scale, only itching, color difference, and pigmentation can be evaluated (Tables 5). (**See table, Supplemental Digital Content 1**, which shows the POSAS scale. **http://links.lww.com/PRSGO/C601**.)

Most outcomes were not statistically different between the two procedures. However, after a detailed 1-month postoperative study, we noted one patient with hypopigmentation on the electrocautery side (3.3%) and two patients (6.7%) with hypopigmentation on the scalpel side. At 3 months and 6 months, there was no hypopigmented scar on the electrocautery side; however, two patients (6.7%) at 3 months and one patient (3.3%) at 6 months had a hypopigmented scars on the scalpel side. Two patients (6.7%) had hyperpigmented scars on both sides at 1 month, and 1 patient (3.3%) had a hyperpigmented scar at

Table 1. Results of the Systematic Literature Review

Reference	Year	Study Site	No. Subjects	Study Design	Comparison	Application	Result
Laurence et al[17]	1987	USA	12	RCT	Electrocautery versus CO_2 laser	Blepharoplasty	CO_2 laser has more thermal damage, no significant difference in scar width
Cameron et al[18]	2008	USA	12	RCT	Electrocautery versus CO_2 laser	Blepharoplasty	No statistically differences between scar outcome
Julio et al[19]	2014	Spain	80	Cross sectional	Electrocautery versus scalpel	Blepharoplasty, lateral tarsal strip, dacryocystorhinostomy	No statistically differences between scar outcome
Yonga et al[20]	2016	Turkey, Italy, USA	254	RCT	Electrocautery versus scalpel	Blepharoplasty	No significant difference in ecchymosis and scar
Jordan et al[21]	2021	USA	—	Descriptive	Electrocautery versus scalpel, laser	Blepharoplasty	No necrosis or separation of keratinocytes from basement membrane, less ecchymosis
This study	2021	Thailand	25	RCT (interindividual)	Electrocautery versus scalpel	Blepharoplasty, blepharoplasty with levator advancement	No significant difference in ecchymosis and scar

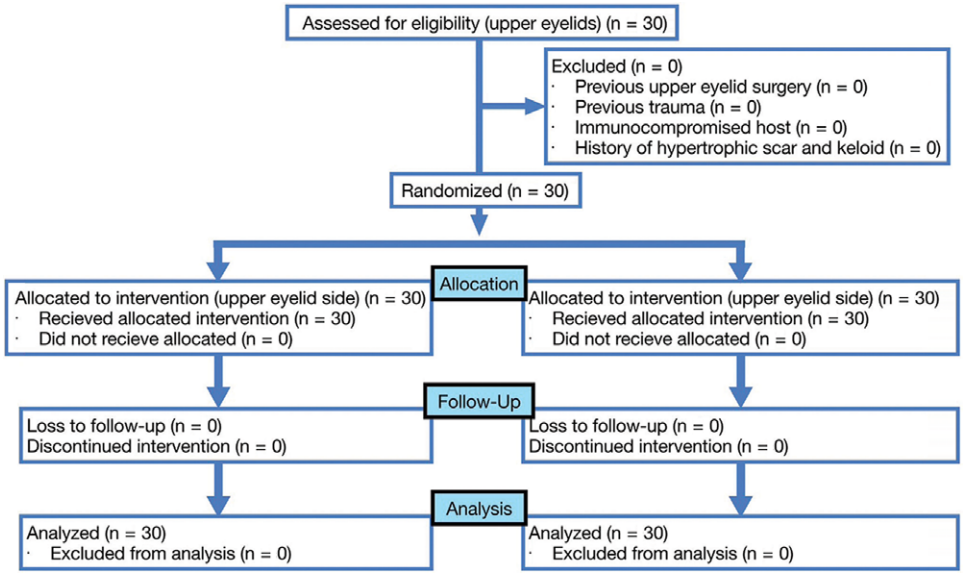

Fig. 2. Consolidated standards of reporting trials flow diagram.

3 months on the electrocautery side; however, no hypopigmented scar was observed at 1 year postoperatively, and hyperpigmented scars were not found at 6 months and 1 year postoperatively (Table 6).

When using the HWES for scar evaluation, as found in the literature, we found that step-off borders, contour irregularity, margin separation edge inversion, and excessive distortion were not found in delicate scars such as upper blepharoplasty scars. Additionally, it could detect only overall appearance of distress in the early month, equally on both sides (Table 7). There were no complications such as hematoma, surgical site infection, asymmetry, proptosis, ectropion, or entropion in this study (Table 8).

DISCUSSION

Heat-producing incisional devices such as electrocautery have been introduced to provide hemostasis and can incise without tissue pressure or stretching. It is available in almost every operating room. Electrocautery has many modes of action, such as pure cutting mode, coagulation mode, desiccation, and fulguration/spray. Based on the literature review, we found that the cutting mode is better than the coagulation mode in less area of tissue injury, and a smaller zone of coagulation[22] is appropriate for skin incisions. A variety of tips are available for use when applying cutting current to the tissue. Most tips are supplied with a spatula-shaped electrode; however, the smaller Colorado needle with a micro needle tip, 5 μm smaller

Table 2. Demographic Data (n = 30)

Variables	Statistics Data
Gender	
Women	19 (63.3%)
Men	11 (36.7%)
Age (y)	67.67±6.04
Weight (kg)	63.9±10.45
Height (cm)	164.1±7.88
BMI(kg/m^2)	23.57±2.19
Previous eyelids	
Double eyelids	24 (80%)
Single eyelids	6 (20%)
Blepharoptosis	
Normal	26 (86.7%)
Mild	1 (3.3%)
Moderate	3 (10%)
Operation	
Blepharoplasty	26 (86.7%)
Blepharoplasty + levator advancement	4 (13.3%)
HT (yes)	10 (33.3%)
DM (yes)	5 (16.7%)
DLP (yes)	3 (10%)
Surgeon hand dominant, right	30 (100%)
Electrocautery	
Left	16 (53.3%)
Right	14 (46.7%)
Scalpel	
Left	14 (46.7%)
Right	16 (53.3%)
To do first	
Electrocautery	12 (40%)
Scalpel	18 (60%)

Table 3. Intraoperative Data

	Electrocautery	Scalpel	*P*
Time of skin extraction (s)	75.57±13.52	66.3±6.3	<0.001*
Bleeding cotton bud stick	2.4±0.97	3.27±0.136	<0.001*

Paired *t* test.
*Statistical significance between the two groups.

Table 4. Ecchymosis

Ecchymosis (cm^2)	Electrocautery	Scalpel	Mean difference (95% CI)	*P*
Day 3	0.81±0.42	0.81±0.37	0 (– 0.06 to 0.06)	0.909
Day 7	0.38±0.34	0.4±0.31	– 0.02 (–0.07 to 0.03)	0.405
Day 30	0±0	0±0	0	NA

Repeated ANOVA test.

than the simple micro-needle and suitable for meticulous tasks,[23] is superior for a maximum cut with minimal damage.[24] Therefore, using cutting mode electrocautery with a Colorado needle electrode ensures accuracy during skin incisions in small and precise areas such as the upper eyelid skin, and it has the benefit of decreasing bleeding during incision. However, the objective of this study was to examine whether electrocautery is comfortable to use in upper eyelid blepharoplasty incisions because it does not need to stretch or provide pressure to the skin during incision. Our results showed that the average incisional time on the electrocautery side was significantly longer than that on the scalpel side. We think this is because surgeons are familiar with the scalpel more than they are with electrocautery because it is a traditional method. We observed that in later operations, surgeons could incise with electrocautery quicker than during prior operations and sometimes quicker than when using the scalpel.

In a systematic review, the authors found five previous studies[17–21] on Colorado needle electrocautery for upper eyelid skin incision; however, among these articles, they did not have an RCT study to compare Colorado needle electrocautery and a scalpel in upper blepharoplasty incision with respect to bleeding during skin incision and scarring using standard evaluation. Moreover, there were no previous studies on Asian people with poor scar outcomes compared with White people.[25] In a previous study, Arat et al[20] compared Colorado microdissection needle and scalpel incision for upper eyelid blepharoplasty; however, they used only the HWES for scar evaluation. The objective of the HWES was to evaluate traumatic wounds, surveillance, and treatment data collection in emergency departments that are not delicate wounds, such as upper eyelid blepharoplasty wounds.[26,27] Upper eyelid blepharoplasty wounds usually do not have step-off borders, contour irregularity, margin separation, edge inversion, and excessive distortion as an observation score in the HWES, and the overall appearance mentioned in this scale directly affects the incision procedure as well as all procedures, patient factors, and postoperative care. In our study, the authors used the VSS and POSAS scales, which are more standard scar evaluation scales and more acceptable in plastic surgery. We also used the HWES as in the previous literature for comparison of some scar outcome parameters, which cannot detect delicate scar issues, including hypopigmentation, hyperpigmentation, and itching, such as the VSS and POSAS scar scale. Moreover, the POSAS scale can also be used to evaluate scars in patients.

When comparing our study with previous studies included in our systematic review, in terms of ecchymosis, our results were concordant with those of Yonga et al,[20] with no significant difference between electrocautery and the scalpel in postoperative ecchymosis. However, this is different from the results of Jordan et al, who found that electrocautery produces less ecchymosis. Regarding scarring, our study according to Julio et al[19] and Yonga et al[20] showed no significant difference with scalpel. No previous study has recorded data regarding hypopigmentation, hyperpigmented scarring, and bleeding volume while the incision was being performed.

In this study, we detected consequent scar reports in both hypopigmented and hyperpigmented scars. These outcomes are very important in upper eyelid blepharoplasty because they lead to dissatisfaction in posteyelid surgery patients who are often concerned with the cosmetic appearance of their postoperative wound, scar, and overall appearance. One month postoperatively, there was one hypopigmented scar on the electrocautery side and two hypopigmented scars on the scalpel side. Three months postoperatively, there were two hypopigmented scars on the scalpel side, whereas there was no hypopigmented scar

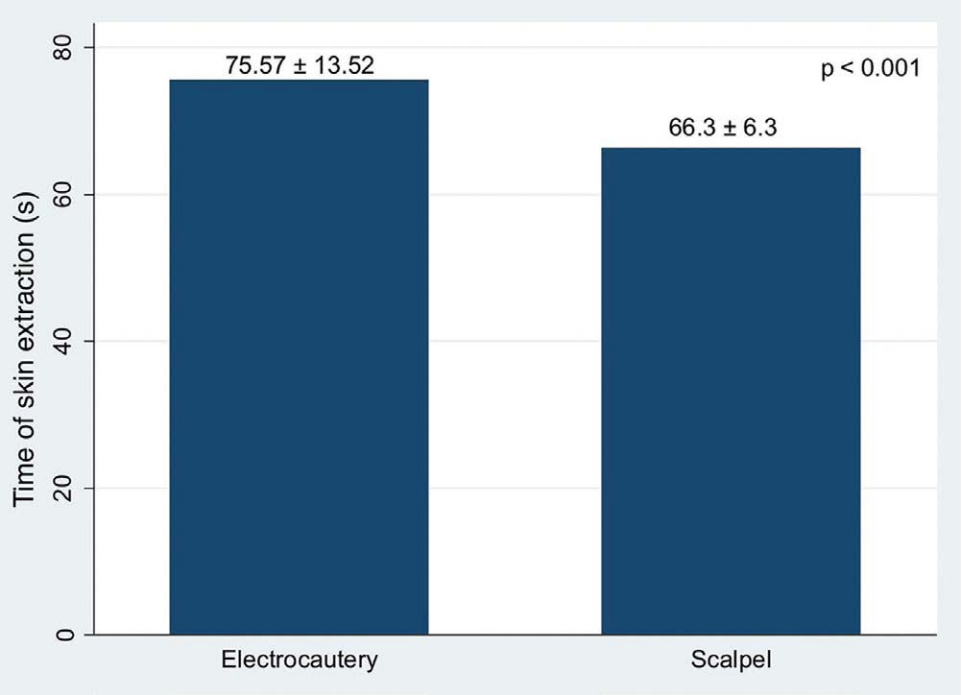

Fig. 3. Time of skin extraction (s).

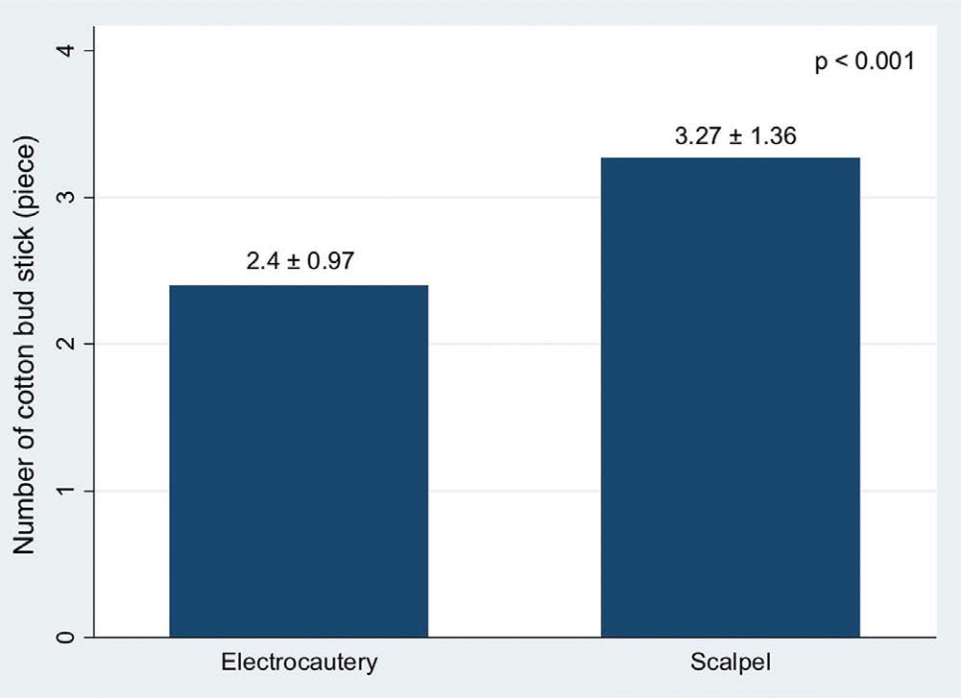

Fig. 4. Number of cotton buds used for absorbing bleeding in each surgical field.

on the electrocautery side. At 6 months, there was still a hypopigmented scar on the electrocautery side. However, owing to small sample sizes, which is one of the limitations of this study, statistical significance was not found. However, this issue remains a concern because of the importance of postoperative wound and cosmetic-scar satisfaction in patients, as mentioned above. Hypopigmented scars are more visible than hyperpigmented scars, especially in Asians, who have darker skin compared with White skin. Based on our results (Figs. 9, 10; **Supplemental Digital Content 1, http://links.lww.com/PRSGO/C602**), we postulate that electrocautery may be better than the

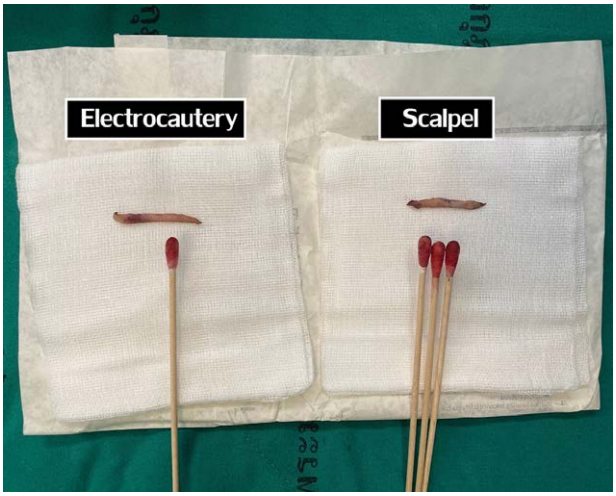

Fig. 5. Cotton bud sticks used for absorbing bleeding and excess skin of the upper eye lid.

scalpel in less hypopigmented scar that is obvious and the same amount of hyperpigmented scar that is harmonious. Therefore, using electrocautery seems to be better than the scalpel in this regard. (**See figure, Supplemental Digital Content 2,** which shows an example case: preoperative and postoperative at 1, 3, and 6 months and at the 1-year follow-up. **http://links.lww.com/PRSGO/C602**.)

Estimating incisional blood loss in upper eyelid blepharoplasty surgery is a difficult task; we absorbed blood using cotton buds. Therefore, we developed a method for determining the absorptive capacity of cotton buds, which was conducted using human blood and a small tip cotton bud that is usually used in eyelid surgery; each milliliter of blood was gradually dropped and then absorbed by the cotton bud step by step until full saturation of the cotton bud. The full saturation of cotton buds was determined by adding more blood to the 100% saturated cotton bud; however, the inability of cotton buds to absorb extra blood from the tray led to dripping from the cotton bud. Our experiment was repeated with new pieces of cotton buds several times to satisfaction. This experiment shows that the absorptive capacity of each cotton bud is 0.5 ml. In this study, we used cotton buds to absorb bleeding during skin incision and recorded bleeding as the number of cotton buds used. Our result shows that bleeding was significantly lower in electrocautery group (2.4 ± 0.97 versus 3.27 ± 0.136, $P < 0.001$). Hence, electrocautery has benefits in terms of improved visualization during incision and decreased bleeding. [**See Video 2 (online),** which shows the bleeding testing method (cotton bud capacity)].

We focused on older adults because in this age group, patients have thin and pliable skin of the upper lid, which makes it difficult for surgeons to perform precise incision and can sometimes lead to slanting. Moreover, Asian people tend to have worse scar outcomes than White people.

Although the authors were unable to show a significant difference between the two devices in some parameters, based on the results of this study, we can assume that using Colorado needle electrocautery is useful for upper eyelid blepharoplasty incision. Future studies with greater numbers of patients might detect some subtle differences.

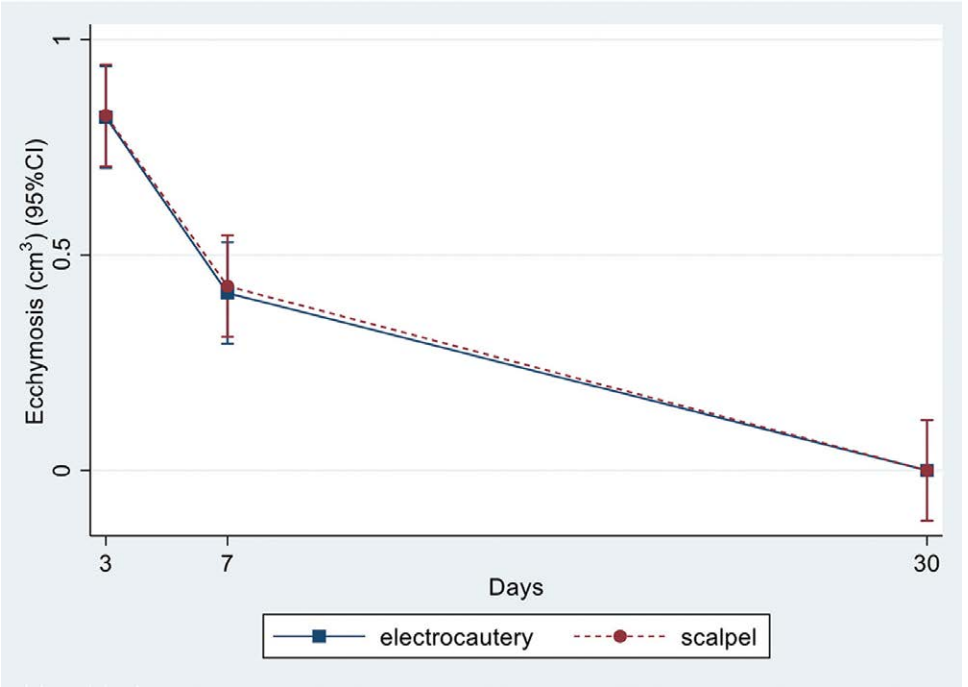

Fig. 6. Area of ecchymosis (cm^3) at 3, 7, and 30 days postoperatively.

Fig. 7. Postoperative ecchymosis was evaluated on days 3 and 7 and 1 month. Example case: ecchymosis at 3 days (A, B), 7 days (C, D), and 30 days (E, F) postoperatively.

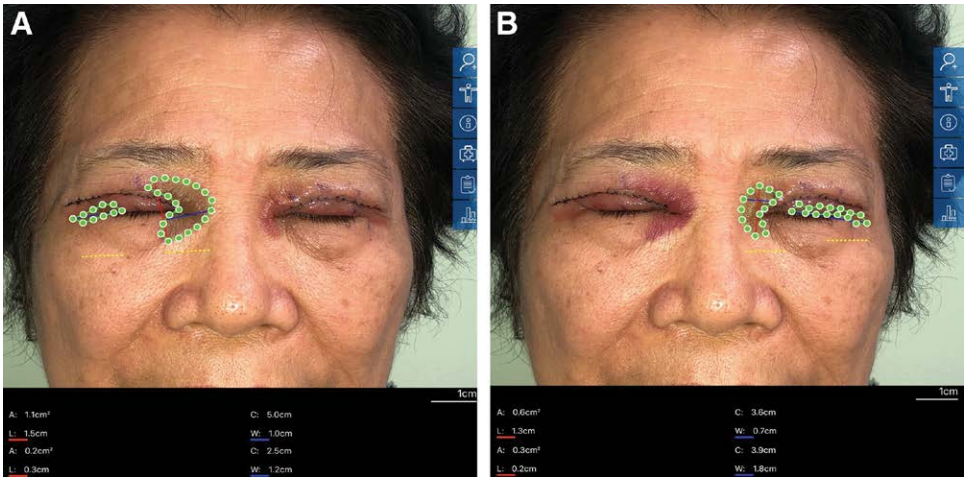

Fig. 8. Postoperative ecchymosis was evaluated on days 3 and 7 and 1 month by using the Wound Doc application to measure the ecchymosis area as centimeter square. A, B, Postoperative ecchymosis evaluation.

CONCLUSIONS

Surgeons can safely and efficiently use Colorado needle electrocautery in cutting mode, which can be used as an alternative to the scalpel in upper blepharoplasty in older patients because they have an equal scar effect. Moreover, cutting mode electrocautery yields a hemostatic benefit, leading to a decrease in bleeding that can obscure the incisional site, and it does not require pressure or stretching of the skin during incision, which is good for upper eyelid blepharoplasty surgery in older patients who

Table 5. Vancouver Scar Scale

	Electro-cautery	Scalpel	Mean Difference (95% CI)	*P*
Vascularity				
1 mo	0.03±0.18	0.03±0.18	0	NA
3 mo	0±0	0.03±0.18	−0.03 (−0.1 to 0.03)	0.326
6 mo	0±0	0±0	0	NA
12 mo	0±0	0±0	0	NA
Pigmentation				
1 mo	0.17±0.53	0.2±0.55	−0.03 (−0.24 to 0.17)	0.745
3 mo	0.03±0.18	0.13±0.43	−0.1 (−0.28 to 0.08)	0.264
6 mo	0.03±0.18	0.03±0.18	0 (−0.1 to 0.1)	1
12 mo	0±0	0±0	0	NA
Pliability				
1 mo	0±0	0±0	0	NA
3 mo	0±0	0±0	0	NA
6 mo	0±0	0±0	0	NA
12 mo	0±0	0±0	0	NA
Height				
1 mo	0±0	0±0	0	NA
3 mo	0±0	0±0	0	NA
6 mo	0±0	0±0	0	NA
12 mo	0±0	0±0	0	NA
Pain				
1 mo	0±0	0±0	0	NA
3 mo	0±0	0±0	0	NA
6 mo	0±0	0±0	0	NA
12 mo	0±0	0±0	0	NA
Itching				
1 mo	0.07±0.25	0.07±0.25	0 (−0.1 to 0.1)	1
3 mo	0±0	0±0	0	NA
6 mo	0±0	0±0	0	NA
12 mo	0±0	0±0	0	NA

Repeated ANOVA test.

Table 6. Hypopigmented and Hyperpigmented Scar

Hypopigmentation	Electrocautery (People/30)	Scalpel (People/30)	*P*
1 mo	1 (3.3%)	2 (6.7%)	1
3 mo	0 (0%)	2 (6.7%)	0.492
6 mo	0 (0%)	1 (3.3%)	1
1 y	0 (0%)	0 (0%)	N/A
Hyperpigmentation	**Electrocautery (People/30)**	**Scalpel (People/30)**	***P***
1 mo	2 (6.7%)	2 (6.7%)	1
3 mo	1 (3.3%)	0 (0%)	1
6 mo	0 (0%)	0 (0%)	N/A
1 y	0 (0%)	0 (0%)	N/A

Fisher exact test.

have fragile and wrinkled outer skin. However, the incision time on the electrocautery side was significantly longer than on the scalpel side; this may be owing to surgeon adaptation technique.

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Table 7. Hollander Wound Evaluation Scale

	Electrocautery	Scalpel	*P*
Step off of borders			
1 mo	0 (0%)	0 (0%)	N/A
3 mo	0 (0%)	0 (0%)	N/A
6 mo	0 (0%)	0 (0%)	N/A
12 mo	0 (0%)	0 (0%)	N/A
Contour irregularities			
1 mo	0 (0%)	0 (0%)	N/A
3 mo	0 (0%)	0 (0%)	N/A
6 mo	0 (0%)	0 (0%)	N/A
12 mo	0 (0%)	0 (0%)	N/A
Margin separation			
1 mo	0 (0%)	0 (0%)	N/A
3 mo	0 (0%)	0 (0%)	N/A
6 mo	0 (0%)	0 (0%)	N/A
12 mo	0 (0%)	0 (0%)	N/A
Edge inversion			
1 mo	0 (0%)	0 (0%)	N/A
3 mo	0 (0%)	0 (0%)	N/A
6 mo	0 (0%)	0 (0%)	N/A
12 mo	0 (0%)	0 (0%)	N/A
Excessive distortion			
1 mo	0 (0%)	0 (0%)	N/A
3 mo	0 (0%)	0 (0%)	N/A
6 mo	0 (0%)	0 (0%)	N/A
12 mo	0 (0%)	0 (0%)	N/A
Overall apperance			
1 mo	6 (20%)	5 (16.7%)	1
3 mo	2 (6.7%)	1 (3.3%)	1
6 mo	0 (0%)	0 (0%)	N/A
12 mo	0 (0%)	0 (0%)	N/A

McNemar test.

Table 8. Complication

	Electrocautery	Scalpel	*P*
Hematoma	0	0	N/A
Surgical site infection	0	0	N/A
Asymmetry	0	0	N/A
Proptosis	0	0	N/A
Ectropion	0	0	N/A
Entropion	0	0	N/A

McNemar test.

Fig. 9. Hypopigmented scar on the scalpel side (left eye).

Fig. 10. Patients underwent follow-ups at 1 month, 3 months, and 1 year after surgery for scar evaluation. Hyperpigmented scar on both sides at 1 month postoperatively (A). Hyperpigmented scar only on the electrocautery side (left eye) at 3 months postoperatively (B).

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

PATIENT CONSENT

All participants provided written informed consent for the publication of the photographs.

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