



Contents lists available at ScienceDirect

JPRAS Open

journal homepage: www.elsevier.com/locate/jpra

Original Article

Skin subdermal adhesion technique for upper blepharoplasty treatment for dermatochalasis

Satoshi Onoda^{a,*}, Kahori Tsukura^a, Ken Takeda^b^a Department of Plastic and Reconstructive, Aesthetic Surgery, Toyama University Hospital, Toyama, Japan^b Department of Orthopedic Surgery, Takeda Orthopedic Clinic, Okayama, Japan

ARTICLE INFO

Article history:

Received 25 November 2024

Accepted 19 January 2025

Available online 25 January 2025

Keywords:

Blepharoptosis

Eyelid surgery

Postoperative complication

ABSTRACT

Aim: We developed a simple bipolar skin and subdermal hemostasis technique called the “Skin Subdermal Adhesion Technique” (SAT), which prevents postoperative complications and provides good cosmetic results.

Patients and Methods: We performed 40 ptosis surgeries in 20 patients using SAT. All patients underwent bilateral excision of the excess skin due to age-related upper eyelid skin laxity; patients with facial nerve palsy and those who underwent manipulation of the levator muscle were excluded. The maximum wound width of the defect after skin resection and diameter after SAT were measured. Additionally, the presence or absence of postoperative complications requiring additional surgeries or procedures was investigated.

Results: The mean (range) age was 76.0 (55–86) years. Among the bilateral resection widths, the diameter of the wider side was 11–20 mm (mean, 14.85 ± 2.67 mm). In contrast, the defect width after SAT was 8–13 mm (mean, 9.75 ± 1.84 mm). SAT reduced the maximum width by 34.3%. There were no cases of postoperative complications, such as wound hematoma formation or infection.

Conclusion: SAT is useful for treating upper eyelid skin defects because it does not require any special equipment, is quick to

* Correspondence to: Satoshi Onoda: Department of Plastic and Reconstructive, Aesthetic Surgery, Toyama University Hospital, 2352 Sugitani, Toyama, Toyama, Japan, 930-0194; Tel: +81-076-434-2281; Fax: +81-076-434-1463

E-mail address: satoshiprs18@gmail.com (S. Onoda).

perform, reduces the risk of postoperative complications such as hematoma, and provides good cosmetic results.

© 2025 The Authors. Published by Elsevier Ltd on behalf of British Association of Plastic, Reconstructive and Aesthetic Surgeons. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

There are several causes of ptosis^{1–4} in adults^{5,6} including age-related upper eyelid dermatochalasis that is associated with upper eyelid muscle dysfunction^{7–9} and medically-induced ptosis following cataract surgery or botulinum-induced therapy.^{10,11} Moreover, cases of pediatric surgery for treating congenital ptosis have also been reported.^{12–14} Other surgical options include eyelid retraction and blepharoplasty.

Among these causes, the most frequently encountered cause in clinical practice is age-related upper eyelid dermatochalasis.^{15,16} Upper eyelid dermatochalasis is commonly treated by resecting the excess skin and suturing the skin margins to relieve the narrowing of the visual field. The postoperative complications of upper eyelid surgery include swelling of the eyelids to varying degrees. To address this issue, we developed a simple bipolar skin and subdermal hemostasis technique called the “Skin Subdermal Adhesion Technique” (SAT), which prevents postoperative complications and provides good cosmetic results. In this study, we describe the details and usefulness of this technique.

Patients and Methods

This study was conducted according to the principles of the Declaration of Helsinki. Moreover, photographs have been presented here with the consent of the patients. In this study, we performed dermatochalasis surgery using SAT on 40 sides in 20 patients. All patients underwent bilateral excision of the excess skin due to age-related upper eyelid skin laxity. Among bilateral skin defects, the side with the largest defect width after skin excision was the target of measurement. The maximum wound width of the defect after skin resection and diameter after SAT were measured. Additionally, the presence or absence of postoperative complications requiring additional surgeries or procedures was investigated (Table 1). The bipolar device used in this study is shown in Figure 1. It is recommended that the metal part at the tip of the device should be too short to concentrate the tissue at a single point while being pinched (Figure 2).

Surgical procedure

During the surgery, we designed a skin resection line, and skin excision was performed at the area with the greatest excess of skin. The skin resection line was set according to the degree to which the patients could close their eyes. The maximum width of the excision should be approximately 20 mm because removing too much skin at one time can cause functional problems and a significant change in appearance. The skin resection point is a wide area of the skin, that is, the eyebrow inferior part or eyelid margin. First, a skin incision was made under local anesthesia using 1% xylocaine. We only performed hemostasis for arterial bleeding from the stump with a bipolar catheter after resection. Venous bleeding from the skin stump occurred to a certain extent, and we performed coldness testing with a gauze soaked in saline for swelling prevention for approximately 1 min. After performing similar skin resections next to the anti-side, we assessed the coldness. Next, we stuck the subcutaneous panniculus adiposus and musculus orbicularis together using a bipolar region near the central part of the deficiency width (SAT). At this point, we increased the power to lightly place both ends of the defect. The output power was set at 15–25 watts. SAT was terminated when a reduction in wound width was attained in the entire wound. Intraoperatively, resection of fat bags in the upper eyelid was not performed. Finally, we performed epidermal suturing with a 6-0 nylon thread (Figure 3).



Figure 1. Skin subdermal adhesion technique (SAT) uses the bipolar system (Force FX Electrosurgical Generator: COVIDIEN Company) that is used in conventional surgery.

Table 1
Details of Skin subdermal adhesion technique.

No.	Age/Sex	Side	Deficiency width after the resection	Deficiency width after the SAT	Postoperative complication	SAT ratio
1	81/F	Bil	12	8	None	67%
2	86/F	Bil	14	9	None	64%
3	82/F	Bil	12	8	None	67%
4	70/F	Bil	11	7	None	63%
5	55/F	Bil	12	8	None	67%
6	67/F	Bil	12	7	None	58%
7	75/F	Bil	16	11	None	69%
8	76/F	Bil	13	9	None	69%
9	69/F	Bil	12	8	None	67%
10	83/F	Bil	16	10	None	63%
11	82/F	Bil	15	10	None	67%
12	75/F	Bil	14	9	None	64%
13	76/M	Bil	16	10	None	63%
14	70/F	Bil	20	13	None	65%
15	76/F	Bil	14	9	None	64%
16	76/M	Bil	18	12	None	67%
17	74/M	Bil	15	10	None	67%
18	86/F	Bil	18	12	None	67%
19	82/M	Bil	20	13	None	65%
20	79/F	Bil	17	12	None	71%
mean		14.85	9.75		65.7%	

Bil: bilateral; SAT: Skin Subdermal Adhesion Technique; SAT ratio: 100-deficiency width after SAT/deficiency width after resection; M: male; F: female

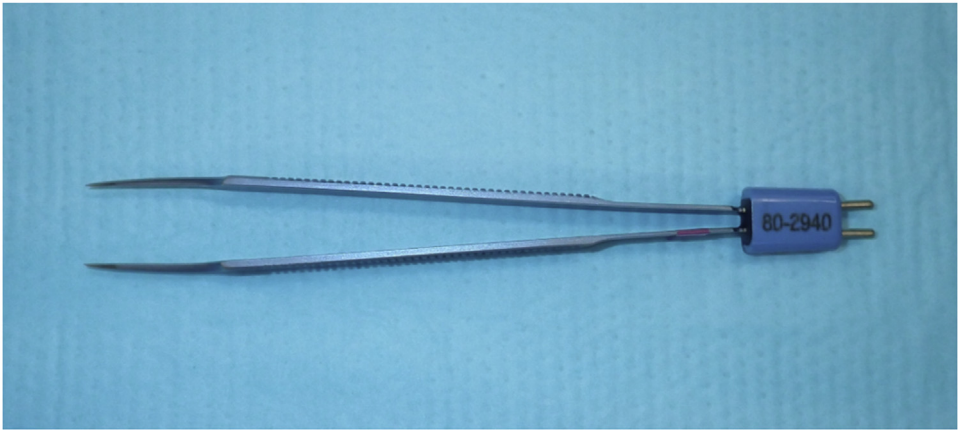


Figure 2. Needle tip is relatively short and easily clamps the tissue. The tip should be made of titanium if possible.

Results

Four male patients and 16 female patients were included in this study. The mean (range) age was 76.0 (55–86) years. Among the bilateral resection widths, the one with the greater resection width was the object of measurement and diameter of the wider side was 11–20 mm (mean, 14.85±2.67 mm). In contrast, the defect width after SAT was 8–13 mm (mean, 9.75±1.84 mm). SAT reduced the maximum width by 34.3%. The p-value for comparing deficiency width after the resection and SAT was $p<.01$.
Postoperatively, swelling was prevented by icing the wound in all cases. There were no postoperative complications, such as wound hematoma formation or infection. However, for excess skin excision

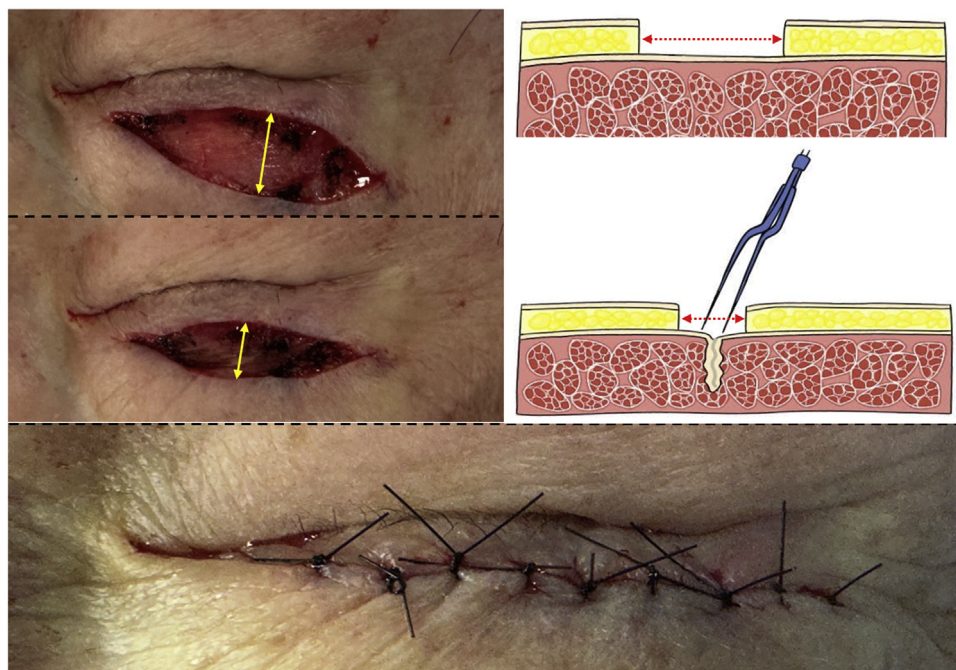


Figure 3. Upper row: Condition after skin excision. The maximum width of the defect was 16 mm (yellow, black arrow). Middle row: After the skin subdermal adhesion technique. The width of the defect was reduced to 10 mm (yellow, black arrow). Lower row: After full-layer suture using a 6-0 nylon thread.

performed prior to the adoption of this method, postoperative internal bleeding was observed in 2 of the 30 cases, and hemostasis was required in 1 case. Regarding the extent of scarring, 2 of the 30 patients who did not undergo SAT complained of disfiguring scarring from the wound. Contrastingly, none of the SAT cases exhibited disfiguring scars. The surgery was performed bilaterally and lasted approximately 30 min. Postoperative follow-up was performed 1 week after the removal of stitches, and thereafter it depended on the patient.

Discussion

We describe in detail the method for performing SAT, which uses a bipolar hemostasis technique to stop bleeding and simultaneously reduce wound width in a short period of time. Although Fagien reported a similar technique, the novelty of this study is that it describes the details of the technique and relevant concerns.¹⁷

The upper eyelid is one of the thinnest areas of the skin and is usually unsuitable for dermal suturing.¹⁸ Therefore, only one layer of skin suture is often used after the excision of excess skin; however, this method tends to create a dead space under the skin, which can lead to the formation of subcutaneous dead space, associated hematoma formation, and postoperative swelling. When suturing a full skin layer defect caused by trauma or surgical resection, the longitudinal wound length corresponds to the suture line length after suturing, and the horizontal wound width is proportional to the tension after suturing. When the tension during suturing is high, the force acts in the direction of wound separation, which leads to the formation of wide scars, hypertrophic scars, and keloids, owing to the expansion of the wound after suturing.

In the present study, we simultaneously reduced the width of the wound and dead space using a bipolar technique in the defective skin layer. This allowed us to prevent complications, such as postoperative swelling and hematoma, and simultaneously achieve good cosmetic results (Figure 4). SAT



Figure 4. Photographs taken 2 years after surgery; wound scar is inconspicuous.

can be performed using only the bipolar device that is used for conventional surgery. In addition, the operative time was not prolonged because only intraoperative hemostatic operations were performed. Furthermore, SAT is simple and can be performed by anyone. However, it is easier to perform with bipolar hemostasis than with monopolar hemostasis because the bipolar method promotes coagulation while clamping the defect.^{19,20} Notably, SAT should be performed as deep as possible in the subcutaneous fat layer at the deepest part of the wound margin. If the SAT is performed close to the skin surface, it will cause additional burns on the skin components, leading to disfiguring scars.

Conclusion

We reported the usefulness of SAT for upper blepharoplasty treatment of dermatochalasis in this study. It is a useful method for treating upper eyelid skin defects because it does not require any special equipment, is quick to perform, reduces the risk of postoperative complications such as hematoma, and provides good cosmetic results.

Conflicts of interest

None declared

Funding

None

Ethical approval

Not required

References

1. Xu P, Huang H, Zhang S, Yin X, Zhang Q, Du Y. A comprehensive approach to upper eyelid rejuvenation surgery. *Aesthetic Plast Surg.* 2021 Jun;45(3):1047–1055.
2. Warren RJ. Upper blepharoplasty and brow rejuvenation in men. *Clin Plast Surg.* 2022 Apr;49(2):197–212.
3. Gao H, Wu D, Jie X, Hu Z, Zhang W, Zhu L, Zhu X. Global research trends and perspectives of blepharoplasty: A 20-year bibliometric analysis based on web of science. *Aesthetic Plast Surg.* 2023 Apr;47(2):654–665.

4. Pelton RW. Evaluation and management of blepharoptosis. *Facial Plast Surg.* 2022 Aug;38(4):375–386.
5. Zhou J, Chen W, Qi Z, Jin X. Minimally invasive conjoint fascial sheath suspension for blepharoptosis correction. *Aesthetic Plast Surg.* 2019 Aug;43(4):956–963.
6. Lisman RD, Garcia MD. Evaluation of the Effect of Dermatochalasis and Upper Eyelid Blepharoplasty Surgery on Corneal Epithelial Thickness Alterations. *Aesthetic Plast Surg.* 2023 Apr;47(2):652–653.
7. Li B, Yang J, Wu W, Chai C, Gu Z, He Z, Tan Z, Cheng S, Lu P, Zeng L. Anatomical and histological study of the conjoint fascial sheath of the levator and superior rectus for ptosis surgery. *Ophthalmic Plast Reconstr Surg.* 2020 Nov/Dec;36(6):617–620.
8. Wong CH, Hsieh MKH, Mendelson B. A comprehensive approach to Asian upper eyelid ptosis correction: The levator musculo-aponeurotic junction formula. *Aesthet Surg J.* 2021 Sep 14;41(10):1120–1129.
9. Wong CH, Hsieh MKH, Mendelson B. Upper eyelid ptosis correction with levator advancement in Asian patients using the musculoaponeurotic junction of the levator as the key reference point. *Plast Reconstr Surg.* 2020 Dec;146(6):1268–1273.
10. Bernardini PP, Skippen B, Croasdel B, JM Cerón Bohórquez, Murray G, Sayed K, Walker L, ME; Hartstein. Complications in medical aesthetics collaborative (CMAC) study group. management of severe botulinum-induced eyelid ptosis with pre-tarsal botulinum toxin and oxymetazoline hydrochloride 0.1. *Aesthet Surg J.* 2023 Mar 21.
11. Wong MB, Maamari RN, Couch SM. Contralateral eyelid elevation following unilateral upper eyelid retraction repair. *Orbit.* 2022 Aug;41(4):452–456.
12. Tenzel PA, Brown K, Zhou B, Itani KM, Mancini R. Facial asymmetry in children with unilateral congenital ptosis. *Ophthalmic Plast Reconstr Surg.* 2022 Sep-Oct 01;38(5):483–489.
13. Kokubo K, Katori N, Hayashi K, Kasai K, Kamisasanuki T, Sueoka K, Maegawa J. Frontalis suspension with an expanded polytetrafluoroethylene sheet for congenital ptosis repair. *J Plast Reconstr Aesthet Surg.* 2016 May;69(5):673–678.
14. Cang ZQ, Liu CH, Cui JB, Fan X, Chen YJ, Song BQ, Hao DY, Peng P, Cao J. Extended frontalis muscle advancement technique for severe congenital blepharoptosis. *Plast Reconstr Surg.* 2023 Mar 7.
15. Guo F, Song J, Wang L, Yu X. Upper eyelid skin laxity in elderly patients: Correction surgery with eyelid marginal incision. *Ann Plast Surg.* 2022 Dec 1;89(6):610–614.
16. Lee TY, Shin YH, Lee JG. Strategies of upper blepharoplasty in aging patients with involutional ptosis. *Arch Plast Surg.* 2020;47:290–296.
17. Fagien S. The role of the orbicularis oculi muscle and the eyelid crease in optimizing results in aesthetic upper blepharoplasty: a new look at the surgical treatment of mild upper eyelid fissure and fold asymmetries. *Plast Reconstr Surg.* 2010 Feb;125(2):653–666.
18. Yuzuriha S, Matsuo K, Kushima H. An anatomical structure which results in puffiness of the upper eyelid and a narrow palpebral fissure in the Mongoloid eye. *Br J Plast Surg.* 2000 Sep;53(6):466–472.
19. Minieri V, Ambrosino E, Aceto B, Schonauer F. Monopolar diathermy: 2 instruments, 1 hand. *Aesthet Surg J.* 2014 Mar;34(3):477–478.
20. Carruthers J, Fabi S, Weiss R. Monopolar radiofrequency for skin tightening: our experience and a review of the literature. *Dermatol Surg.* 2014 Dec;40(Suppl 12) S168–73.