OPEN

PRS GLOBAL OPEN

ORIGINAL ARTICLE
Cosmetic

Skin–Tarsus–Skin Combined with Orbicularis–Tarsus–Orbicularis Fixation Technique Creates a Double Eyelid: A Case Series

Tingfeng Xiong, MD*†
Qing Ye, MD‡

Background: The skin–tarsus–skin and orbicularis–tarsus–orbicularis fixation methods are widely used in double-eyelid surgery. Both methods have limitations. In this study, the two surgical methods were integrated and applied to form a stable double eyelid that mimics the natural physiological structure with minimal visible scarring.

Methods: At the inner, middle, and outer sites of the double-eyelid line, 7-0 silk sutures were passed successively through the orbicularis oculi muscle at the lower edge of the incision, the tarsus/anterior tarsus tissue, and the orbicularis oculi muscle at the upper edge of the incision, and the skin was sutured with 8-0 thread. The remaining parts were fixed with 8-0 silk sutures successively passed through the skin at the lower edge of the incision, tarsus/anterior tarsus tissue, and skin at the upper edge of the incision. Scar formation, incidence of complications, and patient satisfaction were observed and recorded during follow-up.

Results: Fifty-eight patients were included. The follow-up ranged from 3 to 24 months (mean, 8 months) with 47 patients undergoing primary and 11 secondary/revision surgery. Twelve cases showed slight linear scars and in 46 cases, surgical marks were almost invisible, and there were no dynamic depressed scars. Evaluation of patient satisfaction showed high satisfaction scores (VAS score, 8.56 ± 0.51). The main reason for dissatisfaction was asymmetry of the double eyelid. There were no significant complications.

Conclusion: A skin–tarsus–skin combined with orbicularis–tarsus–orbicularis fixation technique can produce a long-lasting, natural-looking double eyelid. *(Plast Reconstr Surg Glob Open 2024; 12:e5728; doi: 10.1097/GOX.0000000000005728; Published online 10 April 2024.)*

INTRODUCTION

Eyes are one of the most important aesthetic components of the face and play a key role in a person's confidence and attractiveness.[1] Double eyelids can visually enlarge the eyelid fissure and increase facial attractiveness.[2] However, about 50% of Asians have single eyelids, with flabby upper eyelid skin and hypertrophied subcutaneous soft tissue, and some Asian people also have an epicanthus that makes the palpebral fissure smaller and affects facial beauty.[3] Double-eyelid surgery can make the eye look more awake, well framed, and in line with the pursuit of modern aesthetics. Therefore, it has become one of the most popular plastic surgery procedures in Asia in recent years.[4]

The ideal effect of double-eyelid surgery is to create a durable, stable, dynamic upper eyelid fold with appropriate depth and width and no obvious depression or visible scarring when the eyes are closed or lowered.[5] At present, double-eyelid surgery generally uses either the nonincisional suture ligation technique or the external incisional surgical technique. The external incisional double-eyelid procedure has become the most widely

*From the *Department of Plastic Surgery, Affiliated Hospital of Jiujiang University, Jiujiang, Jiangxi, China; †Jiujiang Clinical Precision Medicine Research Center, Jiujiang, Jiangxi, China; and ‡Department of Ophthalmology, Hubei Provincial Hospital of Integrated Chinese and Western Medicine, Wuhan, Hubei, China.*

Received for publication October 23, 2023; accepted February 16, 2024.

DOI: 10.1097/GOX.0000000000005728

Disclosure statements are at the end of this article, following the correspondence information.

Related Digital Media are available in the full-text version of the article on www.PRSGlobalOpen.com.

used operation because of its stable surgical effect.[6] The intraoperative suture fixation method plays a key role in the postoperative appearance of the double eyelid.[7] The traditional "skin–tarsus–skin" method produces a stable double-eyelid line, but it often leaves an obvious depression and wide feeling at the double-eyelid line after the operation.[8,9] The "orbicularis–tarsus–orbicularis" method produces less-discernable scarring, and the surgical effect is naturalistic, but the double-eyelid line is shallow and may become effaced after the operation. This study combined the two surgical procedures of skin–tarsus–skin and orbicularis–tarsus–orbicularis to develop a new suture method that produces an outcome that mimics the natural physiological structure of the double eyelid.

Takeaways

Question: To our knowledge, the skin–tarsus–skin and orbicularis–tarsus–orbicularis fixation methods are widely used in double-eyelid surgery. However, both methods have limitations.

Findings: This study combined the two surgical procedures of skin–tarsus–skin and orbicularis–tarsus–orbicularis to develop a new suture method that produces an outcome that is more like the natural physiological structure of the double eyelid.

Meaning: A new surgical fixation method for double eyelid.

METHODS AND PATIENTS

General Information

Fifty-eight patients who desired double-eyelid surgery at the department of plastic surgery, from January 2020 to June 2022 were included in the study, including 47 cases undergoing primary surgery and 11 cases of revision surgery. There were two men and 56 women aged from 18 to 48 years (29.40±8.51). This study was reviewed by the medical ethics committee of the hospital, and all subjects gave informed consent and complied with the postoperative follow-up plan.

Inclusion and Exclusion Criteria

Inclusion criteria included (1) single-eyelid patients without serious systemic or mental health diseases who voluntarily requested double-eyelid surgery, (2) patients with or without epicanthus, (3) patients with or without age-related upper eyelid skin laxity, (4) patients with or without ptosis, and (5) patients with good medical compliance who agreed to follow the postoperative follow-up plan. Exclusion criteria included (1) patients with a history of eye diseases who were not suitable for surgery and (2) patients with systemic diseases who cannot tolerate surgery.

Surgical Methods

The patients were placed in the supine position, and the face and neck were routinely disinfected with towels. While considering each patient's requirements, facial contour, and eyelid skin laxity, a double-eyelid line was designed 6–8 mm above the upper eyelid margin; the skin resection range was determined via the clamping method, and the incision line was marked.

Local anesthesia (1% lidocaine plus 1:200,000 epinephrine) was injected in both upper eyelids. The skin was incised with a scalpel according to the previous markings. The skin (Fig. 1A) and orbicularis oculi muscle (Fig. 1B) were removed en bloc with the orbicularis oculi muscle edges at the upper and lower margins kept flush with the skin incision. The lateral orbital septum was opened, naturally herniated fat was removed, and hemostasis was performed (Fig. 1C).

Parts of the anterior tarsal fascia and tarsus were exposed, and part of the excessive tarsal tissue was removed. Three points on the double-eyelid line were marked, and at the highest point in the center of the double-eyelid line, 7-0 silk thread was successively passed through the orbicularis oculi muscle at the lower edge of the incision, tarsus/anterior tarsal tissue, and orbicularis oculi muscle at the upper edge of the incision with internal suture fixation (Figs. 1 and 2A–C). These sutures were not removed after surgery. To close the upper eyelid skin, 8-0 sutures were used (Fig. 2A–B), which were removed after surgery. The medial and lateral sides of the double-eyelid line were sutured in the same way.

An 8-0 silk thread was successively passed through the skin at the lower edge of the incision, tarsus/pretarsus tissue, and skin at the upper edge of the incision, and the remaining parts of the double-eyelid line were sutured intermittently (Figs. 1 and 2B). The sutures were removed after surgery. [See **Video (online)**, which shows how we perform double-eyelid surgery.]

Epicanthus correction was performed according to the Z-plasty method in patients with epicanthus. Contralateral surgery was performed in the same way. An ice dressing was applied after the operation. The dressing was changed on the first day, and stitches were removed on the fifth to seventh day.

The patients returned to the hospital regularly according to the follow-up plan. The surgical effect, postoperative complications, scar hyperplasia, and patient satisfaction were recorded.

Evaluation Criteria

1. Serious postoperative complications: Serious complications included eye infection, eyelid dysraphism, ptosis, upper eyelid ectropion, and disappearance of double-eyelid line.
2. Degree of satisfaction regarding postoperative scarring: The degree of scarring was judged by more than three plastic surgeons over a period ranging from 3 months to 2 years and included the visibility of traces of scarring and dynamic depression with the eye closed (the average score was calculated). The visual simulation score (VAS) was used to evaluate scarring, including static scarring and dynamic depression. The score was divided into 10 points, and the higher the score, the more severe the scarring was. A score of 0 indicated normal skin, whereas a score of 10 indicated that the scarring was very apparent and unacceptable.[10]

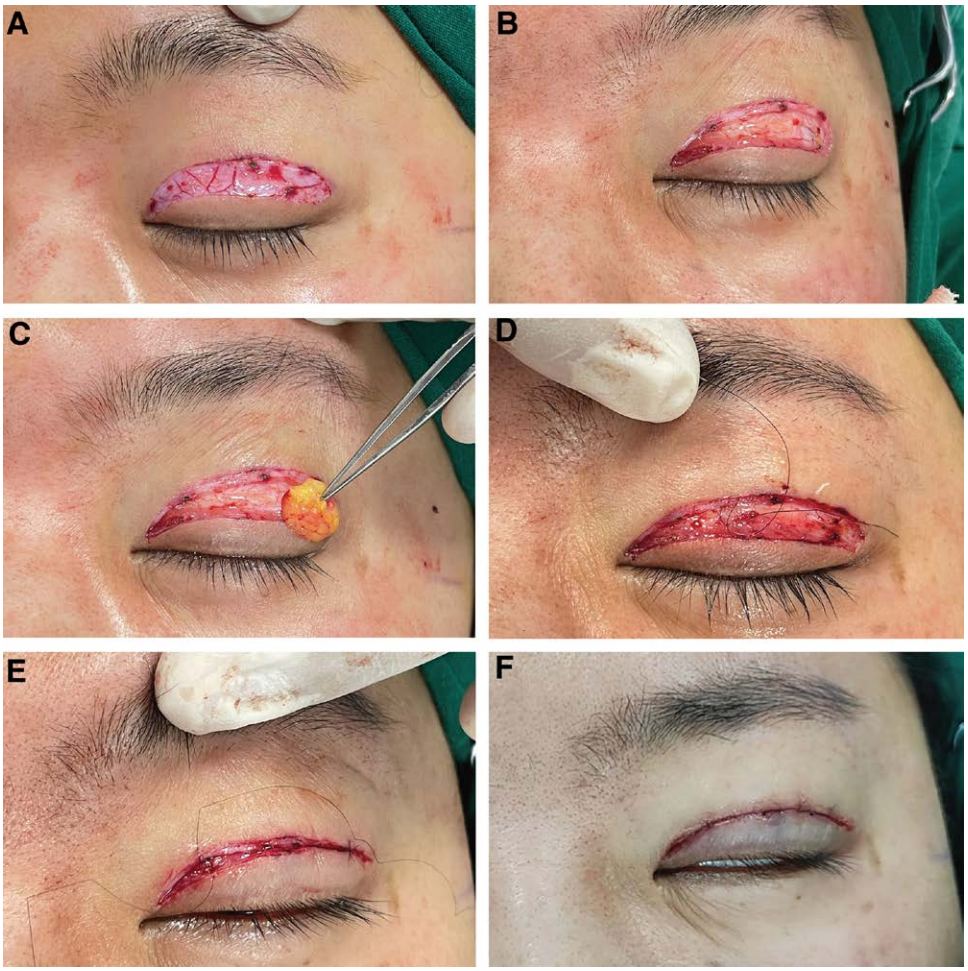

Fig. 1. Surgical procedure. A, Removal of skin. B, Removal of muscle. C, Removal of orbital septum fat. D, Orbicularis–tarsus–orbicularis fixation. E, Skin–tarsus–skin fixation. F, Skin–tarsus–skin fixation combined with orbicularis–tarsus–orbicularis fixation.

3. Evaluation of the level of aesthetic satisfaction: The patients' satisfaction with their appearance was evaluated 6 months after the operation and scored using the following: The satisfaction of the patients was based on their subjective satisfaction assessed using a VAS (0–10, with 0 indicating not at all satisfied, and 10 indicating very satisfied).[11]

Statistical Method

The Kendall consistency coefficient was used to determine the consistency of the observer and the rating consistency of the three scores. The positive values in the table indicate positive correlations, and negative values show negative correlations. The greater the value, the greater the correlation. Measured data are expressed as mean ± SD. SPSS was used for all statistical analyses.

RESULTS

A total of 58 patients were included in this study, and all the surgical incisions healed without complications. The mean follow-up time was 8 months (range 3–24 months). No serious complications occurred after the operations. All scars were mild. In this study, the Kendall consistency coefficient showed that consistency between observers was strong ($P < 0.01$), and there was a small VAS score observer bias for scarring and satisfaction. The VAS score was 0.69 ± 0.41, with 12 cases having only slight linear scars when the eyes were closed, and there were no dynamic depressed scars. In 46 cases, surgical marks were almost invisible with the eye closed, and there were no dynamic depressed scars. Evaluation of satisfaction revealed high levels of satisfaction (VAS score, 8.56 ± 0.51). The main reason for dissatisfaction was asymmetry of the double eyelid, and the patient concerned was treated with reoperation (Table 1). The overall success of the postoperative effects is shown in Figures 3 and 4.

DISCUSSION

The formation of double eyelids is related to anatomical, genetic factors. The anatomical structure of the upper eyelids differs between Asians and Westerners, and Asians are less likely to form a double eyelid than Westerners.[12]

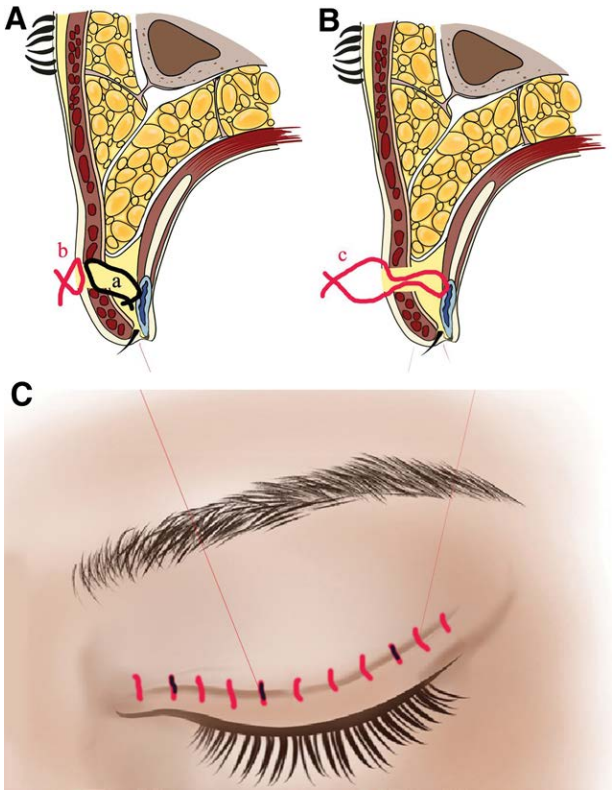

Fig. 2. Schematic diagram of suture fixation. A, Orbicularis–tarsus–orbicularis fixation. a: orbicularis oculi muscle at the lower edge of the incision, tarsus/anterior tarsal tissue, and orbicularis oculi muscle at the upper edge of the incision were fixed with internal sutures (not removed). b: Sutured skin. B, Skin–tarsus–skin fixation. C, Skin–tarsus–skin fixation combined with orbicularis–tarsus–orbicularis fixation.

Table 1. Basic Information of Patients and Evaluation

Parameters	Value (n)
Sex	
Male	2
Female	56
Age	18–48
Serious postoperative complications:	
Yes	0
No	58
Degree of scarring	0.69 ± 0.41
Patient satisfaction	8.56 ± 0.51

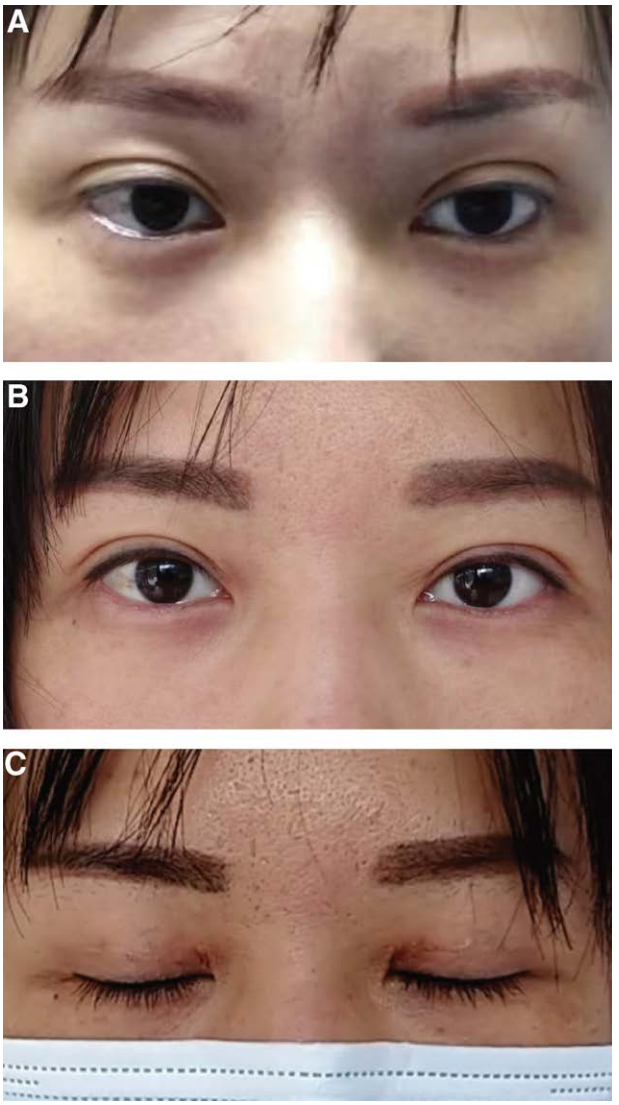

Fig. 3. Typical cases of overwide double-eyelid revision surgery (age 34 years). The overwide double eyelid had heavy scarring before the operation. After the operation, the effect was naturalistic, and there was no obvious scarring. A, Before surgery with eyes open. B, After surgery with eyes open. C, After surgery with eyes closed.

Therefore, double-eyelid surgery has become one of the most popular aesthetic plastic procedures in Asia. There are many surgical methods for blepharoplasty that can be roughly divided into open methods, minimally invasive methods, and embedding methods, according to different principles.[13] Among them, open blepharoplasty has become the most widely used surgical method because it can form stable and lasting folds with a strong three-dimensional structure. Most Asians have a low nose radix and unrounded forehead that is not suitable for the formation of a deep and wide eyelid.[2] Thus, avoiding a "falsely deep and wide" badly formed and heavy eyelid, and at the same time, guaranteeing the stability and persistence of the double eyelid has become an important goal in the field of double-eyelid surgery in recent years.

With the advancement of social aesthetic concepts, patients have more refined aesthetic requirements for double-eyelid surgery. They no longer simply pursue the formation of a double-eyelid fold, but also request that attention be given to the depth of double-eyelid line, corneal display rate, eyelash level, double-eyelid state when eyes are closed, and other details. The traditional skin–tarsus–skin suture method often produces obvious depression and a wide feeling at the double-eyelid line after the operation.[14] The deep layer is fixed by orbicularis–tarsus–orbicularis, and the skin is sutured directly, which provides an effect

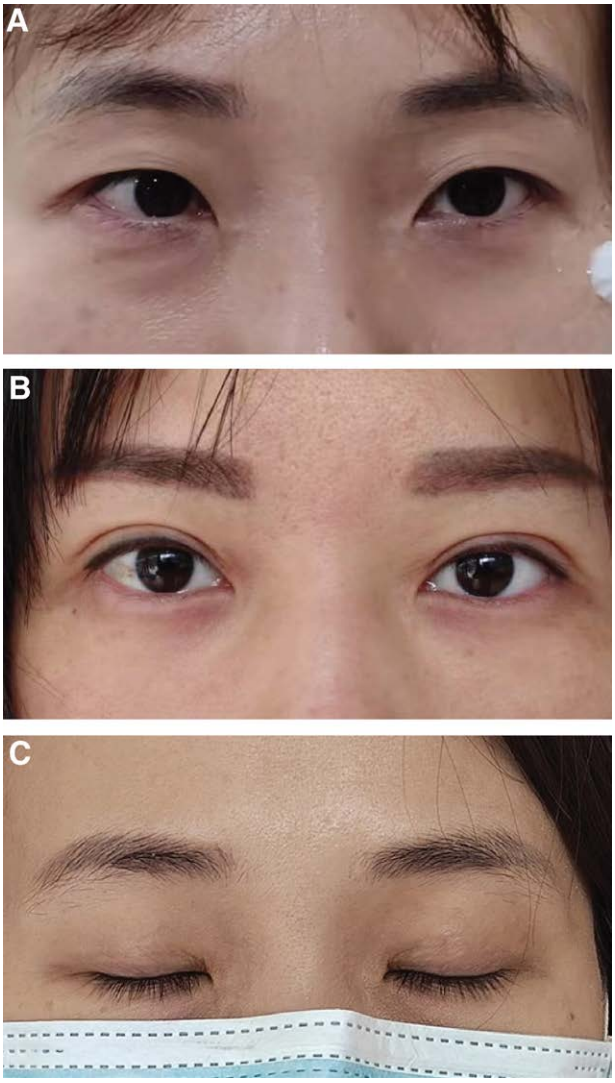

Fig. 4. Typical case with single eyelid before and after double-eyelid surgery (age 29 years). The effect was naturalistic, and there was no obvious scarring after the operation. A, Before surgery with eyes open. B, After surgery with eyes open. C, After surgery with eyes closed.

similar to the physiological anatomy of the double eyelid. Retaining muscle tissue at the upper and lower edges of the incision and suture can reduce skin tension at the incision, which is conducive to healing of the incision and reduces scarring. The final double eyelids are almost seamless, but due to the unstable adhesion, the double eyelids are often too shallow or disappear at a later stage[15]; therefore, few procedures are performed directly in this way.

In this study, a combination of orbicularis–tarsus–orbicularis suture and skin–tarsus–skin suture was used to form double eyelids. The anatomical structure of the double eyelids was close to the natural anatomy and remained stable after the operation.

The anatomical features of natural double eyelids are formed by the tarsus passing through the orbital septum and orbicularis oculi muscle and terminating at the upper eyelid skin. When the eyes are closed, the levator muscle relaxes, and the upper eyelid skin is smooth. When the eyes are open, the levator muscle is retracted, and the upper eyelid skin is stacked to form the double eyelid.[15] According to the principles behind natural double-eyelid formation, we believe that the key to achieving a natural and seamless surgical effect is to reconstruct the anatomical structure of the upper eyelid to match the structure of the natural double eyelid.[16] The tissue structure of each layer of the eyelid should be fully reset so that the upper eyelid conforms to the normal physiological structure after operation and to reduce unnecessary misplaced scar adhesion between the tissues and form a smooth and vivid double-eyelid shape. In the inner, middle, and outer parts of the incision, the orbicularis oculi muscle was anchored to the tarsus and anterior tarsus tissue complex to simulate the anatomical basis of the natural double eyelid. Skin from the other incision sites was intermittently sutured and fixed to the tarsus and anterior tarsus tissues to promote more durable and stable adhesion and provide a dynamic basis for the formation of the double eyelid. During clinical practice, we confirmed that the above double-fixation suture method has the following advantages: (1) Appropriate orbicularis oculi muscle sutures at the upper and lower edges of the incision maintain tissue continuity and retain the full shape of the skin under the skin, avoiding skin depression and ladder sensations, and reducing tension at the skin incision, helping to avoid an overly deep double eyelid line after the operation and reduce the visible scarring of surgery when the eye is closed. (2) Fixing the orbicularis oculi muscles in the inner, middle, and outer regions to the tarsus and anterior tissue of the tarsus, and reconstructing the normal structure of the eyelid muscle layer as much as possible reduces unnecessary scarring at the adhesion site between the layers. (3) A firm adhesion scar is formed between the skin of the tarsus and other eyelid parts, reducing the possibility of the double eyelid losing depth and disappearing. (4) The mechanical point runs through the skin–muscle–tarsus and the pretarsal tissue, so that a stable interaction is formed between the orbicularis oculi muscle and the tarsus, as well as between the skin and the tarsus, which reduces the risk of a shallow double-eyelid line that may eventually disappear and maintains the stability of the double-eyelid shape. This study had some limitations. The postoperative follow-up time was short, as patients have been followed up for no more than 2 years at the time of writing. In the future, we will continue to follow up patients and expand the clinical data to better verify the surgical effects.

In summary, our method combining the two suture methods, skin–tarsus–skin and orbicularis–tarsus–orbicularis, was successful. Double-suture fixation increased the stability of the double eyelid, reduced the visibility of surgical marks at the double-eyelid line when the eye was closed, and produced an effect close to the physiological structure and appearance of the natural double eyelid. A natural, realistic, and stable double-eyelid effect was achieved.

Qing Ye, MD
Hubei Provincial Hospital of Integrated Chinese and Western Medicine
No.11 LingJiaohu Road
Wuhan, Hubei Province
China
E-mail: qingyework@outlook.com

DISCLOSURE

The authors have no financial interest with respect to the research, authorship, and publication of this article. This work was funded by Science and Technology of Jiangxi Provincial Department of Education to Tingfeng Xiong (grant no.: GJJ211843).

PATIENT CONSENT

The patients provided written consent for the use of their images.

ETHICAL APPROVAL

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

REFERENCES

1. Bueller H. Ideal facial relationships and goals. *Facial Plast Surg.* 2018;34:458–465.
2. Burusapat C, Thanapurirat S, Wanichjaroen N, et al. Anthropometry analysis of beautiful upper eyelids in Oriental: new eyelid crease ratio and clinical application. *Aesthetic Plast Surg.* 2020;44:392–410.
3. Paik JS, Lee JH, Uppal S, et al. Intricacies of upper blepharoplasty in Asian burden lids. *Facial Plast Surg.* 2020;36:563–574.
4. Wang C, Mei X, Pu LLQ. Asian upper blepharoplasty in women: a comprehensive approach for a natural and aesthetically pleasing outcome. *Aesthet Surg J.* 2021;41:1346–1355.
5. Chen WP. Visual, physiological, and aesthetic factors and pitfalls in Asian blepharoplasty. *Aesthet Surg J.* 2016;36:275–283.
6. Chen WP, Park JD. Asian upper lid blepharoplasty: an update on indications and technique. *Facial Plast Surg.* 2013;29:26–31.
7. Gu T, Dong G, Teng L, et al. Orbicularis–tarsus–orbital septum fixation technique in Asian double-eyelid blepharoplasty: a retrospective study. *J Craniofac Surg.* 2022;33:2638–2643.
8. Jin R, Shen Y, Yu W, et al. Tarsal-fixation with aponeurotic flap linkage in blepharoplasty: bridge technique. *Aesthet Surg J.* 2020;40:NP648–NP654.
9. Chen WPD. Depth of upper lid crease construction in Asian blepharoplasty. *Plast Reconstr Surg Glob Open.* 2022;10:e4427.
10. Gómez VHA, Espinoza JAG, López JCM, et al. Upper blepharoplasty scar and patient satisfaction evaluation in a plastic surgery center in Mexico. *J Biosci Med.* 2020;8:77.
11. No YA, Kim BJ, Kim MN, et al. The clinical experience and efficacy of radiofrequency device for wrinkle treatment. *Lasers Med Sci.* 2017;32:1449–1450.
12. Jeong S, Lemke BN, Dortzbach RK, et al. The Asian upper eyelid: an anatomical study with comparison to the Caucasian eyelid. *Arch Ophthalmol.* 1999;117:907–912.
13. Song RY, Song YG. Double eyelid operations. *Aesthetic Plast Surg.* 1985;9:173–180.
14. Chen WP. The eyelid crease height, depth, and shape: a scoring system for revisional Asian blepharoplasty. *Plast Reconstr Surg Global Open.* 2020;8:e2802.
15. Sun Y, Liu R, Yu N, et al. Tarsus–orbicularis–septum fixation in double-eyelid blepharoplasty: a reliable and flexible technique. *Clin Cosmet Investig Dermatol.* 2022;15:1125–1132.
16. Wang Y, Cao Y, Xie A. A modified procedure for blepharoplasty: physiological structure reconstruction of upper eyelids. *J Craniofac Surg.* 2020;31:456–459.