



Orbicularis–White Line Fixation in Asian Blepharoplasty: Kiss Technique

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Abstract

Background In recent years, because the formation mechanism of double eyelids in Asians is still controversial, many techniques for double-eyelid plasty have been developed. However, the removal of large amounts of pretarsal tissue and the obvious scars in those techniques make patients dissatisfied with the appearance. Thus, we have devised a novel surgical approach named the kiss technique. The method is to create a physiological double-eyelid fold on the basis of the formation mechanism of double-eyelid creases.

Methods From January 2017 to March 2019, the novel blepharoplasty was performed on 386 Chinese patients (769 eyes) in our department. Patients were evaluated at 3–24 months after surgery. Instead of dividing the orbital septum all the way to the orbital margin both medially and laterally, all that is required is to dissect the pretarsal orbicularis oculi muscle inferiorly to the lower border of the tarsus and to incise the pretarsal extension of the aponeurosis to expose the white line. Then, the white line is sutured to the orbicularis oculi muscle. Finally, the skin incisions are sutured interruptedly, and a vivid fold is created.

Results The general satisfaction rate was 97.5%. The edema period for most patients ended within 2 weeks. The scars became unnoticeable after 3–6 months. Disappearance of the fold was not found in any case.

Conclusions The kiss technique is a simple and effective method, which can not only create a natural double crease but also reduce the complications of double-eyelid surgery.

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Keywords Blepharoplasty · Double-eyelid plasty · Orbicularis oculi muscle · White line · Kiss technique

Introduction

Blepharoplasty, or double-eyelid plasty, is one of the most popular cosmetic surgeries in Asia [1]. Recently, because the formation mechanism of double eyelids in Asians is controversial, various methods have been described in the literature, including incisional and nonincisional methods. The nonincisional technique is quick and simple, but it has a high relapse rate [2, 3]. All of the incisional techniques in the past focused on fixing the pretarsal skin or orbicularis to either the tarsal plate or to the levator aponeurosis. Although the relapse rate is lower than in the suture technique, the swelling period can last very long, and a distinct sunken scar usually is unavoidable [4].

To address these issues, we observed the anatomy of the upper eyelid during the operation and found that when the patient opened his eyes, the silvery white tissue 3–4 mm above the tarsal plate was the first thing to move upward

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and inward (Figs. 1, 2). And according to our observation, the orbital septum merged smoothly with the levator aponeurosis and became the conjoined fascia exhibiting as a shiny silver–whitish robust ligamentous structure which was similar to the levator aponeurosis, and actually it was the distal end of the levator aponeurosis. Therefore, this white tissue can transmit the strength of the levator muscle and was the nearest position of the levator aponeurosis to the pretarsal orbicularis oculi muscle.

Then we noticed that as early as 1994, Miyake et al. [5] already mentioned the structure terminating above the tarsal margin. Subsequently, anatomic studies showed that the vertical orbital septum fused with the levator palpebrae superioris aponeurosis into a whitish connective tissue structure, namely the white line, in connection with the superior tarsal plate margin [6]. What is more, Hirohiko Kakizaki described the white line as the distal edge of the anterior layer of the levator aponeurosis through the orbital septum. He also found that the average distances from the superior tarsal plate border to the white line were 3.0 mm in the medial area, 3.7 mm in the central area, and 0.9 mm laterally. But in some individuals, this distance was higher medially than centrally [7]. They also suggested that the white line may be helpful to improve the cosmetic outcome of blepharoplasty.

Based on this anatomical development, we have devised an orbicularis oculi muscle–white line fixation technique to reduce various complications of blepharoplasty mentioned above. Without dissection of the orbital septum and removal of pretarsal tissues, fixation of the white line and orbicularis oculi muscle alone could mimic the physiological structure of natural double eyelids.

Because the procedure of fixing the orbicularis oculi muscle to the white line is similar to locked lips, and with

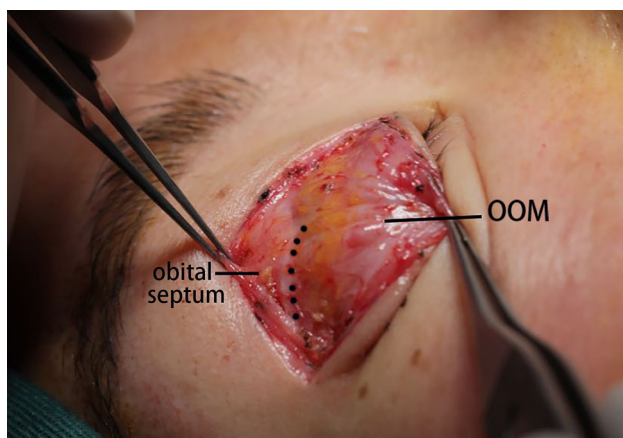


Fig. 1 When the patient closed her eyes, we observed that there is a silvery white tissue (the black dotted line) 3–4 mm above the tarsal plate. OOM orbicularis oculi fat

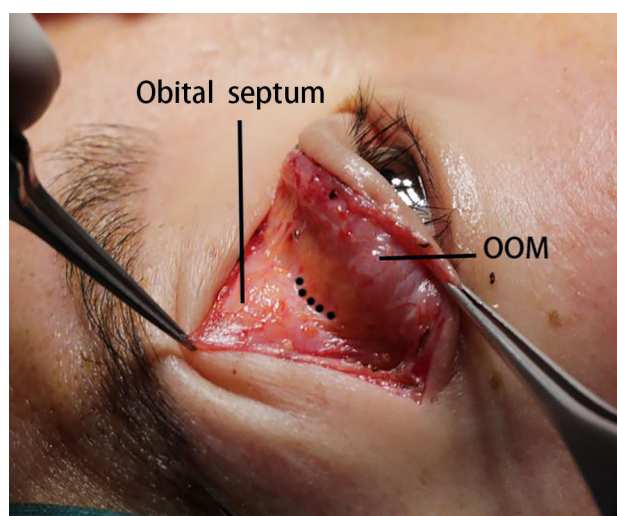


Fig. 2 Asking the patient to open her eyes, we observed that the silvery white tissue 3–4 mm above the tarsal plate was the first thing to move upward and inward

the inspiration of the kiss flap [8], the author named it the kiss technique.

Patients and Methods

A total of 386 patients (769 eyes) underwent the kiss technique between January 2017 and March 2019. The 23 men and 363 women in the study ranged in age from 18 to 56 years. For every patient, 3–24-month (average 9-month) follow-up evaluation was regularly carried out. Postoperative evaluation includes the stability of double eyelid, asymmetry, double fold curve, and scar formation. All patients signed informed consents before the operation.

All the figures were processed with Adobe Photoshop CC 2019.

Surgical Technique

With the patient in the supine position, the fold line of the upper eyelid was marked. The height of the line usually was 6.5–7.5 mm. The eyelid with lax skin will have a marking 3–4 mm above the fold line. In the medial canthal area, the line continues when the Y–W epicanthoplasty was necessary [9]. The operation was performed with the patient under anesthesia induced by injecting 4 ml of 2% lidocaine containing 1:100,000 epinephrine. The incision was then made through the skin using a no. 11 sharp blade along the marked line. Once the incision spread the skin edges apart, the author used the monopolar electrical cautery for coagulation hemostasis and then transected the deeper tissue including the orbicularis oculi muscle and the

retro-orbicularis oculi muscle fat (Fig. 3). Gentle upward retraction of the upper eyelid skin and muscle flap revealed a tightly stretched orbital septum and pretarsal fat. Previous techniques require incision of the orbital septum medially and laterally; however, this technique does not.

Dissection is performed between the ROOF layer and the pretarsal fascia. Usually, the orbicularis oculi muscles were dissected inferiorly to the lower border of the tarsus using an ophthalmic scissor (Fig. 4). The dissection edge should stay 1–2 mm away from the palpebral margin to avoid disruption of the cilia. Sometimes, dissection of the oculi muscle downward was not enough, because there was a loose connection usually formed by the fibroadipose tissue between the pretarsal fat and the septum, and dividing this space was important to expose the white line (Fig. 5). Then, turning the orbital septum upward with forceps, the white line was more widely exposed as a pearly white, glistening membrane in proximity to the superior tarsal plate margin (Fig. 6). Usually, the Müller muscle could be seen between the white line and the upper tarsal plate margin. As the patient opened his eyes, the three substances contracted rapidly to lift the upper eyelid, which were named the triad of the kiss technique by the author (Fig. 7).

The pretarsal orbicularis oculi muscle was then gently grasped with forceps, the needle passed through the muscle and retro-orbicularis oculus fat (ROOF) near the dermis (Fig. 8). Unlike the suture through the pretarsal orbicularis oculi muscle only, the suture through the muscle and the fatty fibrous tissue could hold tissue for a much longer

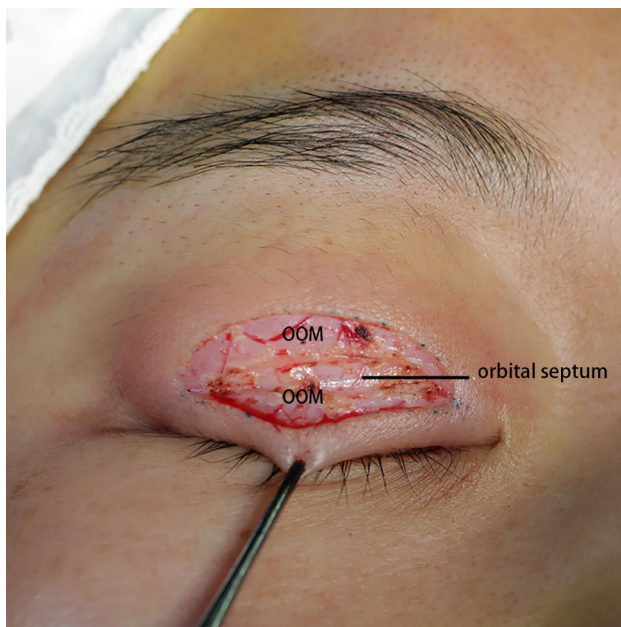


Fig. 3 After incision of the skin and the orbicularis oculi muscle, the orbital septum was revealed



Fig. 4 Dissection between ROOF and pretarsal fascia. The orbicularis oculi muscles were dissected inferiorly to the lower border of the tarsus. Meanwhile, the ineffective aponeurotic extension was cutoff

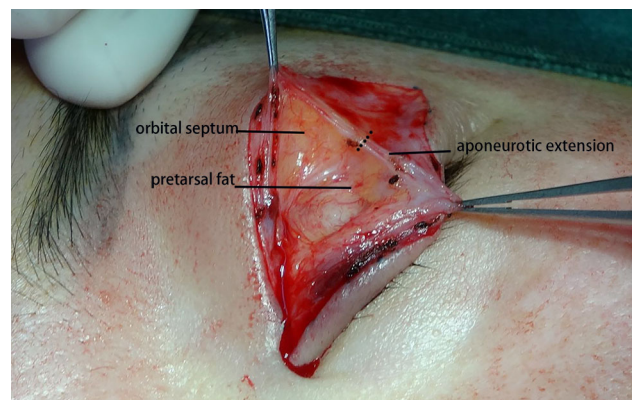


Fig. 5 Dividing the space between the orbital septum and pretarsal fat (from the black dotted line)

postoperative period. Subsequently, the white line was gently grasped with forceps. A 7–0 nylon suture was passed through this line (Fig. 9). The first suture was placed at the midpupillary point. The patient was then asked to open the eyes to compare the initial results. This suture was most important in obtaining symmetry between the eyes. The second suture was placed near the medial canthus. Usually, the white line in the medial canthal area was rather high or may blend in with the fatty fibrous tissue, taking an extra orbicularis oculi muscle–pretarsal fascia fixation horizontally can compensate for the lack of traction by the white line. The third suture was placed in the lateral canthal area. All these three sutures were parallel mattress sutures (Fig. 10). If the surgeon was concerned about the fixation, he or she could add 1 or 2 additional sutures at an even distance for security. Once the sutures were completed, the

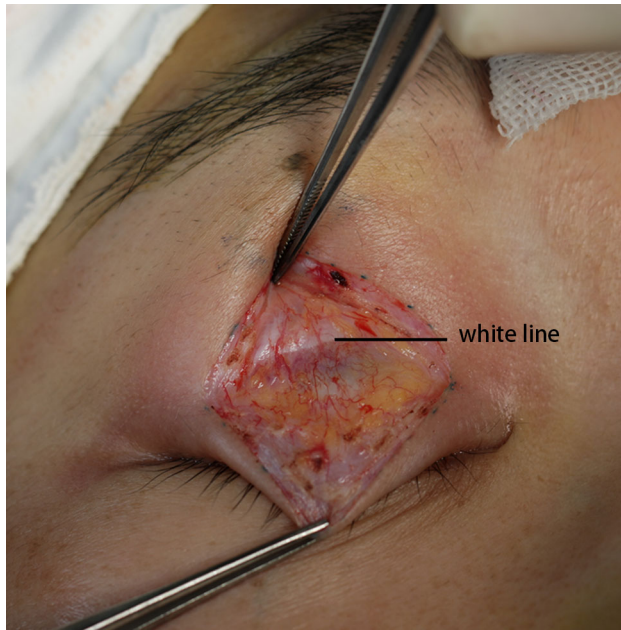


Fig. 6 The exposure of the white line, which exhibits as a pearly white, glistening membrane in proximity to the superior tarsal plate margin

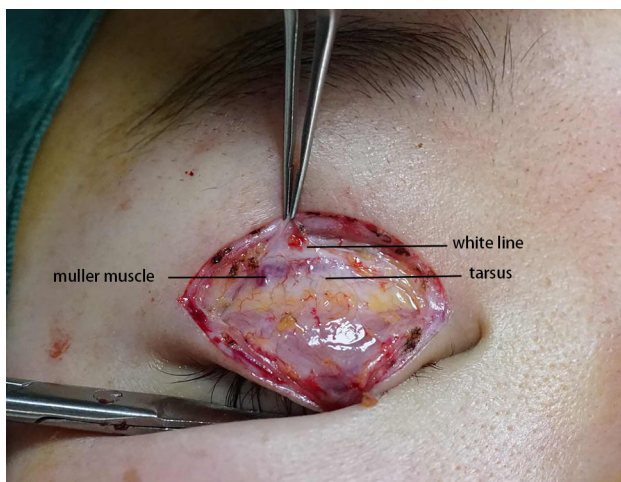


Fig. 7 The triad of the kiss technique, which is the first substances to contract and it can transmit dynamic “motor power” of the levator muscle to the upper eyelid

patient was asked to open and close the eyes. The surgeon should make sure that the tarsal margin does not evert excessively. Skin closure was done with a 7–0 nylon suture in an interrupted suture manner. The radian and symmetry were carefully rechecked, and the location of the fixation could be readjusted if required.



Fig. 8 A 7–0 nylon suture needle passed through the orbicularis oculi muscle and ROOF at the midpupillary point

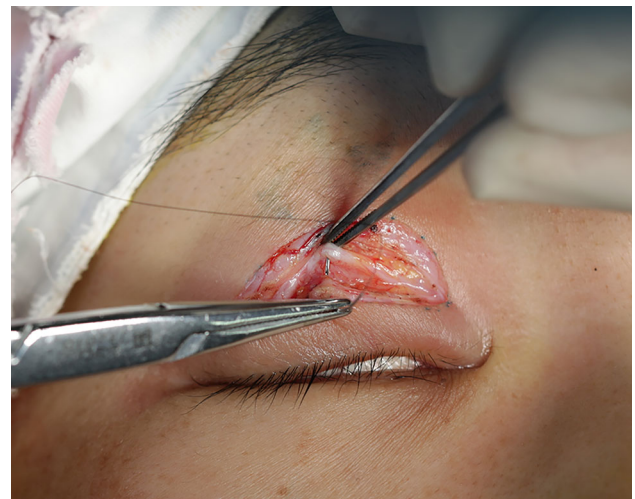


Fig. 9 The needle passed through the white line

Postoperative Care

The surgical area was spread with a thin layer of Aureomycin oclentum and then covered with a pressure dressing, which was removed the next day. Before the stitches were removed, sterilization was performed twice a day on the incisions for a period of 7 days.



Fig. 10 Parallel mattress sutures at the midpupillary point, the lateral canthal area, and the inner canthal area

Efficacy Evaluation

Clinical efficacy assessments were completed by the patients and the author at the 7th day, the 3rd month, the 6th month, and the 12th month after the operation. It was divided into three grades [10].

Fully satisfactory Double-eyelid creases are well formed and natural looking, with appropriate sizes in length and width; bilateral eyelid creases are symmetrical; the edema period is short (within 3 weeks); the incision scar is flat and unnoticeable; subjects are satisfied with the results.

Basically satisfactory Double-eyelid creases are well formed and natural looking, but there is a slight asymmetry in length or width; the edema period is slightly long (during 3–8 weeks); the incision scar is not very flat; subjects are generally satisfied with the results; reoperation is not needed.

Unsatisfactory There are no double-eyelid creases or poor eyelid shape; bilateral asymmetry is obvious; the edema period is rather long (more than 8 weeks); the incision scar is notched and uneven; reoperation is needed.

Results

A total of 386 patients underwent upper blepharoplasty with the kiss technique. There were 363 women and 23 men, whose ages ranged from 18 to 56 years, with a median age of 29. All patients were Chinese. During the

3–24-month (average 9-month) follow-up period, the general satisfaction rate was 97.5% (750 eyes). Edema was not obvious in a week and disappeared in 3 weeks for most of the patients. A total of 735 eyes (95.6%) showed good fold curves. Four eyes had palpebral fold asymmetry caused by the rather high level of the white line near the inner canthus. Through a small incision, taking an extra orbicularis oculi muscle–pretarsal fascia fixation horizontally can successfully revise the problem. All patients were satisfied with the revision effects. The scars of the incision were no longer visible 3–6 months after the operation. Disappearance of the fold was not observed. No postoperative blepharoptosis was observed and no significant complications have occurred (Figs. 11, 12 and 13).

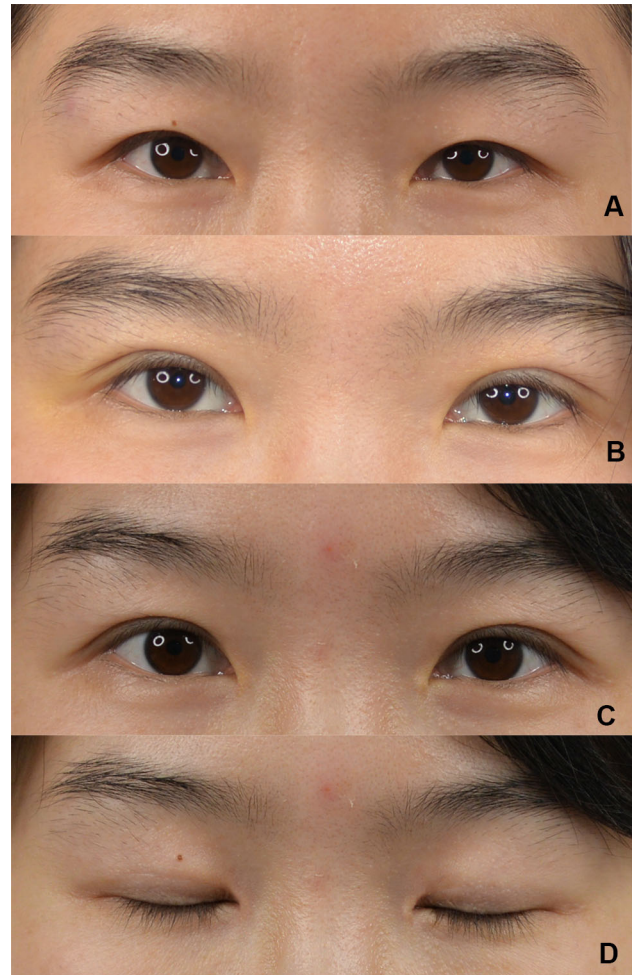


Fig. 11 a Preoperative view of a woman with single eyelids. b Seven-day postoperative view. c Six-month postoperative view with eyes open. D. Six-month postoperative view with eyes closed

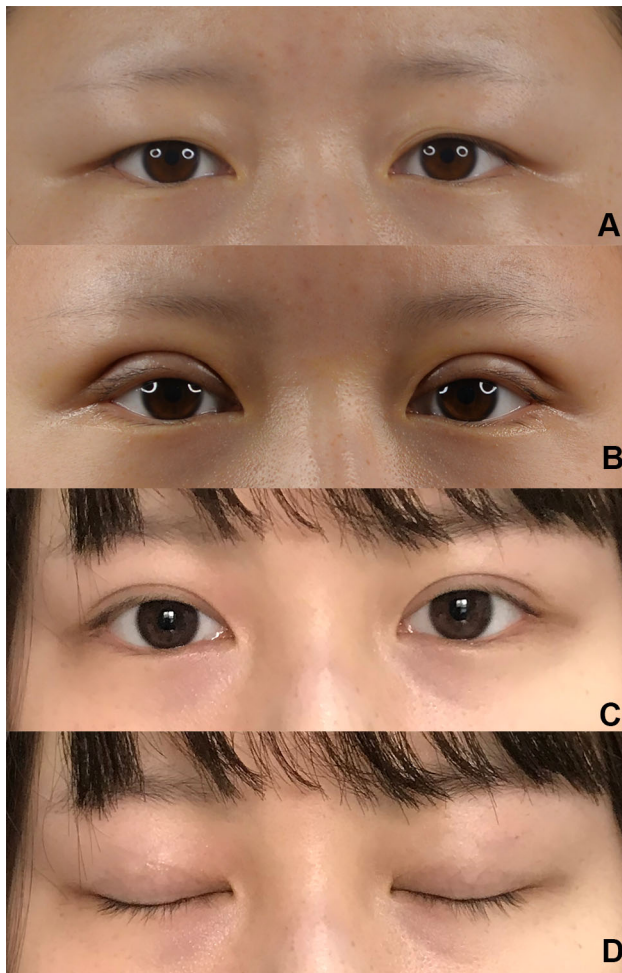


Fig. 12 **a** Preoperative view of a woman with puffy eyes. **b** Seven-day postoperative view. **c** Six-month postoperative view with eyes open. **d** Six-month postoperative view with eyes closed

Discussion

The most important thing to when attempting Asian upper blepharoplasty is a clear understanding of the anatomy of the double eyelid. The anterior layer of the upper eyelid refers to the skin, orbicularis oculi muscle, and ROOF (retro-orbicularis oculi fat). And the levator palpebrae superioris, levator palpebrae superior aponeurosis, Müller muscle, and tarsus make up the posterior layer of the upper eyelid, which is the original motive force of eye movement and the mechanical basis of blepharoplasty. The double eyelid is formed by the connection of the aponeurosis extension between the anterior layer and the posterior layer [11]. When the eye is opened, the posterior layer moves backward and upward, and the anterior layer is passively refolded to form a double-eyelid gully or fold. The orbital fat layer lubricates the relative movement between the anterior and posterior layers which is also the anatomical basis for the full appearance of the upper eyelid and the



Fig. 13 **a** Preoperative view of a woman with primary double eyelids. **b** Seven-day postoperative view. **c** Six-month postoperative view with eyes open. **d** Six-month postoperative view with eyes closed

racial difference between Eastern and Western ethnicities. Based on the anatomical characteristics, the traditional incision method was first described by Sayoc [12]. He sutured the anterior layer directly to the posterior layer where dermal–tarsal fixation required removal of part or all of the pretarsal orbicularis oculi muscle, which may lead to a depressed and unsightly scar. In the modified incision method [13], the pretarsal orbicularis oculi muscle is maintained, and the orbicularis–levator fixation brings a physiologically natural double eyelid. However, it may result in palpebral fold disappearance postoperatively. This is mainly because the suture point on the aponeurosis is not easily controlled; sometimes, it is easy to treat the septal extension as the aponeurosis of the levator muscle after opening the orbital septum [14], so that the force of the posterior layer cannot be effectively transmitted to the anterior layer. Furthermore, without the support of the orbital septum, the depositing of the preaponeurotic fat

above the orbicularis oculi muscle and the aponeurosis will impact the stitches, making the stitches easy to loosen. In addition, for many patients who were born with inner double eyelids, it is easy to form multiple eyelids after blepharoplasty in the modified incision method. Because the pretarsal extension of the aponeurosis is not cutoff (Fig. 14), when the strength of the suture weakens and becomes equal to the strength of the aponeurotic extension, the former folds come out again (Fig. 15). However, these problems do not exist in our new approach. The following advantages should be noted during this new operation:

1. There is no need to remove any pretarsal tissue during the procedure. The traditional incision method usually removes part or all of the pretarsal orbicularis oculi resulting in a sunken scar and a stiff appearance. However, the scars of the new technique were no longer visible 3–6 months after the operation due to the reservation of pretarsal tissues.
2. The authors do not need to incise the orbital septum medially and laterally, which can not only provide a short time of operation and faster recovery, but also avoid iatrogenic ptosis and multiple eyelids. Besides, the integrity of the orbital septum will provide good support for the preaponeurotic fat, so that it can protect sutures from being impacted. When the orbit septum contained excess fat, a small incision on the lateral side

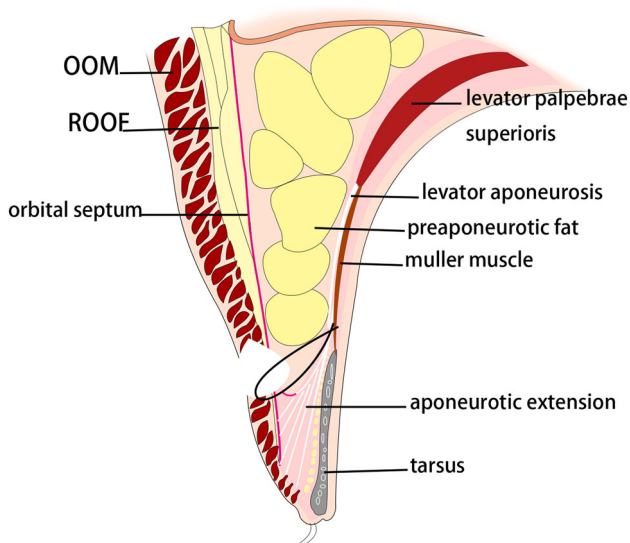


Fig. 14 Schematic layout of the modified incision method: The orbital septum was divided medially and laterally so that it could not support the depositing of the preaponeurotic fat above the orbicularis oculi muscle and the aponeurosis, which may impact the sutures and make the stitches easy to loosen. Furthermore, the old, ineffective extension of the aponeurosis was not dissected, which may result in multiple eyelids. OOM orbicularis oculi fat, ROOF retro-orbicularis oculi fat

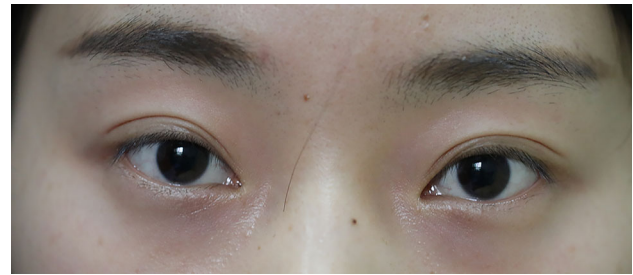


Fig. 15 The patient was treated with Park's technique one year postoperative, and her inborn eyelids reappeared

- of the orbital septum was made, and part of the fat pad could be removed.
3. Since the author dissects the old, ineffective extension of the aponeurosis and rebuilds the effective power system, the scar connection may be constructed between the orbicularis oculi muscle and the tarsus; thus, the patient's inborn folds will not reappear (Fig. 16).
4. The white line is the fusion line of the orbital septum and the levator aponeurosis, which is always located 3–4 mm above the superior border of the tarsal plate so that there is no need for repeated adjustment during the operation.
5. The white line is used to transmit dynamic “motor power” of the levator muscle to the upper eyelid, and both the white line and the orbicularis oculi muscle are elastic tissues; the formation of physiologically natural eyelid folds depends on their flexible fixation rather than excessive scar formation between the skin and tarsal plate.

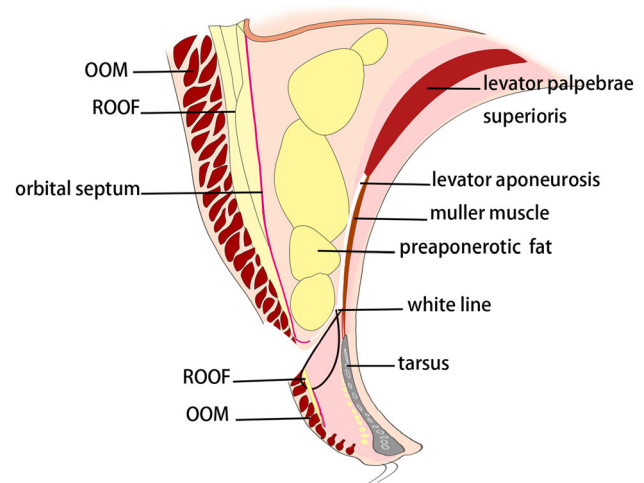


Fig. 16 Schematic layout of the kiss technique: The fixation suture is placed through the orbicularis oculi muscle, the ROOF, and the white line. Pretarsal extension of the aponeurosis has been dissected. And the orbital septum is intact

The only drawback is that it may be difficult to identify the white line for beginners. As we described above, the white line is the site of confluence between the septum and aponeurosis, which is always situated above the superior border of the tarsal plate. But the lower margin of the preaponeurotic fat reaches below the white line, and usually, there is fibroadipose tissue between the preaponeurotic fat pad and the pretarsal fascia. These factors may have precluded an accurate identification of the junction of the orbital septum and the levator aponeurosis in Asian eyelids. So dividing the fibroadipose tissues and turning the orbital septum upward are important to expose the pearl white line.

Conclusion

The kiss technique is a simple and effective method. It is successful in developing a natural-looking and long-lasting double-eyelid fold with inconspicuous scars and a short recovery period.

Compliance with Ethical Standards

Conflict of interest No potential conflict of interest was reported by the authors.

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 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent For this type of study, informed consent is not required.

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