Creating Natural Double Eyelids With Continuous Buried Suture and Mini-incision Technique Using Subcutaneous Absorbable Suture for Patients With Puffy Eyelids

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**IMPORTANCE** Incision and buried suture are 2 primary techniques for creating double eyelids. The incision method is suitable for all kinds of eyelids, but operational trauma and prolonged recovery time limit its application. The nonincision approach can shape a natural and vivid crease with a relatively short recovery time. However, it is not suitable for patients with puffy eyelids, and in those patients the duration of the supratarsal crease is not long. We propose a method of combining the techniques of continuous buried suture and mini-incision.

**OBJECTIVE** To explore a new kind of double eyelid plasty, a corrective surgical procedure for patients with puffy eyelids.

**DESIGN, SETTING, AND PARTICIPANTS** Observational study of 221 patients with puffy single eyelids who underwent this new blepharoplasty from May 2007 to and March 2012.

**INTERVENTIONS** Combined continuous buried-suture and mini-incision surgery using subcutaneous absorbable suture to create natural double eyelids under local anesthesia. All procedures were performed by the same surgeon.

**MAIN OUTCOMES AND MEASURES** All patients were observed after surgery for a period ranging from 1 to 28 months (mean follow-up, 16 months). Data collection included operative time, postoperative recovery and complications.

**RESULTS** All double eyelids appeared natural after short operative time and rapid postoperative recovery, leaving an invisible scar and long-lasting supratarsal crease. No corneal damage or infection occurred.

**CONCLUSIONS AND RELEVANCE** Combined continuous buried-suture and mini-incision surgery using subcutaneous absorbable suture to create natural double eyelids is a reliable, durable, and less-invasive technique for patients with puffy eyelids.

**LEVEL OF EVIDENCE** 2.
Double-eyelid surgery is the most commonly performed aesthetic procedure in Asians. The technique is used to induce loose cicatriziation between the skin and the levator aponeurosis. The operations can be divided into 2 major categories: suture ligation (buried-suture technique) and external-incision technique. In most cases, the double eyelids of patients look natural, and the convalescence period is brief after the buried-suture operation. Therefore, this operation is preferred by most patients. However, it is not suitable for patients whose upper eyelids are puffy because the eyelids will appear to be bloated, and the double eyelid shape is not favorable after this operation.

Traditionally, a full-incision blepharoplasty technique is used for removal of excessive fat and simultaneous creation of a double eyelid. This technique can be applied to almost all types of eyelids; however, several disadvantages limit its application. These limitations include prolonged recovery time and the visible scar formation. Additionally, patients also need to return to the hospital for suture removal.

Most Asians have hypertrophic eyelids and lack of a supratarsal crease, so they are not suitable for the buried-suture approach. In addition, most would prefer to avoid a return visit for suture removal. To resolve this problem, we combined the continuous buried-suture approach with a mini-incision to create natural double eyelids for these Asian patients. We created a 5-mm mini-incision at the middle point in the fold of the double eyelids and cut off the orbital fat through the opening of the orbital septum. After performing the continuous buried-suture procedure for double eyelids, we anchored the subcutaneous tissue on the edge of the incision and the pretarsal tissue with 6-0 absorbable sutures. The technique is suitable for patients with puffy eyelids. The advantages of this improved operation include lack of visible incision scar, no suture removal, and durable results.

Methods

Preoperative Evaluation of Double Eyelids
A total of 221 patients with puffy single eyelids underwent this blepharoplasty from May 2007 to March 2012. The local institutional research and human ethics committees approved this study, and written informed consent was received from each patient. All patients were female, and their mean age was 24 years (age range, 20-38 years). The purpose for this surgery in all patients was cosmetic enhancement. Patients with fatty upper eyelids were chosen for participation in this study, and follow-up ranged from 1 to 28 months (mean follow-up, 16 months).

The height and shape of the fold was determined according to both the surgeon’s preference and the characteristics of patient’s tarsal while the patient was in the sitting position. In general, the tarsal height was usually 6 to 8 mm above the ciliary margin or along a naturally established line. Because skin was not removed, in contrast to the incision method, the crease line of this method was designed 1 to 2 mm higher. Along the crease line, fine forceps were gently pushed upward to open the patient’s eyes. A crease line could be seen clearly. The lines could be adjusted, depending on the patient’s preference. The line was marked on the skin to identify adequate double eyelids, and the line was equally divided into 6 portions. The 6 points were the locations of the stab incisions, each of which was shorter than 1 mm. Then the 5-mm mini-incision was defined by the fourth point, which was located between the medial canthus and the lateral medial canthus, along the double-eyelid fold line (Figure 1A).

Surgical Procedure
After disinfection with povidone iodine, 5%, local anesthesia was injected into the upper eyelids (lidocaine, 0.5%, mixed with epinephrine, 1/5000). To make enough space for the suture and knots, we punctured the dermis at the designated spots with a No. 11 blade. Then we created a 5-mm mini-incision with a No. 11 blade at the marked line located at the fourth point, which was calculated from the medial canthus to the lateral medial canthus along the double-eyelid fold line. We dissected the incision slightly with a fine scissors to avoid cutting the subcutaneous vascular system. Then we excised the orbicularis oculi and submuscular areolar tissue to the level of the pretarsal area and levator aponeurosis. We exposed and opened the orbital septum. Excess orbital septal fat and orbicularis oculi muscle were resected through the mini-incision. Then we treated the visible vessels in the capsule using electrocoagulation to prevent bleeding. We smeared antibiotic eye gel on a corneal protector and placed it beneath the upper eyelid.
Patients therefore underwent a second operation. We repaired 15 patients (1.5%) who complained of mild asymmetry. These 15 patients (1.46%) were satisfied with the surgical outcome. Among them, 9 patients (4.3%), experienced regression of the eyelid lines; 3 patients (1.46%) were dissatisfied with the double-eyelid line with continuous buried sutures. After the second operation, all of the patients rated the cosmetic results satisfactory (eFigure 1 in the Supplement). No obvious scarring was observed in any patient. No foreign-body granulation was observed in any patients. No corneal damage or infection occurred. The scars were natural appearance, long-lasting crease, and rapid postoperative recuperation. In our series, 190 of 205 patients (92.7%) were satisfied with the surgical outcome, which is suitable for all kinds of single-eyelid patients; however, the long recovery time, a possible unnatural appearance lasting for months, and visible scar formation are serious concerns.

Swollen upper eyelid may be induced by hypertrophy of orbital septum fat, orbicularis oculi muscle, subcutaneous fat, or fat before meibomian. The lateral orbital septum fat is the leading cause of swollen upper eyelid, which separates the upper-eyelid aponeurosis from the upper-eyelid skin and prevents the formation of double eyelid. About 30% to 40% of single-eyelid Oriental patients have a swollen upper eyelid. Our technique combines the advantages of the suture-ligation method and the external-incision method. We resect proper orbital septal fat as well as orbicularis oculi muscle through the mini-incision. After a small portion of subcutaneous fat and orbicularis muscle are excised, the whitish orbital septum can

Discussion

The outcome of this study indicates that combined continuous buried-suture and mini-incision surgery produced satisfactory results to create natural double eyelids in patients with puffy eyelids. Investigators have reported that about 50% of Asians do not have upper-eyelid creases. The double-eyelid operation has become the most common cosmetic procedure in Asia and the third most common procedure among Asian Americans.5

The suture ligation technique was first described by Mikamo.7 In Mikamo’s method, 3 sutures were passed through the full thickness of the eyelid 3 mm apart and 6 to 8 mm superior to the lid margin, which ensures a naturally occurring crease. Zubiri8 reported that subdermal placement of sutures is a good choice for double-eyelid surgery fold, which may result in a more ethnically natural look. Moon et al9 proposed a modified single-knot, continuous, buried nonincision technique in durable double-eyelid surgery, which provides satisfactory aesthetic results.

Other authors have reported minor modifications to the suture ligation technique. Some surgeons placed the crease 7 to 8 mm from the ciliary margin.10 This technique is a relatively simple procedure associated with invisible scarring, short healing time, and rapid recovery. However, it is also associated with some drawbacks, such as lack of long-lasting crease and inability to correct adipose fullness.11 As a result, compared with those of the incision techniques, the long-term effects of nonincision procedures have been questioned.12 Because this procedure does not include any skin, muscle, or fat excision, patients with redundant skin or excessive amounts of fat would not be considered appropriate candidates for this procedure.13,14 Since most Asians’ single eyelids are swollen, most are not suitable for this technique.

The external incision technique was first described by Maruo.15 He made an incision across the eyelid, 7 mm from the ciliary margin, and closed the incision from the conjunctiva to the superior tarsal border of the anterior skin edge to the tarsal plate. It is a technique with a longer-lasting outcome and is suitable for all kinds of single-eyelid patients; however, the long recovery time, a possible unnatural appearance lasting for months, and visible scar formation are serious concerns.

A 6-0 nylon suture was inserted into spot d (Figure 1) and exited through spot c in the punctured skin through the superficial part of the tarsus. The identical procedure was repeated for the segments c to b, b to a, a to b, b to c, c to d, d to e, e to f, f to e, and e to d (Figure 1B and C). The 2 ends of the sutures were tied and the knots buried under the skin at spot d. The needle should bite the pretarsal tissue in a stable manner, or the formed double eyelid will disappear postoperatively.

Finally, at spot d, we sutured together the subcutaneous tissue on the edge of the incision and the superficial part of the tarsus (upper end) with 6-0 absorbable suture to fasten the double-eyelid line (Figure 2).

Results

This improved operation was performed in 221 patients with fatty single eyelids. A total of 205 patients were observed from 1 to 28 months postoperatively (mean follow-up, 16 months). Their ages ranged from 20 to 38 years old (mean age, 24 years). The levels of patient and surgeon satisfaction were evaluated according to the natural appearance, long-lasting crease, and rapid postoperative recuperation. In our series, 190 of 205 patients (92.7%) were satisfied with the surgical outcome, which was natural appearance, long-lasting crease, and rapid postoperative recovery (Figure 3) (eFigure 1 and eFigure 2 in the Supplement). Fifteen patients (7.3%) were dissatisfied with the surgical outcome. Among them, 9 patients (4.3%), experienced regression of the eyelid lines; 3 patients (1.46%) were dissatisfied with the shape of the double-eyelid line; and 2 patients (1.5%) complained of mild asymmetry. These 15 patients therefore underwent a second operation. We repaired the double-eyelid line with continuous buried sutures. After the second operation, all of the patients rated the cosmetic results satisfactory (eFigure 1 in the Supplement). No obvious edema or hematoma in local tissues was observed during the operation. No foreign-body granulation was observed in any patients. No corneal damage or infection occurred. The scars of the puncture incision and mini-incision were invisible on follow-up examinations.
be easily identified. When the septum is opened, a gentle squeeze may facilitate herniation of the fat pad. Removing the fat pad from the mini-incision puncture is simple and safe with this new technique. A puffy fat pad may weaken the pretarsal skin-scarring adhesion, and resection of the puffy fat pad may better define the supratarsal fold.16

After resecting the puffy fat pad, we anchor the subcutaneous tissue on the edge of the incision and the pretarsal tissue with 6-0 absorbable sutures (polyglactin 910). Using this approach, we create a stronger fixation between the dermis and the tarsal-levator complex. These operations strengthen the adhesion between the skin and the pretarsal tissue. The absorbable lines will avoid the need for return visits to remove stitches. Patients may find this simplified operation favorable.

Initially, when we cut off the orbital fat through this small incision, we adopted continuous buried sutures directly. Then we found that some patients with double-eyelid fold developed a lack of adhesion at the position of the small incision, which reduced the effectiveness of this operation. The most likely reason for this lack of cohesion was that excising the subcutaneous tissue limited the adhesion or scar tissue between the skin and the pretarsal tissue. To address this issue, we sutured the subcutaneous tissue on the edge of the incision and the pretarsal tissue with a 6-0 absorbable suture, which strengthened the adhesion between the skin and the pretarsal tissue. By the time the absorbable lines are completely absorbed, the scarring adhesion between subcutaneous tissue and pretarsal tissue has been formed. The follow-up outcomes confirmed that this modification of the procedure ensured more permanent, and firmer, double eyelids.

Kruavit17 used a short-incision technique for Asian blepharoplasty in 6215 patients. The short-incision technique is more suitable for patients without loose upper-eyelid skin. However, patients must return to the hospital for removal of the stitches. Cho and Byun18 have reported a new combination technique using a suture and incision method for creating a more natural double eyelid. There again, however, patients required an additional visit to have stitches removed. With our technique, patients do not need to return to the hospital for suture removal. Additionally, due to the smaller incision, there is minimal surgical scarring compared method described by Cho and Byun.18

The single eyelid is due to the absence or paucity of fibrous attachments between the levator aponeurosis and the orbicularis and skin of the eyelid. Tung et al19 reported that fat removal along with suture blepharoplasty is a good choice for creating natural double eyelids. However, the low durability of the resulting double eyelid restricts the use of this technique. After resecting the orbital fat, we performed a transconjunctival buried suture procedure to create double eyelids. Then we anchored the subcutaneous tissue on the edge of the incision and the pretarsal tissue with a 6-0 absorbable line. The resection of the puffy fat pad enhances the fixation between the dermis and the levator aponeurosis or tarsal plate. The suture method has been criticized for its impermanence,20 with dermal adhesion alone cited as insufficient for long-term fixation. We resected the puffy fat pad through a mini-incision and

Figure 3. Preoperative, Intraoperative, and Postoperative Clinical Images of a 20-Year-Old Woman

A, Preoperative photograph shows single upper eyelids and puffy eyelids of a patient who underwent upper blepharoplasty of both eyes. B, Preoperative design of crease height and puncture incisions. C, With the patient under local anesthesia, the dermis was punctured at the designated points with a No. 11 blade. D, The orbital fat was released through the mini incisions. E, Appearance after suture fixation. F, Appearance immediately after the upper blepharoplasty treatment. G, Appearance of open eyes 2 months after the procedure. H, Appearance of closed eyes 2 month after surgery. Owing to the patient’s different eyelid conditions, there is slight asymmetry, but the patient was satisfied.
anchored the subcutaneous tissue on the edge of the incision and the pretarsal tissue with 6-0 absorbable sutures, which strengthened the double-eyelid lines. Finally, we performed a continuous buried-suture approach to attain the double eyelid.

This new technology has many advantages, such as simplifying the working process, minimal invasiveness, rapid recovery, nearly scar-free outcome, and reversibility, and this process produces a natural appearance. It is suitable for patients with puffy eyelids (mild to moderate) who want to avoid obvious traces of incision. However, excess loose upper eyelid skin and hypertrophied orbicularis oculi muscle cannot be removed through the incision. As a result, we do not recommend that patients with severe slackness of the upper eyelid and seriously hypertrophied orbicularis oculi muscle undergo this new procedure.

In summary, the modified technique combines the advantages of the suture-ligation and the external-incision methods to remove subcutaneous fat and anchor the pretarsal fascia/levator aponeurosis to the subcutaneous tissues. Our results demonstrate that this is a reliable, durable, and less-invasive technique for patients with puffy eyelids.

REFERENCES