INTRODUCTION

During the natural course of aging, excess skin, muscle, and fat can produce an unattractive bulge in the lower eyelid. This protrusion of the lower eyelid is an aesthetic condition often associated with an old and tired appearance. Although transcutaneous lower blepharoplasty can lead to a more acceptable aesthetic appearance, it has been associated with an increased risk of lower eyelid malposition. To minimize lower eyelid complications, lateral canthoplasty can be combined with lower blepharoplasty, as horizontal eyelid laxity, entropion, ectropion, and lateral canthal dystopia can all be corrected by lateral canthoplasty [1].

Because lower eyelid bags are a common problem in young people who prefer invisible postoperative scars, transconjunctival blepharoplasty has received increasing attention as an alternate technique to traditional transcutaneous blepharoplasty [2,3]. At the same time, lateral canthoplasty can be performed to maximize aesthetic outcomes. Many young Asian patients with short palpebral...
fissures and an up-slanting appearance seek not only a more youth-
ful appearance, but also larger, brighter, and oval-shaped eyes [4,5].

We performed transconjunctival lower blepharoplasty and later-
al canthoplasty using simple inferolateral canthotomy incisions at
the lateral canthus. The methodology employed allowed for exact
and easy performance of transconjunctival orbital fat removal and
orbital septal reset with a better operative field. Additionally, it al-
lowed lengthening of the lateral palpebral fissure and lowering of
the up-slanting lateral canthal angle. Herein, we describe the tech-
niques used and the outcomes experienced using lateral cantho-
plasty combined with lower blepharoplasty in young Asians.

METHODS

From June 2011 to May 2014, a total of 59 patients underwent cos-
metic lateral canthoplasties and transconjunctival lower blepharo-
plasties simultaneously, including inferior orbital fat removal and
orbital septal resets. The patients who had visible lower eyelid bulg-
ing without excess skin laxities and sought to correct their up-slan-
ting appearance or short lateral palpebral fissures were considered
as candidates. Patients who had dry eyes or severe exophthalmoses,
or sought to have an S-shaped lower eyelid margin were excluded
from the candidates. All patients were evaluated to identify the
presence of postoperative complications of the lower lid or lateral
canthus and the need for secondary operations. We measured the
pre- and postoperative palpebral fissure lengths using photograph-
ic analysis software (Image-pro Plus 5.0, Media Cybernetics, Silver
Spring, MD, USA). Patients included 1 man and 58 women rang-
ing in age from 19 to 37 years with an average age of 26.9 years.
The follow-up periods varied from 2 to 12 months, with an average

Fig. 1. (A) Inferolateral lateral canthotomy from the lateral canthal angle. (B) Freely everted lower eyelid after lateral canthotomy: the superfi-
cial lateral canthal tendon should also be transected. The transconjunctival incision is performed mediolaterally [red dashed line]. (C) The tar-
sal plate is sutured with non-absorbable suture material to the desired position of the periosteum on the inner aspect of the lateral orbital rim
the lateral orbital rim. (D) Postoperative changes of the lower eyelid and lateral canthus: lengthening and widening of the lateral palpebral fis-
sure is evident [shaded area].
of 3.4 months.

**Surgical techniques**

In the sitting position, a 7–8 mm skin marking was made for inferolateral canthotomy from the lateral canthal angle (Fig. 1A). Additionally the quantity of inferior orbital fat was assessed, and its prominence was marked. Lidocaine mixed with 1:100,000 epinephrine was used for local anesthesia and was injected diffusely to the lower periorbital tissues, conjunctivae, and lateral canthal area. Anesthetic eye drops were used to anesthetize the eyes, and corneal protectors were inserted. After applying traction sutures in the lower eyelid, the procedure was initiated with a lateral canthotomy. The lateral palpebral fissure was cut inferolaterally, including the skin, the orbicularis oculi muscle, and the conjunctiva. The superficial fanning fibers of the lateral canthal tendon were also transected and the lower eyelid was freely everted using traction sutures. A transconjunctival incision was placed 3–4 mm below the lid margin at the inferior edge of the tarsal plate (Fig. 1B). The incision was performed in a mediolateral direction and extended laterally as far as was necessary. Blunt dissections were performed with scissors along the preseptal plane to just above the arcus marginalis, keeping the orbital septum intact. Using electrocauterization, the orbital septum was cut at the arcus marginalis. Excessive fat was excised from the medial, middle, and lateral fat pads (Fig. 2A, B). The lower edge of the strong and reinforced upper orbital septum was then sutured to the periosteum of the orbital rim or arcus marginalis (Fig. 2C). The continuous suturing began medially with a 5-0 absorbable suture material. Completion of the orbital septal reset created a flat and strong correction of the previously bulging fat. The transconjunctival incision was closed from medial to lateral with a running 6-0 absorbing suture with buried knots.

After closing the conjunctiva, a mattress suture with a 5-0 non-absorbable suture material was applied through the tarsal plate, the orbicularis muscle, and the conjunctiva, and tightened to the desired position of the periosteum on the inner aspect of the lateral orbital rim (Fig. 1C). In general, the lateral canthus was positioned 1–2 mm higher horizontally than the medial canthus. A small wedge resection of the skin was used to avoid a dog ear deformity of the lower eyelid. To avoid webbing of the lateral canthus, the newly formed lateral canthal angle was carefully reconstructed, and the upper eyelid was sutured between the palpebral conjunctiva and skin, and the lower eyelid was sutured between the skin and skin (Fig. 1D).

**RESULTS**

In total, 59 patients underwent the aforementioned surgical techniques. All patients were evaluated with interviews and photographs taken at follow-up visits. Most of the patients obtained satisfactory aesthetic results after being followed up from 2 to 12 months postoperatively (Fig. 3, 4). The average length of the palpebral fissure increased by 2.9 mm, ranging from 2.4 to 4.2 mm.

The mean follow-up period was 3.4 months. There was no recurrence of lower eyelid bulging, postoperative asymmetry, or wound-related complications. However, three patients experienced entropion, and 2 patients experienced roundness of the lateral canthal angle. These postoperative complications resulted from fixation of the lateral canthus to the excessively inner surface of the lateral orbital rim. They were corrected by entropion correction surgery and by re-performing lateral canthoplasty. Chemosis was usually self-limited; however, some cases were treated with lubricants and steroid drops. A follow-up at two months after the surgery showed acceptable cosmetic scars in the lateral canthal area.

![Fig. 2.](image-url) [A] Bulging of the inferior orbital fat. [B] Transconjunctival preseptal approach for orbital fat (dotted arrow): the orbital septum is cut at the arcus marginalis, and excessive orbital fat is excised. [C] Orbital septal reset: the lower edge of the reinforced septum is sutured to the periosteum of the orbital rim or arcus marginalis.
DISCUSSION

The lower eyelid is divided into 3 lamellae: anterior, middle, and posterior. The anterior lamella includes the skin and orbicularis oculi muscle. The middle lamella is defined as a combination of the orbital septum, orbital fat, and suborbicularis fibroadipose tissue. The posterior lamella includes the retractors, tarsal plate, and conjunctiva. Among these, the orbital septum functions as a diaphragm to retain the contents within the orbit and requires strength for this function. Originally, the fat pad compartments of the lower eyelid had been thought to be divided into 3 parts: medial, central, and lateral. The medial and central fat pads are divided by the inferior oblique muscle, and the boundaries of the middle and lateral fat pads are defined by the arcuate expansion of Lockwood ligament [6].

Many theories have been advanced regarding the causes of orbital fat prolapse, including weakness of orbital septum, laxity or atrophy of the orbicularis oculi muscle, skin laxity and excess, and suspensory Lockwood’s ligament laxity [6,7]. However, none of these theories alone can explain the phenomenon sufficiently, as a fatty appearance can occur in young people who have no laxity of the relevant anatomical structures. In young people, a fat hernia appearance is usually congenital, which provides evidence for heritability [8]. In addition, the orbital septum is anatomically divided into 2 parts: an upper reinforced portion, supported by the capsulopalpebral fascia, and a lower unreinforced portion, which is not supported by the capsulopalpebral fascia [2]. In Asians, the area of the unreinforced portion is larger than in those from Western countries, and the lower eyelid appears to be thicker [6]. Although advantages of orbital fat preservation [9] and repositioning [10] have been reported, removal of excessive fat and resetting of the orbital septum can be helpful in young Asians with lower eyelid bulging. However, to avoid the development of local hollowing and sunken eyelids [2,7], the excessive orbital fat should be excised conservatively. The orbital septal reset can reestablish the normal position of the bulging orbital fat, avoid undercorrection, and provide prevention of recurrence [2,7].

The transconjunctival approach was first described in 1924 by Bourguet in the French literature, and it has evolved subsequently to become a popular method for the treatment of lower eyelid fat bulging due to minimized complications and better aesthetic results (invisible scars) [2,3]. However, a transconjunctival approach has a limited operative field. Therefore, accurate assessments of bulging orbital fat and manipulation of the orbital septum are difficult [2]. In particular, suturing the orbital septum to the insufficient periosteum of the lateral orbital rim is very difficult in pa-
tients with small orbits. In 1992, Hadeed described a lateral canthotomy transconjunctival approach to the orbit that allowed for excellent exposure of the surgical field [11]. In our cases, the lateral canthotomies were performed with transconjunctival lower blepharoplasties to secure sufficient operative fields, and the incisions were used for cosmetic lateral canthoplasties.

Lateral canthoplasty is commonly performed with lower blepharoplasty in elderly patients to reconstruct weakened lateral canthal tendons due to loss of lateral canthal support [1]. Conversely, lateral canthoplasty in young Asians is often performed to reshape the narrow and short appearance of the eyes to be clearer and larger. Several methods have been reported to increase the horizontal length of the palpebral fissure [4,12,13]. However, even the these methods are not perfectly ideal due to visible scars, disruption in the continuity of the lower lid, misalignment of the mucocutaneous junction of the lateral canthus, and length disparity between the upper and lower lids [14].

Lengthening and repositioning of the lateral canthus using lateral canthotomy was described by Jang et al. in 2009 [4]. This procedure comprised inferolateral canthotomy, tarsal-periosteal canthopexy, subciliary incision, and skin-muscle flap elevation. The lower lid skin and orbicularis muscle was redraped to avoid a dog ear deformity and to reduce the tension in the lateral canthal area. We modified this method to overcome disadvantages including subciliary incision and denervation of the orbicularis oculi muscle after lower blepharoplasty. To avoid the chance of lower eyelid retraction or ectropion, we performed a wedge excision of the lower eyelid skin instead of subciliary incision. To promote posterior forces of the lateral aspect of the eyelid, the tarsal-periosteal fixation was placed on the inner side, however, entropions were observed in some cases. No further complications were observed after changing the tarsal-periosteal fixation to the anterior surface of the orbital rim in these cases. This rigid tarsal-periosteal fixation is a familiar technique for plastic surgeons and is effective for the avoidance of recurrence and web formation. Additionally, surgeons can adjust the degree of horizontal lengthening and lowering of the lateral canthal angle according to the degree of flatten of the lower eyelid using this method.

A primary advantage of this combined technique is the ability to easily and precisely correct the lower eyelid bag. Moreover, aesthetic results and patient’s satisfaction can be maximized with cosmetic lateral canthoplasty in young Asian patients who have short palpebral fissures and up-slanting appearances.

CONCLUSIONS

Transconjunctival lower blepharoplasty and lateral canthoplasty were performed simultaneously in young Asian patients. Using the incision of lateral canthoplasty, a better operative field for manipulation of the orbital septum was obtained and the lower eyelid bag could be corrected more easily and accurately. Additionally, the short palpebral fissures and up-slanting lateral canthal angles were corrected without significant recurrence or visible scars. In conclusion, lateral canthoplasty combined with transconjunctival lower blepharoplasty is a safe and effective method to maximize aesthetic results in young Asian patients who seek a youthful and more attractive peri-orbital appearance.

REFERENCES