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Lowering Lateral Canthoplasty and Orbital Rim Shaving: An Ignored but Necessary Procedure for Maximizing the Effect of Reduction Malarplasty in Asians

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Abstract

Background Although reduction malarplasty is a well-accepted procedure for Asians with prominent cheek bones, some patients are not fully satisfied with the outcomes and request further surgery. This is because much attention on the contouring procedure has focused on the position of the zygomatic body and arch. As a result, periorbital appearance including the axis of the lateral canthal angle and the protrusion of the inferolateral orbital rim are often overlooked or ignored. The authors introduce a new surgical technique for maximizing the effect of reduction malarplasty that allows for both the lowering of the lateral canthal angle and reduction of the orbital rim in selected Asian patients.

Methods In this retrospective study, the medical records of 41 patients who underwent lowering lateral canthoplasty in conjunction with reduction malarplasty were reviewed. Of those, orbital rim reduction was combined in 21 patients. In addition to the intraoral and preauricular approach for standard reduction malarplasty using an L-shaped osteotomy, lower eyelid and continuous canthotomy incisions were made. And then the protruding inferolateral orbital rim was shaved off, followed by inferolateral repositioning of the lateral canthus. Outcome measurements included a square millimeter of the cheek area surface using a software program (image J: IJ 1.46r) in 17 patients.

Results A statistically significant difference can be observed between preoperative and postoperative measurements of the area. Average decreases of measurements were 4761.59 mm^2 (18.5%) from 23,639 mm^2 preoperatively to 18,878 mm^2 postoperatively ($P < 0.05$, paired t test). The up-slanting lower eyelid margin was lowered, and the protruding zygomatic body with inferolateral part of the orbital rim was reduced by the procedure in all cases. Cosmetic outcomes were encouraging and satisfying to most patients. Four complications occurred: asymmetry in two patients (4.9%) and lid malposition in two patients (4.9%). Conjunctival edema was noted in half of the patients but resolved within 1 month.

Conclusions The simultaneous lowering lateral canthoplasty and reduction malarplasty offer Asian patients desiring a slim and soft image a novel surgical option. The procedures proved to be a reliable and consistent technique that provided satisfactory results in carefully selected patients.

Level of Evidence IV This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Lowering canthoplasty · Orbital rim shaving · Reduction malarplasty · Zygomatic reduction

Introduction

The concept and detailed surgical techniques of reduction malarplasty have been presented in the scientific literature by various authors over the past few years [1–5]. The object of which is simply to soften the prominent mid-

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facial contour by reducing the antero-laterally protruded zygomatic bone and arch. Reported surgical methods through bony reposition by various modifications of L-shaped osteotomy on the zygoma body to remove the excess segment have shown overall satisfactory outcomes for correcting a prominent zygoma. However, some patients are not fully satisfied with the outcomes after conventional reduction malarplasty even though surgical and technical issues are absent and even request further surgery, especially in Asian patients with slanted eyes (Fig. 1). This is because much attention on the contouring procedure has focused on the position of the zygomatic body and arch. As a result, periorbital appearance including the axis of the lateral canthal angle and the protrusion of the inferolateral orbital rim are often overlooked or ignored.

Therefore, while performing malar contouring procedures in Asians, plastic surgeons should pay special attention to ethnic characteristics of Asians whose prominent high cheek bone usually is accompanied by up-slanted eyes. These up-slanted eyes leave a wide margin below eyes and emphasize their high cheekbones, especially when smiling. Prominent high cheek bones with the superolateral orientation of the brow and the mongoloid slant are regarded as attractive and youthful by Western standards of beauty, while the same features are considered as less attractive by Asian standards as it gives a harsh, strong impression. Thus, recently, to attain a more slender and smooth mid-facial contour, reduction malarplasty as well as lowering canthoplasty is widely performed among Asians as a separate procedure.

However, to the best of our knowledge, no report has been introduced on combined lowering lateral canthoplasty and reduction malarplasty. The authors believe that there are several advantages of combining the two operations in one sitting. One is the added periorbital approach enabled us to reduce the remaining protruding inferolateral orbital rim, which will help refine the contour of the periorbital region including the upper zygomatic body. Another advantage is that reversion of the mongoloid slant reduces the wide margin below the eyes and makes their high cheekbones less conspicuous, especially when smiling. The purpose of this study is to provide a retrospective review of 41 patients who underwent combined lowering lateral canthoplasty and reduction malarplasty to ascertain whether the combination of the two procedures increases surgical morbidity or enhances aesthetic outcome of the malar region, and to see what the problems have been.

Fig. 1 A 26-year-old female patient with a prominent cheek bone with mild asymmetry treated by conventional L-shaped osteotomy technique. (Left) Preoperative views; (right) postoperative views. Even though she had a softer and symmetric midface contour from the front view, she complained of remaining prominence of the inferolateral orbital rim. Only zygomatic body reduction using the conventional techniques made the inferolateral orbital rim more prominent after surgery

Patients and Methods

From February of 2015 to February of 2016, 41 patients underwent lowering canthoplasty in conjunction with reduction malarplasty with the objective of creating a

smoother and softer midface. There were 39 women and 2 men that ranged in age from 19 to 55 years (mean, 29.2 years). Postoperative follow-up ranged from 6 to 18 months (8.7 months on average). The greatest patient concern was wide, prominent cheek bones with up-slanted eyes. Patients described themselves as having a wide margin over the malar area and an aggressive impression. The exclusion criteria were as follows: acute or chronic sinus infection and lack of permeability of the osteomeatal complex; the cases with a small eyeball surrounded by a projecting lateral orbital rim as the lowering lateral canthoplasty may be less effective and may keep the lower lid away from the eyeball; in particular, patients with very prominent eyes are at risk for scleral show and should be excluded.

Preoperative examinations included inspection and palpation of the entire midface including malar prominence, infraorbital rim protrusion, globe–orbital rim relationships, and lateral canthal angle, which are essential to determine the combination of the procedures needed. These features were thoroughly examined and discussed in a sitting position to determine how much to lower the lateral canthus vertically and lengthen the palpebral fissure horizontally. The degree and location of orbital rim prominence were evaluated through three-dimensional computed tomographic images to determine how much to reduce the rim by the shaving method. The orbital rim was defined as protruding when a tangent perpendicular to the lateral orbital rim was drawn and the most projecting point of the rim was 2 mm or more forward on a three-quarter oblique 3-dimensional computed tomographic image. In addition to this, we considered it prominent when the innominate semi-horizontal groove between the orbital rim and the malar prominence was well developed because it was expected that the rim protrusion would get worse after setback of the osteotomized zygomatic body. Especially in cases of enopthalmic eyes with well-developed orbital rims (morphologically prone, positive vector), it should be reduced more than expected. Out of those 41 patients enrolled, 21 patients underwent orbital rim shaving simultaneously (Table 1).

Soft tissue contributions such as fat amount and facial asymmetry should be shown and discussed with the patient prior to surgery so that after the operation, an unobserved unilateral deformity not noticed by the patient beforehand does not create a problem postoperatively. All of the results and images that appear in this article belong to patients who have given their express consent for their images to be published in scientific publications in compliance with current personal data protection regulations.

Surgical Concept and Evaluation of Outcome Measurement

For the evaluation process of the aesthetic outcomes, we focused on not only the reduction of the protrusion but also the area of cheek surface. Through virtual plastic surgery (simulation surgery), the effectiveness of combination of zygomatic reduction and lowering lateral canthoplasty can be verified. The malar surface area below the eye is further reduced when two procedures are combined rather than when zygomatic reduction is performed alone. The simulation surgery showed that 9.2% of a malar surface area (a-b'-c) is decreased more than that of reduction malarplasty alone (a-b-c). Also, it showed the patients the potential changes that might occur (Fig. 2) [6]. However, unlike virtual plastic surgery, it was impossible to measure the surface area with and without lowering lateral canthoplasty because it was performed combined with reduction malarplasty as a single-stage procedure in real surgery. Pre-/postoperative square millimeters of the cheek area surface were measured in 17 patients (who were followed up more than 6 months) using software program (image J: IJ 1.46r) to evaluate the outcome. The preoperative surface area was from point 'a' to 'b' and 'c,' and the postoperative surface area was from point 'a' to 'b'' and 'c,' respectively (a: a point connecting the lower lid margin to mid-pupillary line, b: a line from 'a' to facial margin along the lower lid slant, b': a line from 'a' to facial margin along the lower lid slant after lowering lateral canthoplasty, c: a line from 'a' to ear lobe, shaded area: square centimeter of the surface area). To evaluate the results, statistical analysis was conducted using paired t test (SPSS 18.0) at a significance level of < 0.05. Also, the aesthetic outcomes were analyzed by comparing preoperative and postoperative medical records and photographs of each patient. On the scale of 0 (very dissatisfied) to 4 (very satisfied), patient satisfaction was rated.

Surgical Techniques

Operations were all performed under general anesthesia, with the patient in a neck-extended supine position. The surgical method involves three basic maneuvers, which include bone sculpturing along with standard reduction malarplasty using L-/high L-shaped osteotomy, inferolateral orbital rim shaving (if necessary), and, finally, repositioning of the lateral canthus (Figs. 3, 4) [6]. Reversion of a Mongolian slant can be performed by various methods, but inferior canthopexy was preferred.

Two possible periorbital approaches exist that vary depending on whether or not the redundant skin of the lower eyelid needs to be excised or the tendency of entropion. When some excision of the lower eyelid skin is

Table 1 Classification of patients by sex, age, and surgical procedure performed

	Reduction malarplasty	Lowering lateral canthoplasty	Inferolateral orbital rim reduction
Sex			
Female	39	39	20
Male	2	2	1
Age			
< 20 years	2	2	0
21–30 years	24	24	9
31–40 years	8	8	7
> 40 years	7	7	5

required or when entropion is anticipated after lowering lateral canthopexy, the approach is made through a subciliary incision, where the remaining cutaneous fragment is eliminated. The second access route is the transconjunctival approach. This approach allows for better scar camouflage. Once the approach route is chosen, a continuous oblique canthotomy incision starting from the lateral canthus and extending laterally and inferiorly according to the slope between the lateral part of the upper eyelid and the lateral canthus is made. The length of the incision is usually 3 to 4 mm, although it can be longer or shorter based on the desired extended length. Then, dissection is carried out through the preseptal space toward the infraorbital rim.

A preauricular incision is used to cut and free the posterior part of the zygomatic arch. An intraoral incision is used to access the lower midface skeleton. This dissection is carried superiorly until it reaches the infraorbital rim previously exposed through the lower lid access. The lower lid and midface soft tissues are freed by subperiosteal dissection. It is important to identify the infraorbital nerve and the zygomatico-facial nerve. Of these, the infraorbital nerve should be protected; however, the zygomatico-facial nerve is sacrificed inevitably to allow the medial oblique osteotomy to be placed toward the external orbital rim, usually 4 to 7 mm close to the rim. The main difference of this technique with conventional L-shaped osteotomy is in the oblique part of the osteotomy line; the oblique line is moved more toward the external orbital rims in comparison with the L-shaped osteotomy, in which the medial oblique osteotomy is placed lateral to the zygomatico-facial nerve foramen to avoid injury [7]. The next step is osteotomy of the zygomatic body with removal of the excess bony segment followed by postero-medial reposition of the osteotomized malar complex which is rigidly fixed with miniplates and screws. When necessary, the inferolateral orbital rim region is shaved off using an electric burr with a diameter of 4 mm at the same time. At this point, it is important to avoid any periorbital soft tissue injury as well as asymmetry and irregularity of the orbital rim region.

Once all of the contouring is finished, the detached lateral end of the lower lid tarsus is secured toward the inferolateral direction (usually lower pupil margin level) using non-absorbable 5-0 nylon suture onto the periosteum of the lateral orbital rim. When fixation to the periosteum is impossible, a drill-hole placement can be an alternative.

It is important to ensure that a new lateral canthal angle is formed as desired and that the proper contact between the eyeball and palpebral conjunctiva is maintained by preventing ectropion of the lower eyelid. Then, pull the end

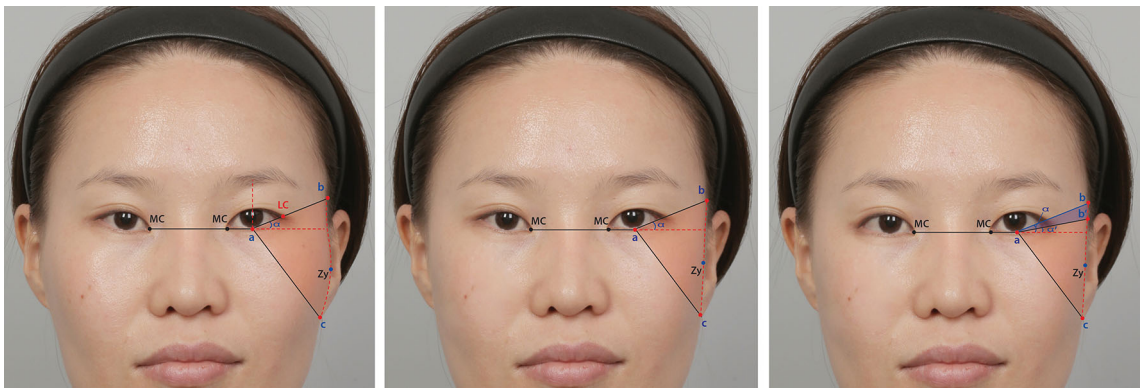

Fig. 2 Simulating the lowering lateral canthoplasty after reduction malarplasty. This simulation can demonstrate how vertical lowering and horizontal expanding of the lateral canthus make the high cheek bone less conspicuous by reducing the surface area below eye. Malar surface area (a-b'-c) is decreased (9.2%) more than that of reduction malarplasty alone (a-b-c). Through this virtual plastic surgery, we can verify the effectiveness of combination of the above-mentioned two procedures. a: a point connecting the lower lid margin to mid-pupillary line. b: a line from 'a' to facial margin along the lower lid slant. b': a line from 'a' to facial margin along the lower lid slant after lowering lateral canthoplasty. c: a line from 'a' to ear lobe. Zy: the most lateral point of the zygomatic arch. Shaded area: square centimeter of the surface area. Reprinted by permission from Springer Singapore. See Ref. [6]

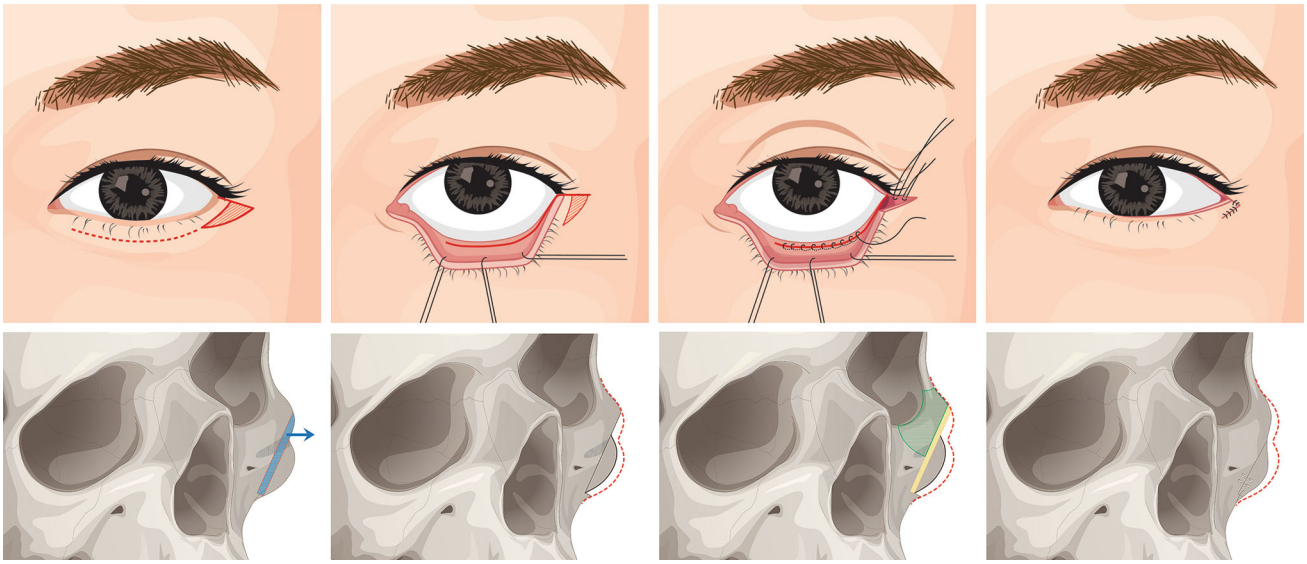

Fig. 3 Illustrations showing two key surgical procedures: a lowering lateral canthoplasty and inferolateral orbital rim reduction. (Upper row) A lowering lateral canthoplasty through transconjunctival (solid red line)/-cutaneous (broken red line) approach with extended lateral canthotomy incision. After inferior cantholysis, canthopexy for vertical and horizontal lengthening is performed. Triangular-shaped skin is excised for dog-ear correction. (Lower row) Illustrations showing why the inferolateral orbital rim looks more prominent after conventional L-shaped osteotomy and how to overcome this problem. Blue area indicates resection of excess body using L-shaped osteotomy. Postero-medial repositioning of the osteotomized body increases the prominence of the inferolateral orbital rim. The yellow shading indicates the area of rasping through an intraoral approach. As the orbital rim (shown in green) cannot be effectively reduced through an intraoral approach, a transconjunctival/-cutaneous approach should be added. Completion of the procedure shows a reduced and smoothed contour. Reprinted by permission from Springer Singapore. See Ref. [6]

of the conjunctival flap and suture it to the skin of the lateral corner. The wound is closed while removing the dog-ear skin surrounding the lateral canthus by making a minimal incision following the cilia on the lower eyelid. On average, one and half hours of the operation was spent for the full procedure.

Results

In all cases, the up-slanting lower eyelid margin was lowered and the protruding zygomatic body with inferolateral part of the orbital rim was reduced by the procedure. No visible deformity was found in the upper zygomatic region including the orbital rim, and a bony step or irregular border of the zygomatic body osteotomy site was not palpable. Regarding complications, no major complications, such as periorbital soft tissue or orbital contents injury, were observed during surgery and post-surgery. However, most patients experienced a temporary sensory change over the high cheek bone area innervated by the zygomatico-facial nerve, but sensation was recovered without sequelae in all patients within several months.

As for combined lowering lateral canthopexy and orbital rim shaving, most patients experienced considerable swelling of the periorbital area, especially conjunctival edema and hemorrhage frequently occurred, but at 2 to 3 weeks, this subsided sufficiently and patients were able to observe changes in appearance. Another four complications occurred: asymmetry in the lateral canthal angle and horizontal length in two patients (4.9%) and lid malposition (mild entropion in one patient, mild ectropion in one patient) in two patients (4.9%). Both of which needed revisional surgery and were simply corrected. Evaluation of the patient satisfaction surveys showed that on average, patients were satisfied with the various aspects of their surgery. The average overall result was 3.09. The square millimeter cheek surface area below the eye was decreased from 23,639 mm^2 preoperatively to 18,878 mm^2 postoperatively (average 4761.6 mm^2 and 18.5%). These results were statistically significant ($P < 0.05$, paired t-test) (Table 2).

Clinical Cases

Case #1

A 39-year-old female patient showing a prominent zygoma with upward-slanted eyes wanted to have a softer image. In anterior view, the midface is wide and convoluted, the zygomatic arch is laterally projected, and 45° zygomatic body is also antero-laterally projected. The lateral canthal angle is up-slanted; thus, the palpebral fissure on the lateral side is short in both the vertical and horizontal direction.

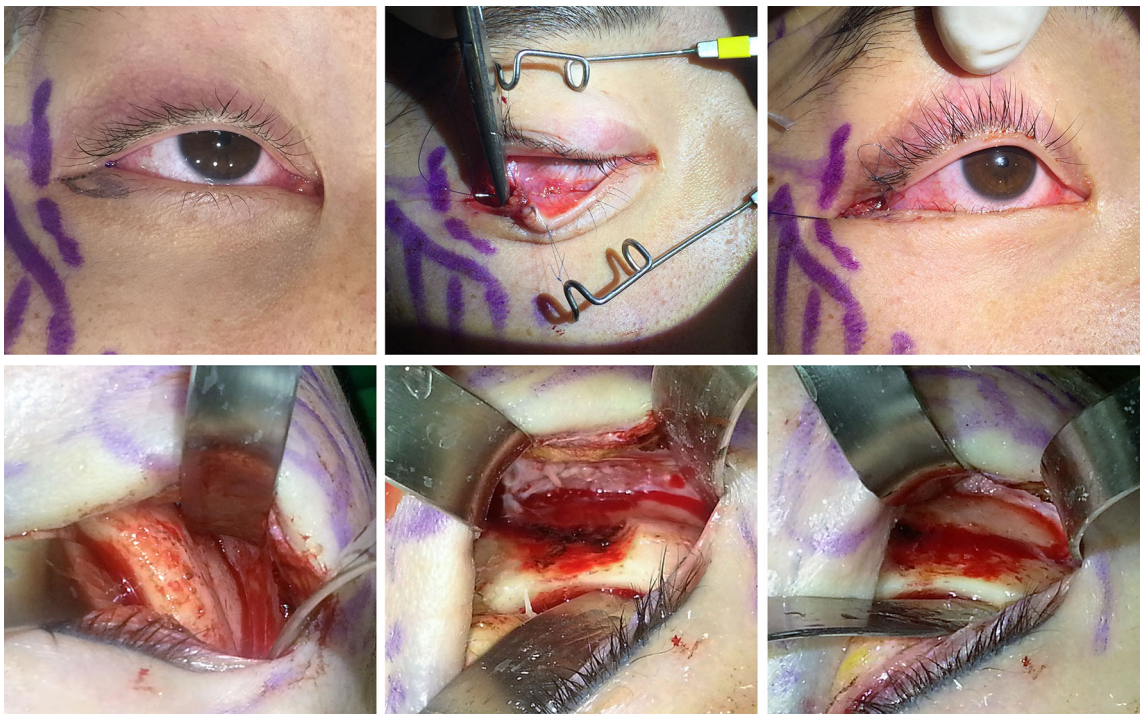

Fig. 4 Clinical photographs show a step-by-step description of the surgical procedures. (Upper left) Design of triangle-shaped skin ellipse for dog-ear correction. (Upper center) Lower lid tarsal stump is engaged to the lateral orbital rim periosteum of the lateral orbital rim. (Upper right) Lateral canthus is repositioned toward inferolateral direction (usually just above the lower limbus margin level) for horizontal lengthening and vertical lowering. (Lower left) Note the exposed inferolateral orbital rim through lower lid after setback of lateral malar segment via oral route (lower, center) shaving of orbital rim is done up to 3 to 4 mm in thickness. Care should be taken not to injure the infraorbital nerve, which is usually seen just medial to the titanium plate and screw. A Tessier retractor and a malleable retractor are used to protect the lower lid and the orbital contents. (Lower, right) After finishing the rim shaving, smooth transition between the orbital rim and lateral malar segment can be achieved. Reprinted by permission from Springer Singapore. See Ref. [6]

Table 2 Preoperative and postoperative measurements of the cheek surface area

Preoperative (mm^2)	Postoperative (mm^2)	Average (mm^2)	*P* value
23639.0	23639.0	4761.6	< 0.05

Reduction malarplasty using standard L-shaped osteotomy combined with lowering lateral canthoplasty was performed. In a subsequent visit 6 months after the surgery, the postoperative mid-facial contour and slanted eyes improved as expected. The patient was satisfied with her softer facial appearance (Fig. 5).

Case #2

A 45-year-old female patient complained about her prominent cheek bones and upward-slanted eyes. In anterior view, she showed a small lateral scleral triangle because of a steep mongoloid slant. From the oblique view, a severely projected 45° zygomatic body and external orbital rim were noted. After reduction malarplasty using high L-shaped osteotomy (body resection 5/6 mm, setback 4/4 mm, arch medialization 5/5 mm, posterior arch shaving on both sides) and inferolateral orbital rim shaving (up to 4 mm), mongoloid slant lowering was completed with downward movement of 2 mm and lateral extension of 3 mm on both sides. The inferolateral orbital rim was slightly over-corrected. Postoperatively, the protruding cheek bone was reduced, the mongoloid slant became less steep, and the lateral scleral triangle was enlarged. However, mandible reduction and a lifting procedure are planned for a more balanced facial shape (Fig. 6).

Discussion

When reviewing our unsatisfactory cases of reduction malarplasty in East Asians for a decade, the authors found that dissatisfaction sometimes can arise even without any technical problems. This is usually due to ignored or overlooked external orbital rim and mongoloid slant of the

Fig. 5 Preoperative views of a 39-year-old female patient in Case 1 (left). Postoperative views after zygoma reduction combined with lowering lateral canthoplasty (right). Six months postoperative views showed that the contour of the mid-facial margin was smooth and up-slanted eyes were corrected, thus having a softer image, especially, when smiling

Fig. 6 Preoperative views of a 45-year-old female patient in Case 2 (left). Postoperative views after zygoma reduction using high L-shaped osteotomy combined with inferolateral orbital rim shaving followed by lowering lateral canthoplasty (right). Postoperative views showed that the contour of mid-facial margin was smooth via sufficient reduction of orbital rim. The lateral canthus was also extended inferolaterally exposing more sclera which gives a softer image. However, mandible reduction and lifting procedure are planned for more balanced facial shape

palpebral fissure as described in Fig. 1, which are ethnic characteristics of East Asians.

To successfully address these issues, we should be conscious about not only the zygomatic region, but also the periorbital region including the external orbital rim and lateral canthal slant as a whole [8]. For this, until now, lowering lateral canthoplasty has been performed as a separate, single procedure before or after reduction malarplasty at a time selected by the patient. The drawback of the separate technique is cost and time delays for the patient. However, no report has been introduced on combined lowering lateral canthoplasty and reduction malarplasty, not to speak of the protruding orbital rim reduction.

Combining these procedures as described in the introduction is of great advantage to us to get a better outcome than is possible with just reduction malarplasty alone. This is supported by our simulation surgery (virtual plastic surgery) result. We could verify the effectiveness of reversing the Mongoloid slant in addition to standard reduction malarplasty for decreasing the cheek surface area (9.2%) and eventually for achieving a softer image.

With regard to the up-slanted eyes, it leaves a wide margin below the eyes and emphasizes their high cheekbones, especially when smiling. Patients described themselves as having a wide margin over the malar area and an aggressive impression. We believe that lowering lateral canthoplasty is a good adjunct procedure for this. Generally, lateral canthoplasty refers to all surgeries transforming the lateral canthus. Notably, a lot of Western studies have commonly introduced lateral canthoplasty as a surgical method that corrects canthal laxity or lower lid malposition and relieves aging-related signs on the lower eyelid and midface. 'Lateral canthal extension' surgery performed for Asians as a cosmetic procedure is also considered lateral canthoplasty [9, 10]. However, to be precise, lateral canthoplasty is an expansion of the lateral canthus and a reshaping of the lateral canthal area including the angle of lateral canthus. For cosmetic lateral canthoplasty for Asians, not only horizontal palpebral extension, but also proper vertical lowering and posterior deepening should be performed so that a proper contact between the eyeball and palpebral conjunctiva can be maintained [10]. When lateral canthoplasty is to be performed on an Asian patient, it should be also considered that the average value of the slant of the palpebral fissure was 8.5° ± 2.0° for males and 8.8° ± 2.5° for females [9].

Based on our experience, other considerations in the selection of good candidates include the degree of exophthalmos and the location of the orbital bone. People who have exophthalmic eyes have better attachment between the eyeball and palpebral conjunctiva after lateral canthoplasty than people who have enophthalmic eyes. In addition, they show more visible expansion of the lateral canthus from the frontal view, though care should be taken to prevent scleral show resulting from excessive vertical lowering of the lateral canthal level. On the contrary, enopthalmic eyes with a short palpebral fissure, especially, small and deeply seated eyeballs within the projecting orbital rim, should be selected on a limited basis or even contraindicated because keeping the proper contact between the eyeball and palpebral conjunctiva is difficult and even worse. Also its effect is not dramatic after lateral canthoplasty. Additionally, lateral canthoplasty is not recommended in patients who have severe ptosis because the power of the vector occurring from the lateral and posterior extension of the canthus tends to aggravate upper eyelid ptosis [10, 11].

Thus, good candidates for our procedures are patients with (1) up-slanted eyes with more than 8.5° of the slant of the palpebral fissure [12, 13], (2) a distance of 4 mm or more between the lateral canthus and lateral orbital rim, (3) exophthalmic eyes rather than enopthalmic eyes, and (4) a lateral fornix deeper than 3 mm. There is no single technique that can address the full spectrum of small palpebral fissures, and the surgeon can use the most comfortable technique for themselves. Our preferred method is inferior canthopexy because it is easy to perform. In addition, it is possible to prevent the eye tails from rising as much as possible when smiling by securely fixing the lower lid tarsal stump to the periosteum of the lateral orbital rim.

Care should be also taken that the remaining protrusion of orbital rim after setback of the osteotomized body in standard reduction malarplasty can be a source of complaints as shown in Figs. 1 and 3. Based on the authors' experience, we need to inspect the inferolateral orbital rim carefully with 2 to 3 out of ten zygomatic reduction patients. As the protruding inferolateral orbital rim cannot be easily reduced through an intraoral approach due to a narrow field of vision and risk of periorbital soft tissue injury, it is a limitation of the conventional surgical method. We have experienced two cases of bulbar conjunctival laceration due to soft tissue twisting by burring through the intraoral route. Therefore, an additional periorbital approach is mandatory for safer handling of the electric bur, and that allows us to reduce the orbital rim 2 to 4 mm in thickness. The transconjunctival/-cutaneous approach with or without canthotomy has been widely used for access to the orbital floor and orbito-malar complex in reconstructive surgery including treatment of a fractured orbital floor and maxilla and congenital malformations [14–17]. However, we have used this approach for shaving of the protruding orbital rim combined with lowering lateral canthoplasty for purely aesthetic purposes.

In the present study, patient follow-up and surgical review revealed that postoperative complications were similar to those associated with conventional operations and included under correction, lid malposition (lid entropion or ectropion), asymmetry, temporary numbness, and swelling, etc. Complications like temporary numbness, and swelling were overcome within several months. However, two patients complained of lid malposition and two patients of asymmetry in the lateral canthal angle and horizontal length. These are caused by inappropriate placement of the canthal anchoring suture and should be revised within the first few weeks of the initial operation. Beyond this period, however, revisions should not be attempted until after 6 months, or until the hypertrophic response has subsided. Disadvantages of our method are

exposure of red conjunctiva when the conjunctiva is pulled too much and a visible scar at the lateral part of the lower eyelid. The most difficult part of this surgery lies in obtaining symmetry. Accordingly, we caution that the vertical point to anchor the canthus is carefully selected in accordance with the degree of lateral canthal slant and patient's desire. Too much lowering can cause aggravation of scleral show.

Here, the authors present the detailed surgical technique of the above-mentioned 'two' complementary techniques. An attempt is made to show that their combination with the conventional zygomatic reduction procedure can yield an outcome that is greater than the sum of its parts in East Asians with zygomatic prominence. However, it should be noted that data from this procedure are only available from a limited sample size and from surface area measurements with two-dimensional tools. This novel technique clearly needs further study to evaluate long-term safety and efficacy.

Conclusions

For successful malar contouring in East Asians, preoperative evaluation should involve not only the zygomatic region, but also the periorbital region as a whole because prominent high cheek bone is usually accompanied by upslanted eyes or protrusion of the orbital rim. Pitfalls can be avoided if one is conscious about these relationships. In carefully selected such patients, the lowering lateral canthoplasty and orbital rim shaving can be performed safely along with standard reduction malarplasty and can result in significant improvement in the appearance of the malar and periorbital area with no added morbidity.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Human and Animal Rights 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 Informed consent was obtained from all patients included in the study.

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