Objective: To review my experience in both malar reduction and mandibular reshaping techniques to establish optional, effective, and reliable surgical procedures. A square-shaped face is considered aesthetically unfavorable among East Asians; therefore, reduction malarplasty and mandibular reshaping are becoming more acceptable for aesthetic facial skeleton recontouring.

Methods: The techniques of zygoma arch infracture or mandibular angle reduction were used until 2 alternative techniques were introduced in 2002: the wedge-section osteotomy in the malar complex and inclined-fullness osteotomy in the mandibular angle and margin. Both osteotomies were selected according to personal experience and communication with patients. The wedge-section zygoma osteotomy was performed in the lower zygomatic body via an intraoral approach and green-stick infracture of the posterior zygomatic arch through a tiny preauricular incision. The prominent malar complex could be reduced by being pressed inward and was stabilized only by surgical suture or self-stabilization without any fixation, and the latter method was chosen in my recent cases. For the lower face, I designed an inclined-fullness osteotomy to address the mandibular angle and margin along the diagonal of marked projection of the mental foramen on the margin of the mandible and the projection of mandibular foramen on the ramus. The surgical indications, major complications, and levels of patient satisfaction for the different techniques were compared, and thus the pros and cons of wedge-section osteotomy and mandibular reshaping vs conventional procedures were analyzed.

Results: A total of 585 patients who had undergone either reduction malarplasty or mandibular reshaping in the craniofacial center at the Shanghai Ninth People’s Hospital from May 1988 through December 2008 were reviewed in this study. Intraoral incision was the dominant method of access in both types of osteotomies. Wedge-section malarplasty osteotomy was more effective and reliable compared with other conventional methods. More than half of the patients in cases of the mandibular reshaping have undergone surgery that included both reduction of the mandibular angle and shaving of the mandibular margin.

Conclusion: As optimal strategy for aesthetic facial contouring surgery in East Asians, reduction malarplasty and mandibular reshaping were proven to be safe, effective, and easily handled techniques for modifying the square-shaped face.

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to remove the excess segment, (3) infracture procedure performed on the zygoma body without any bone removed, and (4) a curved osteotomy or radiated osteotomy along the junction of the mandibular body and ramus.

Reflecting on my 20 years of experience in China making use of the malar reduction and mandibular reshaping methods described herein, I have summed up their advantages and disadvantages and developed a modified wedge-section osteotomy for repositioning the zygomatic arch and inclined-fullness osteotomy to contour the mandibular angle and margin, which overcame the pitfalls of using conventional techniques.

**METHODS**

At the craniofacial center of Shanghai Ninth People’s Hospital, a total of 585 patients underwent malarplasty and/or mandibular reshaping from May 1988 through December 2008, including 310 women and 75 men. Their ages ranged from 17 to 45 years, with a mean age of 27.5 years. Indications for the operation were cosmetic (94.5% of cases), traumatic (4.0%), and concomitant malarplasty after removal of fibrodysplasia or benign bone tumor (1.5%).

A total of 129 patients underwent isolated zygoma resections for narrowing the middle portion of the face; 261 patients underwent isolated mandibular reshaping for the lower part of the face, and 195 underwent both zygoma reduction and mandibular reshaping to have a more oval or melon seed–shaped face.

Before the operation, facial proportion and symmetry were carefully assessed. All patients underwent preoperative cephalometric imaging and a computed tomographic (CT) scan. If necessary, the patients and surgeons can quickly discuss the 3-dimensional model planning. In addition, facial digital photographs were taken for the patients and surgeons to have a detailed understanding of the facial structures.

All patients underwent surgery under general anesthesia through a nasotracheal tube. The malar contour and the lateral head of the condyle were outlined by marking on the skin.

**Intraoral Bone Shaving**

In my early experience, burring, chiseling, and chipping were performed through an intraoral incision, which shaved the outer cortex of the cheekbone and flattened out the protruding zygomatic process.

**Bicoronal I-Shaped Osteotomy**

After a bicoronal scalp incision, a lateral orbital I-shaped osteotomy was initiated from the frontozygomatic suture downward to the inferomedial area in selected cases. The zygomatic arch was cut obliquely and then repositioned superoposteriorly by sliding it back and fixing it with miniplates or wires.

**Intraoral I-Shaped or L-Shaped Osteotomy**

Via intraoral incision, an L-shaped lateral orbital osteotomy was applied. An L-shaped osteotomy (2 parallel vertical lines and 1 transverse line) at the medial part of the zygomatic body, removing of the mid segment and using miniplates for fixation, is a technique introduced in 2000.10

**Intraoral and Preauricular I-Shaped or L-Shaped Osteotomy**

An L-shaped or L-shaped osteotomy was performed according to the method described in the previous subsection, by making a 1.5-cm-long incision in the preauricular area to facilitate the infracture of the posterior zygomatic arch by using a narrow osteotomy.

**Intraoral and Preauricular Wedge-Section Osteotomy**

Since 2002, I have used a modified osteotomy technique—a wedge-section procedure via an intraoral and preauricular approach according to the following steps. (1) Make a 2-cm minor intraoral incision from the canine to the first molar region. (2) Limit the subperiosteal separation of zygomatico-alveolar area and the inferior part of the zygomatic process, allowing only enough space for placing the reciprocating saw. Dissection should be careful and meticulous to minimize the detachment of the massteric muscle to the zygomatic arch and thus prevent postoperative cheek droop. The inner cortex of the zygomatic arch can be exposed subperiosteally and broadly to the lateral side of the orbito-zygomatic rim. Specifically, the vertex of the zygoid is the inferior portion of the anterior wall of the zygomatic process, that is, a narrow outer cortex. The base of the trapezoid is the posterior wall of the zygomatic body, a broad inner cortex that doubles the wall of the vertex edge. The 2 oblique sides of the trapezoid are equal in length.

The osteotomy type was determined by the severity of the malar prominence. In a mildly prominent malar body, the trap€ezoid was then simplified to a triangle shape; thus, a wedge-section osteotomy could be reduced to a triangular prism osteotomy. The osteotomy direction was usually started from the inner cortex to the outer cortex so that excessive dissection of the malar body could be avoided. The excess bone segment was removed, leaving a trapezoid base ranging from 2 to 6 mm in width.

Then, a zygomatic arch infracture was performed. A sharp mastoid chisel was placed at the zygomatic root, which is anterior to the temporomandibular joint. Next, the zygomatic root was cut obliquely from outside to inside. Meanwhile, the greenstick-fractured point was the anterior part of the zygomatic tubercle. The incomplete fractured arch was displaced inward and forward (Figure 1 and Figure 2).

Once the osteotomy was completed, palm pressure was added on the posterior arch toward the zygomatic body to rotate the infracture malar complex curvilinearly inward, with the infracture point acting as a pivot. The 2 wedge-section osteomized surfaces resulting from the zygomatic process and the anterior end of the zygomatic arch, respectively, fitted well. The same procedure was repeated on the other side. After checking the symmetrical position for the new malar complex to make sure no step-off occurred, silk surgical suture fixation was applied. It is worth noting that a step-off generally did not occur.
because the wedge-section margin abuts stably. A pinhole was burried on the zygomaticomaxillary buttress, then nonabsorbable surgical suture was used for the zygomatic arch and masseter muscle reattachment. In my opinion, the rigid internal fixation was not necessary. Self-stabilization, without any suture, was recommended in my recent cases, considering that a stable contact surface could be provided after a wedge-section osteotomy and thus fixed well (Figure 3).

After manipulation of these various techniques in different patients, respectively, the surgical field of each patient was characterized using electrocautery to prevent further hemorrhage and then rinsed with chloramphenicol solution. The mucosal incision, coronal incision, or the preauricular incision was closed using a routine method, whereas the tiny sideburn incision did not need any suturing. Systemic antibiotics were given for 3 days postoperatively. A clear fluid diet was recommended, and an elastic sleeve on both cheeks was used for at least 2 weeks.

**MANDIBULAR RESHAPING METHODS AND INCLINED-FULLNESS OSTEOTOMY**

General anesthesia with nasal intubation was given to all patients. An intraoral incision was made 0.5 to 1 cm away from the attached gingiva along the lower buccal mucosa, beginning at the second premolar and ending at the occlusal plane. Subperiosteal undermining was performed meticulously to expose the lateral-inferior part of the mandibular angle and body of the mandible, taking precautions to protect the mental nerve until sufficient exposure was achieved.

**Burr and Shaving Method**

For cases of a moderately prominent or outward type of mandibular angle, the patient usually underwent bone shaving by burring, chiseling, and/or chipping of the outer cortex of the mandibular angle in the early period.

**Mandibular Angle Reduction Osteotomy**

For cases of a severely prominent or inward type of mandibular angle, angle osteotomy was used. Usually, the direction line was marked with an electric grinder before the osteotomy. The full thickness of the mandibular angle was then removed with an oscillating saw, including equal amounts of the outer and inner cortices.

**Outer Cortex-Splitting Osteotomy**

In cases of a moderately prominent or inward type of mandibular angle, I performed sagittal osteotomy of the outer cortex in the mandibular angle area. The prominent degree of the region between the molar teeth and the external oblique line was the key factor for evaluating the possibility of split cortical osteotomy. The osteotomy line was first labeled by using an electric drill. The horizontal line on the ramus and the perpendicular line on the mandibular body were then cut superficially on the outer cortex. After that, split cortical osteotomy was performed to remove the half-thickness of the outer cortex, thus reducing the lateral projection of the lower face (Figure 4).
Inclined-Fullness Osteotomy in the Mandibular Angle and Margin

In 2000, I modified the conventional procedure to include inclined-fullness osteotomy in the mandibular angle and margin area; this technique has been preferred in many recent cases. The design of the osteotomy is as follows (Figure 5A): (1) The starting point of the osteotomy is the intersection point where the occlusal plane meets the posterior edge of the ramus (point A). (2) The end point of the osteotomy is the intersection point where the vertical line from the second premolar meets the edge of the mandible (point B). Usually, the position of the mental foramen is just beneath the second premolar.14 We can also set point B according to the mental foramen shown on a cephalogram. (3) For a curved osteotomy, the curvilinear osteotomy line is drawn from point A to point B. The actual osteotomy procedure is composed of 2 steps. First, the upper half of the curvilinear line is cut with a reciprocating saw, with more outer plate removed than inner plate in the mandibular angle portion. Then, a second osteotomy is performed on the lower half of the curvilinear line, also with more outer plate removed than inner plate in the mandibular margin. These 2 surgical steps can be helpful to avoid damage to the alveolar nerve (Figure 5B).

RESULTS

The major problems with zygoma bone shaving included hyperosteogeny and periosteal proliferation caused by local grinding and in filing procedures. It is hard to accept that there could be malar prominence relapse and postoperative cheek droop caused by large periosteum dissection. Local skin shading and nonsmooth bone contour sometimes appear in the cheek bone, caused by a postoperative step-off deformity, in which the zygomatic body was moved during both zygoma bone shaving and an L-shaped or L-shaped osteotomy. In bicoronal L-shaped zygoma osteotomy, problems included the patient’s focus on scarring after the coronal incision, the possibility of facial nerve injury, lack of smoothness in the lateral orbital rim by rigid fixation, and damage to the maxillary sinus. Comparing intraoral and preauricular wedge-section osteotomies with zygoma reductions, in my experience the modified practice is proven to be a simple, effective, and ideal method for reduction malarplasty.

In view of this, a total of 342 patients with a prominent malar complex underwent reduction malarplasty using the different procedures described herein, of whom...
195 were treated with either mandibular angle reduction or genioplasty concomitantly to obtain a better aesthetic facial contour. Among all zygoma reductions, 104 patients underwent the new wedge-section procedure, and the different surgical procedures and their clinical data are listed in Table 1. Patients were required to have the first follow-up 3 months postoperatively, and thus the longest follow-up period is 10 years. Postoperative assessments, such as panoramic radiographs, Waters view radiographs, or CT imaging, were included in the data collection. Most patients were satisfied with the postoperative facial outcome and indicated that there had been a sufficient reduction in their facial width and malar prominence. Complications associated with different surgical procedures are displayed in Table 2.

Mandibular reshaping, which included one-third of the lateral and inferior portion of the mandible, was performed in a total of 456 cases. Burring and shaving in the mandibular angle region (performed in 23 patients) is easy to control even for new surgeons and in cases of a prominent outward mandibular angle. It is a safe procedure, but the results usually did not satisfy most of these East Asian patients. Mandibular angle osteotomy (performed in 114 patients in this study) used to be a popular procedure in China and resulted in obvious lateral reduction in the mandibular region. Adverse effects have appeared from time to time, depending on the skill of the surgeons and the appropriate indication of the procedure to be used; of these adverse effects, a rough border after angle reduction was the most debated issue, as a so-called secondary mandibular angle. Outer cortical split osteotomy (performed in 42 patients) seems to be a sort of alternative method to avoid an uneven border on the mandible. But it was still difficult to control the reciprocating saw and chisel to split the thickness of the mandible, and it was easy to break the ramus and damage the mandibular nerve. Inclined-fullness osteotomy in the mandibular angle and margin (performed in 227 patients) was the procedure preferred in most of the recent cases, but complications still happened, as shown in Table 3.

A total of 195 patients underwent combined surgical procedures of both malar reduction and mandibular reshaping (Figure 6).

### Table 1. Comparison Procedures in Reduction Malarplasty

<table>
<thead>
<tr>
<th>Surgical Procedure</th>
<th>Patients, No. (n=342)</th>
<th>Duration of Surgery, h</th>
<th>Blood Loss, mL</th>
<th>Recovery Period, wk</th>
<th>Complications</th>
<th>Secondary Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone shaving</td>
<td>24</td>
<td>0.8</td>
<td>80</td>
<td>3</td>
<td>9 (37.5)</td>
<td>6 (25.0)</td>
</tr>
<tr>
<td>Bicoronal I-shaped osteotomy</td>
<td>64</td>
<td>3.2</td>
<td>350</td>
<td>6</td>
<td>8 (12.5)</td>
<td>2 (3.1)</td>
</tr>
<tr>
<td>Intraoral I- or L-shaped osteotomy</td>
<td>88</td>
<td>2.0</td>
<td>200</td>
<td>4</td>
<td>6 (6.8)</td>
<td>3 (3.4)</td>
</tr>
<tr>
<td>Intraoral + preauricular I- or L-shaped osteotomy</td>
<td>62</td>
<td>1.6</td>
<td>120</td>
<td>3</td>
<td>5 (8.1)</td>
<td>3 (4.8)</td>
</tr>
<tr>
<td>Wedge-section osteotomy</td>
<td>104</td>
<td>0.4</td>
<td>30</td>
<td>2</td>
<td>3 (2.9)</td>
<td>1 (1.0)</td>
</tr>
</tbody>
</table>

### Table 2. Complications in Reduction Malarplasty in 342 Patients

<table>
<thead>
<tr>
<th>Complication</th>
<th>Bone Shaving (n=24)</th>
<th>Bicoronal I-Shaped Osteotomy (n=64)</th>
<th>Intraoral I- or L-Shaped Osteotomy (n=88)</th>
<th>Intraoral + Preauricular I-Shaped or L-Shaped Osteotomy (n=62)</th>
<th>Wedge-Section Osteotomy (n=104)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymmetry</td>
<td>4 (16.7)</td>
<td>2 (3.1)</td>
<td>2 (2.3)</td>
<td>1 (1.6)</td>
<td>1 (1.0)</td>
</tr>
<tr>
<td>Overcorrection</td>
<td>1 (1.6)</td>
<td>1 (1.6)</td>
<td>1 (1.1)</td>
<td>1 (1.6)</td>
<td>1 (1.6)</td>
</tr>
<tr>
<td>Recurrence</td>
<td>6 (25.0)</td>
<td>1 (1.6)</td>
<td>1 (1.1)</td>
<td>1 (1.1)</td>
<td>1 (1.0)</td>
</tr>
<tr>
<td>Nerve injury</td>
<td>2 (3.1)</td>
<td>2 (3.1)</td>
<td>2 (2.3)</td>
<td>2 (3.2)</td>
<td>2 (3.2)</td>
</tr>
<tr>
<td>Swelling/hematoma</td>
<td>3 (12.5)</td>
<td>1 (1.1)</td>
<td>1 (1.1)</td>
<td>1 (1.1)</td>
<td>1 (1.1)</td>
</tr>
<tr>
<td>Unfavorable scars</td>
<td>4 (16.7)</td>
<td>4 (6.3)</td>
<td>4 (6.3)</td>
<td>4 (6.3)</td>
<td>4 (6.3)</td>
</tr>
<tr>
<td>Skin shading</td>
<td>2 (3.1)</td>
<td>1 (1.6)</td>
<td>1 (1.1)</td>
<td>2 (3.2)</td>
<td>3 (2.9)</td>
</tr>
<tr>
<td>Cheek drooping</td>
<td>3 (12.5)</td>
<td>4 (6.3)</td>
<td>3 (2.4)</td>
<td>3 (2.4)</td>
<td>3 (2.4)</td>
</tr>
<tr>
<td>Malar numbness</td>
<td>1 (4.2)</td>
<td>1 (1.6)</td>
<td>1 (1.1)</td>
<td>1 (1.1)</td>
<td>1 (1.1)</td>
</tr>
<tr>
<td>Malunion</td>
<td>1 (4.2)</td>
<td>1 (1.6)</td>
<td>1 (1.1)</td>
<td>1 (1.1)</td>
<td>1 (1.1)</td>
</tr>
<tr>
<td>TMJ disorder</td>
<td>1 (4.2)</td>
<td>1 (1.6)</td>
<td>1 (1.1)</td>
<td>1 (1.1)</td>
<td>1 (1.1)</td>
</tr>
<tr>
<td>Temporal depression</td>
<td>3 (12.5)</td>
<td>3 (4.7)</td>
<td>3 (4.7)</td>
<td>3 (4.7)</td>
<td>3 (4.7)</td>
</tr>
</tbody>
</table>

Abbreviation: TMJ, temporomandibular joint.

### Comment

Malar complex prominence usually appears as a protruding cheekbone in anterior, lateral, and oblique directions, and therefore the zygomatic bone arch junction is the key element in reducing the sharp cheekbone. Inward alteration of the zygomatic arch is also an important element in narrowing the facial width in the frontal view (Figure 7).

My initial reduction malarplasty method was the bone shaving procedure introduced by Onizuka et al; however,
ever, this method was applicable only for cases of mild zygomatic body prominence and was soon out of use owing to a high recurrence rate with periosteal proliferation. Local grinding and filing procedures flattened the zygomatic process, which caused the face to appear broader after surgery, leading to a more angular contour appearance. Postoperative relapse due to hyperosteogeny or periosteal proliferation was much more apt to occur. Other limitations, such as unnatural curvature, undercorrection, or asymmetry, restricted its prevalence.

Therefore, zygomatic arch osteotomy and segment repositioning tended to be popular procedures because of the effective and stable result. I-shaped osteotomy in the zygomatic arch and rigid fixation in the lateral orbit rim via a bicoronal approach have been adopted to provide definite manipulation under a wider surgical field. But facial nerve injury, minor protuberance of the fixed palate in the orbital rim, and a longer scar are the main adverse effects that conflict with the aesthetic appearance desired, except in older women, who prefer to accept the face contouring surgery, intend to undergo a face-lift in the future, and do not care about the coronal incision.

The I-shaped or L-shaped osteotomy of the zygomatic body through an intraoral approach, combined with a complete or greenstick fracture of the zygomatic arch for reposition, is presented as a modification that enables the surgeon to remove the excess protruding portion of the bone by adjusting the distance between the lines of the parallel osteotomy. However, these methods usually need extensive periosteum dissection of the whole zygomaticomaxillary area, including the malar body, the lateral orbital rim, and the lateral or medial surface of the zygomatic arch, which leads to postoperative cheek droop owing to the broad separation of the masticeric and musculus zygomaticus attachments. In addition, infraorbital nerve and facial nerve injury may occur. Besides, these methods generally cause damage to the maxillary sinus, and the oblique osteotomy plane was difficult to fit well, which resulted in step-off and postoperative skin shading. Although the technique of complete fracture of the posterior arch was widely applied and could reduce the facial width to a large extent, postoperative facial depression in the preauricular area was a common problem because the medially replaced arch may generate a step-off. The impaction of the arch might also cause restriction of mouth opening.

To avoid these drawbacks, I used a wedge-section osteotomy procedure that minimized the dissection area to the inferior border of the zygomatic body, and the medial wall of the malar process was just large enough to admit a reciprocating saw blade. The posterior portion of the arch was accessed by the tip of a mosquito clamp before the temporomandibular joint via a tiny incision.

### Table 3. Comparison in Mandibular Reshaping in 456 Patients

<table>
<thead>
<tr>
<th>Complication</th>
<th>Burr and Shaving (n=23)</th>
<th>Angle Osteotomy (n=114)</th>
<th>Outer Cortex-Splitting Osteotomy (n=42)</th>
<th>Inclined Full-Thickness Osteotomy (n=277)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymmetry</td>
<td>1 (4.3)</td>
<td>3 (2.6)</td>
<td>1 (2.4)</td>
<td>4 (1.4)</td>
</tr>
<tr>
<td>Overcorrection</td>
<td>5 (4.4)</td>
<td>8 (7.0)</td>
<td>2 (4.8)</td>
<td>3 (1.1)</td>
</tr>
<tr>
<td>Rough border</td>
<td>2 (8.7)</td>
<td>16 (14.0)</td>
<td>1 (2.4)</td>
<td>2 (0.7)</td>
</tr>
<tr>
<td>Hematoma</td>
<td>2 (8.7)</td>
<td>2 (3.5)</td>
<td>1 (2.4)</td>
<td>9 (3.2)</td>
</tr>
<tr>
<td>Delayed infection</td>
<td>4 (1.8)</td>
<td>1 (0.9)</td>
<td>2 (4.8)</td>
<td>2 (0.7)</td>
</tr>
<tr>
<td>Ramus fracture</td>
<td>1 (0.9)</td>
<td>2 (1.8)</td>
<td>1 (2.4)</td>
<td>4 (1.4)</td>
</tr>
<tr>
<td>Nerve injury (M)</td>
<td>2 (1.8)</td>
<td>2 (1.8)</td>
<td>1 (2.4)</td>
<td>1 (0.4)</td>
</tr>
</tbody>
</table>

Abbreviation: TMJ, temporomandibular joint.

Figure 6. A patient with a prominent mandible who underwent inclined-fullness mandibular reshaping. A, Preoperative frontal view. B, Postoperative frontal view.

Figure 7. A patient with a square-shaped face who underwent wedge-section reduction malarplasty and inclined-fullness mandibular reshaping. A, Preoperative frontal view. B, Postoperative frontal view.
in front of the hair on the temples. The dissection was performed according to the direction that the facial nerve branches run, and the tunnel was made just large enough to admit a mastoid chisel. By doing this, the broad detachment of the arch could be avoided, and the facial nerve was less likely to be injured. The tiny incision can also avoid the superficial temporal artery in the preauricular region, and the sideburn scar was almost invisible after the surgery. The wedge-section osteotomy surface could fit better, and the infracture malar complex after the greenstick fracture of the arch was pushed forward and curvilinearly inward. In this way, patients could gain sufficient reduction and achieve a smooth malar contour. It can also keep the malar soft tissue inward so as to prevent postoperative check droop. The direction of the mastoid chisel was determined by the amount of the malar body segment being removed. When removing a large amount, the angle of the chisel should be oblique to avoid the dislocation of the infracture point and thus guarantee stability. I recommended suture fixation instead of rigid internal fixation to allow autoregulation of the infracture segment. Kim and Seul13 emphasized the importance of fixation with miniplates because they thought that the repositioned zygomatic complex could undergo external rotation from the force of the masseter muscle.

In my experience, it is enough to apply suture fixation under minimal dissection, zygomatic arch infracture, and fixed attachment of the masseter and temporalis muscle. Suture fixation also has merit in that the muscle attachment adheres to the zygomaticomaxillary buttress, and it plays a role in prevention of soft-tissue drooping. Recently, I developed a “self-stabilization” technique that does not use any fixation and suture between the osteotomy and infracture segment. It is feasible to perform in consideration of the contact surface, which, according to geometry, self-stabilizes after wedge-section osteotomy.

A combination of molding and osteotomy methods proposed by Lee and Park15 includes 3 steps: filing the zygomatic body, a partial-thickness osteotomy of the posterior orbital rim, and a full-thickness osteotomy of the posterior zygomatic arch. According to the major elements determining the reduction consequence, which I analyzed in the “Results” section, the inward repositioning of the zygomatic arch by greenstick fracture of the orbital rim and a complete fracture of the posterior osteotomy site resulted in undercorrection of the prominent malar complex for this method and insufficient removal of the excess malar segment.

Mandibular angle osteotomy was first introduced by Beckers15 through an external approach. This technique was considered to be acceptable until Converse16 reported a surgical method via an intraoral incision. Both methods used linear osteotomies, which did not adapt to the East Asian aesthetic concept, and usually resulted in the “second mandibular angle.” Baek et al17 proposed a multitosteotomy method to overcome this disadvantage; however, it was complicated, and the patient did not present a natural mandibular outline.

I use the term “mandibular reshaping” instead of describing reduction osteotomies in the lower mandibular region. Actually, recontouring surgery of the lower face includes not only mandibular angle reduction but a decrease of the thickness of the mandibular body and body margin.

Outer cortex-splitting osteotomy was reported for the treatment of reduction mandibuloplasty.18 Although it is a simple method, it provides limited effectiveness. I further modified this procedure to include a sagittal outer cortex-splitting osteotomy. However, although it could remove the half-thickness of the outer cortex and relieve the lateral projection of the lower face, it did not change the angle between the ramus plane and the mandibular plane. Female patients still complained about a postoperative masculine appearance from the lateral view. Furthermore, a splitting osteotomy could decrease the rigidity of the mandible and increase fracture risk.

The inclined-fullness osteotomy that I introduced had key modifications in that it not only could achieve a natural mandibular margin outline that is well connected to the chin, but it also could reduce the full thickness of the mandibular angle area without damaging the solidity of the mandible and could alter the angle between the ramus plane and the mandibular plane through a 1-stage operation. The problem was how to determine the location of the new mandibular angle. In my experience, the new mandibular angle was usually set at the point inferior to the earlobe (no more than 1 cm), but it also could reduce the full thickness of the mandible prominence, the oral functions (eg, biting strength, occlusion, and temporomandibular joint function) examined postoperatively showed a satisfactory outcome. Transient alveolar nerve injury still occurred in 4 cases, which caused numbness of the mental foramen area. It is necessary to mark up the anatomic structure of alveolar nerve before surgery to avoid mistaking the location of the nerve. Careless work or mistakes caused by a less experienced surgeon that cause mandibular fracture will probably lead to nerve injury. I emphasize that inclined-fullness osteotomy should be performed under the direction of an experienced and skilled surgeon.

In conclusion, this retrospective study of aesthetic surgery in facial proportion reviews the different methods used in the past 20 years. Intraoral wedge-section malarplasty and/or mandibular reshaping are the procedures most often used in my clinic to deal with facial contouring surgery in East Asian patients.

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Correspondence: Xiongzheng Mu, MD, Department of Plastic and Reconstructive Surgery, Shanghai Ninth People’s Hospital, Floor 18, Building 1, No. 639, Zhizaoju
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