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Aesthetic Orthognathic Surgery

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The skeletal foundation of the human face serves as the invisible determinant of facial morphology. Aesthetic surgery performed on facial soft tissue alone, without dual consideration for the skeletal structural abnormalities that caused the patient's undesired facial appearance, will consistently fall short of achieving the best possible outcome. Correction of facial skeletal disproportions and disharmony necessitates a keen aesthetic sense of the soft tissue changes that can result from making alterations to the underlying skeletal base.

Although dental occlusion and skeletal stability were once the surgical priorities in orthognathic surgery, most patients now present for orthognathic surgery because of aesthetic discontent. Aesthetic considerations now dictate the goals of surgery. More consistent and favorable outcomes in aesthetic orthognathic surgery have resulted from advancements in surgical technique, a paradigm shift in surgical planning away from rigid cephalometric measurements to parameters that are guided by the surgeon's aesthetic sense, and improved patient care.

In Asia, an increasing number of patients, especially young women, are presenting for correction of dentofacial deformities. Conditions that are particularly common in Asia include mandibular prognathism, bimaxillary protrusion, and facial asymmetry. Optimal management of these patients requires equal contribution and shared responsibility from both the surgeon and the orthodontist. In this chapter, we will provide an overview of patient evaluation and surgical indications for dentofacial deformities common to the Asian patient, our preferred operative techniques, and caveats for avoiding complications in orthognathic surgery.

Preoperative Assessment

The patient's significant aesthetic concerns should be firmly established during the initial consultation, because these concerns will form the priorities on which decision-making and surgical planning will be determined. To ascertain an accurate diagnosis and to formulate an appropriate treatment plan, the surgeon must perform a thorough and systematic appraisal of the patient's facial morphology, elucidating the

Table 48-1 Components of Intraoperative Assessment of Facial Aesthetics

Assessment Points	Assessment Point Considerations
Facial proportions	Vertical, transverse, and sagittal proportions Nasolabial angle Lip protrusion Soft tissue pogonion
Facial and dental midlines	Correlation of midline anatomic structures (glabella, nasal tip, cupid's bow, upper dental midline, lower labial frenulum, piriform aperture)
Facial asymmetry	Chin deviation Mandibular prominence
Occlusal plane	Comparison of lower eyelid to commissure distances
Teeth show	A 2 to 3 mm upper incisor display is ideal
Chin projection	Rickett's E-line

patient's skeletal, dental, and soft tissue features[1] (Table 48-1). Cephalometric and panoramic radiographs are useful in determining skeletal and dental relations, demonstrating the state of the temporomandibular joint, and identifying pathologic lesions. Appropriate photographic documentation of the patient smiling and in repose should be recorded (Fig. 48-1).

The skeletal evaluation should include a description of the overall symmetry of the patient's face. The most commonly detected lower facial asymmetries are chin point deviations from the midline, the discrepancy between the vertical position of the inferior border of the mandible between the left and right, and occlusal canting, which may result in tilting of the oral commissure. Vertical proportionality of the face is elucidated by comparing the height of the lower face from the menton to the subnasale relative to the midface from the subnasale to the glabella.

From the lateral view, the sagittal position of the maxillary and mandibular skeletal bases can be compared. Overall facial convexity or concavity can be established by connecting a line from the glabella to the subnasale to the pogonion. Patients with mandibular prognathism typically present with an overall concave facial profile with a divergent chin point, whereas patients with bimaxillary protrusion often have an overall convex profile with chin retrusion.

Dental evaluation should verify the occlusion type and include an assessment of the dental alignment, arch coordination, dental midline, and incisor inclination. The amount of upper incisor and gingival display in repose and while smiling should be noted. A gummy smile can be derived from a number of causative factors. Periodontal causes such as a shortened incisor height may be sufficiently treated with crown-lengthening procedures, although surgery may be necessary when the underlying basis is bimaxillary protrusion or vertical maxillary excess.

More recently, increased emphasis has been placed on the value of the smile arc (Fig. 48-2) and the aesthetic enhancement that can be brought to a patient's smile through orthognathic means. The *smile arc* is the relationship of the curvature of the maxillary incisors and canines to the curvature of the lower lip in the posed smile. The ideal or consonant smile arc has the maxillary incisal edge curvature parallel to the

Fig. 48-1 **A,** This 22-year-old woman has excess gingival show and a "gummy" smile. These major concerns must be part of the surgical planning. **B,** However, these characteristics cannot be seen in her photos in repose.

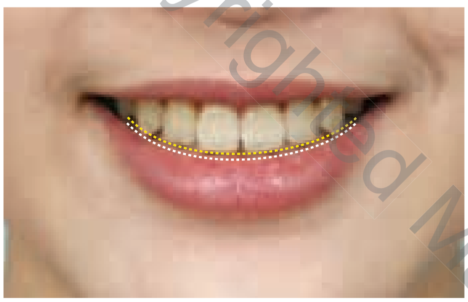


Fig. 48-2 The smile arc is defined as the upper incisal edge line *(yellow dotted line),* which should be concordant with the lower lip line *(white dotted line)* when the patient is smiling.

curvature of the lower lip.[2] A nonconsonant or flat smile arc can often be improved by performing posterior impaction of the maxilla and clockwise rotation of the maxillomandibular complex, with occlusal plane neglect.

The facial soft tissue attributes should be assessed in both static and dynamic poses. The features that should be assessed include the nasolabial angle, mentolabial fold, interlabial gap, and the presence of mentalis strain. The adequacy of skeletal support of the soft tissue is important so the surgeon can anticipate changes that may occur to the face after surgical alteration of its skeletal foundation. Soft tissue does not always respond favorably to skeletal displacements intended to achieve normal facial measurements and proportions; therefore patients should be informed of potential soft tissue changes, such as lengthening of the upper lip, deepening of the nasolabial fold, and widening of the nasal base that may result from surgery.[3]

Surgical Planning and Preoperative Treatment

The patient's aesthetic concerns and desires should dictate the priorities in formulating the surgical treatment plan. Once a clinical examination and radiographic analysis have been completed, prediction tracings and preoperative model studies are performed to formulate the necessary vector and amount of bony movement. A surgical splint is then constructed. For two-jaw surgery, we prefer to use a single final occlusal splint, making fine three-dimensional adjustments to the maxillomandibular complex intraoperatively based on our assessment of the patient's facial aesthetics[4] (see Table 48-1). Therefore the surgical plan may consist of a selected combination of LeFort I osteotomy of the maxilla, bilateral sagittal split osteotomy (BSSO) of the mandible, upper and lower anterior segmental osteotomies (ASO), and genioplasty. In recent years, patients have been offered preoperative cone-beam computed tomography (CBCT) as part of

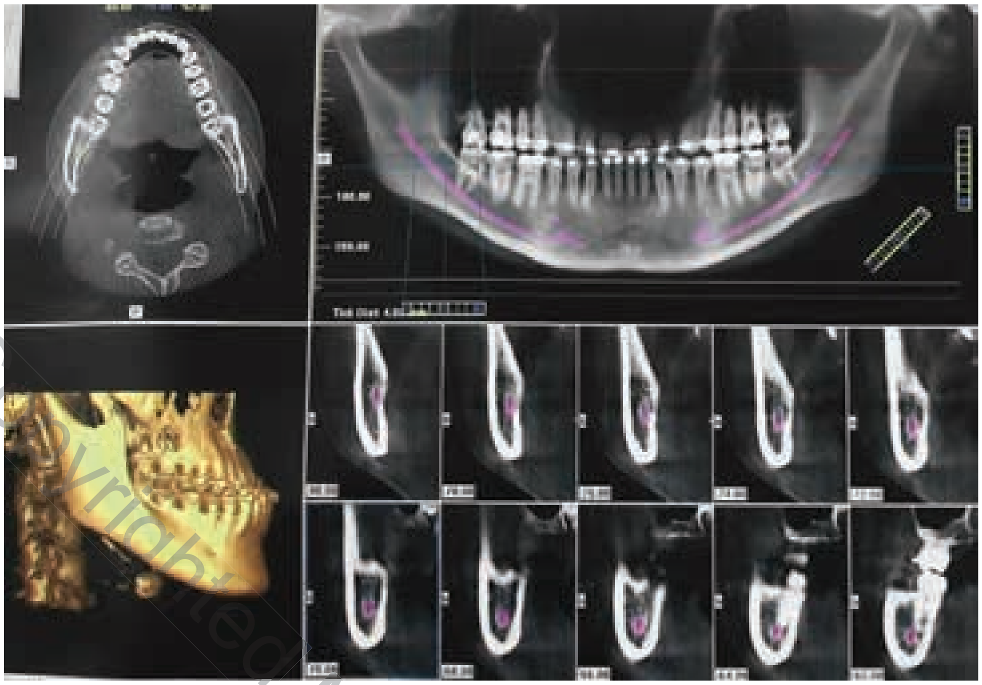


Fig. 48-3 CBCT provides detailed information regarding the proximity of the inferior alveolar nerve canal *(pink line and dot)* to the buccal cortex of the ramus and the inferior border of the mandibular body.

the surgical planning. There is evidence to suggest that CBCT images can reliably assess the risk of postoperative neurosensory disturbance[5-8] (Fig. 48-3). We have found that patients have a significantly lower incidence of inferior alveolar nerve injury after presurgical CBCT evaluation.

Traditionally, a period of presurgical orthodontics is required to obtained optimal dental alignment in preparation for surgery. More recently, however, the surgery-first approach has become an alternative. With this approach, a minimal amount of presurgical orthodontics is performed before the skeletal deformity is corrected surgically, and the majority of orthodontic adjustment is subsequently undertaken after surgery has been completed. The surgery-first approach utilizes the greater potential for rapid teeth movement after maxillary and mandibular osteotomies; therefore this approach is able to achieve the necessary orthodontic treatment goals in a much shorter period.[9-14]

Indications

Mandibular Prognathism

In addition to having an overall concave facial profile, patients with mandibular prognathism commonly present with a retrodisplaced maxilla and a class III malocclusion. Occasionally, when the maxilla is already in an optimal position, surgical correction through a BSSO and setback of the mandible will suffice. More commonly, however, treatment for mandibular prognathism involves two-jaw surgery, comprising a LeFort I osteotomy of the maxilla and BSSO of the mandible.

A LeFort I osteotomy with posterior impaction and advancement of the maxilla can provide better upper lip fullness, reduce the amount of mandibular setback required and thus reduce the likelihood of relapse, and improve the consonance of the smile arc. Segmental maxilla osteotomies may be used to correct deformities in the curve of Spee and for transverse maxillary plane adjustments. Once the mandible has been set back, chin projection should be assessed to determine whether a genioplasty is required (Fig. 48-4).

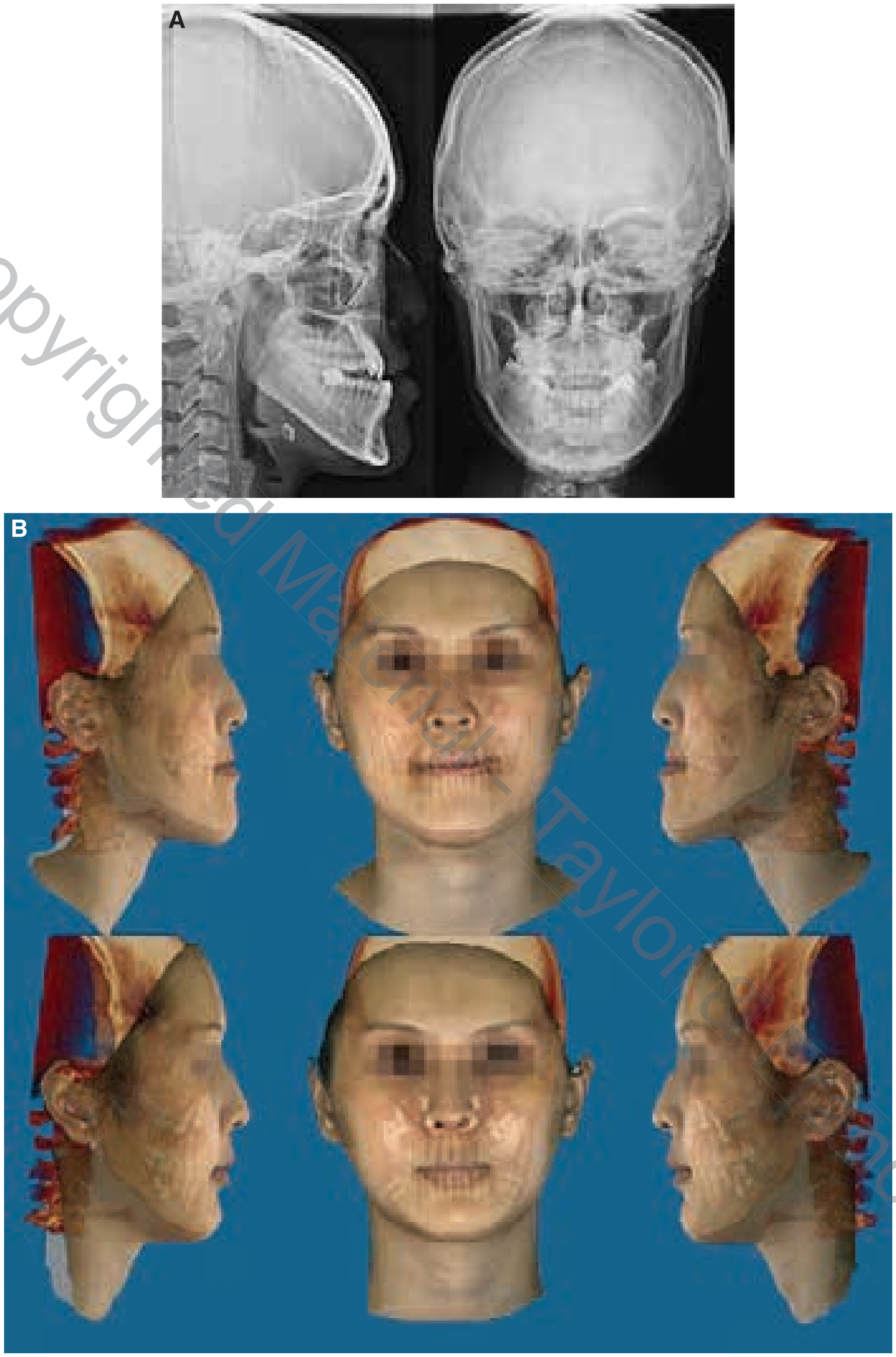


Fig. 48-4 **A,** Cephalometric study. **B,** A tracing of a 22-year-old woman with mandibular prognathism.

Bimaxillary Protrusion

Bimaxillary protrusion is a condition characterized by dentoalveolar flaring of the upper and lower incisors that causes upper and lower lip protrusion and an overall convex facial profile. This deformity is commonly associated with lip incompetence, an excessive display of frontal teeth, a gummy smile, mentalis strain, an anterior open bite, and a class II malocclusion. A combination of surgical procedures may be indicated to correct bimaxillary protrusion. The simplest method of correction involves extraction of four of the first premolars, and performing ASO of the mandible and maxilla through the extraction sites. The segments are then set back and tilted to reduce inclination of the incisors.

In certain patients, maxillary excess may be corrected solely with a LeFort I osteotomy and maxillary setback, without the need for dental extractions and ASO. In patients in whom bimaxillary protrusion and vertical maxillary excess are coexistent problems, a LeFort I osteotomy with superior impaction of the mandible combined with an ASO may be needed.[1] A BSSO may be required to advance or set back the mandible.

Facial Asymmetry

The multifaceted mechanisms that generate differential bony growth between the two sides of the face can result in complex facial asymmetries that can involve both skeletal and soft tissue discrepancies. Orthognathic means of correcting these asymmetries are limited to the lower face. Chin asymmetry can be corrected with simple burring if the deformity is minor. In more severe patients, the surgeon may need to perform an osseous genioplasty with the required displacement of the segment to return the chin point centrally. Discrepancies in the vertical position of the inferior borders of the mandible are best treated with a BSSO and an appropriate shift to level the two sides.

Contouring of the angle and lower borders of the mandible by burring can further refine the symmetry of the mandible. Occlusal canting frequently requires a LeFort I osteotomy and differential superior impaction or downgrafting of the maxilla to level the occlusion.

Surgical Technique

Anesthesia

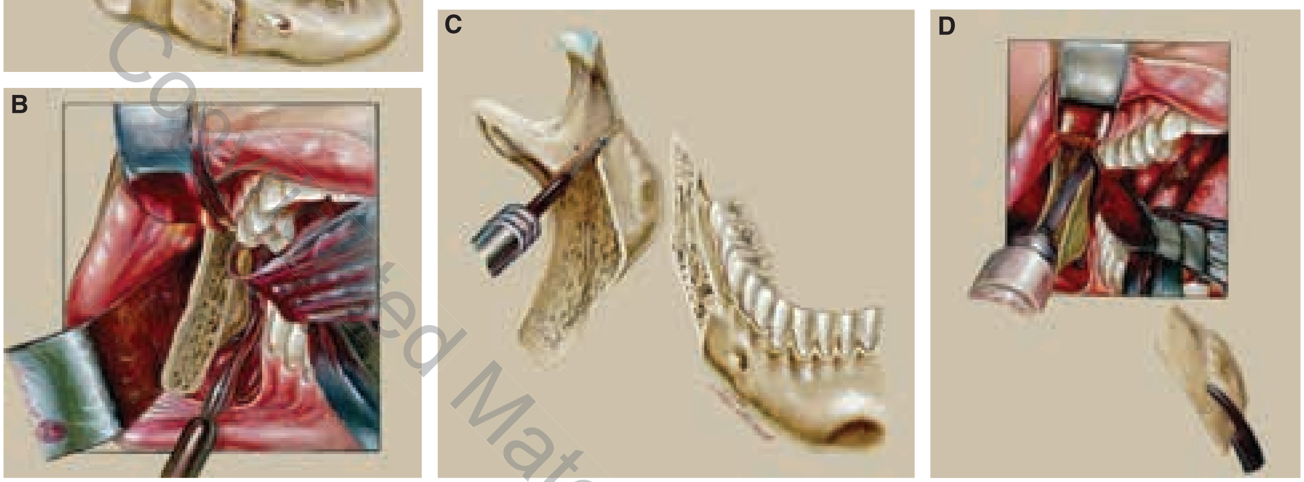
Aesthetic orthognathic surgery is carried out with a general anesthesic, preferably with nasotracheal intubation. The patient is positioned with a transverse roll under the shoulders to extend the neck. A dilute solution of epinephrine is infiltrated into the operative site, and blood pressure is maintained at a mean of approximately 60 mm Hg with hypotensive agents to minimize intraoperative blood loss. A single dose of intravenous antibiotics is administered.

Bilateral Sagittal Split Osteotomy

Our preferred technique of performing a BSSO of the mandible is a modification of the technique described by Hunsuck[15] (Fig. 48-5). The mandible is incised and exposed[16] (Fig. 48-6).

Subperiosteal dissection of the medial aspect of the ascending ramus is then performed to expose the lingula and the inferior alveolar neurovascular bundle. The inferior alveolar nerve is retracted and protected, and a burr is used to perform a horizontal corticotomy on the medial aspect of the ascending ramus just superior to the mandibular foramen (Fig. 48-7). The posterior extent of this corticotomy ends distal to the mandibular foramen. The sagittal osteotomy of the mandibular body is performed with a reciprocating

Fig. 48-5 Bilateral sagittal split-ramus osteotomy. The drawing shows the technique described by Hunsuck, with our modifications. **A,** Configuration of osteotomy lines. **B,** Full detachment of the pterygomasseteric muscle sling. **C** and **D,** Ostectomy of the pterygoid protuberance facilitates concomitant angle contouring and is a good source of bone grafts if needed. (From Honda T, Lin CH, Yu CC, Heller F, Chen YR. The medial surface of the mandible as an alternative source of bone grafts in orthognathic surgery. J Craniofac Surg 16:123-128; discussion 128, 2005.)



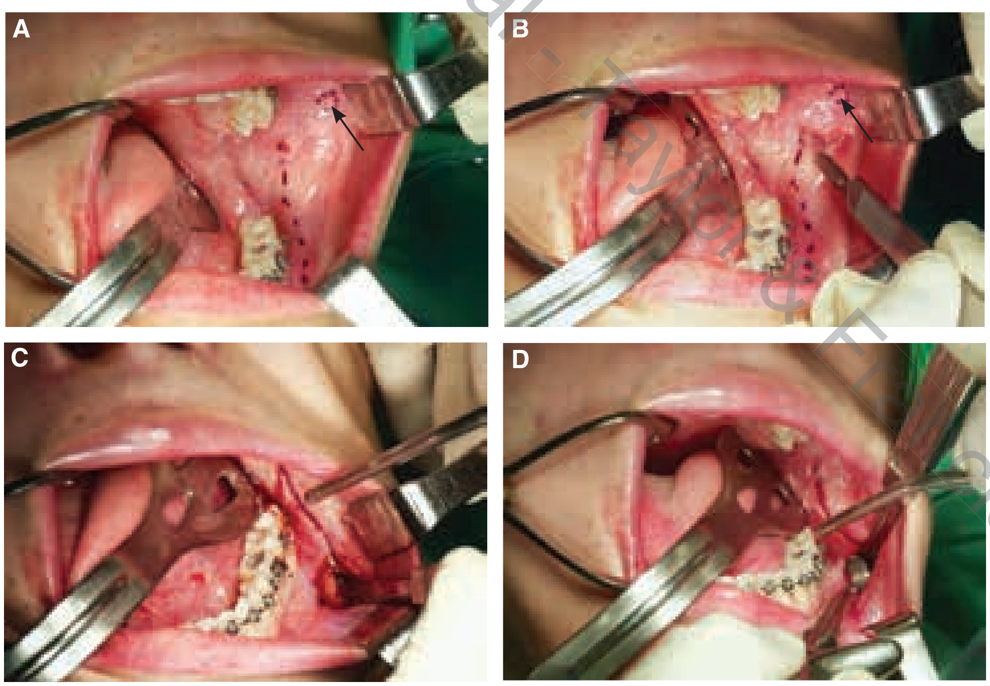


Fig. 48-6 Incision and exposure of the mandible. **A** and **B,** Markings for the buccal vestibular incision and identification of the papilla of Stensen's duct *(black arrow).* A buccal vestibular incision begins at the anterior border of the ramus and extends anteriorly along the mandibular body up to the second premolar. **C** and **D,** A sufficient cuff of mucosa should be left on the mandible to facilitate later closure. The incision is taken onto the bone, and subperiosteal dissection is performed to expose the lateral aspect of the mandible.

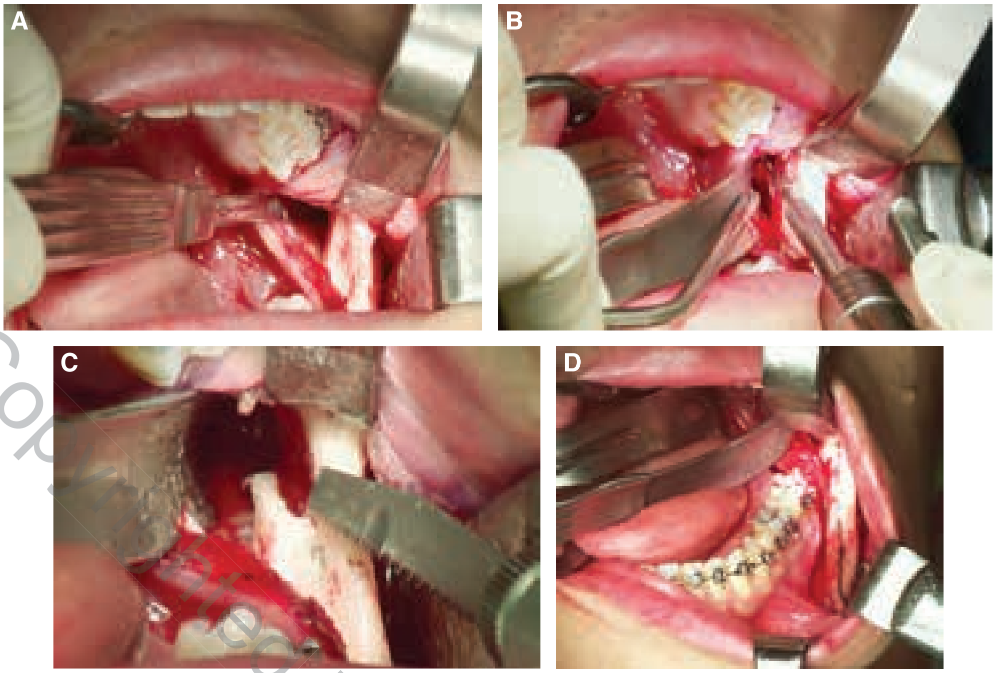


Fig. 48-7 **A** and **B,** Subperiosteal dissection of the medial aspect of the ascending ramus. **C** and **D,** The sagittal split osteotomy of the mandibular ramus. Completion of the osteotomy (BSSO) is performed according to the technique described by Hunsuck, with our modifications.

saw and follows the anterior oblique line up to the level of the first molar, where it is joined by the vertical osteotomy of the buccal cortex of the mandibular body. A similar procedure is completed on the other side before actual splitting is performed.

The proximal and distal segments are split through a variety of osteotomies. The medial cortex of the mandibular angle remains with the proximal segment, and an osteotomy of the medial cortex of the mandibular angle is performed. This modification allows greater long-term stability after repositioning the mandible, because muscular forces are no longer restricting its excursion. Concurrent mandibular angle contouring can be performed, and the resected medial cortex of the angle can be a source of bone graft if necessary.

The mobile medial segment of the mandible is now guided into its new position with the occlusal splint, and intermaxillary fixation (IMF) is accomplished. Bony adjustments are made as necessary to provide optimal contact between the segments. The condyle should be in a relaxed position within the glenoid fossa. Osteosynthesis is achieved with two 2.0 mm plates secured with monocortical screws along the body of the mandible. The IMF is released and occlusion is verified. Intraoral drains are placed and the wound is closed with resorbable sutures.

LeFort I Osteotomy

An intraoral labial-buccal incision is made, preserving an adequate mucosal edge to facilitate final closure. Subperiosteal dissection then exposes the anterior maxillary wall, infraorbital foramen, lateral zygomatic-maxillary buttress, and pterygomaxillary junction. The nasal mucosa is elevated off the nasal piriform, and intranasal dissection extends onto the nasal floor and the lateral nasal wall, and medially onto the septum and vomer. The nasal septum is separated from the maxillary crest by sweeping an elevator across its junction.

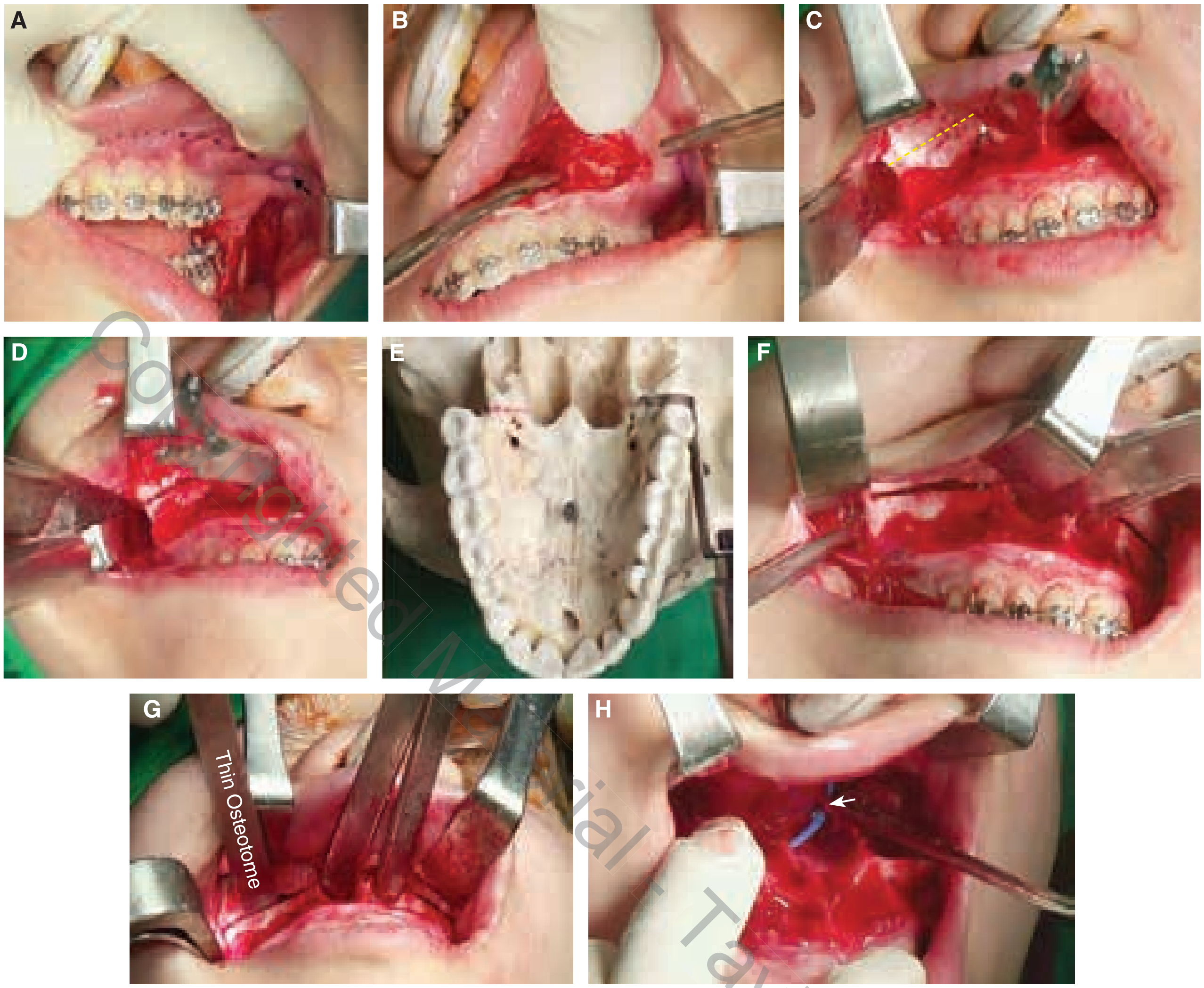


Fig. 48-8 LeFort I osteotomy. **A-C,** Markings for an intraoral labial-buccal incision to ensure an adequate mucosal edge are preserved to facilitate final closure. Note that the papilla of Stensen's duct is identified to avoid injury *(black arrow)*. Subperiosteal dissection with a periosteal elevator exposes the anterior maxillary wall. The planned osteotomy is marked *(yellow line)* 5 mm above the canine root apices *(canine root apex is marked with an asterisk)*. **D-F,** The pterygomaxillary osteotomy is initiated with a right-angled oscillating saw and subsequently completed with a curved thin-blade osteotome. **G** and **H,** A posterior maxillary wall osteotomy is performed with a thin osteotome and gentle tapping. Once the osteotomies are complete, the maxilla is downfractured with digital pressure alone (*white arrow* marks the descending palatine vessels).

The planned osteotomy is then marked, maintaining a distance of 5 mm above the tooth root apices. A reciprocating saw is used to perform the horizontal osteotomy, proceeding from the posterior-lateral maxillary wall, across the anterior maxillary wall, and onto the lateral nasal wall. The pterygomaxillary osteotomy begins with the use of a right-angled oscillating saw, and completion of its disjunction is confirmed with a curved osteotome. A posterior maxillary wall osteotomy is performed through gentle tapping with a thin osteotome. Once the osteotomies are complete, the maxilla can then be downfractured with digital pressure alone. To prevent unfavorable fractures, the surgeon must avoid using force to accomplish the downfracture (Fig. 48-8).

When the maxilla has been fully mobilized, either as a single piece or in multiple segments, the occlusal splint is introduced and IMF is performed. If a BSSO is performed concurrently, the maxillomandibular complex is placed in the desired position as directed by the preoperative calculations and on-table assessment of facial aesthetics (see Table 48-1).

In patients with superior impaction or setback of the maxilla, any areas of bony interference should be removed. Maxillary setback occasionally presents as a somewhat difficult maneuver, but it can be facilitated by reducing the pterygoid process, resecting the maxillary tuberosity, and extracting the third molar. If there is significant inferior maxillary repositioning, bone from the medial cortex of the mandibular angle can be used as interpositional grafts. The nasal septum may need to be partially removed to prevent septal buckling.

With the maxilla in the desired position, it is stabilized with plates and screws at the medial and lateral buttresses. The IMF is released and the occlusion is verified. An alar cinch suture is placed to control the width of the alar base, and the wound is closed with absorbable sutures.

Anterior Segmental Osteotomy

An ASO of the maxilla and mandible (the Wassmund and Kole procedures, respectively) are usually performed through extraction spaces at the first premolars or through interdental osteotomies. For an ASO of the mandible, the exposure is identical to that for a genioplasty. The labial gingival bridges at the sites of extraction or interdental osteotomy are elevated and kept intact to avoid a vertical scar and to provide an extra source of vascular supply to the anterior segment. The vertical osteotomy lines must be kept at least 5 mm central to the mental foramen, and the horizontal osteotomy line must be at least 5 mm from the canine roots.

If BSSO is indicated, it is performed initially without complete splitting. The split is completed after an ASO of the mandible, providing better control of the segment.

For an ASO of the maxilla, palatal tunnels are elevated subperiosteally through the extraction spaces and interdental osteotomies to meet at the midline. The width of the palatal tunnel should be around 10 mm to prevent palatal mucosal kinking after setback of the segment. Gingival bridges at the osteotomy sites are kept intact.

If required, a LeFort I osteotomy of the maxilla is performed at this time. The horizontal osteotomy of the LeFort I osteotomy or an ASO is kept at least 5 mm above the canine roots. The vertical osteotomies with the appropriate amount of bone removal are designed according to the necessary incisor inclination.

If a three-piece LeFort I osteotomy is indicated, parasagittal splits of the posterior maxillary segment are performed. Once completely mobilized, the anterior segment[17] is guided into the desired position with the occlusal splint. Areas of premature bony contact are burred to allow optimal fit, and fixation is performed with plates and screws (Fig. 48-9).

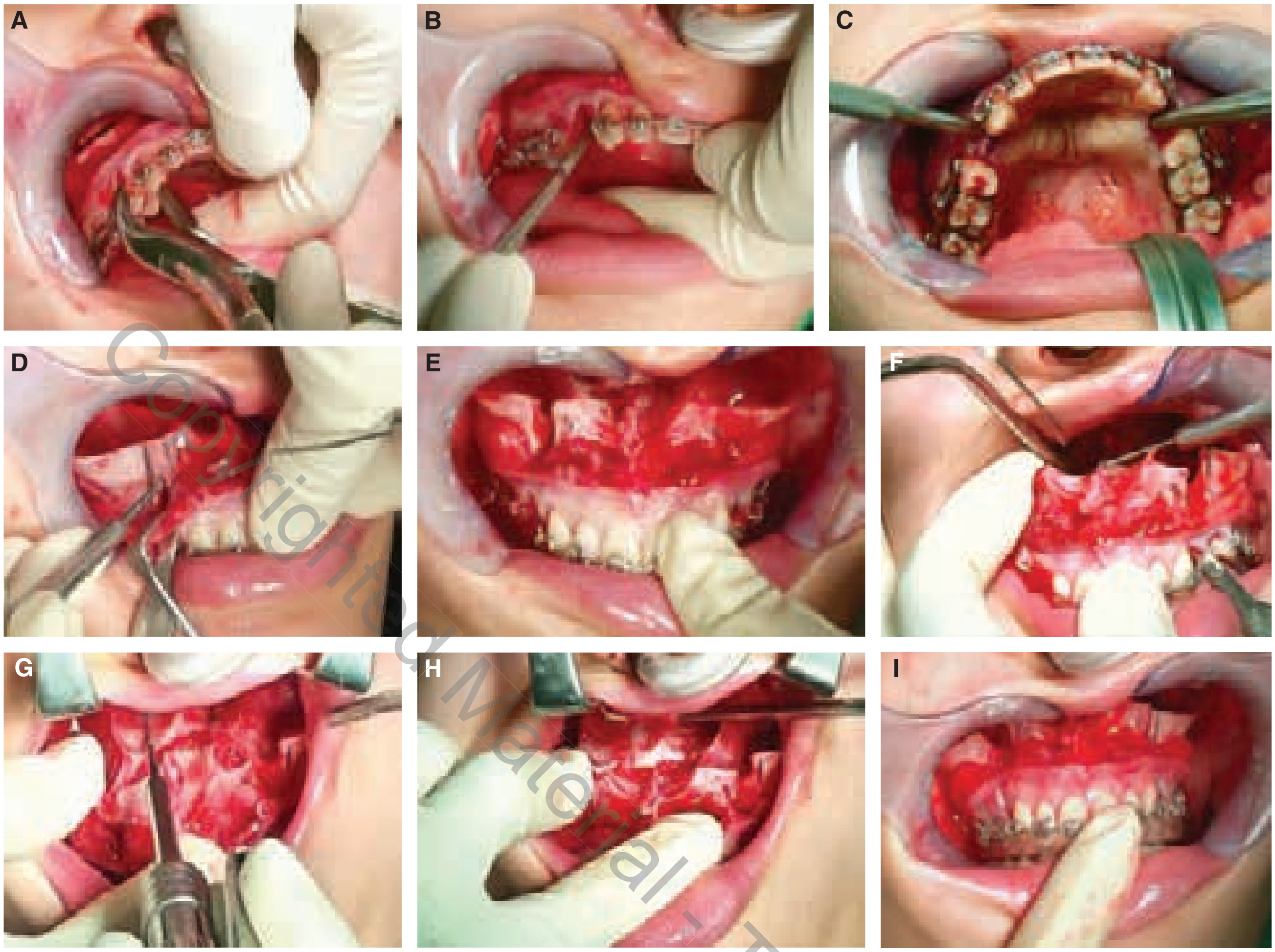


Fig. 48-9 ASO of the maxilla. **A-C,** Extraction of the first premolar is required to create sufficient space for the ASO. The palatal tunnels are elevated subperiosteally through the extraction spaces and interdental osteotomies to meet at the midline. **D-F,** The horizontal osteotomy of the ASO is kept at least 5 mm above the canine roots *(asterisk)*. The vertical osteotomies are designed according to the necessary incisor inclination. **G-I,** If a three-piece LeFort I osteotomy is indicated, parasagittal splits of the posterior maxillary segment are performed. Once completely mobilized, the anterior segment is guided into the desired position with the occlusal splint.

Postoperative Care

The IMF is routinely removed after surgery. For multiple-segment osteotomies of the maxilla or mandible, the dental splint is maintained for 2 weeks to provide additional stability, if necessary. The intraoral drain tubes are removed on the first postoperative day. Patients routinely rinse their mouths with chlorhexidine solution to remove blood clots. Patients are encouraged to initiate a liquid diet as soon as possible after surgery and to gradually shift to a soft diet within 2 weeks. Nonsteroidal antiinflammatory drugs are routinely prescribed for pain relief. For those patients who have moderate to severe pain, meperidine 50 mg IM is given every 4 hours. Broad-spectrum parenteral antibiotics are given after the operation and then converted to an oral form for 1 week. Soft tissue swelling is a major concern to these patients. To reduce the discomfort, patients should routinely use ice packs and elevate their head, and they should take a nasal decongestant for the first few days after surgery.

Most patients receive autologous blood transfusions during the surgery, and a postoperative hemoglobin level is not routinely checked unless clinically indicated. The majority of patients are discharged 2 days after the surgery once their oral intake is adequate and they are able to ambulate. Patients routinely follow up at 1 week, 1 month, 4 months, and 1 year after surgery. Postoperative orthodontic treatment is initiated 4 weeks after surgery.

Results

From 2003 to 2011, the senior author (Y.R. Chen) performed 2054 orthognathic procedures at the Craniofacial Center of Chang Gung Memorial Hospital. The majority of these patients had class III malocclusions with mandibular prognathism, followed by class II malocclusion with bimaxillary protrusion (Fig. 48-10), facial asymmetry (Figs. 48-11 through 48-13), midfacial hypoplasia resulting from a cleft, obstructive sleep apnea, or posttraumatic maxillofacial deformities. Two-jaw surgery with or without genioplasty is used in more than 95% of aesthetic orthognathic surgery cases.

Fig. 48-10

This 39-year-old woman presented with bimaxillary protrusion and chin retrusion. Note the lip incompetence and mentalis muscle strain over her chin preoperatively (Fig. 48-10). She is shown 11 months after having a LeFort I osteotomy, setback and intrusion of the maxilla, bilateral sagittal split osteotomy with mandibular setback, and advancement genioplasty.

The most common complication is inferior alveolar nerve injury. Transient sensory disturbance of the lower lip is observed in 90% of patients immediately after the procedure but lasts longer than 6 months in only 10% of patients. Unexpected fracture of the mandibular ramus occurred in 1% to 3% of the patients. An unexpected fracture usually results from the surgeon's attempt to prevent an inferior alveolar nerve injury and, in the process, making the mandibular ramus too thin. Most unexpected fractures are incomplete and can be identified before the ramus has been split completely. For those completely unexpected ramus fractures, rigid fixation by miniplates is mandatory. Injury to the descending palatine artery is not uncommon when performing LeFort I osteotomies; the bleeding is controlled with cauterization to prevent postoperative hematoma. The chance of injury to the facial artery is low. However, if it occurs, we recommend ligation to prevent the development of a late pseudoaneurysm.

In our study, no patients had permanent facial palsy resulting from facial nerve injury. Eight patients in this series received revision orthognathic surgery after the first operation. The indications for repeated surgery include residual asymmetry or midline deviation,[6,8] uncorrectable malocclusion,[1,8] and relapse.[1,8]

Fig. 48-11

This 22-year-old man presented with mandibular prognathism and chin deviation (Fig. 48-11). After undergoing a LeFort I osteotomy to improve his left posterior maxilla, bilateral sagittal split osteotomy for mandible setback, and genioplasty to advance his chin, his facial profile and symmetry improved as shown at his 11-month follow-up.

Fig. 48-12

This 20-year-old woman presented with facial asymmetry and an anterior open bite (Fig. 48-12). After having a LeFort I osteotomy of the maxilla with a three-piece anterior segmental osteotomy and a bilateral sagittal split osteotomy of the mandible and genioplasty, she shows an improved symmetrical facial profile and an aesthetic smile arc at her 7-month follow-up.

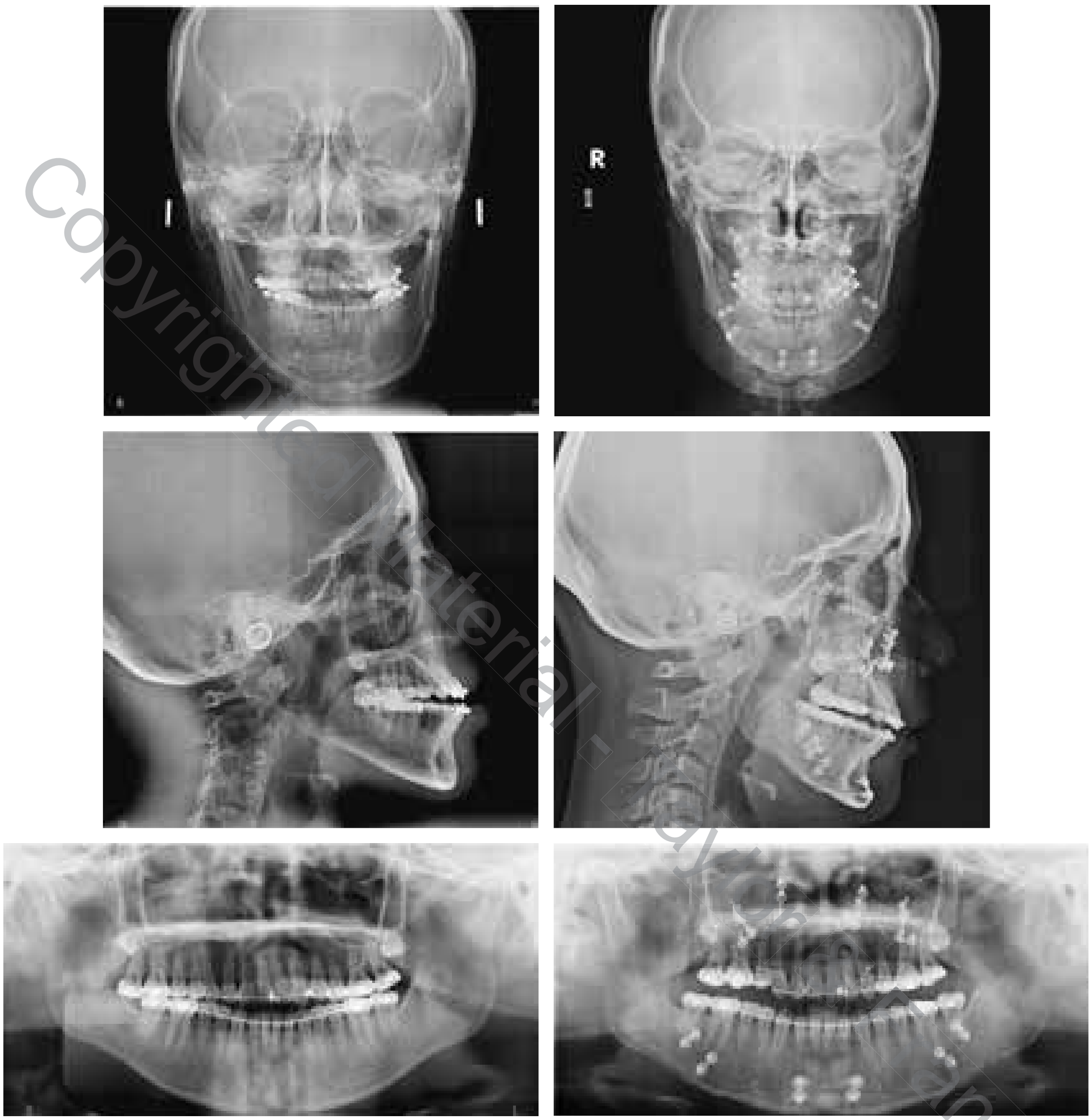


Fig. 48-13

Radiographs of the same 20-year-old woman reveal the improvement in her facial asymmetry and anterior open bite after surgery.

Discussion

Avoiding complications in orthognathic surgery begins with the surgeon's careful aesthetic and functional evaluation of the patient as well as strategic surgical planning. Certain undesired outcomes should be considered sequelae rather than unexpected complications.

Examples include patients with bimaxillary protrusion and older patients, who are at the highest risk of developing an aged appearance after surgery as a result of setback or superior positioning of the maxilla and relaxation of midfacial soft tissue support. These patients should be forewarned and prepared to accept this likely consequence.

Vascular compromise and segmental necrosis is uncommon, but can occur as a result of extensive soft tissue degloving, previous scarring, loss of gingival attachment, and excessive stripping of the palatal mucosa. Subperiosteal dissection should only be performed to complete the osteotomies. Efforts should be made during a LeFort I osteotomy of the maxilla to protect and maintain the integrity of the descending palatine artery, which provides an additional source of vascularity to the maxilla.

Relapse and postoperative malocclusion typically become evident in the immediate operative period or shortly thereafter. The minimal tendency toward early relapse can be managed with the IMF, dental elastics, or orthodontic appliances, whereas significant relapse necessitates a return to the operating room. Early relapse can be caused by inadequate mobilization of bony segments, bony interference or instability, dislocation of the mandibular condyles from the glenoid fossa, or failure of fixation. All bony segments should be sufficiently mobilized to allow a passive and precise fit into the occlusal splint, and fixation of BSSO segments should ensure that the condyles are in a relaxed position within the glenoid fossa.

A significant percentage of patients undergoing mandibular surgery will develop potentially long-term deficits as a result of injury to the inferior alveolar nerve. During splitting of the mandible, the osteotome should be directed closely against the inner surface of the buccal cortex, keeping a safe distance from the course of the inferior alveolar nerve. Similarly, the osteotomy line for a genioplasty should be placed at least 5 mm below the mental foramen, because the nerve within the canal descends before exiting the foramen. If nerve transection is identified during surgery, repair should be carried out. Facial palsies that develop after BSSO are likely to be caused by facial nerve compression or traction. Complete recovery is expected for the majority of patients, and conservative management is recommended.

Unfavorable fractures that occur during a LeFort I osteotomy of the maxilla can extend up to the cranial base when downfracture is attempted forcefully, despite incomplete osteotomies or when the osteotome is directed in a superior direction during pterygomaxillary disjunction. Unfavorable fractures can also occur in BSSO, and can involve the condylar neck, lingual plate, or buccal plate. The key to preventing these unwanted mandibular fractures is to ensure proper direction and complete corticotomies of the horizontal and vertical mandibular osteotomy lines.

Among those patients demanding revision, postoperative asymmetry is the most common indication, followed by untreatable malocclusion and relapse. Postoperative occlusion is established according to the occlusal splint, which is applied intraoperatively to bring the maxilla and mandible to a predetermined position. However, during the procedure, the surgeon judges the facial profile and adjusts it if necessary. To create an aesthetically pleasing facial profile, the surgeon uses several soft tissue parameters as a guide (see Table 48-1) to determine where to place the maxillomandibular complex. In certain patients with facial asymmetry, symmetry in repose and with a smile cannot be achieved simultaneously, especially in those severe patients with asymmetries involving not only the skeleton but also the teeth and soft tissue. To reach a harmonious profile, the surgeon needs to make a compromise between the dental, skeletal, and soft tissue midline; the priority of soft tissue symmetry is usually higher than that of skeletal and dental symmetries.

Pearls for Success

- The priorities in orthognathic surgery have evolved from a focus on rigid cephalometric calculations based on population norms and achieving ideal occlusion to its current art form, in which each treatment plan is customized to the aesthetic needs of the patient.
- Effective collaboration between the surgeon and orthodontist is essential to obtain a balanced outcome that incorporates both facial and dental ideals.
- The functional outcome should consider both occlusion and temporomandibular joint function.
- Functional issues, such as malocclusion, can often be corrected utilizing single-jaw surgery. However, most aesthetic concerns require a two-jaw operation.
- The aesthetic outcome should include both static (facial symmetry, facial proportion, occlusal cant) and dynamic (smile arc, gingival show) parameters.
- The surgeon must be cautiously aware of the soft tissue changes that can result from displacement of the underlying skeletal support. An intraoperative systematic evaluation to the facial aesthetics must be performed to appropriately adjust bony movement.

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