

AESTHETIC ORTHOGNATHIC SURGERY

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1. What is orthognathic surgery?

Orthognathic surgery is the term used to describe surgical movement of the tooth-bearing segments of the jaws as well as the maxilla and mandible. It can be used to correct problems related to developmental anomalies, posttraumatic deformities, and sleep apnea. The goal of orthognathic surgery is to establish ideal dental occlusion with the jaws in a position that optimizes facial aesthetics.

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2. What is dental compensation?

The term *dental compensation* is used to describe the tendency of teeth to tilt in a direction that minimizes the dental malocclusion. For example, in a patient with an overbite (class II malocclusion), the upper incisors will retrocline while the lower incisors will procline. The opposite occurs in a patient who has dental compensation for an underbite (class III malocclusion). Thus dental compensation will mask the true degree of skeletal discrepancy. Typically, the true skeletal discrepancy is worse than what appears on intraoral examination due to dental compensation.

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3. Why is it important to discuss orthodontic camouflage versus surgical treatment prior to initiating orthodontic therapy?

In an attempt to correct an overbite with orthodontics alone, an orthodontist will retrocline the upper incisors in an attempt to normalize overjet. This will reduce upper lip support, which will make the nose look more prominent. Many patients who had moderate to severe class II malocclusions corrected with orthodontics alone present for rhinoplasty, complaining of an overprojecting and large nose. In actuality, the nasal dimensions often are normal. It is the jaw relationship that requires correction. It is important to meet with patients before they decide whether to proceed with surgical or nonsurgical orthodontic correction. If the patient elects surgical treatment, the teeth are moved in the opposite direction rather than if nonsurgical orthodontic correction was selected. Therefore it is imperative for this consultation to take place prior to initiation of treatment.

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4. What is orthodontic decompensation?

Prior to orthognathic surgery, the orthodontist will decompensate the occlusion by removing the degree of dental compensation produced by the skeletal discrepancy. Preoperative orthodontic decompensation allows the surgeon to take advantage of the maximal amount of skeletal advancement possible.

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5. What is the ideal vertical position of the maxilla?

The vertical position of the maxilla is determined by the amount of the incisors that is visible with the lips in repose. A man should show at least 2 to 3 mm, whereas as much as 5 to 6 mm is considered attractive in a woman. If the patient shows the correct degree of incisor in repose but shows excessive gingiva in full smile, the maxilla must not be impacted. The correct degree of incisor in repose is more important than is visible gingiva in full smile. It is undesirable to bury the incisors in repose just to reduce the degree of gingiva in a full smile. If the patient exhibits a long lower face with proper incisal show, the chin may be reduced to reestablish the aesthetic height of the lower facial third (Fig. 87-1).

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6. How does the clinician determine the anteroposterior position of the jaws?

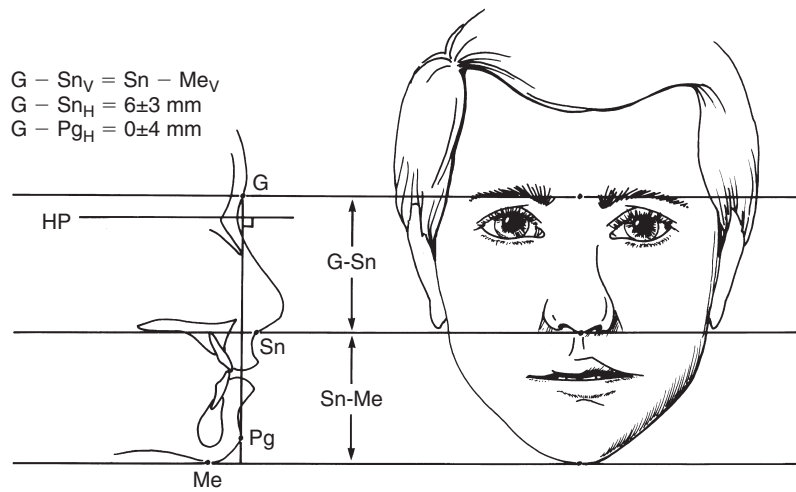
The profile evaluation focuses on the projection of the upper and lower jaws relative to fixed structures such as the forehead, orbits, and malar regions. The clinician usually can determine whether the deformity is due to the maxilla, mandible, or both just by looking at the patient. The details of the millimeter movements are determined on the cephalometric tracings (Fig. 87-2).

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7. What is skeletal expansion and why is it important?

Movements that result in a net skeletal expansion (anterior or inferior repositioning of the jaws) will attenuate the creases and folds, whereas skeletal contraction (posterior or superior movements of the jaws) will accentuate these problems. A prematurely aged appearance is an unfavorable result from jaw movements that result in net skeletal contraction. It is important that the surgeon develop a treatment plan that will expand or maintain the preoperative

f0010 **Figure 87-1.** Soft tissue cephalometric measurements. *Left*, Vertical perpendicular dropped from glabella (*G*), the horizontal distance from which is measured at the subnasale (*Sn*) and pogonion (*Pg*). Normal values are 6 ± 3 mm and 0 ± 4 mm, respectively. *Right*, Normal vertical facial proportions: Glabella to subnasale is equal to subnasale to menton (*Me*). (From Rosen H: *Aesthetic Perspectives in Jaw Surgery*. New York, Springer-Verlag, 1999.)

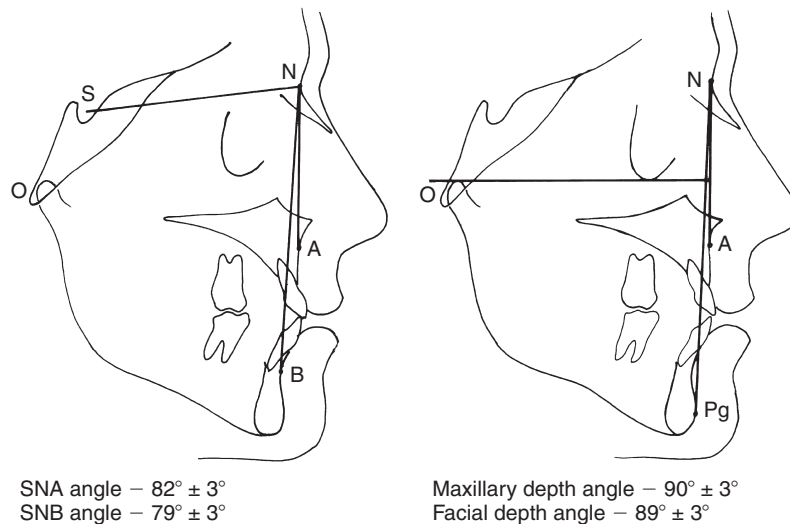


$$G - Sn_V = Sn - Me_V$$

$$G - Sn_H = 6 \pm 3 \text{ mm}$$

$$G - Pg_H = 0 \pm 4 \text{ mm}$$

f0015 **Figure 87-2.** Skeletal cephalometric measurements describing sagittal positions of the jaws. *Left*, SNA and SNB measurements relate the maxilla and the mandible to the cranial base. Normal values are $82^\circ \pm 4^\circ$ and $79^\circ \pm 3^\circ$, respectively. *Right*, Maxillary depth and facial depth angles relate the maxilla and the mandible to the Frankfort horizontal. Normal values are $90^\circ \pm 3^\circ$ and $89^\circ \pm 3^\circ$, respectively. (From Rosen H: *Aesthetic Perspectives in Jaw Surgery*. New York, Springer-Verlag, 1999.)



SNA angle – $82^\circ \pm 4^\circ$
 SNB angle – $79^\circ \pm 3^\circ$

Maxillary depth angle – $90^\circ \pm 3^\circ$
 Facial depth angle – $89^\circ \pm 3^\circ$

volume of the face. If a superior or posterior (contraction) movement of one of the jaws is planned, an attempt should be made to neutralize the skeletal contraction with an advancement or inferior movement of the other jaw or the chin. It is important to avoid a net contraction of the facial skeleton because this may result in a prematurely aged appearance.

s0050 **8. How is a lateral cephalometric radiograph obtained?**

p0045 A lateral cephalometric radiograph is performed under reproducible conditions so that serial images can be compared. This film usually is done at the orthodontist's office using a cephalostat, an apparatus specifically designed to maintain consistent head position. The surgeon must be able to visualize bony as well as soft tissue features on the image to facilitate tracing of all landmarks. A piece of transparent acetate tracing paper is secured with tape over the radiograph and the following landmarks are traced: sella, inferior orbital rim, nasion, frontal bone, nasal bones, maxilla, maxillary first molar and central incisor, external auditory meatus, condylar head and mandible, and mandibular first molar and incisor. The soft tissue of the forehead, nose, lips, and chin also are traced. Once the normal structures are traced, several planes and angles are determined (see Chapter 27, Questions 2 and 21).

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s0055 **9. What is the difference between an absolute and relative crossbite?**

p0050 Dental casts allow the clinician to distinguish between absolute and relative transverse maxillary deficiency. Absolute transverse maxillary deficiency presents as a posterior crossbite with the jaws in a class I relationship. A relative maxillary transverse deficiency is commonly seen in a patient with a class III malocclusion. A posterior crossbite is observed in this type of patient, leading the surgeon to suspect inadequate maxillary width. However, as the maxilla is advanced or the mandible retruded, the crossbite is eliminated. Articulation of the casts into a class I occlusion allows the surgeon to easily distinguish between relative and absolute maxillary constriction.

s0060 **10. Is facial disproportion ever acceptable in facial aesthetics?**

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It has been shown that skeletal expansion is aesthetically pleasing even if facial disproportion is necessary to achieve the expansion. Fashion models often exhibit slight degrees of facial disproportion and are considered beautiful. The aesthetic benefits the patient receives by expanding the facial envelope frequently justify the small degree of disproportion necessary to achieve them. Even in young adolescent patients who do not show signs of aging, one must not ignore these principles. A successful surgeon will incorporate these principles into the treatment plan of every patient so that as the patient ages, the signs of aging will be minimized and a youthful appearance will be maintained as long as possible.

s0065 **11. Why is a final splint necessary?**

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The occlusion desired may not be the same as maximum intercuspal position. The splint is useful in maintaining the occlusion in the desired location when it does not correspond to maximal intercuspal position. It is easy for the orthodontist to close a posterior openbite, but it is very difficult to close an anterior openbite with orthodontics alone. At the end of the case it is important to have the anterior teeth and the canines in a class I relationship without an openbite. If the desired occlusion is the same as that produced when the models are placed into maximal intercuspal position, a final splint is not necessary.

s0070 **12. What is the least stable movement?**

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The least stable movement is transverse expansion of the maxilla. Stable movements include mandibular advancement and superior positioning of the maxilla. Movements with intermediate stability include maxillary impaction combined with mandibular advancement, maxillary advancement combined with mandibular setback, and correction of mandibular asymmetry. The unstable movements include posterior positioning of the mandible and inferior positioning of the maxilla.

s0075 **13. What are the causes of malocclusion after skeletal fixation?**

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Improper positioning of the jaws is noted by poor occlusion or an obvious unaesthetic result. If this complication results from improper condyle position during fixation or improper indexing of the splint, fixation must be removed and reapplied. It is wise to verify splint fit prior to surgery. Meticulous treatment planning prior to surgery minimizes splint-related problems.

s0080 **14. How is lip length affected by closure of the circumvestibular incision?**

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A linear closure of a circumvestibular incision will shorten lip length and cause thinning of the lip. According to Rosen, the lip shortens by 20% to 50% of the amount of vertical maxillary reduction. The best way to minimize this shortening is to do a V-Y closure at the midline of the incision. A skin hook can be placed at the midline and used to pull the incision up while the vertical limb of the V-Y closure is performed. This limb typically is approximately 1 to 1.5 cm but can be modified in specific indications (Fig. 87-3).

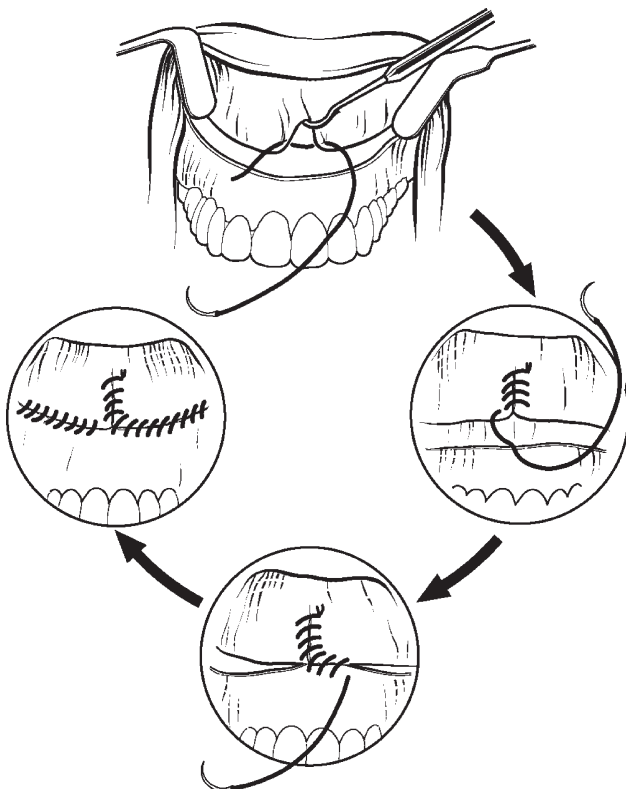
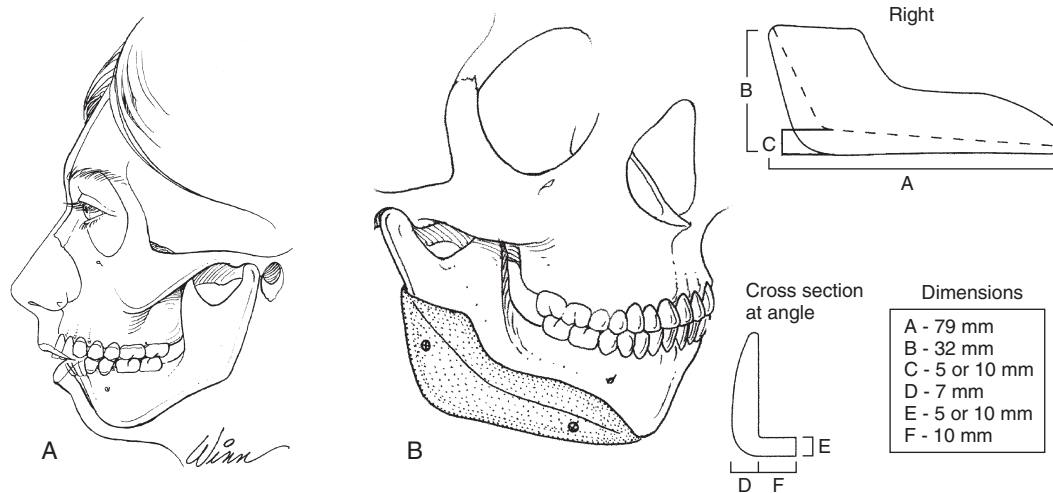


Figure 87-3. V-Y closure at the anteriormost portion of the maxillary buccal incision minimizes lip shortening. A skin hook is placed in the mucosa superior to the incision at the midline. The vertical limb is closed for 1 cm with a running suture. Each lateral incision is closed with a continuous locking 4-0 chromic suture. (From Booth PW, Schendel S, Hausamen JE [eds]: *Maxillofacial Surgery*, Vol 2, 2nd ed. New York, Churchill Livingstone, 2006.)

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fo025 **Figure 87-4.** A, Soft tissue contour and skeletal configuration of patient with mandibular deficiency and class II malocclusion. B, Configuration and dimensions of mandibular body implant used to augment the deficient mandible. Because it extends beyond the posterior border of the ramus and inferior edge of the ramus and body, it closes the mandibular angle and lessens the plane of the mandibular border. Screw fixation guarantees position and ensures application of implant to skeleton. (From Yaremchuk MJ: Mandibular augmentation. *Plast Reconstr Surg* 106:697, 2000.)

s0085 **15. What is the role of alloplastic augmentation in orthognathic surgery?**

p0080 Alloplastic augmentation can be a useful tool in achieving aesthetic augmentation with minimal morbidity and recovery in a patient who may benefit from the skeletal augmentation but has no occlusal problems that require an osteotomy. Mandibular angle implants will enhance mandibular definition and soft tissue support in the patient with short rami and a steep mandibular plane. In facial rejuvenation patients, this skeletal augmentation can greatly enhance the aesthetic result and provide much better soft tissue support than can be achieved with soft tissue repositioning alone. Piriform and malar implants can provide soft tissue support that enhances facial aesthetics as well in patients who have a class I occlusion but suffer from lack of adequate midfacial skeletal projection (Figs. 87-4 and 87-5).

s0090 **16. When should the nose be addressed in the orthognathic patient?**

p0085 Because Le Fort I osteotomy will alter the dimensions of the nose, definitive rhinoplasty should be deferred until after the patient recovers from the maxillary osteotomy. The Le Fort procedure requires dissection and release of tissues from the anterior nasal spine. The effects of these maneuvers will cause nasal tip rotation. Even in isolated mandibular osteotomies, the surgeon must remember that nasal intubation is required to place the patient in maxillomandibular fixation prior to application of rigid fixation. If rhinoplasty is to be performed at this time, the patient must be reintubated orally after the mandibular procedure is completed. It is acceptable to perform rhinoplasty in conjunction with mandibular osteotomies, but we recommend doing rhinoplasties at least 6 months after maxillary procedures.

s0095 **17. What nasal changes are seen after orthognathic surgery?**

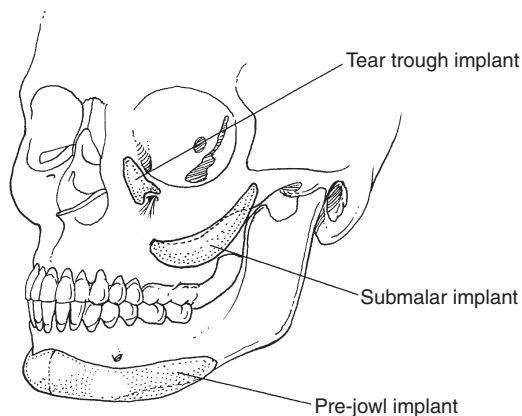
p0090 If the maxilla is moved anteriorly, the nasal tip moves anterior and the dorsum may appear too low for the new position of the nasal tip. If the maxilla is moved posteriorly, the nasal tip will decrease its projection and the dorsum of the nose may appear too high relative to the new position of the nasal tip. The nasal length may decrease with maxillary movement and the nasolabial angle will increase. Maxillary osteotomies will result in increased alar width.

s0100 **18. How can alar widening be reduced in maxillary surgery?**

p0095 The alar cinch is a procedure that places a suture from an intraoral incision that takes a bite from each transversalis nasi muscle and pulls them together to normalize ideal alar width. Weir excisions also can be useful in restoring ideal alar aesthetics after maxillary osteotomies (Fig. 87-6).

s0105 **19. What are the soft tissue changes in the upper lip that occur after Le Fort I osteotomy?**

p0100 The upper lip will thin approximately 2 mm from its preoperative thickness after a Le Fort I sulcus incision has been closed. Flattening of the lip also occurs, and downturning of the lateral commissures can be seen. It is important to counsel patients about these changes prior to surgery. Fat grafting or Restylane may be useful in restoring lip volume. These soft tissue fillers also are useful for nonsurgical modification of incisal show if postoperative modifications are necessary.



0030 **Figure 87-5.** Three implants used primarily to fill out involutional soft tissue deficiencies that occur with aging. Depicted are the tear trough, the submalar implant, and the prejowl implant. (From Mathes S [ed]: *Plastic Surgery*, 2nd ed. Philadelphia, Saunders, 2006.)

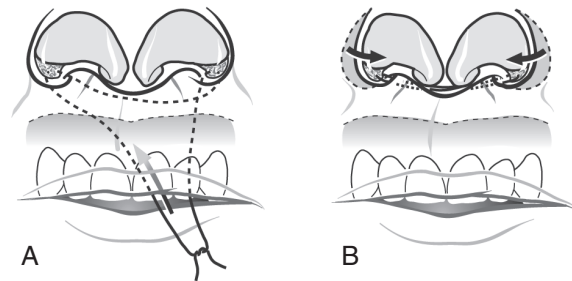


Figure 87-6. Alar cinch stitch is designed to prevent alar widening after Le Fort I osteotomy and allow the surgeon to control the width of the nose. 2-0 Prolene suture is used to grasp the transversalis nasi muscle on each side of the nose. The suture is tightened to the point that normal alar width is restored. (From Booth PW, Schendel S, Hausamen JE [eds]: *Maxillofacial Surgery*, Vol 2, 2nd ed. New York, Churchill Livingstone, 2006.)

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s0110 **20. What is the role of genioplasty in orthognathic surgery?**

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A genioplasty is commonly required in orthognathic surgery to optimize chin position after the jaws have been moved into the desired location. When the mandible is moved either anteriorly or posteriorly the chin will move with the mandible. If the final position of the chin is not ideal, it should be moved into the optimal location based on the anticipated facial changes that will occur from the orthognathic procedure. These anticipated postoperative facial changes and the new desired position of the chin are based on the postoperative cephalometric tracings that are performed as part of the treatment planning phase of the procedure.

s0115 **21. What is the role of fat grafting?**

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Autogenous fat grafting can be a useful adjunct procedure in the adult orthognathic patient. Many patients desire cosmetic as well as functional improvements, and fat grafting is a relatively benign method for augmenting any remaining deficiencies in the soft tissue envelope after skeletal expansion. Fat can be easily harvested using either Coleman or Tulip syringes and injected into the desired areas to fill depressions that can persist in the nasolabial crease, paramandibular, or piriform regions. As our understanding of adipocyte biology as well as the effects on the adipocytes from harvesting, processing, and injection improves, fat grafting will be used more commonly to achieve an optimal aesthetic result for the orthognathic surgical patient.

BIBLIOGRAPHY

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1. Coleman SR: Structural fat grafts: The ideal filler. *Clin Plast Surg* 28:111–119, 2001.
2. O’Ryan F, Schendel S: Nasal anatomy and maxillary surgery. II Unfavorable nasolabial esthetics following the Le Fort I osteotomy. *Int J Orthodon Orthognath Surg* 4:75–84, 1989.
3. Proffit WR, Sarver DM: Treatment planning: Optimizing benefit to the patient. In Proffit WR, White RP, Sarver DM (eds): *Contemporary Treatment of Dentofacial Deformity*. Mosby, St. Louis, 2003, pp 213–223.
4. Proffit WR, Turvey TA, Phillips C: Orthognathic surgery: A hierarchy of stability. *Int J Adult Orthod Orthogn Surg* 11:191–204, 1996.
5. Rosen H: Aesthetics in facial skeletal surgery. *Perspect Plast Surg* 6:1, 1993.
6. Rosen HM: Facial skeletal expansion: Treatment strategies and rationale. *Plast Reconstr Surg* 89:798–808, 1992.
7. Rosen HM: Lip-nasal esthetics following Le Fort I osteotomy. *Plast Reconstr Surg* 81:171–182, 1988.
8. Stella JP, Streater MR, Epker BN, Sinn DP: Predictability of upper lip soft tissue changes with maxillary advancement. *J Oral Maxillofac Surg* 47:697–703, 1989.
9. Stuzin J: Restoring facial shape in facelifting: The role of skeletal support in facial analysis and midface soft-tissue repositioning. *Plast Reconstr Surg* 119:362–376, 2007.
10. Terino EO: Facial contouring with alloplastic implants. *Facial Plast Surg Clin North Am* 7:85–103, 1997.

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