CHAPTER 7

Submalar and Midfacial Augmentation in Aesthetic Facial Surgery

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Over the past 10 years we have become more aware of the contribution of a variety of adjunctive surgical techniques, as well as of rhytidectomy, that must be considered if we are to meet today's higher professional standards and patient expectations for aesthetic facial enhancement. This chapter focuses on the use of midfacial augmentation to provide balanced aesthetic contours and a more youthful appearance in facial surgery.

Recently a number of diverse rhytidectomy techniques have been introduced in the surgical literature. Modifications, such as extended superficial musculoaponeurotic system (*SMAS*) dissections and deep plane and subperiosteal face lifts, have all shown the limitations of using only classic subcutaneous dissection.[19,22,25,29,33] The deep plane and subperiosteal methods attempt to improve midfacial appearance with more extensive and deeper dissection than conventional rhytidectomy. Both methods rely on a common precept of repositioning and rearranging deep soft tissue or muscle or both but paradoxically differ on the basic mechanism used to accomplish similar results.

However, in the presence of involutional midfacial defects caused by deficiencies in skeletal structure or soft tissue volume, soft tissue procedures, fat graftings, or rhytidectomy alone will not provide adequate correction. Thus rhytidectomy has become only one component of the complex composite picture of facial rejuvenation strategies. Similarly, it is not appropriate to rely only on regional augmentation to achieve the comprehensive effects obtained from a complete face lift procedure. With that in mind, this chapter discusses the optimum use of alloplastic implants in midfacial contouring. Emphasis is also placed on defining specific patterns of midfacial deformity to facilitate correct implant selection, a vital step in choosing patient candidates who will benefit most from these procedures.

PATHOPHYSIOLOGIC CONSIDERATIONS OF MIDFACIAL AGING

It is generally acknowledged that patients endowed with strong, well-balanced skeletal features, essential hallmarks for current standards of beauty, will best endure the ravages of age.[31] Analysis of the faces of teens reveals an abundance of soft tissue providing a homogeneous composite of facial form. Full cheeks and smooth, harmonious and symmetrical contours free of sharp, irregular projections or indentations commonly embody these youthful qualities.[7] As time goes by, this picture becomes more complex. Involutional soft tissue changes brought on by age, weight loss, or even excessive exercise may bring perceived facial flaws that appear progressively more obvious and pronounced with age. It is this midfacial change that often becomes the early focus of one's attention and the motivation for seeking consultation for facial cosmetic surgery.[17] Recognizing these various defects and configurations caused by aging becomes the very essence of understanding the subject of facial contouring.

A direct anatomic correlation has been demonstrated between the loss of buccal fat and the resultant topographical variations of the midface.[35] Disparate downward movement of the facial integument will also reveal underlying asymmetrical bone structure usually not evident in earlier years. Degenerative soft tissue changes are also seen in other areas such as the temporal region and in other conditions such as lipodystrophy, all of which are treated similarly by supplemental autologous grafts or augmentation type techniques using alloplastic implants.[8,36]

During the aging process, depending on the underlying skeletal structure, different but definable configurations of the midface are formed. These include a generalized flattening of the face, thinning of the vermillion border of the lip, the formation of jowls, deep cavitary depressions of the cheek, and prominence of the nasolabial folds.[21] In cases of degenerative changes of the skin and soft tissue combined with deficient underlying bone structure, the gravitational effects of aging are exaggerated, and rhytidectomy techniques alone will not rejuvenate the face (Fig. 7-1, *A*). Similarly, long faces or those with recessive bone structure either in the midface or mandibular region make proper draping and repositioning of skin, SMAS, or composite flaps during rhytidectomy difficult and preclude achievement of long-term results.

In contrast, people who have an exceptionally prominent malar-zygomatic bone structure and thin skin lacking in both subcutaneous and deep supporting fat will experience a "skeletonizing" of the face that further emphasizes facial depressions. This creates a gaunt or haggard appearance in an otherwise healthy person (Fig. 7-1, *B*).

Expressed in many different forms and degrees of severity, most soft tissue deficiencies of the midface are found within the anatomical recess described as the "submalar triangle."[35] This inverted triangular area of midfacial depression is bordered above by the prominence of the zygoma, medially by the nasolabial fold, and laterally by the body of the masseter muscle (Fig. 7-2, *A* and *B*). Analogous topographical deficiencies are also recognized in other areas of the face such as the prejowl sulcus, formed in part by relaxation of the soft tissues surrounding an area of bone resorption along the body of the mandible[24] (Fig. 7-3).

Among the many techniques evolving in facial rejuvenation surgery, the missing link still remains the ability

A

B

FIGURE 7-1 **A,** In this patient the conspicuous lack of midfacial skeletal development and the inferomedial migration of deficient overlying integument contribute to the deep midfacial grooves and prominent nasolabial folds. Additional midfacial structural and supplementary support are necessary if a proposed rhytidectomy is to achieve satisfactory long-term results. **B,** This patient has thin skin and an abrupt transition between extremely prominent malar projections and severely recessed areas of soft tissue atrophy localized to the adjacent submalar region below. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)

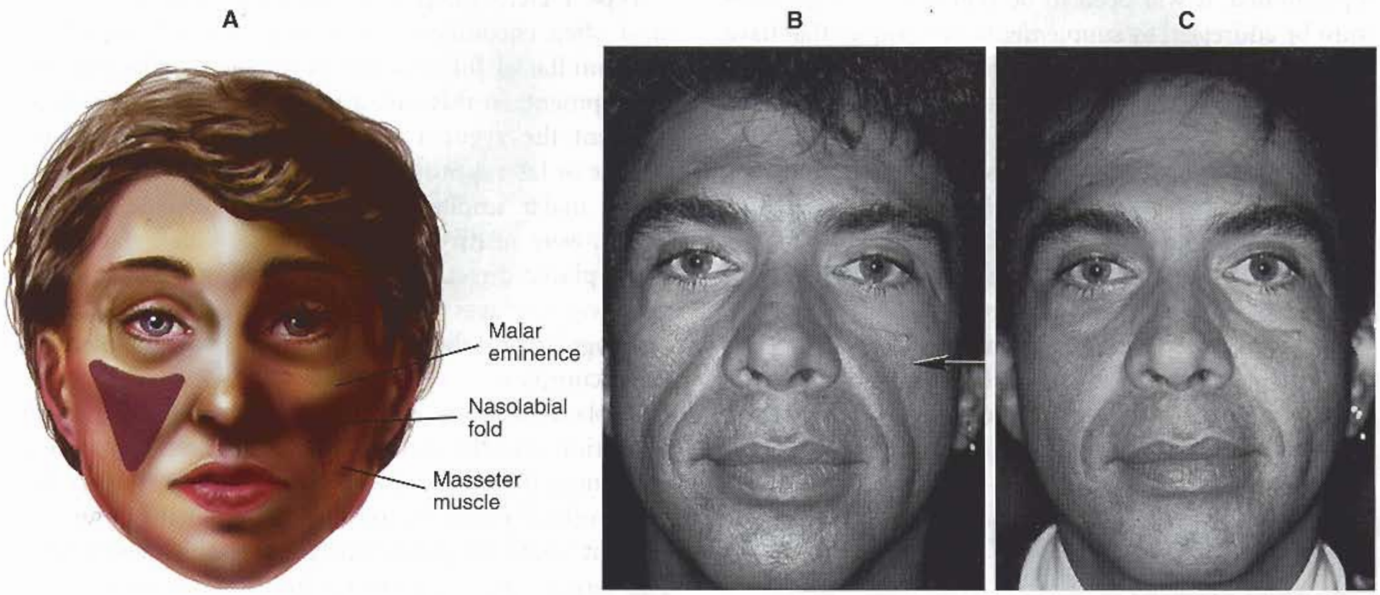


FIGURE 7-2 **A,** The inverted submalar triangle is an area of midfacial depression bordered medially by the nasolabial fold, superiorly by the malar eminence, and laterally by the main body of the masseter muscle. **B,** Significant depth to the submalar triangular recess *(arrow)* is shown in this patient, who had undergone face lift surgery 1½ years previously to correct this problem. With no supplementary support provided for the lack of midfacial soft tissue, the deep facial recesses, along with the adjacent prominent nasolabial fold, spontaneously returned 3 months after the initial face lift surgery. **C,** Six months after surgery. Submalar augmentation was the sole procedure used to re-expand the midfacial depression. Augmentation of the depressed midfacial area simultaneously reduced the prominence of the adjacent nasolabial fold. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)

FIGURE 7-3 Resorption of bone within the anterior mandibular groove, coupled with progressive encroachment of the jowl, creates the prejowl sulcus, a defect of the mandible that worsens with age *(arrow)*. The prejowl implant is used to augment and correct this specific mandibular deficiency and to assist the rhytidectomy to achieve and maintain the desired straight mandibular line and inhibit recurrence of the jowl. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)

to permanently replace soft tissue bulk in sufficient quantity. Therefore, if it is not present and cannot be repositioned, it will need to be replaced. This problem must be addressed by supplemental techniques that have the ability to smooth out and soften sharp angles or depressions as well as augment inadequate skeletal structure.[3,4]

Acknowledging these elements of structural deficiency and phenomena of aging, we elect to use a new generation of computer-aided design/computer-aided manufacturing (CAD/CAM) Silastic facial implants that have the necessary refinements and greater anatomical accuracy for improved results in facial contouring that remain permanently.* Along with rhytidectomy, these modalities are used collectively to restore and prolong the optimum aesthetic qualities typical of the youthful face.[6]

PREOPERATIVE EVALUATION: PATTERNS OF MIDFACIAL AGING

Correct analysis and identification of distinctive, recognizable configurations of midfacial deficiency are essential for selection of the implant shape and size that will give the best overall results in facial contouring. To provide basic assessment guidelines, we have classified the midface into five external anatomical patterns of facial physiognomy and correlated them with specific implant designs (Table 7-1) (Fig. 7-4).

Type I Deformity. The first deformity (type I) is most often encountered in younger patients who have good midfacial fullness but insufficient malar skeletal development. In this case a malar implant is chosen to augment the zygoma and create a higher and more oblique or lateral-projecting cheek bone. In the past the classic malar implants, such as the oval or triangle shapes, were relatively thick in relation to surface area. When placed directly over the prominence of the zygoma, these implants often produced an abnormally high and angular protuberance, not an aesthetically pleasing malar complex.

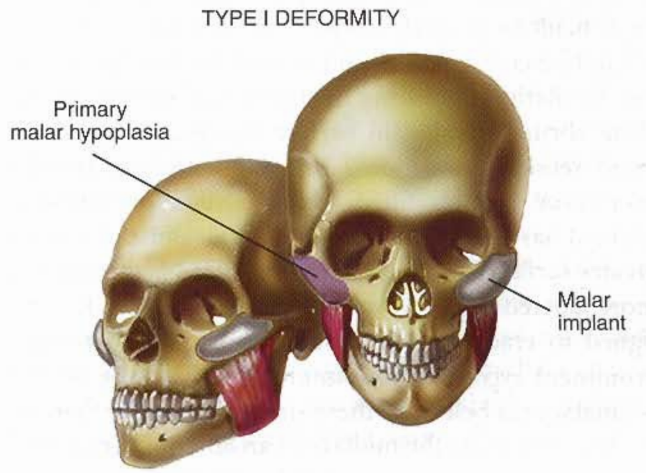
Implant thickness required to achieve desired lateral projection over the malar prominence ranges between 3 and 7 mm, the average being 4 to 5 mm. In most type I deformities I prefer to use the newer, shell-type malar implants that have greater surface area–thickness ratio.[34] This larger surface area to thickness ratio provides implant stability and reduces the incidence of rotation or displacement. Inferior extension into the submalar space establishes a more natural transition from the localized area of maximum augmentation to contiguous areas of relative recession (Fig. 7-5).

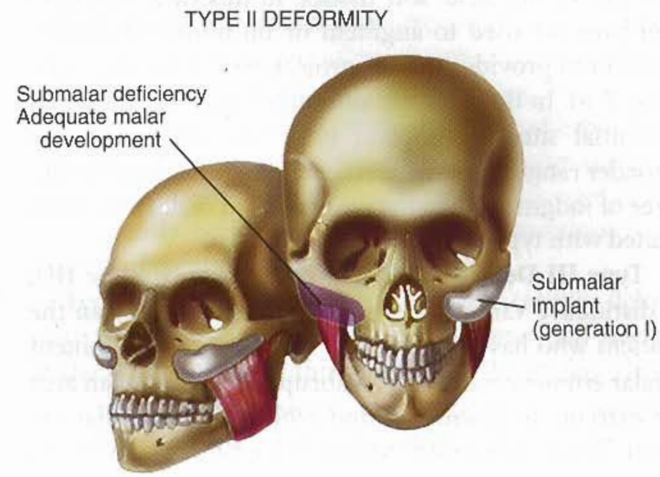
Type II Deformity. The second deformity (type II) becomes evident in patients between 30 and 45 years of age who have adequate malar development but who start to show progressive signs of midfacial aging due to

*CAD/CAM Implants: Process used for implant manufacture. Implantech, 2064 Eastman Avenue, Unit 1019, Ventura, CA 93003.

TABLE 7-1 *Patterns of Midfacial Deformities Correlated with Type of Implant*

Deformity Type	Description of Midfacial Deformity	Type of Augmentation Required	Type of Implant Predominantly Used
I	Primary malar hypoplasia; adequate submalar soft tissue development	Requires projection over the malar eminence	Malar implant: shell-type implant extends inferiorly into submalar space for more natural result
II	Submalar deficiency; adequate malar development	Requires anterior projection; implant placed over face of maxilla or masseter tendon or both in submalar space; also provides for midfacial fill	Submalar implant (generation I)
III	Extreme malar-zygomatic prominence, thin skin, with abrupt transition to a severe submalar recess	Requires normal anatomic transition between malar and submalar regions; plus moderate augmentation around inferior aspect of zygoma	Submalar implant (generation II): more refined; U-shaped to fit within submalar space and around inferior border of prominent zygoma
IV	Both malar hypoplasia and submalar deficiency	Requires anterior and lateral projection; "volume replacement implant" for entire midface restructuring	Combined submalar-shell implant: lateral (malar) and anterior (submalar) projection; fills large midfacial void
V	Tear-trough deformity (infraorbital rim depression or recess)	Requires site-specific augmentation along infraorbital rim	Tear-trough implant: to fit site-specific suborbital groove





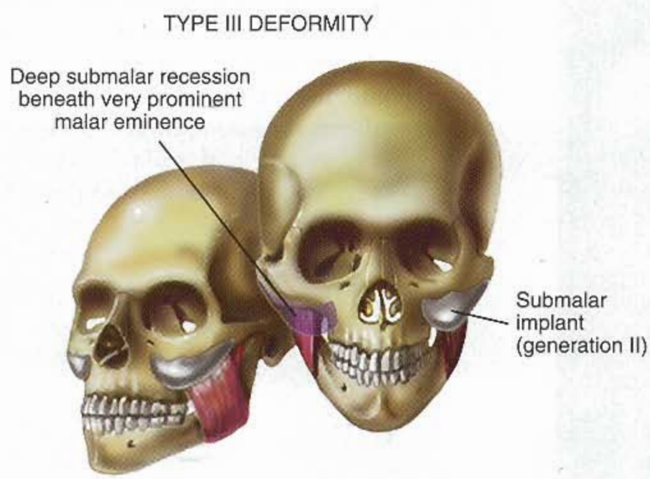
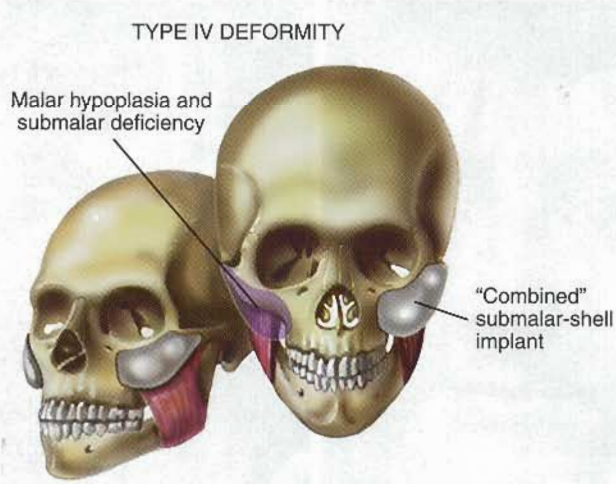
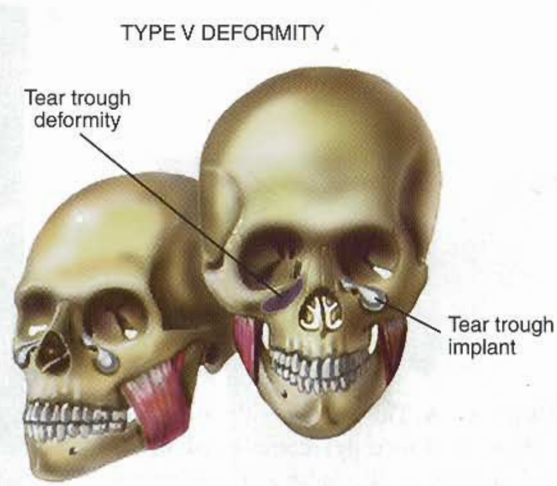


FIGURE 7-4 Frontal and lateral drawings illustrate the anatomical areas of the midface and five distinctive topographical patterns of midfacial deformity. Implants directly correlated with each specific pattern of midfacial deformity are selected for treatment (see Table 7-1).





atrophy of midfacial soft tissues. In this case, submalar implants are used to augment or fill midfacial depressions or to provide anterior projection to a flat midface.[5] (Fig. 7-6). In this area the amount of augmentation and potential sites for implant placement are open to a broader range of interpretation and require a greater degree of judgment than the more defined malar area associated with type I deformities.

Type III Deformity. The third deformity (type III), a distinctive variant of type II deficiency, is seen in the patient who has thin skin and exceptionally prominent malar eminences causing an abrupt transition to an area of extreme hollowness found within the submalar region. This produces an extremely gaunt or skeletonized facial appearance. In this group of patients the skin may be difficult to properly drape, and the midfacial hollow might be exaggerated instead of remedied by rhytidectomy. Similarly, contouring methods used to smooth out these abrupt changes in surface topography require a more refined, transitional implant with less anterior projection. This modified, second-generation submalar implant has an increased superoinferior dimension with greater surface area to thickness ratio and is thinner and more tapered than the first-generation implant. It is designed to cradle the inferior portion of an extremely prominent zygoma while simultaneously filling out the submalar area below. In these situations, rather than directly augmenting the midface in an anterior direction, I

A

B

FIGURE 7-5 **A,** Example of malar hypoplasia (type I deficiency). **B,** Eight months after malarplasty and replacement with the malar shell. Augmentation of a greater surface area and extension inferiorly into the submalar space produces a more natural high cheekbone effect and the more favorable facial oval. Relative malar hypoplasia is further exaggerated in patients with a square jaw.

A

B

FIGURE 7-6 **A,** This patient with midfacial flatness (type II deformity) complained of a depressed demeanor. **B,** Submalar augmentation (generation I implant) restored the anterior projection to the midthird of the face.

supplement the area around the bone to restore the rounder high cheek bone appearance of a younger age (Fig. 7-7). These implants therefore demonstrate that the smooth, harmonious cheek bone structure of youth, particularly as seen in today's fashion literature, is due only in part to skeletal structure. The thicker, more robust soft tissue pads that encompass this underlying bony framework are the other component.

Type IV Deformity. The fourth deformity (type IV) is malar hypoplasia combined with midfacial soft tissue deficiency (the "volume-deficient face") wherein both the submalar and malar regions of the midface require augmentation. In this situation a single combined malar-submalar implant must serve two purposes: It must proportionately augment a deficient skeletal structure (malar region) while simultaneously filling a void created by absent midfacial soft tissue (submalar region) (Fig. 7-8). One example of patients who fall within this category are those who typically have a long, narrow face with poorly developed bone structure. Because this condition is also associated with premature aging of the skin, these patients are often classified as suboptimal candidates for rhytidectomy. As seen in Fig. 7-9, *A* to *H*, total midfacial restoration and lateral mandibular augmentation, using a combined malar-submalar and prejowl implant, provide the structural basis needed if the concurrently performed rhytidectomy procedure is to achieve optimum results.

Type V Deformity. The fifth, or tear-trough, deformity (type V) is a deep groove that commonly occurs at the junction of the thin eyelid and the thicker cheek skin, extending downward and laterally from the inner canthus of the eye, across the infraorbital rim and suborbital component of the malar bone[14] (Fig. 7-10). Recognizing the extremely high rate of occurrence of this age-related defect in patients presenting for blepharoplasty, Flowers uses a tear-trough implant specifically designed to correct this deformity.[15]

FIGURE 7-7 **A,** This patient has extreme projection to the malar complex and severe midfacial hollows associated with thin skin (type III deformity). **B,** A submalar implant (generation II) establishes a smooth transition between the two anatomical regions and also provides a moderate degree of supplemental midfacial augmentation. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)

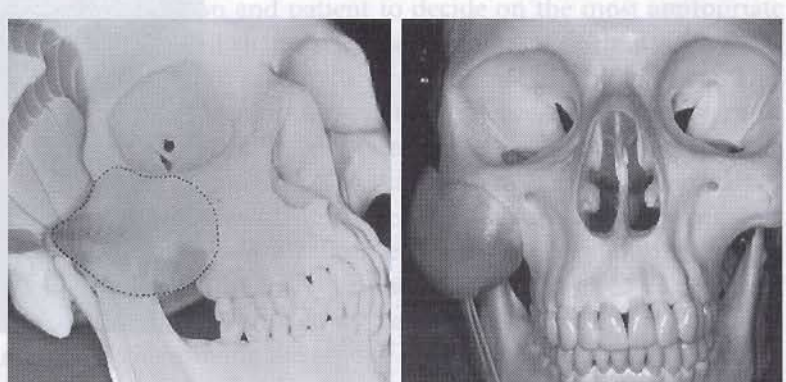


FIGURE 7-8 The combined malar-submalar implant is indicated for total midface restructuring in patients with malar hypoplasia and severe loss of soft tissue. It is proportioned to simultaneously project the malar area while volumetrically expanding the submalar and premaxillary space. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)

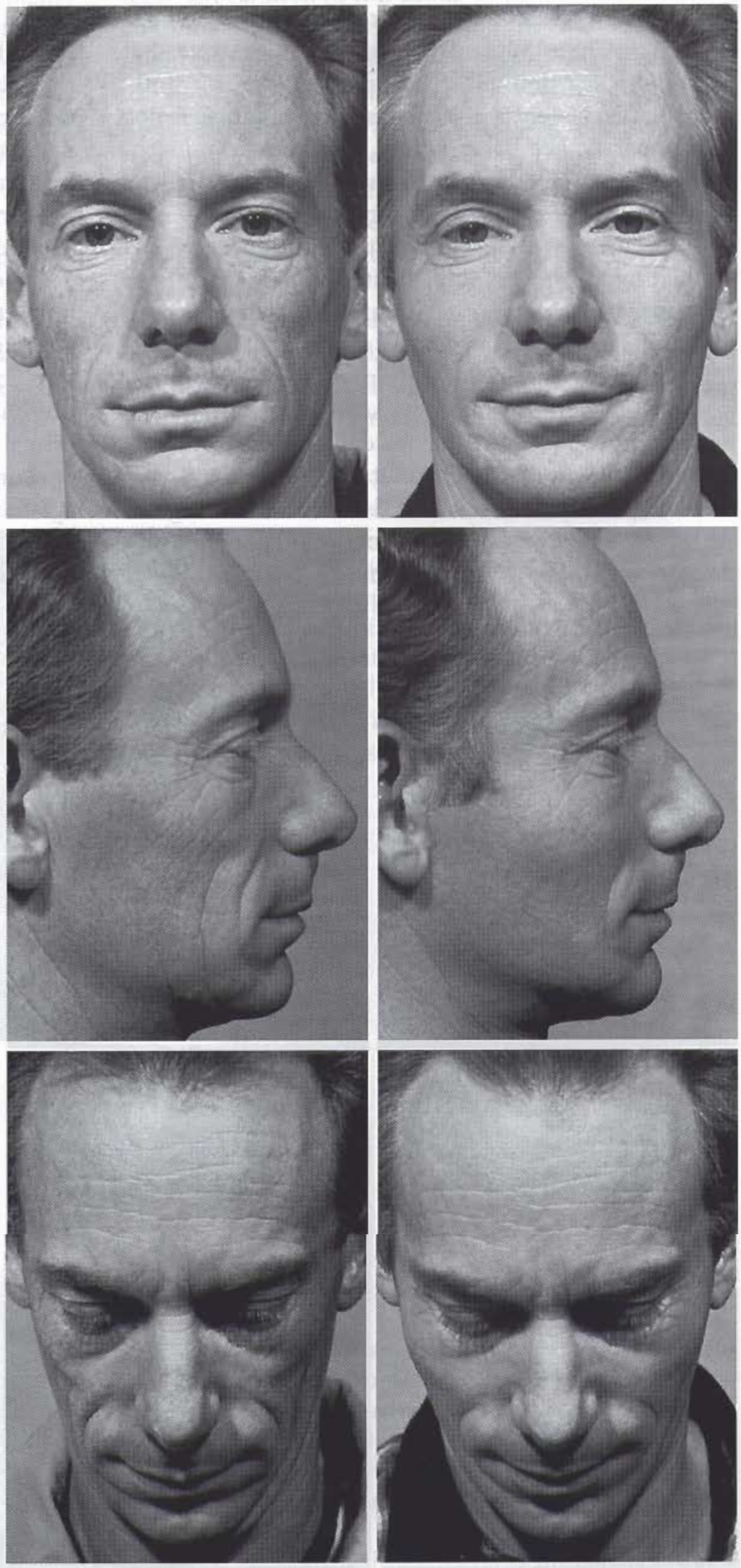
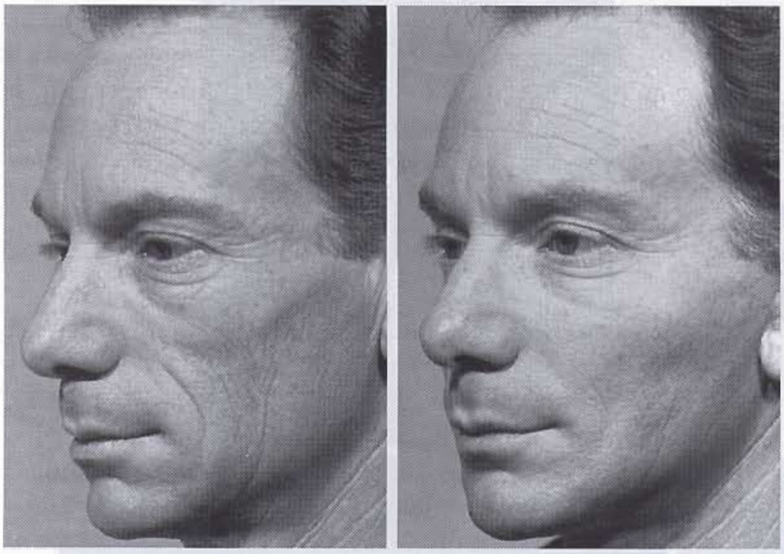


FIGURE 7-9 A, C, E, and G, Preoperative analysis of the facial configuration in this 40-year-old patient reveals severe deficiency in both skeletal structure and soft tissue volume. B, D, F, and H, Seven months after submalar and midfacial augmentation performed concurrently with rhytidectomy; the combined submalar-shell implants were used to restructure the entire midface, and a prejowl implant was used to add width to the mandible. In this patient these augmentation procedures were essential for the structural and volumetric enhancement required for the face lift procedure to provide a meaningful, long-term improvement. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)



G H

FIGURE 7-9, cont'd
For legend see opposite page.

FIGURE 7-10 The infraorbital tear-trough deformity between the thick cheek skin and the thin eyelid skin is also influenced by the configuration of suborbital bone structure.

PROCEDURE

The day before surgery the patient is started on a broad-spectrum antibiotic regimen that continues for five days after surgery. Intravenous antibiotics and dexamethasone are also administered perioperatively.

Marking Out the Defect

Before starting anesthesia and while the patient is in an upright position, the precise midfacial area to be augmented is outlined with a marking pen. A line drawn vertically downward from the midpupillary line or infraorbital foramen provides a good reference point for proper positioning of the implant. As a rule the implant is not placed medial to this line to prevent potential encroachment into the area of the infraorbital nerve and medial malposition.

The initial outline drawn on the skin assists both the surgeon and patient to decide on the most appropriate implant shape, size, and position for optimum augmentation to accomplish their mutual goals (Fig. 7-11). This final decision on exact shape, size, and thickness must ultimately be based on the patient's input and the surgeon's judgment. In this subjective preoperative analysis there is an obvious need for standardized measurements to provide a rationale for treatment planning, but to date most analytical measurements used in determining aesthetic guidelines have been unreliable.[12] Therefore, identifying the type of midfacial deficiency becomes extremely helpful in trying to assess implant selection.

FIGURE 7-11 Prior to any infiltration of local anesthetic, the areas requiring augmentation are outlined with the patient sitting in the upright position. In most cases the medial border of submalar or malar implants is placed lateral to the infraorbital foramen, corresponding approximately to the midpupillary line. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)

Anesthesia and Preparation

When implant procedures are performed alone, intravenous sedation accompanied by a local wide-field block is usually sufficient. With other more prolonged implant procedures, general anesthesia is preferred. The preparation procedure is routine, and additionally povidone-iodine (Betadine)-impregnated gauze sponges are placed into the buccal-gingival sulcus.

Local anesthetic is injected percutaneously at the level of the periosteal plane. The amount infiltrated should be sufficient to minimize bleeding and facilitate dissection. The addition of hyaluronidase (Wydase) disperses the local anesthetic and reduces soft tissue distortion.

Incision and Periosteal Elevation

A small (1 to 1.5 cm), obliquely oriented incision is made in the buccal-gingival sulcus over the lateral part of the canine fossa and lateral buttress (Fig. 7-12, *A*). Bleeding is minimized by preoperative injection of the mucosa and by compressing it against the underlying bone while the incision is being made. The incision is carried immediately down to bone. Since the mucosa will stretch and allow complete visual inspection of midfacial structures, a long incision through adjacent submucosal or muscle layers is not necessary and is discouraged.

The incision should be made high enough to leave a minimum of 1 cm of inferior gingival mucosa cuff. If the patient wears dentures, this incision must be placed above the denture's superior border. Dentures can be left in place after the procedure and in our experience have not been found to cause extrusion or to increase the incidence of complications.

The periosteum is then elevated superiorly off the anterior surface of the maxilla, and dissection is extended in a superolateral direction (Fig. 7-12, *B*). It is not necessary to identify the infraorbital nerve in every case. However, if unusual circumstances require more medial placement of the implant or if the surgeon is unfamiliar with the intraoral approach, the infraorbital foramen and nerve are easily identified by elevating the mucosa in a superomedial direction.

Dissection continues in a subperiosteal plane, providing exposure from the anterior surface of the maxilla medially to over the malar-zygomatic complex and zygomatic arch laterally. It is essential that the dissection stay on bone in the safe subperiosteal plane, particularly over the middle and posterior portions of the zygomatic arch. The external or free hand is used to help guide the elevator over the designated area (Fig. 7-12, *C*).

A small elevator may be used to start the dissection but is immediately changed for a much broader 10 mm curved periosteal elevator. This is particularly important when one is dissecting laterally over the zygoma and zygomatic arch (Fig. 7-12, *D*). Broad elevators facilitate safer, relatively easy dissection within the subperiosteal plane as opposed to narrow elevators (Fig. 7-12, *E*). Using narrow instruments makes the dissection more difficult and dangerous, since they have a greater tendency to slip out of the correct plane of dissection into overlying soft tissue.

Identifying and Opening the Submalar Space

The submalar pocket is formed by extending the subperiosteal dissection inferiorly below the zygoma in an avascular plane over the tendinous attachments of the masseter muscle. In the correct plane the glistening white tendinous attachments of the masseter muscle can be seen by gently and bluntly pushing the superficial tissues inferiorly and away from the deeper tendinous structure. These masseter attachments are *not cut* and are left completely intact, providing a supporting framework upon which the implant may rest (Fig. 7-12, *F*).

The submalar space may be extended without difficulty for at least 2 to 3 cm inferomedially below the body

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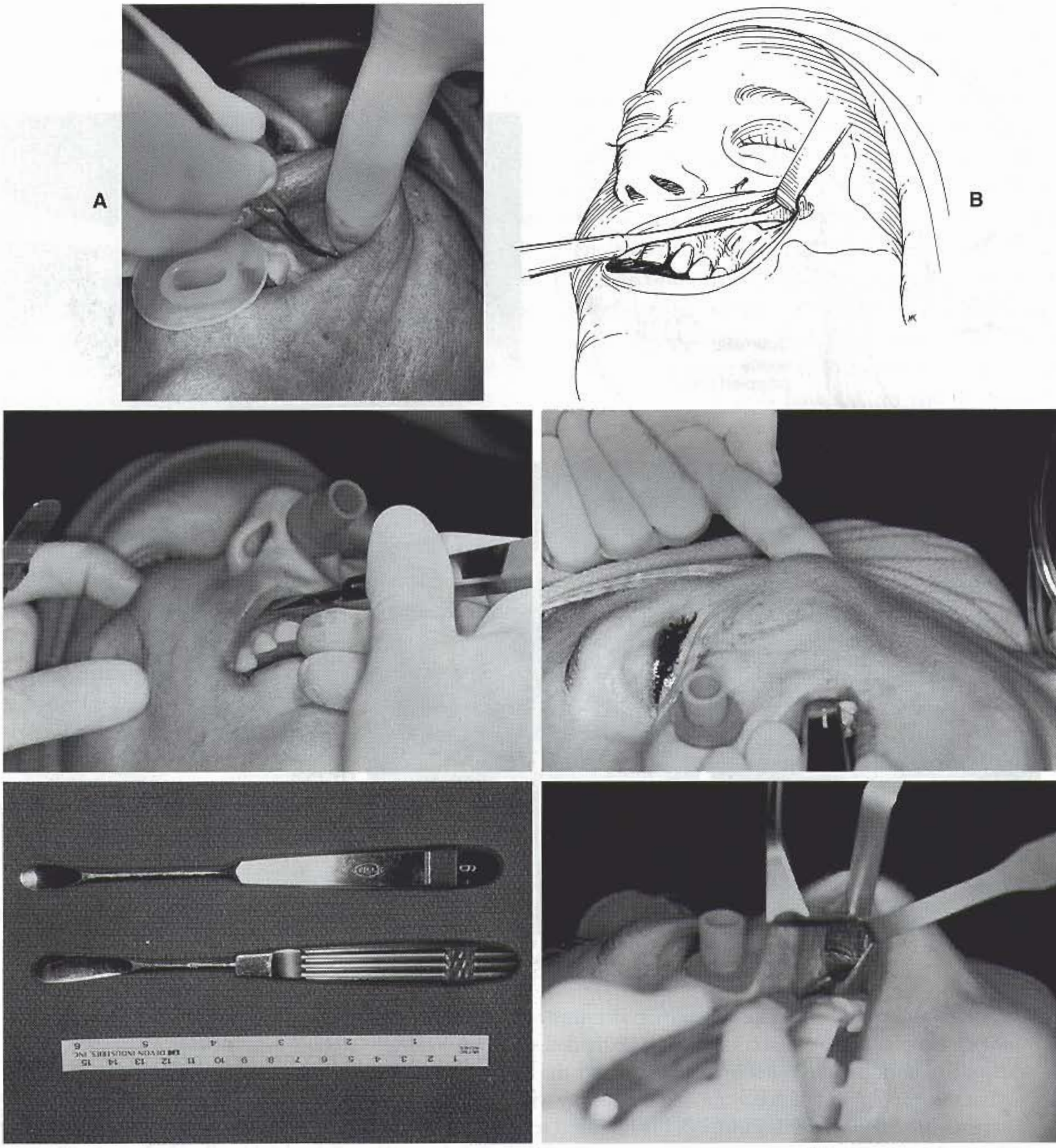

FIGURE 7-12 **A,** After injection with local anesthetic the mucosa is compressed and a single incision is carried through the mucosa and periosteum directly onto bone. A small (1 to 1.5 cm) incision is placed over the lateral aspect of the canine fossa and lateral buttress at least 1 cm above the buccal-gingival line. **B,** The medial extent of the subperiosteal dissection beginning from a position at or lateral to the infraorbital nerve and extending in a superolateral direction. **C,** The free hand (external to the skin), using broad periosteal elevators, helps guide the dissection over the area to be undermined. **D,** The dissection may be easily continued laterally over bone in the subperiosteal plane. In this photograph the instrument is inserted into the pocket over the zygomatic arch, indicating the posterior extent of the dissection. **E,** Straight and 9 and 10 mm curved periosteal elevators used for dissection. **F,** The periosteal elevator is positioned over the anterior surface of the masseter tendons within the submalar space. This submalar portion of the pocket is made large enough to ensure no inferior encroachment of soft tissue on the implant. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)

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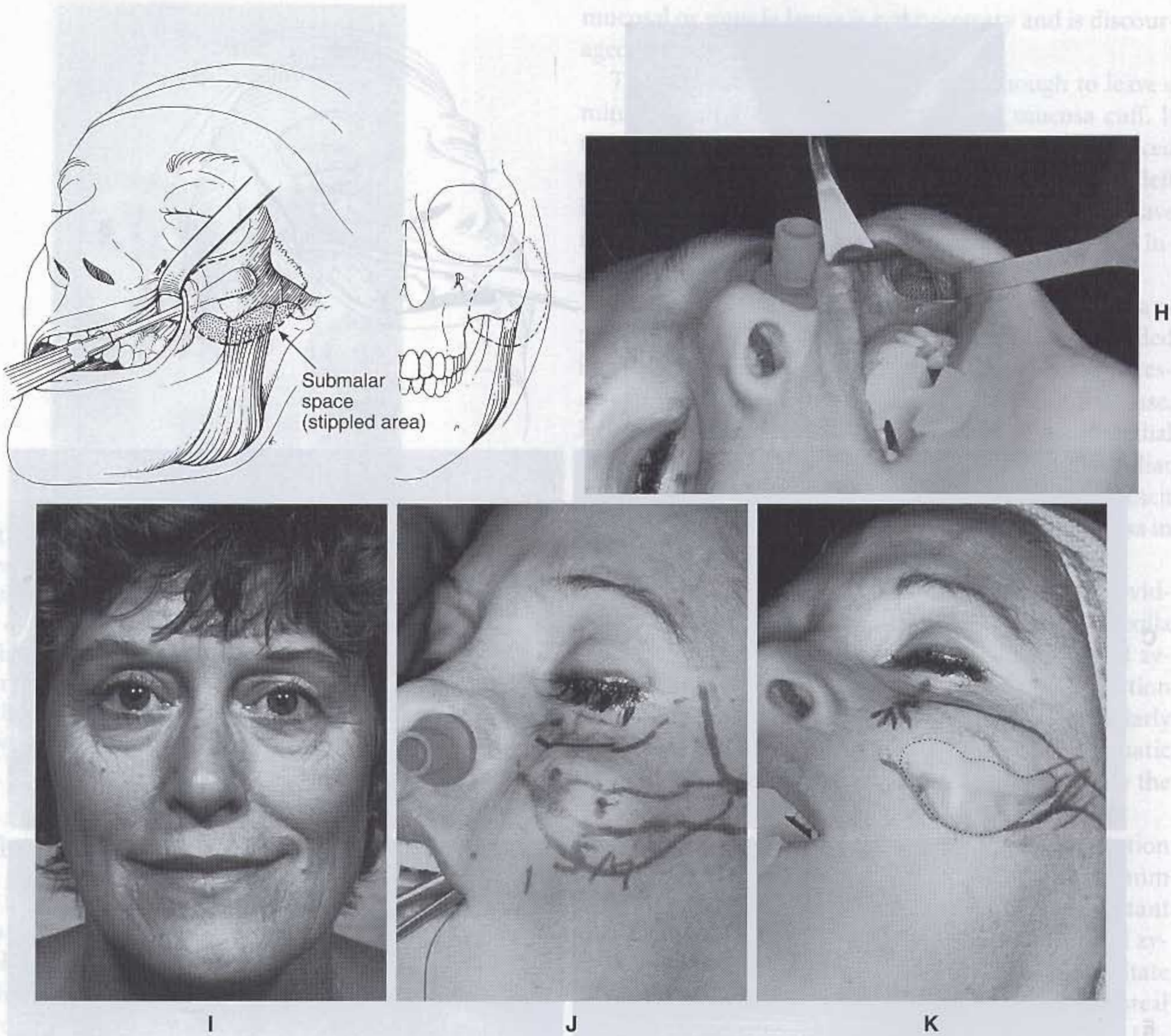


FIGURE 7-12, cont'd **G,** This illustration demonstrates the general extent of dissection required for most midfacial implants. The dissection must be extended sufficiently posterolaterally over the zygomatic arch or expanded inferiorly into the submalar space over the tendinous insertions of the masseter muscle, or both, so that the implant can be accommodated passively within the pocket. **H,** Direct visual inspection of midfacial structure can be obtained through the intraoral route by retracting the overlying tissues. Using sizers or different implants helps to determine optimum size, shape, and position of the final implant selected. (The stippled area represents a sizer that has been placed within the pocket.) **I,** This patient has complex facial asymmetry. Overall assessment reveals the right side of the face to be significantly narrower in width and to exhibit a degree of maxillary-zygomatic hypoplasia relative to the more prominent malar development on the left side. Also, adequate soft tissue provides good anterior projection over the left midfacial and submalar area as compared to the relative flattening and lack of soft tissue substance on the right side. Therefore, to properly balance the face, we might anticipate using a combined malar-shell implant on the right side and a malar implant on the left side. **J,** The external drawings made on the skin delineate the malar bone and submalar space below. **K,** The shape and size of the superimposed implant should roughly coincide with the external topographical defect demarcated prior to surgery. In this case the inferior aspect of the implant extends downward to occupy the submalar space. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)

of the zygoma. In this location the contraction of the masseter muscle produces lateral rather than superoinferior movement and does not displace the implant. As the dissection moves posteriorly along the zygomatic arch, the space becomes tighter and is not as easily enlarged. This part of the space, however, can be opened by gently advancing a heavy periosteal elevator posteriorly along the inferior border of the zygomatic arch. Care must be taken not to apply force in this region.

It is important that the dissection be extended sufficiently in all directions to create a large enough space over the zygomaticomaxillary skeletal complex or submalar region or both so that the implant fits passively within the pocket. There must be no compression by the surrounding soft tissue on any segment of the implant (Fig. 7-12, *G*). If an implant is forced into a pocket that is too small, any constricting tissue adjacent to the implant, particularly at the posterior limit of the dissection, will have a tendency to push it toward the opposite direction, causing implant displacement or extrusion.[11] Under normal conditions, even after large pockets have been made, we estimate that the periosteum and soft tissues immediately collapse and obliterate most of the space around the implant within 24 to 48 hours following surgery.

Routes of Insertion

The intraoral route is recommended for the insertion of submalar or larger surface area implants. It allows for direct examination of all internal structures, ease of implant insertion, and optimum placement and leaves no external scars. More extended inferior dissection of the submalar space is also more effectively and safely performed through the intraoral route than through other approaches. Access to this area through a blepharoplasty or face lift approach is technically more difficult. For malar augmentation using smaller implants or for insertion of tear-trough implants, blepharoplasty or face lift approaches do provide direct access over the infraorbital rim and superior aspect of the maxilla and zygoma. However, if the eyelid approach is used to insert larger implants requiring more extensive dissection or if there is laxity of the lower eyelid, suspension canthoplasty should be considered to avoid postoperative retraction or ectropion.

Final Implant Selection

At this time, via the intraoral route, final implant selection is completed by observation of the actual topographical changes produced by inserting either sizers or, if necessary, different implants into the pocket (Fig. 7-12, *H*). Among the advantages of silicone elastomer is its flexibility, which enables large implants to be compressed through small openings and then to reexpand within the pocket created beyond the incision.[32] This allows for ease of implant insertion and removal during the selection process and avoids having to make larger incisions required for rigid implants.

Silicone implants are malleable, conformable, and exchangeable. Advances in silicone engineering have improved upon these qualities. I now use an implant made from a new form of silicone rubber, the Conform implant.* A new grid backing on the implant reduces it "memory," improving shape, flexibility, and softness.

Facial Asymmetry

The most difficult task in achieving successful results in facial contouring is the management of facial asymmetry. During the preoperative consultation a thorough discussion regarding this problem is essential, since patients are often unaware of the qualitative or quantitative aspects of their own facial asymmetry.[18] Meticulous attention to detail is required to visualize, perceptually integrate, and then make procedural adjustments to accommodate existing three-dimensional discrepancies. It is not unusual to find adequate malar development and a well-suspended soft tissue pad with good external contour on one side of the face and a hypoplastic malar eminence along with relative atrophy of the soft tissue on the other side (Fig. 7-12, *I*). In these cases I find it essential to have an applicable selection of implants available or to anticipate carving or altering the existing implants to adjust for the differences in contour between the two sides. Unusual asymmetries may also require using shims carved from a silicone block, which are sutured to the posterior surface of the implant.

Final Implant Positioning

The final determinant for implant placement is its correspondence to the external topographical defect (Fig. 7-12, *J* and *K*). In submalar augmentation the implant may reside below the zygoma and zygomatic arch, over the masseter tendon, or more superiorly on bone, or it may overlap both bone and tendon. The larger shell-type malar implants rest primarily on bone in a more superior, lateral position and extend partly into the submalar

*Available from Implantech, Ventura, California.

space. The combined implant will occupy both areas. However, the length or thickness of the lateral portion of any implant placed in patients with particularly thin skin or prominent bone structure may have to be reduced to avoid ridging or abnormal projections.

Methods of Fixation

Once implant position has been established, one can determine whether it is necessary to further secure the implant. Although stabilization is not always required, it can be accomplished by a number of different methods.

Internal suture fixation relies on the presence of an adjacent stable segment of periosteum or tendinous structure to anchor the implant. Stainless steel or titanium tap screws can also be used. The screw should be placed posteriorly over the lateral maxillary buttress to avoid accidental entry into the antrum.

Two methods of external fixation can be used to stabilize midfacial implants: indirect lateral suspension or direct fixation. In the lateral suspension technique, long Keith or swaged arthroscopic needles pass through the lateral end of the implant, enter the pocket intraorally, and exit the skin over the temporal region, where the sutures are tied over a bolster (Fig. 7-13). This exerts superolateral traction on the implant. I find this technique, which pulls the implant over the body and arch of the zygoma, more suitable for malar positioning.

In submalar augmentation in patients with gross asymmetry or with mobile implants, direct external fixation provides a more exact method of stabilization. It allows a large pocket to be made for better visual inspection and accurate implant placement, prevents slippage in the immediate postoperative period, and assists in closing off the dead space.

This direct method relies on implant fenestrations that coincide to points marked on the skin surface, which are used as a guide for implant placement and fixation. *Once the implants are correctly positioned within* their pockets, a point is marked on the exterior surface of the skin corresponding directly to the position of the most medial fenestration of each implant. Locating this point is aided by inserting a right angle clamp into the pocket over the first fenestration of the implant. With the tip of the clamp at right angles to the skin and while it is tented up, a mark is placed at this point (Fig. 7-14, *A*). Symmetrical placement of both implants is assisted by measuring the distance from the midline to both right and left medial markings (Fig. 7-14, *B*). The implants are then removed and placed on the skin by lining up the medial fenestration over the corresponding mark and confirming that the implant is within the general area outlined by the preoperative skin markings. The position of the lateral portion of the implant is then decided by placing a mark corresponding to the adjacent implant fenestration. Each end of a double-armed suture with 1-inch straight needles is passed through the medial and central implant fenestrations, and the suture is looped around the posterior surface of the implant. The needles are advanced through the pocket and passed perpendicularly through the skin, exiting at the respective external markings (Fig. 7-14, *C*). The implant, following the needles, is guided into the pocket. Both implants are examined by palpation and direct vision to ensure that they are correctly and symmetrically positioned. The implants are then secured in place by gently tying the sutures over a bolster consisting of two cotton rolls (Fig. 7-14, *D*).

Augmentation Performed Simultaneously with Rhytidectomy

Midface augmentation procedures can be performed either before or after rhytidectomy. If one is reasonably certain of the design and size of the implant to be used, it can be inserted at the end of the face lift operation. A disadvantage to performing augmentation procedures before the face lift is related to time. If the time of the succeeding procedures exceeds the duration of action of the local anesthetic, blood or fluid may accumulate within the pocket. The manipulation by the face lift itself may also cause accumulation of fluid and keep the surrounding tissues from immediately closing down to eliminate dead space. In these situations the incision is either left open and closed at the end of the procedure or Penrose drains that exit perorally through the mucosal incision are inserted into the pocket. The drains are usually removed within 1 to 2 days. I have had no *infections occur from the use of transoral drains. In fact,* I have found their use reduces the incidence of hematoma and seroma, which are frequent causes of infection.

An advantage to performing the implant procedure at the beginning of the face lift is that it is easier to make fine contour or position adjustments. Initially performing subperiosteal dissection of the midface combined with supplemental augmentation theoretically enhances the effectiveness of rhytidectomy. Instead of a two-dimensional force being exerted on facial flaps that are pulled over a flat or hollow surface, the expanded under-

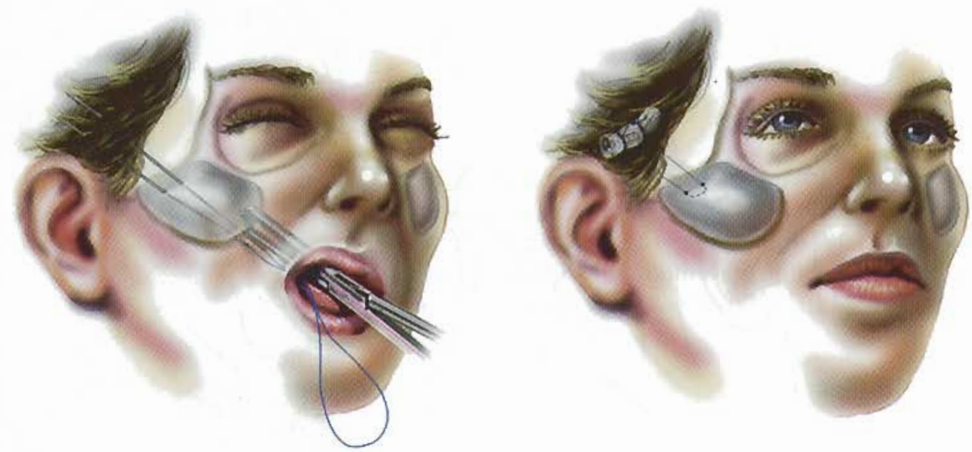
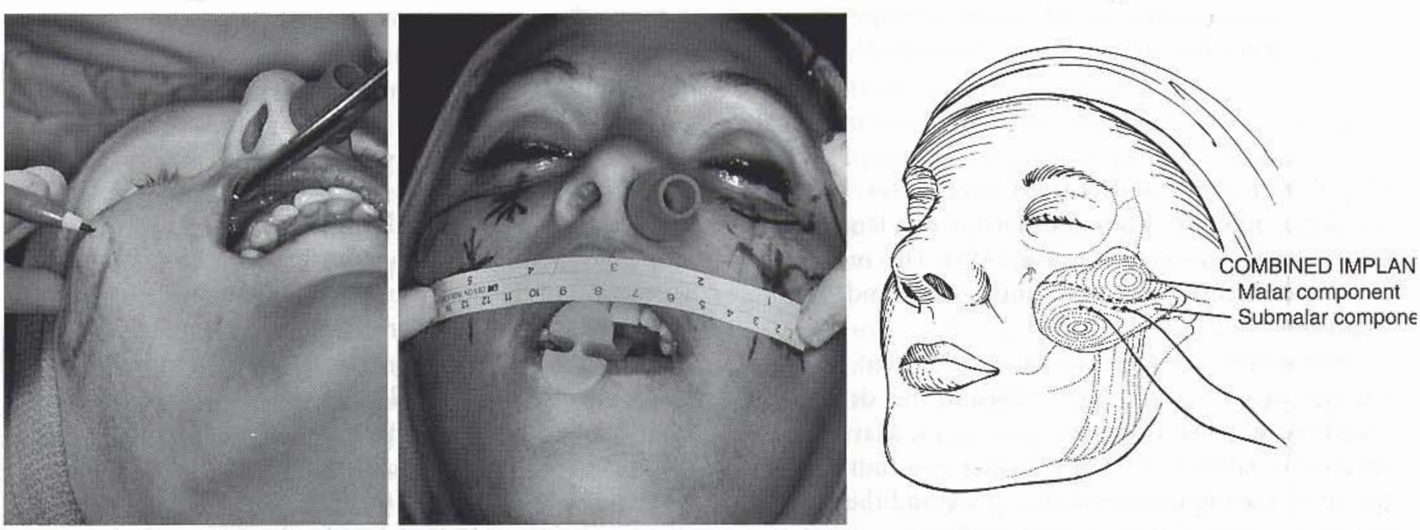
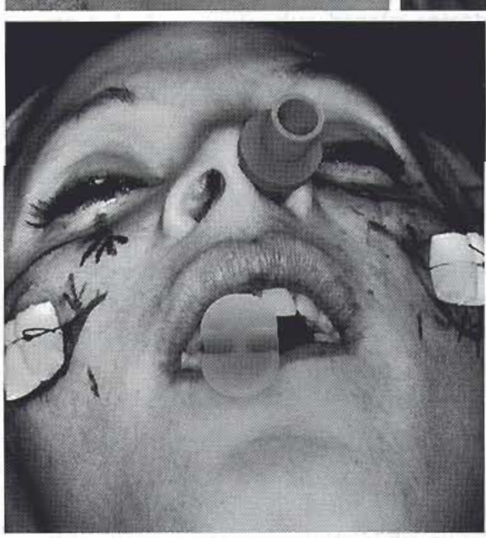


FIGURE 7-13 Indirect external method of suspension fixation whereby the implant is pulled and fixed in a superolateral position. I find this technique to be more suitable for malar than submalar implants.

A B C





D

FIGURE 7-14 Direct external method of fixation. **A,** The implant is adjusted inside the pocket in the exact position desired; a mark is placed at the point where a right angle clamp tents up the skin. This corresponds to the position of the first or medial-most fenestration of the implant. **B,** Symmetrical placement is assisted by measuring the distance from the midline to both the right and left marks. A second mark is then placed on the skin that corresponds to the second, adjacent fenestration, which determines the superoinferior orientation of the lateral portion of the implant. **C,** A double-armed 2-0 silk suture is passed around the posterior surface of the implant and through the fenestration. From inside the pocket the needles are passed directly perpendicular to the skin, exiting at the respective external markings, thus providing two-point fixation. (This figure illustrates the two components [malar and submalar] that form the combined implant.) **D,** The implant is stabilized by tying the suture directly over an external bolster (comprised of two cotton rolls). The suture and bolster are removed by the third postoperative day. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)

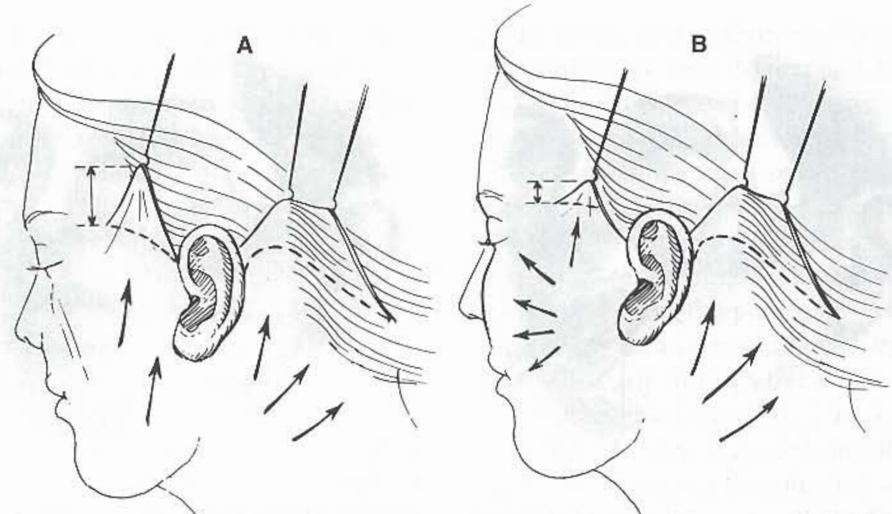


FIGURE 7-15 The midfacial implant augments the anterior facial structure, adding a third force vector, so that instead of stretching the skin over a smaller concave structure (**A**), it is draped over a larger, convex structure, requiring more surface area of skin for coverage (**B**). This avoids putting excessive tension on the skin. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)

lying infrastructure adds a third force vector, such that the skin is repositioned and draped over a larger three-dimensional convex surface (Fig. 7-15). This reduces the tension exerted on the oral commissure and perioral structures.

After midfacial augmentation is completed, an internal method of fixation may be used. If it is determined that direct external fixation is necessary and if extended anterior facial skin or SMAS dissection or both are anticipated, the implants are left in place and the mucosal incision is either left open or partially closed with one temporary suture. At the conclusion of the face lift, the mucosal incision is reopened, and the external sutures are passed and stabilized to an external bolster.

The Face Lift

Except in cases of minimal relaxation, anterior platysmal banding or moderate amounts of preplatysmal or subplatysmal fat are treated primarily through a submental incision. The submental dissection is executed in a preplatysmal plane, leaving the fat on the skin flap. If the platysma is dehiscent, platysmal plication or platysmaplasty is performed. If there is an excess of submental fat, liposuction is performed prior to platysmaplasty.[1,9]

After the submental procedure is completed, the SMAS and anterior cheek flaps are elevated. Superolateral traction may be exerted by developing a superoposterior platysma-SMAS flap from the subzygomatic area. Dissection of this flap over the zygomaticus major muscle allows continuous rotation-advancement of the platysma-SMAS flap and malar fat pad in a superior and posterior direction and elevates the jowl. If the implant is already in place, it is important to anticipate that there will be less than the normal amount of temporal and superior preauricular skin to be excised. We favor using negative-suction drains placed subcutaneously for approximately 48 to 72 hours. This significantly reduces postoperative swelling and bruising and facilitates a more rapid recovery.

At the conclusion of the procedure, if bolsters are used, sutures are tied loosely over the bolsters. We do not apply any elastic bandages over areas of undermined skin. Instead, a loose cling dressing is used to apply mild compression to the face. The implants are usually stable by the third postoperative day, at which time the sutures are cut and removed along with the bolsters.

DISCUSSION

Many patients presenting typical signs of aging such as the formation of jowls, platysmal relaxation, excess sub-

FIGURE 7-16 This patient demonstrates the linear pull lines extending laterally from the oral commissure caused by multiple face lift procedures. (From Binder WJ: A comprehensive approach for aesthetic contouring of the midface in rhytidectomy. *Facial Plast Surg Clin North Am* 1:231-255, 1993.)

mental and submandibular fat, and anterior facial folds seek consultation for rhytidectomy often as the solution to all of these problems. Whenever the rhytidectomy procedure is extended or an adjunctive procedure is added, the benefits of doing so must be substantial enough to justify the additional risk. Alternatively, adjunctive procedures or more radical rhytidectomy approaches may reduce a large percentage of patient dissatisfaction with rhytidectomy results.

In the area of the midface, patient dissatisfaction after conventional rhytidectomy is often tied to lack of long-term improvement in alleviating the nasolabial folds and adjacent depressions.[10,23] These limitations have been attributed to either inadequate elevation of the malar fat pad or failure to release the zygomatic ligamentous attachments and the fascial attachments of the SMAS that remain fixed to the zygomatic and facial muscles after subcutaneous or conservative SMAS procedures.[2,16] Overzealous attempts via multiple or extended rhytidectomy to reduce anterior facial folds, particularly in older patients with atrophic, inelastic skin, without simultaneously augmenting existing deficiency may cause unnatural pull lines around the mouth or result in a tight, skeletonized, masklike appearance, with general loss of facial expression[30] (Fig. 7-16).

The enhanced benefits obtained from extended SMAS, deep plane, or subperiosteal face lift procedures are based on the effective mobilization and repositioning of the deep soft tissues or facial muscles and ligaments or both. To achieve an optimum natural correction of the nasolabial folds, release of the SMAS attachments anterior and superficial to the zygomaticus major muscle is necessary.[22] However, because of the greater complexity and scope of the deep plane face lift, the surgeon must have substantial experience in rhytidectomy to avoid being at increased risk of inflicting facial nerve injury.[22,29]

It is crucial to choose the type of facial rejuvenation appropriate for the patient. For example, patients with good skeletal structure and an abundance of midfacial fat are not candidates for augmentation. Similarly, chances are slim that cheek flap translocation procedures alone can effectively correct atrophy of buccal fat pads, extreme ptosis of zygomatic cheek pads, or redundancy in the nasolabial folds.[2]

The subperiosteal face lift elevates and repositions the periosteum and separates the zygomaticus major and minor, the levator anguli oris and all the soft-tissue components from their bony attachments over the malar-zygomatic complex. It then exerts superior traction on these muscles and adjacent soft tissues by mobilizing and anchoring the flap to temporalis fascia. In contradistinction, the deep plane approach leaves facial muscles intact, separates cheek fat from the muscles, and pulls the superficial fibroadipose tissue in a lateral direction and sutures it under tension. However, the descent of cheek fat is but one pathophysiologic event among many that shape the configurations of midfacial aging, and the amount of rejuvenation that will be accomplished using these soft tissue translocation techniques depends upon the percentage that remains of the original volume of fat present in youth. Orbital pathology associated with aging also has diverse causes.[13,14] Although repositioning muscle festoons, as performed in composite rhytidectomy, may enhance the periorbital region in patients with good bone structure, it will not provide the degree of augmentation required for effective change in most cases of malar hypoplasia.

In current midfacial contouring procedures using larger implants, the extent of subperiosteal zygomaticomaxillary and supramasseteric undermining is similar to that used in the subperiosteal face lift, which further mobilizes an extra component of midfacial soft tissue.[28] This supramasseteric area directly corresponds to the submalar space and is routinely undermined during submalar augmentation.[5] Theoretically, this wide subperiosteal undermining makes the SMAS elevation more effective in mobilizing and relocating the deep soft tis-

FIGURE 7-17 **A** and **C,** The structural deficiencies of the mandible include a recessive chin and prejowl sulcus. Atrophy of the buccal fat pad and malar cheek pads produces a hollowed out submalar depression just below the malar eminence. **B** and **D,** Facial rejuvenation shown 11 months after surgery was accomplished by upper and lower blepharoplasty, submalar and mandibular augmentation (prejowl chin implant), and complete rhytidectomy inclusive of SMAS-platysma dissection. In this case, it would have been difficult to rely entirely on repositioning a small amount of malar cheek fat to accomplish the same effect in the midface.

sue layers of the face during rhytidectomy. Thus the benefits obtained from facial contouring procedures are multifactorial and derived not only from the implant but also from the procedure itself (Fig. 7-17). This synergistic effect is due to the positive mechanical benefits of mobilized periosteum, the increased effectiveness of the subcutaneous-SMAS elevation and relocation, and the underlying support and volumetric enhancement provided by the implant. The placement of the implant in the subperiosteal plane further enhances the foundation and support to facilitate redraping of the midfacial soft tissues to achieve the desired smooth external contour of the midface (Figs. 7-18 and 7-19). In these structure- or volume-deficient patients the addition of augmentation procedures has proved vital for enhanced and prolonged improvement following rhytidectomy.

FIGURE 7-18 A and C, Preoperative views. B and D, Views 18 months after upper and lower blepharoplasty, rhytidectomy, and submalar augmentation were performed. By producing a slight convexity in the midface, submalar augmentation has been able to provide a more vibrant and youthful appearance, reduce the depth of the nasolabial folds, and prolong the results of rhytidectomy.

FIGURE 7-19 A and C, The patient exhibits loss of midfacial soft tissue evidenced by caving in of the submalar region. **B** and **D,** One year after upper and lower blepharoplasty, submalar augmentation, rhytidectomy with platysmal and SMAS flaps, and perioral dermabrasion.

CONCLUSION

In conclusion, accurate preoperative analysis of facial bone structure is necessary for successful results in facial augmentation. Similarly, when the scope of the procedures to be used for the purpose of facial rejuvenation is being decided, the aging process should be considered not only as the development of loose skin but also as the acquisition of facial defects that must be restructured to truly restore a youthful appearance. Depending on the patient, a single procedure such as face lift surgery may only be a partial solution to the problems of facial aging, and facial contouring may be a necessary foundation for achieving more successful and longer lasting results in rhytidectomy.

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