# A COMPREHENSIVE APPROACH FOR AESTHETIC CONTOURING OF THE MIDFACE IN RHYTIDECTOMY

William J. Binder, MD, FACS

Over the past two decades, advances in many areas of facial rejuvenation surgery have made us keenly aware of relying less on the exclusive option of facelift in the attempt to accomplish the entire goal of providing a more youthful and vibrant appearance to the face. We have come to realize that other adjunctive techniques (inclusive of brow lift, blepharoplasty, augmentation procedures, face peeling, makeup, and others) are also required if we are to meet today's higher professional standards and patient expectations for esthetic facial enhancement. Thus, rhytidectomy has become only one component of the complex composite picture of facial rejuvenation strategies.

Recently there have been a number of diverse rhytidectomy techniques introduced in the surgical literature. Modifications such as extended superficial musculoaponeurotic system (SMAS) dissections and deep plane and subperiosteal facelifts have all shown the limitations of using only classic subcutaneous dissection.[19,22,23,27,32] The deep plane and subperiosteal methods attempt to improve midfacial pathology with more extensive and deeper dissection than conventional rhytidectomy. Both methods rely on a common precept of deep soft tissue or muscle repositioning and rearrangement, but paradoxically differ on the basic mechanism used to accomplish similar end results.

However, in the presence of defects caused by the absence of sufficient skeletal structure or soft tissue volume, reliance on soft tissue procedures alone will not provide adequate correction. Similarly, it is not appropriate to rely on regional augmentation to substitute for the comprehensive effects obtained from a complete facelift procedure. With that in mind, this article provides a detailed discussion of technique in midfacial contouring procedures using alloplastic implants and its application to rhytidectomy. Emphasis is also given to defining specific patterns of midfacial deformity for correct implant selection, a vital step in discerning which patients will benefit from these procedures.

## PATHOPHYSIOLOGIC CONSIDERATIONS OF MIDFACIAL AGING

It is acknowledged generally that strong, well-balanced skeletal features, essential hall-

From the Department of Head and Neck Surgery, University of California School of Medicine; and the Department of Otolaryngology and Head and Neck Surgery, Cedars-Sinai Medical Center, Los Angeles, California

marks for current standards of beauty, also best endure the ravages of age.[30] Analysis of the faces of teens reveals an abundance of soft tissue providing an homogeneous composite of facial form. Full cheeks and smooth, harmonious and symmetric contours free of sharp, irregular projections or indentations commonly embody these youthful qualities.[7] As one proceeds through time, this picture becomes more complex. Change may bring perceived facial flaws that appear progressively more obvious and pronounced with age, often becoming the focus of one's attention and the motivation for seeking consultation for facial surgery.[17]

Inherent in the concept of rejuvenation surgery, therefore, must also be recognition that the aging process is a gradual manifestation of various facial defects and configurations. It precipitates relaxation and downward migration of subcutaneous fat and inelastic skin and causes atrophy of the deeper buccal fat. A direct anatomic correlation has been demonstrated radiographically between topographic variations of the midface and the loss of buccal fat (Tobias, personal communication, 1991). Disparate movement of the integument will reveal underlying asymmetric bone structure not usually evident in earlier years. Degenerative fat changes also occur in other areas such as the temporal region and in other conditions such as lipodystrophy, and are all treated similarly by supplemental or augmentation techniques.[8,34]

Depending on the underlying skeletal structure, different but definable configurations of midfacial aging are formed. These include the development of a generalized flattening of the face, thinning of the vermillion border of the lip, formation of jowls, and areas of deep cavitary depressions of the cheek that are found adjacent to prominent nasolabial folds.[21] In some, severe degenerative changes of the skin and soft tissue, when combined with deficient underlying bone structure, may exaggerate the gravitational effects of aging. These patients lack sufficient skeletal structure or soft tissue volume for the surgeon to rely on rhytidectomy techniques alone to rejuvenate the face (Fig. 1*A*).

In contrast, other individuals may have an exceptionally prominent malar-zygomatic complex combined with thin skin lacking in both the subcutaneous and deep supporting fat buffer. In this situation, the skin assumes direct contact with the underlying bone structure, skeletonizing the face and accentuating existing midfacial depressions that are charac-

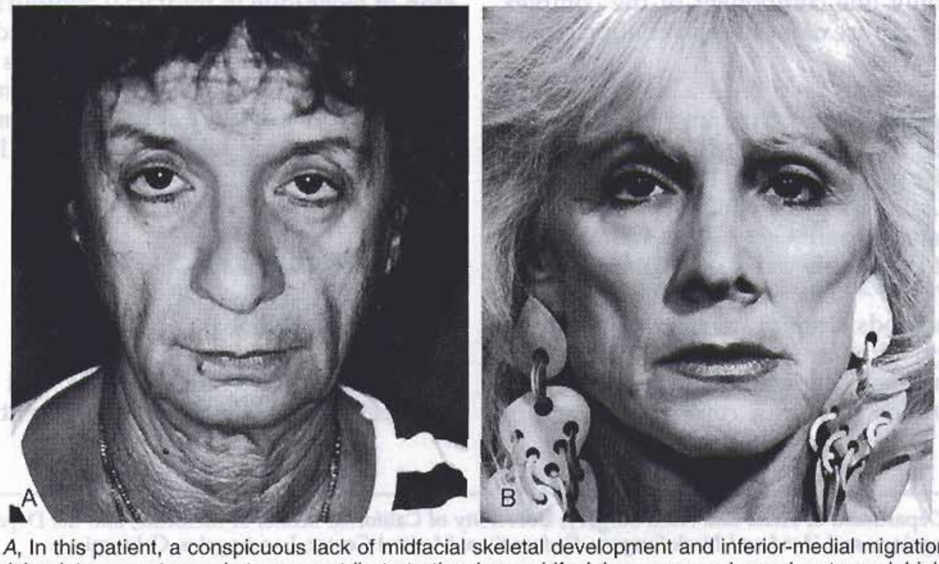


**Figure 1.** *A*, In this patient, a conspicuous lack of midfacial skeletal development and inferior-medial migration of inadequate overlying integumentary substance contribute to the deep midfacial grooves and prominent nasolabial folds. It is obvious that additional midfacial structural and supplementary support is necessary to provide the foundation for any proposed rhytidectomy procedure to achieve satisfactory or long-term results. *B*, This clinical picture of aging is characterized by a patient with 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.

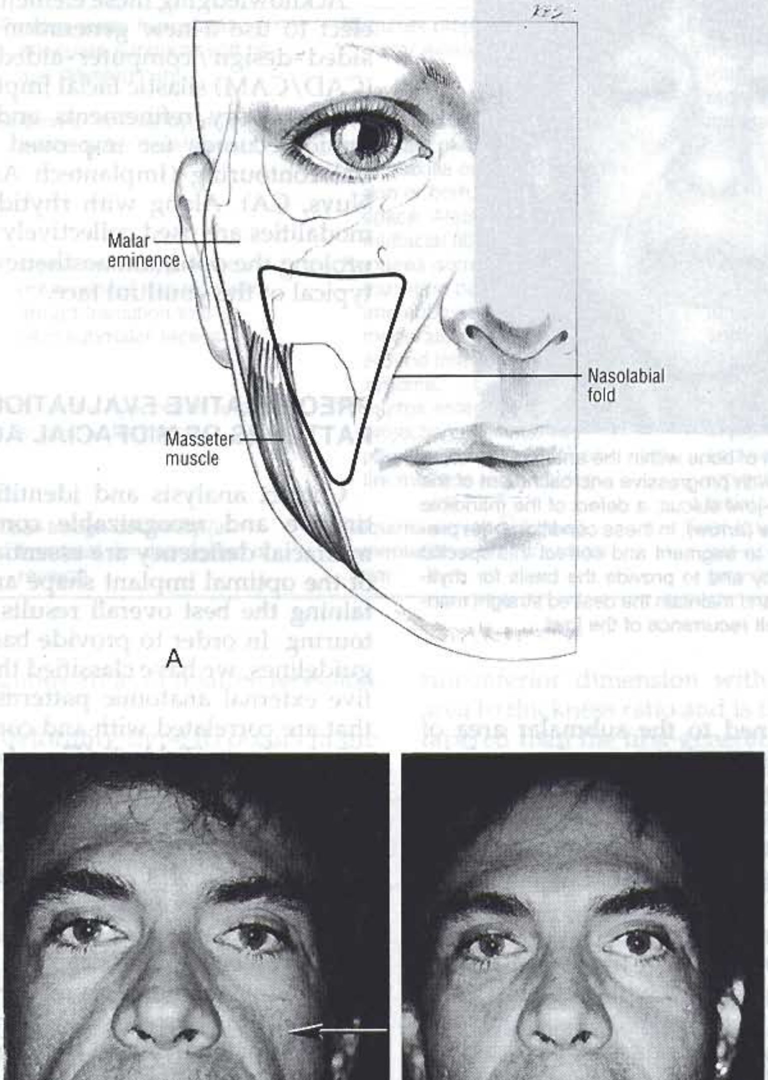


**Figure 2.** *A*, The Submalar triangle is an area of midfacial depression bordered medially by the nasolabial fold, superiorly by the malar eminence, and laterally by the main body of the masseter muscle. *B*, Before surgery. Significant depth to the submalar triangular recess *(arrow)* is shown in this patient, who had already undergone face lift surgery 1½ years ago in an attempt to correct this problem. Without providing supplementary support for the lack of midfacial soft tissue, the deep facial recesses and the adjacent prominent nasolabial fold spontaneously returned 3 months after the initial face lift surgery. *C*, Six months after surgery. Submalar augmentation was used as the sole procedure to re-expand the midfacial depression. By augmenting this depressed midfacial area, the prominence of the adjacent nasolabial fold is reduced simultaneously.

**Figure 3.** Resorption of bone within the anterior mandibular groove, coupled with progressive encroachment of the jowl, creates the pre-jowl sulcus; a defect of the mandible that worsens with age *(arrow)*. In these conditions, the pre-jowl implant is used to augment and correct this specific mandibular deficiency and to provide the basis for rhytidectomy to achieve and maintain the desired straight mandibular line and inhibit recurrence of the jowl.

teristically confined to the submalar area of the face. This creates a gaunt or haggard appearance in an otherwise healthy person (Fig. 1*B*). It also causes difficulty in proper draping and repositioning of skin, superficial musculoaponeurotic system (SMAS), or composite flaps during rhytidectomy.

Expressed in many different forms and degrees of severity, most soft tissue deficiencies of the midface are found within the anatomic recess described as the submalar triangle. 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 (Figs. 2*A* and *B*). Analogous topographic deficiencies are also recognized in other areas of the face such as the pre-jowl sulcus, formed in part by relaxation of the soft tissues surrounding an area of bone resorption along the body of the mandible (Mittelman, personal communication, 1990) (Fig. 3).

Among the techniques evolving in facial rejuvenation surgery, the missing link still remains the ability to permanently replace soft tissue bulk in sufficient quantity. 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 aging, we elect to use a new generation of computer-aided-design / computer-aided-manufacture (CAD/CAM) silastic facial implants that have the necessary refinements and greater anatomic accuracy for improved results in facial contouring (Implantech Associates, Van Nuys, CA). Along with rhytidectomy, these modalities are used collectively to restore and prolong the optimum aesthetic qualities more typical of the youthful face.[6]

## PREOPERATIVE EVALUATION: PATTERNS OF MIDFACIAL AGING

Correct analysis and identification of distinctive and recognizable configurations of midfacial deficiency are essential for selection of the optimal implant shape and size for obtaining the best overall results in facial contouring. In order to provide basic assessment guidelines, we have classified the midface into five external anatomic patterns of deformity that are correlated with and corrected by specific implants (Table 1) (Figs. 4*A* and *B*).

The first deformity (type I) occurs in the patient who has good midfacial fullness and insufficient malar skeletal development. In this case, a malar implant is chosen to augment the zygoma and create a high, arched and more lateral-projecting cheek bone appearance. Classic malar implants such as the small oval or triangular designs are relatively thick in relationship to surface area. When placed directly over the prominence of the zygoma, these implants often produce an abnormal angular protuberance and do not esthetically augment the entire malar complex.

Implant thickness required to achieve desired lateral projection over the malar prominence ranges between 3 and 7 mm, with the majority averaging 4 to 5 mm. In most type I deformities the author prefers to use the newer, shell-type malar implants which have greater surface area.[33] 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 augmen-

**Table 1.** PATTERNS OF MIDFACIAL DEFORMITIES CORRELATED WITH TYPE OF IMPLANT

| Deformity Type | Description of Midfacial Deformity | Type of Augmentation Required | Type of Implant Used |
|---|---|---|---|
| Type 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 |
| Type 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 |
| Type 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 |
| Type 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 |
| Type V | Tear-trough deformity (infraorbital rim depression or recess) | Requires site-specific augmentation over infraorbital rim | Tear-trough Implant; to fit site-specific suborbital groove |

tation to contiguous areas of relative recession (Fig. 5).

The second deformity (type II) occurs in the patient who has atrophy of midfacial soft tissues and adequate malar development. In this case, submalar implants are used to augment or fill midfacial depressions or provide anterior projection to a flat face[5] (Fig. 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 judgement than the malar area associated with type I deformities.

The third deformity (type III) is a distinctive variant of type II deficiency and occurs in the patient who has thin skin and prominent malar eminences with abrupt transition to an area of extreme hollowness found within the submalar region. This produces the impression of an extremely gaunt or skeletonized facial appearance. In this group of patients the midfacial hollow may be exaggerated instead of remedied by rhytidectomy. Similarly, contouring methods used to smooth out these abrupt changes in surface topography requires a more refined transitional type of submalar implant with less anterior projection. This modified, more U-shaped second-generation submalar implant has an increased superior-inferior 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 malar bone we are able to supplement the area around the bone in order to restore the rounder high cheek bone appearance of a younger age (Fig. 7). Therefore, analysis of the smooth, harmonious cheek bones of youth, particularly as seen in today's fashion photography, concludes that the effect is due only in part to skeletal structure. The other component is the presence of thicker, more robust soft tissue pads that encompasses this underlying bony framework.

The fourth deformity (type IV) is the result of combined malar hypoplasia and midfacial soft tissue deficiency, wherein both the submalar and malar regions of the midface require augmentation. In this situation a single combined implant (malar-submalar) must serve two purposes: it must proportionately augment a deficient skeletal structure while simultaneously filling a void created by absent midfacial soft tissue (Fig. 8). One example of patients that fall within this category are those

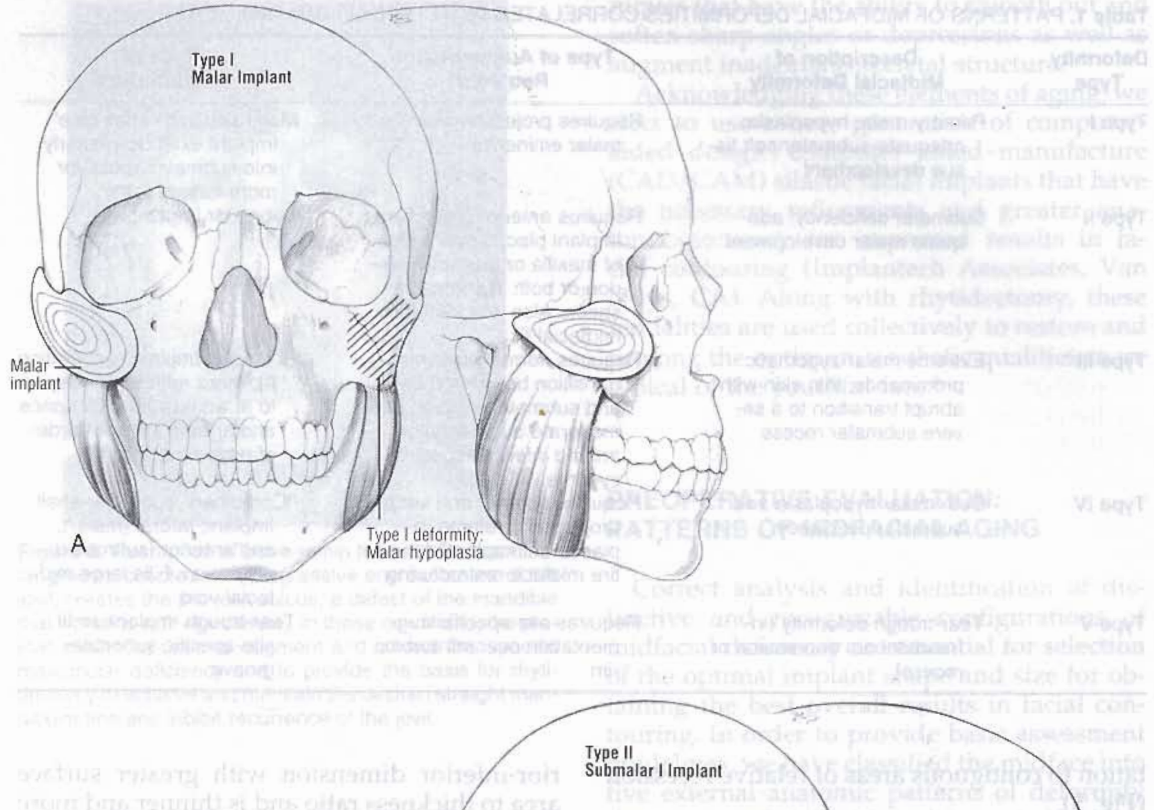


**Figure 4.** *A–E,* Frontal and lateral drawings illustrate the anatomic areas of the midface and five distinctive topographic patterns of midfacial deformity. Specific implants that are directly correlated with and used to correct these specific patterns of midfacial deformity are selected (see Table 1).

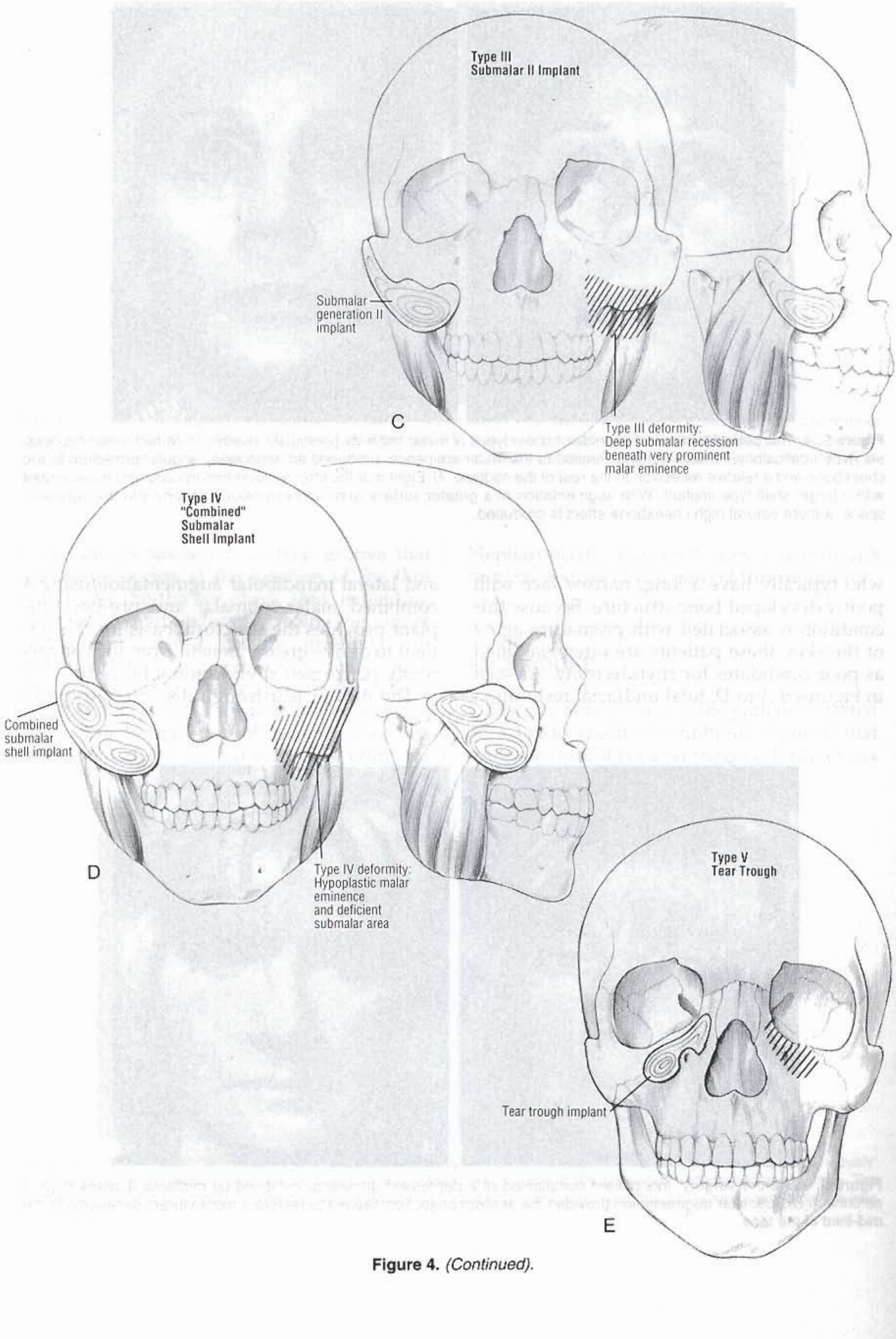


**Figure 4.** *(Continued).*


**Figure 5.** *A*, This patient had one of the older, bulkier types of malar implants previously inserted to correct malar hypoplasia (type I deficiency). These implants, limited to the malar eminence, produced an abnormally angular projection to the cheekbone and a relative recession to the rest of the midface. *B*, Eight months after revision malarplasty and replacement with a larger shell-type implant. With augmentation of a greater surface area and extension inferiorly into the submalar space, a more natural high cheekbone effect is produced.

who typically have a long, narrow face with poorly developed bone structure. Because this condition is associated with premature aging of the skin, these patients are often classified as poor candidates for rhytidectomy. As seen in Figures 9 *A* to *D*, total midfacial restoration and lateral mandibular augmentation using a combined malar-submalar and pre-jowl implant provides the structural basis for this patient to derive greater benefit from the concurrently performed rhytidectomy procedure.

The fifth or tear-trough deformity (type V)


**Figure 6.** *A*, Before surgery, this patient complained of a depressed demeanor exhibited by midfacial flatness (type II deformity). *B*, Submalar augmentation provided the anterior projection needed to restore a more vibrant dimension to the mid-third of the face.


**Figure 7.** *A*, Before surgery. This patient has extreme projection to the malar complex and severe midfacial hollows associated with thin skin. (type III deformity) *B*, After surgery, a submalar implant (Generation II) establishes a smooth transition between the two anatomic regions and also provides a moderate degree of supplemental midfacial augmentation.

is specifically limited to 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 (Fig. 10).[13] This deformity also gives the face a dissipated or tired appearance. Recognizing the extremely high rate of occurrence of this age-related defect in patients presenting for blepharoplasty, Flowers[14] uses a tear-trough implant specifically to correct this deformity.

## PROCEDURE

The day before surgery the patient is started on a broad-spectrum antibiotic regimen that continues for 5 days after surgery. Intravenous

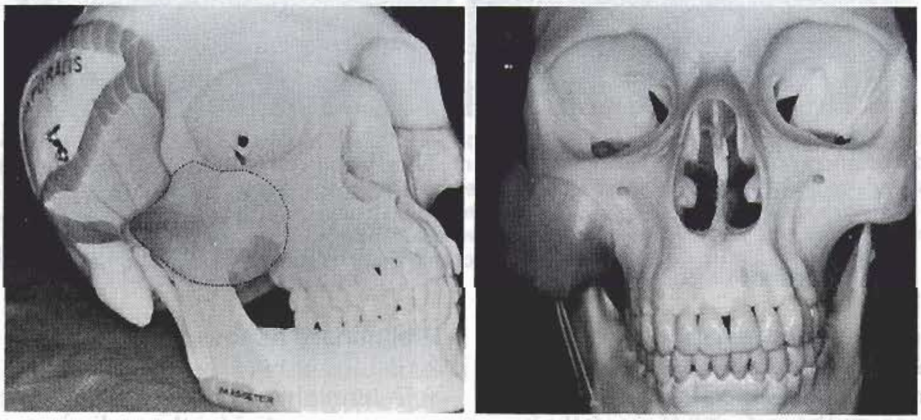

**Figure 8.** The combined malar-submalar implant must be proportioned precisely to fit two anatomic areas simultaneously: it must project in an anterior and lateral direction and volumetrically expand the submalar and premaxillary space. The combined implant is indicated for total midface restructuring in patients with malar hypoplasia plus moderate to severe loss of soft tissue.

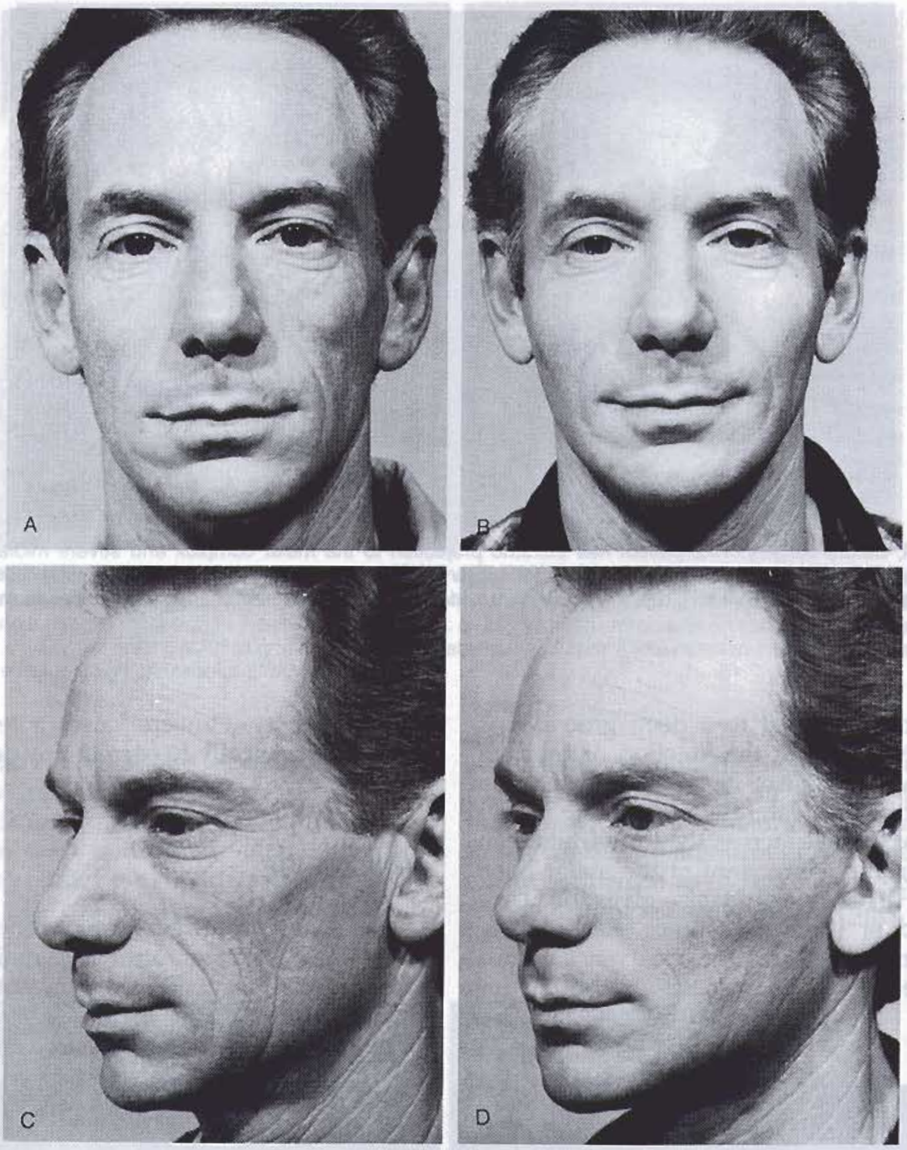


Figure 9. *See legend on opposite page*

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. In the majority of cases, the medial border of the implant is placed at or lateral to a line drawn vertically downward from the midpupillary plane or infraorbital foramen. This initial design drawn on the skin helps both the surgeon and patient decide on the implant shape, size, and position appropriate to accomplish their mutual goals (Fig. 11).

## Preliminary Assessment

Determining the type of midfacial deficiency is essential for the preliminary selection of the implant that will achieve the best overall improvement. In such subjective preoperative analysis, there is an obvious need for stan-

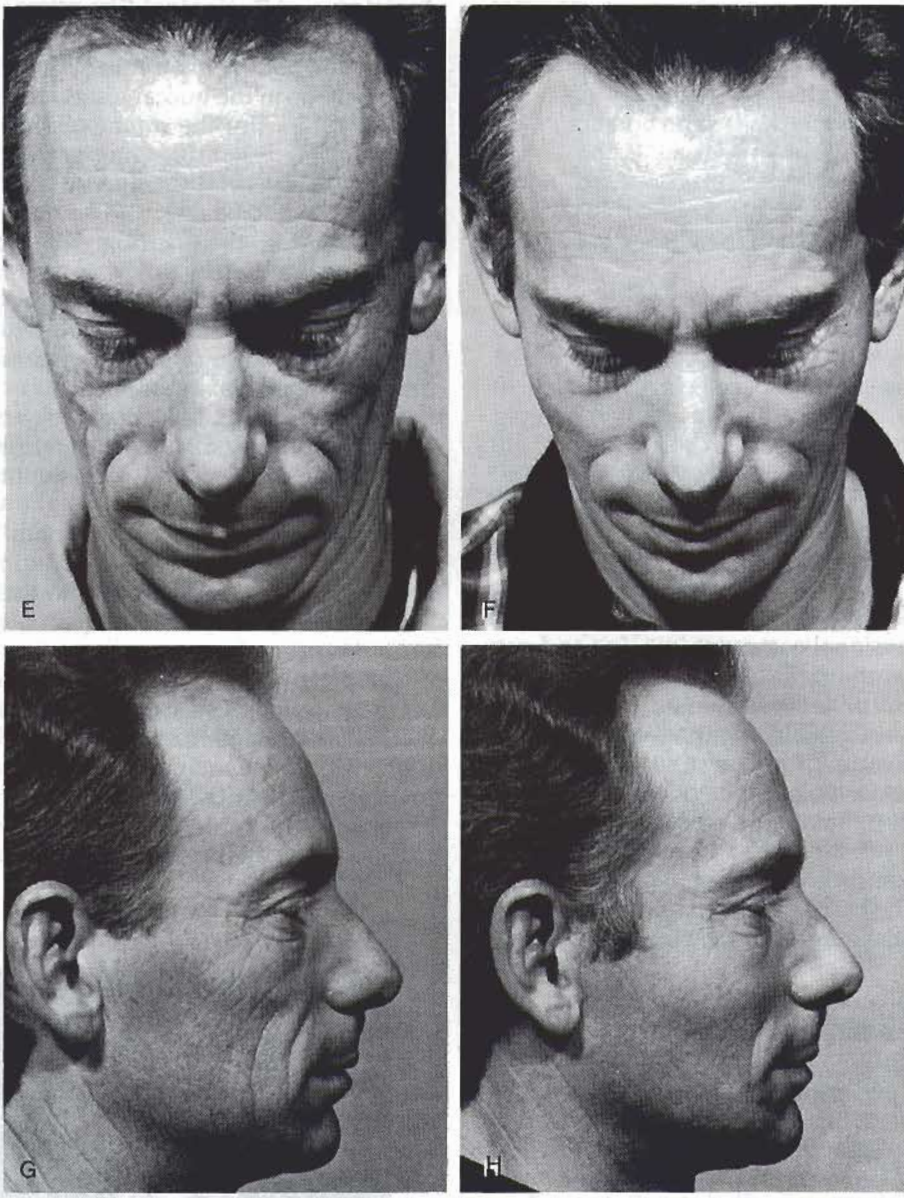


**Figure 9.** *A* and *B*, Frontal. *C* and *D*, Oblique. *E* and *F*, Head down. *G* and *H*, Lateral. *A, C, E,* and *G*, Preoperative analysis of the facial configuration in this 40-year-old patient reveals the presence of severe deficiency in both skeletal structure and soft-tissue volume. *B, D, F,* and *H*, Seven months after surgery. Performed concurrently with rhytidectomy, the combined submalar shell implants were used to restructure the entire midface, and a pre-jowl 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 facelift procedure to provide a meaningful, long-term improvement.

dardized measurements to provide guidelines in treatment planning. Considering the infinite variations of facial form, however, most analytic measurements used in determining esthetic guidelines have been unreliable.[12] Terino[33] relies on the principles of skeletal "zonal anatomy" to assist in the implant selection process. The ultimate problem still remains the inability to determine the exact amount of augmentation required to not only correct the deficiency but also create an esthetically enhanced result. With the integration of

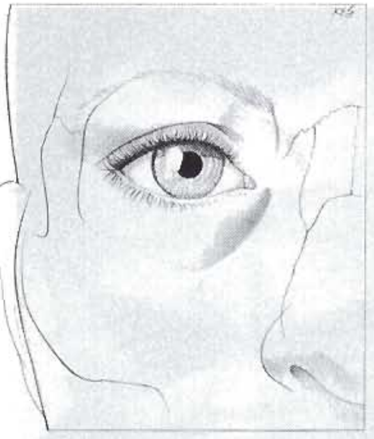

Figure 10. The infraorbital "tear-trough" deformity present between the thick cheek skin and the thin eyelid skin also is influenced by the configuration of suborbital bone structure.

three-dimensional computer imaging and surface laser scanning, a more accurate and definitive determination in volumetric replacement will be feasible eventually.[26] However, until these complex and currently experimental diagnostic tools become more practical, only an approximate preoperative determination in the selection of an implant is possible. The decision on exact shape, size, and thickness must be based ultimately on the patient's input and the surgeon's judgement.

## Anesthesia and Preparation

When performing implant procedures alone, intravenous sedation accompanied by a local wide-field block is usually sufficient. When implant surgery is performed with other time-consuming procedures, general anesthesia is preferred. A routine preparation is performed and povidone-iodine (Betadine, Purdue Frederick, Norwalk, CT) impregnated gauze sponges are additionally placed into the buccal-gingival sulcus.

Local anesthetic is injected percutaneously at the level of the periosteal plane. A sufficient amount of infiltration minimizes bleeding and provides increased safety by facilitating dissection. The addition of hyaluronidase (Wydase, Wyeth-Ayerst, Philadelphia, PA) disperses the local anesthetic and reduces soft-tissue distortion.

## Incision and Periosteal Elevation

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

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 is usually well above the denture's superior border. Dentures remain in place during and after the procedure, and in our experience have not been found to cause extrusion or 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. 12*B*). It is usually not necessary to identify the infraorbital nerve. However, if unusual circumstances require more medial placement of the implant or if the surgeon is

Figure 11. Prior to infiltration of local anesthetic, the areas requiring augmentation are outlined specifically with the patient sitting in the upright position. In most cases, the medial border of submalar or malar implants is placed at or lateral to the midpupillary line.

unfamiliar with the intraoral approach, the infraorbital foramen nerve are identified easily by elevating the mucosa in a superomedial direction.

Dissection continues in a subperiosteal plane, providing exposure from the anterior surface of the maxilla medially and continuing laterally over the malar-zygomatic complex and zygomatic arch. This dissection of the midface is similar in scope to that described during the subperiosteal face lift.[28] It is essential that the dissection stay on bone in the safe subperiosteal plane, particularly over the mid- and posterior portions of the zygomatic arch. The external or free hand is also used to help guide the elevator over the designated area to be undermined (Fig. 12*C*).

A Joseph elevator may be used to start the dissection, but is immediately changed for much broader (approximately 9–10 mm), heavier, curved, and straight periosteal elevators. This is particularly important when dissecting laterally over the zygoma and zygomatic arch (Fig. 12*D*). Broad elevators facilitate the dissection safely and with relative ease within the subperiosteal plane (Fig. 12*E*). Using more delicate or narrow instruments is difficult and dangerous because 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 over the tendinous attachments of the masseter muscle. If in the correct plane, the glistening white tendinous attachments of the masseter muscle are seen by gently and bluntly pushing the superficial tissues inferiorly and away from the deeper tendinous structure. These masseteric attachments are not cut and are left completely intact, providing a supporting framework upon which the implant may rest (Fig. 12*F*).

The submalar space may be extended without difficulty for at least 2 to 3 cm inferomedially below the body of the zygoma. In this location the contraction of the masseter muscle produces lateral rather than superior-inferior movement and does not cause displacement of the implant. Even in reconstructive cases where more extensive inferior and lateral dissections are made to accommodate larger prostheses, there is surprisingly imperceptible implant motion.

As the dissection moves posteriorly along the zygomatic arch, the space becomes tighter and is not as easily enlarged. However, this part of the space can be opened by gently advancing a heavy periosteal elevator posteriorly along the inferior border of the zygomatic arch.

It is of utmost importance that the dissection be extended sufficiently in all directions to create a large enough space over the zygomaticomaxillary skeletal complex-submalar region 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. 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 collapse immediately 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, optimized placement, and 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 facelift approach is difficult technically, and one cannot be confident that the dissection continued inferiorly below the bone is within the correct plane. When performing malar augmentation using smaller implants or inserting tear-trough implants, blepharoplasty or facelift 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

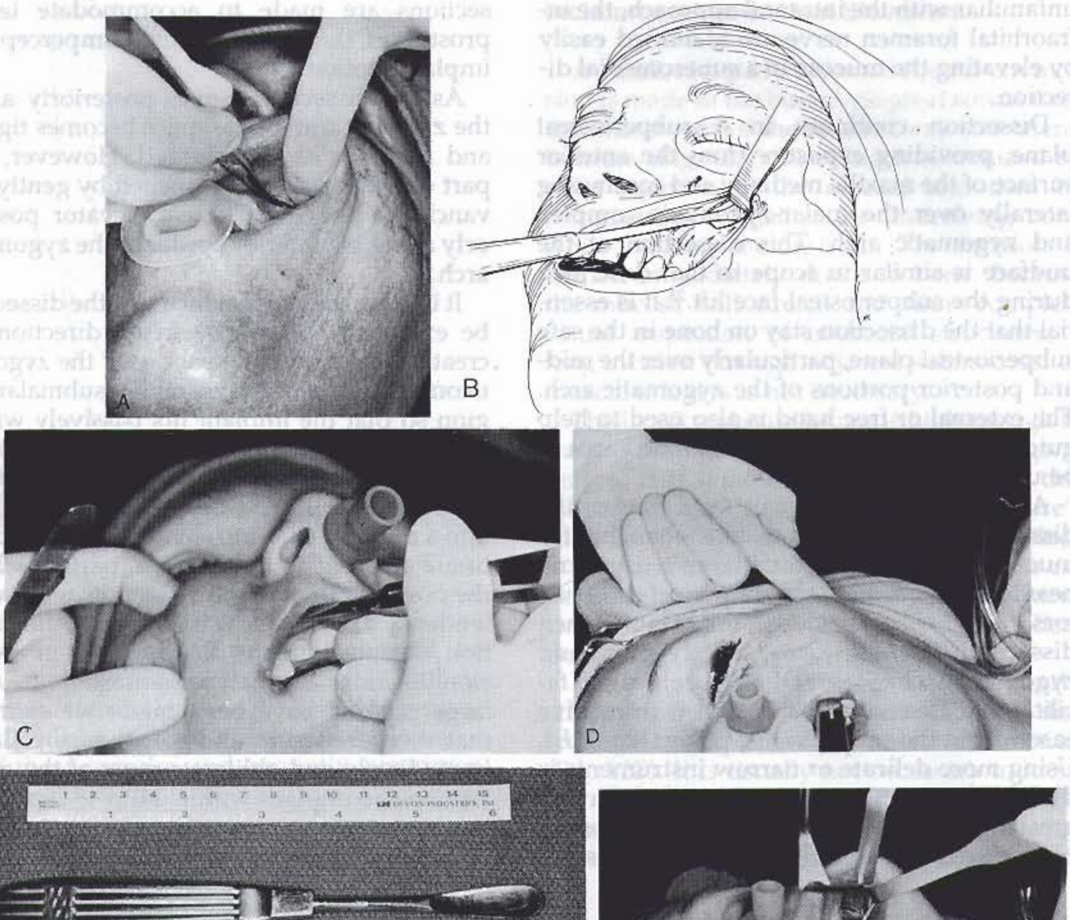


**Figure 12.** *See legend on opposite page*

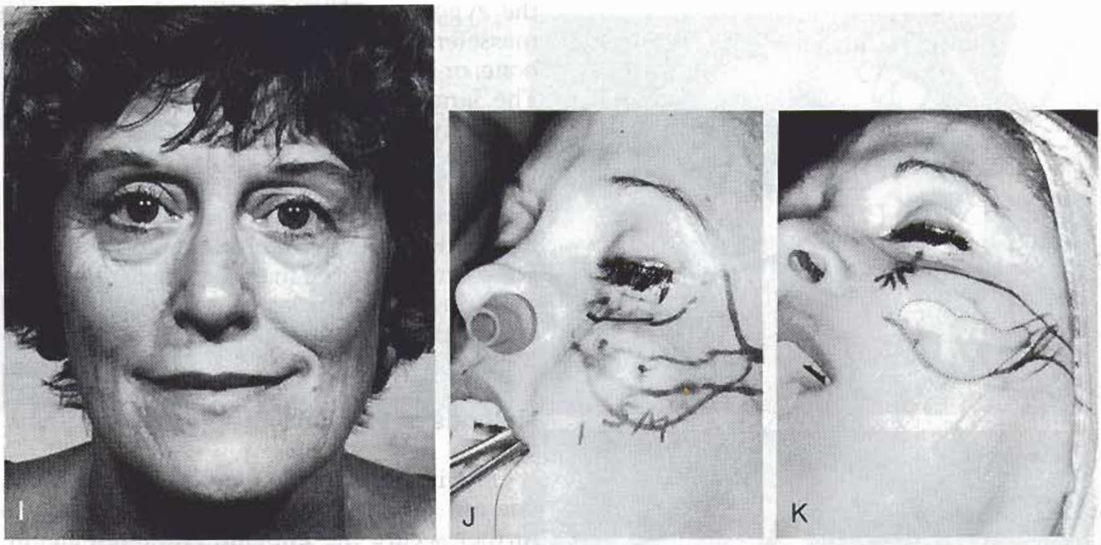


**Figure 12.** *A,* After injection with local anesthetic, the mucosa is compressed and a single incision is carried through mucosa and periosteum directly onto bone. The incision is small (1 to 1.5 cm) and is placed over the lateral aspect of the canine fossa and lateral buttress, at least 1 cm above the buccal-gingival line. *B,* Illustration demonstrates the medial subperiosteal dissection beginning from a position at or lateral to the infraorbital nerve and extending in a superolateral direction. © William J. Binder, MD. *C,* Using broad periosteal elevators, the free hand (external to the skin) helps guide the dissection over the designated area to be undermined. *D,* The dissection easily may be continued laterally over bone in the subperiosteal plane. In this photograph, the instrument is inserted into pocket over the zygomatic arch, indicating the posterior extent of the dissection. *E,* The 9- and 10-mm curved and straight 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 insure that there will be no inferior encroachment of soft tissue on the implant. *G,* This illustration demonstrates the general extent of dissection required for most midfacial implants. The dissection must sufficiently be extended posterolaterally over the zygomatic arch, and/or expanded inferiorly into the submalar space over the tendinous insertions of the masseter muscle so that the implant can be accommodated passively within the pocket. ©William J. Binder, MD. *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 reveals a complex picture of facial asymmetry. Overall assessment reveals the right side of the face to be significantly narrower in width and exhibits a relative degree of maxillary-zygomatic hypoplasia as compared to the more prominent malar development on the left side. There is also adequate soft tissue providing 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-submalar 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 coincide roughly 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.

lid, suspension canthoplasty should be considered to avoid postoperative ectropion.

## Final Implant Selection

At this time, via the intraoral route, final implant selection is completed while observing the actual topographic changes produced by inserting either sizers or, if necessary, different implants into the pocket (Fig. 12*H*). Among the advantages of silicone elastomer is its flexibility that enables large implants to be compressed through small openings and then to reexpand within the pocket created beyond the incision.[31] This allows for ease of implant insertion and removal during the selection process and avoids the surgeon having to make larger incisions required for rigid implants. Small incisions further reduce the chances of wound dehiscence and the potential for implant extrusion.

## Facial Asymmetry

The most difficult task in achieving successful results in facial contouring is the manage-

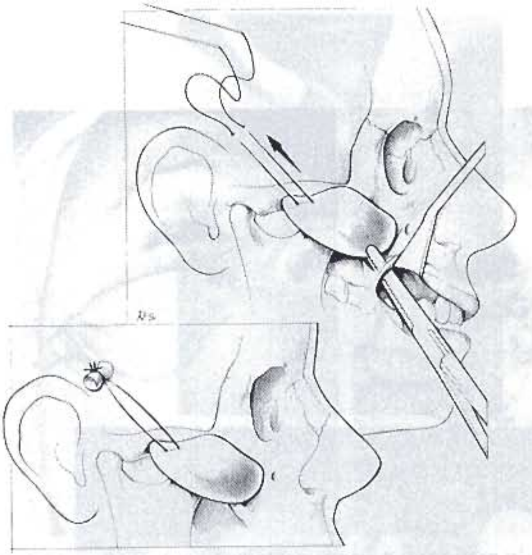

Figure 13. Indirect external method of suspension fixation whereby the implant is pulled and fixed in a superolateral position. This technique is more suitable for malar augmentation rather than submalar augmentation.

ment of facial asymmetry. During the preoperative consultation a thorough discussion regarding this problem is essential, because patients are often unaware of the qualitative or quantitative presence of their own facial asymmetry.[18] Meticulous attention to detail is required to visualize, perceptually integrate, and make procedural adjustments to accommodate existing three-dimensional discrepancies. It is not unusual to observe in some patients 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 with atrophic soft tissue on the other side (Fig. 12*I*). In these cases we find it essential to either have all potential, applicable shapes and sizes of implants available or have the ability to carve implants from blocks of silicone. Unusual asymmetries may also require differential positioning or altering various portions of the implant.

## Final Implant Positioning

The final determinant for implant placement must correspond to the external topographic defect (Figs. 12*J* and 12*K*). In submalar augmentation, the implant may reside below the zygoma and zygomatic arch or over the masseter tendon, or rest more superiorly on bone; or it may overlap both bone and tendon. The larger shell-type malar implants reside primarily on bone in a more superior, lateral position and extend partly into the submalar space. The combined implant will occupy both areas. However, any implant placed in patients with particularly thin skin or prominent bone structure often may require modification by reducing its thickness or length to avoid potential 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, particularly with the larger implants, 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 tap screws can also be used, but care must be taken not to enter the maxillary sinus when the implant is positioned over the anterior surface of the maxilla.

Two methods of external fixation can be used to stabilize midfacial implants: indirect lateral suspension or direct fixation. In the lateral suspension technique, long swedged-on arthroscopic needles are passed 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. 13). This asserts indirect superolateral traction on the implant. This technique, which pulls the implant over the body and arch of the zygoma, is more suitable for malar than submalar augmentation.

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

This direct method relies on implant fenestrations that coincide to points marked on the skin surface that are used as a guide for implant placement and fixation. Once the implants are correctly positioned within their

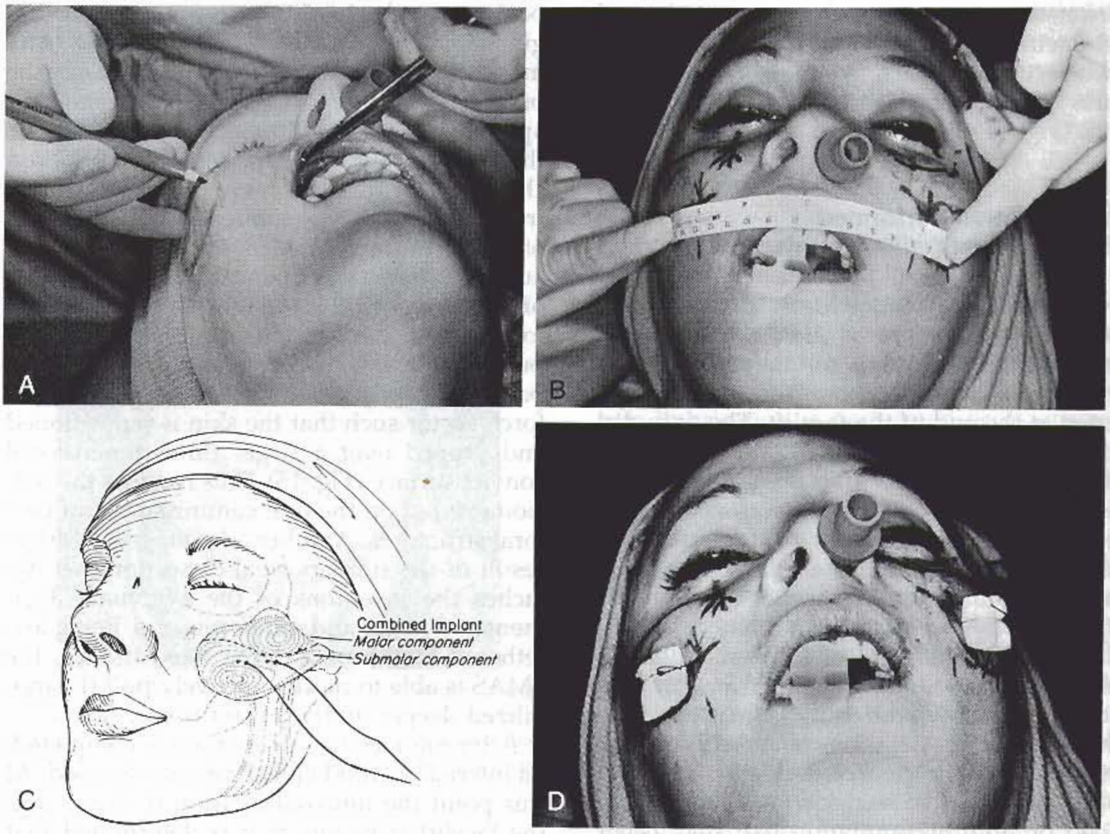


**Figure 14.** *A–D,* Direct external method of fixation. *A,* The implant is adjusted inside the pocket in the exact position desired; a mark is placed at the point where a right-angle clamp tents up the skin. This corresponds to the position of the first or medial-most fenestration of the implant. *B,* Symmetrical placement is assisted by measuring the distance from the midline to both the right and left marks. A second mark, which corresponds to the second, adjacent fenestration that determines the superior-inferior orientation of the lateral portion of the implant, is then placed on the skin. *C,* A double-armed 2-0 silk suture is passed around the posterior surface of the implant and through the fenestrations. 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), with the respective topographical variations 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.

pockets, a point is marked on 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 while tenting it up, a mark is placed at this point (Fig. 14*A*). Symmetric placement of both implants is assisted by measuring the distance from the midline to both right and left medial markings (Fig. 14*B*). The implants are then removed and placed on the skin by lining up the medial fenestration over the corresponding mark, while confirming that the implant is within the general area outlined by the preoperative skin markings. The superior-inferior position of the lateral portion of the implant is then decided and a second point is marked on the skin corresponding to the adjacent implant fenestration. Each end of a double-armed 2-0 silk suture with 1-in straight needles is passed through the medial and central implant fenestrations, looping the suture around the posterior surface. The needles are advanced through the pocket and passed perpendicularly through the skin, exiting at the respective external markings (Fig. 14C). 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. 14*D*).

### Augmentation Performed Simultaneously with Rhytidectomy

Augmentation procedures can be performed either before or after rhytidectomy. Preoperatively, if one is certain of the design and size of implant to be used it can be inserted at the end of the facelift. The only disadvantage to performing augmentation procedures before the facelift is related to the time factor. If the time required to perform the succeeding procedures exceeds the duration of action of the local anesthetic, blood or fluid may accumulate within the pocket. The manipulation by the facelift itself may cause additional accumulations of fluid and directly inhibits the surrounding tissues from immediately closing down the dead space around the implant. In these situations penrose drains are inserted into the pocket and exit perorally through the mucosal incision in anticipation of blood or fluid accumulation that may occur during a prolonged procedure. The drains are usually removed the next day or can be left for up to 72 hours. No infections have occurred from the transoral use of drains. Instead, we have found their use reduces the incidence of hematoma or seroma, frequent causes of infection.

There are, however, more advantages to performing the implant procedure at the beginning of the facelift than at the end. Any moderate amount of tissue edema that may be present at the end of rhytidectomy will limit appropriate implant selection and preclude the ability to make the fine contour or position changes required for more accurate results. Initially performing subperiosteal dissection of the midface combined with supplemental augmentation also 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 underlying infrastructure adds a third force vector such that the skin is repositioned and draped over a larger three-dimensional convex surface (Fig. 15). This reduces the tension exerted on the oral commissure and perioral structures. Another advantage is a direct result of the subperiosteal dissection that detaches the insertions of the zygomatic ligament and major and minor muscles. Being less tethered to the underlying fixed tissues, the SMAS is able to more effectively pull the mobilized deeper midfacial soft tissues.[28]

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

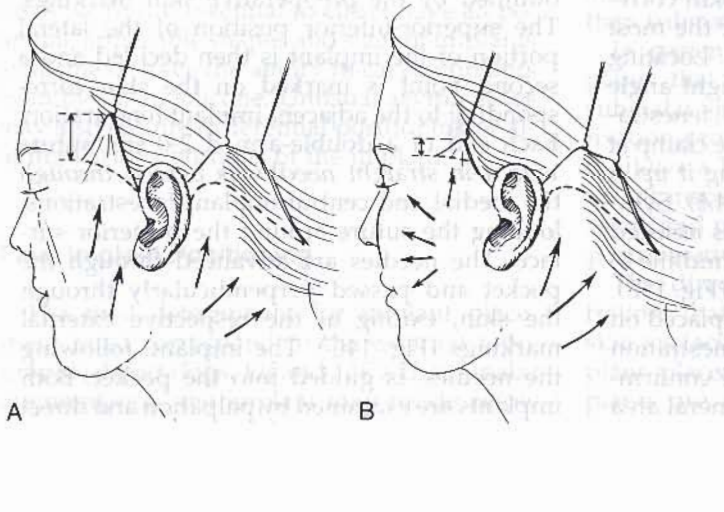


**Figure 15.** The submalar implant augments the anterior facial structure, adding a third force vector, so that instead of stretching the skin over a smaller concave structure *A*, it is draped over a larger, convex structure, requiring more surface area of skin for coverage *B*. This avoids applying excessive tension on the skin.

**Figure 16.** This patient demonstrates the linear pull lines that extend laterally from the oral commissure which, in this case, are caused by multiple face lift procedures. Augmentation of the midface would have prevented this "mask look" from occurring.

## Facelift

After the implant procedure is completed, the facelift is usually begun by first treating the submentum and anterior neck. Except in cases of minimal relaxation, treatment of anterior platysmal banding or moderate amounts of subplatysmal fat is performed primarily through a submental incision.

The submental dissection is executed in a preplatysmal plane, leaving the fat on the skin flap. This will eventually join the right and left subcutaneous cervical dissections so that a continuous elevation of the cheek-neck flap is allowed to rotate and advance in a superior and posterior direction without restriction. Unless the neck has a substantial amount of subcutaneous fat, we do not perform liposuction before platysma dissection. We have found that the routine use of liposuction causes more bleeding, creates muscle dehiscences, and makes platysmal dissection more difficult. If the platysma is dehiscent, the anterior edges are grasped with a forceps and dissection is performed in the subplatysmal plane laterally and inferiorly down to and below the level of the thyroid cartilage. Excess muscle is excised and if necessary a wedge of muscle is removed inferiorly at the level of the thyroid cartilage.[1] If back cuts are necessary, they are also performed at this level to provide the rotation and advancement necessary to unite the platysma muscles in the midline without undue traction on the muscle flaps.[9] The flaps are approximated with inverted sutures of 4-0 clear nylon and 3-0 Dexon from the submental crease downward. If necessary, subplatysmal fat is excised before suturing the platysma. Suture imbrication is performed occasionally if there is only minimal platysma laxity.

After the anterior platysmaplasty is completed, any further redundancy is treated after elevation of the cheek and posterior neck flaps. Superolateral traction may be exerted by developing the posterior platysma-SMAS flap from the subzygomatic area downward. This continuous rotation and advancement of the platysma-SMAS flaps in a superior and posterior direction provides for an even distribution and draping of the facial flaps to eliminate the jowl and establish a more defined jaw-neck line. It is also important to anticipate that there will be less than the normal amount of temporal and superior preauricular skin excised, particularly with prior implant insertion, because the skin is draped over an expanded surface area.

When implant procedures are performed in conjunction with rhytidectomy, there is usually an increased amount of postoperative facial swelling. Therefore 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, stretch bandaids or elastoplast are placed over them and a routine facelift 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

Patients presenting typical signs of aging—the formation of jowls, platysmal relaxation, excess submental and submandibular fat, and anterior facial folds—seek consultation for rhytidectomy as the solution to most 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 additional risk.

Alternatively, adjunctive procedures or more radical rhytidectomy approaches may reduce a large percentage of patient dissatisfaction with rhytidectomy results. This is particularly relevant when a technically proficient procedure yields suboptimal results because of unrecognized skeletal or soft tissue deficiencies or both. 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.[10,24] These limitations have been attributed to nonrelease of 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 dissection.[2,16]

For optimal correction of the nasolabial folds to occur, total release of the SMAS attachments to the zygoma anterior to the zygomaticus major muscle is necessary.[23] By contrast, 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 a tight, skeletonized, mask-like appearance with general loss of facial expression (Fig. 16).[29]

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. However, avoidance of increased risk of facial nerve injury requires the surgeon to have substantial experience in rhytidectomy before increasing the complexity and scope of the procedure.[23,27]

As with any surgical modality, appropriate patient selection is crucial for long-term efficacy. Patients with good skeletal structure and an abundance of midfacial fat are not candidates for augmentation. Similarly, in patients with atrophy of buccal fat pads and extreme ptosis of zygomatic cheek pads, the redundancy found in the nasolabial folds exceeds the potential for cheek flap translocation procedures alone to effectively correct this condition.[2]

The subperiosteal facelift elevates and repositions the periosteum and separates the zygomaticus major and minor and levator anguli oris muscles and entire 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. The deep plane approach leaves facial muscles intact, separates cheek fat from the muscles, and pulls the superficial fibroadipose tissue in a lateral direction. The facelift flap is used as the vehicle to reposition the cheek fat which is sutured under extreme tension. However, the descent of cheek fat is but one pathophysiologic event among many that shape the configurations of midfacial aging. The amount of rejuvenation that will be accomplished using soft tissue translocation techniques also depends on the percentage that remains of the original volume of fat present in youth.

Orbital pathology associated with aging is also due to diverse etiologies.[13,15] 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 or substantial midfacial soft tissue loss.

In current midfacial contouring procedures using larger implants, the extent of subperiosteal zygomaticomaxillary and supramasseteric undermining that approaches the limits of dissection performed during subperiosteal facelift is far greater than in previous traditional augmentation procedures using smaller implants. Extending the dissection inferiorly below the zygomatic arch and superficial to the masseter muscle further mobilizes an extra component of midfacial soft tissue.[28] This area corresponds directly to the submalar space and is undermined routinely when performing submalar augmentation.[5] During this midfacial subperiosteal dissection, the zygomatic muscles are consequently released from their bony insertions. The SMAS, formerly attached and tethered by its muscular attachments, is no longer completely bound by a fixed anatomic structure. Theoretically, this wide subperiosteal undermining provides the SMAS

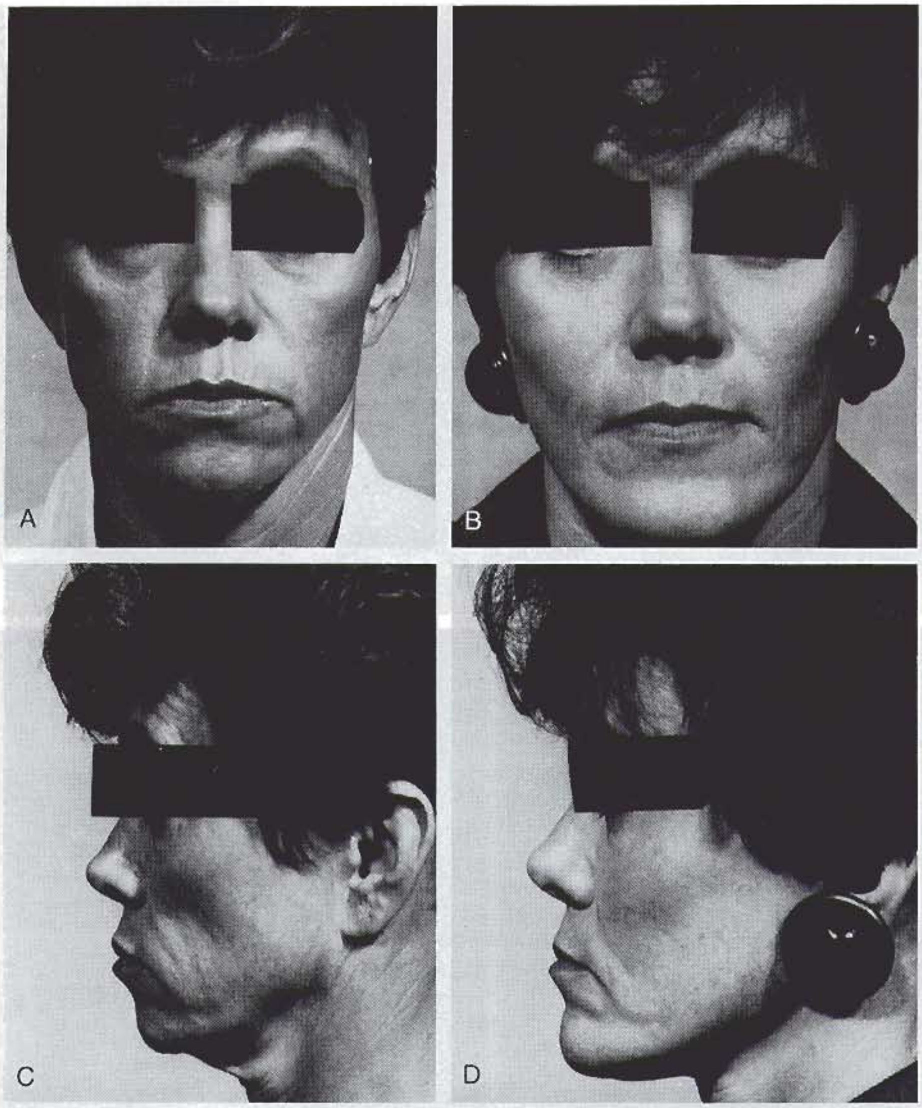


**Figure 17.** *A* and *C*, Views before surgery. The structural deficiencies of the mandible include a recessive chin and pre-jowl sulcus. Atrophy of the buccal fat pad and malar cheek pads combine to produce a hollowed-out submalar depression just below the malar eminence. *B* and *D* Eleven months after surgery. Facial rejuvenation is accomplished by upper and lower blepharoplasty, submalar and mandibular augmentation (pre-jowl chin implant), and complete rhytidectomy inclusive of SMAS-platysma dissection. In this case, it would be difficult to rely entirely on repositioning a small amount of malar cheek fat to accomplish the same effect in the midface.

greater effectiveness in mobilizing and relocating the deep soft tissue layers of the face during rhytidectomy. An analogous situation exists when mandibular augmentation is performed and subperiosteal elevation extends along the parasymphysis, releasing the ligamentous attachments in the area of the pre-jowl sulcus. This procedure helps the facelift establish a smooth, straight jaw line. Thus, the benefits obtained from facial contouring procedures are multifactorial and derived not only from the implant but also from the procedure itself (Figs. 17*A*–*D*).

This synergistic effect is due to the positive mechanical benefits of mobilized periosteum, increased effectiveness of the subcutaneous-SMAS elevation and relocation, in combination with the underlying support and volumetric enhancement provided by the implant. The placement of the implant in the subper-


**Figure 18.** *A* and *C*, Preoperative views. *B* and *D*, Postoperative views 18 months after upper and lower blepharoplasty, rhytidectomy, and submalar augmentation were performed. By producing a slight convexity to the midface, submalar augmentation provided a more vibrant and youthful appearance and prolonged the results of rhytidectomy.

iosteal plane further provides an enhanced foundation and support to facilitate redraping of the midfacial soft tissues to achieve the smooth external contour of the midface that is exemplified in youth (Figs. 18*A*–*B*). It is also important to emphasize that the addition of facial augmentation procedures is not intended to correct generalized integumentary chalasis and soft tissue ptosis associated with the aging face, or to substitute for performing a complete facelift procedure, inclusive of adequate platysma and SMAS dissection (Figs. 19*A* and *B*).

Whenever more extensive dissection or


**Figure 19.** *A* and *C*, Before surgery, 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.

other surgical procedures are performed in conjunction with rhytidectomy, increased postoperative edema and a more prolonged recovery time must be anticipated. This additional amount of edema caused by augmentation procedures is usually less severe or persistent than found after complete deep plane or subperiosteal facelift. However it will also vary according to the extent of the implant procedure and the concurrently performed rhytidectomy.

Over the past 10 years we have found that in structure- or volume-deficient patients the addition of augmentation procedures proved vital for enhanced and prolonged improvement following rhytidectomy (Figs. 9*A*–*D*). It

**Figure 20.** *A* and *C*, This patient had undergone rhytidectomy a few years before, with rapid recurrence of jowls and midfacial pathology. Analysis of the midface reveals recurrence of the submalar triangular depression. A necessary supporting framework is required to assist in maintaining and preventing the midfacial soft-tissue pads, which are superiorly repositioned by the face lift, from migrating in an inferomedial direction. *B* and *D*, Fifteen months after revision rhytidectomy (with SMAS and platysma plication), combined with submalar and mandibular augmentation.

is particularly interesting to observe a substantially greater degree of patient satisfaction associated with revision facelifts. These patients had the unique opportunity to compare the results of prior rhytidectomy to those obtained after the revision facelift surgery was concurrently performed with augmentation procedures (Figs. 20*A* and *B*).

## CONCLUSION

In conclusion, accurate preoperative analysis reveals that the aging process is manifested not only by the development of loose skin but also by the accumulation of facial defects that must be restructured to truly restore a youthful appearance. We should, therefore, view the facelift as only a partial solution to the appearance problems of facial aging, and regard facial contouring as a necessary foundation for achieving more successful and longer lasting results in rhytidectomy.

---

*The author has a financial interest in the implant of his design.

## References


1. Aston S: Platysma-SMAS cervical rhytidoplasty. Clin Plast Surg 10:506, 1983
2. Barton FE: Rhytidectomy and the nasolabial fold. Plast Reconstr Surg 90:601, 1992
3. Belinfante LS, Mitchell DL: Use of alloplastic material in the canine fossa-zygomatic area to improve facial esthetics. J Oral Surg 35:121, 1977
4. Bell WH: Augmentation of nasomaxillary and nasolabial regions. Oral Surg 41:691, 1976
5. Binder W: Submalar augmentation: An alternative to face lift surgery. Arch Otolaryngol 115:797, 1989
6. Binder W: Submalar augmentation: A procedure to enhance rhytidectomy. Ann Plast Surg 24:200, 1990
7. Broadbent TR, Mathews VI: Artistic relationships in surface anatomy of the face. Application to reconstructive surgery. Plast Reconstr Surg 20:1, 1957
8. Coelho JA: Surgical treatment for atrophy of the buccal fat pads: Case report. Plast Reconstr Surg 60:796, 1977
9. Connell B: Cervical lifts: The value of the platysma muscle flaps. Ann Plast Surg 1:34, 1978
10. Cook T: Adjuncts to face lifting procedures. Otolaryngol Clin North Am 13:321, 1980
11. Courtiss E: Complications in aesthetic malar augmentation—discussion. Plast Reconstr Surg 71:648, 1983
12. Farkas G, Kolar JC: Arthropometrics and art in aesthetics of women's faces. Clinics Plast Surg 14:599, 1987
13. Flowers RS: Cosmetic blepharoplasty, state of the art. *In* Advances in Plastic and Reconstructive Surgery, Vol 8. St. Louis, Mosby Year Book, 1992, p 31
14. Flowers RS: Tear trough implants for correction of tear trough deformity. Clin Plast Surg 20:403, 1993
15. Flowers RS: Periorbital aesthetic surgery for men. Clin Plast Surg 18:689, 1991
16. Furnas DW: The retaining ligaments of the cheek. Plast Reconstr Surg 83:11, 1989
17. Gonzalez-Ulloa M, Stevens EF: Senility of the face. Basic study to understand its causes and effects. Plast Reconstr Surg 36:239, 1965
18. Gorney M, Harries T: The preoperative and postoperative consideration of natural facial asymmetry. Plast Reconstr Surg 54:187, 1974
19. Hamra ST: The deep-plane rhytidectomy. Plast Reconstr Surg 86:53, 1990
20. Hamra ST: Composite rhytidectomy. Plast Reconstr Surg 86:53, 1990
21. Keen M, Arena S: The surgical anatomy and plastic surgical significance of the buccal fat pad. Am J Cosmetic Surg 6:193, 1989
22. Mitz V, Peyronie M: The superficial musculo-aponeurotic system (SMAS) in the parotid and cheek area. Plast Reconstr Surg 58:80, 1976
23. Mendelson BC: Correction of the nasolabial fold: Extended SMAS dissection with periosteal fixation. Plast Reconstr Surg 89:822, 1992
24. Millard DR, Yuan RTW, Devine JW: A challenge to the undefeated nasolabial folds. Plast Reconstr Surg 80:37, 1987
25. Morales P: Rhytidectomy: Suprazygomatic and infrazygomatic SMAS treatment. Aesth Plast Surg 15:35, 1991
26. Moss FP, Linney AD, Grindrod SR, et al: Three-dimensional visualization of the face and skull using computerized tomography and laser scanning techniques. Eur J Orthod 9:247, 1987
27. Ramirez OM, Maillard GF, Musolas A: The extended subperiosteal face lift: A definitive soft-tissue remodeling for facial rejuvenation. Plast Reconstr Surg 88:227, 1991
28. Ramirez OM: The subperiosteal rhytidectomy: The third-generation face lift. Ann Plast Surg 28:218, 1992
29. Rees T: Face lift. *In* Rees T (ed): Aesthetic Plastic Surgery, vol 2. Philadelphia, WB Saunders, 1980, pp 587–703
30. Romm S: Art, love and facial beauty. Clin Plast Surg 14:579, 1987
31. Schultz RC: Reconstruction of facial deformities with alloplastic material. Ann Plast Surg 7:434, 1981
32. Skoog T: Plastic Surgery: New Methods. Philadelphia, WB Saunders, 1974
33. Terino EO: Alloplastic facial contouring by zonal principles of skeletal anatomy. Clin Plast Surg 19:487, 1992
34. Watanabe K, Mayagi H, Tsurukiri K: Augmentation of temporal area by insertion of silicone plate under the temporal fascia. Ann Plast Surg 13:309, 1984.


*Address reprint requests to*

William J. Binder, MD, FACS
9201 Sunset Boulevard, Suite 809
Los Angeles, CA 90069