Submalar Augmentation: A Procedure to Enhance Rhytidectomy

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The use of submalar augmentation in facial rejuvenation surgery satisfies the need for enhancement of the midface to obtain longer lasting and better results from rhytidectomy.

Submalar augmentation is a new surgical technique that positions anatomically designed silicone implants over the midface of the face. It provides the appearance of restoring midfacial soft tissue and reduces the depth of intense facial folds. The enhanced underlying bone structure assists in carrying excessive tension on the skin during face-lift surgery, thus preventing distortion of midfacial architecture.

Submalar augmentation is a procedure that has been used as a supplementary enhancement to rhytidectomy in its patients over six and one-half years. Only minimal complica-
tions have been reported, all of which have been satisfactor-
ily resolved. To date, no implant has been resected or permanently removed. In our experience, when performed in conjunction with rhytidectomy, submalar augmentation has greatly enhanced and prolonged the results of face-lift surgery, and has significantly increased patient satisfaction.


Conventional rhytidectomy presents acknowledged limitations and sometimes subsequent problems as a sole face-lift rejuvenation technique. There are patients who are poor candidates for rhytidectomy, others for whom the face-lift procedure is only a partial solution to appearance problems, and still others who require follow-up enhancement of successful rhytidectomy. Throughout history, each culture has formulated its own criteria for evaluating the beauty of its people. Perceptions of ideal facial proportions have changed over the centuries. Attempts to define the ideal facial form have, for the most part, been based on neoclassic doctrines [11]. However, detailed tables of standardized measurements do not necessarily represent the general population nor define the essence of beauty [26]. Therefore, it is important to emphasize that the only factor found as a constant in almost all historical definitions of beauty is the inclusion of that which exemplifies youth.

One of the strongest characteristics of youth is fullness of the cheeks, indicating presence of healthy midfacial soft tissues. In improving facial form, empha-
sis should therefore be placed on supplementing the midfacial area as well as smoothing out folds and tightening sagging skin.

Moderate to severe underdevelopment of the mid-
third of the face and degenerative soft tissue changes combine to produce signs of facial aging, which are difficult to treat. These changes are commonly re-
vealed by the development of folds and cavitary de-
pressions of the cheek. Patients who prematurely exhibit these signs of aging become early candidates for facial rejuvenation procedures. Although the newer methods of rhytidectomy have made substanti-
tial progress in reducing jowls and submental pathol-
y, they have had minimal success in reversing the degenerative signs of aging found in the midthird of the face.

Submalar augmentation, performed before rhytidec-
tomy in patients with deficient bone structure or so-
vere atrophy of overlying soft tissue, returns vibrance and youthful fullness to the midthird of the face. It establishes the foundation for an enhanced and longer lasting result from rhytidectomy, reducing the need for extended or multiple face-lift procedures, and avoids a stretched or mask-like appearance.

Considerations

Understanding the dynamics of the aging process is a prerequisite for obtaining successful results in facial rejuvenation surgery.

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The subcutaneous tissue of an infant contains the greatest amount of adipose tissue, forming “baby cheeks” that maintain the skin at maximum tautness [25]. In an adult, progressive atrophy of the quantity and character of this intervening buffer of subcutaneous fat, combined with a decrease in thickness and loss of elasticity in the skin, facilitates the wrinkling process [14]. The inferior migration and redistribution of cheek fat form jowls and depressions, contributing to typical midfacial signs of aging [12]. Atrophy of the buccal fat pad and relaxation of the skin also deepen nasolabial folds and thin the vermilion border of the lip.

Progressive loss of volume of facial skeletal structure combines with degenerative soft tissue changes in the aged so that the skin, lacking subcutaneous tissue, comes into contact with the deep structures of the face. This results in a gaunt appearance with marked hollows and depressions. Similar changes can be seen in patients with sudden weight loss or in premature lipodystrophy [9].

Developmental alterations in facial skeletal structures range from minor imperfections to severe deformity. The importance of using onlay grafts or implants to augment midfacial skeletal deficiencies for improved facial aesthetics has been well documented [3, 4]. In selected cases, alloplastic augmentation has been used alone in an attempt to eliminate more extensive maxillofacial procedures [2, 5].

Since the soft tissues of the cheek may camouflage midfacial skeletal deficiencies throughout the first four decades of life, many patients who are contemplating cosmetic surgery may not be aware of the presence or significance of these abnormalities.

Preoperative Evaluation

The aesthetic correction of contour deficiencies, particularly in relation to overlying soft tissues, requires precise evaluation and careful patient selection. Measured analysis of the size and shape of the patient’s face and proper placement of the appropriate implant is extremely important for a successful result.

Negus [20] pointed out the importance of evaluating soft tissue structure while measuring the facial skeleton. It was shown anthropologically that soft tissue does not always distribute itself in a uniform manner [15]. As the aging process continues, this asymmetric distribution will adversely affect facial harmony, which is an important factor in determining acceptable facial form.

Fig. 1. The aging process causes the soft tissues of the face to atrophy, losing inherent structural integrity, and then migrate inferiorly. Only prominent underlying bone structure can slow this process.

Many patients seeking facial rejuvenation surgery have commented on their apparent loss of high cheekbones. Comprehensive preoperative evaluation of these patients reveals that actual skeletal structure has not changed significantly. Instead, the overlying soft tissue pad that formerly was prominent over the malar eminence has both atrophied and migrated inferiorly. Prominent underlying bone structure then becomes more important in slowing down this process (Fig 1).

It has been further emphasized that smoothing out sharp angles or depressions can restore symmetry, render a softer appearance, as well as enhance the aesthetic quality of the face [1, 8]. For example, deep-set eyes, prominent malar-zygomatic arches or nose can produce a shallow look in the malar midfacial region. Alternatively, enhancing the fullness and curvature in the area of the canine fossae can effect a relatively decreased anterior-posterior projection to the nose and provide a softer appearance to the face [2].

It therefore becomes essential for the surgeon to accurately assess how augmenting underlying bone
structure will affect overlying soft tissue. During rhyt-
didectomy, significant underlying skeletal deficiency, particularly in the older population, makes draping of the soft tissue difficult, resulting in recurrence of redundant skin folds. Incorrect preoperative evaluation of a patient with poor skeletal structure or inelastic skin can therefore negate the efforts of a perfectly performed face lift procedure, yielding a less than de-
stable result.

Methods and Material

The day before surgery the patient should be started on a broad-spectrum antibiotic. Intravenous antibiot-
ic drugs are also given just before the procedure. Before anesthesia is started, the midfacial deficiency is out-
lined with a marking pen with the patient in the up-
right position. In addition to routine preparation, both areas of the canine fossae are prepared by inserting Betadine-impregnated gauze sponges into the buccal-
gingival sulcus for approximately 10 minutes and then removing the sponges.

The type of anesthesia used is primarily intrave-
nous sedation accomplished by a wide-field local
block. General endotracheal anesthesia can also be used, particularly if required by concurrently per-
formed procedures.

A small incision, approximately 1 to 1.5 cm, is made on the inner surface of the lip at the buccal-
gingival sulcus over the canine fossa. The periost-
ium is incised and elevated superiorly off the ante-
rior surface of the maxilla, and the infraorbital nerve is identified. The incision is made high enough so that it does not interfere with structures (Fig 2A).

Using both a Joseph's elevator and a spatula-type periosteal elevator, a pocket is created providing total exposure from the anterior surface of the maxilla to the lateral maxillary zygomatic areas of the facial bone.

The area just below the inferior surface of the zygoma, over the tendinous insertions of the masseter muscle, is also exposed (Fig 2B). The periosteum, eas-
ily elevated medially, may be more adherent laterally, in which case the dissection may slip into a supra-
periosteal plane without having to forcibly elevate the periosteum in this area. Unusually high anterior-
superior masseteric tendinous attachments that may limit access inferiorly can be incised. However, if more inferior placement of the implant is desired, the pocket is continued by exposing the anterior surface of the tendinous insertions of the masseter muscle which are usually left intact. The pocket is always made large enough so that there will be no compres-
sion of soft tissues on any part of the implant.

The anatomical configuration is identified by direct vision, and sites are used to choose the appropriate submalar implant. The submalar implant consists of soft, solid silicone rubber in a three-dimensional anat-
omy design specifically contoured to accommo-
date the variation of midfacial bone structure (Fig 2C).

The bulk of the implant is placed over the anterior surface of the maxilla, and the tapered, posterior-
lateral extension wraps around the zygomatic arch or rests on the superior tendinous attachments of the masseter muscle.

Once the correct implant size is chosen, it is placed on the anterior skin surface and outlined on the skin in the desired position. The position of the two most medial perforations of the implant are also marked on

the skin (Fig 2D).

The implant is inserted in the pocket over the ante-
rior face of the maxilla, around the zygoma, and is adjusted in position until the desired facial contour is achieved. The implant is lined up so that the two medial perforations correspond to the external mark-
ings on the skin. Conversely, the external markings can also be altered if the position of the implant is changed.

The implant is then removed, and a 00 or 000 silk suture on tapered needles is loped around the under-
surface and through the perforations of the implant. The needles are advanced through the pocket and then passed perpendicularly through the skin, exiting at the external markings (Fig 2E). The implant, fol-

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Fig 2. (A) The infraorbital nerve is identified through the infraorbital approach. (B) Dissection continues laterally around the zygoma and inferriorly over the superior tendi-

uous insertions of the masseter muscle. The pocket is made large enough so that there is no encroachment of soft tissue on any part of the implant. (C) The submalar implant is specifically designed to deal with the three-dimensional problems encountered in midfacial structure. (D) The sub-
malar implant is adjusted in the desired position so that the two most medial perforations of the implant correspond to the markings placed on the external skin surface. (E) A double-armed 4-0 silk suture is passed around the periosteal surface and through the perforations of the im-
plant. From inside the pocket, the needles are passed di-
rectly perpendicular to the skin, exiting at the external markings, corresponding to perforations on the implant inser-
tions. (F) The implant is stabilized by tying the suture
directly over an external button.
lowing the needles, is placed into the pocket in the desired anatomical position. The implant is stabilized by tying the sutures externally over a bolster (using one or two dental rolls), immobilizing the implant [Fig 2]).

After the contralateral side is completed, both implants should be examined by palpation and direct vision to ensure that they are positioned symmetrically. The incision is then closed in two layers. At the conclusion of the procedure, an external compression dressing is used to further immobilize the implants.

The external dressing is removed the first or second postoperative day and stretch plastic bandage strips are applied over the bolsters. The direct fixation technique allows a large pocket to be made for precise placement and prevents implant slippage. We have found that adequate fixation by the surrounding tissues occurs by the third or fourth postoperative day, at which time the sutures are cut and the bolsters removed.

Results

From May 1982 to October 1988, submalar augmentation was performed on 340 patients. This report focuses on 56 of these patients in whom submalar augmentation was used as a preliminary, adjunctive procedure to enhance the midfacial skeletal structure so that the overall results of rhinoplasty are improved.

Overall, the complications were minor and the incidence small. Three cases of postoperative asymmetry required adjustment of the implant. With the use of silicone, there was no difficulty in repositioning or replacing the implant. One patient who developed a unilateral infection was successfully treated by drainage and antibiotics without having to remove the implant. Two patients who experienced partial numbness of the lower lip had complete return of sensation within three months. There was a slight degree of reduced lip mobility in two patients, all unilateral, with complete return of function within four weeks.

Based on x-ray films taken on 2 patients three and one-half years postoperatively, no bone erosion of any kind has been reported. The incidence of bone erosion related to silicone implants has not been substantiated, particularly in the medical literature relating to chin augmentation and malarplasty [5, 7, 13].

The majority of patients experienced very little postoperative discomfort. Only a few patients complained of pain, which was totally absent the day after surgery. The results of this series show submalar augmentation to be an extremely low-risk procedure. Most patients reported that they could not feel the implant and regarded it as a normal part of their facial structure. To date, no implant has been revised or permanently removed.

Discussion

Since replacement material for large, soft-tissue deficiencies does not yet exist, we have provided a technique that simulates the appearance of increased soft tissue bulk.

Silicone was chosen as the implant material for its advantages over all other available alloplastic materials. The properties of silicone rubber fulfill more of the requirements of an ideal synthetic implant than any other currently used alloplastic material, with very little tissue reaction [15, 26]. It has mechanical and thermal stability, is not absorbed, and does not warp or distort.

Proplast has been used in the midfacial area primarily because it can be immobilized and readily fixed to surrounding structures [17, 29]. However, difficulty has been encountered with implant shrinkage and migration, and Proplast fragments easily, making secondary repositioning extremely difficult [4, 25]. The rapid ingrowth of granulation tissue with Proplast can entrap bacteria, causing a relatively high infection rate. Once an infection occurs, the implant must be removed and discarded. However, since silicone is nonporous, it is resistant to infection and can be reutilized.

Placing the submalar implant over the anterior surface of the maxilla supports and eases the tension of the infraorbital ligament, and provides a framework for the lower eyelid to fall over. This results in the better positioning of the lower eyelid, which in turn enhances the overall facial appearance.

The indication of implant placement is based on the patient's facial anatomy and the expected result. The implant should be placed in such a way as to produce a natural appearance. The implant should be placed in a subcutaneous plane, with its upper surface lying in the suborbital groove and its lower surface lying in the subnasal area. The implant should be placed in the subcutaneous plane to avoid the risk of infection and to enhance the esthetic result.
Fig. 3 (A, C) Preoperative views. (B, D) Postoperative results six months following blepharoplasty and submalar augmentation without rhinoplasty. The submalar implant augments skeletal structure while supporting the prolabial overlying soft tissues. This has the effect of repositioning the relaxed midfacial soft tissues to a more suprornarion superior location.
Fig 4. (A, C) Preoperative views. (B, D) Two months after submental augmentation. In this patient medical problems precluded thyroidectomy. However, submental augmentation, a less lengthy procedure, was allowed to effectively restore the appearance of midfacial soft tissue.
Fig 5. (A, C) Preoperative views showing insufficient facial skeletal structure unable to support collapse of degenerative soft tissue and aging skin. The underlying bone structure must first be enhanced for even extensive face-lift surgery to provide a satisfactory, long-lasting result. (B, D) Views two years postoperatively showing the results of submental augmentation and chin augmentation before planned face-lift surgery. The enhanced facial structure will now provide the basis for a more successful face-lift surgery.
Many patients with deficient facial skeletal structure or severe degenerative soft tissue changes, or both, are considered poor candidates for face-lift surgery and are sometimes denied its benefit. By enhancing deficient bone structure and repositioning multifacial soft tissue, subnasal augmentation has the unique ability to change the status of a patient from that of a poor candidate to one who can benefit from rhinoplasty (Fig 6).

It has been accepted that gravitational folds located in the medial multiracial area are the most difficult to improve by means of face-lift surgery [10, 18]. Attempts to treat these problems have consistently met with patient dissatisfaction [16, 19, 22]. The prevalence of the nasolabial folds plus rhinoplasty has prompted the development of many primary as well as ancillary surgical procedures. These include direct skin excision, transcutaneous dermal grafts, implantation of fascial techniques, extended rhinoplasty procedures, injection of silicone or collagen, and the recent use of liposuction [19, 21, 27].

We have found that liposuction can actually accentuate the problem. Excessive fat extraction, particularly of the buccal fat pad, alone or in conjunction with rhinoplasty, can have the long-term effect of causing loss in elasticity and producing thinner, looser, and more redundant skin. A youthful, vibrant appearance is thus lost.

It is generally agreed, however, that a smooth nasolabial fold is part of the youthful facial expression. In an attempt to reduce the nasolabial folds, extended face-lift techniques mobilize and stretch already thin and inelastic skin. This may result in an unnatural, skeletonized, mask-like appearance with general loss of facial expression [14, 24]. Fig 6A, B. Excessive undermining can also cause ischemic changes in the skin and increases the chance of skin slough as well as temporal alopecia.
Fig. 7. (A, C) Preoperative views. A major part of this patient's problem is associated with the extensive wrinkling and depth of folds around the nasal labial and perioral areas of the face. Facelift surgery alone would have difficulty in eliminating this problem, potentially producing a stretched appearance around the mouth. (B, D) Views one and one-half years postoperatively. Submalar augmentation was performed first followed by facelift surgery. The enhanced facial structure provided by submalar augmentation enabled the facelift operation to smooth out the wrinkles and folds around the mouth without pulling the skin too tight, thus achieving a more natural and longer lasting facelift result.
Fig 8. The submalar implant augments the anterior facial structure so that instead of dropping the skin over a smaller concave structure (A), it is shaped over a larger convex structure, requiring more surface area of skin to cover it (B). This avoids applying excessive tension on the skin and reduces the amount of temporal hair-bearing skin that must be excised during rhinoplasty.

Fig 9. (A) Preoperatively the loss of midfacial soft tissue is depicted by a flattened appearance to this area. (B) View 12 months after submalar augmentation and rhinoplasty. By enhancing midfacial bone structure, submalar augmentation gives rhinoplasty the capacity to achieve enhanced, longer lasting results.