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## Volumetric Facelift: Evaluation of Rhytidectomy With Alloplastic Augmentation

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**Objectives:** Facial aging occurs as a result of soft tissue atrophy and resorption of the bony skeleton, which results in a loss of soft tissue volume and laxity of the overlying skin. Volumetric augmentation is a key component of facial rejuvenation surgery, and should be considered of equal importance to soft tissue lifting. Augmentation can be accomplished with synthetic fillers, autologous grafts, soft tissue repositioning techniques, and/or alloplastic implants. Only alloplastic implants, however, provide truly long-term volumetric correction. To date, there have been no large series dealing with the complications and results of implantation performed concurrently with rhytidectomy, which we have termed "volumetric rhytidectomy." We present our experience with 100 patients treated with a combination of malar and chin implants and rhytidectomy, compared to 200 patients who underwent rhytidectomy alone.

**Methods:** The authors performed a retrospective review of patients treated with a combination of silicone malar and chin augmentation with rhytidectomy versus patients treated with rhytidectomy alone. Both groups of patients underwent close postoperative evaluation at 3 days, 1 week, 2 weeks, and 1 month. All patients were surveyed at 6 months to assess aesthetic satisfaction. Complication rates were noted and tabulated. Statistical analysis was performed to evaluate for any differences in the two groups.

**Results:** Between 2002 and 2006, 100 patients underwent malar and chin implantation along with rhytidectomy; 200 patients underwent rhytidectomy alone. In the first group, there were a total of 6 cases in which implant removal was necessary, and 2 cases in which revision was required. There were no statistically significant differences ( $p < 0.05$ ) observed between the two groups with respect to major or minor hematoma, seroma, infection, sensory nerve injury, facial nerve injury, hypertrophic scarring, dehiscence, skin sloughing, or revision.

**Conclusions:** Volumetric rhytidectomy reliably augments the malar and mental areas, allows for subtle skeletal contouring, and results in successful rejuvenation. Rhytidectomy is relatively safe to perform concurrently with silicone augmentation, and does not result in an increased complication rate as compared to rhytidectomy alone.

**Key Words:** aging, alloplast, face, facelift, implant, rhytidectomy.

### INTRODUCTION

Facial features and appearance are defining aspects of an individual's self-image. For many people, the aging of the face diminishes self-esteem and self-confidence. Facial aging is a result of gradual soft tissue descent and atrophy, as well as changes in the bony skeleton.<sup>1</sup> In simplistic terms, the face can be described as a cone of soft tissue that inverts over time.<sup>2</sup> Thus, facial rejuvenation should focus equally on lifting and augmenting skin and soft tissue.

Contemporary rhytidectomy techniques that address unwanted changes in the aging face created by gravity and atrophy have changed dramatically over the past several decades. The classic superficial

musculo-aponeurotic system (SMAS) facelift introduced by Skoog<sup>3</sup> in 1974 was a major advance that involved the repositioning of soft tissue in addition to skin lifting. Since then, different modifications of the SMAS rhytidectomy, including deep plane and composite techniques, have resulted in more permanent aesthetic results.<sup>4,5</sup> Still, most of these procedures rely only on 2-dimensional recontouring, which addresses soft tissue laxity without improving facial fullness.

In order to create a more youthful and natural facial appearance through surgery, particular consideration should be given to procedures that restore midface convexity and skeletal contours. Volumetric filling of the aging face can be successfully ac-

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complished with synthetic bioengineered fillers, autologous fat, soft tissue repositioning, or alloplastic implants.<sup>2,6</sup> Only alloplastic implants, however, provide long-term volumetric correction.

Here, we present a group of 100 patients treated with a rhytidectomy, malar augmentation, and chin augmentation, which we refer to as a volumetric facelift (although, classically, the term volumetric facelift did not include chin augmentation, but rather, rejuvenation of the midface by fat transfer, imbrications of the midface soft tissues, or alloplastic implant). In properly selected patients, a volumetric facelift can offer effective, long-term rejuvenation. However, this combination of invasive procedures, when performed together, could potentially carry a greater risk of surgical complications than would be associated with a single procedure. A review of the literature reveals surprisingly little data on patients who simultaneously underwent different types of alloplastic augmentation. The aim of our study was to describe our experience with the volumetric facelift, and to compare complication and satisfaction rates in patients who underwent rhytidectomy, malar augmentation, and chin augmentation with those in patients who underwent only rhytidectomy.

#### PATIENTS AND METHODS

A retrospective evaluation of 100 consecutive patients who underwent alloplastic malar and chin augmentation and rhytidectomy was performed over a period of 4 years. All patients were deemed appropriate candidates for both midface and chin augmentation. Appropriate medical clearances were obtained. All patients underwent preoperative computer imaging (Uniplast) and were informed of the risks and benefits of alloplastic implantation before surgery. The control group in our study consisted of 200 consecutive patients who underwent rhytidectomy over the same 4-year period. All procedures were performed by the senior author (S.B.H.) using a similar technique.

Patients with hypomalar deficiencies generally received Binder Submalar Silastic Implants (Implantech Associates, Inc, Ventura, California). Those with true malar deficiencies had implantation of Terino Malar Shells (Implantech Associates) or a similar malar implant with an appropriately high contour profile. For augmentation of the chin, Anatomical Chin Implants (Implantech Associates) were used in all cases.

**Alloplastic Augmentation.** All patients were placed on oral rinses with chlorhexidine acetate 3 days before surgery, as well as prophylactic antibiotics on the day of surgery (cefazolin sodium 1 g

or erythromycin 500 mg given intravenously 1 hour before surgery). All surgeries were performed in an outpatient facility certified by the Accreditation Association for Ambulatory Health Care. Intravenous sedation anesthesia with local infusion of 0.05% lidocaine with 1:200,000 epinephrine was utilized in all cases. Implants were soaked in cefazolin sodium solution (1 g in 250 mL of saline solution) before placement.

Chin implants were placed via a submental incision after completion of neck liposuction or platysmaplasty. A supraperiosteal pocket was created over the mentum and subperiosteal pockets laterally along the inferior mandibular borders to avoid injury to the mental nerves and the ramus mandibularis of the facial nerve. The chin implant was secured to the periosteum of the inferior border of the mandible with 4-0 Vicryl sutures to prevent rotation and superior migration. The mentalis muscle was closed with interrupted 4-0 Vicryl sutures. The submental skin was closed with 5-0 plain catgut.

Malar implants were placed either before or after the rhytidectomy was completed. All malar implants were placed via an intraoral, horizontal gingival buccal sulcus incision measuring 2 cm in length and placed high in the gingival buccal sulcus to allow an adequate soft tissue cuff for suture closure. Subperiosteal pockets were formed, with care taken to identify and preserve the infraorbital nerves. In the majority of cases, sizers were placed to assist in the proper implant size selection. All cheek implants were secured with a 4-0 nylon transcutaneous suture tied over silicone sheeting to protect the underlying skin. This transcutaneous "bolster" suture was removed on the third postoperative day. It serves to assist in the symmetric placement of the implants and in the prevention of hematoma or seroma. The intraoral incision was closed in 2 layers with 4-0 Vicryl sutures used subcutaneously and 4-0 chromic sutures used for the mucosa.

**Rhytidectomy.** The rhytidectomy procedures were performed as either a short-flap approach or a traditional SMAS rhytidectomy approach, depending on the amount of cervical laxity. A retrotragal incision was utilized in both female and male patients. With 2-0 Vicryl purse-string sutures, the mobile SMAS and the extended supraplatysmal plane were plicated to the periosteum-fascia of the zygomatic arch. Our traditional SMAS rhytidectomy followed standard techniques and involved elevation of a long skin flap and a shorter SMAS flap. A vertical strip of redundant SMAS preauricularly and an oblique strip of the SMAS parallel to the nasolabial fold were excised. The cut edges of the SMAS were imbricated

TABLE 1. RHYTIDECTOMY COMPLICATIONS IN VOLUMETRIC FACELIFT GROUP AND CONTROL GROUP (FACELIFT ONLY)

Complication	Volumetric Facelift (N = 100)	Facelift Only (N = 200)	p
Major hematoma	2	4	0.19
Seroma	0	0	N/A
Sensory nerve injury	1	0	0.13
Temporary facial nerve injury	0	4	0.79
Skin slough or dehiscence	0	0	N/A
Hypertrophic scar	5	6	0.29
Infection	0	4	0.79
Parotid fistula	0	2	0.06
Persistent pain	2	4	0.19

N/A — not applicable.

with 2-0 Vicryl purse-string sutures, and the vectors of pull were in a superoposterior direction.

All patients had an adjuvant minimal incision temporalplasty in order to aid redraping of the temporal skin and to reduce the tendency for standing cone deformities. The flap was tightly secured to the temporalis fascia at this point with a 4-0 Vicryl suture. After trimming of redundant skin, the wound was closed with subcutaneous 4-0 Vicryl sutures and subcuticular 5-0 Monocryl sutures for the preauricular skin. All scalp incisions were closed with surgical clips. Upon closure, the primary area of tension on the skin flap was at a point just above the ear. A light dressing was applied for 24 hours.

**Statistical Analysis.** A  $\chi^2$  test was used for statistical analysis. Statistical significance was determined when  $p < 0.05$  or  $p < 0.01$ .

### RESULTS

One hundred consecutive patients who underwent a combination of rhytidectomy and silicone cheek and chin augmentation were reviewed retrospectively. The group comprised 82 women and 18 men within a 4-year period (2001 to 2005). The follow-up period ranged from 12 months to 48 months. Sixty-six patients had a traditional SMAS rhytidectomy, and 34 had a short-flap rhytidectomy.

Two hundred consecutive patients underwent rhytidectomy without other surgical procedures (control group) over a 4-year period (2001 to 2005). The group comprised 171 women and 29 men. The follow-up period ranged from 12 months to 48 months. Of these patients, 145 had traditional SMAS rhytidectomy and 55 had short-flap rhytidectomy.

Rhytidectomy-related complications in the group of patients who underwent a volumetric facelift versus those who underwent only a rhytidectomy are

TABLE 2. IMPLANT-RELATED COMPLICATIONS IN VOLUMETRIC FACELIFT GROUP (N = 100)

Complication	No.
Swelling/infection necessitating removal	6 malar
Swelling/infection resolved by antibiotic therapy	2 malar
Asymmetry	2 malar
Persistent pain	1 mandibular
Too-large implant	1 mandibular
Nerve impairment	0
Seroma	0
Exposure/extrusion	0

presented in Table 1. After correction for variables (type of rhytidectomy, etc), both groups had a similar incidence of hematomas, motor or sensory nerve injuries, skin slough or dehiscence, parotid fistulas, hypertrophic scarring, infection, and persistent pain. Facial nerve palsies in the control group (2 in the buccal division and 2 in the ramus mandibularis branch) resolved with expectant treatment within 3 months. There was no incidence of facial nerve palsy in patients who underwent a volumetric facelift.

One case of persistent sensory impairment in the volumetric facelift group was due to a known great auricular nerve injury. Two cases of parotid fistula were noted in the group that underwent rhytidectomy alone, and both resolved with drainage and pressure dressings after 3 weeks. In both groups, persistent pain over the zygomatic arch was thought to be related to purse-string sutures, and usually resolved with injections of triamcinolone acetonide and time. Cases of preauricular scarring were also treated with injections of triamcinolone acetonide for patients in both groups (5 mg/mL). Statistical analysis did not show any significant difference in rhytidectomy-related complications between the two groups of patients (Table 1;  $p > 0.05$ ).

Table 2 summarizes the implant-related postoperative complications in patients who underwent a volumetric facelift. Six cheek implants were removed because of swelling or inflammation that did not respond to systemic oral antibiotics (ciprofloxacin hydrochloride 750 mg given orally twice per day for 10 days). In those 2 patients, serous fluid was aspirated. No gross purulence was noted in any case. Cultures were performed at the time of implant removal, and no pathogens were isolated in any case. All of these patients were placed on oral antibiotic therapy for 10 days after implant removal. Four of the implants that were previously removed were replaced 6 to 8 weeks after removal without complications. Two patients declined implant replacement. Two cases of swelling or inflammation responded to the oral antibiotic regimen (ciprofloxacin hydro-



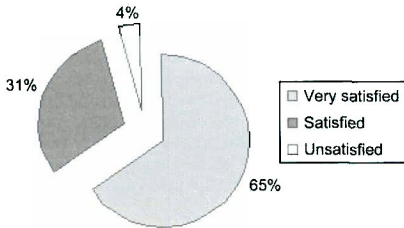


Fig 1. Patient satisfaction survey after 6 months (100 consecutive volumetric facelifts).

chloride 750 mg given orally twice per day for 10 days) with no further sequelae noted. Two cheek implants were revised because of complaints of asymmetry. One patient received fat grafting to improve malar symmetry. One chin implant was removed because of persistent pain. One chin implant was replaced because the patient thought it was too large. There were no permanent sensory or motor nerve impairments.

All 100 patients who had undergone volumetric facelifts were surveyed at 6 months to assess satisfaction. The overall satisfaction rate was 96% (65% very satisfied and 31% satisfied; Fig 1). Four percent of patients indicated that they were not satisfied with their aesthetic results. In the group who underwent rhytidectomy alone, the overall satisfaction rate was 98% (72% very satisfied and 26% satisfied). Two percent of these patients indicated that they were not satisfied.

#### DISCUSSION

Facelift techniques have undergone significant changes over the past few decades. As a result of the pioneering work of Skoog<sup>3</sup> and Mitz and Peyronie,<sup>7</sup> the simple subcutaneous rhytidectomy has now been

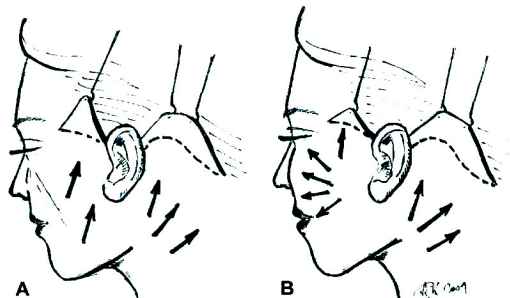
modified to incorporate the SMAS in facelifting techniques. During the same time that the SMAS lifting concept was being developed, it began to be appreciated that volumetric augmentation plays a very important role in facial rejuvenation.<sup>8</sup>

Prior authors have demonstrated that high malar prominences are regarded as a sign of beauty among many races and ethnic groups.<sup>9</sup> Whereas traditional SMAS rhytidectomy is limited to 2-dimensional correction of soft tissue laxity, facial alloplastic augmentation provides 3-dimensional enhancement of facial structures by adding volume to the malar and chin areas. When combined, rhytidectomy and alloplastic augmentation complement each other. The enhancement of facial contours allows for natural vectors of soft tissue pull to be achieved with less skin excision, resulting in a more natural facial profile (Fig 2).

Our results revealed high satisfaction rates among both groups of patients: 98% for patients who underwent solely rhytidectomy and 96% for patients who underwent a volumetric facelift. We do not consider the slight difference in satisfaction rates to support rhytidectomy alone over a volumetric facelift because of the subjective nature of self-assessment and the difference in expectations of patients in these two groups. Additionally, satisfaction was assessed for all patients 6 months after surgery; thus, longer-term satisfaction was not measured.

It is a widely held assumption that the more surgical procedures performed on a patient during an operation, the greater the risk of complications. Interestingly, a review of the literature reveals very little data on complication rates in patients who have simultaneously undergone different facial cosmetic surgery procedures. We sought to evaluate whether concomitant rhytidectomy and alloplastic facial augmentation interferes with the general outcome or

Fig 2. Alloplastic implants affect vectors of soft tissue lift (arrows). A) Rhytidectomy only addresses soft tissue laxity without improving facial fullness. B) Volumetric facelift also restores midface convexity and skeletal contours. Note that volumetric expansion with vertical lifting results in less aggressive preauricular skin excision.







**Fig 3.** Marking "high point" as guide for malar implant placement.

complication rate as compared to undergoing a single cosmetic procedure.

Rhytidectomy-related complications in 100 patients with volumetric facelifts consisted of 2 cases of major hematoma, 1 sensory nerve injury, 5 hypertrophic scars, and 2 cases of prolonged pain. Complications of rhytidectomy alone included 4 major hematomas, 4 temporary facial nerve palsies, 2 cases of parotid fistula, 4 cases of persistent pain, 6 cases of hypertrophic preauricular scarring, and 4 cases of infection. Statistical analysis ( $\chi^2$ ,  $p < 0.05$ ) did not reveal a difference in rhytidectomy-related complication rates between these two groups.

After a total of 300 implants in 100 patients (100 bilateral malar and 100 mandibular), we observed 8 cases of suspected infection, which we initially treated with antibiotic therapy. In 2 patients, the symptoms quickly resolved with antibiotics. Six patients had persistent swelling despite antibiotics and underwent implant extraction. Interestingly, all cases of suspected infection involved malar implants. The total infection rate necessitating implant removal was 2% (6 of 300 placed implants). Cultures performed at the time of implant removal did not reveal any microorganisms.

On the other hand, chin augmentation with alloplastic implantation appeared to carry a very low complication rate. This finding appears to be corroborated by other studies dealing with alloplastic augmentation. Rubin and Yaremchuk<sup>10</sup> performed an extensive review of complications and toxicities of implantable biomaterials used in facial reconstructive and aesthetic surgery. Silicone chin implants had an average infection rate of 0.7% in 1,260 total patients. The infection rate in silicone malar implants was slightly higher, at 1.2%, across

7 studies and 404 total patients. Although bioinert and nonporous, silicone is still considered a foreign body, and when infection does not respond to antibiotics, implant extraction should be considered. The implants can readily be replaced 6 weeks after implant removal and use of oral antibiotic therapy. Both the patient and the surgeon must be willing to accept this possibility before surgery is considered; accordingly, it should be discussed during preoperative counseling.

Complications such as infection and bleeding are difficult to predict and avoid. Preventable complications include incorrect sizing and positioning.<sup>11</sup> The correct size of the implant is readily determined by the use of sizers, and we utilize them routinely for most patients. Proper implant positioning is more difficult. Hinderer<sup>12</sup> first proposed a method to identify the malar prominence and to ensure proper implant placement. By drawing one line from the ala to the tragus and another from the oral commissure to the lateral canthus, one can get a sense of where the implant should be placed. The proper position for an implant is in the upper outer quadrant as defined by Hinderer's crossed lines. Since then, several other authors have proposed different methods for locating the malar eminence.<sup>11,13,14</sup>

We believe that patient input is invaluable for determining proper placement of the implant. Our method begins by having the patient smile in an upright sitting position. The patient holds a mirror to help determine the desired "high point" of the implant, which usually corresponds to the thickest diameter of that particular implant. Once the "high point" is marked, we mark the anterior superior point of the zygomatic arch at its junction with the malar bone. A third mark is placed at the ipsilateral junction of the ala and the melolabial line. A line joining these 3 points is then constructed (Fig 3). The transcutaneous suture that secures the implant is placed on this line, and exits at a point 1 cm on either side of the high point. This fixation technique ensures that the implant "high point" is exact and that the implants are symmetrically placed. Malar asymmetries can be addressed by adjusting the implant placement laterally or medially on this constructed line, by using different-size implants, or with autologous fat.

In their review, Rubin and Yaremchuk<sup>10</sup> also reported a 2% displacement rate and a 0.5% rate of seromas with silicone malar implants (404 patients). With chin implants, they reported a less than 0.5% rate of displacement and a less than 0.5% incidence of prolonged pain.<sup>10</sup> In our series, we had to revise 2 malar implants because of asymmetry (2%), and



**Fig 4.** (Patient 1) **A)** Before operation. **B)** One year after operation.

1 chin implant because of persistent pain (1%). We have not experienced any cases of implant exposure or extrusion. Our experience does not appear to differ from the data presented in the review of Rubin and Yaremchuk,<sup>10</sup> and we could not find any significant difference ( $\chi^2$ ,  $p > 0.05$ ) in complication rates when comparing our series.

Alloplastic augmentation techniques offer predictable, controllable, and permanent augmentation of prominent facial subsites, and are commonly utilized in malar, paranasal, and mandibular areas.<sup>15</sup> Silicone was the first alloplastic polymer that achieved widespread use in facial plastic surgery, and it now has been used in humans for more than 40 years. Silicone implants are very well tolerated, easily inserted, easily sutured, and easily sterilized (with steam sterilization, irradiation, or ethylene oxide gas). They can be carved and modified during the procedure and cause very little surrounding tissue reaction. The smoothness and flexibility of silicone allows for easy insertion through small incisions, which makes it well suited for facial surgery. Once inserted and covered with soft tissue, the implant confers a natural tactile sensation. Despite



**Fig 5.** (Patient 2) **A)** Before operation. **B)** One year after operation.

scrutiny by the US Food and Drug Administration in the 1990s, silicone remains one of the least bioactive materials available for use in medical devices. Today, more than 1,000 medical products contain silicone as either a primary component or as a residuum from the manufacturing process. New generations of silicone implants have an excellent safety record to date,<sup>16</sup> and numerous studies have failed to demonstrate a link between silicone and systemic disease.<sup>17</sup>

Complications are unpleasant for both the patient and the surgeon after any surgery, but seem to be particularly distressing after elective cosmetic procedures.<sup>18</sup> Although complete elimination of complications after rhytidectomy or alloplastic augmentation is impossible, every attempt should be made to minimize these risks. This would naturally involve foregoing additional surgery if there was a higher risk of complications. Our review of the volumetric facelift suggests a complication rate similar to that of rhytidectomy alone, which supports our assertion that implantation and rhytidectomy can be relatively safely performed concurrently.

The greatest advantage of utilizing facial implants

along with rhytidectomy is the volumetric improvement that can be achieved in conjunction with soft tissue tightening. Loss of fullness of the midface and chin are two important features of aging that must be addressed if the cosmetic surgeon wants to achieve optimal facial rejuvenation. In patients with malar

and chin insufficiency, alloplastic implants can offer dramatic improvement (Figs 4 and 5). Facial alloplastic augmentation provides a 3-dimensional lift by adding volumetric expansion of the malar and chin areas, while better skeletal contouring allows patients to age more naturally and gracefully.

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