Comparison of Lip Enhancement Using Autologous Superficial Musculoaponeurotic System Tissue and Postauricular Fascia in Conjunction With Lip Advancement

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Objective: To evaluate and compare the short- and long-term aesthetic results of surgical lip enhancement using the superficial musculoaponeurotic system (SMAS) and postauricular fascia graft implantation with and without vermilion border advancement.

Methods: A single-blinded cohort study was performed using 39 patients who underwent surgical lip enhancement at a private facial plastic surgery practice between 2005 and 2007. The cohort was grouped as follows: 14 patients underwent lip augmentation using SMAS grafting; 10 patients underwent lip augmentation using postauricular fascia grafting; and 15 patients underwent combined lip augmentation and lip advancement (SMAS grafting was used in 8 of the procedures, and postauricular fascial tissue was used in 7). All procedures were performed in a controlled setting by a single surgeon (E.G.M.). Patients who had undergone previous lip augmentation of any kind were excluded from the study. Preoperative and postoperative photographs were analyzed by 3 blinded physician observers using the Lip Fullness Grading Scale. Postoperative photographs were evaluated at approximately 6 months and 1 year after the procedure.

Results: Reviewers noted a significant improvement in aesthetic scoring for each of the methods of lip augmentation examined at 6 months after surgery. This result was sustained at 12 months after surgery. Postauricular fascia graft lip augmentation and combined lip advancement and postauricular fascia augmentation recorded the highest scores after surgery. The largest mean scoring increases of 1.459 (t = -9.5049; P < .001) at 6 months and 1.584 (t = -9.0308; P < .001) at 1 year were found in the lip advancement and SMAS lip augmentation study group.

Conclusions: Youthful, natural-appearing lips tend to enhance an individual’s appearance. Surgical lip augmentation using SMAS or postauricular fascia, with or without vermilion border advancement, is a straightforward, safe, potentially long-lasting treatment for hypoplastic lips, with little to no morbidity.

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FULL, WELL-DEFINED LIPS transcend time and culture as a hallmark of youth and beauty. The goal of fuller lips has led to the development of many different techniques and materials that are available to the facial plastic surgeon. The advent of newer synthetic injectable fillers has made lip augmentation popular in medical spas and physician’s offices because of the attractiveness of nonsurgical procedures. Though effective, most fillers offer, at best, a temporary solution. Surgical options for lip augmentation are plentiful and may include the use of synthetic materials, homografts, autograft implants, and advancement procedures. Nonautologous implant materials, such as expanded polytetrafluoroethylene products and permanent injectable fillers, offer the benefits of longevity but often create a hardened, unnatural feel to the lip. Furthermore, these materials are expensive and apt to be associated with potential complications. Also, should the removal of nonautologous implants associated with tissue ingrowth become necessary, extensive filleting techniques may become necessary as well. Moreover, structural fat grafting for lip augmentation has gained popularity but has been associated with mixed results. Along with unpredictable resorption with grafted fat, multiple procedures are often required to produce a lasting effect.

The ideal lip augmentation material should be safe, nonreactive, easy to procure and insert, cost-effective, and able to produce predictable, reliable, and lasting results. More than 35 years of experience in facial plastic surgery has afforded us more than a passing familiarity with most of the known techniques that are used to provide lip enhancement. Having observed and experienced the often disappointing outcomes of other forms of lip enhancement, we have found that the...
Combination of autologous superficial musculoaponeurotic system (SMAS) and postauricular fascial tissue has provided consistently predictable results for well over a decade. With SMAS suspension rhytidectomy, the excised preauricular SMAS provides a convenient autologous source of graft material. We also frequently use postauricular fascial tissue as grafting material in patients who are not undergoing rhytidectomy or when suitable SMAS is not available. Each of these autologous graft techniques can be combined with direct lip advancement in patients who require both fuller and larger lips. The focus of this article is a comparative examination of our lip enhancement methods. Furthermore, we present a novel technique for graft placement and positioning that, to our knowledge, has not been previously described. We believe that it offers several advantages over the previously published techniques.

METHODS

DESCRIPTION OF SURGICAL PROCEDURES

Our chosen method of harvesting grafting materials during rhytidectomy has been unchanged for more than 3 decades. However, we have used excised SMAS tissue for volume replacement in other regions of the face, such as the melolabial grooves, lips, and deep glabellar creases, only within the past 2 decades. The use of SMAS for melolabial fold augmentation has also been described by others.

Access to postauricular tissue can also be accomplished through an incision made in the postauricular sulcus and at or within the occipital hairline, if necessary (Figure 1), at the time of rhytidectomy or in cases in which rhytidectomy is not being performed. In either case, once the skin and subcutaneous tissue are dissected free, the underlying fibrous fascial tissue lying superficial to the postauricular musculature and mastoid periosteum is easily dissected with forceps and scissors (Figure 2). Typically, 1 or 2 strips (approximately 5×1 cm) of tissue are excised (Figure 3). Care is taken to avoid injury to the greater auricular nerve or inadvertent inclusion of postauricular muscle in the graft. In patients who are undergoing secondary rhytidectomy procedures, the postauricular site provides a bounty of subcutaneous scar tissue. We recommend caution when attempting to obtain materials for lip augmentation in the preauricular region in patients who have previously undergone face-lifts with SMAS excision.

Placement of autologous grafts for lip augmentation has classically been described via an incision placed on the mucosal surface at each oral commissure. As a modification of this technique, an additional small vertical mucosal incision is made in the midline on the mucosa of the upper and/or lower lip. These 4 separate incisions allow greater ease and accuracy in creating the submucosal tunnels that are needed for graft placement (Figure 4). Grafting materials are fashioned so as to add only the desired augmentation on either side of the midline. Two separate grafts are used in each lip. Once the grafts are tailored to the appropriate length and width, an alligator forceps is used to pull each graft through its respective tunnel (Figure 5). The central portion of each graft is overlapped for approximately 3 mm, thereby creating the natural central tubercle, which is a hallmark of an aesthetically pleasing and youthful lip. These incisional modifications allow ease in tunnel creation and graft placement and decrease the potential for twisting of the graft on insertion. They also help facilitate addressing asymmetries in the lip and ultimately can provide a more aesthetically pleasing appearance that is not readily achievable with the classic single-tunnel technique.

In cases in which lip augmentation alone is performed—and once graft placement is satisfactory—all incisions are closed with 5-0 chromic catgut sutures. Patients are told that their lips initially will appear overly corrected because of postoperative swelling.
ing but that approximately 80% of swelling will have subsided by 2 weeks and 90% by 2 months, at which time the lips will have begun to assume their final size and shape. For patients with thin lips who require modification of the vermilion borders, a combination of lip advancement and autologous SMAS or postauricular fascia grafting is recommended. Lip advancement procedures have been previously described. However, the method described herein offers modifications that provide not only enhanced results but also more acceptable postsurgical scars.

It is possible to perform lip and vermilion advancement surgery without the addition of soft-tissue grafting, especially in younger patients; however, when both lip enlargement and volume replacement are desired, the senior author (E.G.M.) recommends a combination of lip augmentation and vermilion advancement. In his combined lip advancement and augmentation procedure, vermilion advancement incisions are performed first, taking care to incise precisely at the vermilion border and approximately 2 to 4 mm higher (in the upper lip) or lower (in the lower lip) depending on the amount of vermilion modification desired (Figure 6). Meticulous attention during marking must be directed toward preserving and exaggerating the Cupid’s bow of the upper lip. If asymmetry exists, markings can be altered to address it. Presurgical markings should be made to allow a slight (1- to 2-mm) overcorrection, taking into account expected postoperative retraction. The skin between the 2 incisions is then excised in an immediate subdermal plane, taking care not to remove subcutaneous tissue or muscle, which helps preserve or create the natural ridge at the vermilion border.

Undermining the skin or mucosal edges is not recommended. If lip-grafting augmentation is desired, incisions for creating submucosal tunnels are made to receive the autologous tissue grafts (Figure 4). With a combined lip advancement and augmentation procedure, the incisions can be made either within the advancement wound or on the mucosa of the oral commissures, as previously described. The method used to close vermilion advancement wounds is paramount to creating acceptable scars. To achieve this objective, 6-0 fast-absorbing catgut vertical mattress sutures are placed at, and between, the peaks and trough points of the Cupid’s bow in the upper lip. Vertical mattress closure ensures eversion of wound edges, thereby preserving a natural and symmetrical appearance of the Cupid’s bow. The remaining closure consists of a running 5-0 polypropylene subcuticular suture followed by a simple running 6-0 catgut suture along the length of the incision, but only if additional wound edge approximation and eversion are required (Figure 7).

**STUDY DESIGN**

To compare the efficacy of these and previously described procedures, we designed a single-blinded cohort study. All procedures in the study were performed by a single surgeon (E.G.M.) at a private facial plastic and reconstructive surgery practice between 2005 and 2007. Patients who were eligible for inclusion in the study underwent primary upper and lower lip augmentation with or without lip/vermilion advancement. Patients who had previously undergone documented surgical or

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**Figure 4.** Creation of a submucosal tunnel for graft placement.

**Figure 5.** The tissue graft is pulled through the tunnel with alligator forceps. Often, the superficial fat will be stripped from the underlying fibrous tissue as the graft is pulled through.

**Figure 6.** Preoperative markings (A) for lip advancement and excision of white lip skin. Note the careful preservation of Cupid’s bow (B).
nonsurgical lip enhancement procedures were excluded, as were those who did not have appropriate postoperative photographic documentation, which was defined as preoperative and postoperative frontal and lateral perioral views (Figure 8 and Figure 9). Postoperative photographs were taken at approximately 6 months and 1 year for inclusion in the study. All procedures were strictly cosmetic in nature. A total of 39 patients met the inclusion criteria for this study. Fourteen patients underwent lip augmentation with preauricular SMAS grafting. Ten patients underwent lip augmentation with postauricular fascia grafting. A total of 15 patients underwent combined augmentation and lip advancement: SMAS grafting was used in 8 patients, and postauricular fascia was used in 7 patients. A comprehensive chart review was performed on all patients. Patient demographics, as well as any concomitant procedures at that time and during the follow-up period, were recorded. Short- and long-term complications and the postoperative use of injectable steroids were also recorded.

Three physician observers were recruited for photographic scoring; none of them participated in the surgery or care of the patient cohort. The evaluators reviewed 3 sets of printed photographs of each patient enrolled in the study. The photographs included preoperative and postoperative results at 6 months and 1 year. Therefore, a total of 117 photograph sets were randomized and examined by each observer. The observers were also blinded as to which technique was performed as well as to any reference of date and time. Each was instructed to grade the upper and lower lips as a whole using the following Lip Fullness Grading Scale: 0, very thin; 1, thin; 2, moderately thick; 3, thick; and 4, full. This scale was chosen because of its validation and low intrarater and interrater variability. The observers were also allowed to refer to a sample set of prescaled photographs to use as a guide for grading. They were also asked to note any problems or discrepancies with the photographs at the time of review.

Scoring data from the blinded observers, along with patient demographics, were compiled and analyzed in a single database. Correlation coefficients between individual graders were calculated to demonstrate interrater reliability. The average scores were calculated for each patient's preoperative and postoperative 6-month and 1-year photographs. For comparative analysis, the cohort of patients was divided into 3 groups: group 1, preauricular SMAS lip augmentation; group 2, postauricular fascia lip augmentation; and group 3, combined autologous tissue augmentation and lip advancement. Group 3 was further subdivided into group 3A, representing SMAS augmentation and lip advancement combination, and group 3B, representing postauricular fascia augmentation and lip advance-

RESULTS

Patient age demographics and procedure results are summarized in Table 1. All 39 patients were women (age range, 18-72 years). The average age in groups 1, 2, and 3A was 56, 62, and 57 years, respectively. However, the average age in group 3B was considerably younger, at 38 years. Primary SMAS suspension and imbrication rhyti-
Dectomy was performed in 22 patients, 20 of whom underwent SMAS lip augmentation or combined SMAS augmentation and lip advancement. Secondary face-lift was performed in 6 patients, 5 of whom underwent postauricular fascia augmentation and 1 of whom underwent combined SMAS augmentation and lip advancement. Seven of the 9 patients who also underwent perioral resurfacing with a Baker-Gordon phenol peel were in the SMAS augmentation group. The remaining procedures were fairly evenly spread among the groups and not considered to affect perioral appearance. No additional aesthetic or reconstructive facial procedures, including injectable fillers, were performed on any of the study patients during the 1-year study period.

Intrarater and interrater statistical analysis was performed using a 2-sample t test. Intergrader reliability was

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Table 1. Comparison of Patient Age Demographics and Procedures

<table>
<thead>
<tr>
<th>Group</th>
<th>Age Range (Average), y</th>
<th>Primary Face-lift</th>
<th>Secondary Face-lift</th>
<th>Perioral Chemical Peel</th>
<th>Upper/Lower Blepharoplasty</th>
<th>Rhinoplasty</th>
<th>Full-Face Resurfacing</th>
<th>Brow-lift</th>
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<tr>
<td>1 (n = 14)</td>
<td>45-72 (56)</td>
<td>13</td>
<td>0</td>
<td>7</td>
<td>10</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2 (n = 10)</td>
<td>39-68 (62)</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3A (n = 8)</td>
<td>35-67 (57)</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3B (n = 7)</td>
<td>18-66 (38)</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
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*Group 1, superficial musculoaponeurotic system (SMAS) augmentation; group 2, postauricular fascia augmentation; group 3A, combined SMAS augmentation and lip advancement; and group 3B, combined postauricular fascia augmentation and lip advancement.*
significantly less than that of the other groups (P<.05). The mean score within each procedure group was then examined. The results indicate an overall statistically significant increase in mean scores at 6 months and 1 year after surgery for each procedure (Table 2). The largest score increase was seen in the combined SMAS augmentation and lip advancement group (group 3A), in which there was an observed preoperative to postoperative difference of 1.459 (t=-9.5049; P<.001) and 1.584 (t=-9.0308; P<.001) at the 6-month and 1-year intervals, respectively.

No major short- or long-term complications, including infection, hematoma, and graft extrusion, were reported for any of the procedures. Furthermore, none of the study patients required revision procedures. Postoperative steroid injections were used to address localized delayed swelling and submucosal scarring in 6 of the 15 patients in the combined augmentation and lip advancement group, with 5 of the 6 requiring multiple injections. One patient in the postauricular fascia graft augmentation group required a steroid injection (triamcinolone, 7.5 mg/mL) at the postauricular donor site to soften a scar. Injections were generally spaced 3 weeks to 1 month apart. Insignificant vermilion border asymmetries were also present in 3 of the 15 patients in the combined augmentation and lip advancement group as long as 1 year after surgery. The graders reported small discrepancies, including differences in lighting and positioning, in the photographs.

Our experience and data reveal that autologous tissue lip augmentation with or without vermilion and lip advancement can provide aesthetically pleasing and potentially long-lasting rejuvenation to the perioral region of the face. Results from each procedure category demonstrated an average of approximately 1- to 1.5-point improvement on the Lip Fullness Grading Scale at 6 months after surgery. This score corresponds to at least a 1-grade improvement aesthetically. More importantly, this improvement was sustained at 12 months, suggesting that the grafts had survived transfer and that swelling and retraction had run their course in vermilion augmentation. The largest improvement was seen in the combined procedure group.

In all conditions, selecting the correct procedure for the indication is important for obtaining and maintaining optimal results. In general, we recommend autologous tissue augmentation for patients who require lip bulk and fullness. Often, however, patients desire both fuller and larger lips that cannot be created by grafting. Those in whom combined augmentation and lip advancement procedures are recommended generally have severe lip hypoplasia, with significant soft-tissue deficit and loss of red lip show (Figure 8). Naturally, such patients require a more aggressive treatment, with results that are achievable only through a combined procedure. In these cases, raising the vermilion border in the upper lip and lowering it in the lower lip, with or without graft augmentation, offers a better chance to obtain the desired aesthetic result. However, in patients whose vermilion border positions are acceptable, yet exhibit deep wrinkling and/or volume deficiency in the red part of the lip, we recommend autologous tissue grafting alone.

Our results indicate that combination lip augmentation and vermilion border advancement can be used without reservation in both congenital and age-induced lip hypoplasia. However, it should be noted that we do not recommend lip advancement in male patients, especially ones with heavy beards. Removing the non–hair-bearing skin between the vermilion borders and the beard line around the lips creates an unnatural appearance to the lip.

In evaluating our study results, it is important to emphasize that we make a concerted effort not to produce overly volumized or unnatural-looking lips. We believe that this aesthetic paradigm accounts for lower than suspected scores on the postoperative grading scale. However, should more dramatic changes be desired, the amount of grafting and/or skin excision can be increased to achieve larger and fuller lips. This objective can be achieved with the same surgical techniques that are described herein.

Our results also suggest that postauricular fascia is a better autologous grafting material than preauricular SMAS. We attribute this observation to the paucity of fat in postauricular grafts or scar. Grossly, postauricular fascia is a more fibrous graft than preauricular SMAS. Therefore, we believe that it is more likely to be longer lasting, resistant to resorption, and more reliable. Other authors have suggested that fat grafts placed within muscle seem to survive better than those placed in fat or subcu-

### Table 2. Comparison of Mean Scoring Resultsa

<table>
<thead>
<tr>
<th>Group</th>
<th>Preoperative Score</th>
<th>6-mo Postoperative Score</th>
<th>P Value</th>
<th>12-mo Postoperative Score</th>
<th>P Value</th>
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<td>1</td>
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<td>1.714</td>
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<tr>
<td>2</td>
<td>1.1</td>
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<td>2.267</td>
<td>.001</td>
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<tr>
<td>3A</td>
<td>0.333</td>
<td>1.792</td>
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<td>1.917</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>3B</td>
<td>1.048</td>
<td>2.524</td>
<td>.001</td>
<td>2.429</td>
<td>.002</td>
</tr>
</tbody>
</table>

aGroup 1, superficial musculoaponeurotic system (SMAS) augmentation; group 2, postauricular fascia augmentation; group 3A, combined SMAS augmentation and lip advancement; and group 3B, combined postauricular fascia augmentation and lip advancement. Statistical analysis was performed with a 2-sample t test.
taneous tissues. Because all grafting materials used for lip augmentation are inserted within the orbicularis oris muscle, a more desirable bed is provided for the fatty portions that are attached to the typical SMAS graft, thereby potentially having implications regarding graft longevity.

Aging patients whose lips are disappearing are ideal candidates for combination augmentation and lip advancement procedures. Sadly, many surgeons have abandoned direct lip advancement or lip-lifting because of concerns about unacceptable scarring. In our experience, with the use of proper soft-tissue technique and meticulous closure (as previously described), scarring is not a valid concern, especially in older patients. It is important to note that perioral skin resurfacing with chemical peeling, dermabrasion, or laser therapy can be performed in conjunction with each of the techniques for lip enhancement described herein. Lip augmentation is not recommended for treating rhytids in the perioral region. A level III skin resurfacing procedure provides the most reliable, long-term improvement. In most cases, phenol-based chemical peeling is the technique of choice.

Through extensive experience, we have presented our variations and, in some cases, novel techniques of lip enhancement. The inherent subjectivity of the study, the photographic variations due to lighting and makeup, and the relatively small patient population are all potential confounders or limiting factors. Future investigations with larger patient populations, potentially less variability, and longer follow-up periods could perhaps more powerfully support our findings, as well as examine the potential differences between the grafting tissues and techniques. Along these same lines, patient outcome examinations could be an import adjuvant for future studies.

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REFERENCES