

ORIGINAL ARTICLE

Total Face Rejuvenation: Simultaneous 3-Plane Surgical Approach Combined With Ablative Laser Resurfacing

Achih H. Chen, MD, FACS, FAACS; Adam M. Becker, MD, FARS

Introduction: Among the public, the gold standard in facial rejuvenation surgery is often thought of as face-lift surgery or rhytidectomy; however, a lifting and tightening procedure more optimally treats the jawline and neck by smoothing the jowls and addressing the submental waddle. In the middle third of the face, a lifting or tightening procedure may result in widening and flattening of the mid-face, producing an unnatural, pulled appearance. Volume restoration in the mid-face region often creates a more natural-appearing rejuvenation by reversing the deflation of the facial middle third that has occurred over time. While rhytidectomy and volume restoration create excellent results, the aging of the facial skin through extrinsic factors such as sun exposure or tobacco use remains untreated. Consequently, for a more complete facial rejuvenation, ablative laser resurfacing may be added to address fine facial lines and pigment irregularities to smooth the overlying skin texture. More complete facial rejuvenation may be achieved through combined rhytidectomy, mid-face volume restoration, and full-face ablative laser resurfacing performed concomitantly. Although there seem to be inherent risks of simultaneous laser resurfacing and rhytidectomy, previous studies have demonstrated the safety in these combined procedures. To achieve a more complete facial rejuvenation, a third plane of surgical dissection may be performed to restore mid-face volume through a subperiosteal approach; however, the inherent risks of laser resurfacing in patients undergoing a triplanar procedure, including subcutaneous,

sub-superficial musculoaponeurotic system (SMAS), and subperiosteal dissection have not been previously established in the literature. The objective is to evaluate the safety of combined extended-SMAS rhytidectomy, mid-face implant placement, and full-face erbium:YAG resurfacing.

Materials and Methods: A retrospective review of patients undergoing combined extended-SMAS rhytidectomy, mid-face augmentation, and full-face erbium:YAG laser resurfacing by a single surgeon was conducted. Demographic data, surgical complications, and associated factors were recorded.

Results: Twenty-one patients were identified. All were female and aged from 58 to 71 years. There were no cases of flap necrosis or slough. There was 1 case of hematoma that resolved with conservative management. One patient with a history of Roux-en-Y gastric bypass had an implant infection. She was found to have malabsorption of her antibiotics, which immediately resolved once her antibiotics were crushed. Epithelization occurred within 10 days, and all patients were able to wear makeup after 10 days. It is important to note that none of these complications are felt to be the result of combining the procedures.

Conclusions: Simultaneous extended-SMAS rhytidectomy, mid-face augmentation, and full-face erbium:YAG resurfacing is a safe and effective strategy in providing facial rejuvenation.

It is very common for aging individuals to use their hands to place upward and posterior traction on their facial skin in an effort to simulate facial rejuvenation surgery through lifting and tightening of their face and neck. Consequently, it is often thought that the primary component of facial rejuvenation involves redistribution of the ptotic underlying soft tissue through face-lift surgery or rhytidectomy. However, restoration of lost volume and correction of the overlying skin changes also play major roles in facial rejuvenation.

Received for publication April 19, 2014.

From the Georgia Center for Facial Plastic Surgery, Evans, Ga and the Division of Facial Plastic and Reconstructive Surgery, Department of Otolaryngology–Head and Neck Surgery, Georgia Regents University, August, Ga (Dr Chen); Renewal Facial Plastic Surgery, Durham, NC and the Division of Otolaryngology–Head and Neck Surgery, Department of Surgery, Duke University Medical Center, Durham, NC (Dr Becker).

Presented at the 2014 Scientific Annual Meeting of the American Academy of Cosmetic Surgery, Ft Lauderdale, Fla.

Corresponding author: Achih H. Chen, MD, FACS, FAACS, Department of Otolaryngology, Division of Facial Plastic Surgery, Georgia Regents University, 613 Ponder Place Dr, Evans, GA 30809 (e-mail: achen@thegeorgiacenter.net).

DOI: 10.5992/AJCS-D-14-00016.1



Figure 1. Superior-posterior and lateral traction on the middle-third of the face results in an unnatural-appearing widening and flattening of the mid-face.

The first rhytidectomy performed is credited to Lexer in 1916, in which he described subcutaneous elevation of the facial skin and removal of the excess.¹

In the 1960s, Tord Skoog² described dissection and elevation of the fascia of the lower cheek or buccal fascia during face-lift surgery. This was later defined to be the superficial musculoaponeurotic system (SMAS) by Mitz and Peyronie in 1976.³

Others have refined this initial approach by increasing the extent of sub-SMAS dissection, ultimately known as deep plane rhytidectomy.^{4,5} The deep plane face-lift, in addition to elevation of the SMAS, mobilized the malar fat pad to address the mid-face and soften the melolabial folds to achieve a more complete facial rejuvenation. Initially, the results of the deep plane rhytidectomy seemed promising, but ultimately, Hamra,⁶ one of the initial pioneers of the deep plane face-lift, found that even this more comprehensive face-lift failed in the long term to address the mid-face. In addition to the lack of a long-term result in addressing the mid-face, rhytidectomy involves repositioning of the facial soft tissues in a posterior and



Figure 2. Face-lift surgery addresses the jawline and neck but does not greatly affect the mid-face region. (a) Oblique before and after facelift views. (b) Lateral before and after facelift views.

superior vector. Despite the ability to elevate the malar fat pad with more extensive face-lift dissections, the posterior and superior vector of repositioning resulted in widening and flattening of the mid-face, a sign of surgical intervention rather than a sign of youth (Figure 1). Face-lift surgery is ultimately more successful in correcting the anterior banding and redundant tissue of the cervicomental area and jawline but not the mid-face region (Figure 2). Consequently, mid-face rejuvenation has undergone its own significant evolution.⁷ Initial emphasis on mid-face rejuvenation was placed on resuspension of ptotic soft tissues of the mid-face.



Figure 3. Mid-face augmentation helps restore the natural-appearing volume of a youthful face. Notice how the concavity of the mid-face has been addressed with placement of mid-face implants (red arrows). (a) Oblique before and after mid-face implant views. (b) Lateral before and after mid-face implant views.

This was accomplished through a variety of approaches including the extension of the deep plane face-lift to include a medial vector of lift in the lower eyelid area.⁸ Over time, a greater understanding of the anatomic basis for aging has led to newer techniques that focus on revolumization in this area, either alone or in combination with resuspension techniques. Concerns regarding longevity of mid-face lifting procedures and a better understanding of the aging of the mid-face have prompted investigation into rejuvenation of the mid-face by restoring volume through the use of mid-face silicone implants and dermal fillers with very promising results (Figure 3).^{9,10}

Although rhytidectomy and mid-face augmentation provide excellent rejuvenation of the neck, jawline, and middle-third of the face, the overlying skin remains untreated. The aging skin results from a combination of intrinsic factors including tissue atrophy and loss of



Figure 4. Full-face erbium laser resurfacing addresses the fine lines and actinic damage of the facial skin.

cellular components, as well as extrinsic factors such as photodamage. Skin rejuvenation by laser resurfacing, chemical peels, or dermabrasion allows for the correction of fine lines and actinic damage (Figure 4). Combining resurfacing procedures with rhytidectomy has been shown to be safe and yields complementary results, providing a level of rejuvenation that is not attainable by use of either technique alone.¹¹ However, mid-face volume loss seen in the aging face is not addressed by either of these treatment strategies.

To achieve the greatest degree of rejuvenation possible in a single surgery, the senior author proposes a multiplanar approach that addresses soft-tissue descent and volume loss as well as environmental exposures to the skin. A combination of rhytidectomy, mid-face augmentation, and laser resurfacing allows for resculpting of the neck, corrects for volume loss of the malar fat, and evens the texture of the skin in a single setting (Figure 5).

Previously, investigators have shown that with careful patient selection, combining face-lift procedures with laser resurfacing can be performed safely.¹¹ These studies have not investigated the potential sequelae of laser resurfacing in the setting of subperiosteal dissection. The goal of the current study is to review the senior author's experience in performing extended SMAS rhytidectomy, mid-face dissection for either implant placement or mid-face lift, and erbium:YAG full-face laser resurfacing in a single surgical setting in consecutive patients.

Technique

The procedure is performed under total intravenous anesthesia with local anesthetic. Platysmaplasty is



Figure 5. Three-plane rejuvenation with subperiosteal, sub-superficial musculoaponeurotic system, and subcutaneous dissection and concomitant full-face erbium laser resurfacing for a more complete facial rejuvenation. (a) Oblique before and after “total face rejuvenation” views. (b) Lateral before and after “total face rejuvenation” views. (c) Frontal before and after “total face rejuvenation” views.

performed first, with direct excision of submental fat and liposculpting in appropriate patients. After hair sparing, periauricular incisions are made, a 3- to 4-cm skin flap is elevated anteriorly, and the cervical portion of the flap is brought into continuity with the submental flap. Following this, an extended-SMAS flap is elevated to the premasseteric fascia. The SMAS is resuspended to the temporalis fascia and mastoid fascia with undyed, 3-0 polydioxanone sutures. The redundant SMAS is excised, and the SMAS defect is then closed with 4-0 Vicryl sutures in inverted fashion. At this point, the skin flap is tailored and the incisions closed.

Mid-face implants are placed in a subperiosteal pocket through a gingivolabial sulcus incision as described by Binder et al¹² with the modification that the implants are anchored into position with a single 1.65 × 5-mm titanium self-drilling cross-drive screw (Biomet Microfixation, Jacksonville, Fla).

Full-face resurfacing is performed using an erbium: YAG laser with fluences ranging from 15–10 J/cm². Eye shields are placed, and resurfacing is performed to a depth of 150–300 μm (ablation + coagulation). Two orthogonal passes in the forehead, 2 along the eyelid and 2–3 around the mouth and cheeks, were used (Sciton, Palo Alto, Calif). It is important to note that resurfacing of the distal portion of the skin flap is conservative.

Postoperative records were reviewed for any sequelae including skin slough, flap necrosis, pigmentation changes, delayed reepithelization, delayed healing, and infection.

Results

Twenty-one patients were identified. All were female and aged 58–71 years. There were no cases of flap necrosis or slough. There was 1 case of hematoma that resolved with conservative management. One patient with a history of Roux-en-Y gastric bypass had an implant infection. She was found to have malabsorption of her antibiotics, which immediately resolved once her antibiotics were crushed. Epithelization occurred within 10 days, and all patients were able to wear makeup after 10 days. It is important to note that none of these complications are felt to be the result of combining the procedures.

Discussion

The face-lift has generally been thought of by patients, as well as by many aesthetic surgeons, as the

answer to facial aging changes. While there is no question that rhytidectomy does bring about a significant improvement in the neck, jawline, and lower melolabial fold, it leaves something to be desired when it comes to improvement of the mid-face and really does very little with regard to fine lines and wrinkles. Because of this, surgeons have sought out different methods of providing a complete facial rejuvenation. Mid-face implants or fat transfer are effective ways to augment the mid-face and correct for volume loss in a way that face-lift surgery cannot. Together, these provide a more optimal rejuvenation to the ptotic soft tissues of the face and remove redundancy in the skin. They do not significantly affect the skin texture and tone, which we feel is critical in achieving maximal results.

The malar prominence is an important concept in facial aesthetics. A youthful mid-face demonstrated a round convex contour balanced to the chin and nose. With age, volume loss leads to flattening and descent of the mid-facial soft tissues. While mid-face lifting procedures can elevate ptotic soft tissues, they also have a tendency to widen and flatten the mid-face due to their vectors of pull. In addition, these procedures fail to restore the volume seen in youth. By contrast, mid-face implants are able to restore volume and, in doing so, restore the natural contours of the mid-face. They have been studied and were shown to have good success and very little morbidity.¹³ They are relatively simple to place and have the advantage of being reversible. They have been shown to have an excellent biocompatibility and are very durable.¹⁴ Mid-face fat transfer can be used quite successfully with equally good results.¹⁵ Fat grafting has the obvious advantage of being living tissue derived from the patient's body. The transfer process is relatively safe, and there are no concerns about ongoing risks of infection or extrusion. The drawbacks of fat grafting are that there is a variability in graft survival, which may be surgeon dependant. It requires specialized instrumentation and demands a certain degree of technical proficiency to maximize results. As a result, it may require multiple procedures to achieve an acceptable degree of volume restoration. For these reasons, the authors prefer the reliability of silastic implants.

The earliest reports describing concomitant resurfacing and rhytidectomy advised strongly against this practice.¹⁶ Over time, advances in laser technology in conjunction with improved surgical techniques allowed surgeons to revisit the possibility of simultaneously

performing rhytidectomy and resurfacing.^{11,17} Koch and Perkins¹¹ presented a meta-analysis of 453 patients who underwent combined rhytidectomy using various techniques and full-face laser resurfacing. Their analysis revealed low complication rates including a 0.2% preauricular flap necrosis measuring 2 cm in a smoker who did not discontinue smoking perioperatively. Of the patients, 1.3% had secondary perioperative skin infections, and 4 patients had sequelae related to resurfacing involving unelevated skin. Koch and Perkins also underscored the importance of surgical technique and the impact of the amount of skin undermining in patients undergoing combined laser resurfacing and rhytidectomy, pointing out that many surgeons in their study used short subcutaneous flaps prior to transitioning to deeper planes.

While rhytidectomy and full-face resurfacing have been more widely accepted in recent years, the question remains as to whether additional deep dissection would affect skin viability. To the authors' knowledge, this is the first report demonstrating the safety of concomitant face-lift surgery, mid-face implantation, and erbium:YAG full-face resurfacing. Our results seem to indicate that these procedures can be safely combined without increasing the risks to the patient. A few points deserve mention. We would agree with previous suggestions that the degree of skin undermining plays a role in the safety of the procedure. The authors used a short subcutaneous flap before transitioning to a deep plane of dissection. Equally critical to maintaining viability of the rhytidectomy flap is the degree of skin resurfacing. Differing degrees of laser resurfacing are performed along various aesthetic subunits owing to skin thickness. In the senior author's practice, resurfacing is performed more conservatively over the subcutaneously elevated portion of the flap than during an isolated resurfacing procedure. Anecdotally, this does not seem to affect the overall result. Finally, the wavelength used in resurfacing may also affect flap viability. Studies showing flap compromise with CO₂ laser may suggest that greater care be exercised with this particular wavelength.¹⁸ The reduced thermal injury from erbium:YAG laser is felt to allow quicker healing with less untoward effects, less downtime, and comparable results.^{19,20} Our own experience supports this finding.

Conclusion

In the current study, we describe our experience in performing full-face laser resurfacing in patients who

have had triplanar dissection via a supraplatysmal skin flap, sub-SMAS dissection, and subperiosteal dissection for mid-face augmentation. In our series, there were no cases of delayed wound healing, with patients experiencing epithelization within 10 days and return to wearing makeup after 10 days. This compared favorably to those patients undergoing resurfacing alone. The limitations of the current analysis include a relatively small sample size. In addition, erbium:YAG laser has a relatively low degree of collateral thermal injury. This may, in turn, lower the risk of skin flap morbidity compared with other laser technologies. Therefore, these results may not be extrapolated to other lasers used in resurfacing.

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