

Midface Lift Technique With Use of a Biodegradable Device for Tissue Elevation and Fixation

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Background: *Aesthetic surgeons have become increasingly aware that elevation of the midface is a significant component of facial rejuvenation. However, adequate fixation remains a problem in midface lift procedures, regardless of the approach.*

Objective: *The purpose of this study was to evaluate the efficacy and ease of application of the Endotine midface device (Coapt Systems, Palo Alto, CA), as well as patient and surgeon satisfaction with the results of treatment.*

Methods: *The Endotine device consists of a polylactide polymer that incorporates 5 tines, each 4.5 mm long, to distribute tension over a wide area, maximizing fixation strength and holding power. After the cheek tissue is engaged, upward tension is applied to the anchoring leash, which is then sutured to the deep temporal fascia. Between October 2003 and October 2004, 31 patients underwent Endotine fixation for midface lift. The patient group comprised 7 men and 24 women ranging in age from 40 to 65 years (mean age, 49.25 years). Four patients had midface lifts as the sole procedure, and 27 had adjunctive facial cosmetic procedures. Results evaluated included ease of use/difficulty of insertion, postsurgical pain, adequacy and stability of fixation, side effects and complications, and patient and surgeon satisfaction.*

Results: *All patients were judged to have satisfactory cheek elevation and enhanced contour without evidence of recurrent midface ptosis or loss of elevation/fixation. There were no postoperative complications of infection, hematoma, or dehiscence. In a subset of 11 patients, "pain in the treated area" averaged 2.7 (0 = no pain, 10 = extreme pain) at one month follow-up. Surgeon satisfaction with the fixation result averaged 4.9 (1 = very dissatisfied, 5 = very satisfied) at one month follow-up. Patient self-assessment of aesthetic outcome averaged 3.8 (1 = worse than baseline, 4 = dramatic improvement from baseline) at one month follow-up, and patient satisfaction assessment averaged 3.9 (1 = very dissatisfied, 4 = very satisfied) at one month follow-up.*

Conclusions: *The midface Endotine device provided rapid, secure fixation in our small patient study group without complications, and eliminated the complicated and awkward suture techniques that have been an impediment to midface surgery. Larger clinical studies are in progress. (Aesthetic Surg J 2005;25:376-382.)*

During the last decade, aesthetic surgeons have increasingly realized that elevation of the midface is a significant component of facial rejuvenation. Previously, attention had been directed toward elevation of the cheek and neck with various manipulations of the superficial muscular aponeurotic system (SMAS), fascia, and platysma from the traditional lateral and pre- and postauricular approaches.

Two distinct approaches to midface elevation have arisen. One of these emphasizes a vertical lift from an infraciliary incision, often combined with modifications of the tarsus/canthus. The other approaches the midface from the temporal access, providing a superolateral or

oblique rather than vertical orientation. Both approaches may be combined with an intra-oral release of midface tissues at the subperiosteal level.

Regardless of the vector chosen, adequate fixation remains a problem. Both approaches require tissue elevation and fixation, which is usually accomplished by a series of sutures that may be time-consuming, technically difficult to apply, and require frequent rearrangement and adjustment. These difficulties arise from the complicated instrumentation and dexterity required for precise and accurate placement of the sutures because of limited access to, and visualization of, the surgical site. Suture loops within soft tissue may also contribute to neuro-

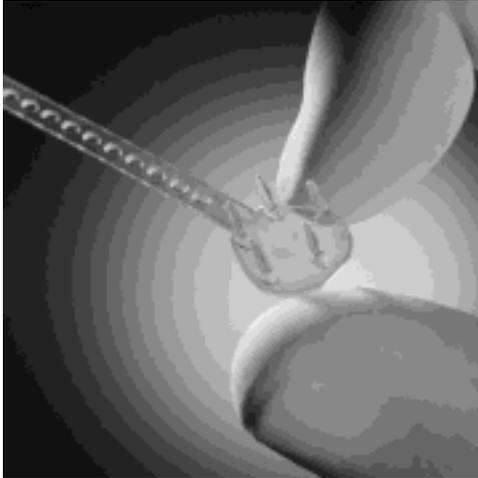


Figure 1. Endotine midface device showing the 5 tines and leash for secure fixation superiolaterally to the deep temporal fascia.

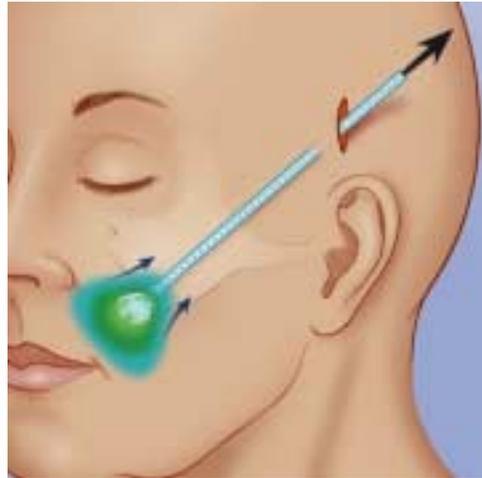


Figure 2. Schematic illustration of position of Endotine device engaging the cheek tissue and exiting at the temple for fixation.

praxia. For all these reasons, the challenge of fixation has been daunting.

In this paper, a system for midface release and elevation is described that has evolved over a decade and now involves the use of the midface Endotine device.

Description of the Device

Coapt Systems (Palo Alto, CA) has developed a new adjustable Endotine device that provides firm elevation and fixation until it softens and bio-degrades in approximately 6 to 12 months (Figure 1), eliminating the need for cumbersome suture fixation. The device consists of a polylactide polymer that incorporates 5 tines, each 4.5 mm long, to distribute tension over a wide area, maximizing fixation strength and holding power. After the cheek tissue is engaged, upward tension is applied to the anchoring leash, which is then sutured to the deep temporal fascia (Figure 2). It can be rapidly deployed via temporal or oral incisions in minutes and can be adjusted with ease.

Surgical Technique

The lead author (R.L.B.) began performing midface lifts in 1992 and has evolved his own technique from an open to endoscopic procedure. Surgery was performed under general anesthesia delivered through a flexible laryngeal mask airway, which was secured to the maxillary central incisors with dental tape. The infraorbital nerves, supraorbital nerves, and malar eminences were infiltrated with 30 mL of .5% bupivacaine with epinephrine 1:200,000. The subperiosteal plane of the lateral brow and midface were infiltrated with an additional 100

to 200 mL of lidocaine .2% with epinephrine 1:500,000. The eyes were covered with a protective polyurethane film (Tegaderm, 3M Corporation, Rochester, MN).

A 3-cm incision was made perpendicular to a tangent drawn radially from the lateral canthus to a point 4 cm above the root of the helix, within the hair-bearing scalp and dissected to the deep temporal muscle fascia proper. A 1-cm counter-incision was made just medial to the first incision at the temporal ridge to provide a second port for bimanual dissection, and to facilitate subperiosteal dissection of the lateral one third of the frontal bone no further medial than the supraorbital foramen/notch. This subperiosteal dissection was performed with a square Obwegeser dissector (Lorenz Instruments, Jacksonville, FL).

Using a round Obwegeser dissector (Lorenz Instruments, Jacksonville, FL), a tissue plane was easily separated over the deep temporal fascia proper within 1 cm of the lateral orbital rim. A 5-mm, 30-degree angle endoscope facilitates dissection along the lateral orbital rim, dividing the superficial temporal fascia attachment at the temporal ridge sharply to form a contiguous plane and optical cavity. Minimal dissection, sufficient to allow scalp retraction temporally, was performed in the subgaleal plane behind the hairline. Periosteum was elevated from the lateral orbital rim to the malar eminence, protecting the emerging zygomatic facial neurovascular bundle as much as possible. Every effort was made to avoid division of the medial zygomatic vein (sentinel vein), as it is a major drain for periorbital varices. Dissection was complete at the medial third of the zygomatic arch.

A 2-cm radial incision was made perpendicular to the buccal sulcus in the canine fossa (directly above the



Figure 3. **A, C, E,** Preoperative views of a 65-year-old woman. **B, D, F,** Postoperative views 6 months after endoscopic forehead and endoscopic mid-face lift with the biodegradable Endotine device used for fixation.



Figure 4. A, C, E, Preoperative views of a 58-year-old man. **B, D, F,** Postoperative views 6 months after endoscopic midface lift using the Endotine device, brow lift and bilateral lower lid blepharoplasty. Note the improvement in cheek contour and elimination of tear-trough deformity.

canine teeth) through mucosa only. Using a lighted Aufricht retractor or, preferably, a 2.0-mm endoscope, dissection was performed cephalad both medial and lateral to the infraorbital nerve, elevating periosteum as far

as the infraorbital rim. Proceeding laterally, elevation continued over the malar eminence connecting to the temporal pocket. The conjoined masseteric fascia¹ was sharply divided with scissors. The round Obwegeser dis-



Figure 5. A, C, Preoperative view of a 43-year-old woman. **B, D,** Postoperative view 5 months after endoscopic midface lift using the Endotine device, with periorbital Erbium laser resurfacing.

sector facilitated cleavage of the areolar plane superficial to the masseteric epimysium as far as the oral commissure or margin of mandible, if desired for greater jowl elevation. The pocket was irrigated with dilute antibiotic solution, and then all fields were sprayed with autologous fibrin sealant (Harvest Technologies, Plymouth, MA) and compressed for 5 minutes, followed by a thin coat of platelet-enriched autologous fibrin sealant (Harvest Technologies, Plymouth, MA).

The Endotine midface device was introduced through the temporal incision and deployed in the soft tissues lateral to the nasolabial fold to engage the 4.5-mm tines. Tension of the tail of the device elevated the midface to

the desired position. It was easy to reposition the tine platform to achieve the desired vector. A remarkable amount of tissue lift was achieved. The tail was secured with 2 figure-of-eight 2-0 PDS sutures, and excess tail was cut and discarded. The superficial temporoparietal fascia was distracted 2 to 3 cm behind the tail of the device to further elevate the lateral brow tissues. The 4 scalp incisions were each closed with a single stainless steel staple. The intraoral incision was closed with a running locking suture of 4-0 chromic for a watertight seal. A Barton's bandage was applied.

A clear liquid diet was mandated for 24 hours, followed by a soft diet and rinsing intraorally with Oxyfresh

Table. Summary of results

Patient No.	Pain assessment*	Surgeon satisfaction with fixation†	Patient aesthetic assessment‡	Patient satisfaction assessment§
1	0	5	4	4
2	4.8	5	4	4
3	3	5	3	4
4	2.5	5	4	4
5	7.7	5	4	4
6	1	5	4	4
7	0.3	5	4	4
8	3.5	5	4	4
9	5.8	5	4	4
10	0	5	4	4
11	0	4	4	3
Average	2.7	4.9	3.8	3.9

*Pain scale: 0 = no pain, 10 = extreme pain.

†1 = very dissatisfied, 5 = very satisfied.

‡1 = worse than baseline, 4 = dramatic improvement from baseline.

§1 = very dissatisfied, 4 = very satisfied.

(Oxyteam Worldwide, Inc., Coeur d' Alene, ID) to maintain oral hygiene. Cautious tooth brushing was permitted after 24 hours, and flossing within 3 to 5 days.

Results

Between October 2003 and October 2004, 31 patients underwent Endotine fixation for midface lift. The patient group comprised 7 men and 24 women ranging in age from 40 to 65 (mean age 49.25 years). Four patients had midface lifts as the sole procedure, and 27 had adjunctive facial cosmetic procedures. Results were evaluated with respect to ease of use/difficulty of insertion, postsurgical pain, adequacy and stability of fixation, side effects, complications, and patient and surgeon satisfaction. Follow-up ranged from 4 to 18 months.

All patients were judged to have satisfactory cheek elevation and enhanced contour (Figures 3 to 5) without evidence of recurrent midface ptosis or loss of elevation/fixation. There were no postoperative complications of infection, hematoma, or dehiscence. In a subset of 11 patients with long-term follow-up greater than 6 months, reported "pain in the treated area" averaged 2.7 at 1-month follow-up, using a scale in which 0 = no pain and 10 = extreme pain. Surgeon satisfaction with the fixation result averaged 4.9 (1 = very dissatisfied, 5 = very satisfied) at 1-month follow-up (Table). Patient self-

assessment of aesthetic outcome averaged 3.8 (1 = worse than baseline, 4 = dramatic improvement from baseline) at 1-month follow-up, and patient satisfaction assessment averaged 3.9 (1 = very dissatisfied, 4 = very satisfied) at 1-month follow-up.

Discussion

Indications for the endoscopic midface lift include elongation of the lower eyelid and attendant tear-trough deformity, descent of the malar fat pad, and drooping of the corners of the mouth. Because the plane of dissection is subperiosteal, there is less correction of nasolabial folds than might be desired otherwise. In patients who have undergone previous lower face and neck lifts, this provides a secondary vector to correct the ptotic tissues lateral to the mouth in the lower cheek.

Concepts about, and goals for, midface lifts have evolved greatly. Initially conceived as an improvement for the nasolabial folds, the present procedures now address the entire midface from the jowl to the eyelid. Between 1985 and 1990, Hamra² described malar fat repositioning as the "deep plane facelift." Yousif et al³ investigated the anatomy of the melolabial fold and found that the fold resulted from a descent of the malar fat pad and overlying attached skin. Owsley⁴ further refined malar fat repositioning combined with SMAS tightening. Stuzin et

al⁵ and Aston⁶ advocated malar fat repositioning and emphasized the superolateral vector. Mendelsohn⁷ described correction of the nasolabial fold by extended SMAS dissection with periosteal fixation. Dempsey et al⁸ believed that subperiosteal brow lift combined with midface lift with superior suspension achieved a total mobilization of the composite full-thickness soft tissues from the bony skeleton. Little⁹ described malar imbrication.

Psillakis et al¹⁰ and, subsequently, Ramirez et al¹¹ demonstrated improved suspension of the face by complete subperiosteal undermining of the midfacial bones medial to the piriform aperture. This suspension appeared to have the same influence on the nasolabial fold as the deep plane face lift: elevation of the ptotic malar fat pad to its original position with effacement of the fold. In 1996, Hester et al¹² described the “centrofacial approach for correction of facial aging” using the transblepharoplasty subperiosteal cheek lift. This technique has subsequently been modified to address eyelid malposition and the need for complicated canthoplasty procedures by redraping the inferior orbicularis muscle and suture suspension of the cheek flap to the lateral orbital rim.¹³ Endoscopic techniques are now commonplace in midface lifting and are recommended by Ramirez¹⁴ as a routine adjunct to standard face lifting.

In this series of 31 patients, including both men and women, facial configurations that included wide and narrow facial structure, marked loss of elasticity in the older patients, and minimal loss of elasticity in the younger group were equally amenable to elevation and fixation with the Endotine device. The 5 tines of the device provide secure fixation and disperse the tension equally, so that there is no suture relaxation (“cut through”) or stretching as may occur with a single suture point. Tissue disengagement from the tines with resultant loss of elevation has not been a problem, as the cheek tissue is relatively tight and adheres readily to the underlying device. Since the device degrades in about 6 to 9 months, mobilization off the maxillary periosteum is critical to allow the tissue to adhere and attach to the periosteum at a superior location, thus assuring a permanent elevation and fixation. These periosteal adhesions are very firm, and no re-descent of the tissues or recurrence of ptosis has been noted at 6- to 12-month follow-up.

Conclusion

The Coapt Systems midface Endotine device combined with the evolved midface procedure described previously

provided rapid, secure fixation without complications in this small patient study group, and eliminated the complicated and awkward suture techniques that have been an impediment to midface surgery. Larger clinical studies are in progress.

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