

Endoscopic Forehead-Lift Using a Bioabsorbable Fixation Device

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Endoscopic brow-lift is the method of upper face rejuvenation preferred by facial plastic surgeons and patients alike. The technique has undergone significant scrutiny regarding methods of fixation. Many techniques have been described, including external bolster dressings, tissue adhesives, Kirschner-wire fixation, cortical tunnels and troughs, and permanent or temporary screw and plate fixation. Many of these techniques are associated with postoperative alopecia, poor reliability, possible intracranial complications, and palpable hardware. Thus, the search for a safe, effective, reliable, and straightforward procedure continues. We describe our experience with an easy-to-insert bioabsorbable device that is fixed to the calvaria and provides multipoint fixation to the soft tissue.

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The use of endoscopy in performing the brow-lift has been readily accepted by facial plastic surgeons and patients alike. The technique provides successful brow elevation with less tissue damage, decreased postoperative edema and numbness, shorter recovery time, and more easily concealed surgical scars than the traditional coronal approach.^{1,2} These results have encouraged the development of new tools and concepts to make the endoscopic brow-lift safer and more reliable. There remains significant debate about the long-term results of endoscopic brow-lift. Many agree that complete periosteal release, complete transection of the glabellar musculature, and adequate, effective fixation of the forehead tissues to their elevated position are the key factors in this regard.

Vasconez et al^{3,4} first described the endoscopic forehead-lift in the early 1990s. The dissection was performed in the subgaleal plane and involved division of the procerus and corrugator muscles and scoring of the frontalis muscle. The fixation of the forehead and brow was not well described. Various techniques have been reported in the literature.⁵ These have included the placement of permanent or absorbable screws, plates, and tacks,^{6,7} Kirschner wires,^{8,9} bolsters,^{10,11} spanning sutures,¹² cortical tunnels and troughs

with suture placement,¹³⁻¹⁵ tissue adhesives,^{15,16} and various nonfixation techniques. The amount of flap elevation during endoscopic lift is equal to that of the coronal brow-lift. Thus, multiple points of adequate fixation are of paramount importance to avoid brow droop.¹⁷ Most reported techniques have provided only 1 point of contact with the elevated tissues. This point usually depends on a suture that may tear through the soft tissues and affect brow-lift reliability. We present our experience with a new technique involving a bioabsorbable fixation device that uses multiple points of fixation to the elevated tissue to create a wide distribution of holding strength.

METHODS

PATIENT ASSESSMENT AND POSITIONING

The shape and symmetry of the brows are assessed with the patient in the upright position. Manual elevation of the brows is performed, and their location relative to the supraorbital rim is noted. The supraorbital foramen is palpated, and the course of the supraorbital nerve is marked. The course of the supratrochlear nerve is marked 1 cm medial to the supraorbital nerve (**Figure 1**). The patient is placed in a slight reverse Trendelenburg position on the operating room table, and the patient's hair is taped in bundles away from the incisions.

ANESTHESIA

The surgery is usually performed under intravenous sedation with local anesthetic. After the pa-

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Figure 1. Preoperative markings of supraorbital and supratrochlear nerves and proposed incision sites.

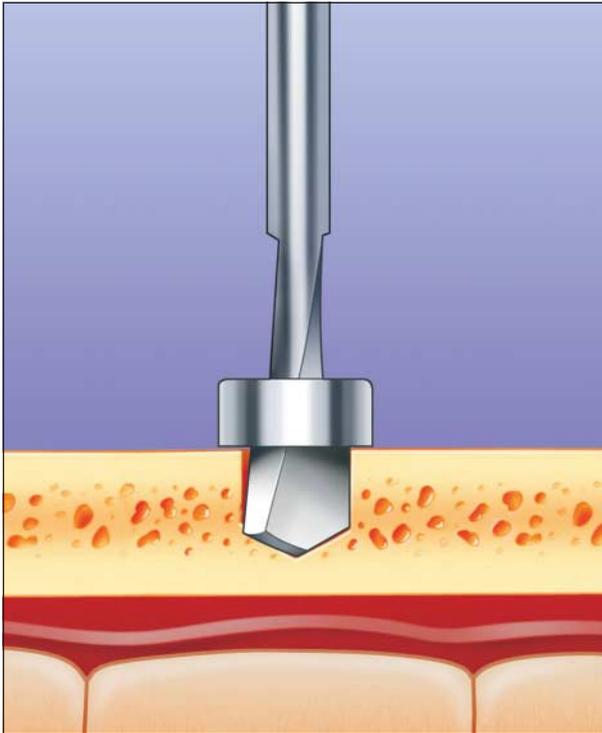


Figure 2. Endotine drill bit with sleeve (Coapt Systems Inc, Palo Alto, Calif). Note the monocortical placement.

tient is sedated, local injections of a 50/50 solution of 2% bupivacaine with 1:200 000 epinephrine and 2% lidocaine hydrochloride with 1:200 000 epinephrine are given to block the supraorbital and supratrochlear neurovascular bundles and anesthetize the forehead flap and planned incision sites. The patient is then prepared for surgery and draped in the usual fashion.

INCISIONS

A series of 4 incisions (12-14 mm long) are made in the scalp 2 cm posterior to the hairline (2 paramedian and 2 temporal) with a radiofrequency device. The paramedian incisions are placed

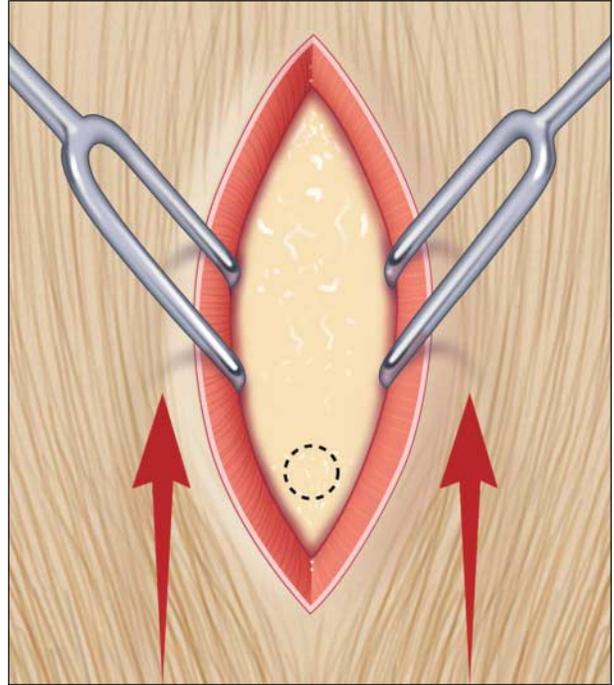


Figure 3. Drill hole placement.

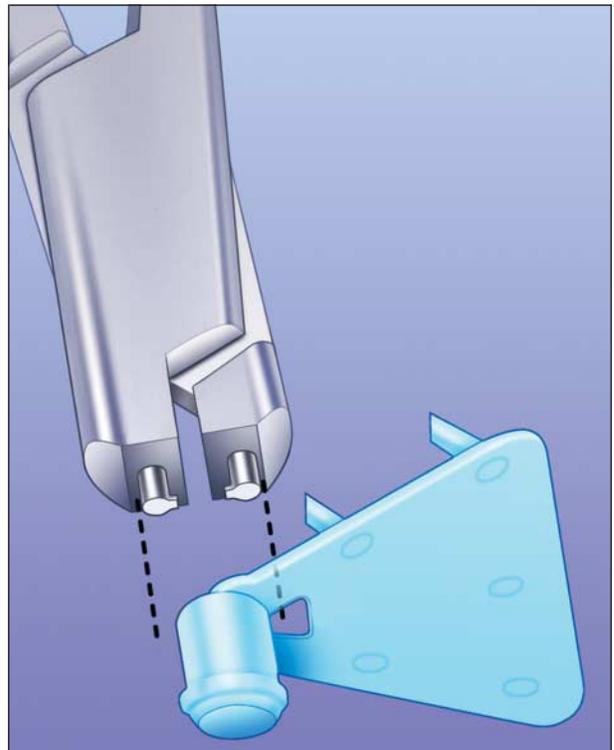


Figure 4. Endotine Forehead 3.0-mm device and insertion tool (Coapt Systems Inc, Palo Alto, Calif).

in a line parallel to the supratrochlear vessels down to the calvaria. The temporal incisions intersect a line made from the lateral aspect of the nasal ala to the lateral canthus and are made to the deep temporal fascia.

DISSECTION

Through the temporal incision, dissection is carried out on top of the superficial layer of the deep temporal fascia and ex-

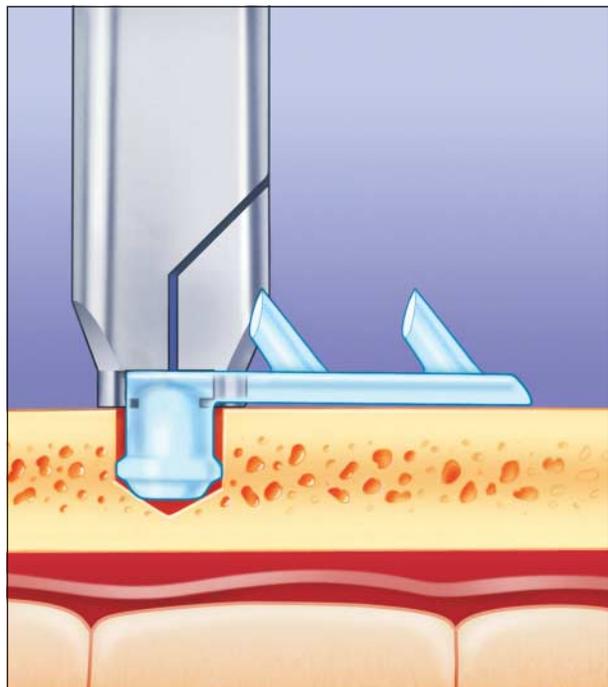


Figure 5. Insertion of the Endotine Forehead device (Coapt Systems Inc, Palo Alto, Calif).

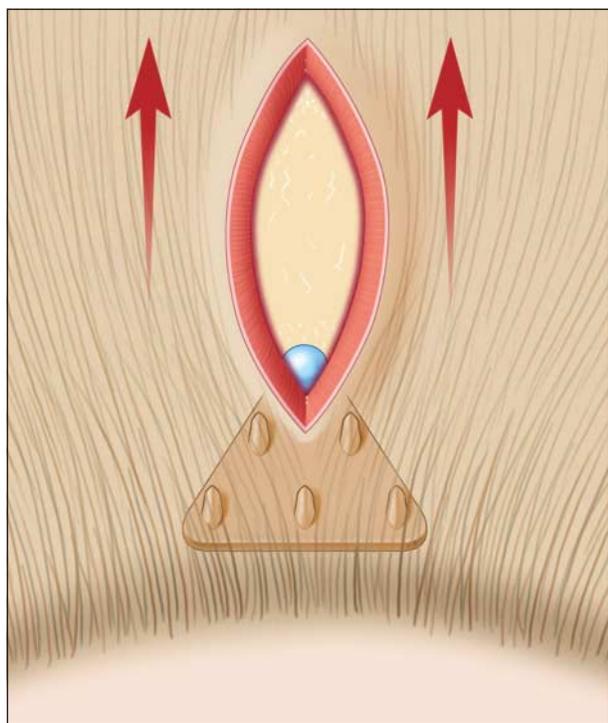


Figure 6. Elevate tissues cephalad. The device is anterior to the incision.

tended to the temporal line anteriorly and along the superior and lateral orbital rim and zygomatic arch inferiorly. Through the paramedian incision, subperiosteal dissection is carried down to within 1 cm of the supraorbital rim and glabella. The temporal pocket is connected to the subperiosteal pocket along the temporal line. At this point, the 5-mm, 30° endoscope is inserted to visualize the remainder of the dissection. The Ramirez orbital rim dissector is used to dissect the periosteum off the lower portion of the forehead to the level of the supraorbital

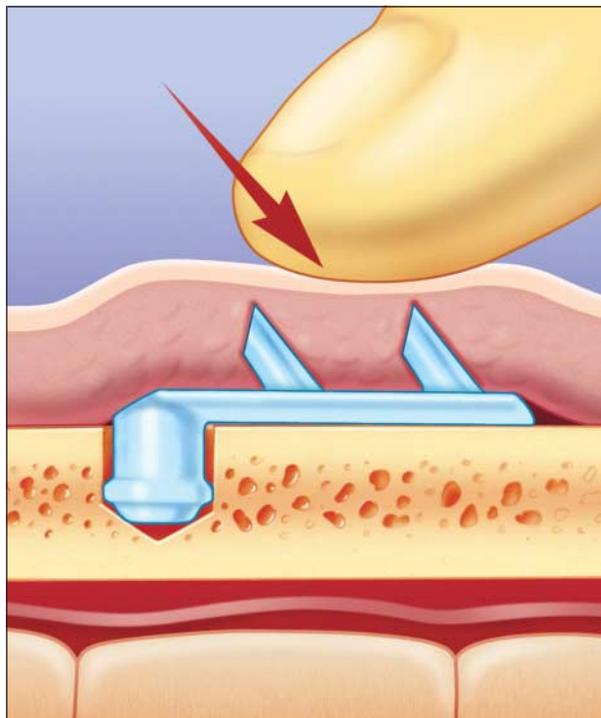


Figure 7. Apply digital pressure to the tines to affix tissues to the Endotine Forehead device (Coapt Systems Inc, Palo Alto, Calif).

rims. The supratrochlear and supraorbital nerves are identified and preserved. The Ramirez nerve dissector is then used to incise the periosteum on either side of the supraorbital and supratrochlear nerves along the entire arcus marginalis.

MUSCLE DIVISION

The corrugator and procerus muscles are identified medial to the neurovascular bundles. The muscles are cauterized and divided with radiofrequency cutting cautery. The forehead is then manually lifted to confirm complete release from its orbital attachments.

FIXATION

The brow is first fixed laterally to the temporal fascia. A 2-0 braided polyester suture is placed through the incision line and brought through the skin as close to the brow as possible. This is usually placed just anterior to the hairline to remove all tension from the incision line and decrease the possibility of alopecia. A 15-blade knife is used to make a small stab incision through the epidermis. The suture is passed back through this stab incision and secured to the temporalis fascia.

The midline fixation with the Endotine Forehead device (Coapt Systems Inc, Palo Alto, Calif) is then performed. A hand drill or low-power electric drill affixed with the Endotine drill bit and sleeve is used to create 2 monocortical holes at the anterior edge of the 2 paramedian incisions (**Figure 2** and **Figure 3**). A drop of octyl-2-cyanoacrylate (ISO-DENT; Ellman International, Ocean-side, NY) is placed into each hole. The Endotine Forehead 3.0-mm devices are then seated firmly against the outer table in each hole using the provided insertion device (**Figure 4** and **Figure 5**). The scalp is elevated cephalad for fixation on the tines (**Figure 6**). Digital pressure is used to ensure penetration of the periosteum by the tines (**Figure 7**).

The Endotine Forehead device is composed of a bioabsorbable copolymer of lactic and glycolic acids and completely dissolves within 6 to 12 months. The scalp incisions are closed



Figure 8. Patient 1 before (A) and after (B) endoscopic forehead-lift.



Figure 9. Patient 2 before (A) and after (B) endoscopic forehead-lift.



Figure 10. Patient 3 before (A) and after (B) endoscopic forehead-lift.

with staples, and a pressure dressing of Kerlix (Tyco Healthcare Group LP, Mansfield, Mass) and Coban (3M Healthcare, St Paul, Minn) is applied to the forehead and removed after 24 hours.

POSTOPERATIVE CARE

Staples are removed from the scalp between 7 and 10 days post-operatively. Patients may be able to feel the Endotine device for several weeks after surgery. Some transient numbness at the incision site is not unusual.

RESULTS

Since we began using the Endotine Forehead device in March 2003, 53 patients have undergone endoscopic brow-lift. Satisfactory forehead rejuvenation has been obtained in all but 1 patient. This patient had recurrent lateral brow ptosis requiring only lateral temporal fixation. The medial brow maintained adequate elevation with the Endotine device. This compares with our endoscopic brow-lift

revision rate of 10% prior to using the Endotine Forehead device. **Figures 8, 9, and 10** show preoperative and postoperative views of patients who underwent endoscopic forehead-lift with the Endotine device.

COMMENT

Permanent fixation of the brow is brought about by reattachment of the periosteum to the skull at the new point of brow elevation. Recent researchers have found this reattachment to be virtually complete within 2 weeks of the initial operation.^{18,19} Romo et al²⁰ and Sclafani et al²¹ showed adherence to occur after 6 to 12 weeks. Numerous techniques for fixing soft tissue long enough to allow reattachment of the periosteum have been described. External compression dressings and skin advancement techniques have been unpredictable in their results due to their lack of prolonged fixation. Rigid fixation techniques, including permanent and temporary techniques, have been more reliable in providing lasting results.

The Endotine Forehead device is a safe, simple, effective, and reliable method of forehead fixation. Advantages of using the Endotine device include no metal screws protruding through the scalp that can cause wound irritation and alopecia; no sutures that may pinch hair follicles also leading to alopecia; and no need for removal of the device because the Endotine absorbs over time. The device's unique structure provides multiple points of contact with the elevated tissue to create a wide distribution of holding strength that does not rely on a single suture. In the event of asymmetry noted postoperatively, it is also possible to redrape the tissues over the device to improve the aesthetic result.

Fixation techniques that transfer the tension of the suspension to the scalp incisions will result in alopecia. Fixation of the Endotine device to the calvaria eliminates the concern of undue tension on the scalp. The preformed burr drills to a depth of 3.95 mm thus preventing inadvertent intracranial injury that may occur with calvarial trough and bridge techniques.

Possible complications of use of the Endotine fixation system include extrusion of the device, the need for repositioning owing to asymmetry, and patient awareness of the device. Prior to absorption, the device may be palpable in thin-skinned individuals. Tenderness over the device is common. Each Endotine device costs \$175, thus adding to the expense of the procedure.

In conclusion, the Endotine Forehead device provides a safe, simple, and effective method of endoscopic

forehead fixation after brow-lift. The device need not be removed, provides a wide distribution of holding strength, and is adjustable in the postoperative period.

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