Endoscopic Brow and Forehead Lift: A Case for New Technology

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As with most things in life, the passage of time usually brings progress through advancing technologies. At one time, the horse was a state-of-the-art military fighting machine and a simple compass represented advanced navigational technology. Things come and go and while some leave a lasting impact others are replaced, never to be revisited. Surgical techniques are continually evolving, and while quantum strides have been made in the last century, just because something is new, this does not make it better. For this reason we all owe it to our respective professions to carefully evaluate emerging trends and technologies before abandoning procedures that are proven to be safe and effective. Some surgeons too eagerly embrace new technologies, while others are late in acceptance or in some cases never progress.

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Elevation of the ptotic brow and forehead complex has long been recognized as integral to upper facial rejuvenation. Many techniques have been described for elevating the brow and forehead.[1-7] These include direct techniques that involve suspension of the brow to the forehead periosteum through the upper blepharoplasty incision, tissue excision above the brow, and tissue excision higher in the forehead creases. Historically, the most common technique was (and in some cases still is) coronal brow and forehead lifting. This surgical approach is very familiar to most oral and maxillofacial surgeons from our experience with trauma, craniofacial procedures, and temporomandibular joint surgeries. Although the coronal brow and forehead lift is described with various modifications (pretrichial and trichophylic incisions), the basic technique involves incision from the preauricular area on one side, across the coronal portion of the skull, and extending to the preauricular area on the contralateral side. After this large flap is developed, various techniques are performed to release the forehead and brows followed by excision of redundant scalp tissue, elevation of the structures, and fixation of the tissues.

There is no doubt that this procedure can produce elevation and rejuvenation of the brow and forehead, but many problems exist with this technique even in the most experienced hands. Elevation of the hairline, alopecia, paresthesia, and anesthesia of the scalp sensory innervation are common sequelae of coronal brow and forehead lifting.

The 1970s and 1980s brought endoscopic surgical techniques to the forefront of surgery and virtually all specialties saw this technology applied to their respective operations. In many cases, especially in orthopedics and general surgery, endoscopic technology revolutionized many surgical procedures. Operations could be performed more conservatively, patients experienced shorter recoveries, and the health care system saved money because procedures that once required days of hospitalization could now be performed in an outpatient setting. In other cases, such as temporomandibular joint arthroscopy, these procedures did not necessarily replace existing open surgical techniques, but instead added alternative methods of dealing with old problems in a more conservative method. They also accelerated and intensified our diagnostic appreciation of the form and function of the temporomandibular joint.

I would agree that some arthroscopic procedures have so many incisions and are so time consuming for the average surgeon that the "old way" of surgery is an advantage. I also feel that endoscopic brow and forehead lifting is a superior and effective technique when compared with coronal open techniques. I cringe when I hear a surgeon say that "endoscopic brow lift surgery does not work." It is the same mentality that was pervasive in the 1980s when many people said that "dental implants don't work." This type of surgical aspersion frequently translates into, "I

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do not know how to do this technique" or "I tried this technique and it did not work for me." Most of us have had the experience of attempting a new technique and not being convinced that it was a benefit. A progressive surgeon will explore these techniques, but a forthright surgeon will admit that the failure of this new technique may be a result of his or her inexperience.

The endoscopic brow and forehead lift definitely has a significant learning curve. It requires expensive, dedicated armamentarium and the development of the required surgical skills and dexterity. Furthermore, it requires an intimate knowledge of the anatomy associated with the periorbital complex. I would say that it takes at least 20 cases of endoscopic brow and forehead lift to develop and appreciate this technique.

The advantages of endoscopic brow and forehead lift when compared with conventional coronal techniques are numerous. The procedure is performed through a series of small incisions that are much less invasive than coronal techniques. There is, in my experience, much less problem with supraorbital and supratrochlear anesthesia and paresthesia. Hair loss is a rare problem and bleeding is much less than with the coronal techniques. The scars produced by endoscopic techniques are rarely seen, whereas coronal techniques frequently produce large hypopigmented scars. Patient acceptance of endoscopic techniques is much higher than the coronal technique. When I mention a brow lift to patients, it never ceases to amaze me how many individuals have seen a coronal brow lift on educational TV and are intimidated by the invasiveness of the technique to the point of never wanting a brow lift. They are relieved to know that a new, more conservative option exists.

Again, I personally feel that surgeons that malign endoscopic brow lift either have not taken the time to learn this technique or have had unfavorable experiences with it. I believe that the biggest mistake novice surgeons make with endoscopic brow lifting is the failure to release adequate tissue in the lateral orbital area. Any subgaleal or subperiosteal brow lifting technique is predicated on total release of the bound tissues from the vertex of the skull to the arcus marginalis and around the lateral orbital rims onto the zygoma. Plain and simple, if these tissues are not adequately released then the brow and forehead complex cannot be elevated. A common mistake and misconception occurs unknowingly to many surgeons. Because the patient is supine and gravity is not exerting the normal downward pull on the brow and forehead, a false sense of lift is often felt by the surgeon and staff. It appears that the brow and forehead are elevated because of the supine position. When the surgery is completed and the patient is once again upright, gravity re-enters the picture and the brows are not elevated. In my experience, a brow that looks overly elevated in the supine position will be in good position when the patient is upright.

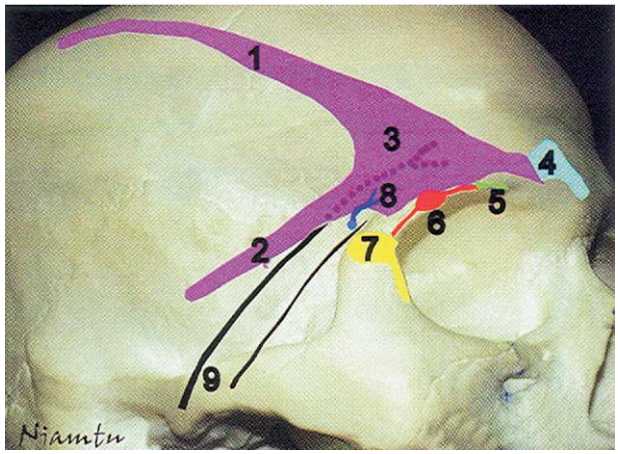

FIGURE 1. This diagram shows the primary anatomy that needs to be freed bilaterally to adequately release the brow and forehead complex. 1, superior temporal septum; 2, inferior temporal septum; 3, temporal ligamentous adhesion; 4, supraorbital ligamentous adhesion; 5, periorbital septum; 6, lateral brow thickening of periorbital septum; 7, lateral orbital thickening of periorbital septum; 8, sentinel vein (medial temporal zygomatic vein); 9, temporal branch of facial nerve.

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Getting back to the main cause of failure of endoscopic brow lift is the discussion of inadequate dissection of the lateral orbital rim connective tissue. Many connective tissue planes merge in the area around the superior/lateral and lateral orbital rim (Fig 1).

These tissue planes are also in approximation to the so called sentinel vein and the frontal branch of the facial nerve. Finally, it is difficult to dissect these ligamentous attachments endoscopically, especially on individuals with a high hairline and a rounded frontal bone. I have found that these tissue attachments can be safely dissected while protecting the frontal nerve by keeping the dissection extremely intimate with the plane of the superficial layer of the deep temporal fascia, which is deep to the temporal parietal fascia that contains the frontal nerve. In addition, instead of using periosteal dissectors in this area, scissors can be used to gently push/cut in this plane.

My biggest personal revelation in terms of dealing with the lateral orbital rim connective tissue attachments has been the incorporation of simultaneous blepharoplasty with virtually all endoscopic brow lifts. Close observation has shown me that if someone has enough lateral hooding and brow ptosis to require a brow lift, then he or she is also a candidate for upper lid blepharoplasty. On the surface this may sound excessive, but those surgeons who have performed

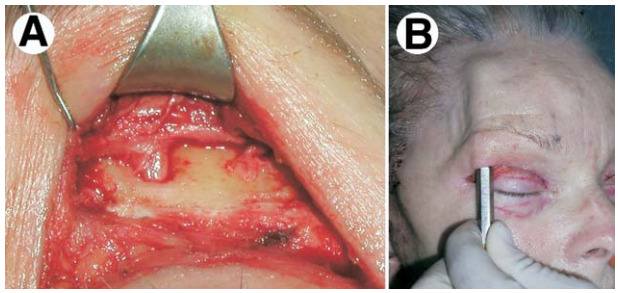

FIGURE 2. *A* shows the supraorbital nerve visualized through the upper blepharoplasty incision. This area is easily accessed from the eyelid incision (*B*). Dissection in this area is then not necessary with the endoscope from above, which greatly facilitates the procedure.

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many brow lifts can attest that even in cases of adequate brow elevation, dermatochalasis (eyelid skin wrinkling) and steatoblepharon (fat pseudoherniation of the eyelid) frequently still exist. The cumulative advantage of brow lift, skin and muscle excision, and fat removal with or without orbital rim recontouring is that it produces a more esthetic brow-forehead-eyelid complex than either procedure by itself. The real advantage, however, is the ability to perform extensive dissection through the upper blepharoplasty incision. As stated earlier, I routinely perform upper eyelid blepharoplasty with virtually all endoscopic brow lifts. An exception would be a young individual without significant dermatochalasis or a patient who has had previous blepharoplasty and may be at risk for lagopthalmous (inability to close the eyelids). When performing simultaneous blepharoplasty and endoscopic brow lift, I routinely excise one half of the amount of eyelid skin as I would if I were performing blepharoplasty alone. Once I have performed the blepharoplasty, I incise the lateral orbital periosteum in the frontozygomatic area. I then use a periosteal elevator to tunnel in a subperiosteal plane. I dissect first inferiorly to the malar process, then incise the supraorbital periosteum and dissect medial to visualize the supraorbital nerve (Fig 2A). Finally, I dissect superiorly to the hairline (Fig 2B).

By doing this dissection through the blepharoplasty incision I can visualize and protect the sensory nerves and more easily free the connective tissue in this difficult area than could be done from above with the endoscope. This approach and dissection enables much of the surgery to be performed without the endoscope.

After the blepharoplasty dissection, I proceed with the standard endoscopic approach through 5 portals. I use a midline incision, 2 lateral incisions, and 2 temporal incisions. On the temporal incisions I excise a 1 cm skin ellipse instead of a straight line incision. I feel this assists in elevating the lateral brow. After completing the routine endoscopic dissection I pay close attention to the lateral orbital rim area. Even though I have previously dissected this area through the upper blepharoplasty incision, some remaining connective tissue adhesions are often present in this area. With the endoscope in the lateral portal, I place my finger in the temporal incision and feel the incision. I then insert facelift scissors into the temporal incision and, under endoscopic visualization, I cut these attachments. This frees up the entire lateral periorbita. Figure 3A shows my finger being stopped by these adhesions and Figure 3B shows my finger freely advancing to the eyelid after lysis of this connective tissue. I feel that this level of dissection is absolutely mandatory for successful lifting.

Finally, the brow needs to be fixated. After using all common techniques including bone plates, bone tunnels, removable screws, and posts,[8-12] I have settled on resorbable fixation posts (Endobrow Suspension Push Screw; Walter Lorenz, Inc, Jacksonville, FL). This system is safe, easy, and fast. A 4 mm drill with a guarded stop is used to make burr holes in the outer calvarial table, which should correspond to the area of maximum anticipated brow elevation. In most cases this is on a vertical line that corresponds with the junction of the middle and lateral one third of the brow or a line tangent to the lateral limbus of the iris. The burr hole is drilled with a powered or hand drill and the 4 mm guarded stop has proven effective in hundreds of drill holes in my experience. This system uses smooth posts without threads and they easily push into the burr hole and are retained with friction. There is a hole through the top of the screw and the suspension suture is threaded through the hole and secured (Fig 4).

I routinely do not suspend the central incision because this area is usually adequately supported by the lateral incisions and elevation of the medial brow produces a "surprised" look. Another caveat that can

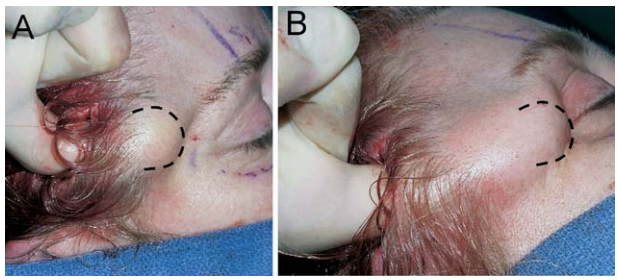

FIGURE 3. *A* shows the inability to advance the finger past the fortified connective tissue planes in the lateral orbital rim area. *B* shows the finger advanced to the eyelid after careful lysis of these ligamentous attachments.

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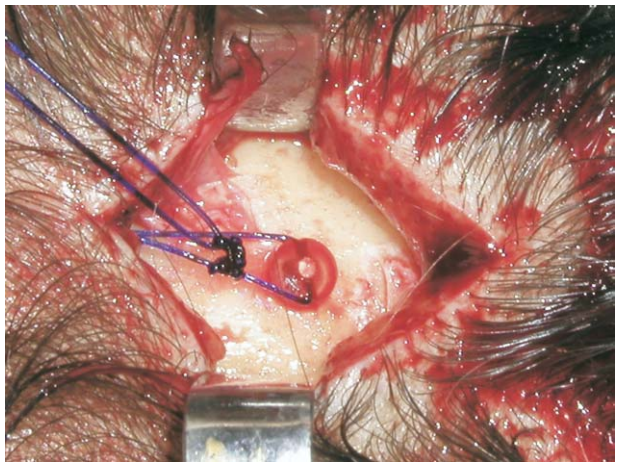

FIGURE 4. The Lactosorb fixation push screw is shown in place with a 2-0 PDS suture attached to the distal edge of the lateral scalp incision.

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affect the success of the fixation step is to take a double bite of tissue when securing the distal end of the lateral incision to the resorbable fixation post. A single bite of tissue can too easily pull through the tissue and affect the fixation. This is also applicable to the temporal incisions. Finally, I am not a believer in disrupting the brow depressors (procerus and corrugators), as is usually described in classical endoscopic brow surgery. I believe that any minor myotomy of this musculature will only grow back and heal and any major disruption will potentially cause a depression defect in the glabellar area. Our trauma and reconstructive experience has shown us that large areas of muscle mass can be excised, only to heal back with perfect function.

After 8 years of experience with endoscopic brow and forehead lifting I am convinced that several factors have improved my results, predictability, and stability; namely, adequate dissection of the lateral orbital rim, predictable fixation, and simultaneous upper blepharoplasty with trans-blepharoplasty dissection. I have experienced several cases where I was unable to successfully elevate the brows to the desired level. I asked all of these patients to bring me a high school picture and none of them ever had elevated brows. I believe that in patients who have never had an arched or elevated brow that it may be more difficult to elevate their brows and keep them there. Obviously, I can only base this on empirical experience but I now routinely examine younger photos of the patient preoperatively.

In conclusion, I believe that endoscopic brow and forehead lift offers many advantages to the patient and surgeon when compared with coronal techniques. More conservative subcutaneous open brow techniques offer some advantages over full coronal incision techniques. One drawback of the subcutaneous open brow technique is the inability to perform aggressive laser skin resurfacing over the thin subcutaneous flap. I have performed aggressive, multipass laser skin resurfacing over the endoscopic brow flap without a problem.

Finally, I feel that it takes more experience to master the endoscopic technique and that until the point of competence most problems are proximal to the endoscope (ie, the surgeon).

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