The endoscopic-assisted forehead-lift has rapidly emerged as a very real alternative and probable replacement for the classical forehead-lift because of its equivalent results and minimal sequelae. In comparison to the variety of incisions, dissection planes, and muscle modifications found in classic forehead-lift procedures, the endoscopic technique encompasses an equal diversity of operations. A review of the historical evolution of the procedure will place these operations in perspective.

Evolution
In September 1992, at the annual meeting of the American Society of Plastic and Reconstructive Surgeons, two papers were presented on endoscopic forehead-lift and frown muscle excision. The most extensive was Vasconez et al. which describes an extensive research project into the clinical applications of endoscopic techniques for aesthetic surgery culminating in a coronal face-lift operation. The salient points of this paper are as follows:

1. via short access incisions behind the anterior hairline, a visualization pocket was created for a rigid 5-mm endoscope;
2. a subgaleal dissection was performed, followed by resection of the corrugator and procerus muscle;
3. posterior scalp elevation allowed the forehead to slide posteriorly, thereby unfurling the forehead; and
4. anchoring of the forehead at the desired level was intimated.

The face-lift was then done in the subcutaneous plane. Liang and Narayanan report their experience using both the endoscope and the neodymium yag contact laser for frontalis and corrugator muscle excision in both cadavers and clinical patients. Of interest is their use of the subgaleal plane and carbon dioxide insufflation. Once the technique was developed in cadavers and the extent of muscle resection confirmed by direct inspection, they then applied the technique to six patients with isolated frown lines whose correction did not warrant a full coronal forehead-lift. From these papers, several important points emerge. First, the endoscope was being used successfully in aesthetic procedures. Second, two different operations were emerging: frown muscle excision and the complete forehead-lift. Third, the laser was being combined with the endoscope.

The next major contribution came from Isse, who advocated the subperiosteal approach with complete division of the peristium, release of the corrugator muscle, preservation of the frontalis, and fixation using small microscrews. Isse also made a crucial technical innovation—the extended sheath/retractor that covers the endoscope. This instrument allows the surgeon to elevate the skin using the endoscope without obscuring the view. Also, attached ports allow for both irrigation and suction. With these advances, Isse was able to achieve results comparable to classic forehead-lifts.

Daniel and Daniel and Ramirez approach endoforehead rejuvenation using five different operations including the following:

1. frown muscle excision via the subgaleal plane;
2. as part of a complete face-lift, the frown muscles are excised while the lateral brow is ebulated and fixed in a temporal direction using the endoscope;
3. forehead-lift using an anterior hairline incision/subcutaneous dissection plus a subperiosteal muscle resection/periosteal release;
8. Endoforehead: Subperiosteal Approach

4. complete forehead-lift via the subperiosteal plane; and
5. a combined endoforehead/endoface-lift.

Based on this experience with both the subgaleal and subperiosteal approach, I prefer the latter because of the long-term fixation, soft tissue release, visualization, and simplicity. Although the aesthetic objectives of an endoforehead procedure are multifactorial, correction of brow ptosis is the most critical and difficult objective to obtain because frown muscle excision is relatively comparable irrespective of approach. The most important distinction is how to fix and maintain the eyebrows at a higher level. Because periosteum rigidly adheres to bone, it is logical to assume that it will reattach rigidly at the more desirable higher level.

Anatomy

The relevant surgical anatomy for endoscopic forehead-lift can be divided into the scalp and forehead skin, muscles, fascia, and nerves.

Scalp/Forehead

The scalp is composed of the classic five layers: skin, subcutaneous tissue, aponeurosis, loose space, and periosteum. One of the critical distinctions is the relationship between the galea, the subgaleal space, and the periosteum. Essentially these layers and spaces fuse 1 cm above the supraorbital rim, which means that in the classic forehead-lift, the galea is penetrated to allow access to the corrugator muscle as well as release of the forehead. Of critical importance, the forehead is more extensively released if a subperiosteal dissection is done, followed by division of the periosteum along the periorbital rim. Periosteal dissection alone is not the answer but rather the addition of transecting the periosteum and spreading it, thereby insuring total release.

Muscles

The muscles are important in determining the shape and position of the eyebrows as well as the location and severity of the frown lines. The muscles consist of frontalis/epicanthus, procerus, orbicularis oculi/depressor supercilii, and corrugator. The frontalis muscle is actually part of the epicranial muscle, which consists of occipital belly-galea aponeurosis-frontal belly. The occipitalis has a bony origin from the superior nuchal line of the occipital bone and inserts in the galea. The frontalis originates within a split in the galea and inserts into the brow skin after penetrating the orbicularis oculi—there is neither bony insertion nor origin. The frontalis is essentially the only eyebrow elevator, and its preservation is recommended by most functional surgeons. The procerus muscle is truly a nasal muscle as it originates from the osseocartilaginous vault and its insertion is into the forehead skin. The procerus’s function is to dilate the nasal cavity, but as a consequence it draws down the medial angle of the eyebrow and produces transverse wrinkles at the nasal/forehead junction. The orbicularis oculi is obviously considered a muscle of the eyelid, yet its orbital portion is clearly a critical component of the forehead. By definition, the orbital portion originates from three sources: the frontal bone, the maxilla, and the medial palpebral ligament. The orbital portion forms a complete ellipse around the eye without interruption at the lateral palpebral raphe. These fibers extend outward into the temporal area, but the upper portion blends with the corrugator and frontalis. When strongly contracted, the forehead skin is drawn toward the medial angle of the orbit. The corrugator muscle arises from the medial end of the orbit, runs upward and sideways between the palpebral and orbicularis portion of the orbicularis oculi, and inserts into the skin above the middle portion of the orbit. Traditionally, the corrugator is considered the muscle of suffering as it draws the eyebrows downward and to the center of the face. The origin of the depressor supercilii is a point of conflict; some authors feel it is part of the corrugators, and others say it is part of the orbicularis oculi. It is considered a distinct entity, requiring resection in only 10–15% of cases.

Fascia

The forehead fascia and the spacial relationships between its various components comprise the key to the periorbital dissection and preservation of the frontal nerve branch. Unfortunately, fascial terminology is very confusing, with multiple names for the same structure. To avoid problems, the author will use the Ramirez terminology. From a conceptual viewpoint, there are three areas of interest: temporal, arch, and junctional. Fascia in the temporal area consists of the superficial temporal fascia (temporoparietalis), the subgaleal fascia (innominate fascia), and the temporal fascia proper, which splits into two lamina—the intermediate temporal fascia and deep temporal fascia. The temporal dissection is done on top of the temporal fascia proper. It is important to note that there are three fat pads: superficial, intermediate, and deep. The critical factor in the inferior extent of the temporal dissection is recognition that the frontal branch of the facial nerve runs through the substance of the superficial temporal fat pad. If one elects to continue the dissection down to the zygomatic arch, a rare necessity in most forehead-lifts, it is then essential to pierce the intermediate temporal fascia 1.0–1.5 cm above the arch to avoid injuring the frontal branch, which is vulnerable.