Technical Considerations in Endoscopic Brow Lift

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KEYWORDS

• Endoscopic • Brow lift • Surgical procedure • Plastic surgery • Aging face

KEY POINTS

- The goal of endoscopic brow lifting is stabilization of the brow at an aesthetically ideal height and orientation.
- The procedure results in reliable and reproducible surgical outcomes.
- A full understanding of the surgical anatomy, especially in the temporal dissection pockets, will help to prevent complications and optimize results.
- An understanding of brow aesthetics is necessary before beginning this procedure.
- There is debate as to the best method of brow fixation.
- A thorough understanding of the endoscopic brow-lift equipment enables a safe, efficient, and effective procedure.

INTRODUCTION

The breadth of human emotion is conveyed through our eyes; thus, the eyes must play a fundamental role in aesthetic surgery of the face. During the aging process, there is a gradual loss of tissue elasticity and forehead rhytids become more prominent. Descent of the brow may ensue and, in time, may contribute to lateral upper eyelid hooding and visual field deficits. This brow ptosis and lateral hooding may be misconstrued as fatigue, tiredness, and lethargy, despite good rest, energy, and health. An endoscopic brow lift, often in conjunction with blepharoplasty, rhytidectomy, and volume replacement, aims to restore a more youthful and rested appearance. (Terella AM, Wang TD. Debate on current topics in facial plastic surgery: upper face rejuvenation. *Facial Plastic Surgery Clinics of North America*. Submitted for publication, October, 2011.)

The goals of any brow-lifting procedure are to stabilize the brow at an aesthetically ideal height and orientation and provide reproducible and lasting results while concealing scars and avoiding the stigmata of a facial plastic surgery: hairline elevation, overelevated brows, or a quizzical appearance. (Terella AM, Wang TD. Debate on current topics in facial plastic surgery: upper face rejuvenation. *Facial Plastic Surgery Clinics of North America*. Submitted for publication, October, 2011.) The authors emphasize the concept of brow *stabilization* instead of brow *elevation*. Rather than raising the eyebrows, the goal is to fixate the brows to minimize progressive brow ptosis. These goals were the impetus for developing the endoscopic brow-lift technique.

Since first being described by Isse in 1992,[1] the endoscopic brow lift has become a technique capable of producing reliable and lasting brow restoration. This approach allows for correction of both brow ptosis and glabellar rhytids. As the authors discuss, meticulous surgical technique, adherence to anatomic dissection planes, and direct visualization used at key points in the

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procedure enables a safer, more-complete dissection and ultimately a better outcome.

ANATOMY

The ability to limit morbidity is the primary advantage of the endoscopic technique over more traditional coronal approaches. A detailed understanding of forehead, scalp, and temporal anatomy serves as the basis for a safe, efficient, and successful endoscopic procedure.

It is generally accepted that the supraorbital ridge separates the forehead and the midface, whereas the hairline separates the forehead from the scalp. It is effective to discuss the brow, forehead, and scalp anatomy in respect to layers. This region is commonly divided into 5 layers:

1. Skin
2. Subcutaneous tissue
3. Aponeurosis (galea)
4. Loose areolar tissue
5. Pericranium

A layer of thick skin overlies and is fixed to the subcutaneous tissue by fibrous septa traversing from the skin to the galea aponeurosis. The galea aponeurosis lies deep to the subcutaneous tissue and is a fibrous fascial layer that connects the frontalis and occipitalis muscles. It represents the continuation of the superficial musculoaponeurotic system (SMAS) layer of the forehead and scalp. The galea sits on top of loose areolar tissue, which separates the galea from the pericranium, and provides for relatively free movement of the galea over the pericranial layer. The pericranium densely adheres to the skull.

Brow Muscles

The brow musculature consists of the frontalis, procerus, and the paired corrugator muscles. Each of these muscles independently contributes to brow positioning, lateral eyelid hooding, and forehead/glabellar rhytids. In the discussion of brow lifting, it is useful to classify these muscles into *brow elevators* and *brow depressors.* The frontalis muscle is the primary brow elevator and is responsible for deep horizontal brow rhytids. It originates from the galea and inserts into the dermis via fibrous septa. The main depressors of the brow include the procerus muscle, the paired corrugator supercilii, and the paired orbicularis oculi musculature. The procerus originates from the nasal bones and upper lateral cartilages and inserts into the caudal border of the frontalis muscle. The contraction of this muscle results in the horizontal rhytids in the glabella region. The paired corrugator supercilii muscles originate from the nasal process of the frontal bone and attach in an interdigitating fashion to the frontalis and orbicularis oculi muscles. The contraction of the corrugators will medialize and depress the brow, thus creating vertical glabellar furrows. The orbicularis oculi serves the important role of palpebral sphincter and is a rather minor depressor of the brow (**Fig. 1**).[2,3]

Brow Innervation

The temporal branch of the facial nerves provides motor innervation to the brow musculature and the superior portion of the orbicularis oculi muscle. The nerve leaves the parotid gland deep to the SMAS and crosses the zygomatic arch over the middle third, traveling between the SMAS and periosteum. As the nerve travels above the zygomatic arch, it travels within the temporoparietal fascia (TPF) until inserting into the undersurface of the musculature. The muscular insertion point is on average 1 cm above the supraorbital rim.[4] The course of the nerve can be approximated by drawing a line spanning a point 0.5 cm anterior to the tragus and 1.5 cm lateral to the lateral taper of the brow.[5]

Afferent branches of the ophthalmic division of the trigeminal nerve, via the supraorbital and supratrochlear nerves, are responsible for sensation to the forehead and brow. It should be noted that after emerging from the supraorbital notch, the nerve travels in a supramuscular plane on the surface of the frontalis muscle. The lacrimal nerve supplies lateral brow innervation.

The forehead and brow enjoy a robust arterial blood supply from the internal and external carotid systems. The internal carotid terminally branches into the ophthalmic artery, which then branches distally into the supraorbital and supratrochlear arteries to provide for the central forehead and scalp. The external carotid terminally branches into the superficial temporal artery, which, through arborization, provides for the lateral forehead. The zygomaticotemporal artery branches off the superficial temporal artery to provide for the lateral brow.

The zygomaticotemporal venous drainage that receives branches bridging the surgical plane between the superficial temporal fascia and deep temporal fascia (DTF) deserves special mention. A large perforating vein in this system has been named the *sentinel vein* because it has been found to predictably fall within 2 mm of the temporal branch of the facial nerve. This vein is located approximately 1 cm lateral to the frontozygomatic suture line. Importantly, when more than one bridging vessel is encountered during the