

77. Brow Lift

Jason E. Leedy

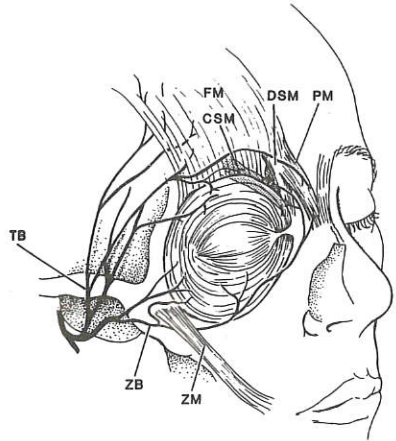
ANATOMY (Fig. 77-1)

MUSCULATURE

■ Frontalis muscle

- **Origin:** Galea aponeurosis
- **Insertion:** Supraorbital dermis by interdigitating with orbicularis oculi
- **Innervation:** Frontal branch of facial nerve
- **Action:** Brow elevator; creates transverse forehead rhytids
- **Galea aponeurosis:** Splits into two sheaths, which encapsulate the frontalis
 - ▶ Posterior sheath extends to the periosteum at the superior orbital rim

Fig. 77-1 Brow anatomy: Periorbital motor nerves and the muscles they activate. *CSM*, Corrugator muscle; *DSM*, depressor supercilii muscle; *FM*, frontalis muscle; *PM*, procerus muscle; *TB*, temporal branch of facial nerve; *ZB*, zygomatic branch of facial nerve; *ZM*, zygomaticus major muscle. (From Knize DM. Muscles that act on glabellar skin: A closer look. *Plast Reconstr Surg* 105:350, 2000.)



■ Corrugator supercilii muscle

• Oblique head

- ▶ **Origin:** Superior-medial orbital rim
- ▶ **Insertion:** Dermis at medial eyebrow
- ▶ **Innervation:** Zygomatic branches
- ▶ **Action:** Brow depressor; creates oblique glabellar lines

• Transverse head

- ▶ **Origin:** Medial-superior orbital rim
- ▶ **Insertion:** Dermis just superior to the middle third of the eyebrow
- ▶ **Innervation:** Frontal branch
- ▶ **Action:** Moves the brow medially; creates oblique and vertical glabellar lines

■ Depressor supercilii muscle

- **Origin:** Superior-medial orbital rim
- **Insertion:** Medial brow dermis
- **Innervation:** Zygomatic branches
- **Action:** Brow depressor; creates oblique glabellar lines

■ Procerus muscle

- **Origin:** Superior-medial orbital rim
- **Insertion:** Dermis of medial brow
- **Innervation:** Superior portion by frontal branch, inferior portion by zygomatic branches
- **Action:** Brow depressor; creates oblique glabellar and transverse nasal root lines

■ Orbicularis oculi

- **Medial orbital portion** can cause medial brow depression
 - ▶ Insignificant contributor to glabellar rhytids
- **Lateral orbital portion** can cause lateral brow depression
 - ▶ Creates lateral orbital rhytids (i.e., crow's feet)
- Innervated by **zygomatic branch of facial nerve**

SENSATION

■ Supratrochlear nerve

- Exits orbit **medially** and usually arborizes
- Enters corrugator then frontalis to supply the forehead

■ Supraorbital nerve

- Exits through foramen or notch **lateral to supratrochlear nerve**
- Divides into **superficial** and **deep** branches
- **Superficial branch** enters frontalis 2-3 cm above rim; supplies forehead
- **Deep branch** supplies scalp posterior to the hairline
- Runs 0.5-1.5 cm medial to the superior temporal line

TIP: Transection of the deep branch with subgaleal dissection and coronal incisions is believed to be responsible for postoperative scalp paresthesias.¹

BROW-RETAINING LIGAMENTS

- **Orbital ligament:** Fibrous band connecting the orbital rim and the superficial temporal fascia deep to the lateral eyebrow²
- **Temporal and supraorbital ligamentous adhesions and lateral brow and lateral orbital thickening of the periorbital septum:** Periorbital attachments released for brow elevation³
- **Brow-retaining ligament and upper lid-retaining ligament:** Zones of attachment from bone to overlying skin that require release for brow elevation⁴

AESTHETICS

YOUTHFUL APPEARANCE

- Absence of forehead and glabellar rhytids
- Absence of dyschromia
- Appropriately positioned hairline
- Pleasing eyebrow shape and position

AESTHETIC MEASUREMENT GUIDELINES⁵ (Fig. 77-2)

- **Anterior hairline to brow:** 5 cm in women; 6 cm in men
- **Eyebrow position at lateral limbus:** On orbital rim in men; 1 cm above orbital rim in women

- **Medial brow** club-shaped, and **lateral brow** tapers; ends lie at approximately same level, but lateral end may be slightly elevated
- **Gentle arch:** Peak at junction of the medial two thirds and the lateral one third, lying halfway between lateral limbus and lateral canthus
- **Medial brow:** Lies in vertical line with medial orbital fissure and alar base
- **Lateral brow:** Lies on oblique line from alar base through lateral orbital fissure
- **In midpupillary line:** Anterior hairline to brow, 5-6 cm; brow to superior orbital rim, 1 cm; brow to supratarsal crease, 1.6 cm; and brow to midpupil, 2.5 cm

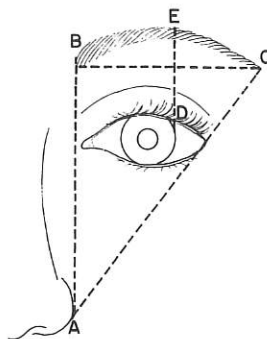


Fig. 77-2 Spatial relationships of the ideal brow. **A**, Nasal alar base. **B**, Medial eyebrow. **C**, Lateral eyebrow. **D**, Lateral limbus. **E**, Brow peak. (From Ellenbogen R. Transcoronal eyebrow lift with concomitant upper blepharoplasty. *Plast Reconstr Surg* 71:490, 1983.)

STIGMATA OF FOREHEAD AGING

- Transverse forehead rhytids
- Glabellar rhytids
- Brow ptosis
- Skin dyschromia

PREOPERATIVE EVALUATION

OUTLINE AESTHETIC GOALS

- Brow position
- Shape
- Symmetry

TIP: The brow should always be evaluated in patients seeking periorbital rejuvenation.

ASSESS HAIRLINE POSITION AND QUALITY OF ANTERIOR HAIR

- **High hairline**
 - Considered when brow to hairline distance is greater than 5 cm in women and greater than 6 cm in men
 - Alternatively considered when the anterior hairline lies on more oblique aspect of forehead from lateral view
- **Low hairline**
 - Brow to hairline distance less than 5 cm in women and less than 6 cm in men, with anterior hairline on vertical portion of forehead from lateral view
 - Fine, sparse anterior hair less likely to conceal a coronal incision than thicker, dark hair

ASSESS QUALITY OF RHYTIDS

- **Dynamic rhytids**
 - Present only during animation
 - Amenable to botulinum toxin
 - Surgical improvement with weakening of the involved muscles
- **Static rhytids**
 - Present at rest; result of sustained muscle hyperactivity
 - In general, partially improved with surgical muscle weakening but require redraping soft tissue
 - **Superficial rhytids:** Amenable to fillers and resurfacing procedures
 - **Deep rhytids:** Require extensive soft tissue redraping (e.g., subcutaneous dissection)

ASSESS POSITION AND SHAPE OF BROW

- Use aesthetic guidelines, mentioned previously.

TIP: Note that brow may be artificially elevated secondary to plucking and makeup.

ASSESS SKIN QUALITY

- Improvement in dyschromia and skin texture dramatically improves surgical result.

TIP: Consider skin care, dyschromia treatments, and resurfacing procedures as adjuncts.

SURGICAL TECHNIQUE

There are multiple variables to consider; therefore the surgical approach should be individualized for each patient.

INCISIONS

- **Direct, superciliary**
 - Removal of ellipse of skin and subcutaneous tissue at supraorbital rim, concealing scar above the eyebrow
 - Useful in men with thick skin and alopecia, thereby making coronal and temporal incisions less favorable
- **Transblepharoplasty**
 - Involves tacking brow to periosteum or deep temporal fascia to obtain lift
 - Can also perform simultaneous corrugator and procerus excision for glabellar rhytids⁶ (Fig. 77-3)

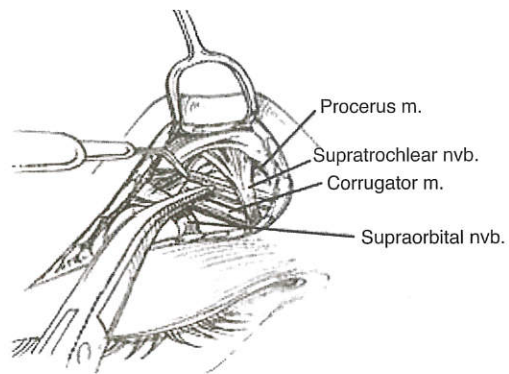


Fig. 77-3 Transblepharoplasty corrugator excision. (From Paul MD. The evolution of the brow lift in aesthetic plastic surgery. *Plast Reconstr Surg* 108:1409, 2001.)

■ **Midbrow**

- Removal of midforehead skin strip, concealing incision in transverse rhytid
- **Useful in men with thick skin, deep rhytids, and alopecia**, thereby making coronal or temporal incisions less favorable
- Advances hairline downward

■ **Coronal**

- **Useful for low hairline:** 1.5 mm of anterior hairline retrodisplacement required for every 1 mm of eyebrow elevation
- Incision placed at least **3 cm posterior to hairline** for better scar camouflage

TIP: In bald men place the incision further posteriorly to make it less visible from the frontal view.

- Greater scalp excision (up to 3-4 cm) performed laterally than medially to preferentially correct lateral brow descent

■ **Temporal** (Fig. 77-4)

- One of the oldest techniques
- Similar to coronal but spares midline vertex incision

■ **Anterior hairline**

- Useful if high hairline (hairline on oblique portion of forehead from lateral view)
- Use extreme bevel to allow hair to grow through incision for camouflage
- Temporal portion of incision follows coronal incision

■ **Endoscopic**

- Usually small central incision with two temporal incisions
- Argued to limit morbidity of coronal and hairline incision

■ **Combined**

- Temporal with transpalpebral incisions (Knize²)

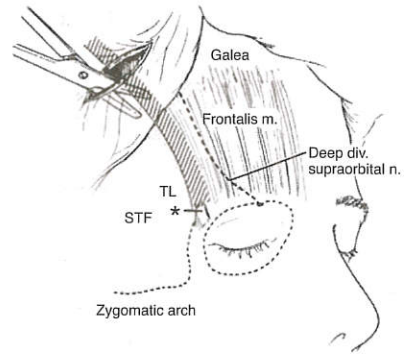


Fig. 77-4 Temporal approach. TL, Temporal fusion line; STF, superficial temporal fascia. (From Knize DM. Limited-incision forehead lift for eyebrow elevation to enhance upper blepharoplasty. *Plast Reconstr Surg* 97:1334-1342, 1996.)

PLANE OF DISSECTION

■ **Subcutaneous**

- Allows preservation of posterior scalp sensation
- Useful for improving deep transverse rhytids
- Decreases flap vascularity and **may be associated with increased wound complications**
- Tedious dissection
- Difficult to perform medial brow depressor muscle excision

■ **Subgaleal**

- Rapid, easy dissection
- Allows direct excision or scoring of muscle

TIP: Some surgeons argue that fixation of galea to periosteum is quicker than periosteum to bone, which may improve durability of the lift.⁷

■ Subperiosteal

- Some surgeons believe lifting the pericranium provides more sustained lift⁸
- Requires release of arcus marginalis for effective lift

NOTE: Troilius⁸ evaluated 1-year results of subgaleal and subperiosteal lifts: Subperiosteal lifts had 7 mm of elevation compared with no elevation for subgaleal lifts. (This may be attributed to a fixation issue rather than an issue with the dissection plane.)

■ Biplanar (Fig. 77-5)

- Subcutaneous with endoscopic subperiosteal approach; allows improvement in forehead rhytids with suprabrow muscle excision⁹

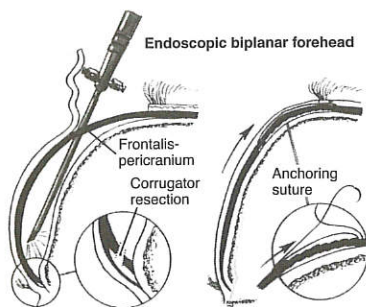


Fig. 77-5 Endoscopic biplanar forehead lift. (From Ramirez OM. Endoscopically assisted biplanar forehead lift. *Plast Reconstr Surg* 96:323, 1995.)

MUSCLE WEAKENING

■ Direct muscle excision

- Can remove corrugators and frontalis
- Preserve suprabrow frontalis (at least 2 cm) to maintain brow animation
- Can graft glabella with fat after removal of corrugators to correct depression deformities after resection of muscle bulk¹⁰

■ Muscle scoring

- Corrugators and frontalis

■ Chemical paralysis

- Botulinum toxin

SECURING BROW ELEVATION

- **Elastic band principle:** *The farther away the suspension point is from the brow, the less effective the lift⁷*
- **Skin excision:** Open technique
 - 2:1 ratio of skin excision to brow elevation, or 3:1 if frontalis removed for brow elevation¹¹
 - Some authors recommend up to 5:1 skin excision to achieve longer-lasting results
- **Suture techniques**
 - **Endoscopic techniques**
 - ▶ **Cortical tunnel:** Suture secured to tunnel made in outer table of calvarium
 - ▶ **Lateral spanning suspension sutures**

DEVICES

- **Percutaneous or internal screw placement with attached suture:** Screws can be removed at later follow-up
- **K-wire placement:** May be left permanently or removed
- **Endotine™** (Coapt Systems, Palo Alto, CA): Dissolvable, fan-shaped anchoring device
- **DePuy Mitek** (Raynham, MA): Bone anchor with attached suture

COMPLICATIONS

- **Sensory nerve deficit:** Results from injury to supraorbital or supratrochlear nerves; requires careful preservation during corrugator excision
- **Posterior scalp dysesthesias:** Results from transection of deep branch of supraorbital nerve
- **Frontalis muscle paralysis:** Results from frontal branch injury in temporal dissection
- **Skin necrosis:** Results from excessive tension
- **Alopecia:** Results from excessive tension or thermal injury
- **Infection**
- **Hematoma and bleeding**
- **Abnormal hair part or visible scar:** Excessive tension
- **Chronic pain:** Supraorbital nerve dysesthesias; more likely if history of migraines
- **Permanent overcorrection**
- **Abnormal soft tissue contour:** Can occur with muscle excision
- **Asymmetry, poor cosmesis, or lateral displacement of brow:** Results from excessive corrugator excision

KEY POINTS

- ✓ Frontalis muscle action is antagonized by corrugators, procerus, depressor supercillii, and orbicularis oculi muscles.
- ✓ High hairline occurs when hairline is on the superior, oblique portion of frontal bone.
- ✓ Coronal incisions cause posterior scalp paresthesias, which may trouble patients postoperatively.
- ✓ Endoscopic approaches require fixation techniques.

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