For nearly 100 years, aesthetic improvement of the aging face has included surgical elevation of the brow. Early attempts to correct brow ptosis were largely unsuccessful. Recognizing the need to modify the brow muscles heralded the achievement of results previously unobtainable. Within the past decade, the minimal incision approach to brow lifting afforded with the endoscope radially changed surgical options in forehead rejuvenation. Further advances have added to these options and have provided a palette of alternatives in aesthetic correction of the upper one-third of the aging face. (Plast. Reconstr. Surg. 108: 1409, 2001.)

**History of the Brow Lift**

The Coronal Brow Lift

*The early approaches.* The earliest description of brow lifting in the literature was published by Passot in 1919. He used elliptical excisions to elevate the brows and diminish crow's feet (Fig. 1). Interestingly, Miller in 1906 recommended muscle excision. In 1926, Hunt published *Plastic Surgery for the Head, Face, and Neck*, in which he described his techniques, which included coronal incisions both within the hair-bearing scalp and at the anterior hairline and direct excisions within the forehead skin (Fig. 2). Passot in 1930 proposed an incision above the eyebrows with undermining and excision of excess tissue (Fig. 3). The attempts to relieve vertical rhytids by parietal excision and were not effective. Vertical glabellar excisions were performed as well (Fig. 2). Noel in 1926 and Joseph in 1931 published their techniques of forehead lifting that were routinely performed and produced “satisfactory” (for 1926) results. Lexer published his technique for face and forehead lifting in 1931, but is generally credited with performing the first face lift in 1906 (Fig. 4). Claoué in 1931 illustrated a more extensive rhytidectomy that included incisions and rather aggressive (for its time) undermining of the forehead as well as the face and the upper neck (Fig. 5). Fomon in 1939 undermined the forehead skin and transected the epicranium. He also recommended fascia implantation, and in 1951 he suggested the use of derm-fat grafts for this procedure. For the ensuing 20 years, the literature is lacking in addressing either the benefits or the shortcomings of these approaches, which did not include...
muscle modifications including myotomies, muscle excision(s), and/or denervation (chemical or surgical). In the 1950s, the standard forehead lift was mentioned only to be condemned because it did not provide permanent or even long-lasting correction. It was recognized that modification of the frontalis muscle was necessary to impart long-lasting if not permanent improvement in the aesthetics of the forehead. Transection of the frontal branch of the facial nerve was recommended\textsuperscript{12} to improve the temporary nature of improvement gained with the earlier techniques. However, profound brow ptosis occurred from this maneuver. The frontal branch was reportedly injected with 80% alcohol to cause a permanent chemical denervation, with unfavorable side effects.\textsuperscript{4} Cross-hatching of the muscle to diminish frontalis activity (Bames\textsuperscript{13}) and incision (Eitner\textsuperscript{14}) were described. Gonzalez-Ulloa\textsuperscript{15} in 1962 (Fig. 6) described a complete circumferential incision for forehead and face lifting procedures. Marino and Gandolfo,\textsuperscript{16} in 1964, believed that their failures were because of the action of the forehead muscles, which had not been modified by their technique. They described modifying the frontalis and corrugator muscles to improve the results. [They credit this modification to McIndoe (no reference cited).] Morel-Fatio\textsuperscript{17} described partial excision of the frontalis muscle in 1964, and Uchida\textsuperscript{18} in 1965 described a technique to
correct the hypermotility of the muscles of the forehead. Vinas in 1965 described a procedure for correcting the clinical findings in the aging forehead. What was described 35 years ago is currently relevant in rejuvenating the forehead:

(1) An inelastic aponeurotic-muscle layer, formed by the *frontalis* and its extensions, occupies the frontal region and expands laterally toward both temporal regions. This layer adheres to the skin and does not permit free movement of it. Traction on the frontotemporal region with a finger will show this fixation of the skin, as it does not cause the wrinkles to disappear (Fig. 7)—in contrast to the results of a similar test in the lower faciocervical area, where the skin glides easily over the subjacent tissue.

(2) There are adhesions that prevent free movement of the soft tissues of the supraorbital regions over the bony orbital rims. In our experience, unless these adhesions are eliminated, traction from above will not give a permanent lift to the eyebrows.

Vinas presented his technique for forehead rhytidectomy and brow lifting in 1969 at the Annual Meeting of the American Society of Plastic and Reconstructive Surgeons and published it in 1976. He recognized two types of forehead wrinkles, transitory and persistent:

Transitory wrinkles appear only with the movements of expression, and they disappear when the action of the muscles is eliminated and the skin is stretched.

Persistent wrinkles remain when the muscles are relaxed and can be “erased” only by adding a skin abrasion to the preceding treatment.

He realized that maximum elevation in the lateral brow and crow’s feet area without tension was necessary to obtain adequate correction. He accomplished this by excising a strip of the deep aponeurotic-muscle layer in the upper portion of the forehead (Fig. 8), extending the excision laterally to the temporal regions and by releasing the adhesions between the soft tissues of the eyebrow and the orbital rims. Interestingly, Vinas acknowledged the need to change the location of the coronal incision on the basis of the height of the forehead (Fig. 9). In 80 percent of the cases, the incision was placed behind the hairline, whereas only one in five had a forehead height that would commit one to an anterior hairline.
incision. Vinas effectively dealt with vertical frown lines in the glabellar region by detaching the frontal flap medially so as to expose and then resect 1 cm from the medial corrugator muscle mass.

The resection of an aponeurotic-muscle layer did allow some skin stretching and lifting of the brows. However, “badly drooped brows” could only be effectively corrected by “eliminating any adhesions between the eyebrows and the orbital rims.”

To this end, the subfascial dissection must go down to reach the orbital cavities, and laterally down to the level of the zygomatic arches where, if necessary, the fascia can be detached from the arches for an effective face lift.

Of historical interest in light of current trends in facial rejuvenation, an editorial comment to this article reads: “The reader will recognize, of course, that many authorities do not agree with the necessity for, or the advisability of, this maneuver.”

Of interest, Vinas also described variations of a “butterfly wing” technique that elevated low brows by excising various skin patterns directly above the brow (Fig. 10). (This technique carries the advantage of a direct one-to-one correction of brow ptosis, but the tradeoff is a scar that is visible and the method is advisable only when the patient’s medical condition will not permit more aggressive brow elevation techniques from a distance, a usable forehead crease is not available, and the patient is willing to accept the scars.) Vinas even recommended using this technique when the results of the long flap technique did not effectively elevate the brows or correct the crow’s feet.

Among the more frequent complications were paresthesias and pruritus “which, in nervous people, may last up to 8 to 10 months.” (Note: were these patients “nervous” before or after the pruritus developed?)

Regnault presented her approach to correcting the stigmata of the aging face by performing a “double traction on crow’s feet” at the Annual Meeting of the American Society for Aesthetic Plastic Surgery in 1971 and published it in 1972. This was accomplished by a subgaleal forehead dissection to the eyebrows and the upper margin of the crow’s feet with galeal relaxing incisions for better traction, if necessary, and a subcutaneous face lift dissection preserving the neurovascular bridge in the temporal area (Fig. 11). Again, historically the editorial note is fascinating as we look at what many are now doing:
The reviewing editors felt the work presented herein to be rather heroic, and of interest to readers. Two of them noted that they often add blepharoplasty, dermabrasion, or submental lipectomy to a face lift—or all 3—but there is a point where prudence becomes better than valor.

She lists numbness of the scalp as a complication that usually lasts for a few months, “but in a few cases has been permanent.”

Kaye presented in 1976 and published in 1977 a method of performing a forehead lift derived from the methods of Vinas. He elevated the forehead flap deep to the galea and resected segments of the corrugator supercilii muscles as well as a strip of frontalis and fascia. He would combine the coronal lift with a facial rhytidectomy, preserving the frontal branch of the facial nerve in the mesotemporalis while ligating the superficial temporal artery and vein to increase flap upward mobility. Kaye made the following observations:

Older patients may present with ptosis of the forehead and eyebrows along with sagging upper lid skin. Under these circumstances, it may be difficult to accomplish the desired result by blepharoplasty alone.

Upper lid ptosis in younger patients is often secondary to congenitally low position, or premature ptosis, of the upper third of the face. Often these patients can benefit from a forehead lift without an upper lid blepharoplasty. The surgeon can determine this preoperatively by gently elevating the forehead and eyebrows, and seeing what this does for the eyelid ptosis.

This is a widely practiced and extremely useful maneuver in assessing the need for a brow lift with or without an upper eyelid blepharoplasty. Kaye discussed the alternate use of an anterior hairline incision in patients with a high forehead. He felt, as this author does, that patients with a high forehead typically wear their hair down to partially cover their forehead and therefore their lifestyle would not be changed by a slightly higher forehead. Kaye felt that the only absolute contraindication to the coronal incision was lack of enough hair to cover the incision, as in male pattern baldness. (Note: A further posterior incision or the use of small access incisions such as those afforded by an endoscopic approach may lessen this concern.)

Pitanguy described the blocking technique in face and forehead lifting. The important elements of his technique are the following:

1. Wide exposure of the forehead flap through an open approach.
2. Weakening of the muscles that act in this region by making multiple incisions that cut through the aponeurosis and free the muscle fibers.
3. Blocking the facial flaps with key stitches so that once the forehead has been positioned, no alterations in anatomy will occur in the face.

He also described using the open approach as the route to the dermocartilaginous ligament of the nose. By sectioning this ligament, the nasal tip can be rotated to a slightly more superior position.

This approach to lifting the brows and passively improving the upper eyelid aesthetics through orbital rim soft-tissue release, partial corrugator resection, and frontalis modification has remained the mainstay of correcting the stigmata of the upper one-third of the aging face for about 35 years. This has remained a popular procedure despite the sequelae and complications reported by Riefkohl et al. They reported the following:

Sequelae of the procedure
1. Numbness behind the coronal incision
2. Pain, swelling, and bruising
3. Temporary loss of expressive movements
4. Sensation of tightness in the forehead
5. Eyebrow position initially high
6. Absent nasoglabellar frown

Complications of the procedure
1. Sensory nerve deficit
2. Frontalis muscle paralysis
3. Skin necrosis
4. Alopecia
5. Infection
6. Hematoma and bleeding
7. Abnormal hair part and visible scar
8. Asymmetrical eyebrows or eyelids
9. Chronic pain
10. Permanent overcorrection
11. Abnormal soft-tissue contour

Interestingly, in discussing numbness behind the incision, Riefkohl observed: “It is extraordinary for a patient to be bothered by this numbness. Apparently, among neurosurgical patients, complaints of numbness behind a
coronal incision are practically unheard of. Obviously, the cosmetic surgery patient is less forgiving.” (Note: as true, or more so today, than it was in 1983.)

The most common and the most troublesome complication discussed by Riefkohl was a sensory nerve deficit affecting the forehead. He felt that the supratrochlear and supraorbital nerves should be identified and the supraorbital nerve should be freed from the frontal bone to prevent a stretch injury.

Owsley stressed the importance of adequate release of the galea from its fascial attachments at the superior orbital rim. He modified frown muscles and excises a strip of frontalis muscle between the branches of the supraorbital nerve. The flap is advanced, trimmed, and closed without tension. He followed patients for 5 years and reported excellent maintenance of aesthetic correction.

A review of the forehead lift by Adamson et al. in 1985 presented their experience in a forehead lift procedure closely following that suggested by Brennan. Ninety-two percent of their patients had the correction of eyebrow ptosis as their major indication for forehead lifting. Other indications were ablation of glabellar and forehead creases, and improvement in glabellar ptosis. Of interest were the following more common complications and their percentages: hair loss (33 percent temporary, 8 percent permanent); scar widening (32 percent); scar itch (18 percent temporary, 10 percent bothersome or nonresolving); forehead numbness (16 percent temporary, 8 percent permanent); and forehead neuritis (10 percent). Despite this reported complication rate, the authors found this procedure to be “... a useful surgical procedure to reduce the signs of aging of the upper third of the face.”

The later approaches. Papillon et al. and Su et al. presented an anterior hairline incision with a subcutaneous dissection plane. In 1989, Wolfe and Baird published their limited experience (27 patients) with the subcutaneous approach to forehead lifting. They found no difficulties with wound healing or alopecia and felt that this procedure had the advantages of more effectively removing the vertical and transverse wrinkles in the glabellar area, raising the brows, and preserving sensation posterior to the incision.

Connell et al. published their experience with coronal brow lifting and presented their concept of improving the aesthetics in the upper one-fourth of the nose by modifying the procerus and depressor supercilii muscles. They emphasized precision in diagnosis, preoperative planning, technique, and postoperative care. A hallmark of their technique is minimizing detection of the surgical incisions by detailed planning of their location, meticulous handling of soft tissue, and precision in closure. Flowers stressed the value of correcting brow ptosis as the major aesthetic finding in the aging upper one-third of the face and not removing excessive upper eyelid skin. He combined “anchor blepharoplasty” with the coronal brow lift for optimal aesthetic improvement while avoiding the deformities associated with excision of excessive amounts of upper eyelid skin. Periorbital soft-tissue and bony orbital rim contouring were added as indicated by the anatomy. Lateral canthoplasties were frequently included to improve the aesthetics and stability of the lower eyelid.

Tirkani and Daniel in 1990 combined the best features of the subcutaneous, anterior hairline dissection with the subgaleal coronal dissection to improve results in patients with high foreheads, severe static wrinkling, and asymmetric eyebrows. In their technique, the junction between the subgaleal and subcutaneous plane is divided at the temporal hairline level.

The longest published postoperative follow-up at that time of the subcutaneous forehead lift with an anterior hairline incision was published by Vogel and Hoopes in 1992. The mean follow-up was 7.5 years with a range of 1 to 17 years. They found the benefits of this approach to be maintenance of forehead size, a mechanically efficient lift, a direct attack on wrinkles, and a low incidence of hair loss. According to patient assessment, the benefits of the procedure were long-lasting. The added precision required in making the incision, time-consuming dissection, and closure were listed as disadvantages. Mayer and Fleming in 1992 described their method of further camouflaging the anterior hairline incision by following the irregular trichophytic hairline, which made the scar less conspicuous. To get the hair to grow through the scar, the anterior edge of the flap was deepithelialized and the forehead skin sutured over this. De Benito described a “zigzag” incision when selecting the anterior hairline incision to camouflage the scar.
**The periorbital approach.** Paul presented his technique for a transblepharoplasty brow lift that used an upper eyelid incision to perform a browpexy while simultaneously correcting the findings in the hooded eyelid. This included trimming of hypertrophied orbital orbicularis oculi muscle and suborbicularis oculi fat (the “roof” fat pad) with brow stabilization by soft tissue suturing above the orbital rim (Fig. 12).

There were other periorbital and midforehead approaches to brow lifting, and these included a direct brow lift as mentioned previously. Connell also described using existing transverse forehead rhytids as a means of removing forehead soft tissue and thereby obtaining lifting of the brow while nicely concealing the scar in selected individuals with fair skin whose main concern was brow ptosis.

McKinney et al. developed clinically useful measurements to aid the surgeon in deciding when to perform a forehead lift and where to place the incisions. They used four basic surgical techniques: (1) direct brow lift, (2) midforehead crease incision, (3) prehairline incision, and (4) posthairline incision. An extremely useful measurement that McKinney et al. presented indicated that patients in whom the distance from the midpupil to the top of the eyebrow was equal to or greater than 2.5 cm were not candidates to have their brow raised further.

An interesting assessment of the goals of brow lifting by Matarasso and Terino revealed that the traditional goal of elevating low brows was no longer the most common indication. Previously considered minor goals such as forehead rhytids, frown muscle imbalance, upper eyelid aesthetics, lateral temporal laxity, and an abnormal expression were actually found to be more prevalent as the reason(s) for performing a forehead rhytidoplasty.

**The subperiosteal approach.** The concept of elevating the soft tissues of the face (the “mask lift”) through a subperiosteal plane of dissection was initiated by Tessier in 1979 and further described in 1989. Psillakis and Santana followed Tessier with publications in 1984. Krastinova-Lolov in 1989 presented his technique as an application of craniofacial procedures. Hinderer in 1985 and Hinderer et al. published a combined approach with a subperiosteal dissection in the lower forehead and a sub–superficial musculoaponeurotic system dissection in the middle third of the face. However, beginning in 1986, Hinderer limited his subperiosteal undermining to a small area around the supraorbital bundle to facilitate its dissection.

Ortiz-Monasterio (Fig. 13) presented his experience with the subperiosteal dissection plane for the forehead lift as well as skeletal remodeling by bony recontouring or augmenting. In 1991, Tapia et al. published their subperiosteal approach to the upper one-half of the face, which included dissecting the frontonasal orbital rim and zygomaticomalar areas to obtain complete mobilization.

**The endoscopic approach to the forehead lift.** Vasconez and Isser presented their early experience with the use of an endoscope in brow lifting in 1992. The first publication on the use of an endoscope for brow lifting was by Paul.
of the endoscope for brow lifting was by Chajchir in 1993. Appearing in the same year, 1994, were two publications that presented this new high-tech method of elevating the forehead soft tissues at the subperiosteal plane with the use of an endoscope. Isse (Figs. 14 through 16) and Chajchir detailed their method of performing a brow lift through small incisions behind the anterior hairline. In 1995, Isse updated his experience with the endoscopic approach and made the following points:

The basic concept of this procedure is a dynamic functional lift of the eyebrow exerted by the frontalis muscles when the depressor of the eyebrows has been modified or weakened.

One should remember that when we were doing the “open approach” we were relying mainly on soft-tissue traction and soft-tissue resection with minimal soft-tissue modification. The only muscle mentioned as an eyebrow depressor was the corrugator supercili muscle. No other muscles were mentioned.
as responsible for lowering of the eyebrows and frown line formation (e.g., the procerus muscle). Now we read that the depressor supercilii muscle and the orbital portion of the orbicularis muscle are powerful additional depressors of the eyebrows.

Isse identified the need to vary his technique on the basis of the configuration of the skull, bony architecture, and soft-tissue thickness and tightness. He suggested four techniques selected to accommodate patient variations and degree of tissue dissection. The classifications were the following:

1. Standard forehead lift: Five incisions with subperiosteal dissection to the nasal bones and supraorbital rims, and subsuperficial temporal fascia dissection medially to end at the sentinel vein and inferiorly to the superior edge of the zygomatic arch.
2. Extended forehead lift: Same as above with the dissection extended over the lateral orbital rim, supraperiosteal up to the midborder of the lateral orbital rim. This technique was recommended when the primary goal was elevation of the tail of the brow, as well as the desire to correct crow’s feet and elevate the lateral canthal raphe.
3. Lateral forehead/temporal lift: Incisions placed in the paramedian area and the temporal area to mainly effect elevation of the tail of the brow, modify the contour of the brow, improve the crow’s feet, and/or elevate the lateral canthal raphe.
4. Limited forehead lift:
   a. Glabellar: Dissection either subperiosteal or supraperiosteal with access from the frontal hairline, palpebral, or nasal routes. Treatment of the brow depressors was accomplished as the only goal of this technique. (Note: Isse felt that this technique would narrow the brows, a point that has been debated, as some postoperative endoscopic results from various authors show a spreading of the brow with increased interbrow distance.)
   b. Supraorbital rim: This technique uses a transpalpebral access at either the supra-or subperiosteal level followed by modification of the orbital portion of the orbicularis muscle. The technique is designed to elevate the tail of the brow, correct brow contour, improve crow’s feet, and elevate the lateral canthal raphe. (Note: Isse felt that one might not be able to obtain the same elevation of the tail of the brow when using the transpalpebral route as that obtained through a temporal access. This point is shared by this author (see the Transblepharoplasty Subperiosteal Brow Lift section).

Other elements of the endoscopic brow lift are tissue modifications. These include periosteal release (horizontal and/or vertical); retroorbicularis fat pad release to improve the lateral brow; muscle modifications including myotomies, myectomies, and detachment; and neurotomies to denervate brow depressors (Note: Precise anatomic knowledge can guide one to the motor innervation of these muscles, but reliability is the key to successful denervation.)

Of considerable interest and ongoing debate are the various methods of flap fixation to maintain the elevated brow position while the soft tissues are readhering at a higher level. An excellent review of the controversies and the rationale of various methods of fixation is provided by Rohrich and Beran. The methods used medial to the anterior temporal crest include bolster fixation, mattress sutures, cortical tunnels, Kirschner wire, external screws, internal screws both absorbable and nonabsorbable, and fibrin glue. The temporal flap can be stabilized with the use of sutures between the superficial and the deep layers of the temporal fascia.

In reviewing his experience, Isse in 1995 found a few cases of partial alopecia and par-
esthesias, all of which were temporary. He did, however, recognize that recurrence may occur in men with supraorbital bossing. (Note: Recurrence of brow ptosis may also result from inadequate soft-tissue release including failure to transect the orbital ligament, inadequate muscle modification, and/or inadequate flap stabilization.) In 1995, Oslin et al.\textsuperscript{59} proposed that fixation of the elevated forehead flap through an endoscope was not necessary and that maintenance of brow position could be accomplished by adequate release alone.

Daniel and Tirkanits\textsuperscript{60} felt that the illumination and magnification brought by the endo-

\begin{figure}[h]
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\caption{Schematic of the operative technique. (Above, left) Old incisions on the left, new incisions on the right. (Above, right) The planes of dissection. (Center, left) Subgaleal muscle resection is graded but may include the insertions of all four confluent muscles. (Center, right) Periosteal release allows posterior advancement of the forehead. (Below, left) Bony fixation is accurately determined using screws and staples. (Below, right) The lateral temporal advancement uses absorbable sutures to open the eyes. From Daniel, R. K., and Tirkanits, B. Endoscopic forehead lift: An operative technique. \textit{Plast. Reconstr. Surg.} 98: 1148, 1996.}
\end{figure}
scope could be applied to the aesthetics, analysis, goals, and techniques that formerly guided the classic approach (coronal, subgaleal). Techniques were developed to address the individual anatomic findings in the aging upper third of the face, discarding the one operation theme that was so easy to apply with an endoscope.

Ramirez in 1995 described an endoscopically assisted biplanar forehead lift to be used in all patients in whom the anterior hairline incision is used. In his technique, the subcutaneous dissection transforms to a subperiosteal and subtemporoparietal fascial dissection.

Fig. 18. (Above) Incisions are located to avoid the deep branch of the supraorbital nerve, which lies between the dotted lines, 5 and 15 mm medial to the superior temporal line. (Center) The six galea aponeurosis plication sutures pull against gravity with only vertical vectors. (Below) Plication sutures provide temporary fixation of the lifted brow until scar tissue provides permanent fixation over the entire area of flat elevation, as shown.

Fig. 19. (Above) The galea aponeurosis is freed completely on the deep surface to mobilize the forehead and just along the hairline on the superficial surface to allow shortening by plication. (Below) This procedure raises the brow and leaves a roll of excess skin at the hairline to shrink or redistribute. From Hamas, R. S. An endoscopic brow lift that does not raise the hairline. Aesthetic Surg. J. 17: 127, 1997. Used with permission.

Fig. 20. Subperiosteal transblepharoplasty dissection.
about halfway down the forehead. He felt that this approach allowed preservation of sensation behind the incision and endoscopically controlled periorbital dissection and frown muscle modification. Ramirez further modified his technique to avoid some of the sequelae of a coronal brow lift and incorporated them in endoscopically assisted brow lifts. Among others, the recommendations were including the pericranium in the flap, extensive subperiosteal dissection, maintenance of the integrity of the frontalis muscles, using a galea periosteal rim flap to anchor the frontal flap to the posterior scalp flap, and detailed skin closure without through-and-through sutures to prevent alopecia.

Daniel and Tirkani reviewed 100 endoscopic brow lifts and modified their technique to better address the frown muscles and predictably control the position and the shape of the elevated brow (Fig. 17). The essential components were the following:

1. A subgaleal resection of muscle insertions rather than a subperiosteal approach to muscle origins.
2. A complete perioseal release along the lateral orbital rim.
3. A vertical suspension using screws and staples that are removed at 1 week.

Certainly, the endoscope was used by others to address isolated glabellar findings and permitted muscle modification(s) with an anterior hairline short incision. Hamas also published a technique to avoid raising the anterior hairline while using an endoscope. He described a galea aponeurosis plication technique that entails several sutures placed through an anterior galeal flap dissected off of the forehead flap and anchored posteriorly. The brow is nicely elevated without raising the central hairline (Figs. 18 and 19).

Transblepharoplasty Subperiosteal Brow Lift

Paul in 1996 published his technique for the subperiosteal brow lift using the upper eyelid as the approach. The perioseal along the superior orbital rim is incised lateral to the supraorbital neurovascular bundle and the line of fusion is divided connecting the dissection with the subtemporalis fascial plane laterally. The corrugator muscles are partially excised and the origin and insertion of the procerus muscle are divided. A counterincision is made at the projected peak of the brow behind the anterior hairline for vertical brow vector stabilization and a temporal incision is made to allow an oblique vector for lateral brow elevation and spanning. All aspects of the hooded upper eyelid can be addressed through this approach, and biologic fillers can be added as well (Figs. 20 through 22). Ramirez published a similar approach with the added benefit of transpalpebral use of the endoscope to assist in the dissection. He identified the following categories of patients who might benefit from this technique:

1. Patients with male pattern baldness
2. Patients with a history of hair transplants
3. Patients with excessively high foreheads
4. Patients in which upper blepharoplasty is planned simultaneously with the brow lift.
5. Patients with spastic frontalis syndrome
6. Patients needing periorbital orbicularis muscle repositioning

Del Campo\textsuperscript{68} detailed the transpalpebral approach to the forehead as part of the “endoface lift,” which included the transpalpebral approach to the midface and subperiosteal mandibular dissection.

**The Limited-Incision Forehead Lift**

This technique, published by Knize\textsuperscript{70} in 1996, advocates the following procedures. Using a short temporal incision, the subtemporalis fascial plane is dissected, a portion of the deep temporal fascia is removed as a graft and to provide cicatrical flap fixation, medial subperiosteal dissection is performed as indicated, the orbital ligament is divided to mobilize the lateral brow, and the flap is stabilized laterally at the fascial level (Fig. 23). Through an upper eyelid incision, the corrugator muscles are partially excised, the procerus muscle is divided, and temporalis fascia is placed in the glabella. The hallmark of this technique is the preservation of the deep division of the supraorbital nerve. The importance of preserving this nerve is well described in the skillfully detailed anatomic work of Knize\textsuperscript{71} (Fig. 24).

Combining approaches and technology. Michelow and Guyuron\textsuperscript{72} sorted out the options in forehead rejuvenation and suggested a palate of procedures, both invasive and noninvasive, on the basis of the individual goals and needs of the patient. The armamentarium includes botulinum injection, fat injection, fat grafting, transpalpebral corrugator muscle resection, subcutaneous forehead rejuvenation, and endo-
scopic techniques for forehead rejuvenation. Combining the endoscope with the potassium-titanyl-phosphate laser allowed Keller et al.\(^73\) to incise or excise the procerus, corrugator, and frontalis muscles, with little or no bleeding, at a distance from a small incision immediately behind the hairline. Rosenberg\(^74\) combined an endoscopic brow lift with a flexible laser wave or rigid laser extensions to ablate the frown muscles. He did not use skin excision or fixation with this technique. Roberts and Ellis\(^75\) compared coronal brow lifting, endoscopic brow lifting with carbon dioxide laser resurfacing, and carbon dioxide laser resurfacing alone. The best result in wrinkle reduction was reported in those patients who underwent endoscopic brow lifting with carbon dioxide laser resurfacing. (Note: Many proponents of the endoscopic brow lift feel that adequate diminution in static and dynamic rhytids occurs from brow depressor muscle modification and, therefore, resurfacing is not necessary.) Weinstein\(^76\) combined carbon dioxide laser resurfacing with endoscopic forehead lift, laser blepharoplasty and transblepharoplasty corrugator resection.

Nassif et al.\(^77\) compared three methods of forehead elevation to determine the most effective dissection plane. They found that the subperiosteal plane with or without release at the superior orbital rim and the subgaleal dissection plane significantly elevated the brow at rest and when traction was applied to the flap. However, subgaleal dissection was associated with less flap tension and therefore was concluded to be the optimal plane for the forehead lift, whether performed with the aid of an endoscope or via the open approach.

Ellis and Bakala\(^78\) studied the motor innervation of the corrugator muscle in fresh-frozen cadaver heads. As a result, a procedure was developed to perform a selective neurotomy lateral to the corrugator muscle that affected vertical glabellar creases without affecting the glabellar depressor muscles. A fascinating study on muscle activity and associated eyebrow displacement\(^79\) sheds light on the frequent finding of preoperative and persistent postoperative brow asymmetry despite the best attempt to correct the asymmetry with a stronger pull on the lower side, allowing the higher side to float rather than be fixed in position.

As one travels back almost a century in looking at the upper one-third of the aging face and how best to correct the signs of aging, the position of the brow and how to change it, the effect that raising the brow has on improving the upper eyelid appearance, and the aesthetics of the upper eyelid and how it impacts surgical decision making are paramount to properly performing aesthetic restoration. Constant refinement of techniques with an eye always focused on the goals and patient safety will allow us to proceed with caution and, it is hoped, with improved, long-lasting, aesthetically desirable results.

Hunt in 1926\(^3\) validated the goals of future generations of aesthetic plastic surgeons:

Those who have held that their mission is to heal rather than beautify may find that the two practices are not dissimilar and that they are equally effective in making life more worth the living to the patient.

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