Technical Note

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Frontotemporal Brow lift With Suspension to Frontal Bone

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Abstract

Brow position is a key feature to define a fresh and youthful appearance of the periorbital region. Frontotemporal brow lift implies the elevation of both the medial brow and lateral brow and can be performed through an open (coronal), endoscopic, or combined approach. While endoscopic brow lift has the advantage of minimal incisions compared with the open coronal approach, it requires specific equipment, a longer learning curve, and has been associated with high recurrence rates. Herein, the authors' technique for frontotemporal brow lift is presented, an approach that includes complete access under direct vision to the lateral brow and glabellar area, through 2 limited frontotemporal incisions and a novel method of 3-vectoring suspension to the frontal bone. It has proved to be predictable with long-lasting results.

Keywords

Brow lift, brow ptosis, suspension, brow elevation

Introduction

Brow position is a key feature to define a youthful appearance of the periorbital region, and brow ptosis is one of the earliest signs of aging.[1,2] Surgical correction of the ptotic brow was first described by Passot[3] and since then, multiple techniques have been proposed for its correction including the coronal approach (with its trichophytic and pretrichial variants), the direct brow lift, midforehead, temporal, endoscopic, and transblepharoplasty approaches.[4-9]

While temporal brow lift is an effective method for repositioning the lateral portion of the brow,[10] it cannot address the glabellar area. The coronal approach allows for correction of both lateral and medial brow; however, it has been considered a most invasive approach with higher rates of sensitive sequelae.[11] The endoscopic approach has the advantages of smaller incisions and decreased numbness; however, it is technically more complex and has been associated with recurrent rates up to 9%.[11]

Regardless of the approach, the method of fixation and suspension is fundamental for achieving long-lasting results.[10] A variety of anchoring techniques have been described in the literature to either the deep temporal fascia (DTF) or the cortical bone, by means of different suture materials, bone tunnels or implants such as absorbable and nonresorbable screws, tacks, and plates.[12-14]

This article aims to present the authors' approach for frontotemporal brow lift, a technique that allows for complete mobilization of the forehead through 2 limited frontotemporal incisions and uses a novel 3-vectoring suspension to bone tunnels that secures stable and long-lasting results.

Surgical Technique

Incision Marking

A single incision is used for each frontotemporal region. The incision is placed 2 to 3 cm behind the hairline and has 6 cm in length, extending 2 cm laterally and 4 cm medially to the temporal crest (Figure 1).

Anesthesia

The patients are operated under general anesthesia. Approximately 4 mL of a local anesthetic solution containing 50 mL of 2% lidocaine, 0.5 mL adrenaline 1 mg/mL (1:1000), and 5 mL of tranexamic acid 500 mg/5 mL[15] is infiltrated in the incision line.

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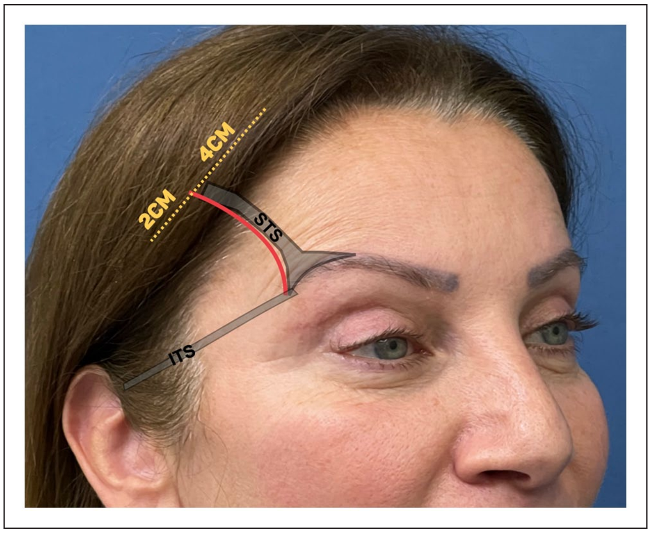

Figure 1. Incision placement: 2 to 3 cm behind the hairline, extending 2 cm laterally and 4 cm medially to the temporal crest (6 cm length).

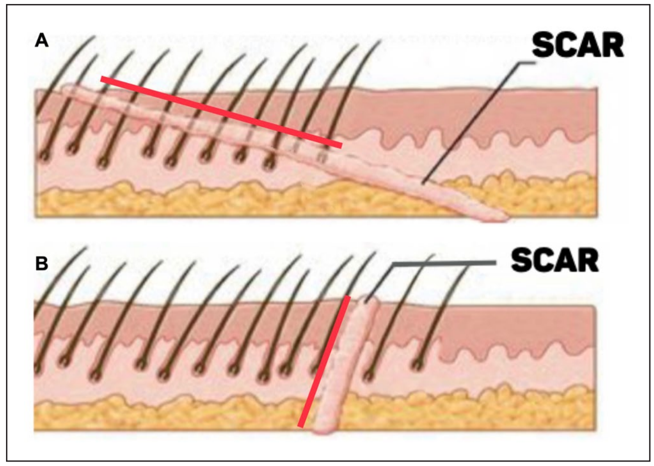

Figure 2. (A) Traditional beveled incision. (B) Skin incision following the direction of the hair follicles to avoid its injury.
Note. Red line is the direction of the blade.

Dissection

Instead of using the traditional beveled incision, the skin is incised with a 15-blade following the direction of the hair follicles to avoid its injury until reaching the bone and DTF (Figure 2).

With the help of a periosteal elevator, the dissection is carried out anteriorly in a subperiosteal plane medially to the superior temporal septum (STS) and over the DTF laterally to the STS (Figure 3A and 3B). After complete mobilization, the temporal and frontal pockets are connected by complete release of the STS (Figure 3C).

Dissection is carried out inferiorly up to the inferior temporal septum (ITS), the sentinel vein (SV), and the lateral orbital rim until level of the lateral canthus. The SV is a reliable marker for the frontal branch of the facial nerve, which lies superficial to the dissection plane within the innominate fascia.

The 2 frontotemporal flaps are connected in the midline for complete mobilization of the forehead flap. Dissection is also carried out posteriorly for about 5 cm in the same dissection planes.

Periosteal Release

Mobilization of the brow requires complete release from its periosteal attachments at the level of the orbital rim, named the temporal ligamentous adhesion (TLA), the supraorbital ligamentous adhesion (SLA), and the orbital retaining ligament. With a sharp tip periosteal elevator, multiple vertical releasing incisions are made in the periosteum from the corrugator area medially, until the tail of the brow (Figure 4A-4C). Identification of the SV will help to protect the frontal nerve. (Figure 4D). If the medial brow is to be lifted as well, periosteal release and myotomies in the depressors can be performed in the same fashion and under direct vision to protect the supraorbital and supratrochlear nerves.

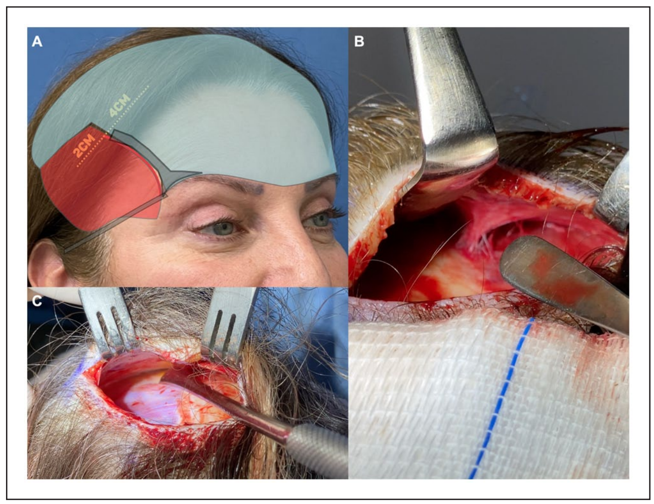

Figure 3. (A) Area of flap elevation in the subperiosteal plane (light blue) and above the DTF (red). (B) Intraoperative photograph, right side, showing the temporal (right) and frontal (left) pockets, separated by the STS. (C) Intraoperative photograph, left side, showing the release of the STS and connection of the 2 pockets in a single frontotemporal flap.
Note. DTF = deep temporal fascia; STS = Superficial temporal septum.

Suspension to Forehead Bone

Three tunnels in the cortical bone are created (Figure 5A). Each tunnel is made by connecting 2 holes using the piezo tip (SL2) of Piezotome M+ (Comeg Medical, France) (Figure 5B and 5C). The tunnels are placed over 3 vertical lines passing through: (1) the mid-pupillary line, (2) the peak of the brow, and (3) 3 cm lateral to the lateral orbital rim.

Figure 4. (A) Multiple vertical releasing incision (black lines) are made in the periosteum of the supraorbital region from the corrugator area medially, and below the level of the SV up to the lateral canthus over the lateral orbital rim. (B) Sharp tip periosteal elevator used for periosteal release. (C) Intraoperative photograph evidencing the periosteal release in the supraorbital area. (D) Intraoperative photograph showing the SV.
Note. SV = Sentinel vein.

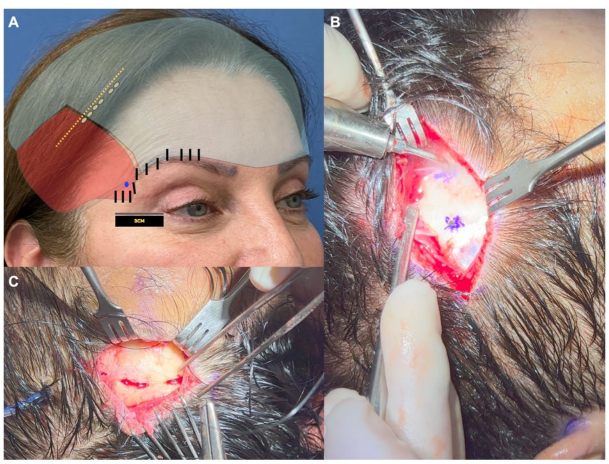

Figure 5. (A) Three tunnels are created in the cortical bone. (B) Intraoperative photograph: each tunnel is made by connecting 2 holes using the piezo tip (SL2) of Piezotome M+ (Comeg Medical, France). (C) Intraoperative photograph showing the bone tunnel.

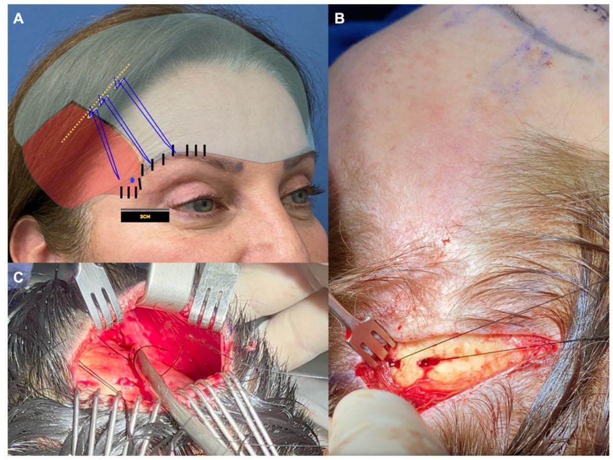

Figure 6. (A) Inferior row of suspending sutures (blue). (B) Nylon 3/0 suture passed through the bone tunnel. (C) Suture placement in the flap: sutures are placed from lateral to medial, in a horizontal fashion and should grab periosteum and subcutaneous tissue, with care not to create pinching in the skin.

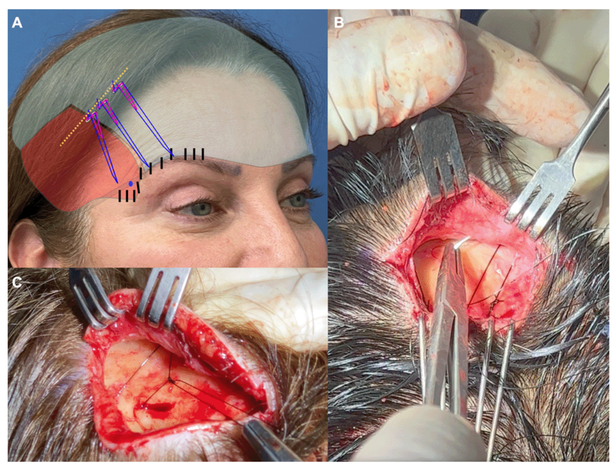

Figure 7. (A) Superior row of suspending sutures (pink). (B) Intraoperative photograph of suture placement in the flap. These sutures are placed approximately 5 cm from the incision, following the same vector and anchor in the same bone tunnel as those in the inferior row. (C) Intraoperative photograph: once tied the knots can be displaced upward and hidden in the tunnel.

Two rows of suspending sutures of Nylon 3/0 will be anchored to each tunnel, 1 inferior and 1 in the middle of the flap (approximately 5 cm from the incision), following the same vectors. The inferior sutures are placed from lateral to medial, in a horizontal fashion and should grab periosteum and subcutaneous tissue, with care not to create pinching in the skin (Figure 6A and 6C). The exact point where the sutures are placed is defined according to the desired shape of the brow. The sutures are anchored to the tunnels in the bone and tied from lateral to medial. The tension applied to each suture should be consistent with the final desired position and shape of the brow. The sutures in the upper row are placed and tied in the same fashion to their corresponding bone tunnel (Figure 7A and 7C). After suturing, the knots are hidden within the tunnels.

Before anchoring the sutures to their respective tunnels, a single #3 drainage is placed at the lower part of the forehead flap, over the orbital rim (Figure 8A).

Figure 8. (A) Drainage placement (blue) and layered closure of the wound (violet). (B) Intraoperative photograph showing the closure of perioustium/glaeal plane with monocryl 4/0. (C) Intraoperative photograph showing the subcutaneous plane closure with of monocryl 4/0.

Figure 10. 28 years old female. (A) Preoperative (front view). (B) Postoperative at 1 year (front view). (C) Preoperative (3 quarters). (D) Postoperative at 1 year (3 quarters). (E) Preoperative (profile). (F) Postoperative at 1 year (profile).

Figure 9. (A) Skin closure (blue lines). (B) Intraoperative photograph showing skin closure with simple sutures of nylon 5/0. (C) Intraoperative photograph showing final appearance of the wound.

Figure 11. 34 years old female. (A) Preoperative (front view). (B) Postoperative at 1 year (front view). (C) Preoperative (3 quarters). (D) Postoperative at 1 year (3 quarters). (E) Preoperative (profile). (F) Postoperative at 1 year (profile).

Wound Closure

Closure of the wound is performed in 3 layers: periosteum and galea, subcutaneous tissue (Figure 8B and 8C), and skin (Figure 9A and 9C). Plaster tape is placed over the whole frontotemporal area.

Patients' Results

A total of 300 patients were operated with this technique between January 2020 and January 2022, of whom 270 (90%) were women and 30 (10%) were men. Mean (range) age was 42.5 (35-50) years. The postoperative follow-up time ranged from 11 to 36 months, with a mean of 23.5 months. In 270 patients (90%), the frontotemporal lift was associated with other concomitant facial plastic surgery procedures: rhinoplasty in 120 patients (40%), deep plane face and neck lift in 90 patients (30%), and eyelid surgery in 60 patients (20%). The mean (range) of brow elevation was 5 mm.[4-6] Overall patient satisfaction was high; a stable and long-lasting result was observed during the follow-up period (Figures 10-13). Partial relapse occurred in 30 patients (10%), although no

Figure 12. 26 years old female. (A) Preoperative (front view). (B) Postoperative at 1 year (front view). (C) Preoperative (3 quarters). (D) Postoperative at 1 year (3 quarters). (E) Preoperative (profile). (F) Postoperative at 1 year (profile).

Figure 13. 37 years old female. (A) Preoperative (front view). (B) Postoperative at 1 year (front view). (C) Preoperative (3 quarters). (D) Postoperative at 1 year (3 quarters). (E) Preoperative (profile). (F) Postoperative at 1 year (profile).

further treatment was required. Mild asymmetry in brow height was found in 30 patients (10%). Transient-sensitive complications (paresthesia/hypoesthesia) were observed in most of the patients. However, all resolved within 5 months postoperative with no permanent sensitive sequelae. No complications were found in the incision line, neither scarring alopecia nor hypertrophic scarring. One patient developed a soft tissue depression in the forehead, probably due to flap cauterization, which was solved with subsequent fat grafting.

Discussion

Many techniques have been described for brow elevation over the years.[4-9] Frontotemporal brow lift implies elevation of both the middle brow and lateral brow, and can be performed through an open (coronal), endoscopic, or combined approach.[4] The endoscopic and combined approaches require the use of 3- to 6-cm bi-temporal incisions along with a small vertical or horizontal incision in the center.[4,11,16,17]

The strategic placement of the incision in the proposed technique provides good access to both the lateral brow and the glabellar area under direct vision, with minimal sensitive denervation as most branches of the supraorbital nerve are respected.

Regardless the approach, an effective technique requires (1) wide dissection of the frontotemporal flap, (2) periosteal release at the orbital rim, and (3) weakening of brow depressors by myotomies or myectomies while maintaining the integrity of the frontalis muscle, and Paul[4] en bloc advancement of the scalp flap.[17]

Along with proper periosteal release, fixation and suspension are key factors to counteract the gravitational forces and muscular activity of the brow depressors.[10,12] Moreover, since the period of maximal wound strength may extend up to 90 days,[18,19] semipermanent to permanent fixation methods are believed to be more suitable.[16]

Anchoring can be performed to either the DTF or the cortical bone.[12-14] In the authors' experience, fixation to the DTF can produce pain and discomfort up to several weeks in some patients. Bone fixation eradicates this issue and can be performed with screws, plates, or bone tunnels.[13-16,20] The authors advocate the use of Piezotome M+ for tunneling the bone as it is precise, safe, and avoids the use of exogenous implants.

In regard to suspension, the proposed technique uses 2 lines of sutures for suspending the forehead flap in each of the defined vectors. While the inferior sutures give the brow its desired shape and position, the superior row acts as a reinforcement, sharing the load of descent forces and allowing for a tension-free closure of the skin.

Finally, although it has been suggested that beveled incisions in hair-bearing areas allow for hair regrowth and better hiding of the scar,[21-23] the authors have encountered the development of scarring alopecia in some patients. Changing toward the use of incisions parallel to the direction of the hair follicles has enabled the authors to achieve unremarkable scarring.

Conclusion

Brow lifting is an essential tool for achieving aesthetic outcomes in periorbital rejuvenation surgery. The proposed technique allows for complete elevation of a forehead flap under direct vision through two small frontotemporal incisions, without the need of an endoscope, along with minimal sensitive denervation. Moreover, the method of suspension/fixation has proved to be predictable, long-lasting, and cost-effective, without the need of exogenous implants and with less postoperative discomfort.

Declaration of Conflicting Interests

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Ethical Statement

Not applicable.

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