Subcutaneous Brow Lift With Precise Suture Fixation and Advancement

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Background: Current aesthetic literature reflects a renewed interest in the subcutaneous brow lift. The authors believe that this trend is based on the principle that the most direct approach to elevating the brows is subcutaneous dissection with skin advancement. Furthermore, the addition of progressive tension sutures (PTSs) to the subcutaneous brow lift permits precise fixation of brow position, controlled advancement of the forehead flap, and elimination of dead space.

Objective: The authors report on the use of active suture fixation of the brow and advancement of the forehead flap to accomplish a precise, effective, and sustained brow elevation.

Methods: Dissection was carried down to the frontalis muscle with a reversed bevel incision. Corrugator resection was performed by incising the galea transversely in the glabellar region and then identifying, isolating, and resecting the muscle. The first PTS was placed to secure the midline subcutaneous tissue to the superior edge of the transected galea. Then a PTS was placed from the subcutaneous tissue or deep dermis of the flap deep to the anticipated brow peak. The brow was anchored in an elevated position with additional PTS placed medially and laterally.

Results: A consecutive series of 80 patients underwent the described procedure, with average follow-up of 13.5 months. One case of transient epidermolysis occurred, resulting in a small area of partial alopecia. Three patients had extruding sutures. Upper eyelid excision was required in 5 patients, and in 1 patient unilateral revision was performed to improve symmetry.

Conclusions: This approach simplifies the forehead lift and allows the surgeon to directly and precisely control the position of the brows, while shortening convalescence and reducing complications. (Aesthetic Surg J 2007;27:388–395.)

The preponderance of brow lift scientific articles, presentations, and media pieces during the past 15 years have advocated the endoscopic subperiosteal approach. As recently as 2004, Trolius predicted that most surgeons practicing cosmetic surgery today advocate an endoscopic subperiosteal technique for elevation of the brow and elimination of glabella furrows and wrinkles.

However, despite public interest and the enthusiasm of surgeons for this high-tech, minimally invasive procedure, overall use of this approach appears to be decreasing. According to Chiu and Baker, who reviewed 628 endoscopic brow lifts at Manhattan Eye, Ear and Throat Hospital, complications of the endoscopic brow lifts were similar to those of an open procedure, and the recurrence rate was 50%. They report that at their institution the use of this procedure declined 70% over the 5-year period studied. The authors concluded that management of eyebrow ptosis remains a most challenging problem and that there is no single superior solution for brow ptosis currently available.

The subcutaneous brow lift is not a new approach, but it has not had widespread acceptance. Recently, there has been a renewed interest in this procedure, as evident in the literature, including the contributions of Miller et al, Vogel and Hoopes, de Benito, and Bernard et al. Miller et al have shown the safety of the subcutaneous approach in avoiding injury to supra trochlear and supraorbital nerves. Ullman and Levy reported 96% patient satisfaction and 1.8% minor and reversible complications in a retrospective series of 980 women who underwent subcutaneous brow lift through an anterior hairline incision. Vogel and Hoopes reported similar results in a smaller series of patients followed up for a mean period of 7.5 years. And Bernard et al concluded that the lateral subcutaneous browlift is a safe and technically simple technique that achieved optimal aesthetic results with minimal complications.

There is a compelling logic to the subcutaneous approach to brow lift. Because the brow is a skin appendage, an advancement skin flap provides the most direct approach to elevation of the ptotic brow. It is
important to note that the lift is direct, resulting in a 1:1 ratio of advancement to lift. Stuzin et al⁹ describe endoscopic subperiosteal brow lift as placing the surgeon at a mechanical disadvantage by attempting to reposition the superficial brow from the deeper periosteal approach. Additionally, dissection in the subcutaneous plane avoids injury to the supraorbital and frontal branches of the VII nerve, which avoids the neurologic complications of deeper dissections. The anterior hairline approach, with careful surgical technique and a reversed bevel incision, results in an inconspicuous scar with no elevation of the frontal hairline.⁵,⁸ In fact, this approach can be used to actually advance the hairline by anterior scalp dissection in the subgaleal plane and fixation with progressive tension sutures (PTS).

The addition of PTS to the conventional subcutaneous brow lift adds precision to this otherwise effective procedure, which Ullman and Levy⁸ have described as “time-worn, safe, reproducible and effective.”⁹-¹¹ This precision is accomplished through direct fixation of the brow, by placing PTS from the subcutaneous or deep dermis to the underlying frontalis muscle, fibrofatty tissue, or galea (Figure 1).

Methods

Anesthesia

Under intravenous sedation, the anterior hairline and supraorbital area were anesthetized with 0.25% bupivacaine (Marcaine). After the administration of local anesthetic, with a 25-gauge spinal needle, the subcutaneous tissue was infiltrated with a dilute lidocaine (Xylocaine) with epinephrine solution. This latter maneuver provided profound anesthesia and a relatively bloodless operative field and facilitated the dissection.

Technique

With the reversed bevel incision (perpendicular to hair shafts) at the anterior hairline, the dissection was carried down to frontalis muscle. The incision was carried a short distance into the temporal scalp to facilitate the dissection and suture placement. The dissection extended inferiorly, with both sharp dissection with a no. 15 blade and blunt dissection with the scalpel handle or scissors. This was a relatively easy dissection with minimal bleeding. Pinpoint cautery was used for hemostasis. Metzenbaum scissors were used to continue the dissection inferiorly, by spreading in a vertical direction and cutting when appropriate. The end point of this dissection was determined by the mobility of the supraorbital skin and eyebrows.

Corrugator resection was carried out by incising the galea transversely in the glabellar region (Figure 2), then identifying, isolating, and resecting the muscle under direct vision (Figure 3). Once hemostasis was complete, the area was irrigated with normal saline solution and the placement of the progressive tension sutures initiated. With 3-0 Vicryl sutures (Ethicon, Somerville, NJ), the first PTS was placed to secure the midline subcutaneous tissue to the superior edge of the transected galea in the midline, with a slight advancement as indicated. Then a PTS was placed from the subcutaneous tissue or deep der-
Figure 2. An incision is made through the galea in the glabellar region for access to the corrugator muscle.

Figure 3. The corrugator muscle is identified, isolated, and excised, with care to preserve the supratrochlear neurovascular bundle.

mis of the flap deep to the anticipated brow peak (Figure 4). Additional PTS were placed medially and laterally to this initial suture, thereby precisely anchoring the brow in an elevated position. Sutures can be easily removed and replaced as needed to obtain brow symmetry. Tying sutures was facilitated by having an assistant maintain the flap in an advanced position while the surgeon secured the knots (Figure 5).

Although brow fixation was precise, a slight overcorrection of the brow position allowed for some postoperative descent. Advancement of the forehead flap was achieved by placement of multiple PTS, with each subsequent suture unloading the tension from the previous one. Sutures were placed as deep as necessary into the frontalis muscle, the galea, and even the periosseum. Sutures were placed with a vertical orientation to minimize risk of sensory nerve entrapment. Each pass of the needle through the dermis was inspected from the surface to confirm that it had not penetrated the skin. The final PTS were placed just inferior to the skin incision, and the excess skin was excised with the appropriate reversed bevel. Tension-free skin closure (Figures 6 and
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Figure 4. Placement of 3-0 Vicryl PTS suture from the skin flap to the underlying frontal fascia.

Figure 5. The surgeon ties the suture while the assistant maintains flap advancement.

7) was performed with 4-0 nylon half-buried mattress sutures, with the knots on the superior (scalp) edge. To avoid suture extrusion, no buried sutures were placed at the level of the incision closure. A continuous 5-0 fast absorbing plain catgut suture was used to approximate the wound edge.

This approach can be used for full or lateral brow lift, depending on the indication. If upper lid blepharoplasty was appropriate, it was performed at the completion of the forehead procedure.

Although this approach permits the use of a drain, the authors have not found postoperative drainage to be necessary. If an optional padded pressure dressing was used, it was removed the next morning to allow the patient to shower and shampoo, which can be repeated daily. Activity was not restricted, and sutures were removed in 1 week.

Results

Eighty consecutive patients who underwent subcutaneous brow lift with PTS advancement of the fore-
head flap were followed for an average of 13.5 months. All patients were female, with an age range of 32 to 74 years (average age, 54.2 years). In this series, 1 patient underwent a unilateral brow lift, 38 patients underwent full brow lifts, and 42 patients underwent lateral brow lifts. Typical results are shown in Figures 8 to 11.

One patient had a transient epidermolysis in the temporal scalp that healed rapidly but resulted in a small area of partial alopecia. Two patients had extruding sutures, probably because of placing the sutures too superficially. A single patient had suture extrusion in both forehead and face, which was attributed to low-grade infection. Upper eyelid skin excision was required.
in 5 patients, which was attributed to some degree of recurrent ptosis. A single patient required unilateral revision to improve symmetry.

**Discussion**

The authors have found that the described approach provides a secure fixation of the brows at a level precisely controlled by the surgeon. Brow position and shape can be precisely determined by direct suture placement. Moreover, as Stuzin et al have suggested, the repositioning of soft tissues (in this case, brow) is most predictable if fixation is secure and direct. In the described procedure, progressive tension sutures were placed at appropriate intervals to effectively advance the forehead flap.

**Figure 8.** A, Preoperative view of a 59-year-old woman. B, Postoperative view 18 months after temporal rhytidoplasty, lateral subcutaneous/PTS brow lift, and 4-lid blepharoplasty.

**Figure 9.** A, Preoperative view of a 55-year-old woman. B, Postoperative view 3 months after full subcutaneous/PTS brow lift with corrugator resection.
to distribute the tension of the advancement over the entire deep aspect of the forehead flap. This wide distribution of tension prevented excessive tension on the distal flap, which in the authors’ opinion preserved the circulation to the distal tissues. As in any procedure in which a flap is involved, one must be concerned about medical conditions, such as diabetes, or patients who smoke. However, the blood supply of the forehead is robust, and the wide distribution of tension by these sutures prevented compromise of distal circulation. Furthermore, skin incisions were approximated with no tension, minimizing hairline scars.

Complications of this approach have been rare. An occasional extruding suture was noted, but this problem

**Figure 10.** A, Preoperative view of a 64-year-old woman. B, Postoperative view 18 months after full subcutaneous/PTS brow lift with cervicofacial rhytidoplasty.

**Figure 11.** A, Preoperative view of a 63-year-old woman. B, Postoperative view 14 months after full subcutaneous/PTS brow lift.
can be avoided by keeping the PTS in the deep dermis and avoiding buried sutures along the incision. In the early postoperative period, occasional dimpling caused by initial edema may be visible. No permanent dimpling occurred in our series. Occasionally, transient numbness of the frontal scalp is observed, but permanent paresthesias or anesthesia was not noted. Visible residual scars are rare, and the hairline position is unaltered. Brow elevation was maintained in most patients.

Conclusions
The subcutaneous/PTS brow lift is a simple suture fixation technique that provides precise placement of the brow position and controlled advancement and fixation of the forehead flap. This is an open procedure that eliminates the need for an endoscope or endoscopic instrumentation, skeletal or soft tissue fixation devices, drains, or tissue adhesives. The subcutaneous dissection is easy, safe, and logical, reduces the recurrence of brow ptosis, and reduces complications.

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References

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