INTRODUCTION

Congenital low-brow position and age-related changes to the periorbital region continue to be an area where patients are often seeking rejuvenation. These changes reflect the anatomy of the region, which often result in a ptotic lateral brow. Various techniques have been described to correct the ptotic brow. These include a coronal, endoscopic, anterior hairline and temporal approach. In addition, subgaleal, subperiosteal, and subcutaneous planes of dissection have all been described. While open techniques date back to the early 1900s, there were a multitude of modifications to this technique throughout the remainder of the century. Endoscopic techniques were introduced in the 1990s followed by numerous variations, particularly focused on fixation. The general agreement is that an ideal technique minimizes scarring, scalp dysesthesia/anesthesia, hairline distortion, and risk of injuring surrounding neurovascular structures. In addition, the technique should correct the ptotic brow in a precise and reproducible manner while maintaining longevity of the result.

The senior author (A.M.) began his career routinely performing coronal brow lifts with modifications for patients with high hairline (modified anterior brow lift). In the mid-1990s, he began performing endoscopic brow lifts. A study by Matarasso and Terino reported that patients requested brow lifts for four indications: congenital and...
senile brow ptosis, and/or glabellar or forehead rhytids. However, with the wide adoption of neurotoxin for rhytids performing brow lifts for the last 2 indications became rare. In this study, we describe the senior author’s evolution of his current systematic technique and experience, as well as report on a systematic review of the literature as it relates to this technique. The vast majority (>90%) of patients were female and ranged in age from 32 to 82 years. Concurrent upper eyelid blepharoplasty and lateral subcutaneous lift were performed on indicated patients. A levator test was performed by placing the brow to an appropriate height. If excess upper lid skin exists, then an upper eyelid and brow procedure can be performed. If no excess upper lid skin exists, then a brow operation alone is sufficient. In the senior author’s (A.M.) experience, the lateral subcutaneous brow lift has produced consistent and effective results while maintaining a low-risk profile.

METHODS

A retrospective chart review of the senior author’s (A.M.) experience, as well as a systematic review of the literature, was performed using the MEDLINE, PubMed, and Cochrane Central Register of Controlled Trials databases. English language journals were searched using the following keywords: “lateral subcutaneous brow lift,” “lateral subcutaneous foreheadplasty,” “lateral subcutaneous forehead rhytidectomy,” “temporal subcutaneous brow lift,” “temporal subcutaneous foreheadplasty,” and “temporal subcutaneous forehead rhytidectomy.” Studies were included if the content was original and provided outcome and complication data.

RESULTS

The senior author began utilizing a lateral temporal brow lift for lateral brow ptosis in the early 2000s. Initially, beginning with a subperiosteal dissection, then a biplanar (subperiosteal and subcutaneous), and finally, for the last 15 years, solely subcutaneous. It became evident that there were no advantages to any other dissection plane other than the subcutaneous plane of dissection. The 4–5 cm × 2–3.5 cm elliptical incisional dimensions were noted to be applicable to the majority of patients. Fluid collections occurred in less than 1%–2% of cases and fibrin sealant was introduced in an attempt to reduce this. Numerous skin closure methods resulted in settling on bidirectional barbed suture closure. Over 500 cases have been performed with no cases of permanent nerve injury or skin necrosis. This is the largest series of patients utilizing this technique. Most patients experience transient hypesthesia. In a follow-up period of 1–16 years, there were 3 hematomas, and 2 cases of alopecia and unsatisfactory scarring (Table 1). There were no cases of asymmetry, pruritus, or infection. Overall, there was a high degree of patient satisfaction reported for all those who underwent this procedure.

Operative Details

The senior author’s (A.M.) technique is outlined below (See Video 1 [online], which displays the senior author’s operative technique)

1. The midline of the forehead (widow’s peak) is identified and 3.5 cm lateral to the midline, at the midpupil, the ellipse begins. A 4–5 cm in length, and 2–3.5 cm in width ellipse is marked. The incision is placed (a) either in the hair-bearing scalp in normal width (5–6 cm from the eyebrow) patients; or (b) at the hairline in patients with wide foreheads to reduce the width. These are determined after discussions with patients and based on hair stage, density, and hairline position (see figure 1A, Supplemental Digital Content 1, which displays an outline of the senior author’s technique, http://links.lww.com/PRSGO/B371).
2. The planned incision sites are infiltrated with 20 ml of 0.5% lidocaine with epinephrine (1:200,000).
3. The ellipse of skin is incised precisely.
4. The dissection begins sharply with a #10 blade, followed by blunt fingertip dissection, and completed with facelift scissors in a spreading motion. The dissection ends at the upper edges of the eyebrows and is wider than the elliptical resection (see figure 1B, Supplemental Digital Content 1, which displays an outline of the senior author’s technique, http://links.lww.com/PRSGO/B371).
5. Hemostasis is obtained and the wound is packed with a sponge containing 0.5% lidocaine with epinephrine (1:200,000). The contralateral side is treated and packed. We then return to inspect the first side for final hemostasis.
6. Fibrin sealant is evenly distributed in the wound and 3 minutes of pressure is applied (see figure 1C, Supplemental Digital Content 1, which displays an outline of the senior author’s technique, http://links.lww.com/PRSGO/B371).
7. The lateral temporal lift wound is closed with a 3-0 Monoderm bidirectional Quill suture (Angiotech, Inc., Vancouver, British Columbia, Canada), with a diamond point needle, 14 × 14 cm in length (see figure 1d, Supplemental Digital Content 1, which displays an outline of the senior author’s technique, http://links.lww.com/PRSGO/B371). Interrupted prolene sutures also can be used as indicated (see figure 1e, Supplemental Digital Content 1, which displays an outline of the senior author’s technique, http://links.lww.com/PRSGO/B371).
8. Appearance of the closed lateral temporal lift (see figure 1f, Supplemental Digital Content 1, which displays an outline of the senior author’s technique, http://links.lww.com/PRSGO/B371).

There were no prospective, randomized, controlled trials available for review. Twenty-six articles were reviewed from the initial keyword searches of the MEDLINE, PubMed, and Cochrane Central Register of Controlled Trials databases. Five met our screening criteria and were analyzed critically for inclusion and further objective review. From this information, a narrative synthesis of data was undertaken (Table 1).

In 2000, Miller et al.20 reported performing a lateral subcutaneous brow lift in 65 patients with a follow-up ranging from 2 to 40 months. In terms of adverse events,
Table 1. Systematic Review of the Literature

| Reference                  | No. of Patients | Age (yr)      | Follow-Up (mo) | Hematoma | Dysesthesia | Asymmetry | Reoperation | Alopecia | Pruritus | Infection | Scarring |
|----------------------------|-----------------|---------------|----------------|----------|-------------|-----------|-------------|----------|----------|-----------|----------|
| Miller et al.20            | 65              | -             | 2–40 (range)   | -        | 0           | -         | -           | 0        | 0        | -         | 0        |
| Bernard et al.21           | 117             | -             | 14 (mean)      | 2        | 6           | 0         | -           | 0        | -        | -         | 0        |
| Guerrissi22                | 142             | 35–55 (range) | 24 (mean)      | -        | 0           | 12        | 3           | -        | -        | 16        | -        |
| Bidros et al.23            | 28              | 54 (mean)     | 10.8 (mean)    | 0        | 0           | 1         | 2           | -        | -        | 0         | 1        |
| Mahmood                    | 100             | 55 (mean)     | -              | 0        | 0           | -         | -           | -        | -        | 0         | 0        |
| and Baker24                |                 |               |                |          |             |           |             |          |          |           |          |
| Matarasso (current study)  | 500             | 32–82 (range) | 12–192 (range) | 3        | 0           | 0         | 2           | 2        | 0        | 0         | 2        |

Fig. 1. Case examples.
sensation to light touch was consistently reduced in the central forehead postoperatively but returned to normal in all cases within three months. There was no diminished scalp sensation or pruritus above the lateral brow lift incision. In addition, there was no alopecia observed, and in most patients, the hairline was improved by advancement of the frontal and temporal scalp. The scars were acceptable as brow elevation was successful in all cases.

In 2006, Bernard et al. reported their experience after performing a lateral subcutaneous in 117 patients during a 2-year period with an average follow-up period of 14 months and an average operative time of 23 minutes. They reported 2 hematomas. Scalp hypesthesia was reported by 6 patients and was confined to the region just posterior to the incision. These alterations were temporary, and all patients regained full sensation of the scalp within 8 weeks. No alopecia was observed. In 1 patient, the flap was inadvertently torn during its elevation secondary to excessive cephalic traction with a double hook. Meticulous repair was done, and the final outcome was unaffected. There were no cases of brow asymmetry postoperatively. All patients perceived their scars as imperceptible.

Similarly, Guerrissi described his experience of using a similar subcutaneous technique with the addition of deeper structure suspension to the temporal aponeurosis in 142 patients from 1999 to 2006 to treat periorbital aging. This technique was performed in patients ranging from 35 to 55 years old, and 94.5% were female. A total of 130 patients (91%) presented satisfactory results. In 16 patients (11%), partial infection of the temporal wound was detected; in other 12 (9%), asymmetry of eyebrows was present, of which 9 (75%) corrected spontaneously after 3 months and in other 3 (25%), a reoperation was necessary. No major complications were observed.

In 2010, Bidros et al. reported their results of performing a subcutaneous temporal brow in 28 patients over a 4-year time period between July 2003 and January 2007. Of the 28 patients, 27 were female and 1 was male; the mean age was 54 years. Five patients underwent a unilateral brow lift for asymmetry and 25 patients underwent a bilateral procedure. The mean length of follow-up was 10.8 months. Scarring was minimal and rated as “good” or “excellent” by both patients and surgeons. The effectiveness of the browlift was also rated as “good” or “excellent” by all but one patient. Two patients underwent revision—1 for scar revision and the other for a greater degree of lift. There were no incidences of hematoma, infection, numbness, or excessive scarring.

Finally, Mahmood and Baker published their results in 2015 after having performed the lateral subcutaneous brow lift on 100 patients; 99 of those were female, age range 33–82 years, with an average age of 55 years. They reported no complications in the early postoperative period or in long-term follow-ups. No patients experienced paresthesia, unsightly or widened scarring, or hairline elevation, and there were no seromas or surgical site infections in any patients. There was no incidence of hematoma in their series of patients. Furthermore, they reported durable brow elevation and an overall high patient satisfaction for all those who underwent this procedure.

**DISCUSSION**

In this study, a retrospective chart review of the senior author’s (A.M.) experience as well as a systematic review of the current available literature was performed on the lateral subcutaneous brow lift. All of the studies were retrospective in nature and report high patient satisfaction with an acceptable risk profile. Similarly, the senior author (A.M.) in our study also has very high patient satisfaction and low complication rates with this technique (Fig. 1).

Results of the reviewed studies were consistent and reliable with low complication rates; most commonly infection (0%–11%), asymmetry (0%–8.5%), reoperation (0%–7%), dysesthesias (0%–8.5%), unsatisfactory scarring (0%–3.6%), and hematoma (0%–1.7%). The only study to report infectious complications was Guerrissi. In his study, he reports using a similar subcutaneous technique with the addition of suspension of deeper structures to the temporal aponeurosis using a permanent suture. There are no identifiable risk factors in his study to account for the increased infectious rate.

Similar to other studies analyzing various brow-lifting techniques, the literature lacks randomized prospective outcome studies for the lateral subcutaneous approach. Future investigations might focus on higher levels of evidence studies as well as standardizing and improving both patient and surgeon reported outcomes.

**CONCLUSIONS**

In this study, we report our experience with the lateral subcutaneous temporal lift (with or without fibrin sealant and barbed suture closure) (n > 500), as well as a systematic review of the current available literature on the technique. This procedure has emerged as a safe and reliable technique for lateral brow elevation with a very low and acceptable risk profile.

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