

# Subcutaneous Lateral Temporal Lift



Ira L. Savetsky, MD<sup>a</sup>, Joshua M. Cohen, MD<sup>b</sup>, Alan Matarasso, MD<sup>c,\*</sup>

## KEYWORDS

- Brow lift • Lateral temporal lift • Subcutaneous temporal lift • Subcutaneous brow lift • Brow ptosis
- Brow rejuvenation • Forehead rejuvenation

## KEY POINTS

- An in-depth understanding of forehead anatomy and natural aging allows for effective preoperative analysis and subsequent development of a patient-specific treatment plan.
- The subcutaneous temporal brow lift is a safe, effective, and reliable method for correction of lateral brow ptosis.
- Surgical markings should be performed with the patient in a seated upright position, and care should be taken when evaluating brow ptosis in the setting of chronic frontalis activation and dermatochalasis.

## INTRODUCTION

Achieving the ideal aesthetic of the forehead and brow is a critical part of establishing facial harmony. The plastic surgery literature has traditionally focused on rejuvenation of the face and brow. However, interest in periorbital rejuvenation may have increased further because of mask wearing during the COVID-19 pandemic. An increased focus on periorbital aesthetics is logical because the eyes and eyebrows are the first part of the face that others notice, as well as the most expressive part of the face. The eyes have been called the window to the soul, whereas the brows are a curtain of emotion. The ability to express this range of emotions through one's eyes and eyebrows is an important form of nonverbal communication that helps cross language barriers and cultural differences. Although the unnaturally elevated brow can lead to the so-called surprised look, the aging forehead and brow can lead to the unintentional expression of sadness, anger, or fatigue.<sup>1,2</sup>

Various techniques have been established over the past 30 years to correct the aging brow, ranging from the least invasive, such as neurotoxin, to open surgical correction. The senior author has used multiple techniques for forehead rejuvenation, but his current preferred method is the lateral subcutaneous temporal lift, which is described in detail in later discussion.<sup>3</sup>

## HISTORY OF FOREHEAD REJUVENATION

The evolution of forehead rejuvenation was well documented by Paul<sup>4</sup> in 2001 and begins with Passot in 1919. Passot's brow-lift technique involved multiple direct skin excisions above the eyebrow, hidden in forehead rhytids.<sup>5</sup> Although Passot only excised skin and subcutaneous tissue, others recommended inclusion of muscle. In 1926, Hunt<sup>6</sup> published the first description of an incision in the scalp or anterior hairline for brow lifting. Lexer and Lexer,<sup>7</sup> known for performing the first facelift, published their combined face and forehead lift procedure in 1931. The next major

<sup>a</sup> Private Practice, 6000 West Spring Creek, Suite 200, Plano, TX 75024, USA; <sup>b</sup> Hansjörg Wyss Department of Plastic Surgery, New York University Langone Health, 222 East 41st Street, New York, NY 10017, USA;

<sup>c</sup> Northwell Health System/Hofstra University, Zucker School of Medicine, Manhattan Eye, Ear and Throat Hospital, 1009 Park Avenue, New York, NY 10028, USA

\* Corresponding author.

E-mail address: amatarasso@drmatarasso.com

Twitter: @DrAlanMatarasso (A.M.)

advancement in forehead rejuvenation came in the 1960s when Vinas described the importance of lateral brow elevation in brow lift.<sup>8</sup> Advances continued to be made in the 1980s with Papillon's description of a subcutaneous plane of dissection and Paul's description of his transblepharoplasty approach.<sup>9,10</sup> In 1992, the endoscopic brow lift was first presented at meetings by Isse and Vasconez and subsequently published in the literature in 1993 by Chajchir.<sup>11–13</sup> Although the twenty-first century brings a renewal of various techniques and competing philosophies, the goal remains the same: correction of brow ptosis in a reproducible and long-term manner while maintaining or improving brow shape while causing minimal scarring, nerve injury, alopecia, and hairline distortion.

## ANATOMY

An understanding of facial anatomy, surface landmarks, and natural aging is crucial when addressing rejuvenation of the upper one-third of the face.<sup>14,15</sup> The bony forehead is made up of the frontal bone, which is crossed laterally by the temporal ridge. The temporal ridge is critical, as all fascial layers are tethered to this “zone of fixation.” Inferiorly, the attachments widen to become the orbital ligament. Lateral and inferior to this zone is the inferior temporal septum, which becomes a landmark for endoscopic forehead surgery because the frontal branch of the facial nerve and the sentinel vein are both inferior and medial to this attachment.<sup>16</sup> The lateral-most part of the superficial temporal fascia has attachments to the zone of fixation and weakens over time owing to the effects of gravity. As the superficial temporal fascia descends, so do overlying tissues, including the lateral brow, leading to the classic sad-appearing eyes. The medial brow continues to be supported by the frontalis muscle and the brow depressor muscles. Descent of the galeal fat pad can also contribute to lateral eyebrow ptosis.<sup>17</sup> Typically, the galeal fat pad is encompassed by layers of the galea. However, some patients have no galeal support inferior to the fat pad, which allows it to descend with age.

The level of the eyebrow is also intimately linked to the action of the surrounding muscles and the universal depressor: gravity. The frontalis muscle is the only elevator of the brow. It originates from the galea and interdigitates with the orbicularis oculi. The action of the frontalis leads to transverse forehead skin lines. There are multiple brow depressors that originate from the glabella and insert into the soft tissue. The procerus runs in a vertical fashion; the depressor supercillii and orbicularis run obliquely, and the corrugator runs transversely

and obliquely. These muscles create transverse, oblique, and vertical glabellar skin lines, respectively. As one ages, these skin lines deepen, and with continued actinic changes of the overlying skin and weakening of the underlying collagen, become apparent at rest. The lateral orbicularis oculi is the only lateral muscular depressor of the brow.<sup>16</sup>

The muscles of the forehead are controlled by the temporal branch of the facial nerve. The temporal branch crosses the middle third of the zygomatic arch in a supraperiosteal plane, deep to the parotid temporal fascia. It becomes more superficial approximately 2 cm above the arch, entering the superficial temporal fascia at this point. The temporal branch can be protected during forehead rejuvenation by either performing dissection directly on the deep temporal fascia in the temple, remaining deep to the superficial layer of the deep temporal fascia inferiorly, and in the subgaleal or subperiosteal plane over the frontal bone or performing dissection superficial to the superficial temporal fascia and the surrounding forehead muscles.<sup>18</sup> Another important landmark for the frontal branch is the sentinel vein, which travels 1 cm medial and superior to the nerve and should be protected during endoscopic forehead lifts. The supraorbital and supratrochlear nerves provide sensory innervation to the forehead and peribrow skin. The supraorbital nerve exits above the orbit in either the supraorbital notch or the foramen. The notch can sometimes be felt transcutaneously and falls approximately 2.5 cm from the midline. If the nerve exits a foramen, this has been found to be as much as 1.9 cm above the orbital rim. Because of this variable anatomy, blind dissection should not be performed within 2 cm of the orbital rim.<sup>19</sup> The supratrochlear nerve exits the orbit medial to the supraorbital nerve and immediately divides into multiple branches, which typically pass through the substance of the corrugator muscles. These nerves should both be safe during a lateral subcutaneous temporal lift, as they both will lay medial to the dissection.

Multiple studies have evaluated the change of brow height over time. Although it has been classically thought and logical that all eyebrows descend with time, there is evidence in the literature that some brows can elevate as we age. Lambros<sup>14</sup> evaluated the long-term effects of periorbital aging and observed that in his cohort brow position elevated in greater than one-fourth of patients, was stable in a little less than half, and descended in greater than one-fourth of patients.<sup>20</sup> Brow elevation is secondary to “spastic frontalis syndrome” as described by Ramirez,<sup>21</sup> a compensatory mechanism of frontalis contraction

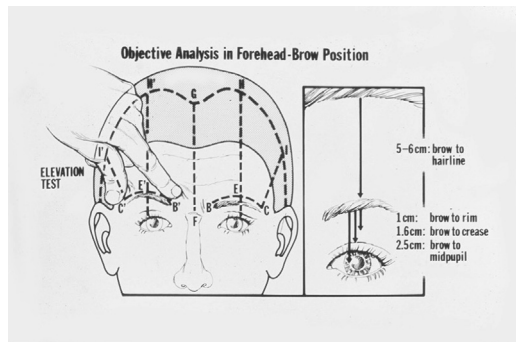
in an effort to relieve the lateral soft tissue hooding from a ptotic brow, or in an attempt to alleviate partial vision obstruction.

The ideal brow position, as described by Westmore<sup>22</sup> in 1974, starts medially on the same vertical plane as the ala and medial canthus and ends laterally at an oblique line from the ala through the lateral canthus. The medial and lateral ends of the brow lie on the same horizontal plane, while the brow peaks on a vertical line directly above the lateral limbus or at the lateral third of the brow. The height of the “ideal” peak is typically higher in women than in men. A survey of plastic surgeons and cosmetologists on their preferences for female eyebrow shape and height determined that the medial brow should be about the level of the supraorbital rim and have an apex lateral cant. A common error seen in brow lifting is over-elevation of the medial brow and under-elevation of the lateral brow. Although brow elevation may thus occur, over-elevation of the medial brow leads to an unattractive appearance.<sup>23,24</sup>

## PREOPERATIVE EVALUATION

Patients presenting for periorbital rejuvenation typically have one or more of the following complaints: forehead and/or glabellar lines, a sad or heavy appearance to the eyes, drooping eyelids and/or eyebrows, bulges, or partially obstructed vision. Although the original option for treatment of the forehead was the classic coronal incision or direct brow lift, several more recent means of treating the aging forehead have generally replaced these techniques.<sup>25</sup> However, with advances comes the need for in-depth facial analysis.

The entire face should first be globally examined for symmetry and signs of aging. The patient can be asked to bring an old photograph to determine the predominant changes and to highlight areas of possible improvement. Next, the upper one-third of the face is evaluated as a unit. This evaluation begins with the patient sitting upright and looking forward in neutral gaze. An assessment should be made of the patient’s visual acuity, eyebrow/orbit relationship and symmetry, eyebrow shape and axis, eyebrow mobility, and forehead and glabellar rhytids. The patient should be evaluated with their eyes both closed and open. By having the patient close their eyes, the frontalis muscle relaxes as the ptotic lateral brow tissue is no longer causing partial vision obstruction. The location of the resting brow is noted, and the surgeon can manually reposition the brow to the ideal location. The eyelid is then evaluated for dermatochalasis, and an elevation test (**Fig. 1**) is performed to verify whether a



**Fig. 1.** The elevation test. The brow is manually elevated to the desired normal position. If there is any excess upper eyelid skin, an upper blepharoplasty may be indicated. (Courtesy of Alan Matarasso, MD, New York, NY.)

concurrent blepharoplasty and ptosis repair are needed.

## MANAGEMENT OF FOREHEAD AGING

There is a wide range of options for management of forehead aging. The mainstay of treatment for dynamic forehead rhytids and glabellar creases is neurotoxin. Neurotoxin blocks nerves from releasing acetylcholine, thereby preventing contraction of the target muscle. The current neurotoxins in use are based on botulinum toxin serotype A and include Botox (onabotulinumtoxin A; Dublin, Ireland), Dysport (abobotulinumtoxin A; Galderma, Lausanne, Switzerland), and Xeomin (incobotulinumtoxin A, Merz, Frankfurt, Germany). Although there are recommended doses of injection depending on the location, the effect of botulinum toxin can range from a softening of dynamic rhytids during expression to complete paralysis of the target muscle leading to a “frozen” appearance. Ultimately, facial analysis, patient expectations, experience, and goals dictate the endpoint. Static rhytids can be best treated by laser resurfacing and chemical peels.

Although neurotoxin can be used to minimally “lift” the brow with denervation of the eyebrow depressors and preservation of the lower frontalis muscle (therefore also leaving those lower rhytids), brow ptosis is best treated with surgical intervention. The open-coronal approach, once deemed the “gold standard,” is a good option for forehead rejuvenation with wide surgical exposure and the ability to effectively mobilize brow tissues and modify muscle attachments under direct visualization. Incisions can either be camouflaged in the hair-bearing scalp or be along the anterior hairline in the long forehead. As the anterior hairline avoids undermining of hair follicles, the plane of

dissection can be as superficial as the subcutaneous plane above the frontalis. This allows for safe and efficient brow elevation and potential effacement of rhytids without concern for transection of major neurovascular structures. The endoscopic brow lift was the next major advancement and was able to address many of the same issues dealt with by open coronal brow lift, however with reduced scar burden, postoperative edema, and risk of nerve injury.<sup>3</sup> With the endoscopic approach, it is very easy to overelevate the medial brow and difficult to adequately elevate the lateral brow.

The senior author began performing lateral temporal brow lifts in the early 2000s, first dissecting in the subperiosteal plane, then biplanar, and finally only subcutaneously. The benefits of the subcutaneous lateral temporal lift are numerous and include safe, repeatable, and effective elevation of the lateral brow.

### SUBCUTANEOUS LATERAL TEMPORAL LIFT *Preoperative Markings*

Appropriate preoperative markings guide the surgeon in providing a symmetric brow lift and appropriate forehead height. All markings are performed with the patient seated upright. The patient is first asked to relax their forehead, and then the midline of the forehead (widow's peak in select patients) is marked. The ellipse begins approximately 3.5 cm lateral from midline, which corresponds to about the midpupillary line. The ellipse is marked to be 4 to 5 cm in length and 2 to 2.5 cm in width depending on the amount of brow lift needed. The width is narrower in patients with a less ptotic brow and narrower forehead. The axis of the ellipse typically runs parallel to the brow.

The incision can be placed either in the hair-bearing scalp or at the hairline (**Fig. 2**). A hairline incision would allow for the height of the forehead to be reduced. Additional thought must be taken for patients who have thin hair density and who are less likely to hide a hair-bearing scalp incision. However, if the incision is carefully made in the orientation of hair follicle growth, the incision can be well concealed.

### *Surgical Technique*

The patient's hair is combed back and wrapped in a blue towel. The operative field is prepared, and the marked incisions are infiltrated with approximately 20 mL of 0.5% lidocaine with epinephrine at 1:200,000. Once adequate anesthesia has been achieved, the ellipse of skin is excised down to the subcutaneous tissue. The inferior dissection begins sharply with a no. 10 blade just



**Fig. 2.** A typical incision at the level of the hairline, which begins at the midpupillary line and extends 5 cm in length. (Courtesy of Alan Matarasso, MD, New York, NY.)

above the frontalis muscle. Once the appropriate plane has been developed, blunt finger dissection ensues inferiorly, medially, and laterally. Any residual points of adhesion are taken down with a face-lift scissors until the upper edge of the eyebrow is reached. The dissection is slightly wider than the width of the initial ellipse to allow for appropriate elevation of the eyebrow and effective redraping of the forehead skin (**Fig. 3**). Hemostasis is



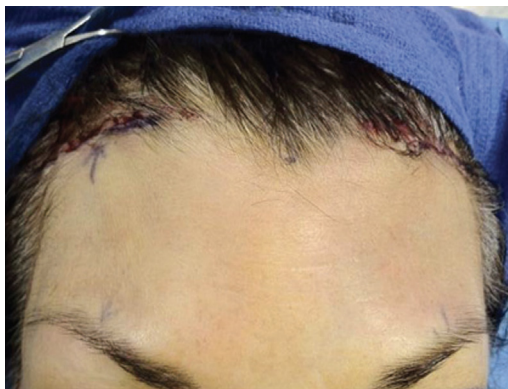
**Fig. 3.** The dissection is extended to the upper edge of the eyebrow and is wider than the length of the incision. (Courtesy of Alan Matarasso, MD, New York, NY.)



**Fig. 4.** Before closure, a fibrin sealant is applied to the wound bed, and pressure is held for 3 minutes. (Courtesy of Alan Matarasso, MD, New York, NY.)



**Fig. 5.** The wound is closed with a 3-0 Monoderm bidirectional Quill suture (Surgical Specialties Corp). (Courtesy of Alan Matarasso, MD, New York, NY.)



**Fig. 6.** Appearance of the on-table result after closure of the incision. (Courtesy of Alan Matarasso, MD, New York, NY.)



**Fig. 7.** Two patients who underwent the senior author's subcutaneous lateral temporal lift with preoperative and postoperative images. (Courtesy of Alan Matarasso, MD, New York, NY.)

achieved on the first side, and a sponge with 0.5% lidocaine with epinephrine at 1:200,000 is packed into the wound. This is repeated on the contralateral side. Attention is then turned back to the first side to achieve a final round of hemostasis. Fibrin sealant is used in the wound, and 3 minutes of pressure is applied on the forehead skin to allow for hemostatic curing of the sealant (**Fig. 4**). The

wound is closed with a 3-0 Monoderm bidirectional Quill suture (Surgical Specialties Corp, Tijuana, Mexico) with a diamond point needle (**Fig. 5**). Interrupted 5-0 Prolene sutures (Ethicon, New Brunswick, NJ, USA) are used to decrease any tension on the incision (**Fig. 6**). The incisions are not dressed, and Prolene sutures can be removed in 3 to 5 days.



**Fig. 8.** A 47-year-old female patient before and 6 weeks after lateral temporal browlift, upper lid blepharoplasty, and periocular erbium laser. (Courtesy of Alan Matarasso, MD, New York, NY.)

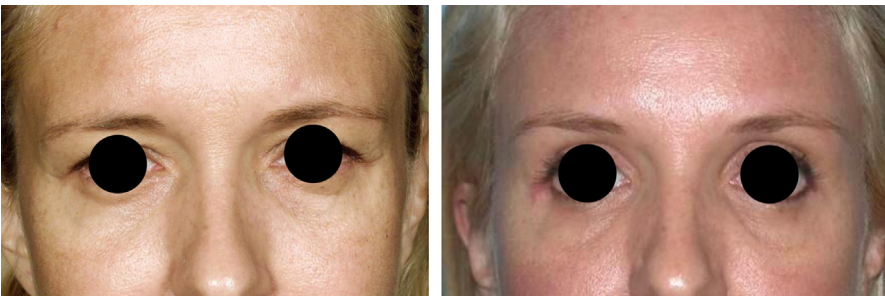
### ***Expected Outcomes and Complications***

The subcutaneous lateral temporal lift is a well-tolerated procedure with very few significant postoperative complications. The senior author published a retrospective review of his 500 consecutive subcutaneous lateral temporal lifts and found no cases of permanent nerve injury or skin necrosis. Patients were uniformly pleased with their postoperative results (Figs. 7–12). Of the 500 cases, there were a total of 3 hematomas/seromas, which were aspirated, and 2 cases of incisional alopecia and unsatisfactory scarring, requiring scar revision.<sup>26</sup>

A systematic review of the literature found 5 other retrospective studies that evaluated postoperative results following subcutaneous lateral brow lifts.<sup>26</sup> Miller and colleagues<sup>27</sup> reported their positive experience with the procedure in 65 patients. All patients had improvement in their brow ptosis and also in their hairline owing to excision of a triangular area of thinning hair in the temporal area. Miller also performed direct excision of glabellar facial muscles to decrease vertical rhytids. There were no episodes of permanent diminished scalp sensation or alopecia after the procedure. Bernard and colleagues<sup>28</sup> reported their experience with the procedure in 117 patients



**Fig. 9.** A 55-year-old female patient before and 5 years after temporal browlift, upper lid blepharoplasty, and periocular erbium laser. (Courtesy of Alan Matarasso, MD, New York, NY.)



**Fig. 10.** A 42-year-old female patient before and after temporal lift, upper and lower lid blepharoplasty. (Courtesy of Alan Matarasso, MD, New York, NY.)



A



**Fig. 11.** (A) A 57-year-old female patient before and 1 month after lateral temporal lift. (B) Same 57-year-old female patient before and 5 years after lateral temporal lift. (Courtesy of Alan Matarasso, MD, New York, NY.)

over a 2-year period. The average operative time for the bilateral procedure was 23 minutes. Two patients developed hematomas, which required evacuation, and no patients had long-standing scalp hypesthesia or alopecia. Guerrisi<sup>29</sup> used a subcutaneous technique in conjunction with deep structure suspension to the temporal aponeurosis in 142 patients from 1999 to 2006. Although 91% of his patients had satisfactory results, 16% of patients developed “partial infection” of the temporal wound, and 9% of patients had immediate asymmetry of their eyebrows. In 2010, Bidros and colleagues<sup>30</sup> reported their results on 28 patients, almost all of whom rated their results as “good” or “excellent” with no incidences of hematoma, infection, hypesthesia, or poor scarring. Mahmood and Baker<sup>31</sup> reported durable results

with no complications in their cohort of 100 patients.

### SUMMARY

With in-depth preoperative planning and precise surgical technique, the subcutaneous temporal brow lift is a reliable and safe option for lateral brow elevation. The advantages of a subcutaneous dissection are numerous, including its safety, shorter operative time, feasibility under local anesthesia, and consistent long-term results with low likelihood of complications.

### DISCLOSURE

The authors have no financial interest to disclose in relation to the content of this article.

**B**

**Fig. 11.** (continued)



**Fig. 12.** A 69-year-old male patient before and 3 months after. Final photograph is 1 year after liposuction of abdomen, neck lift, mid-forehead browlift. Because of his hairline and the lengthy flap undermining required, a mid-forward incision was used. (Courtesy of Alan Matarasso, MD, New York, NY.)

## CLINICS CARE POINTS

- An elevation test should be performed to verify whether the patient is a candidate for concurrent blepharoplasty with the temporal brow lift.
- Blind dissection of the forehead should not be performed within 2 cm of the orbital rim to protect the supraorbital nerve.
- Hemostasis should be checked multiple times before closure, and the addition of fibrin sealants can be used to decrease the most common complication of the procedure.

## REFERENCES

1. Knoll BI, Attkiss KJ, Persing JA. The influence of forehead, brow, and periorbital aesthetics on perceived expression in the youthful face. *Plast Reconstr Surg* 2008;121(5).
2. Matarasso A, Terino EO. Forehead-brow rhytidoplasty: reassessing the goals. *Plast Reconstr Surg* 1994;93(7).
3. Matarasso A. Endoscopically assisted forehead-brow rhytidoplasty: theory and practice. *Aesthetic Plast Surg* 1995;19(2):141–7.
4. Paul MD. The evolution of the brow lift in aesthetic plastic surgery. *Plast Reconstr Surg* 2001;108(5).
5. Passot R. La chirurgie esthétique des rides du visage. *Presse Med* 1919;(27):258–60.
6. Hunt H. Plastic surgery of the head, face, and neck. Philadelphia, PA: Lea & Febiger; 1926.
7. Lexer E, Lexer E. Die Gesamte Wiederherstellungs-Chirurgie, 1 & 2. Leipzig: Jahann Ambrosius Barth; 1931.
8. Vinas JC, Caviglia C, Cortinas JL. Forehead rhytidoplasty and brow lifting. *Plast Reconstr Surg* 1976; 57(4):445–54.
9. Papillon J, Perras C, Tirkanits B. A comparative analysis of forehead lift techniques. Boston: Annual Meeting of the American Society for Aesthetic Plastic Surgery; 1984.
10. Paul MD. The surgical management of upper eyelid hooding. *Aesthetic Plast Surg* 1989;13(3):183–7.
11. Isse N. Endoscopic forehead lift. Los Angeles, CA: Annual Meeting of the Los Angeles County Society of Plastic Surgeons; 1992.
12. Vasconez L. The use of the endoscope in brow lifting. Washington, DC: Annual Meeting of the American Society of Plastic and Reconstructive Surgeons; 1992.
13. Chajchir A. Endoscopia en cirugía plástica y estética. In: Gonzalez Montaner L, Huriado Hoyo E, Altman R, editors. *El Libro de Oro en Homenaje al Doctor Carlos Reussi*. Buenos Aires: Asociacion Medica Argentina; 1993.
14. Lambros V. Observations on periorbital and midface aging. *Plast Reconstr Surg* 2007;120(5).
15. Gunter JP, Antrobus SD. Aesthetic analysis of the eyebrows. *Plast Reconstr Surg* 1997;99(7):1808–16.
16. Knize DM. Anatomic concepts for brow lift procedures. *Plast Reconstr Surg* 2009;124(6):2118–26.
17. Knize DM. Reassessment of the coronal incision and subgaleal dissection for foreheadplasty. *Plast Reconstr Surg* 1998;102(2):478–89.
18. Agarwal CA, Mendenhall SD 3rd, Foreman KB, et al. The course of the frontal branch of the facial nerve in relation to fascial planes: an anatomic study. *Plast Reconstr Surg* 2010;125(2):532–7.
19. Knize DM. A study of the supraorbital nerve. *Plast Reconstr Surg* 1995;96(3):564–9.
20. Matros E, Garcia JA, Yaremchuk MJ. Changes in eyebrow position and shape with aging. *Plast Reconstr Surg* 2009;124(4):1296–301.
21. Ramirez OM. Discussion: subperiosteal brow lifts without fixation. *Plast Reconstr Surg* 2004;114(6).
22. Westmore M. Facial cosmetics in conjunction with surgery. Vancouver, British Columbia, Canada: Aesthetic Plastic Surgical Society Meeting; 1974.
23. Freund RM, Nolan WB 3rd. Correlation between brow lift outcomes and aesthetic ideals for eyebrow height and shape in females. *Plast Reconstr Surg* 1996;97(7):1343–8.
24. Yaremchuk MJ, O'Sullivan N, Benslimane F. Reversing brow lifts. *Aesthet Surg J* 2007;27(4):367–75.
25. Matarasso A, Hutchinson O. Evaluating rejuvenation of the forehead and brow: an algorithm for selecting the appropriate technique. *Plast Reconstr Surg* 2000;106(3).
26. Savetsky IL, Matarasso A. Lateral temporal subcutaneous brow lift: clinical experience and systematic review of the literature. *Plast Reconstr Surg – Glob Open* 2020;8(4).
27. Miller TA, Rudkin G, Honig M, et al. Lateral subcutaneous brow lift and interbrow muscle resection: clinical experience and anatomic studies. *Plast Reconstr Surg* 2000;105(3).
28. Bernard RW, Greenwald JA, Beran SJ, et al. Enhancing upper lid aesthetics with the lateral subcutaneous brow lift. *Aesthet Surg J* 2006;26(1):19–23.
29. Guerrissi JO. Periorbital rejuvenation: a safe subcutaneous approach to forehead, eyebrow, and orbicularis oculis muscle mobilization. *Aesthetic Plast Surg* 2010;34(2):147–52.
30. Bidros RS, Salazar-Reyes H, Friedman JD. Subcutaneous temporal browlift under local anesthesia: a useful technique for periorbital rejuvenation. *Aesthet Surg J* 2010;30(6):783–8.
31. Mahmood U, Baker JL Jr. Lateral subcutaneous brow lift: updated technique. *Aesthet Surg J* 2015; 35(5):621–4.