The Subcutaneous Brow- and Forehead-Lift: A Face-Lift for the Forehead and Brow

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PURPOSE The purpose is to present a less invasive and technically simpler method for brow and forehead rejuvenation and literature review on the subject.

MATERIALS AND METHODS Fifty consecutive female patients were treated with the subcutaneous brow-lift technique over a 30-month period by the same surgeon. This surgical technique is performed under direct vision utilizing an extreme beveled incision made 4 to 5 mm into the anterior hairline with subcutaneous dissection of the anterior forehead only with the excision of 1.5 to 2.0 cm of excess skin.

RESULTS This technique provided stable brow and forehead rejuvenation without hairline elevation. All patients were pleased with the result. No patients complained of problematic scars, permanent dysesthesia, or need to alter their hair style. Patients that were treated with simultaneous blepharoplasty were, overall, more pleased with the procedure.

CONCLUSION This technique has proven to be a viable alternative to endoscopic and other modes of brow- and forehead-lifting in the author's practice. When compared to contemporary endoscopic techniques, this procedure does not require specialized equipment, is performed under direct vision, does not elevate the hairline, and has a more dramatic effect on forehead rhytides. The incision design allows hair regrowth through the scar making it extremely aesthetic and hidden.

The authors have indicated no significant interest with commercial supporters.

Brow- and forehead-lifting has long been realized as the hallmark for upper facial rejuvenation to improve forehead rhytides and brow ptosis, improve lateral eyebrow position, and decrease brow depressor activity. Many techniques have been described including coronal, direct, anterior hairline, posterior hairline, transblepharoplasty, suture suspension, barbed threads, radiofrequency, and endoscopic.1–9 The subcutaneous approach with follicle sparing beveled incision has been described over the years by various authors.10–14 Each technique carries positive and negative specifics and has historically fallen in and out of favor or disfavor.1,2

For those surgeons who trained with coronal brow techniques, problems with scarring, hair loss, and nerve dysesthesia were very frequently encountered, even in the face of satisfactory clinical correction. Endoscopic technique was a welcome addition for most surgeons and was more in line with the contemporary push for less invasive surgical procedures.15–24 This technique continued to evolve with multiple modifications in fixation, dissection, and incisions.25–34 In some circles, those surgeons that did not adapt endoscopic technique were labeled as noncontemporary and chastised by colleagues and or patients. For those surgeons that did adapt endoscopic technology, it was met with mixed feelings. The technique had a significant learning curve, required extensive armamentarium, and in many hands did not provide lasting results. This technique was met with open arms by the public and media because it was new, it was high tech, and it sounded much less invasive and certainly more palatable to patients than having their scalp folded over their nose.

Although contemporary and popular, many surgeons will admit that the stability and longevity of endoscopic lift can be unpredictable. Personal experience

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as well as collegial discussion led the author to explore alternative but conservative techniques for brow- and forehead-lift. Several respected colleagues had long abandoned their scopes and were performing conservative open brow-lifts with excellent success, ease, and patient acceptance.35–38 After heavily investigating the literature and the work of respected surgeons, the subcutaneous technique proved to be an acceptable alternative for those patients that would accept a visible, albeit cosmetic incision. After performing a consecutive series of these surgeries, the technique is simple and longevity at several years has been impressive, making it the favored technique for brow- and forehead-lift in this practice. The author has made a number of modifications that improved the ease of surgery and scar esthetics and are reported herein.

Most older patients that have brow ptosis also have some hairline changes and most common brow and forehead techniques including endoscopic technique will raise the hairline to suspend the ptotic tissues. Unlike all other common brow and forehead lifting techniques, the subcutaneous technique with the trichophytic incision will not elevate the hairline. Most patients, male and female, do not desire further elevated hairlines. This technique (like face-lift surgery) has reinforced the fact that when tissue is ptotic, excising skin will most adequately address the problem. In this procedure, approximately 1.5 to 2.0 cm of skin is removed to elevate the brow and forehead and provide stability. This approach can also provide restoration of an elevated hairline to a more youthful (lower) position while still elevating the brow, forehead, and nasal radix.

Although endoscopic brow- and forehead-lift is touted as a minimally invasive surgical technique, only the actual incisions are minimal. In reality, the endoscopic technique is the most invasive and aggressive technique as it requires extensive dissection in multiple tissue planes from the orbital rims to the skull vertex and significant temporal dissection. Finally, hardware fixation and drilling in the cranium is frequently employed.

To transition to a new technique, the new procedure must have distinct advantages over the previous techniques. When compared to endoscopic brow- and forehead-lift, the subcutaneous mini open brow-lift provided many advantages that are listed in Table 1.

**Limitations**

Relative limitations of subcutaneous technique are consistent with endoscopic surgery in terms of male pattern baldness and unstable hairlines. Patients

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<tr>
<th>TABLE 1. Relative Advantages of Subcutaneous Brow and Forehead Technique Compared to Endoscopic Brow- and Forehead-Lift</th>
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<tr>
<td><strong>Subcutaneous Mini Open Brow- and Forehead-Lift</strong></td>
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<tr>
<td>No specialized instrumentation required</td>
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<td>Minor or moderate learning curve</td>
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<td>Simple subcutaneous dissection</td>
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<td>No concern of frontal nerve injury</td>
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<td>Direct vision technique</td>
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<td>Does not raise the hairline</td>
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<td>Excellent improvement of forehead rhytides</td>
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<td>Very low tension on brow suspension</td>
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<td>Control of brow suspension over entire brow</td>
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<td>Subcutaneous dissection less edema, faster recovery</td>
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<td>Direct access to brow depressors</td>
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<td>No need for osseous fixation</td>
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<td>Predictable longevity</td>
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with short foreheads and a low hairline that desire elevation of the hairline would not be candidates for the subcutaneous technique. Patients that refuse to display any facet of a visible incision are also poor candidates for this technique. Even though the early scar is easily camouflaged with hairstyle, some patients will simply not tolerate a visible suture line, even temporarily. Patients who desire aggressive, multipass, high-fluence simultaneous laser resurfacing would also require a deeper plane technique because this lipocutaneous flap can be very thin and at risk for aggressive laser. Finally, in the first several days after endoscopic brow- and forehead-lift, the procedure could be reversed by taking down the suspension. The subcutaneous technique is irreversible. Although the subcutaneous extreme beveled technique produces acceptable scars, some of the most inferior, fine velous (and sometimes solitary) hairs will be lost. In the author’s experience, this is noticeable by the trained eye, but not a single patient has complained about this.

Subcutaneous Brow- and Forehead-Lift

Surgical Technique

Brow position in females is generally above the superior orbital rim, and in men the brow should sit at the level of the superior orbital rim in the average scenario. Upper facial aging is frequently manifested at an earlier age than the lower face in many individuals. Lateral brow ptosis is one of the early aging manifestations. Although standards and measurements exist for optimal brow position, this author feels that brow position is extremely variable and is a personal choice as decided by the patient and surgeon. Preoperative conversations, pictures, simulations and markings serve as a guide to intraoperative position.

Experience has shown that most brow and forehead patients benefit from simultaneous conservative upper blepharoplasty to sculpt and compliment the brow-lift regardless of the brow-lift technique. This author will typically remove 3 to 4 mm of upper eyelid skin and/or muscle immediately before the brow-lift with the exception of the youngest patients. The simultaneous blepharoplasty is not a requirement, because the brow and forehead will be elevated regardless, but patients tend to pay more attention to the eyelid complex after brow procedures and will be happier if the dermatochalasis is corrected when the brow is lifted. The blepharoplasty is performed before the actual brow-lift as the eyelid anatomy can swell from the tumescent anesthesia and surgical edema. If blepharoplasty is not planned, it is important to warn the patient that even with the rejuvenated brow and forehead the upper lids may still exhibit excess skin.

The subcutaneous brow- and forehead-lift procedure can be performed with local and tumescent anesthesia with or without intravenous anesthesia. Five cubic centimeters of 2% lidocaine with 1:100,000 epinephrine is injected in the subcutaneous plane directly at the hairline. In addition, tumescent anesthesia is injected at the hairline and subcutaneously over the entire forehead between the temporal crests laterally, to the nasal radix, and to the superior orbital rims inferiorly. The main premise of the subcutaneous brow and forehead technique is to craft a precision, geometric, extreme beveled incision on both flaps that allows hair regrowth through the scar, thereby providing camouflage (Figure 1). In 1992 several authors referred to this incision technique as “trichophytic.” Absolute attention to this incision technique is imperative for the success of this procedure. Failing to understand this incision or making the incision at or in front of the hair line will produce a visible scar and defeat the purpose of the technique. Split-scalp studies have shown the extreme beveled procedure to be superior to parallel scalp incision in producing an aesthetic scar.

Surgeons that favor follicle sparing extreme bevel technique vary in the geometry of the incision. Some surgeons utilize larger triangles while others advocate small triangular geometric incisions. Personal experience has shown the larger incisions to produce more drastic and noticeable undulations of the
healed hairline. Very small triangular sawtooth triangles produce less noticeable undulations, but are more intensive and time-consuming to cut and sew. The author adapted a nonrepeating, random geometric incision by using an “in-and-out” (reciprocating) scalpel incision. The scalpel is moved in and out with a sawing motion while slicing in an irregular manner to produce random geometrics while maintaining the extreme bevel. It is important to carefully observe the generalized geometry of the preoperative hairline and attempt to mimic that configuration with the incision. Because this incision must be of an extreme bevel nature, the angle of the scalpel to the skin is 10° to 20° to the perpendicular skin surface (Figure 2).

Also imperative is the exact placement of the actual incision. Natural hairlines are not abrupt but vary in density. The most anterior hairs are fine and at a point approximately 4 to 5 mm posterior, the follicular density changes to a more linear and predictable hairline. It is at the point of the follicular density change (4–5 mm posterior to the fine hairs) that the actual incision is made (Figure 3). By filleting the flap with the extreme bevel at this point in the hairline, the new hair regrowth will penetrate the thinly beveled flaps and repopulate through the scar (Figure 1). This technique produces an extremely cosmetic and often imperceptible scar when mature but is very dependent on freedom of tension, rough flap handling, thermal damage, or subsequent embarrassment of the dermal plexus.

Figure 1. (A) Extreme beveled incision that horizontally transects the hair follicles. (B) Overlap of the beveled edges. (C) Hair regrowth through the surgical scar thereby camouflaging the incision.

Figure 2. The incision in this technique is sharply beveled at an angle 10° to 20° from the horizontal.
Unlike other techniques, it is not necessary to extend the incision or dissection past the temporal crest. In most instances the actual incision only needs to extend to the brow tail. If patients have significant lateral brow ptosis, the incision can be extended more laterally. The frontozygomatic and lateral orbit can be accessed without significant lateral extension by inferior tunneling with the scissors. Avoiding lateral extension past the temporal crest produces less swelling and frontal nerve intrusion. A small downward extension of the excision will prevent a dog-ear at the incision terminus.

After satisfactory incision, subcutaneous dissection is performed. Dissecting this flap is extremely similar to elevating a lipocutaneous face-lift flap (Figure 4). As with any thin flap, it is imperative to protect the thin dermal plexus for flap viability.

Novice surgeons may desire to pretunnel the flap with a thin, flat liposuction cannula without a suction source. This predissects the flap and facilitates dissection as well as surgical plane consistency. Gentle subcutaneous dissection is performed and the dissection must remain in the subcutaneous plane above the frontalis musculature (Figure 5). It is notable to observe the extreme thinness of normal frontalis muscles, especially in the female patient, which are frequently almost translucent.

The dissection is continued with face-lift scissors in a blind fashion to a point approximately 2 cm superior to the brow. At this point, a retractor is inserted under the flap and further dissection is performed under direct vision. The neurovascular structures are

**Figure 3.** An undulating, irregular extreme beveled incision is made 4 to 5 mm posterior to the hairline at the follicular density change (A). (B) Irregular, beveled incision; dotted outline approximates the area of subcutaneous dissection from the hairline, just over the superior orbital rim and down the radix, between the temporal crests.

**Figure 4.** A lipocutaneous flap is elevated with face-lift scissors with care to stay in the subcutaneous plane and above the frontalis musculature. (A) Initial subcutaneous access. (B) Ensuing scissors dissection.
easily visualized and can be protected by blunt dissection and spreading of the scissor blades in the horizontal and especially the vertical direction. The supraorbital and supratrochlear nerves are more branched at this tissue level as opposed to more singularly bundled with subperiosteal endoscopic vision (Figure 6A). Dissection is carried out until the entire brow (including the tail) elevates freely with moderate traction. The dissection is continued in the subcutaneous plane to a point just over the superior orbital rims into the upper lids and well into the nasal radix. As previously mentioned, the lateral extent of the dissection is stopped when the brow is adequately released with gentle traction on the flap. For those patients with significant lateral hooding, dissection to the temporal crest is required and less so for patients without significant hooding.

Experience has shown this to be somewhere between the area of desired maximum brow elevation (an imaginary line tangential to the lateral limbus) to the lateral brow tail. Without severe hooding, there is usually no reason to dissect past the brow tail. As with any fragile lipocutaneous flap, underlying hemostasis is a requisite as postoperative hematoma formation could devitalize the flap.

**Addressing the Brow Depressors**

The corrugator supercili and procerus muscles are easily accessed from this surgical approach. One significant difference in this procedure is that the surgeon is looking down on the position of the brow depressors wherein the endoscopic technique the muscles are accessed from their inferior position above the periosteum. With the open technique, the muscles are automatically separated from their dermal insertion by dissecting the dermis from the subcutaneous layers. In addition, the muscles can be incised, resected, or otherwise disrupted under direct vision (Figure 6B). Miller and colleagues\(^1^4\) have shown a 3.2-cm radius safety zone in the glabellar area that is free from sensory nerve encroachment when resecting the brow depressors.

**Brow Repositioning**

After the flap is adequately dissected and the brows are freed, the flap is put on tension and skin cutbacks are made and key sutures placed. This procedure is performed in the exact manner as are face-lift flaps.

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**Figure 5.** The lipocutaneous flap shows the thin underlying frontalis muscle and the extreme beveled margins.

**Figure 6.** The neurovascular bundles are seen under direct vision and are protected and bluntly dissected (A). (B) Brow depressors (corrugators and procerus) being incised and disrupted under direct vision with a radiofrequency surgery micro-needle (note that the depressors are addressed from above as opposed to from below during endoscopic approach).
It is important that when repositioning the flap, the assistant places forward traction on the posterior scalp to counteract gravity and neutralize the posterior traction of the scalp tissues. This prevents the posterior scalp from pulling backward, which could affect the measurement of skin excision. Once the dissected flap is pulled cephalad, there will be overlapping excess skin. Skin cutbacks are made in the midline and on each lateral side of the lipocutaneous flap, corresponding with area of maximum desired brow elevation, which typically correlates with the lateral limbus. In the typical case the central cutback (sometimes termed back cut) is made to an average length of 15 mm and the lateral cutbacks are made to an average of 20 mm (Figure 7A). As with any flap cutback, the amount of incision varies with the severity of the ptosis. The skin cutbacks are then anchored under moderate tension with 4-0 absorbable gut suture (Figure 7A, patient’s right side).

**Skin Excision**

The key sutures should bear the brunt of any significant flap tension. The remainder of the flap approximation should be tension-free. The excess skin is now trimmed in the same manner as the original incision. Figure 7A shows the excess skin present on the patient’s left side and the skin trimmed on the right-hand side of the incision. By making a corresponding extreme reverse beveled, random, undulating, geometric incision the opposing thin flaps will approximate with an extremely smooth transition. If the scalpel is not held at the same angulation on both flaps, a step off or depression will be evident and affect the final scar result. Again, it is this carefully planned incision that will allow the underlying hair follicles to regrow through the scar and the visible hair follicles and fragile flap margins must be treated with care. Once all flaps are trimmed, the incision is further reinforced with multiple 5-0 gut subcutaneous sutures along its length. Some surgeons utilize long-lasting resorbable sutures such as polylactic acid (Vicryl, Johnson & Johnson, Somerville, NJ). An additional change this author has made is to use 5-0 plain gut for subcutaneous closure as the longer lasting sutures can cause localized areas of chronic irritation affecting the final scar. Finally, running 6-0 nylon sutures are used as final skin closure (Figure 7B). Minor bleeding can be evacuated by inserting a microliposuction cannula between the sutures. Major bleeding necessitates reopening the flap.

A light pressure dressing is optional for the first 24 hours, but the author has performed most lifts with no postoperative dressing. The patient is seen in the office the next day and the flap is examined. Of 50 cases, no postoperative hematomas were seen but several patients required suction of minor hematoma on the operating room table after emergence. Routine wound care is performed and the hair can be washed on Postoperative Day 2. The nylon sutures are removed on Day 10.
The incision will initially be noticeable but is easily hidden by bangs. Makeup can also be applied when the crusting is resolved. Initially, the author was concerned that a visible incision would make the patients anxious, but this has not been a concern of any significance. The incision heals quickly and hair regrowth can be seen in as early as the first several weeks. By Week 12, the scar has reached primary maturity and is usually very aesthetic (Figure 8A). Small areas of concavity or convexity tend to heal without incident. Some patients will develop hypopigmentation around some of the sutures (especially the key sutures). This hypopigmentation tends to improve with time, but in some cases is persistent, although no patient has ever mentioned it. Figures 8B and 8C illustrate the maturation of a typical incision at 1 year.

Simultaneous laser resurfacing of this thin flap should be reserved for those surgeons with experience lasering lipocutaneous flaps. No cases of flap necrosis were noted in any of the lasered patients.

Complications
In this series of 50 consecutive subcutaneous brow- and forehead-lifts, no major complications were seen. Several patients developed subflap bleeding by the end of the procedure, and these collections were evacuated on the operating room table and pressure applied, without reformation. Two patients developed areas of flap necrosis. One patient, a smoker, sloughed a 2-cm area at the superior lateral flap junction. This was allowed to heal with wound care and by secondary intention. Future laser resurfacing is planned to improve the scar. The second patient, a nonsmoker, had a smaller area of necrosis that spontaneously healed without a scar. Experience has shown not to include an entire “widow’s” peak in the geometric incision but rather to cut across above the apex to provide a less intentional scar pattern.

Results
In this study, all 50 patients treated were female. The mean age of the subjects was 51.5 years and all but 2 of the patients were treated with a brow-lift for the first time; the other 2 patients were revision operations secondary to previous endoscopic brow-lift. Of 50 patients operated over a 30-month period,
no patient reported relapse of her result and no revision was necessary on any patient. No patients complained about the resultant postsurgical scar, extended paresthesia, or need to alter their hairstyle. Two patients later requested upper lid blepharoplasty although satisfied with the brow-lift. The majority of patients with dermatochalasis now receive conservative upper lid blepharoplasty with the brow-lift procedure. Figures 9–13 show before and after images of selected patients.

Discussion

The first description of surgical brow-lift was reported by Passot in 1919,43 and the first description of an anterior hairline brow-lift appears to have been reported in 1926 by Hunt.44 In 1991, McKinney and colleagues45 suggested an anterior approach when the hairline is more than 5 cm from the brow to reduce forehead height and Connell and Marten46 modified the hairline approach. In 1992, Vogel and Hoopes47 advocated the anterior hairline incision, and in the same year Guyuron11 and Mayer and Fleming39 described incision techniques to improve and hide the surgical scar and termed the technique “trichophytic.” As stated earlier, other authors described subcutaneous brow-lift techniques with various modifications.10–14

The modern coronal brow-lift technique was described by Gonzales-Ulloa in 196248 and endoscopic techniques followed and have been popular over the past decade. Some literature put forth may illustrate a downward trend in endoscopic brow- and forehead-lifting. A 2001 article surveying almost 7,000 plastic surgeons in this country showed that 49% of surgeons favored endoscopic technique while 51% still prefer the coronal approach.49 Another study showed that 21 surgeons at Manhattan Eye and Ear Hospital dramatically reduced the number of endoscopic procedures from 1997 to 2001 from 180 cases per year to 54 cases.19 In an extremely scholarly discussion of this article, Knize50 attributed this dramatic decrease in endoscopic usage to a three-tiered cycle applicable to many newly introduced techniques. The primary stage is excitement from...
expected improved results with fewer complications. The secondary stage is disillusionment from failure of the new procedure to meet expectations, and the tertiary phase is the realistic application of the procedure.

The purpose of this article is not to condemn endoscopic technique because it is effective and presumably predictable in the hands of many surgeons, although some authors adamantly disagree. In a 2007 article, Tabatabai and Spinelli⁹ say that endoscopic technique has been described as a “passing fancy” by senior surgeons⁴⁹ and quote Chiu and Baker¹⁹ stating that “they attributed the diminished popularity of the endoscopic brow-lift to the fact that other medical and surgical techniques are more effective and predictable; and endoscopic brow-lift is ineffective in a majority of patients.”

Figure 11. This patient is shown before (A), 6 months postoperatively (including lower bleph and periorbital CO₂ laser; B), and 1 year postoperatively (C).

Figure 12. This patient is shown 14 months after subcutaneous open brow lift. Note the amount of lateral brow lift achievable with this technique without violating the temporal crests.
It is also not the purpose of this article to proclaim superiority based on evidence-based hard data research. Its true purpose is to discuss a technique, new to many surgeons, that provides an extremely viable alternative to previous brow- and forehead-lifting procedures, including endoscopic technology.

**Conclusion**

Literature review shows that the past 20 years provided a plethora of techniques including surgical and nonsurgical, minimally invasive procedures, anatomic studies, and detailed discussions without a clear consensus of a single universal technique. No single procedure can work for all surgeons in all patients for all aging problems.

The subcutaneous brow- and forehead-lift technique has been previously described in various forms and customized in multiple ways by this author. It has proven to be a viable alternative to endoscopic and other modes of brow- and forehead-lifting in the author's practice. The procedure is straightforward for surgeons with face-lift experience, can be performed in less than 1 hour, and requires no specialized equipment. The results have proven stable and the incidence of doctor and patient acceptance has been extremely favorable. Unfavorable scar, hair loss, the need to alter hair style, and persistent dysesthesia have not been reported by patients in this series. This approach and technique has a place in the armamentarium of cosmetic surgeons performing upper facial rejuvenation.

**References**


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The subcutaneous mini open brow-lift and forehead-lift technique presented here may be the best procedure for many dermasurgery patients who come to us asking for an “eye-lift” but really require a brow-lift and upper lid blepharoplasty for optimal results. Endoscopic brow-lifts are now being questioned regarding the longevity of their results, and this article demonstrates an excellent alternative to the endoscopic technique. The advantages of the mini open technique are severalfold. The subcutaneous dissection is less technically complex than the endoscopic approach, and it does not require specialized instrumentation. The author notes a quicker recovery, demonstrates results that are equal to or better than the endoscopic technique, and describes a hair-sparing beveled incision that minimizes risk of a hypopigmented scar, the main disadvantage of nonbeveled incisions. The author also demonstrates excellent results when this technique is used in conjunction with carbon dioxide resurfacing and lower lid blepharoplasty. Because the mini open technique removes skin, this procedure will work better in a patient with a large forehead and recessed hairline than in a patient with a low-set hairline. This article demonstrates the utility of the mini open brow- and forehead-lift for cosmetic surgeons with an interest in rejuvenation of the upper face.

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