

Direct Brow Lift - An Update of Current Literature

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Abstract

Eyebrow ptosis is the earliest manifestation of the aging forehead. Surgical procedures to lift the ptotic brow were first published in the early 1900s and since the introduction of the direct brow lift technique, there have been numerous minor refinements to this procedure, as well as some major developments in surgical techniques. It was modified to utilize a mid-forehead or a coronal incision, and then superseded by the endoscopic technique of brow lifting. Yet, with the armory of brow lifting techniques that currently exist, there still is a major role for the direct brow lift, herein described in detail.

Introduction

Ptosis of the eyebrows is the earliest manifestation of the aging face [1]. It gives the face a tired look and accentuates upper eyelid deformities. It may also result from facial nerve paresis. There are numerous surgical procedures to lift the brow; the earliest were published in the early 1900s [2-4]. Since the introduction of the direct brow lift technique, there has been minor refinements to this procedure, as well as some major developments in surgical techniques. Mid-forehead and coronal incisions were later replaced by the endoscopic techniques for brow lifting [5,6]. Yet, with the armory of brow lifting techniques that currently exist, there still is a major role for the direct brow lift, herein described in detail.

Anatomy

The eyebrow is comprised of the skin (with its hair follicles) and soft tissues that cover the superior orbital rim. Under the brow hairs and skin lies the muscle. Laterally, the frontalis muscle intertwines with the orbicularis oculi muscle and medially, the corrugator supercilii and the procerus, insert into the soft tissues of the brow and lower forehead [7]. The muscle overlies the brow fat pad - the retro-orbicularis oculi fat pad (ROOF). The ROOF is strongly attached to the superior orbital rim periosteum. This ROOF should be distinguished from the pre-aponeurotic fat, which is located posterior to the septum. The supraorbital bundle (nerve and blood vessels) ride above and medial to the midpoint of the superior orbital rim to enter the forehead inside the frontalis muscle.

The Ideal Brow Position

The ideal position of the brow has been debated among cosmetic and oculoplastic surgeons [7-9]. The brow is normally located above the superior orbital rim in female and at the level of the rim in males. It has a more prominent fat pad and less curvature in men compared to female [9-11]. Westmore, et al. described the boundaries of the ideal brow [8]. Medially – the ideal brow begins in the same vertical

line as the nasal ala and medial canthus and laterally in ends in an oblique line from the nasal ala and lateral canthus. Both medial and lateral ends of the brow should lie in the same horizontal line and the brow's apex should ideally lie above the lateral limbus. McKinney, et al. measured the minimal distance between the center of the pupil and the apex of the brow and found that in the normal brow this distance should be more than 2.5 cm, if this distance is shorter than the patient has brow ptosis [10].

Brow Ptosis

Brow ptosis is part of the aging process and can occur due to facial nerve paresis [1,2,12]. Clinically, brow ptosis is present if the brow (part of it or all) lies below the superior orbital rim. Ptosis of the lateral part of the brow is more common than of the medial part as the latter has deeper and stronger attachments. When brow ptosis occurs, the redundancy of skin in the upper eyelid increases. In particular, ptosis of the lateral brows can cause mechanical eyelid ptosis, as a result of the hooding of the upper eyelid skin. For this reason, it is important to assess the position of the brow in patients who are candidates for upper blepharoplasty, and the amount of eyelid skin to be excised should be determined only after careful consideration of the interplay between the brow position and the upper eyelid skin.

Brow Lift Surgical Options

There are numerous surgical procedures to elevate the ptotic brow including: trans-blepharoplasty browpexy, mid-forehead lift, coronal brow lift, endoscopic brow lift, and the direct brow lift [12]. Any of these options includes releasing the brow, elevating and shaping it and finally fixating it to the desired location. Pre-operatively the patients should be assessed for skin type, the position, shape and symmetry of the brows, the amount of brow ptosis the position of the anterior hairline and the any presence of forehead rhytides [13,14].

We will briefly go over the main techniques available today and elaborate extensively on the direct brow lift technique;

Trans-Blepharoplasty Browpexy

This approach is more appropriate for small degrees of brow ptosis that affects mainly the lateral brow. It is commonly done together with upper blepharoplasty through the same incision [15]. This procedure is simple, and has the advantage of placing the wounds within the natural skin crease. However, it has only limited efficacy and a higher risk of recurrence.

Mid-Forehead Lift

The incisions in this technique are preformed in the forehead crease, and thus it is suitable for men with deeper forehead creases and retreating hairlines [16,17]. The potential complications of this procedure are visible scarring and altered forehead sensation.

Coronal Brow Lift

This approach involves a long post-trichial or pre-trichial incision from ear to ear. It allows the surgeon to remove excess forehead skin, fat and tissue while lifting the brow [18]. However, it is not suitable for patients that have high hairline or hair that is thinning, as a potential complication of this technique is alopecia.

Endoscopic Brow Lift

This approach utilizes small incisions and has become a popular one for facial rejuvenation. It has similar success rates as the coronal brow lift, with a significantly lower rate of complications (such as numbness, itching, hair loss, tissue swelling, and asymmetry) and a faster recovery time [5,6,19-21]. However this technique has some disadvantages that include a learning curve, the additional expense of the specialized equipment and the additional surgical time associated with it.

Direct Brow Lifting

The direct brow approach can be used for any pattern and amount of brow ptosis. This approach has the advantages of giving the greatest amount of brow lift per millimeter of tissue being excised and also having higher predictability rate (the surgeon has more control on the final brow position and shape). The main disadvantage of this technique is the postoperative scar. The direct brow lift is often reserved for patients with pre-existing deep forehead rhytids which can help camouflage the scar or for patients with full and “bushy” brow hairs which can block the scar from view.

Operative Technique

1. Mark the skin- marking the brow is a crucial step in the operation; it is done while the patient is awake. First mark the superior border of the brow and measure the amount of elevation required by pulling the brow up to its desired postoperative position. Some additional elevation is recommended to compensate for post-operative brow relaxation. Generally, for every 1.5 cm of tissue excised, 1 cm of elevation can be expected. Use the marker pen to outline the superior incision edge and join this line to the line marked just above the brow hairs to form an ellipse. It is important to avoid excess skin excision, as it can cause lagophthalmos.
2. Identify the position of the supraorbital bundle at the medial aspect of the brow.
3. Incision- cut the skin along the marked ellipse. Stay within the ROOF at the medial 1/3rd of the ellipse to protect the

supraorbital bundle and deepen it to the fat layer in the lateral end of the ellipse, to expose the frontalis muscle. Pay constant attention to avoid damaging the supraorbital bundle when excising the ellipse of tissue.

4. Closing the wound- Careful closure in two layers (deep sutures and superficial skin ones) is the preferred closure as it leads to the most satisfactory cosmetic result. Often, interrupted 4-0 absorbable sutures are used to close the deep layers (closing the fat layer and passing through the dermis). In patients with facial palsy these sutures may also be fixated to the periosteum. Closing the skin is often carried out with 5-0 non-absorbable sutures, taking care to evert the skin edges to allow for a flat, rather than depressed scar. Steri-strip dressings may also be placed along the wound. The skin sutures and Steri-strips should be removed at the 5-7 days follow up.

Efficacy and Complications

The current literature lacks randomized controlled trials examining the efficacy of direct brow lift surgery. This technique permits a selective skin resection and an increased control on the eyebrow shape and position. It has the advantage of being able to elevate and at the same time to completely reshape the brow arch with a high degree of precision and without an extensive dissection (Figure 1 and 2).

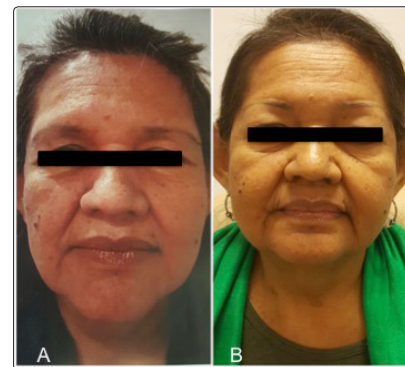


Figure 1: a (before) and b (after) bilateral direct brow lift



Figure 2: a (before) and b (after) right direct brow lift

The key points in the lifting surgical procedure must be always respected, including the adequate release and tension-free fixation, keeping in mind the expected postoperative tissue relapse [14]. It is suitable in elderly patients, as no extensive dissection is required. This procedure is safe, versatile, replicable, and minimally invasive. However this technique has some disadvantages that are further discussed here.

Many authors reported low complication rates following direct brow lift, however there is no exact quantification [22-24]. Supraorbital nerve trauma and complete loss of sensation in the forehead is one of the reported side effects and it should be avoidable when careful dissection is employed. However, temporary patches of reduced sensation from cutting smaller branches of the nerve can occur and will normally recover in a few months. There is no consensus as to the incidence of this complication. One report found that 74% of patients had altered sensation over the forehead, but only 7% of those were unhappy about it [25].

Another report found a 27.5% rate of postoperative paresthesia but did not mention if it was transient or permanent [26]. The postoperative scar in this approach is a major concern to both patients and surgeons. Several publications in the plastic literature suggest ways to minimize this complication. Green et al suggest that closing the wound in a layered fashion will minimize the postoperative scars [22]. The use of absorbable monofilament sutures for closing the deep layers, instead of braided sutures, may decrease the incidence of suture granulomas.

Ueda, et al. reported that 77% of patients were satisfied with the cosmesis of the postoperative scar, and none of their patients was 'completely dissatisfied' [26]. Booth et al found similar high levels of satisfaction, with 81% of their patients reporting being either happy or very happy with the surgical outcome [25]. Unsatisfactory aesthetic outcome is another common patient's complaint [27-30]. Freund and Nolan reported that both the standard open brow lift and the endoscopic approach result in disappointing eyebrow height and contour.

Discussion

Brow-lift surgery has evolved tremendously during the years [30]. New techniques to solve forehead related cosmetic concerns were introduced in the modern era; all have their own potential advantages and disadvantages. The direct brow lift operation, discussed thoroughly here, remains relevant due to its simplicity. This is a quick procedure, with no need for special equipment or extensive training and it provides reliable and predictable postoperative outcome, with high rates of patient content. Postoperative complications can be minimized by careful dissection and layered closure.

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