

SURGICAL BROW LIFT

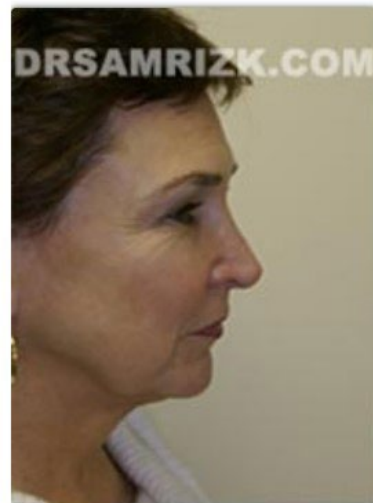
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Before



After



Before



After

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INTRODUCTION

Very often the facial and eyebrow regions are the first areas where marked aging becomes apparent. These are undoubtedly the most expressive part of the face and the eyelid/eyebrow is one of the areas in which subtle improvements may provide excellent aesthetic results, this region is also one of the areas where minor imperfections are easily recognizable and, therefore, aesthetically unacceptable. The facial region, eyes and eyebrows should be assessed individually and as a unit, seeing that their interrelationship should be subjected to a detailed examination prior to the commencement of treatment.

Various factors, such as damage caused by solar rays, gravitational forces and genetic predisposition, contribute toward the loss of skin elasticity, which can result in sagging of the eyebrow. The loss of volume in the superior region of the may also be important. Therefore, a patient's upper eyelid /eyebrow may exhibit an appearance that does not correspond with the patient's subjective feelings of good health and vitality.

Apart from the cosmetic issue, there may be functional deterioration of the superior visual field. Furthermore, brow ptosis may have gone unnoticed by the patient. Very often, they complain of excessive overhanging of the skin of the eyelid without realizing that the position of the eyebrow can be an important factor contributing to the appearance of the this "hood" of skin on the upper eyelid. In fact, superior blepharoplasty performed separately may further reduce the eyebrow. It is important that the plastic surgeon informs the patient and emphasises of the importance of the position of the eyebrow in upper eyelid skin redundancy, since, occasionally, only a lift of the eyebrows will resolve the problem.

In this chapter we will describe the aesthetics of the facial region, anatomy, surgical techniques (including the ideal candidates for these procedures), the authors' preferred procedure and the "treasures" associated with the various techniques.

ANATOMY OF THE FACIAL REGION

The scalp consists of the skin, subcutaneous tissue, galea aponeurctica, areola loose tissue and the periosteum. The galea that connects the frontalis

muscle to the occipital muscle constitutes the galea aponeuratica. The galea is not only attached to the superficial musculo-aponeurotic system (SMAS), but, is also an extension of it. The frontalis muscle originates from the galea (which divides to form a layer enclosing the muscle) and attaches to the skin of the frontal region. It is the main muscle responsible for raising the eyebrow. It actively raises the medial thirds of the eyebrow and passively, the lateral third of this structure. The main depressors of the eyebrow are the corrugator muscles of the eyebrow and the orbicular muscle of the eye and the procerus muscle. The orbicular muscle depresses the entire brow while the procerus and corrugators muscles merely depress the medial segment of the eyebrow. In addition, the corrugator also medializes the eyebrow.

The periosteum above the frontal bone fuses to form the zygomatic arch of the supraorbital notch, which becomes continuous with the periosteum. The temporoparietal fascia (the superficial deep temporal layer) is fused with the periosteum along the temporal line. The deep temporal fascia is found immediately below the temporoparietal fascia, in the temporal region. The deep temporal fascia is attached to the periosteum along the superficial temporal line.

It is at this point that the superficial temporal fascia joins the galea. The point at which the fascia joins is known as the combined fascia or combined tendon and should be separated in an effective manner by means of blunt or sharp dissection when performing a lift along the subperiosteal plane. These planes are distinct from the adipose panicle and located, respectively, above the intermediate adipose panicle and below the temporal adipose panicle.

The motor nerve of the frontalis is the temporal /frontal branch of the facial nerve. This nerve runs exactly below the temporoparietal fascia and is located on the at the medial point between the lateral angle and the root of the helix. It is at this location, deeply towards the nerve, that the layer of superficial temporal fascia is found, separating the zygomatic nerve. In fact the nerve is divided into numerous branches above the zygomatic arch and is more secure, presumably because the nerve occupies an area with a width of approximately 2cm of the arch and approximately 2cm of the lateral orbital rim. Furthermore, the markings of the temporal frontal branch are 1,5cm above the lateral segment of the eyebrow and 2cm laterally to the lateral orbital rim. It may also be found in relation to the sentinel vein (the largest vein seen during an endoscopic lift, between the temporoparietal fascia and the deep temporal fascia) (Figure 17.2).

The supraorbital and supratrochlear nerves are the sensory nerves of the eyebrow (Figure 17.3). The supraorbital nerve exits the supraorbital arch through a fissure or foramen to the medial canthus, really high at 1cm above the supraorbital rim³. Studies performed on cadavers have demonstrated that the supraorbital nerve is divided into medial (superficial) and lateral (deep) branches. The superficial division is subdivided into various branches that penetrate the frontalis muscle and continue in a cephalic direction, on top of the frontalis muscle. to supply 3,5cm of the frontal part of the scalp. The deep division runs laterally, between the galea and the periosteum, and continues until the coronal suture. The supratrochlear nerve exits immediately laterally to the corrugator at the medial supraorbital rim, before entering the corrugator and, thereafter, divides into various smaller branches, which, then, follow their trajectory on top of or immediately below the surface of the corrugator muscle. Afterwards, these branches penetrate the frontalis muscle and run along its ipsilateral medial surface towards the scalp.

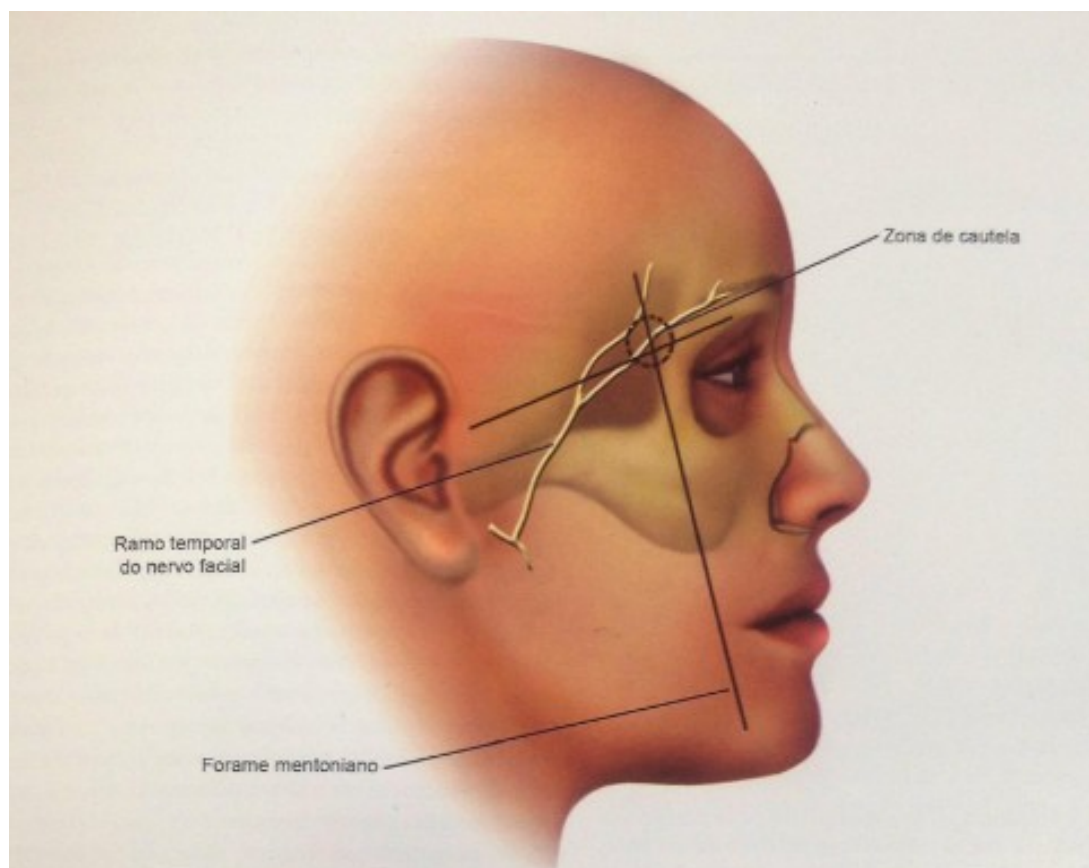


Figure 17.2 Drawing indicating the superficial anatomical relationship between the sentinel vein and the temporal branch of the facial nerve. The danger zone has a diameter of 10mm and is marked out where the two lines intersect: one is extended from the Mentonian Foramen until the lateral orbital rim and the other from the superior orbital rim to the where it crosses the inner ear with the zygomatic arch.

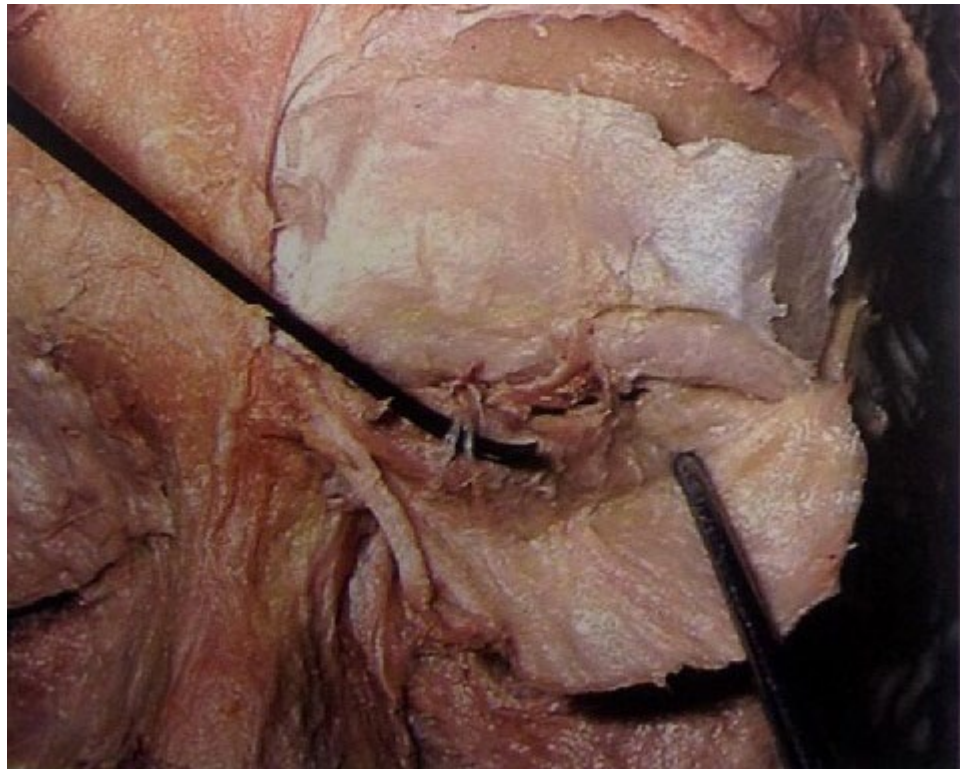


Figure 17.3 Branches of the supratrochlear nerve penetrating through the corrugator muscle. The orbicular muscle of the eye was reflected downwards, and the incision of the periosteum performed from above.

IDEAL EYEBROW AESTHETICS

The shape and position of the eyebrows change with age, gender and ethnicity. The ideal position of the eyebrows in women has traditionally been a subject of debate. It is argued that the ideal apex of the feminine eyebrow should lay at the lateral limbus or later corner. According to the current trend, it appears that the apex of the ideal feminine eyebrow ought to be placed in the lateral corner in order to avoid a more startled “look”.⁶ However, in the case of women, the authors appear to place the ideal apex of the eyebrow at the lateral limbus. Apart from this, the arch of the eyebrow must be situated 1cm from the bony supraorbital rim. The medial and lateral extremities of the eyebrow should start and finish at the same horizontal level. The lateral segment of the eyebrow should end at a line that connects the tip of the bridge of the nose to the lateral corner and should start from a vertical line from the medial corner or from the rim of the tip of the nose (Figure 17.4). The medial segment of the eyebrow should be full, but tapering laterally. Also, changes can be made to the aesthetics of the eyebrow in a way that enhances the shape of the nose. One can make a narrow nose appear bigger if the eyebrows are placed further apart and are not very arched.

Conversely, a big nose can appear narrower if the eyebrows are placed closer together and if the medial rim is square, and not round. The average height of the feminine forehead (from the eyebrow to the “top of the forehead”) should be between 5 and 6cm. 2,7 When the height of the eyebrow is greater than 7cm, consideration should be given to procedures to lower the line of hair implanting.

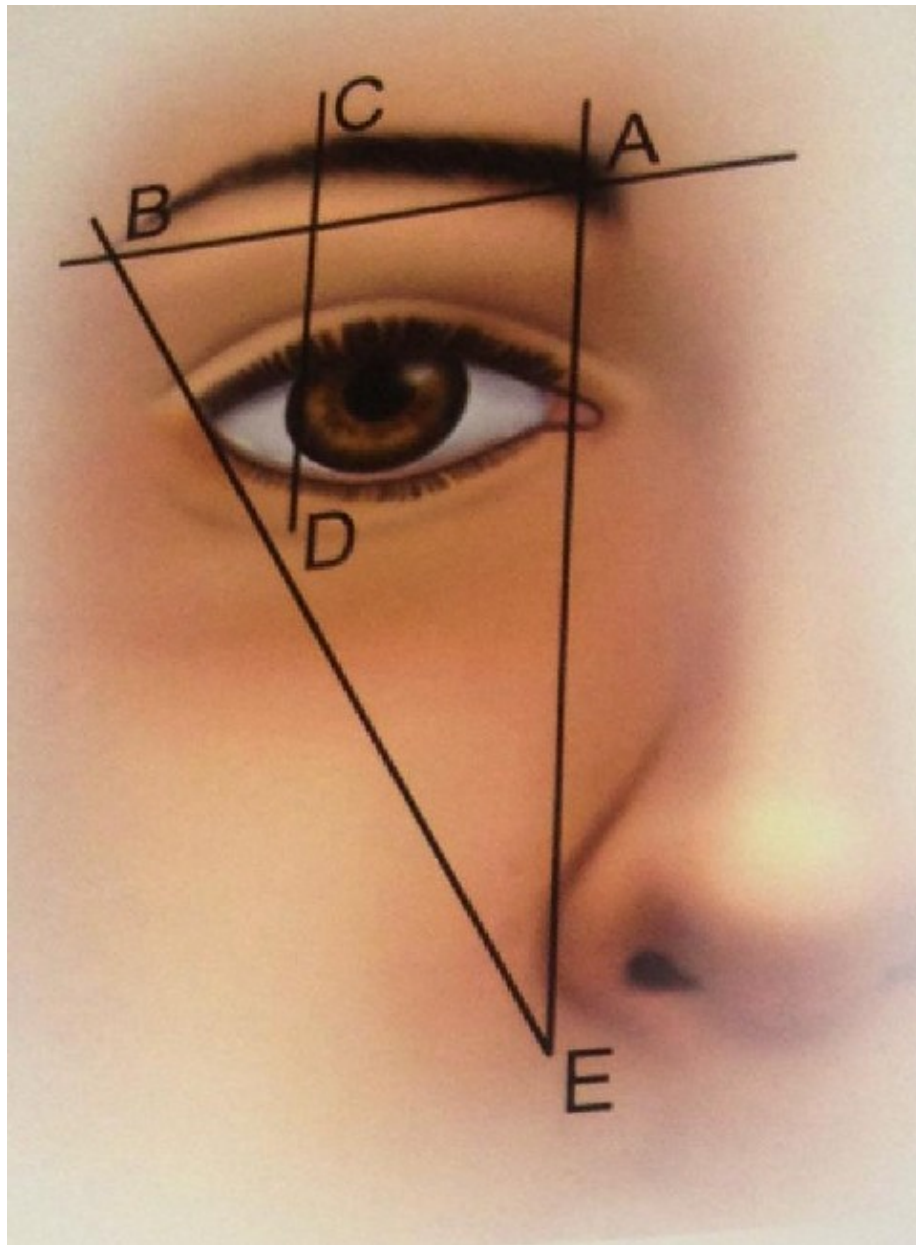


Figure 17.4 An aesthetic eyebrow. A-B=the lateral segment of the eyebrow is at the same level or above the medial segment. C-D= the apex of the eyebrow and is at the lateral limbus of the iris or at the intersection of the medial two thirds and laterally to the eyebrow. A-E= the head of the medial segment of the eyebrow starts at the vertical line that is extended from the bridge of the nose. B-E= the lateral segment of the eyebrow can be extended up to the line traced from the bridge of the nose through the lateral corner of the eye. (Gunter Jp, Antrobus SD. Plastic Reconstr Surg 1997; 99[7]:1808)

The masculine eyebrow should be positioned within or immediately below the supraorbital rim and should be horizontal or have a straight setting (Figure 17.5). It is thick and should be slightly tapered, from the medial to the lateral position. The excessive activity of the corrugator muscles and the procerus muscles may lead to an irritated, worried or tired appearance due to the wrinkles of the glabellas.



Figure 17.5 Typical masculine eyebrows.

When examining the masculine eyebrow it is important to take the glabellas into consideration, seeing that, often, are of greater interest than the vertical height of the eyebrow.

DIAGNOSIS AND SELECTIONS OF SURGICAL PROCEDURE

When examining the patient, it is important to take into consideration the patient's tendency of unconsciously raising the eyebrows when looking into a mirror or when posing for a photograph. Therefore, it is crucial that the patient closes his eyes or relaxes the eyebrows. Thereafter, the eyebrows should be stabilized while at rest with the hands of the examiner, so that, when patient opens his eyes, the true position of the eyebrows will be revealed.

Other important factors to consider in the assessment of the patient include the height of the eyebrow, the folds of the aesthetic eyebrow, glabella wrinkles, skin thickness, and direction of the forehead, male-pattern baldness, eyebrow asymmetry, hair implant line and the preferred hairstyle.² The general purpose of the surgery should be the reduction of wrinkles on the forehead, lateralization and elevation of the medial segment of the eyebrow and the possibility of changing the shape and position of the eyebrow when desired.

Patients with a low hair implant line are treated best with a procedure that will hide the incision and will elevate the hair implant line, with a coronal or endoscopic frontal lift. The quality and texture of the hair should be taken into consideration. The coronal incisions are better hidden in patients who have lighter and finer hair, in such that the hair falls downwards, that there is no important demarcation line between the skin with hair and the hairless skin,. The endoscopic lift is generally more suited to patients with thick hair, a low hair implant line and few dynamic wrinkles. Even male patients with male-pattern baldness can be considered for the endoscopic procedure, because the incisions heal well.

Patients who have a high hair implant line are suited to the use of different techniques. These include, amongst others, the preteichial /trichophytic , bi-plane, mesofrontal, threaded endoscopic, temporal, direct transbelapheroplasty and suture suspension procedures. Some of the procedures mentioned will not be discussed, seeing that they have not been performed, nor necessarily recommended by the authors.

In patients with a suitable hairstyle that helps camouflage the incision and removal of the wrinkles on the forehead, a pretrechial / trichophytic procedure can be taken into consideration.

The incision can be made by means of a w-plasty to hide the scar, and is made immediately inside the hair implant line. It is chamfered underneath to permit the preservation of the hair follicles and hair to grow through the incision. The disadvantages of this procedure includes the need to traverse the medial line with the incision in the scalp and resulting numbness of the post hair implant line, which occurs because of need to section the supraorbital nerve in the hair implant line. The bi-plane and trichophytic endoscopic procedures maintain both the position of the hair implant line and that of the supraorbital nerve.

Patients that have high hair implant lines and deep wrinkles on the forehead are candidates who are suited for the mesofacial lift. This is also an excellent aesthetical paralyzed forehead rejuvenation option. The incision / ellipses is made alongside a forehead crease, which is completely incised. The incision may be staggered along the medial or para-medial line or it may be continuous, crossing the medial line. The temporal lift is effective in women with lateral excess skin (hooding) or lateral ptosis of the eyebrow.

The direct lift procedure is rarely used. For the majority of surgeons, this procedure is reserved for the reanimation of paralysis of the facial nerve or to be

used on aged patients who are not too concerned with the resultant scarring. Its advantage is that the eyebrow can be positioned exactly as desired. This is advantages to the patient who has excessive skin but who cannot protect his eyes because of the paralysis.

Consequently, the precise placement of the eyebrow may be required.³ The different incisions for the procedures mentioned are shown in Figure 17.6

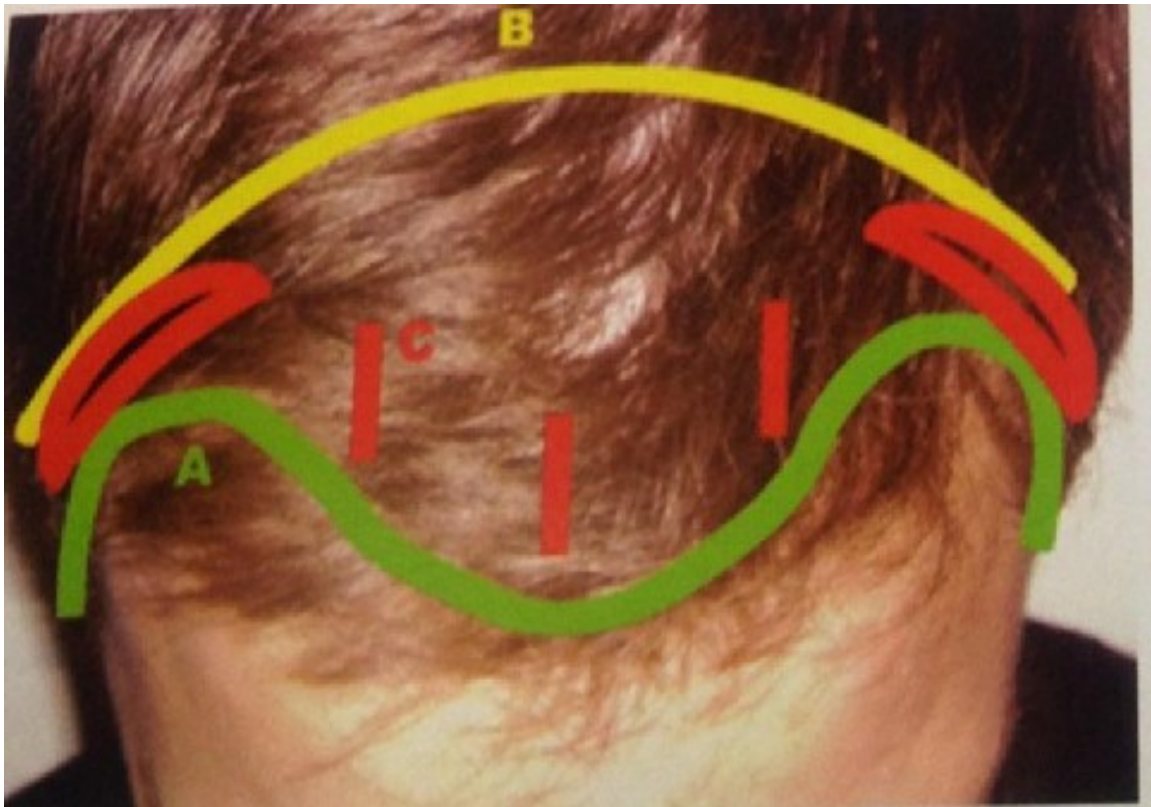


Figure 17.6 Variations in the incisions on hair implant line for the eyebrow lift. A Pretrechal / trycophytic incisions, green. B Coronal incision, yellow. C incisions by means of endoscopy, red.

SURGICAL PROCEDURES

LIFTING OF THE EYEBROW BY WAY OF A CORONAL INCISION

The coronal incision for lifting the eyebrows was first described in 1926 by Hunt⁸. The incisions are made inside the scalp and in the previous hair implant line. The modern procedure involves making a curvilinear incision 4 to 6 cm posterior to the hair implant line. This procedure has withstood the test of time and continues to be the most reliable method for treating a low hair implant line, severe ptosis of the eyebrows and excessive wrinkles on the forehead.

The longevity of this procedure has been well document in reference works⁹. Some even consider such a feat to be an overwhelming victory, achieved at the cost of the collateral effects, such as scaring, alopecia, hypoesthesia of the scalp and posterior displacement of the anterior scalp. Also, this procedure should be avoided in younger men because of the risk of male-pattern baldness developing later.

During the procedure, the incision of is performed posterior to the hair implant line. The incisions should be chamfered so as to preserve the hair follicles. The cut is generally elevated along the subgaleal plane and the incision extends 1-2cm into the helical root. The dissection is performed along the midline in a cutting manner within 1cm of the glabella. At this point, the corrugator and procerus muscles are dissected once the neurovascular bundles has been identified and preserved. They may be cauterized by means of bipolar cauterization, and thereafter cut or avulsed. Laterally, the dissection is made along the temporal line until the superficial layer of the deep temporal fascia. Once the supraorbital rim has been identified, care should be taken not cause damage to the neurovascular bundle of the supraorbital and supratrochlear nerves. The conjoint tendon, the marginal arch and the periosteum along the supraorbital rim are then connected. At the point, the eyebrows should capable of movement and the frontalis muscle can be incised to enhance the removal of the wrinkles of the forehead. The outline is then recovered from the back and above and the redundant skin is excised. A slight adjustment is then carried out enable the tissue to straighten. The wound is closed in two layers with special precision so as to reconnect the galea and the incision in the scalp is closed with staples.

LIFTING OF THE EYEBROWS BY MEANS OF PRETECHIAL /TRYCOPHYTIC INCISION

The pretrechial and trycophytic incision are mainly used in patients who have a high forehead or in patients who want to retain the pre-operative hair implant line. During the pretrechial lift, an incision is made and performed at the junction of the hair implant line and the cephalic boarder of the eyebrow. The trycophytic incision involves is located immediately posterior to the frontal hair implant line. Both incisions must be chamfered to avoid damage to the hair follicles. Some surgeons prefer to use an irregular line of incision in order to camouflage the incision, whilst others prefer to make use of straight-line incision, which is technically easier to execute.

The pretrechial lift can be performed on the subcutaneous, subperiosteal or subgaleal level, in a manner that is similar to the coronal lift. The subcutaneous lifting of the eyebrows provides a much better procedure in relation to the patient with severe wrinkling on the forehead and marked ptosis of the eyebrows. The coetaneous flaps are loosened resulting in excellent removal of the wrinkles on the forehead. Also, there is continued sensory irritation, to a large extent, without interruptions, consequently avoiding hypostasis of the scalp. This requires a meticulous dissection with a relatively higher risk of hemorrhaging of the scalp. The subcutaneous procedure should be avoided in smokers. In addition, great care must be taken to ensure a pressure-free closure. This will reduce the risk of necrosis of the skin occurring.

ENDOSCOPIC LIFT OF THE EYEBROWS

The endoscopic lift of the eyebrows was described for the first time in 1992, by Vasconez and Isse,³ and thereafter published by Vasconez, in 1994, ¹². This is an excellent procedure for the patient with a forehead of average height and slight to moderate ptosis of the eyebrows. Although this technique has been around for a long time, it has still not completely replaced the open techniques.¹³ The contraindications include serious ptosis of the eyebrows, a high frontal implant line and thick and sebaceous skin. The advantages of the endoscopy technique is that it involves small incisions, speedy post operative recovery, reduced risk of there being hair loss and a decrease in diminished post-operative sensitivity. The technique requires specialized training and equipment.

Normally, four or five incisions are made. The fifth incision or the incision along the midline is employed in a patient with a deep nasal root, prominent frontal ridge or orbital border and/or the need for greater medial traction. This incision is often required for male patient who has long eyebrows. The incisions are generally 1 to 1,5cm long and the paramedian incisions are made about 1,5cm posterior to the hair implant line. They are positioned in accordance with the desired traction vector. Incisions are made with a scalpel until the bone is reached, and a separator is used to lift the eyebrow from a subperiosteal aspect by using the non-dominant hand for guidance above the supraorbital boarder. Elevation takes place from the vertex, 1,5cm above the supraorbital rim and, laterally, until the temporal line.

The temporal incisions are chamfered and made parallel to the hair implant line. These should be maintained at a

Under a direct endoscopic view, the marginal arch is completely divided to ensure it stays deeply positioned relative to the temporoparietal fascia and superficially to the deep temporal fascia, in order to protect the facial nerve. There is a denser attachment on the in the temporal line that can be torn to join the subperiosteal and temporal planes. Since the dissection is performed on the lower aspect, it is performed under endoscopic guidance. The sentinel vein is identified approximately 1cm laterally towards the upper aspect of the orbital boarder and must be maintained. The periosteum is lifted out of the lateral orbital boarder and, afterwards, onto the malar eminence, in order to protect the facial nerve. The conjoint tendon is then, carefully released over the temporal line.

Under direct endoscopic view, the marginal arch is completely divided to ensure a successful lift. The supraorbital and supratrochlear neurovascular bundles are carefully preserved. Thereafter, the corrugators and procerus can be identified and removed (or cauterized). The suspension technique is specific to the surgeon, and many techniques were described in the literature, such as the compressive treatment only , external screws (stainless steel versus titanium), Kirschner and Endotine threads (internal absorbable attachment).³ the authors prefer attachment with Endotine in the two paramedian incisions. In the temporal region, a suspension with two threads is used, and a small ellipsis on the scalp is removed around the incision, prior to dual layered closure.

MESOFRONTAL LIFT OF THE EYEBROWS

The mesofrontal lift of the eyebrows is an option that is suited to men with deep wrinkles and who have a high or regressed hair implant line. Furthermore, it is also an excellent choice for the treatment of paralysis of the forehead in patients suffering from facial paralysis. The technique consists in the making of two separate incisions at different levels over the temporal region, which results in the removal of an ellipsis of centralized skin within a deep mesofrontal crease. The authors prefer using a continuous incision through the medial line, whilst other surgeons prefer to stagger their incisions on the different folds of the forehead.

The incisions are chamfered in order to achieve the favorable eversion of the boarder of the skin during closure. The skin and subcutaneous tissues are inferiorly excised up to the level of the frontal muscle, and a subcutaneous/suprafrontal removal plane is used inferiorly up to the level of the orbicular muscle. Afterwards, horizontal cushion suspension threads are positioned from the orbicular to the

upper periosteum. Various threads are normally positioned and, once the appropriate elevation of the eyebrow has been achieved with the appropriate symmetry, the wound is closed through the use of two layers. The coetaneous layer is generally closed by using continuous Prolene suture.

In suitable patients, the mesofrontal lift of the eyebrows may provide excellent elevation in the case of marked ptosis of the eyebrow. Moreover, as a result of its proximity to the eyebrow, it encourages increased longevity and symmetry.

TEMPORAL LIFT OF THE EYEBROWS

The temporal lift of the eyebrow now comprises a large percentage of the brow lift cases of the authors. It is a desirable option for the patients, mainly women, who have excessive lateral skin (hooding) and ptosis of the lateral segment of eyebrow which presents a good placement if the medial segment. The authors are of the opinion that excellent long-terms results can be achieved through the complete release of the temporal line and the lyses of all the ligaments of the eyebrow and the marginal arch.

The elliptical temporal incision must be performed at least 1 to 2cm in the posteriorly to the temporal scalp. The incision is chamfered and parallel to the hair follicles so as to preserve them, and a suitable ellipsis of the skin is removed according to the desired degree of elevation of the eyebrow on a one to one ratio. This normally represent 1 to 2cm in maximum dimension. When the patient has an anterior hair implant line, the ellipsis should be placed 2cm posteriorly to the hair implant line.

The dissection is performed on the superficial layer of the deep temporal fascia approximately 2cm laterally towards the lateral corner. Through adequate traction, the marginal arch and the conjoint tendon are exposed and, thereafter, freed. Once the eyebrow has been completely detached, one or two attachment sutures are applied as from the deep temporal fascia up to the temporoparietal fascia (galea). The incision is closed in two layers with staples placed on the skin.

The senior author does not make use of the procedures that follow for the purposes of elevating the eyebrow; however, for illustrative purposes, these will be briefly discussed in the following sections.

DIRECT LIFT OF THE EYEBROW

This procedure, when used, is typically performed on an aged patient who is not too concerned about the resultant scar. Moreover, it may be used to treat a unilateral paralysis of the frontal nerve.

A minor incision is made directly above the eyebrow, carefully, in order to avoid trauma to the hair follicles of the eyebrow. Thereafter, a determination is made regarding the estimated amount of skin that has to be removed, based on the desired degree of elevation and contour of the eyebrow. Afterwards, a tapered ellipsis of subcutaneous skin and tissue is cut off downwards at the level of the orbicular muscle. The excision is followed by the suspension of the orbicular muscle from the superior periosteum. A closure is then performed in two layers.

The possible disadvantages of this procedure include, a scar that may be difficult to camouflage and the possible interruption of the fine hairs of the eyebrow, leading to a “plucked” or “effeminate” appearance.

BIPLANE LIFT OF THE EYEBROWS

Tirkanits and Daniel describe a lift that involves a subgaleal plane for the coronal part of the dissection and a subcutaneous plane anterior to the hair implant line. The connection between the two planes is divided at the level of the hair implant line.¹⁴ In 1995, Ramirez described a biplane lift of the eyebrows using endoscopy. His technique consists in the transition of a subcutaneous dissection until the subperiosteal/subtemporoparietal fascia, which covers almost half of the area of the eyebrow.

LIFTING OF THE EYEBROWS BY MEANS OF TRANSBLEPHAROPLASTY

This procedure is performed starting from a superior blepharoplasty skin fold. Superiorly, the dissection plane is made below the orbicular muscle. The corrugated muscles and the procerus can be cauterized or divided using this procedure. The orbicular muscle is suspended until the frontal periosteum without the removal of any excess skin.

TRYCOPHYTIC LIFT THROUGH THE USE OF ENDOSCOPY

This lift is a combination of the classical of trycophytic lift and the brow lift using endoscopy. It offers the benefits of reduced numbness and the use of endoscopy to obtain more comprehensive release of the marginal arch. Also, it makes the direct excision of the skin in the trycophytic lift possible. This technique can also enable the excision of the bald skin between the frontal and temporal wisps of hair and reduces the appearance of a receding hair implant line.

The procedure starts with an incision of along the frontal hair implant line and continues along the temporal line. A subcutaneous plane is developed, preserving the sensory nerves, for approximately 2cm. when the frontalis is then actually divided, exposing the periosteum. The dissection then becomes subperiosteal and is carried out in the same way as an endoscopic lift. Once the marginal arch has been separated, the coetaneous remnants are once again covered and the excess skin is removed from below the trycophytic incision. The eyebrow is suspended in the same way as in the classical endoscopy technique.

SUMMARY

There are a myriad number of procedures, for the rejuvenation of the aging face and the eyebrows, available to the facial plastic surgeon. The selection process should be based on the anatomy of the patient, where careful attention is given to the hair implant line. The plastic surgeon's skills in respect of the different procedures described here, will result in the harmonizing the patient's pre-existing anatomy, the aesthetic purpose and objectives.