Upper Blepharoplasty – Nuances for Success

Bryan C. Mendelson, FRCS (Ed), FRACS, FACS[a,*], Chin-Ho Wong, MMed (Surg), FAMS (Plast Surg)[b]

KEYWORDS

• Upper eyelid • Tarsal fixation blepharoplasty • Postblepharoplasty look • Brow ptosis
• Dermatochalasis • Orbital rim augmentation • Hydroxyapatite

KEY POINTS

- Because the "eyes" are of the highest importance in facial appearance and identity, it behooves the surgeon of the motivated patient to go beyond simple age reversal, to reveal inner beauty or add attractiveness.
- A nuanced understanding of facial aesthetics is required of the surgeon, along with refined surgical technique, which includes detailed intraoperative recognition of lid anatomy.
- A blepharoplasty technique based on a lid crease that is stable and lasting provides independent control of both lid segments. A major skin resection is avoided as is unnatural skin tension, visible scars, and the subsequent postblepharoplasty "look."
- Simultaneous correction of the age-related diminution of the orbital rim fat volume adds a level of aesthetic refinement, while avoiding the "operated eye look." Simultaneous correction of a deficient supraorbital rim projection enhances the result in those patients.

Video content accompanies this article at http://www.facialplastic.theclinics.com

Good is the enemy of best.

—Mark Twain

This article represents the personal understanding of an individual plastic surgeon that evolved with a broad experience over the course of his career in aesthetic surgery of the face. It does not replace the "how to guide" for the learning surgeon, for whom much is well presented elsewhere. Rather the concepts may appeal to some individual surgeons, who find satisfaction in the possibilities of aesthetic surgery. All surgery requires quality of practice, but when a person's face is involved, quality has a different significance. This is because of the personal and social impact that surgery of facial appearance has on that person's identity and self-esteem, reflecting how other people are influenced by, and respond to the appearance, usually at a subconscious level.

This significance was succinctly described last century by Egon Brunswick (1934), a psychologist: "*a small change in facial proportion, changes our perception of a person's personality*".

This article is based around a refinement in perceptual understanding, then of the relevant anatomy, leading to the surgery required to obtain the intended result. There are several aspects involved in the aesthetics of the "eye" including illusion, something women know from their experience of using cosmetic eye makeup. Even the term "makeup" tells a story!

Upper lid blepharoplasty is the centerpiece in rejuvenation of the periorbital region and also in glamorization of the eyes. However, a blepharoplasty is part of a larger story. This is because attractive eyes have a strong 3-dimensional aspect to them. Beautiful eyes are in a "picture

[a] The Centre for Facial Plastic Surgery, 109 Mathoura Road, Toorak, Victoria 3142, Australia; [b] W Aesthetic Plastic Surgery, 06 – 28/29, Mount Elizabeth Novena Specialist Center, 38 Irrawaddy Road, Singapore 329563, Singapore
* Corresponding author.
E-mail address: drbryan@bmendelson.com.au

Facial Plast Surg Clin N Am 29 (2021) 179–193
https://doi.org/10.1016/j.fsc.2021.01.001

Fig. 1. (*Left*) (MB01) Preoperative, age 51 years. (*Right*) (B02) One year postop tarsal fixation blepharoplasty, with a temporal lift and face/necklift. Tarsal plate 10.0 mm height, 5 mm skin excision only. The visual impact of the eyes on overall facial appearance is so significant that the benefit to her overall appearance from having a quality contouring of the lid from the upper blepharoplasty compares strongly with the impact of her facelift.

frame" formed by the bony orbital rim, which is highlighted by the brows (**Fig. 1**).

The 3-dimensional contour begins with the relationship between the picture frame, the superior orbital rim, and the globe and continues with the relationship between the 2 parts of the lid (**Fig. 2**). The upper part of the lid is the connection between the brow and the globe. Eye shadow is traditionally applied to glamourize the eyes by creating the illusion of a greater depth of the lid recess, which indicates its importance in Society.

Although the lid is considered a single entity, it is structured of 2 segments that are anatomically separated by the *lid crease* (**Fig. 3**). These are the lid proper, the lower part, the *tarsal segment*, and above that, the *infrabrow segment*.[1] The *lid fold* is the lower part of the infrabrow segment that tends to hang over and conceal the lid crease to a varying degree. The lid fold varies considerably according to race, it may even be absent, and its variation over time is such that it ages a person. Hence, management of an excess lid fold is the usual surgery of upper lid blepharoplasty. Although interrelated, the 2 segments are visually and functionally separate. The hidden crease, with its function of internal fixation influences the appearance of the lid by balancing the 2 lid segments. Unfortunately, there is some confused terminology in some quarters; the terms "crease" and "fold" are confused as if they are the same thing. The crease is an inversion, which cannot be filled, and the fold is the opposite.

The *tarsal segment* moves across the upper globe as a unit, based on the fixed tarsal plate dimensions. Its moves as a unit. In contrast, the *infrabrow segment* is constantly changing its shape and dimensions, as it bridges the gap between the brow above and the mobile tarsal segment. The "look" of the eyes is most strongly determined by *the lid show*, the amount of the tarsal segment visible below the lid fold. Clearly the fold is under the influence of the infrabrow segment. It varies not only in its position but also in its quality. The well-defined surface appearance of an attractive lid reflects the internal anatomy (**Fig. 4**).

UPPER LID BLEPHAROPLASTY

For more than 30 years the senior author has used, and refined, a tarsal fixation technique of upper lid blepharoplasty, first learnt from Dr Robert Flowers.[2–4] This technique progressively replaced the use of the previously used standard excision technique because it provides the surgeon with precise control and predictable and extraordinarily lasting results. These benefits come at the price of a longer operating time and increased risk, both of which are reduced with experience involving a learning curve. The aesthetic, anatomic, and technical considerations are shared later, and the role of the brow is integral in the result.

Surgical control, paramount for quality surgery, is obtained in the technique by considering the 2 interconnected segments of the lid as separate and distinct. Each lid segment is appropriately

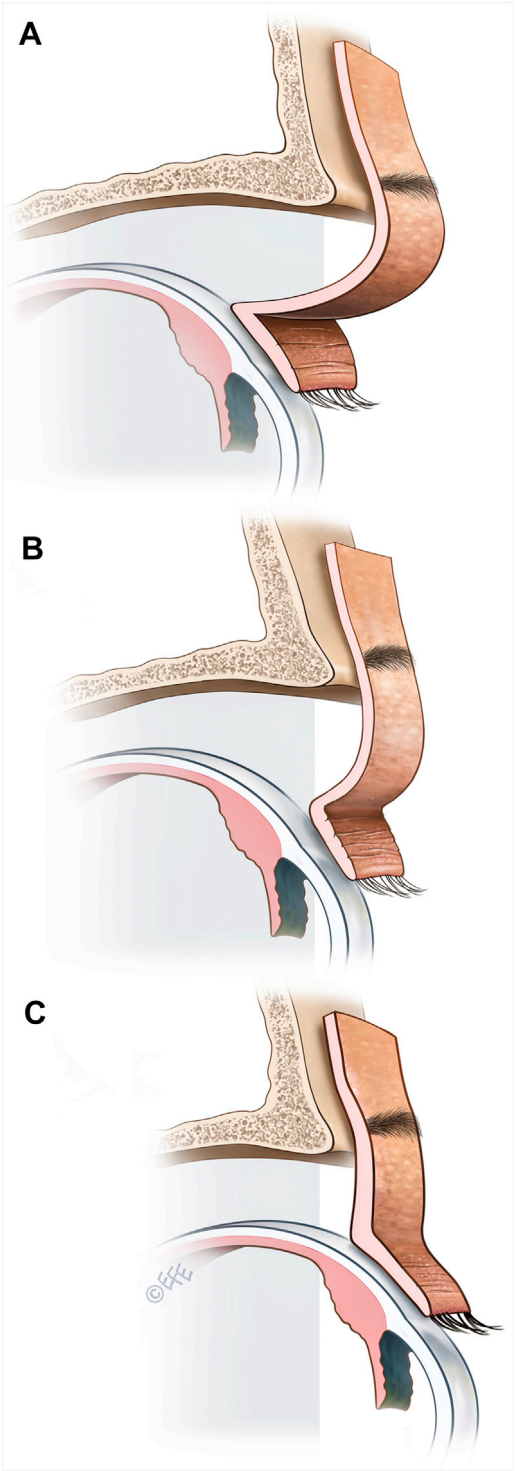

Fig. 2. The shape of the infrabrow segment is largely determined by the skeleton, specifically the amount of superior orbital rim projection relative to the position of the globe. (*A*) The most aesthetically pleasing relationship is where the superior orbital rim projects well forward of the anterior surface of the globe. Accordingly, as the infrabrow segment descends from the brow, it curves inward (recedes). (*B*) An intermediate situation, not as aesthetically pleasing, where the amount of forward projection of the rim is small, leading to less receding (curvature) of the descending upper lid. (*C*) An aesthetically difficult relationship is the prominent eye. In this configuration there cannot be an attractive, receding lid fold. Pseudoptosis may result in the absence of a lid fold. (*Courtesy of* Dr. Levent Efe, CMI, Australia.)

corrected, independent of the other. The procedure is not difficult to master once the surgical steps are understood, although, the surgeon's ability to recognize the internal anatomy is more critical than in traditional blepharoplasty.

Planning the tarsal segment is the first priority. The location of the marking for the lower incision (lower marking) is traditionally placed at a predetermined distance from the lid margin, correlating with the lowest skin crease. A logical alternative is to precisely locate the lower incision, whichis determined by the patient's tarsal plate.

Surgical Technique

Preliminary markings

These are performed with the patient relaxed but cooperative. Three cardinal reference points are first marked on the lashline, with the patient looking at the same distant object. These are the medial limbus, medial pupil, and lateral limbus. Then the provisional lower marking is lightly placed.

The upper marking is made from the brow down, with the brow gently pushed down or naturally relaxed with the patient sitting.

The upper marking of the excision is challenging, as it requires judgment. It is located in reference to the patient's brow position, being placed lower (less skin excision) if more skin needs to be retained due to inherently high and/or forward projecting brows. The usual distance is within the range, 17 to 21 mm, which according to standard excisional only blepharoplasty is not removing sufficient skin. More skin must be retained for the skin inversion of the tarsal fixation. This skin is "released" during lid closure, which prevents lagophthalmos.

Final markings

When the patient is deeply sedated or asleep, the lid is readily everted. Now, the shape of the patient's tarsal plate is clearly seen and noted, then using the caliper, the maximum height of the tarsal plate (distance X) is measured (**Fig. 5**).

The position for the lower skin incision is calculated (X plus 1 mm) and this skin marking now

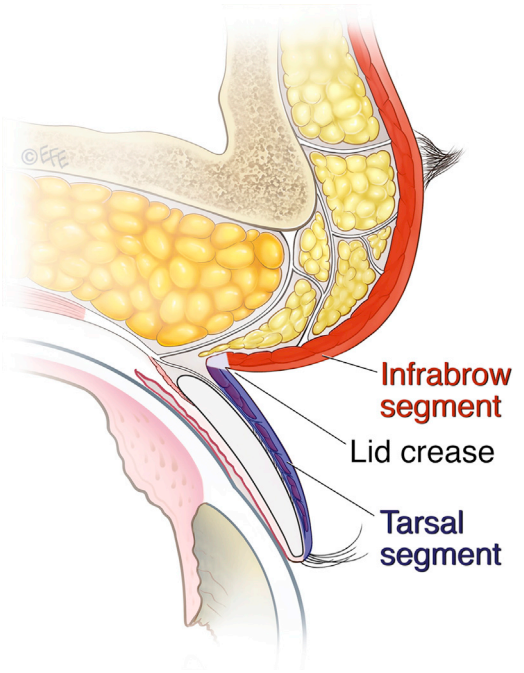

Fig. 3. The 2 segments of the upper lid are anatomically separated by the lid crease. (*Courtesy of* Dr. Levent Efe, CMI, Australia.)

made at the 3 cardinal points. As the marking is being performed, the skin should be placed under the natural tension intended for the final result.

Medial to the medial limbus up to the punctum, the marked distance is reduced to 7 to 8 mm. Similarly, over the lateral canthus the marking is about 8 mm, extending laterally as far as required to excise any moderate temporal hooding but significantly less than with a standard blepharoplasty due to the skin inversion inherent in the technique. The planned skin excision is confirmed by a pinch test and adjusted accordingly.

Excision of skin and muscle

Compared with a traditional blepharoplasty a considerably smaller amount of skin is resected as skin tension is to be avoided.

The skin only is incised, first along the lower incision, then the upper incision, and then carefully removed off the outer surface of the orbicularis with meticulous hemostasis on the muscle surface.

The orbicularis is then incised along the lower incision (*cutting diathermy or scalpel*), bevelling down slightly toward the upper border of the tarsal plate. Lateral to the lateral canthus a small strip of orbicularis is removed to avoid a dog ear at closure.

Defining the tarsal plate

The filmy areola tissue (the pretarsal extension of the levator) is then removed off the tarsal plate. To do this, the orbicularis is first elevated, then the areolar tissue carefully released from the underside of the orbicularis muscle fascia, continuing this dissection as far down toward the lashes as required, according to the pretarsal skin laxity. Both ends of the tarsal plate and the upper edge should be clearly defined. It is not necessary to routinely clean soft tissue off the lower edge of the levator, but if trimming is required, it must be done carefully to avoid shortening of the levator. The removal of the areolar tissue enables, what Dr Flowers described as, the underside of the orbicularis (its fascia) being "wallpapered" onto the tarsal plate surface.

Defining the Levator Edge

The septum orbitale is incised just above the *sling*, where it joins the levator. Identification of the levator is commenced at the lateral extent where it is safer from unintentional levator shortening.

Once it is confirmed that the scissor tip is on the surface of the levator with the septum orbitale, just superficial, a meticulously release of the septum off the levator is performed, continuing medially (**Fig. 6** C,D). Unintended shortening of the levator must be avoided, especially in the medial third where the edge of the levator is less distinct.

Adjusting the fat pad volumes

The lateral prolongation of the central fat pad just above the lateral canthus is reviewed. It is often considerable, especially when there is fullness over the lateral lid. The prolongation is mobilized, from lateral to medial, at times to the lateral limbus, to be folded over later as a fat flap.

If enhancement of the lateral extension of the inferior border of the lid fold beyond the lateral orbital rim is desired, this is obtained by removal of preaponeurotic fat here, with more contouring obtained by removing some ROOF fat here, being mindful not to overdo the resection, especially in men.[5]

Medially, the distinctive pale, nasal fat pad is mobilized from within its fibrous capsule and managed in the standard technique (**Fig. 6**E). As this is Y shaped, the second limb of the Y should be sought.[6]

Reconstruction using Flowers sutures

Reconstruction is performed using a series of standard 3-point fixation sutures (tarsus, levator, pretarsal orbicularis) (**Fig. 6** F,G). The 6/0 Vicryl Rapide suture used is fine, yet provides sufficient

Fig. 4. (*Left above*) (LH01) and (*left below*) (LH02) Preoperative, 36-year-old man, tired eyes, in someone with a favorable skeletal configuration having a broad flat forehead with inherently good projection of his superolateral orbital rims. Highlighting the principle that attractive eyes have a strong 3-dimensional configuration. (*Right above*) (LH04) and (*Right below*) (LH06) Eighteen months postoperative following tarsal fixation blepharoplasty (only 3 mm maximum skin removal). Lipofill performed for subtle contour enhancement, using Lipogems via a Maft gun. 2 mL infrabrow mainly medial. 1.0 mL brows, 1.0 mL superior temple. Also 1.0 mL upper maxilla, 1.0 mL zygoma. Vividly demonstrating that "a small change in facial proportion changes our perception of a person's personality."

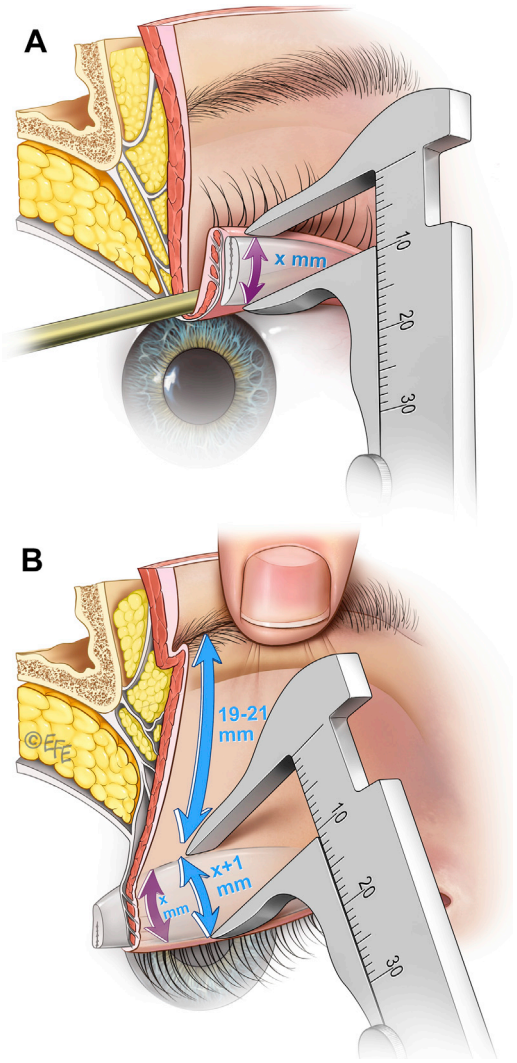

Fig. 5. Lid marking using the tarsal plate. (*A*) The height of the tarsal plate, distance x, measured in the midpupil position. (*B*) Transposed to the skin as x plus 1 mm for the lower incision. (*Courtesy of* Dr. Levent Efe, CMI, Australia.)

strength and durability, without causing tissue reaction.

The first suture at the medial end is placed between the medial (first and second) cardinal points, between the medial limbus and medial pupil. With the upper edge of the tarsal plate stabilized with fine forceps the needle enters the outer surface of the tarsus just below the upper edge and exits the upper edge of the tarsal plate. Note that the needle must not go through to the conjunctival surface.

The second bite of the suture is to the levator, taking a secure bite near the free edge.

The third bite of the suture picks up the orbicularis, more specifically the fascia on its underside. Rather than tightening the pretarsal skin directly, it is indirectly toned by this suture placement here.

With the suture tied, the levator functions, whereas the incision is fixed in the lid crease.

The second suture is the most important, being in line with the medial pupil, the usual high point for the lid margin. It is placed in the same standard technique, as is the third suture, placed at the marking for the lateral limbus.

A fourth suture, not as important as the others, bisects the distance between the lateral limbus and the lateral canthus where the tarsal plate is beginning to reduce in height.

The fifth suture at the lateral canthus is different from the others, because the tarsal plate is so narrow here. This suture has a different objective, that of reducing the temporal hooding lateral to the lateral canthus. The suture ignores the narrow tarsus and picks up the orbicularis first, which is then sutured up and medial to the levator, several mms above its free edge to shape the lateral tarsal contour.

This completes the correction of the tarsal segment, independent of the infrabrow segment. It has been achieved with natural skin tension, yet the lashes are everted.

Fat flap Lateral fat, if mobilized, is translocated medially to restore central infrabrow volume and stabilized by a suture to the septum orbitale beneath the area of peaking in the medial third of the lid.

Skin closure As the lateral skin closure must be meticulous, interrupted sutures are used here for precision. These sutures include the underlying orbicularis, whereas the most medial suture incorporates a bite of the underlying levator edge, at its lateral horn.

A continuous monofilament suture (5/0 pronova) is mainly used for lid closure, commencing at the medial end. As the closure continues across the lid, the suture picks up the edge of the levator, which becomes fixed to the incision.

Summary

The blepharoplasty is completed with natural tension of both the pretarsal and infrabrow skin, yet with eversion of the lashes.

Minimal skin is excised when using the tarsal fixation technique.

The orbicularis is preserved, being incised only at the level of the upper border of the tarsal plate for safe access to its anterior surface.

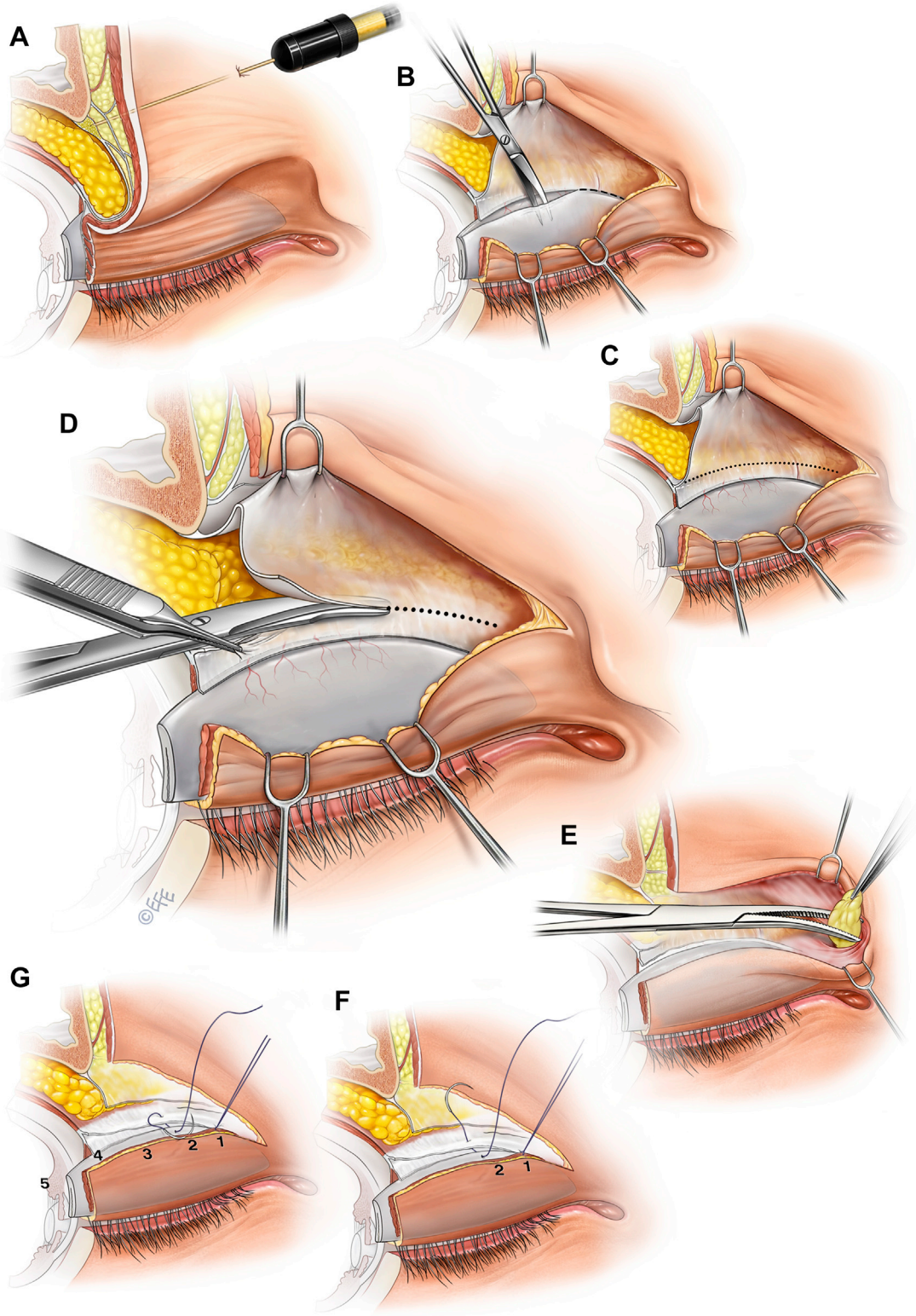

Fig. 6. Key surgical steps in the tarsal fixation blepharoplasty technique. (*A*) Lipofilling is performed initially. The fine cannula is directed vertically through entry points in the brow to the periosteum of the superior orbital rim. Volume is placed deep in the triangular recess formed by the attachment of the septum to the posterior border of the rim and continued up on the rim. (*B*) Following the incision through skin and orbicularis, the pretarsal areolar-like tissue is removed off the tarsal plate. (*C*, *D*) Following definition of the sling, the septum orbitale is released from the levator, with care to avoid shortening the levator. (*E*) Excess deep medial fat is adjusted. (*F, G*) Series of "Flowers" 3-point fixation sutures placed, each commencing at the upper border of the tarsal plate, then to the levator edge, and finally to the pretarsal orbicularis. (*Courtesy of* Dr. Levent Efe, CMI, Australia.)

Fig. 7. (*Left*) (RG03) Preoperative, age 48 years. (*Right*) (RG04) One year postoperative tarsal fixation upper blepharoplasty. Markings: tarsal plate 9.5 mm height, lower incisional line at 10 mm, upper incision at 22 mm from midbrow (maximum skin removal 3 mm). Medial translocation of excess lateral fat and reduction of moderately large excess deep medial fat. Superolateral orbital rim projection contour enhanced with 1.0 mL hydroxyapatite rim augmentation and lipofilling with Maft gun of 2.0 mL, to medial lid and 1.0 mL beneath the brow. (Associated, lower lid cheek refinement, with hydroxyapatite augmentation medial orbital rim, 0.4 mL, maxillary concavity l.6 mL, and zygoma1.0 mL). Demonstrating that control of the shape of the infrabrow segment is not limited to the lid fold. Attention to the deficient volume high in the segment is required, in addition to the reduction of low medial fullness from medial brow fat pad excess.

The removal of the areolar tissue on the tarsal plate minimizes long-term recurrence of crepey pretarsal skin.

The exposure of the levator aponeurosis and tarsus and the internal suture repair integral with the procedure most likely prevents the subsequent development of involutional ptosis and allows the simultaneous correction of previously diagnosed clinical ptosis.

The absence of skin tension allows early suture removal. This Video 1 illustrates the technique.

Discussion

Importance of the shape of the lid fold

Most attractive lids have a lid fold that is soft, rounded, and definitely not flaccid as it descends from the brow. It curves around and inward into the crease in the depth of the lid, at the top of the tarsal plate (**Fig. 7**). The crease itself, although concealed by some overhang of the fold at rest, fulfills its second function, to maintain the pretarsal segment smooth with an even tone, without being taut.

When it has been brought to one's attention, it becomes quite obvious that the curvature of the lid fold has a real but subliminal visual impact. The curvature gives the illusion of the eye appearing more attractively open and brighter, than 2-dimensional measurements reflect (**Fig. 8**).

This focus on shape of the lid fold is not generally appreciated but is of such aesthetic significance as to be a priority in upper lid surgery. Because fixation at the lower edge of the infrabrow segment is a key controller of the shape of the lid fold, there is strong reason for using a technique that provides a secure lid crease. People who attend a plastic surgeon for improvement of their tired eyes appearance are not aware of the importance of the lid crease, especially when not having been blessed by nature with this anatomic attribute.

The benefits of tarsal fixation

Analysis of the lid presentation of patients leading them to secondary upper lid blepharoplasty has only recently received attention. The presentation is different from that of patients presenting for primary upper lid blepharoplasty (lid fullness and excessive hanging of the lid fold). It has acquired a specific term, a "*post blepharoplasty look*."[7,8] This "look" is essentially one of pretarsal skin laxity

Fig. 8. (*Left*) (RS04) A 43-year-old, showing tired eyes. (*Right*) (RS05) Postoperative at 1 year, looking fresher after tarsal fixation blepharoplasty (3 mm maximum skin resection). Also, enhancing of the lid contour with superolateral orbital rim projection increased by 1.0 mL hydroxyapatite orbital rim augmentation. (Associated lower lid-cheek refinement from hydroxyapatite augmentation of the inferior orbital rim, maxilla, and zygoma, along with transconjunctival lid fat adjustment). Demonstrating that the brighter, more open eyes look is partly an illusion that the lid fold is higher due to the round shape of the fold with more incurving of the infrabrow segment.

(dermatochalasis with pleated horizontal skin folds), in the absence of a lid fold. As would be expected for this amount of laxity or if present, the fold tends to be high and flaccid (due to previous fat removal). The lid is hollowed due to the absence of infrabrow fat volume, yet a medial fat bulge is common (persistent or recurrent).

In the sample of 100 secondary upper blepharoplasty patients, who subsequently underwent tarsal fixation blepharoplasty a median 8.7 years following their initial blepharoplasty, nearly 40% did not require further skin resection with the median amount of only 2.0 mm for the others. Medial fat pad correction was required in 90% and lid ptosis correction in 12%. When a lid fixation technique is used, the emphasis is on contouring the shape of the lid, not on skin tension. Similar to other facial rejuvenation surgery, the skin is only a covering, not a support.

The likelihood of a postblepharoplasty look developing, even in small degrees, is inherently reduced, whereas the results are more pleasing and more lasting (**Fig. 9**).

The internal lid tightening results in a youthful restoration of the lash tone, that lasts, while incipient or mild lid ptosis is corrected.

PART 2: PERIORBITAL LIPOFILLING

The advent of lipofilling has provided a quantum advance in the quality of rejuvenation possible around the eyes. The restoration of soft tissue

volume directly improves the contour of the infrabrow segment of the lid.[9–11] A further effect of infrabrow lipofilling is the indirect improvement of the pretarsal segment tissue tone and smoothness, which is possible when the pretarsal tissues are not exceptionally loose. In some cases, lipofilling alone is all that is required to obtain a blepharoplasty effect, without surgery.[12]

An important observation about lid aging (yet to be objectively verified by a study) is that there is a progressive diminution of the preperiosteal fat of the superior orbital rim. This results in a loss of youthful fullness of the upper part of the infrabrow segment, which over time leads to flaccidity and sagging in the lower part, the lid fold. Ultimately, a gaunt hollowing of the upper lid occurs, whereas earlier in this process the reduction of youthful freshness is subliminal but evident.

Fig. 9. (*Top*) (*Middle*) (JR02) (JR02) Preoperative, 53-year-old, man. One year following tarsal fixation blepharoplasty. (*Bottom*) (JR04) Twenty-four years postop. No further surgery. Observe the maintenance of the shape and smooth quality of the pretarsal skin, reflecting the durable fixation of the surgically created but unseen lid crease. Subsequent aging is limited to the infrabrow segment, secondary to forehead, brow descent.

This aging change is readily improved using a fine lipofilling cannula. Importantly, the focus of the lipofilling is to place the fat volume deep on the periosteum.

It is not widely appreciated that the attachment of the orbital septum to the superior orbital rim is not where you would assume it to be, at the center of the rim. It was demonstrated early on, to be at the posterior edge of the rim.[13] This leaves a triangular recess in the angle between the bony rim above and the septum behind and below. This is not usually clinically apparent, as the recess is filled in youth with fat (see **Fig. 5**A, **Fig. 10**).

The early and significant concerns about lipofilling leaving visible lumps no longer remain an impediment to its use in practice; this is due to improved understanding and the improvements in technology. Practically speaking, lipofilling of the periorbital area provides unique challenges, even for a surgeon experienced in lipofilling elsewhere in the body, due to the unusual characteristics of the lid, it's exceptional amount of active mobility, and the exceptional thinness of the eyelid skin that allows even minor imperfections to be revealed. In addition, the reduction of the lid soft tissue volume with age is profound. Although the classic Coleman technique is modified by using smaller fat parcels with finer aspiration and infiltration cannulas, the few difficulties experienced by the author caused a rethink.

In practice, patients are extraordinarily intolerant of even the most minor imperfection with lid lipofilling, which reflects the importance of their eyes to them. Patients may obsess with a corrosive concern about even a microlump that can scarcely be seen! This effect can be most damaging, as the concern does not necessarily abate, even after the imperfection has been objectively improved. This is an intolerable situation for the patient and surgeon to go through, for surgery of such importance to the patient, and must be avoided at all costs.

For grafted fat to take and survive requires certain conditions. The focus has correctly been on the graft size, but the substrate is of importance, even in well-vascularized eyelid tissue. In significantly depleted lids very little remaining fat is present to act as a substrate into which a graft can be placed, that inherently only a small amount of take can occur. It may require repeated grafting, to progressively build the substrate volume for improved take of the subsequently grafted fat. It is much simpler to predictably augment a smaller volume deficiency with adequate substrate, than

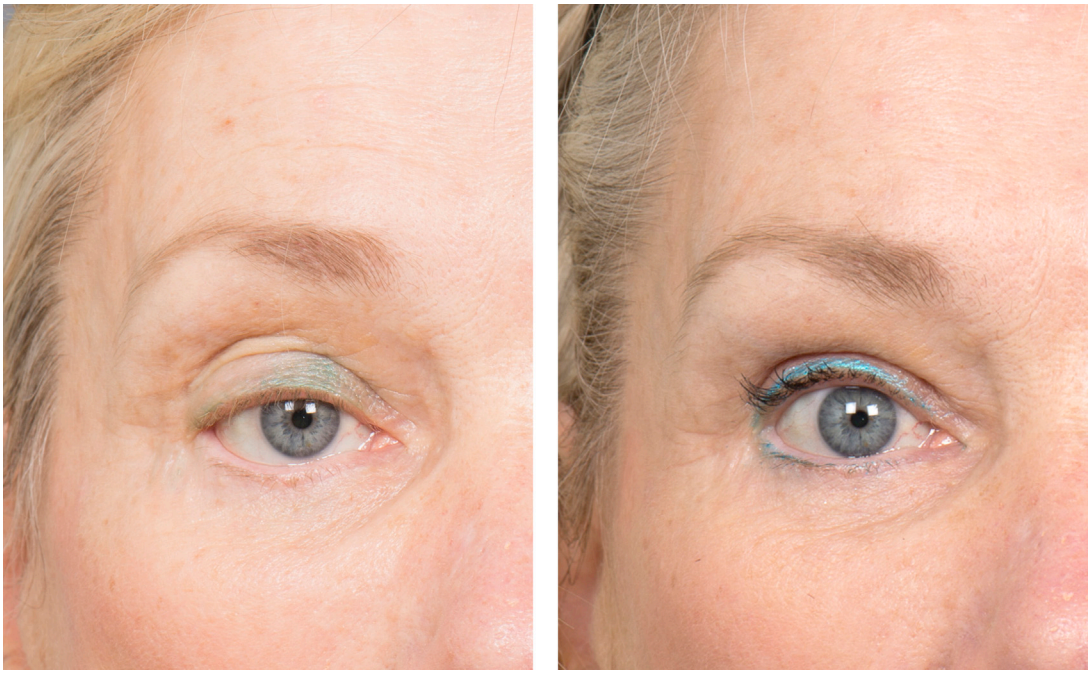

Fig. 10. (*Left*) (JE01) A 65-year-old woman with past history of conventional blepharoplasty 8 years before, with full facial rejuvenation surgery. (*Right*) (JE02) Postoperative. One year following secondary blepharoplasty (tarsal fixation technique) with only 2 mm skin excision. Also, lipogems performed using the Maft gun. A secondary lipogems was performed 4 months later, mainly to the infrabrow orbital rim, temple, and forehead.

a depleted lid. In such a situation, it is important to explain this to the patient as the rationale for the plan of a staged series of lipofilling. It is always safer to slightly underfill, avoiding the risk of even a slight unintended excess. There is more precision control with a smaller final increment, as the second putt in golf.

Preparing the injected fat by washing and diluting with saline or Ringer solution is beneficial for ease of injection and dispersing the injected volume. The author has found that the Lipogems closed system of washing with some microfracturing of the fat has avoided lumps, although it is not inexpensive. Precision control of the injection process is fundamental to safety and the avoidance of irregularities. The precision of use with the MAFT (Micro Autologous Fat Transfer) gun[14] provides a new dimension of risk prevention obtained by mechanical trigger control of calibrated microquantities of injected fat. With this degree of control comes the confidence to inject in areas not previously considered for correction. Now subliminal volume correction is performed along the superomedial orbital rim inferior to the brow, often extending down to the medial canthus and sometimes extending to a dark hollow just inferior to the canthus. This thin preperiosteal lipofilling may be extended medially to where it is blended into the side of the nose.

Although transposition of medial orbital fat can be used to correct superomedial orbital deficiency, controlled lipofilling is more versatile, not limited in volume and with the ability to taper volume at the edge.

Subsequent lipofilling, although an inconvenience for the patient, is often required in some areas to obtain the optimum youthful look without risk. Fortunately, this can be performed using local anesthesia in most instances.

PART 3: SUPERIOR ORBITAL RIM AUGMENTATION

Because of their visual importance, the brows hold a major place in the cosmetics world, where eyebrow thickness, shape, and color are regularly attended to by most adults. Nonsurgical cosmetic procedures benefit eyebrow height and shape to a degree, whereas surgery is required to obtain more significant and permanent improvements.

The intrinsic position and shape of the brow is an external manifestation of the shape of the underlying skeleton, specifically, projection of the superior orbital rim and the superolateral part of the rim formed by the zygomatic process of the frontal bone, on which the brow rests (**Fig. 11**). There is no evidence that this bone changes with aging as there is for some other orbital rim bone.[15,16]

Endeavors to surgically impose a certain shape to the brow unrelated to the skeleton may not necessarily convey an aesthetically balanced look. To a certain extent, the brow and the related infrabrow segment of the lid can be positioned indirectly by surgically enhancing the underlying skeleton. This is a relatively simple procedure with low risk and permanent benefit. The author has performed surgical augmentation of the superolateral orbital rim in more than 150 patients, specifically enhancing the projection of the zygomatic process of the frontal bone, lateral to the supraorbital nerve foramen[17] Ref (**Fig. 12**).

Although a gentle enhancement can be achieved with filler or lipofilling, a definitive contour improvement is obtained by performing a bony augmentation using subperiosteal hydroxyapatite. This increases projection of the superolateral orbital rim, relative to the globe, lateral to the supraorbital nerve[18] (**Fig. 13**).

Markings 1: Incision

With the patient awake, the vertically oriented bony superior temporal line is palpated and marked. Then with the patient raising their brow maximally, mark a prominent frontalis crease immediately medial to the superior temporal line on both sides, between 35 and 50 mm above the brow. This incision line in the crease can be as short as 12 mm in length.

Markings 2

A pair of markings from the planned incision is extended down to the brow. The lateral line extends to the palpable lateral prominence of the superior orbital rim, the zygomatic process of the frontal bone.

The medial line extends inferomedially to the orbital rim at about the location of the supraorbital nerve. Within the area for augmentation indicate the volumes to be placed, increasing from medial to lateral and then tapering along the superior temporal line.

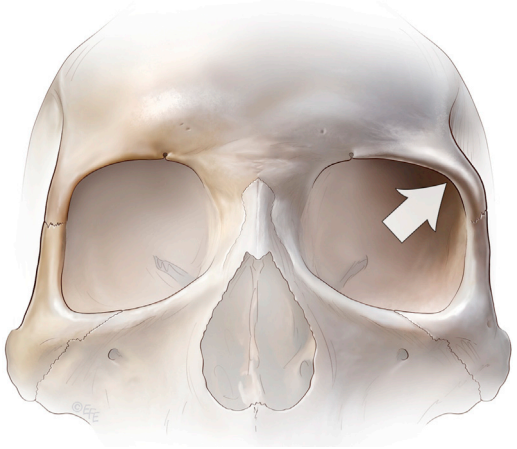

Fig. 11. A well-shaped zygomatic process of the frontal bone provides strong visual emphasis. Projection of the superolateral orbital rim is enhanced while the outer brow is supported over the lid. (*Courtesy of* Dr. Levent Efe, CMI, Australia.)

Preparation

Local anesthetic/adrenaline solution is injected into the incision and subperiosteally within the demarcated area. The periosteum readily hydrodissects here, as it is loosely attached. Given sufficient time for the adrenaline effect, there is virtually no bleeding with the procedure.

Incision and Subperiosteal Pocket Dissection

First incise the dermis only. Then vertically spread to open between the neurovascular structures. The periosteum is then easily entered and partially opened, without bleeding.

Use a narrow periosteal dissector to dissect medially first, which is not at all difficult, extending the dissection to the orbital rim, but not beyond (Fig. 15A). Continue the dissection laterally right up to the periosteal attachment at the lateral extent of the frontal bone, preserving its lateral periosteal boundary. Change the periosteal elevator to one that the tip curves inward, to enable dissection part way around the orbital rim to allow the granules to be placed on the lowest part of the anterior surface of the bone, better supporting the brow. Avoid overdissection, as the shape of the periosteal pocket defines the basic shape of the implant (Fig. 15B).

Placement of the Hydroxyapatite

Using a narrow retractor, the first of the loaded syringes is inserted into the pocket (recommended 1.0 mL syringe, with the hub amputated and loaded with 0.2 mL of the hydroxyapatite mixture). The tip of the syringe is directed to the most medial extent. The tip is felt through the skin to be just above the rim. With a finger protecting the inferior edge of the rim, the content is progressively added while the finger feels the granules emerging onto the bony rim. The plunger is further used to position the granules.

Then the next syringe volume is placed immediately lateral to the first and so on, and the granules are shaped using a small periosteal dissector until the volume along the rim is complete. Additional hydroxyapatite extends along the periosteal edge, tapering up along the superior temporal

Fig. 12. (*Left top*) (JF01) (*left below*) (JF03) A 67-year-old man, no previous surgery. (*Right top*) (JF03) (*right below*) (JF04) Seven years after tarsal fixation blepharoplasty (only 5 mm maximum skin removal), a small reduction of central fat and large reduction of medial fat. Also, lateral brow contour projection was enhanced by a hydroxyapatite augmentation (1.2 mL) of the superolateral orbital rim to enhance 3D contouring. No further surgery since the original. This case impressively demonstrates that less excision of lid skin than expected results from the deeper invagination of the lid skin into the lid crease. The maintenance of pretarsal smoothness and the lid fold shape highlights the long-term benefits of having the lid crease and provides secure and durable fixation.

line. The feathering, shaping process is completed using a finger externally and the dissector internally.

Closure

A simple closure using 3 to 5 everting dermal sutures of 5/0 monofilament is all that is required. The periosteum does not require closure, only a broad Steri-Strip across the upper edge of the granule-based implant.

AFTERCARE: there is minimal need for postop analgesia. With proper wound care the incision is inconspicuous by 8 weeks. The subtle, but permanent, benefit is seen in the "look of the eyes" of the patients (**Figs. 7**, **8** and **12**). It is not detectable that surgery has been done to the brows from this essentially risk-free procedure.

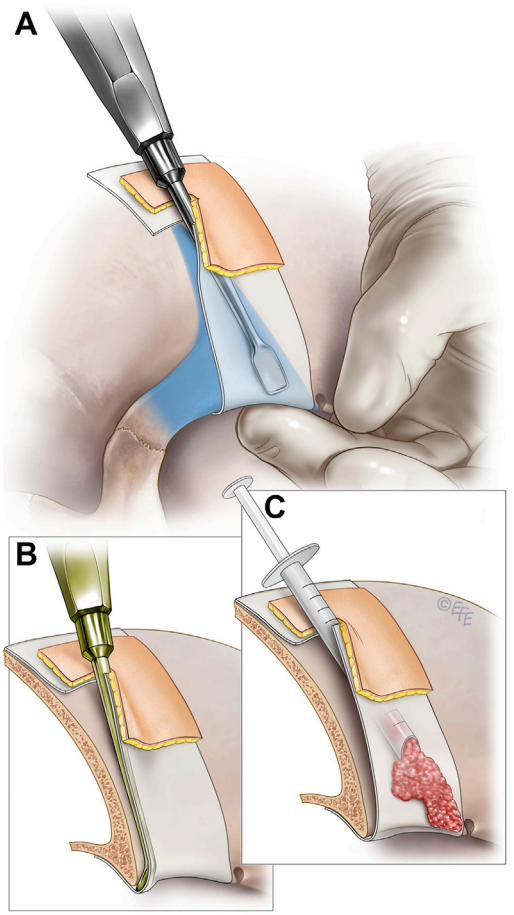

Fig. 13. Surgical steps in augmentation of the superolateral orbital rim using hydroxyapatite granules. (*A*) Through a forehead skin crease incision medial to the superior temporal line a precise subperiosteal dissection is performed down to the orbital rim. (*B*) The pocket extends not further than the lower edge of the rim. (*C*) The hydroxyapatite granule mixture is introduced into the pocket in 0.2 mL increments. (*Courtesy of* Dr. Levent Efe, CMI, Australia.)

SUMMARY

Given the central importance of the "eyes," meaning the periorbital region, to facial appearance, the motivated blepharoplasty patient has the opportunity to improve appearance significantly beyond the minimum of age reversal, to reveal inner beauty or add attractiveness. Bright and beautiful eyes have good 3-dimensional contouring.

The benefits of a quality eyelid crease enable the surgical focus to be on lid contouring with a reduced requirement for lid skin and fat excision. A durable crease maintains fixation of both the tarsal and infrabrow segments, providing lasting benefits while reducing the possibility of a postblepharoplasty look.

The softness of youthful eyes is regained by precise but cautious use of lipofilling. The shape of the lid fold, is important, adding in the concepts of cosmetic makeup illusion.

CLINICS CARE POINTS

- The key to attractive 'eyes' is in the appearance of the infrabrow segment of the lid.
- A rounded and full lid fold that recedes as it descends, suggests a fresh and youthful look.
- The shape of the skeletal orbital frame intrinsically determines the infrabrow segment shape.
- A lid crease that is precise and secure is essential to maintain tone of both the infrabrow and pretarsal skin.
- The 'post blepharoplasty look' is explained by the failure of lid crease fixation.

DISCLOSURE

The authors have no disclosures.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at https://doi.org/10.1016/j.fsc.2021.01.001.

REFERENCES

1. Branham G, Holds JB. Brow/upper lid anatomy, aging and aesthetic analysis. Facial Plast.Clin N Am 2015;23(2):117–27.
2. Flowers RS. Blepharoplasty. Chapter 21. In: Courtiss EH, editor. Male aesthetic surgery. C.V. St Louis (MO): Mosby; 1982. p. 207–37.
3. Flowers R. Upper blepharoplasty by eyelid invagination - Anchor blepharoplasty. Clin Plast Surg 1993; 20(2):193–207.
4. Siegal R. Surgical anatomy of the upper eyelid fascia. Ann Plast Surg 1984;13(4):263–73.
5. May J, Fearon J, Zingarelli P. Retro-orbicularis oculus fat (ROOF) resection in aesthetic blepharoplasty: A 6 year study in 63 patients. Plast Reconstr Surg 1990;86(4):682–9.
6. Ullmann Y, Levi Y, Ben-Izhak O, et al. The surgical anatomy of the fat in the upper eyelid medial compartment. Plast Reconstr Surg 1997;99:658–61.

7. Mendelson BC, Luo D. Secondary Upper Lid Blepharoplasty: A Clinical Series Using the Tarsal Fixation Technique. Plast Reconstr Surg 2015;135:508e.
8. Steinsapir KD, Yoon-Duck K. Pathology of "Post- Upper Blepharoplasty Syndrome" Implications for Upper Eyelid Reconstruction. Clin Opthalmol 2019;13: 2035–42.
9. Fagien S. Advanced rejuvenative upper blepharoplasty: enhancing aesthetics of the upper periorbita. Plast Reconstr Surg 2002;110:278–91.
10. Trepsat F. Periorbital rejuvenation combining fat grafting and blepharoplasties. Aesthet Plast Surg 2003;27:243–53.
11. Massry GP, Azizzadeh B. Periorbital fat grafting. Facial Plast Surg 2013;29:46–57.
12. Tonnard PL, Verpaele AM, Zeltzer AA. Augmentation blepharoplasty: a review of 500 consecutive patients. Aesthet Surg J 2013;33:341–52.
13. Meyer D, Linberg J, Wobig J, et al. Anatomy of the Orbital Septum and Associated Eyelid Connective Tissues - Implications for Ptosis Surgery. Opthalmic Plast Reconstr Surg 1991;7(2):104–13.
14. Lin TM, Lin TY, Chou CK, et al. Application of microautologous fat transplantation in the correction of sunken upper eyelid. Plast Reconstr Surg Glob Open 2014;2:e259.
15. Pessa JE, Chen Y. Curve analysis of the aging orbital aperture. Plast Reconstr Surg 2002;109(2):751–5.
16. Mendelson B, Wong C. Changes in the facial skeleton with aging: implications and clinical applications in facial rejuvenation. Aesth.Plast.Surg. 2012;36:753–60.
17. Minelli L, Richa De Arco J, Mendelson B C. Hydroxyapatite augmentation of the superolateral orbital rim. Aesth Plast Surg, in press.
18. QMP stream Rhytidectomy. Hydroxyapatite Facial Augmentation, Bryan Mendelson. Available at: https://www.qmp.com/login.