Augmentation Blepharoplasty: A Review of 500 Consecutive Patients

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Abstract

Background: Volume loss in the upper and lower eyelids and in the malar area is now considered a major component of periorbital aging. As classical resection blepharoplasty does not address this loss, filling procedures are becoming increasingly common.

Objectives: The authors present their experience with periorbital fat grafting in conjunction with routine blepharoplasty to address periorbital aging.

Methods: Outcomes were retrospectively reviewed for 500 consecutive patients who underwent blepharoplasty in conjunction with the authors' periorbital augmentation technique from January 2008 to September 2011. The augmentation technique was a fine particle fat (microfat) grafting procedure that involved the use of small-diameter cannulae for transfer of autologous fat to the medial part of the upper eyelid, the orbitomalar groove, and the malar area.

Results: Clinical evaluation and review of patient photographs revealed favorable, natural-looking, and long-lasting improvement of the treated areas. Shortcomings of classical resection blepharoplasty, such as hollowing of the upper eyelids, incomplete blending of the eyelid-cheek junction, and persistent deflation of the midface, were avoided; the full and crisp aspect of the upper and lower eyelids seen at a younger age was regained; and the technique was not associated with the complications seen in an earlier patient series. No major complications occurred. Minor complications included bruising and swelling.

Conclusions: Augmentation of the upper and lower eyelids through microfat grafting can be a useful alternative to existing blepharoplasty techniques. This study documents very natural and pleasing results that avoid the shortcomings of classical resection. Microfat grafting appears to be a valuable and safe alternative to complicated, difficult, and potentially dangerous eyelid and midface rejuvenation techniques.

Level of Evidence: 4

Loss of fat tissue is an important cause of physical aging in the face. Clinical findings reveal that the majority of deflation in the face takes place in areas where the most movement from muscle activity occurs—namely, the temporal areas and the central part of the face.

We hypothesize that, like other forms of facial aging, periorbital aging is more due to deflation than to sagging; hence, periorbital rejuvenation should logically incorporate refilling of the deflated areas. The cause of fat loss in the centrofacial area could be purely mechanical (this hypothesis is based on clinical findings and is currently under further investigation). Repetitive movements due to mimic activity could result in long-term loss of fat tissue, especially around the orbits, in the upper and lower eyelids.

In our plastic surgery practices, all blepharoplasty and facial rejuvenation patients are routinely asked to bring pictures taken at a younger age. During the preoperative

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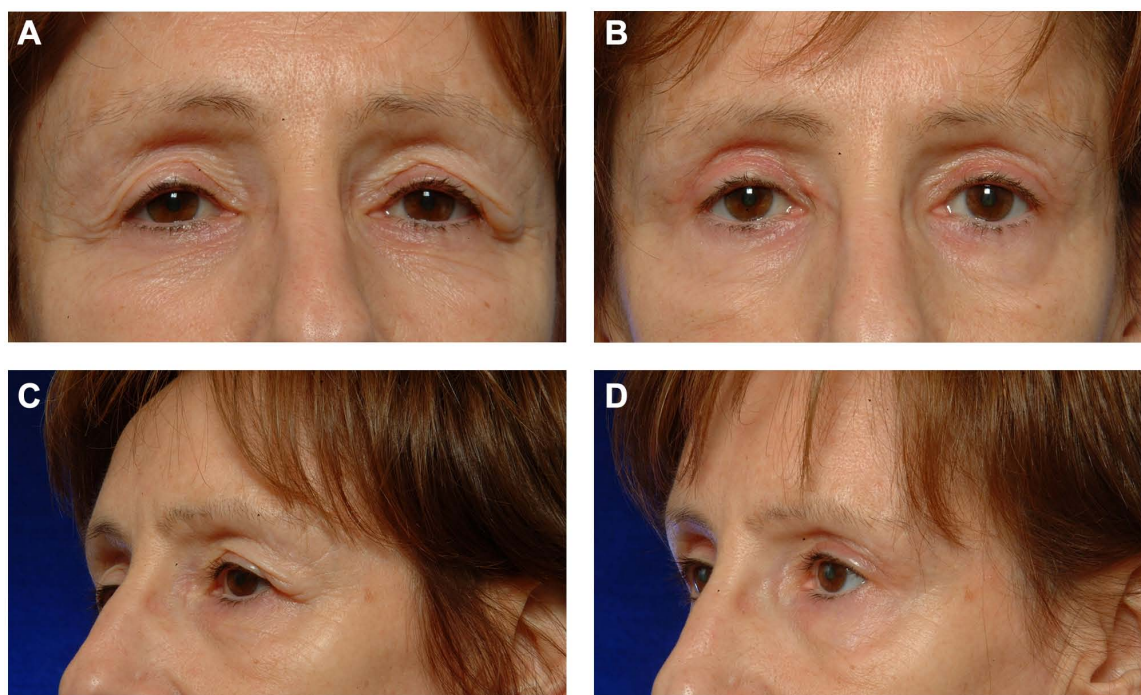
Figure 1. (A, C) This 54-year-old woman presented for upper and lower blepharoplasty. (B, D) One year after classical resection blepharoplasty, the patient's result demonstrates the typical shortcomings of this procedure in the upper and lower eyelid: hollowing of the upper eyelid with accentuation of the A-frame deformity, lowering of the global eyebrow position and residual temporal hooding, and reduction of lower eyelid bulging but incomplete blending of the eyelid-cheek junction. Residual hollowing and temporal hooding are clearly seen on the three-quarter lateral view (D). We believe that these shortcomings can be adequately corrected with the augmentation blepharoplasty technique.

consultation, these pictures are analyzed. They nearly always reveal a certain degree of volume loss in the upper eyelid, especially in the medial part. This has been described as the "A-frame" deformity.[1]

Classical resection blepharoplasty removes the apparent excess of upper eyelid skin and orbicularis muscle and may also involve emptying the medial and lateral fat compartments.[2,3] Browlifts or temporal lifting procedures traditionally complete the classical resection blepharoplasty.[4] In the majority of cases, however, a hollowing of the upper eyelid occurs as a result of these interventions, especially over the long term. Therefore, the postoperative result does not resemble the full upper eyelids most patients have in their 20s and 30s.

For the majority of patients, volume loss is similarly observed in the malar area, especially in the anterior part, even in patients who have gained weight in recent decades. The malar area typically supports the lower eyelid; therefore, volume loss in this area will accentuate the appearance of "bags" on the lower eyelid. In classical lower eyelid blepharoplasty, fat is removed from the medial, median, and lateral compartments, with or without suspension of the orbicularis muscle and trimming of the lower eyelid skin.[5] Although bulging of the lower eyelid is temporarily corrected, the blending of the eyelid-cheek

junction is seldom improved, especially as further deflation of the malar area takes place with aging. A typical example of these sequelae is demonstrated in Figure 1. Due to these limitations, it is natural to question the rejuvenative value of standard blepharoplasty techniques.

In 2003, on the basis of studies published in the literature,[6-10] we began using fat grafts to address periorbital aging, gradually incorporating the correction of volume loss into standard periorbital rejuvenation procedures. Since 2008, we have applied that approach, which now includes fine particle fat grafting (microfat grafting) and can be referred to as *augmentation blepharoplasty*, in 95% of cases. Similar to the term *augmentation mastopexy* in breast surgery, the term *augmentation blepharoplasty* refers to the 2 parts of the surgical procedure: the addition of volume and the resection of skin. Unlike classical resection blepharoplasty techniques, our approach is based on maximal preservation of all existing volume, along with correction of volume loss in the eyelids and periorbital region by means of fat grafting and conservative trimming of excess skin.

In this article, we describe our augmentation blepharoplasty technique and discuss the results from a series of 500 consecutive patients treated with this approach.

Figure 2. Magnification of the tip of a 2-mm diameter "grater" cannula with multiple, sharpened 1-mm diameter holes (Tulip grator canula harvester SuperLuerLok; Tulip Medical, San Diego, California).

Figure 3. Harvested fat is rinsed with saline over a sterile nylon cloth with 0.5-mm perforations, which is mounted over a sterile canister.

METHODS

The charts of 500 consecutive augmentation blepharoplasty patients treated at the 2 senior authors' (P.L.T., A.M.V.) private clinic from January 2008 to September 2011 were reviewed. Patient demographics, complications, and clinical results (based on pre- and postoperative photography) were recorded.

Patients in this series underwent an augmentation blepharoplasty procedure alone or in association with other facial rejuvenation procedures. The procedure was performed under general or local anesthesia. Fat was taken at the time of facial infiltration with local anesthetic. The preferred donor area was the infraumbilical area, marked preoperatively with the patient standing. Preference for this site was based on the ease of access for fat harvest with the patient in a supine position. Other donor areas, such as the hips or the internal side of the thigh or knee, were also used on some occasions.

After the patient was prepped and draped, a typical Klein solution with 800 mg of lidocaine with adrenaline (1:1 000 000) was infiltrated as for regular liposuction.[11] A 2-mm stab incision was made along the skin tension lines with a No. 11 blade, and liposuction was then performed with a 2- or 3-mm diameter cannula with multiple, sharpened 1-mm holes (Figure 2). The small-diameter cannula holes allowed the surgeon to obtain fine particles of fat to be injected with small diameter cannulae in the facial areas, while the sharp edges of the cannula holes helped to augment the yield of harvested fat, with the cannula working like a rasp in the donor area.

Because more liquid is aspirated with fine, multiholed cannulae than with larger diameter cannulae, a total aspirate volume of about 5 times the estimated fat volume to be injected in the facial areas was obtained. The liposuction harvest was then poured over a sterile nylon cloth with 0.5-mm perforations mounted over a sterile canister (Figure 3). The fat was rinsed with saline, transferred into 10-mL syringes, and then, with the aid of a double Luer-Lok adaptor, pulled into 1-mL syringes.

Blunt 0.9-mm or 0.7-mm diameter microcannulae with a single hole at the side of the end (Tulip Medical, San Diego, California) were used for injection of the fat into the face. The cannulae were introduced via a puncture hole made with a 19-gauge needle. Due to the small size of the puncture, no sutures were placed.

For upper eyelid augmentation, the area to be augmented was marked preoperatively with the patient in a standing position (Figure 4). This area typically comprised the medial half to two-thirds of the upper eyelid and frequently incorporated the lower third of the medial part of the eyebrow. The extent of this area was dependent on the hollowness of the upper eyelid in comparison with the patient's appearance at a younger age. After marking, this area was infiltrated with a lidocaine/adrenaline solution (0.3% lidocaine with adrenaline 1:600 000 for patients under general anesthesia; 1% lidocaine with adrenaline 1:200 000 for patients under local anesthesia) in a deep layer beneath the muscle, together with subdermal infiltration of the upper eyelid under the marking for excess skin. A 19-gauge needle was then used to make a puncture hole in the lateral part of the eyebrow. After insertion of the microcannula, 0.5 to 2.5 mL of fat was deposited with the typical multistroke Coleman technique in a layer deep to the orbicularis muscle in contact with the superior orbital rim.

Fat injection was frequently accompanied by resection of apparent skin excess in the upper eyelid, which was per-

Figure 4. Typical markings for an augmentation blepharoplasty procedure. The periorbital areas to be augmented are marked in green. In the upper eyelid, 0.5 to 2.5 mL of fat is injected in the medial hollow just below the eyebrow. The malar area, including the orbitomalar and nasojugal groove, is also augmented with fat. In this case, 1.6 mL of fat was injected in the upper eyelids and 9 mL of fat was injected in the malar areas. Note the additional marking for skin excess in the upper eyelid, the perioral marking for sharp needle intradermal fat grafting, and the markings for the minimal access cranial suspension lift, temporal lift, and submental liposuction.

formed either before or after eyelid fat grafting. Skin excess was marked preoperatively with the patient standing or sitting. The supratarsal crease in the upper eyelid was marked with the eyes closed. The patient was then asked to open the eyes and gaze straight ahead. The upper limit of skin excess was marked at the level of the supratarsal crease. With the eyes again closed, the skin excess to be excised could be visualized between the 2 markings. Skin excision was performed after incising the marked area with a cold blade and then with microneedle electrocautery at a subdermal level. The orbicularis muscle was not resected so as to preserve as

much volume as possible. Occasionally, the orbicularis muscle was opened in the medial portion if resection of herniated fat from the medial pocket was mandatory (seldom) or when a transpalpebral resection of the corrugator muscle was performed. The orbicularis muscle was opened in the lateral portion if associated canthoplasty or internal browpexy procedures were indicated. Skin closure was performed according to the surgeon's preference. Often, blepharoplasty of the upper eyelid was completed with a temporal lift via a separate temporal incision to correct lateral hooding of the eyebrow.

For lower eyelid augmentation, the decision to combine fat grafting of the malar area with fat manipulation via lower eyelid surgery was made based on the extent of fat herniation in the lower eyelid. In cases where there was no fat herniation and a limited eyelid-cheek junction was visible (mostly in the medial part, ie, the nasojugal groove or tear trough), isolated fat grafting of the tear trough and the anterior malar area was performed. In cases where obvious fat herniation existed, fat transposition over the inferior orbital rim via lower eyelid incision was combined with fat grafting of the malar area.

The malar recipient area was marked preoperatively with the patient upright. Infiltration of the marked areas was performed using the lidocaine/adrenaline solutions described above. For fat grafting, the solution was infiltrated in the deep layer in front of the zygomatic bone. For patients who were also receiving lower eyelid surgery, infiltration was performed in the classical way.

Fat grafting of the malar area was achieved using 2, 19-gauge needle puncture holes (lateral and inferior). This was done to crisscross the grafted area and prevent a sausage-like deposit of grafted fat. Care was taken not to overfill the lateral part of the malar area. Most of the fat was grafted in the anterior part of the malar area, where the majority of volume loss takes place. The amount of fat injected varied depending on the loss of volume in the midface and the desired amount of anterior projection. On average, between 4 and 10 mL of fat was injected per side, but in some cases, the volume was as high as 25 mL per side. In patients with excess skin, conservative skin excision was performed after orbicularis suspension to the periosteum of the lateral orbital rim with a 5-0 polyglactin 910 sutures (Vicryl; Ethicon, Inc, Somerville, New Jersey).

RESULTS

Among the 500 patients who underwent our augmentation blepharoplasty procedure and had their cases reviewed, 440 (88%) were women and 60 (12%) were men. The mean patient age was 57 years (range, 36-77 years). Of the 500 patients, 420 (84%) underwent primary blepharoplasty and 80 (16%) underwent secondary blepharoplasty. A total of 378 patients (76%) had an upper and lower blepharoplasty, 69 (14%) had an upper blepharoplasty alone, and 53 (10%) had a lower blepharoplasty alone. The majority of patients (n = 355, 71%) underwent a temporal lift at the same time as blepharoplasty.

Figure 5. (A) This 46-year-old woman presented for total facial rejuvenation. Her periorbital area shows hollowing of the medial part of the upper eyelid and a slight descent in the tail of the eyebrow. The lower eyelid shows demarcation of the eyelid-cheek junction and atrophy of the malar region, especially in the anterior part. (B) A picture of the same patient taken at age 25 years shows full and crisp upper eyelids and full malar regions without eyelid-cheek demarcation. (C) Two years after extended minimal-access cranial suspension lift, temporal fat, rhinoplasty, fat grafting of the nasolabial folds (3 mL per side) and marionette grooves (2.5 mL on the right side; 3 mL on the left), and augmentation blepharoplasty. In the upper eyelid, 2.5 mL of fat was grafted on each side and no skin was resected. In the lower eyelid area, 10 mL of fat was grafted in the orbitomalar area with additional pinch skin blepharoplasty.

Blepharoplasty was performed as an isolated procedure (without facelift) in 245 patients (49%). Of these patients, 127 (52%) underwent blepharoplasty together with a temporal lift, 194 (79%) had an upper and lower blepharoplasty, 39 (16%) had an upper blepharoplasty alone, and 12 (5%) had a lower blepharoplasty alone.

In 255 patients (51%), the blepharoplasty was part of a more complete facial rejuvenation program, including a minimal-access cranial suspension (MACS) lift. Of these patients, the majority (n = 250, 98%) also had a temporal lift, 184 (72%) had an upper and lower blepharoplasty, 30 (12%) had an upper blepharoplasty alone, and 41 (16%) had a lower blepharoplasty alone. For all upper blepharoplasty patients, the procedure consisted of fat grafting of the medial hollow and skin resection without orbicularis muscle resection. In 88% of cases, there was no manipulation of the retroseptal fat pockets, whereas in 12% of cases, there was conservative resection of the medial fat pocket. The lateral fat compartment was left untouched in all cases.

For all lower blepharoplasty patients, surgery consisted of a pinch skin resection with orbicularis suspension. Fat grafting of the orbitomalar area was performed in 42% of cases, while a fat redraping procedure over the inferior orbital rim was performed in conjunction with orbitomalar fat grafting in 58% of cases. In no cases was retroseptal fat resected. A second round of fat grafting was performed 4 or more months after the first surgery in 15 cases (3%), based on the surgeons' clinical judgment and/or the patient's request.

All patients in the series were evaluated clinically with a standard postoperative follow-up and by surgeon review of photographs. The mean length of follow-up for patients in this series was 16 months (range, 3-39 months), with 323 patients (65%) having a follow-up period longer than 1 year. No major complications were reported. There were no expanding hematomas in this series, but bruising was seen to varying degrees in all patients. Prolonged edema (lasting >1 month postoperatively) of the malar area occurred in 35 patients (7%) and 5 patients (1%) had postoperative scleral show. The scleral show was only seen in patients who had undergone fat redraping and it disappeared within 2 months with conservative measures (ie, massage, taping). There were no reports of sensory or motor nerve lesions, infection, asymmetries, or overfilling.

One patient in the current series who had gained 26.5 pounds (12 kg) over the course of a year after smoking cessation in preparation for her facelift surgery ended up with overprojection of both malar areas. This was solved by performing small-volume liposuction under local anesthesia.

Figures 5 through 10 show the clinical results of augmentation blepharoplasty for different indications. The patient in Figure 10 additionally benefited from sharp needle intradermal fat grafting (SNIF) to correct superficial fine wrinkles in the perioral region.[12]

DISCUSSION

The different mechanisms involved in facial aging are expressed to varying degrees and in different combinations in each individual. Furthermore, because the distinct fat compartments in the face can change at different rates with age, the whole face does not age as a compound mass.[13] Skin texture and pigmentation also change with aging.[14] Aging skin loses elasticity, resulting in sagging of certain facial features, especially around the mouth and the neck. Contraction of certain muscles will produce permanent wrinkles—for example, in the frontal area and the glabella, or the muscular bands of the anterior neck. Finally, volume loss or deflation results in an implosion-like appearance with aging.[15,16]

On the basis of analyzing more youthful pictures of patients seeking consultation for facial rejuvenation surgery, we have found that most volume loss appears to take place

Figure 6. (A, D) This 54-year-old woman presented for upper and lower blepharoplasty. She had low-lying eyebrows, deflated upper eyelids (especially in the medial portion), and a descent in the tail of the eyebrow, resulting in temporal hooding. In the photographs, her lower eyelids show marked bulging of retro-orbital fat, resulting in a very marked eyelid-cheek junction and atrophy in the anterior malar area. The preoperative three-quarter lateral view (D) shows skin redundancy in the upper eyelid, temporal hooding, and a marked eyelid-cheek junction. (B, E) Two months after augmentation blepharoplasty under local anesthesia. Simple skin excision (no muscle or fat resection) was performed in the upper eyelid, with 1.5 mL of fat grafted in the medial part of the upper eyelid. Internal browpexy was performed to lift the tail of the eyebrow. In the lower eyelid, a fat redraping procedure was performed without resection of fat, and 4 mL of fat was grafted in the anterior malar area. Skin was excised conservatively after orbicularis suspension. The scars are still visibly red. In the three-quarter lateral view (E), a higher lateral brow tail position and a smooth eyelid-cheek junction are seen. (C, F) Nine months after augmentation blepharoplasty, the stability of the results is evident.

in the centrofacial and temporal region, areas where the most muscle—and, hence, motion activity—is present.[17] This observation led us to propose the "hinge hypothesis" of fat disappearance with age, which rests on the fact that fat cells are known to atrophy under higher pressure. This can be seen clinically in skin overlying tissue expanders, where subcutaneous fat atrophy is observed in the expanded flap,[18] as well as in the skin under an abdominal belt. In regions where repetitive motions occur over an extended period of time, such as in the periorbital and perioral areas, it seems plausi-ble that fat cells will atrophy with time. This might provide a pure mechanical explanation for the fat atrophy seen in the centrofacial and temporal region, even in patients who have gained weight while aging.

Merriam-Webster's dictionary defines the word *rejuvenate* as "to make young or youthful again: give new vigor to" or "to restore to an original or new state."[19] In aesthetic surgical terms, this means that we try to make our patients look younger. Given that there are different mechanisms influencing facial aging and that facial aging is not the

Figure 7. (A, D) This 49-year-old woman presented for total facial rejuvenation. The preoperative photo shows volume loss in the medial part of the upper eyelid and descent of the tail of the eyebrow, resulting in temporal hooding. The lower eyelid shows slight laxity, with a marked eyelid-cheek junction and atrophy of the whole malar area (anterior and lateral). The three-quarter lateral view (D) shows clear temporal hooding and a deflated malar area. (B, E) Six months after extended minimal-access cranial suspension lift, temporal lift, lip lift, fat grafting of the nasolabial folds and marionette grooves, and augmentation blepharoplasty. In the upper eyelid, skin resection was performed without muscle or fat resection and 1.5 mL of fat was grafted to the medial part of the upper eyelid on both sides. In the lower eyelid, 10 mL of fat was grafted in the orbitomalar area and an additional pinch skin blepharoplasty was performed. The three-quarter lateral view (E) shows a well-enhanced malar area, a smooth eyelid-cheek junction, and volume restoration of the medial part of the upper eyelid. (C, F) Two years postoperatively, the results are stable.

same in every patient, it is impossible to accurately imagine a patient's younger face without seeing pictures of the patient at a younger age. In our opinion, it is imperative to have all facial rejuvenation patients bring pictures from when they were young to guide the planning of the facial rejuvenation procedure. With regard to the eyelids, it is striking that at a younger age, most eyelids look full, crisp, and rarely hollow. In contrast, aged eyelids are hollow, wrinkled, and empty. Classical resection blepharoplasty (ie, skin and fat resection) will seldom restore the parameters of youth if volume loss is not addressed.

The technique we proposed to rejuvenate the eyelids is very different from classical blepharoplasty techniques and can even be considered the opposite of these techniques, in that ours involves filling versus resection. This has contributed to a paradigm shift with regard to periorbital rejuvenation. A paradigm is a collection of generally accepted principles, methods, assumptions, and techniques that have proven themselves over time and are passed on to different generations. Working within a paradigm produces a certain comfort level because everybody agrees upon the method and philosophy being applied.

Figure 8. (A, D) This 58-year-old woman presented for total facial rejuvenation. The upper eyelid shows a deflation of the upper medial part, with descent of the tail of the eyebrow. The lower eyelid shows a sharp demarcation with the cheek and a moderate deflation of the malar area. The three-quarter lateral view (D) shows moderate deflation of the malar area and a sharp eyelid-cheek junction. (B, E) Nine months after a simple minimal-access cranial suspension lift, temporal lift, fat grafting of the marionette grooves, and augmentation blepharoplasty. In the upper eyelid, skin resection was performed without muscle or fat resection and 1 mL of fat was grafted in the medial part of the upper eyelid on both sides. In the lower eyelid, 6 mL of fat was grafted in the orbitomalar area and an additional pinch skin blepharoplasty was performed. The three-quarter lateral view (E) shows volume restoration of the medial part of the upper eyelid and an eyelid-cheek junction that is better blended. (C, F) Three years postoperatively, the stability of the results can be seen, especially at the medial upper eyelid. The three-quarter lateral view (F) shows the stability of the volume restoration at the level of the cheek-eyelid junction.

Nevertheless, the accumulation of unsolved problems can challenge the value of the existing paradigm. New solutions proposed from outside the accepted framework can then lead to a migration from the old paradigm to a new one. This is exactly what is currently taking place regarding the need for extra volume in periorbital rejuvenation.

Fat grafting has its opponents and proponents. Not all surgeons are able to reproduce the results presented by their colleagues. Since Sydney Coleman first presented his method of fat grafting in the 1990s, many variations on fat

harvesting techniques, preparation, and injection have been proposed.[20] We follow the guidelines proposed by Coleman, except for the type of harvesting cannulae and the centrifugation process, which we have replaced by simple filtering and rinsing. The cannulae we use have multiple, sharp, 1-mm holes and are designed to harvest small fat particles. Our method of fat harvesting and preparation has been criticized because of the extra trauma induced through the use of sharp-holed cannulae, full vacuum aspiration, and exposure to air. Nevertheless,

Figure 9. (A, D) This 48-year-old woman presented for total facial rejuvenation. She shows moderate sagging of the peripheral facial tissues with moderate jowling and neck laxity but marked deflation in the centrofacial part of the face (periorbital and perioral). (B, E) Twelve months after extended minimal-access cranial suspension lift, temporal lift, fat grafting of the perioral area, and augmentation blepharoplasty. In the upper eyelid, skin resection was performed without muscle or fat resection and 1.5 mL of fat was grafted in the medial part of the upper eyelid on both sides. In the lower eyelid, 4 mL of fat was grafted in the orbitomalar area with pinch skin blepharoplasty. The three-quarter lateral view (E) shows good volume restoration of the medial aspect of the upper eyelid and the upper malar area. (C, F) Two years postoperatively, stability is maintained.

we have been very happy with our clinical outcomes, including the "take" of the fat, with minimal to no over-correction of the deformity. Perhaps trauma, then, is not our enemy in fat grafting, but our friend. If we believe in the regenerative aspects of fat grafting, trauma can be considered the trigger to all regeneration in the human body.[21]

In our experience, using smaller fat particles in fat grafting (ie, microfat grafting) has many advantages. For a certain volume of fat, using smaller fat particles will increase the contact surface of the grafted material.[22] If we consider fat grafting as a transplantation procedure necessitating revascularization of the particles, a greater contact surface with the recipient area will lead to better graft survival with less need for overcorrection. This, in turn, reduces downtime and risk for visible or palpable lumps, especially under the thin lower eyelid skin. In fact, it was this complication in our earliest experience that inspired us to use finer injection cannulae. These cannulae can only comfortably be used when smaller fat particles are harvested with smaller-holed cannulae, as suggested by other authors, including Roberts et al[10] and Trepsat.[23] In our previous, "pre-microfat" patient series (data unpublished), which involved 138 patients who underwent blepharoplasty between 2003 and 2008, the complication rate was higher than that seen in the microfat grafting series discussed in this article. Complications in the earlier series included underfilling (n = 27, 21%), overfilling (n = 12, 9%), graft visibility and lumps (n = 10, 8%), asymmetry

Figure 10. (A, C) This 60-year-old woman presented for total facial rejuvenation. She shows moderate sagging of the peripheral facial tissues with moderate jowling and neck laxity but marked deflation in the periorbital area. The three-quarter lateral view (C) shows clear sagging of the lateral facial tissues with deflation of the malar area, a marked eyelid-cheek junction, and neck laxity. (B, D) Six months after simple minimal-access cranial suspension lift combined with temporal lift, upper and lower augmentation blepharoplasty (3 mL of fat per side in the upper eyelids; 10 mL of fat per side in the orbitomalar area), and perioral lipofilling (2 mL of fat per side in the nasolabial fold, 3 mL of fat per side in the marionette grooves, 3 mL of fat in sharp needle intradermal fat injection [SNIF] in the vertical upper lip rhytids, SNIF in the upper [1 mL] and lower [1 mL] white roll and philtrum [1 mL]).[17] The three-quarter lateral view (D) shows full upper eyelids and good volume restoration in the malar area.

(n = 5, 4%), scleral show (n = 3, 2%), and hematoma (n = 1, 1%).

Discussion about the benefits of fat centrifugation over mechanical filtering with saline rinsing is still ongoing, and the arguments used in defense of each method are currently based more on personal experience than on science.[24-26] Proponents of both methods have presented outstanding results with their respective techniques.

In this series, fat grafting to the upper eyelids was straightforward and, except for some cases of undercorrection, no complications were seen. Based on our experience, surgeons should be careful not to graft too inferiorly in the upper eyelid. The exact location should be close to the superior orbital rim, almost inside the rim. Care also has to be taken not to graft in the lateral part of the eyelid. This produces a kind of "apelike" deformity in the lateral eyebrow region, which is aesthetically very disappointing.

The lower eyelid is much more delicate than the upper eyelid and is easy to overcorrect. Prior to 2008, before we used the small-holed harvesting cannulae, several of our patients had palpable and even visible postoperative lumps. This was also partially due to a poor injection technique, done in just 1 direction parallel to the orbital rim, which promotes the production of sausage-like fat lumps across the nasojugal and orbitomalar groove.

In our experience, it is unwise to correct the nasojugal/orbitomalar groove as an isolated deformity. Instead, correction of this deformity should be incorporated into correction of the whole malar region, which often has to be augmented at the same time. One should augment the malar region primarily in its anterior part, where most fat atrophy takes place due to the greater degree of mimic activity that occurs in this region. Overcorrection of the lateral part of the malar area widens the bizygomatic diameter of the face and will often change its original characteristics, which means that rejuvenation may not be achieved. A rule of thumb is to use two-thirds of the injected volume in the anterior malar area and one-third in the lateral part (ie, lateral to the lateral canthus).

When a proper technique is used in both the upper and lower eyelids, complications are very rare. In both eyelids, undercorrection is better than overcorrection. A touch-up by refilling after a visible but not ideal improvement of the deflation deformity is much better accepted by patients than a removal of excess fat by excision or liposuction, which many patients consider a complication. If an unsatisfactory result occurs, it is mostly due to technical or conceptual errors (ie, surgeon-dependent factors such as overfilling, incorrect harvesting or injection technique, or fat grafting in the wrong area).

Occasionally, hollow upper eyelids can be corrected by fat grafting alone, and cases of asymmetric hollowing have been corrected satisfactorily using this technique. Most of the time, however, a skin-tightening procedure—conservative skin excision of the upper and lower eyelid—is performed simultaneously. Pushing the limits by overfilling the relaxed skin envelope will not yield aesthetically satisfactory results. This

has been observed by Lambros,[8] who stated that "fat looks good under tight skin."

CONCLUSIONS

Over the past few decades, the generally accepted algorithm for rejuvenation of the periorbital region was excision of skin, muscle, and fat from the eyelids, with or without browlifting.

However, recently in the field of periorbital rejuvenation, there appears to have been a paradigm shift away from resection surgery and toward filling procedures. We have found that very natural rejuvenation of the upper eyelid can be achieved through a combination of refilling the medial part of the upper eyelid, raising the tail of the eyebrow through a lateral temporal lift, and conservative skin excision. The lower eyelid can be replenished with careful fat grafting in the malar area and over the inferior orbital rim with or without manipulation of intraorbital fat. Together with an orbicularis muscle suspension and conservative eyelid skin trimming, an aesthetically pleasing and natural blending of the eyelid-cheek junction can be obtained with a high level of safety. Overall, we believe that our augmentation blepharoplasty technique provides an alternative to classical blepharoplasty that is worth consideration in view of the natural and stable results obtained in this patient series. Microfat grafting, as used in this series, appears to be a valuable and safe alternative to complicated, difficult, and potentially complicated eyelid and midface rejuvenation techniques.

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