INTRODUCTION

Over the past several years, the role of volume restoration with autologous fat has become an increasingly recognized entity as a primary mechanism by which to overcome the aging process. Facial fat grafting has assumed a renewed interest among aesthetic surgeons owing to technical advances that have been shown to be beneficial both in achieving consistently excellent cosmetic results and in limiting morbidity.\(^1\)

The aging process can be understood with a simple analogy of the aging face: in youth, the face is like a grape, and as people age, volume depletion causes the face to become like a raisin. When performing age-related surgeries, the redundant skin is lifted, pulled, and cut away so that the remainder no longer resembles the grape of youth but is more like a truncated pea. This approach does not restore all the highlights, contours, and convexities of youth. Filling the depressed facial zones helps restore a youthful appearance more effectively. Note that this reductionist philosophy does not reflect the authors' opinion entirely, because we recognize the complexity of the aging process that can comprise volume loss, volume gain, gravitational descent, and dermatologic changes. In the past, the aging face was perceived as a change caused by gravity and skin redundancy and it is now interpreted as arising from tissue deflation, which can be corrected with facial fat grafting.\(^2\)

The best approach for prospective patients with aging faces seeking to restore a youthful countenance is to view old photographs from the patient’s youth. Old photographs provide a framework for our goals and help the patient understand what combination of procedures will provide a

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natural and rejuvenated appearance. During the consultation and evaluation, it is important to maintain a global approach for optimal rejuvenation. The myriad of procedures may include fat grafting, face-lifting, microliposuction/liposuction, blepharoplasty, and or skin therapies. The combination approach toward fat grafting is not necessarily a stand-alone procedure in every case but an adjuvant to traditional procedures (Fig. 1). This integrated strategy allows the surgeon to select the right combination of individually tailored procedures based on how that person looked previously.

The advent of disposable microcannulas for use with office-based facial fillers, and the continued development of filler products intended for facial volumization, has challenged fat grafting as the sole method for facial volumization. Fillers are now a suitable alternative in patients who desire fat transfer or as an adjunct to fat transfer because microcannulas can be used for advanced facial sculpting, which fat grafting alone was only able to achieve a few years ago.

This article proposes a systematic approach to facial fat enhancement of the midface emphasizing simplicity, consistency, and safety, which is the result of a decade of clinical experience with ongoing refinements in technique. Autologous fat transfer plays a critical role in facial rejuvenation of the midface as a stand-alone procedure or in combination with traditional age-related surgeries. Preoperative education and counseling are emphasized.

**TREATMENT GOALS AND PLANNED OUTCOMES**

There are several goals of facial fat grafting. These goals include the achievement of a natural rejuvenation and restoration of youth, the avoidance of complications, and the attainment of long-lasting aesthetic benefit. In the modern era of facial fat grafting, learning about autologous fat grafting requires completely rethinking of the approach to the aging face. Clinicians must use a novel aesthetic appreciation of the aging process. Clinicians also must use new operative techniques, including body harvesting and infiltration, and must manage unique complications. The details of approach and technique are described later.

Facial aesthetic surgeons must think about autologous fat transfer in a different manner than a typical operative procedure. Specifically, they strive for the ideal result; however, for autologous fat transfer, a more conservative approach is advocated. Surgeons must taper their expectations. In particular, as the limit of fat transfer is pushed by increasing volumes transferred to obtain an ideal result, the associated increased recovery time and potential for

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**Fig. 1.** (A, B) Combination approach to fat grafting. Upper and lower eyelid blepharoplasty was performed with fat transfer to the upper eyelid, lower eyelid, cheek, submalar and buccal regions. (Photo courtesy of Robert Glasgold, MD. Reprinted with permission from Glasgold Group Plastic Surgery, 2012.)
complications increase dramatically. If the surgeon or patient thinks that they are undercorrected, reharvest and transfer of additional fat is an easy task compared with the difficulty of correcting a complication such as a visible contour irregularity or reduction of an overcorrected face. Thus, conservatism should be the rule, especially for surgeons inexperienced with facial fat grafting.

The aesthetic of volume enhancement embodied by facial fat grafting mandates a different approach to patients. The goal of facial fat transfer is to return patients back to their own youthful appearances. Many aesthetic surgeons now evaluate a patient during consultation and attempt to define what areas of the face require improvement without reference to how the patient looked when younger. Patients are encouraged to bring in young photographs, which help the surgeon evaluate the patient’s youthful appearance and help the patient understand the importance of volume loss in the aging process and the need to replace it. The patient must help guide the desired aesthetic outcome. Regardless, patients’ past photographs are reviewed to help the patients understand the role of fat grafting. Past photographs also help surgeons to conceptualize the optimal fat grafting plan.

Our vision for facial rejuvenation does not insist that autologous fat transfer is the only possible method by which facial enhancement is achieved. Fat grafting is a complementary role in our clinical practice. We think that a patient’s aesthetic result can be greatly enhanced by the use of a combination of approaches; for example, fat grafting, face-lifting, and blepharoplasty (Fig. 2). Patients are considerably more pleased when each procedure adds to the tally of aesthetic improvement. Traditional procedures and fat transfer need not be exclusive of one another. Two ideologies can be embraced: volume enhancement for volume depletion and lifting procedures for gravitational descent. Judicious use of fat grafting with select lifting procedures can constitute a potent mixture for correcting specific flaws of aging. Combining procedures can also diminish the risk of morbidity. With ongoing clinical experience, surgeons will begin to perceive the role that volume enhancement can play in the armamentarium of facial rejuvenation.

ANATOMY

As the face matures, soft tissue loss is accentuated by the presence of facial retaining ligaments.

Fig. 2. (A, B) Fat grafting to the upper eyelid, lower eyelid, and cheek, performed in combination with face-lift, and upper and lower eyelid blepharoplasty. (Photo courtesy of Robert Glasgold, MD. Reprinted with permission from Glasgold Group Plastic Surgery, 2012.)
that create unfavorable shadows. The anatomy for fat grafting does not relate so much to an intimate knowledge of specific underlying anatomic structures but rather to understanding the hills and valleys across the surface of the face that can be transformed into a more uniformly convexity free of unwanted depressions.7

The easiest way to categorize the face for anatomic understanding is into thirds: the upper third comprises the brow and temple area; the middle third comprises the cheek and midface; and the lower third comprises the prejowl, jowl, and lateral mandible. This systematic approach provides a formula for specific volume enhancement based on each individual anatomic territory. Rather than delve into the esoteric minutiae related to each anatomic zone, the clinical significance of each area is emphasized with attention to the clinically relevant pearls to guide the optimal surgical strategy.

The middle third of the face is perhaps the most important area for facial rejuvenation with autologous fat and is anatomically the most complex in terms of fully understanding each subunit. By our definition, the middle facial third includes the lower eyelid, malar, and submalar area. A youthful face is characterized by a confluence of the lower eyelid and cheek regions, which become separated into visually distinct regions with the aging process. With aging, the orbital rim becomes a separate entity from the cheek because of orbital fat bulging superiorly and the cheek fat receding, which reveals the bony orbital rim.3,8 The voluminous lateral cheek mound of youth dissipates to uncover a smaller, flatter contour of the malar bony eminence that lacks any notable soft tissue coverage. The anterior cheek begins to separate, often with a linear depression that courses from the nasojugal depression down inferolaterally to the buccal recess, which corresponds with the ligamentous attachment known as the malar septum (Fig. 3).9 The buccal region can show marked atrophy and should be reconstituted along with the discussed anterior and lateral malar regions to achieve better confluence and to avoid exaggeration of buccal hollowing following malar augmentation. As an extension of the midface, the nasolabial fold should be deemed part of midfacial volume enhancement.

PREOPERATIVE PLANNING AND PREPARATION

The facial fat transfer consultation is different than the discussion of lifting style procedures. In order to have a rewarding consultation, the surgeon and patient must be in concordance. Thus, it is imperative to encourage review of older photographs as an instrument to discuss restoration of youth because a patient may not initially entirely understand the benefits of autologous fat. Reviewing each decade of change and showing the gradual dissipation of soft tissue volume as seen in prior photographs, a patient can begin to truly appreciate the aesthetic objectives.7 In addition, showing before-and-after photographs of other patients who have similar anatomy and who have benefited from autologous facial fat transfer can also be illuminating to a prospective patient. In addition, after establishing realistic aesthetic objectives, the surgeon must ensure that the patient fully comprehends the benefits and limitations of the procedure.

PROCEDURAL APPROACH

Marking the Recipient Sites

The patient should be in an upright position so that all the folds and depressions can be easily visualized. Rather than a standard gentian violet marking pen, a permanent marker is advocated owing to the ease of removing the marks shortly after the procedure is completed. The planned areas to be augmented with fat are outlined. Often this includes the temple, superior and inferior orbital rim, anterior and lateral cheek, buccal hollow, pre-canine fossa, nasolabial groove, prejowl sulcus, and anterior chin (Fig. 4).
Selection of Donor Site

Donor-site selection is based on where there is available fat for harvesting and on fat viability. It also depends on the level of anesthesia and the ease of harvesting relative to patient positioning. Asking the individual where the most abundant adipose reserves are located is the easiest method for selecting the favored donor site for fat harvesting. Although men typically carry their extra fat in the truncal distribution, women’s fat storage can be either truncal or extremity dominant. The lower abdomen serves as a good source in both men and women and is a site easily accessed without patient repositioning. When evaluating the lower abdomen as a potential donor site, patients should be examined to rule out the presence of abdominal hernias. In women the outer thigh often provides an excellent and abundant source of fat; alternatively the inner thigh can be used, which offers the benefit of not requiring intraoperative repositioning. In men, the hip is a good alternative for fat harvest but requires intraoperative patient repositioning.

Anesthesia and General Considerations

Fat grafting can be undertaken with almost any level of anesthesia, from straight local anesthesia to general anesthesia. Intravenous conscious sedation is our preferred anesthesia, because it provides the best balance of patient comfort and sedation, and facilitates intraoperative patient repositioning as necessary. In instances of small-volume secondary fat transfers, the procedure is generally performed with an oral benzodiazepine and local anesthetic. The patient’s donor and recipient sites are prepared in a sterile fashion using povidone-iodine solution and sterile drapes. If other concurrent procedures are being performed, facial fat transfer should be performed first because, theoretically, the longer the tissue is outside the patient, the less viable the fat graft becomes.

Donor-site Harvesting

The donor site is anesthetized once the patient achieves an appropriate level of sedation. An injection of 20 mL of 0.25% lidocaine with 1:400,000 epinephrine is infiltrated with a 17.8-mm (7-inch) 22-gauge spinal needle placing half in the superficial aspect of the fat pad (the immediate subcutaneous plane) and the other half in the deep aspect of the fat pad (above the fascia in the deep subcutaneous plane). The 20-mL mixture of anesthetic solution can be constituted by mixing 15 mL of normal saline with 5 mL of 1% lidocaine with 1:100,000 epinephrine. For individuals who are under lighter sedation or straight local anesthesia, a 50:50 mix of 10 mL of normal saline and 10 mL of 1% lidocaine with 1:100,000 epinephrine is used instead. A total of 20 mL of anesthetic mixture can be used for the entire lower abdomen, whereas 20 mL per extremity donor site is preferred.

After an appropriate time for anesthesia has elapsed, a 16-gauge Nokor™ needle is used to create a stab incision through which the harvesting cannula can be inserted. Fat harvesting is undertaken with a blunt bullet-tip cannula (Tulip Medical Inc, San Diego, CA) attached to a Luer-Lok™ 10-mL syringe. Harvesting is performed with hand suction, retracting the plunger with approximately 2 mL of negative pressure to minimize trauma to the adipocytes: a retaining device, such as a Johnnie Lok™ (Tulip Medical Inc) is useful for maintaining negative pressure and reduces unnecessary forearm strain. As the cannula traverses the fat pad, dimpling of the overlying skin, which indicates being too superficial, should not be seen. Harvesting should be focused on getting fat from the mid to deeper levels of the fat pad. The nondominant hand can be used to stabilize the fat pad but should not pinch or tent the skin, which can lead to uneven fat harvesting. In general, surgeons should ensure that the same area of the fat pad is not being over harvested. After the cannula...
is passed back and forth in a prescribed area, the cannula should be retracted back almost to the entry site before redirecting the cannula into a fresh adjacent site. This maneuver ensures that the cannula does not remain in the same harvesting site, thereby allowing uniform harvesting across the donor site and preventing iatrogenic contour irregularities. Estimation of the amount of fat needed for harvest should be based on the assumption that about half of the collected volume will be fat, with the remainder consisting of blood, lysed fat cells, and lidocaine, which will be separated out during fat purification.

**Fat Processing**

After the fat has been harvested into the 10-mL Luer-Lok® syringes, the fat is prepared by centrifugation or by Puregraft® (Puregraft, San Diego, Ca). Fat processing is performed on a sterile field. Although the centrifuge is off the sterile field, sterile sleeves, within which the 10-mL syringes sit, are used to maintain sterility. A dedicated plug and cap (Tulip Medical Inc) must be attached to each syringe to avoid spillage of contents during the centrifugation process. Many centrifuge models exist that can accommodate sterile sleeves or insertable rotary trays to maintain the sterility of the syringes. The syringes are inserted into the centrifuge in a balanced distribution and spun at approximately 3000 revolutions per minute for 3 minutes. On removal, the supernatant (on the non-Luer-Lok® side) containing the lysed fatty acids is poured off first into a gauze or waste basin. Only after the supernatant is poured off should the bloody infranatant be drained from the Luer-Lok® side. Inadvertently draining the infranatant first predisposes the column of fat to slide out of the other side of the syringe when pouring off the supernatant. The syringe, which now contains only a column of purified fat, is placed into a test tube rack or cup so that it stands upright. A noncut 4 × 4 cotton gauze or neuropadie is inserted into the syringe in contact with the fat in order to wick away the excess supernatant for a period of 5 to 10 minutes. The contents from several 10-mL syringes are then transferred to an empty 20-mL syringe from the open non-Luer-Lok® to the open Luer-Lokside. The plunger is then inserted into the back of the 20-mL syringe.

Puregraft® is a membrane filtration system for processing fat developed by Cytori therapeutics as part of the technology for isolating adipose-derived stem cells. Puregraft® uses dual filtration to purify fat. After fat is removed using the process earlier, the Puregraft® system (50-mL or 250-mL bags) is set up and fat is injected into the fat port of the Puregraft® bag. Lactated Ringer solution is infiltrated into the bag (2 times the volume of fat), the Puregraft® bag is agitated for a specified amount of time, placed flat for 1 minute, and then the wash fluid is drained through the drain port. This process is performed 2 times until fat is purified of free lipids and other contaminants. Purified fat is then removed with a 20-mL Luer-Lok syringe through the tissue port for reinjection.

Regardless of the chosen processing technique, the fat is then transferred from the 20-mL Luer-Lok syringe, using a Luer-Lok hub, into individual 1-mL Luer-Lok syringes. Fat injections are performed using the 1-mL syringes attached to a 0.9-mm or 1.2-mm blunt spoon-tip cannula (Tulip Medical Inc).

**Injection Techniques**

In order to increase the likelihood of fat survival, only small parcels of fat (0.03–0.1 mL) are infiltrated per pass of the cannula across multiple tissue planes. The 3 tissue planes (referred to later) are deep, middle, and superficial, corresponding respectively with a supraperiosteal plane, a midfascial to deep subcutaneous plane, and a superficial subcutaneous plane. Although these are not distinct visualized planes, their importance is for guiding fat placement in such a way that fat survival can be maximized and contour problems minimized.

The amount of fat injected per pass of the cannula varies from 0.03 to 0.1 mL depending on the area treated. There are generally 4 major sites of entry for the cannula, referred to earlier as entry sites A, B, C, and D. Additional entry sites should be used as needed to address the desired areas of augmentation. Entry site A is located at the midcheek approximately at the base of the malar septal depression. Entry site B resides about 2 cm lateral to the lateral canthus, C is situated immediately behind the prejowl sulcus at the anterior border of the jowl, and D is located just above the brow to address the superior orbital rim (Fig. 5). Each entry site is made with a standard 20-gauge needle through which the blunt infiltration cannula can be inserted.

Before fat infiltration, the entry and recipient sites need to be anesthetized with 1% lidocaine with 1:100,000 epinephrine. The entry sites and field blocks are done with a 30-gauge and 27-gauge needle respectively. The recipient sites are also infiltrated diffusely with the same anesthetic using a blunt infiltration cannula. Use of the same blunt infiltration cannula for fat infiltration for local anesthetic can minimize the likelihood of ecchymosis. In general, 5 to 10 mL of lidocaine are sufficient to achieve adequate anesthesia each side of the face.
Volume loss in the midface results in visible breakpoints along the malar septum and between the lower lid and cheek, imparting an aged and tired appearance. Often, the midface is the most important region of the face to augment with fat. Reestablishing a uniform and seamless contour between the lower eyelid and cheek should be the principal objective in many cases. As previously mentioned, although infiltration of fat into the canine fossa and nasolabial fold is unlikely to efface a deep nasolabial fold, it is important for the purpose of creating a better transition between the newly augmented cheek and the upper lip.9

The inferior orbital rim is one of the most difficult areas of the face to enhance with fat and constitutes a region where the most complications arise. Injection of too large a fat bolus (>0.03–0.05 mL per cannula pass) or placement of fat too superficially increases the chance of a noticeable irregularity postoperatively. The most important change in technique, which has reduced complications dramatically, is an inferiorly based entry site so the cannula passes perpendicularly to the inferior orbital rim. This maneuver should be performed with the index finger of the surgeon’s nondominant hand placed on the superior aspect of the inferior orbital rim to protect the globe. As the surgeon begins incorporating fat transfer, it is recommended that a conservative amount of fat be placed along the inferior orbital rim (a total of 2 mL per side) in the immediately supraperiosteal plane so as to minimize contour problems. As surgeons gain experience with the technique they will find that larger volumes of fat can be used with additional placement in a more superficial plane to allow for optimal results, particularly in the most volume-deficient patients. The lateral and anterior cheeks are easy areas to augment with fat, allowing more superficial passage of the cannula with the more generous amount of 0.1 mL per pass without risking contour irregularities. The skeletonized lateral cheek should be augmented to restore a youthful, full, rounded contour that blends well with a full anterior cheek. The anterior cheek is typically divided by a linear depression running from the superomedial nasojugal groove to the inferolateral buccal region. Placement of fat into the anterior cheek should principally be situated into the greatest areas of tissue loss: the depression at the malar septum and the region inferomedial to the malar septum. Passage of the cannula to reach the anterior cheek can be made from a lateral cheek entry site, and the cannula often must be forcefully pushed through the fibrous malar septum to breach it. At times, the malar septum does not pose much resistance and can easily be traversed. Patients should be evaluated for the presence of a malar bag, which appears as a protuberance at the junction of the anterior and lateral cheek lying just lateral to the upper portion of the malar septum. When present, surgeons should attempt to avoid placement of excessive fat under the already prominent malar bag. Gentle contouring around the malar bag can help soften the appearance of the malar protuberance while at the same time rebuilding the lost volume of the cheek. If patients note a history of fluctuating, cylindrical edema of the malar bag, placement of fat immediately below this structure may only worsen the condition and lead to a protracted swelling in this area for several months. In thin patients, the buccal and submalar regions are often hollow and can tolerate a generous amount of fat with minimal concern of contour irregularity. Placement of fat into the subcutaneous tissue and more deeply softens a gaunt appearance and provides a better transition between the malar and submalar regions. In addition, the canine fossa and the nasolabial fold are augmented with fat, not with the expectation of effacement of the
fold but again to achieve an improved transition between the newly augmented anterior cheek and the upper lip. A generous amount of fat can be placed into the canine fossa (the triangular depression circumscribed by the nasal ala medially and the upper extent of the nasolabial fold laterally) deeply into the supraperiosteal plane to improve the hollowness in this area. The entire nasolabial fold, including the canine fossa, can then be augmented from a perpendicular direction into a more superficial subcutaneous plane.

POTENTIAL COMPLICATIONS AND MANAGEMENT

The complications that arise after fat grafting are more distinctive than those that arise after traditional lifting procedures. Injuries to nerves or vascular structures are extremely rare and are beyond the scope of this article. A classification of complications following fat grafting, including lumps, bulges, overcorrection, under-correction, and entry-site divot, is presented here.

Lumps

Lumps are small, discrete areas of excessive fat, and are most likely to occur in the periorbital region because of the thin soft tissue covering in the region. Technically it is caused by either too large a bolus of fat with a single pass or too much fat placed in one spot, instead of appropriately dispersing the small parcels throughout the region. Conservative placement of fat in the periorbital regions is an important step in avoiding this problem. When a lump does occur, treatment begins with steroid injections into the area of concern. If this fails to correct the problem, and there appears to be a discrete lump of fat, directly excising this can alleviate the contour deformity. If this proves ineffective the definitive remedy is excision of the lump through a discrete incision situated along the inferior orbital rim at the junction of the thin lower lid skin and the thicker cheek skin (Fig. 6).

Bulges

A bulge is a wide contour irregularity, characterized by palpable persistent edema or thickening. A bulge generally manifests as an oval-shaped elevation with palpable induration oriented parallel to the inferior orbital rim.

Injection with conservative amounts of triamcinolone acetonide in increasing strengths from 5 mg/mL to 40 mg/mL repeated over 1 to 2 months have been shown to be beneficial in most circumstances. In our experience, direct liposuction of these areas has not been successful.

Overcorrection

Overcorrection is a difficult condition to correct and should be avoided at all cost. As previously discussed, a conservative strategy for autologous fat transfer should be instituted to prevent this problem from arising. It is common in the early postoperative period for patients to be concerned that too much fat was placed. Patients are informed of significant tissue edema and thus time must pass for resorption of nonviable adipocytes before results can truly be appreciated. For this reason we recommend waiting 6 months before considering any surgical intervention to address overcorrection. Correction of this entity involves microliposuction of the areas perceived to be overcorrected using an 18-gauge Klein-Capistrano microliposuction cannula in a cross-hatched pattern.

Undercorrection

Undercorrection is the best complication to encounter, because it is the most easily correctable condition. Because of the variable survival of transferred adipocytes, we counsel all patients preoperatively of the possible need for a touch-up procedure to achieve the desired end point. Additional fat harvesting and infiltration can be accomplished quickly and without difficulty under local anesthesia or limited intravenous sedation.

Entry-site Divot

Tethering or divoting at the entry site is a rare occurrence and usually manifests as a dimple at the entry site during facial animation. This complication can easily be rectified by limited subcision using a Nokor™ or standard needle across the scar band.

POSTPROCEDURAL CARE

At the end of the procedure, the patient has no sutures, bandages, or drains of any kind unless a concurrent lifting procedure was performed that requires use of these ancillary measures. The patient is discharged after appropriate postanesthesia observance. Although some surgeons who perform fat transfer do not advocate immediate postoperative icing of transplanted regions given the risk of reducing fat-cell viability, we think that there is no compromise to the aesthetic result and recovery is expedited. We advocate intermittent icing for the first 48 to 72 hours postoperatively, which can be continued if the patient desires. Head elevation also reduces the extent of postoperative edema, but a restful night’s sleep
is of paramount importance and thus this is only stressed for the first several nights after surgery. Although heavy exercise, especially with increased intra-abdominal pressure and bending over, should be avoided, a light isometric weight-lifting regimen with one-half to one-third the typical weight and lighter cardiovascular exercise can be undertaken, typically by the fourth or fifth postoperative day. In addition, salt intake should be limited because this assists in the resolution of postoperative edema.

Although postoperative care is simple and straightforward, management of postoperative expectations may be more involved. Patients
may perceive that their faces appear too inflated for their liking in the first several postoperative weeks and regard this outcome as an unintended result. Although the expected course of recovery will have been explained in detail preoperatively, constant reassurance must be offered, with patients returning as often as necessary for encouragement and counsel. In addition, the ecchymosis and edema are often more pronounced in conjunction with a brow or face-lift and can be a social and professional encumbrance for a longer period of time. In addition, the fat harvesting sites are generally sore for the first several days to weeks after surgery.

CLINICAL RESULTS IN THE LITERATURE AND EVIDENCE

Improving the predictability and reliability of autologous fat grafting has been one of the primary interests. We assessed long-term (>1 year) volume changes after autologous fat grafting to the midface using three-dimensional photography ( Vectra; Canfield) and found our average take to be 32% with an average injection volume of 10 mL in 1 side of the midface. The range of take was 10% to 88%. With an average take of only about 3 mL and volume that was highly unpredictable only 20% of the patients thought that they needed a second procedure. This finding supports the idea that smaller volumes over larger areas with transitions into surrounding areas are desirable and produces an overall result that is better than using any individual site. Based on the aging theory of shadow patterns, the youthful effect is achieved by adding enough volume to a hollow to fill it and create a highlight, which implies that for any given hollow on the face there is a large range of volumes that will fill it. For example, filling a midface depression may be acceptable with volume takes of between 2 and 5 mL.

Hoping to improve the take of our autologous fat grafting we assessed different techniques of processing the fat. Puregraft® is a membrane filtration system for processing fat developed by Cytori Therapeutics as part of the technology for isolating adipose-derived stem cells. We studied long-term take of midface fat transfers using this system and found an average take of 49% at 7 months. This percentage is a significant improvement compared with centrifuge processing. The Puregraft® processed fat has less free lipid content and contaminant blood and a higher volume of potentially viable fat.

We also studied the effect of harvesting cannula design on the fat graft. We originally used a 4-mm keel–type cannula for harvesting. Recently, cheese grater–type cannulas were introduced. Using the Puregraft® system we were able to compare the fat obtained with each cannula type. The yield of injectable potentially viable fat from the cheese grater cannulas was significantly lower than from the keel, with a greater amount of free lipid content. For this reason we currently only recommend keel-type cannulas for harvesting.

SUMMARY

There is currently a major paradigm shift from excision-based surgery to strictly volume enhancement. As the perfect facial filler has not yet been found, development of synthetic facial injectables continues to advance at a remarkable pace. Just a few years ago, bovine collagen was the only US Food and Drug Administration (FDA)–approved synthetic filler. As the FDA proceeds with the approval process there are many choices. Each type of filler carries a specific characteristic that makes it more suited for a certain clinical application. The continuing changes in facial fillers offer the possibility of volume augmentation procedures with less downtime and without the need for harvesting fat.

A combined approach requiring judicious selection of lifting procedures and fat grafting tailored to each individual is advocated. Whatever the outcome, it seems that fat grafting and facial volume enhancement represent the present and future of facial rejuvenation. We predict that volume enhancement will continue to play an increasing role as both a complementary procedure and as a stand-alone procedure in facial rejuvenation.

REFERENCES


