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Techniques in Cosmetic Surgery

Customizing Perioral Enhancement to Obtain Ideal Lip Aesthetics: Combining Both Lip Voluming and Reshaping Procedures by Means of an Algorithmic Approach

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Achieving predictable results with oral lip enhancement procedures is now possible. These procedures are categorized as either lip-reshaping or lip-voluming techniques. By performing these techniques appropriately and simultaneously, the limitations of both are overcome and ideal lip aesthetics can be obtained in one operative setting. An algorithmic approach is presented to facilitate choice of techniques and when to combine them. This article also highlights the combination concept, discussing lip-reshaping procedures such as multiple mucosal advancements, modified paranasal lip lifts, and corner lip lifts performed in concert with voluming by means of fat transfer. However, the main focus of this article is on the fat transfer and simultaneous mucosal advancement (FATMA) procedure, one that has produced remarkable results in terms of permanency and aesthetic appeal. One-year to 7-year follow-up results are presented. (*Plast. Reconstr. Surg.* 113: 2182, 2004.)

Lip enhancement has remained one area in plastic surgery that has received little attention over the years, probably stemming from disillusionment or unfamiliarity with available techniques. Disillusionment has arisen from disappointing long-term results, prolonged postoperative edema and convalescence, generalized fear of producing scars in the perioral area and, finally, from a lack of suitable training in the community and university settings. These conclusions, however, are unfounded; through proper selection, refinement, and execution of preexisting techniques in accordance with the patient's individual needs and

expectations, superlative longevity and aesthetic results may be attained.

Fat transfer into the vermilion is a well-documented technique, despite ongoing debate concerning permanency of results.¹⁻⁵ In addition, oral mucosal advancement is another means of lip augmentation that has been previously described.⁹⁻¹³ Both methods, however, accomplish subtle yet distinctly different goals with regard to lip enhancement. By performing both fat transfer and mucosal advancement in one operative session, impressive lip augmentation (or rejuvenation) in terms of volume and shape can be expected with those lips that are relatively hypoplastic and inverted. This article details this combination process and provides 1-year to 7-year results. Furthermore, a simple algorithm is provided that delineates the indications for this combination technique and for other lip reshaping surgery.

TECHNIQUE

Fat Harvest

The average volume of purified fat needed for both upper and lower lip augmentation is 6 ml. An approximately 80-cc admixture of normal saline and 20 cc of 1% lidocaine with 1:100,000 epinephrine is injected into the proposed donor site (most commonly the infraumbilical abdomen). After 8 minutes are

allowed to elapse, fat is harvested through gentle aspiration using a 10-cc syringe and a short 3-mm cannula (Byron Medical, Tucson, Ariz.). Only 1 cc of negative pressure, as measured by the scale imprinted on the side of the 10-cc syringe, is applied. The harvested fat is then washed over a tea strainer with normal saline until cleared of bloody and oily residue. The fat is dried between a Telfa gauze and manually cleared of fibrous remnants, after which it is transferred into a 3-cc syringe.

Mucosal Advancement

Careful analysis of both the upper and lower lips is necessary before strategically positioning and sizing the proposed V-Y-plasties. Because V-Y-plasties essentially evert and direct localized wet oral mucosa to the exterior, their placement can be critical in dictating the final shape of the lips. For example, they may be planned behind specific areas of vertical vermilion deficiency (such as in a Whistle deformity) to produce a more uniform, plump upper lip. Most often, however, three upper V-Y mucosal advancements and a wide, single, central lower one are designed and carried out.

The designs of the three upper and one lower V-Y-plasties are first applied to the exterior of the lip (Fig. 1). The base of each V should lie above the white roll (or below, in the case of the lower lip). The width of each base may vary between 1 and 2 cm, depending on the patient's presentation. Then, 1% lidocaine with 1:100,000 epinephrine mixed with Wydase is injected into the labial mucosa. While awaiting the vasoconstrictive effect of the epinephrine to occur, the lip is everted and a 25-gauge needle is used to transcutaneously translate the external markings (the three points of each V)



FIG. 1. Exterior markings of the V-Y-plasties to be performed on the interior mucosa.

to the internal labial mucosa. Needle emergence sights are marked with Bovie electrocautery. Before proceeding, final symmetry is verified while the lip is everted by applying even, outward pressure at the oral commissures simultaneously (Fig. 2). The incisions are then made and the flaps raised by gentle scissor dissection with care being taken to preserve as many cutaneous nerves as possible (Fig. 3). Generally, each V-Y is advanced 1 cm, and in the upper lip the lateral two mucosal advancements are performed before the central one. Closure is performed by means of horizontal mattress sutures of 5-0 chromic and facilitated by triangulating the wound with hooks placed at each of the two corner bases of the raised V flap.

Once all flaps are securely advanced, symmetry should be present and no dog-ears visible. These should not be visible as long as the wet-dry junction of the mucosa is not violated.

Fat Transfer

Finally, fat transfer is carried out by means of Coleman cannulae in the standard fashion. It is injected as the cannula is withdrawn from a channel. Fat is first placed very superficially along the vermilion border and then into the muscular substance of the lip proper, using many passes along different channels. Of course, the relative volume and placement of the fat is a fairly artistic endeavor. However, more often than not, a total of 6 cc of purified fat was needed for upper and lower lip augmentation.

RESULTS

To date, a total of 106 fat transfer and simultaneous mucosal advancement (FATMA) combination procedures have been performed by the author between September of 1996 and March of 2002. Average operative time was 1 hour 20 minutes, and all were performed under general or sedative anesthesia.

Among the associated tradeoffs of the fat transfer and simultaneous mucosal advancement technique are potential postoperative pain, dryness, numbness, functional limitations, edema, and associated extended recovery time. Potential complications of this technique include dehiscence of any V-Y mucosal advancement flap, asymmetry, persistent numbness or paresthesia, infection, and subjective disappointment with final lip size.

Discomfort was most apparent in the 48

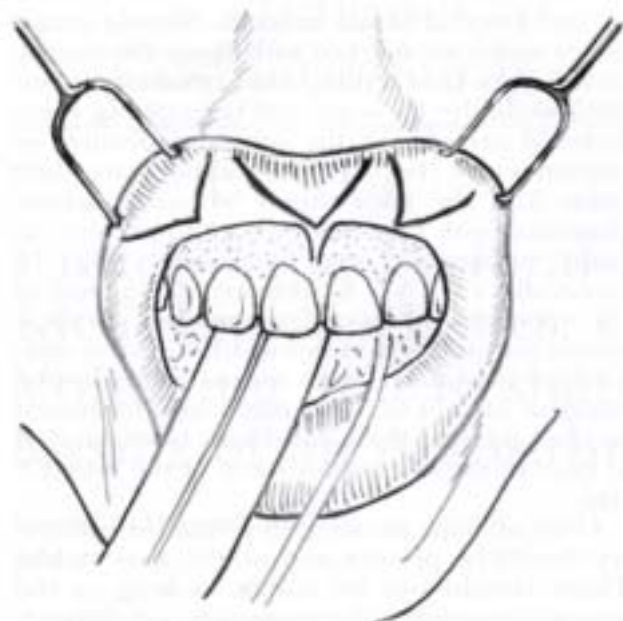


FIG. 2. Final position of the markings is verified while applying symmetrical, outward traction to the upper lip.

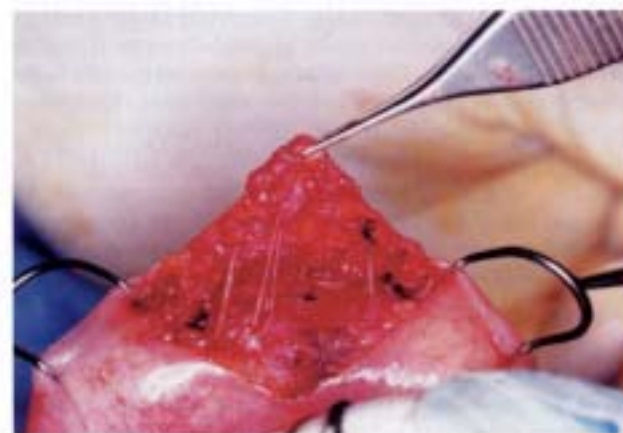


FIG. 3. The flap is raised, with care being taken to preserve as many sensory nerves as possible.

hours postoperatively but rapidly subsided thereafter. Most rated their pain as mild at worst; however, two patients described their pain as an unrelenting burning that took approximately 10 days to disappear with judicious use of nonsteroidal antiinflammatory medication. Application of a small amount of petroleum jelly on the labial side of the anterior incisors provided significant amelioration of tenderness. Seventy-five percent ($n = 80$) reported some dryness of the lips. This symptom generally resolved within 2 to 3 months and was treated with lip balm. All patients experi-

enced some form of numbness that completely resolved as discerned by objective testing. Final resolution of all numbness and paresthesias generally took between 3 and 16 weeks. Severe edema was present for 2 to 3 weeks, hindering return to social activities for up to 4 weeks. Ten patients (9.4 percent) considered their swelling visually debilitating for 8 weeks postoperatively, although another 10 felt comfortable enough to return to their social routine at 2 weeks. Usually, edema seemed to persist in the upper lip for a longer period of time. Regarding functional limitations, 84 patients (79 percent) experienced difficulty with articulation and eating for 1 to 2 weeks. Inability to suck and purse one's lips was the most cited difficulty in terms of eating. Subjective tightness, especially in the upper lip, persisted for up to 10 weeks postoperatively.

Dehiscence of one of the mucosal advancement flaps occurred in six patients (5.6 percent). Treatment was conservative, allowing healing by secondary intention. In two of these patients, dehiscence of the flap allowed fat to escape, resulting in eventual asymmetry. Localized fat transfer successfully treated this at a later date. Subtle asymmetries were more frequent early on in the series but became less frequent as experience was gained. These were most commonly caused by inexact placement of the V-Y mucosal advancement flaps and uneven final distribution of the transferred fat. Again, revisions were warranted in these cases, involving either further localized fat grafting, minor mucosal rearrangements, or minute injections of diluted triamcinolone acetate (40 mg/cc).

Neither permanent dysesthesias nor infections were encountered. However, 9.4 percent of patients ($n = 10$) expressed disappointment with their final outcome. Two patients complained of an overly large upper lip, whereas eight desired further augmentation in size of both the upper and lower lips. Secondary fat transfer was performed in these latter patients. However, the vast majority of patients rated their results as excellent.

DISCUSSION

As with all other parts of the body, age, environment, and genetics have a profound influence on the appearance of the lips. With advancing age, the upper cutaneous lip elongates (often in concert with midfacial descent), eventually covering most if not all of the upper

anterior incisors. This same aesthetic unit flattens, losing its youthful topography including the philtral columns and "white roll" while acquiring vertical rhytides in the process (Fig. 4). These rhytides are exacerbated by photodamage and smoking and perhaps lessened by daily exfoliation or shaving (men have noticeably fewer lip wrinkles than women of corresponding age). The upper and lower vermillion become atrophic and invert. As noted by Austin and Weston, bone resorption and teeth retrusion may contribute to lip inversion by lessening their internal support.¹⁴ The oral commissures may "sag," as may the lower lip in general, resulting in exposure of the lower anterior incisors when the lips are parted in repose. Most patients do not manifest all of these uncomely aging characteristics; instead, only a select few may be apparent. However, even the presence of a single aforementioned feature may impart an uninviting, solemn appearance to not only the mouth but also the entire face.

The number of techniques available to enhance the oral lips belies their inability to produce consistent results. Generally, methods have focused on volume, echoing the underlying philosophy, or lack thereof, of the surgeon concerning lip enhancement. These procedures embody the idea that volume alone equates with youth with regard to the lips. All too often, the lips are an afterthought in facial rejuvenation, at which point the surgeon "fills" the lips with whatever volume agent is in vogue. The results can be dissatisfying.

In fact, shape is more influential than volume for a youthful lip appearance. Conse-

quently, results of these voluming techniques performed alone can result in tight, persistently inverted, rather unwieldy lips that are visually dissonant with the other facial features. In these situations, the lips, despite their increased volume, still display the shapes of aging. Therefore, to achieve the most natural result in lip augmentation surgery, shape must be analyzed before volume.

The author's preferred substance for lip volume augmentation is fat. Coleman and others^{4-6,14,15} have summarized the history of fat transplantation. It dates back to 1893 when Neuber¹⁶ first described fat survival in scarred areas. Since then, a number of other authors^{17,18} have expanded our knowledge of fat transplantation. Recently, both Guerrosantos^{19,20} and Coleman^{5,6} have ushered in the current era of fat transfer, contributing to our understanding of its biology, technique, and uses. Ample evidence exists proving fat is a reliable and permanent filler agent free from the controversy surrounding alloplastic agents. Indeed, when properly performed through initial harvest, preparation, and final transfer, fat transplantation has been so effective that fat excision was performed at the patient's request (Fig. 5). However, the author has observed that smoking and advancing age (especially over age 50) have a damaging impact on fat survival. In the future, hormonal, physical, and biochemical manipulation (including the use of albumin²¹) may all play a part in improving the success rates in these cases.

The perioral region needs to be assessed in both the anteroposterior and lateral views with



FIG. 4. (Left) The perioral region exhibiting all characteristic signs of aging: long cutaneous upper lip with loss of philtral definition, negative upper incisor show, ptotic oral commissures, ptotic lower lip, positive lower incisor show, and atrophic and inverted upper and lower lip substance with vertical rhytides. (Right) The 1.5-year postoperative result of the same patient after paranasal and bilateral corner lip lifts, lower lip mucosal advancement, fat transfer, and carbon dioxide laser abrasion. Although fat transfer and simultaneous mucosal advancement is the focus of this article, this case is included to highlight the other effective lip reshaping procedures.



FIG. 5. Intraoperative view of reduction cheiloplasty 11 months after original fat transfer and mucosal advancement. Ample viable fat is visible.

the lips slightly parted. Likewise, photographs of the lips should be taken with the same parted repose for standardization. In the anteroposterior analysis, the length of the upper cutaneous lip, the presence of philtral columns, upper incisor show, lower incisor show, upper vermilion width-to-lower vermilion width ratio, oral commissural position, and vertical rhytides need to be assessed. According to Hoefflin,²² the upper cutaneous lip length should be equal in height to the distance from the supratarsal fold to the lower lid ciliary line. With the lips in repose, a minimum of 3 mm of the upper incisors should be visible in the female patient, and 1 to 2 mm is sufficient in the male patient. One needs only to peruse the contents of the innumerable fashion magazines to be convinced that upper incisor show equates with a vibrant and fertile youthful look. Conversely, lower incisor show should be absent, with the lower lip eclipsing them by sufficient superior positioning. The upper lip width should be one-third to one-half the corresponding width of the lower lip as measured in the midline. The corners of the mouth should evoke a slight superior cant. Perioral rhytides should be addressed, as should the presence or absence of the philtral columns. Figure 6, *left*, summarizes the characteristics of the ideal young mouth as ascertained in the anteroposterior view.

Analysis of the lateral view is generally more straightforward. Again, the upper cutaneous lip should be short and exert a concave curvature emanating from the base of the columella and ending with the provocative pout of the vermilion border (Fig. 6, *right*). The lower lip

should likewise exhibit a rather steep concavity from the sharp vermilion border to the labio-mental groove. Indeed, the lower lip should evince an almost hypotonic posture in its outward stance. Finally, the upper lip should protrude beyond the lower lip by approximately 1 to 2 mm.⁸ The fat transfer and simultaneous mucosal advancement procedure is ideal for these patients who manifest not only hypoplastic or atrophic lips but also inversion as ascertained in the lateral view. The fat transfer and simultaneous mucosal advancement method not only everts the upper and lower lips but also provides volume in one surgical setting.

All patients in this series were analyzed and subsequently apprised of their lip shape and volume. Surprisingly, many were unaware of the significant role that lip shape played in their outward appearance, but most, once educated, were fully accepting of the proposed surgical plan. On the basis of preoperative assessment, patients were offered either volume enhancement alone (if they possessed ideal lip shape) or volume enhancement combined with lip reshaping. Carbon dioxide laser resurfacing was also planned as a concomitant adjunct whenever dictated by perioral rhytides (Fig. 7). Figure 8 summarizes the decision-making process of lip enhancement.

As with any procedure, obtaining informed consent is crucial. Patients undergoing the fat transfer and simultaneous mucosal advancement procedure will generally be socially unacceptable for a period of 3 to 4 weeks, but this is the price of permanency. Edema seems to persist longer in the upper lip because of two



FIG. 6. The ideal perioral anteroposterior appearance. (*Left*) The lateral appearance of the aging lips. (*Right*) The ideal lateral appearance of the lips. Note the provocative concavity bordering the upper and lower vermilion and the 2-mm upper lip protrusion beyond the lower. The fat transfer and simultaneous mucosal advancement procedure can mimic this appearance.



FIG. 7. (Left) Patient with inverted and hypoplastic lips with moderate rhytides. (Right) The patient is seen 1.5 years after upper and lower lip augmentation by means of fat transfer and simultaneous mucosal advancement, carbon dioxide laser abrasion, and rhytidoplasty.

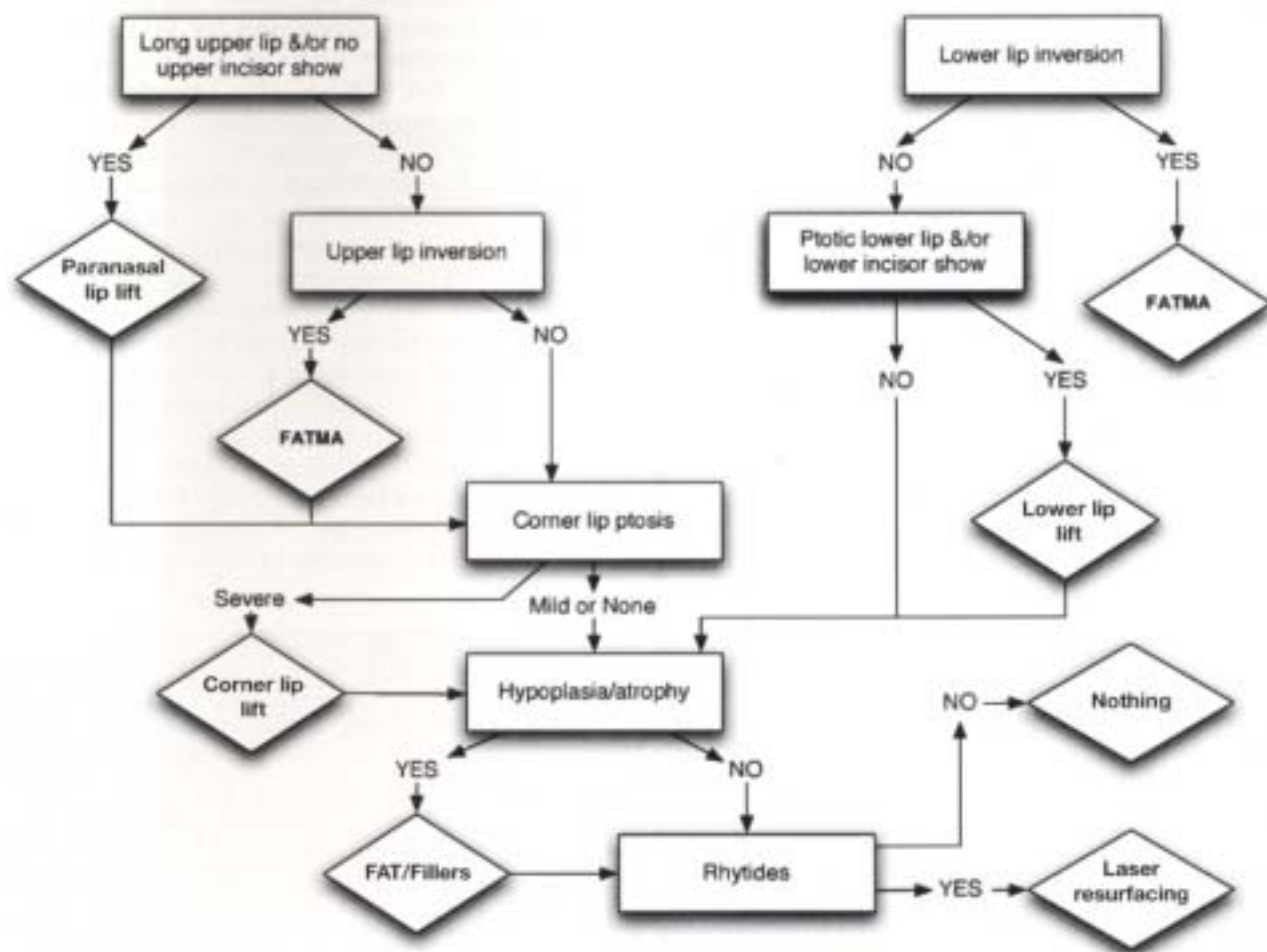


FIG. 8. Decision-making process with lip enhancement. FATMA, fat transfer and simultaneous mucosal advancement.

factors, the first being that three mucosal advancements are performed on the upper lip as opposed to the one on the lower; the second being that the lymphatic channels must first

travel horizontally to traverse the actual length of the lip before coursing inferiorly to meet with the main cervical chains. In addition, patients may experience stiffness, paresthesias,

and numbness that by and large disappear in a number of months. Most understand and accept this with proper preoperative counseling. Candidates for the fat transfer and simultaneous mucosal advancement procedure who could not accept its potential convalescence were offered a volume-augmentation technique alone.

The V-Y mucosal advancement component of the procedure works by shortening the horizontal width of the labial mucosa adjacent to the labiobuccal sulcus while forcing the mucosa just inside the wet-dry junction to advance outward, thereby everting the lip. One may liken this process to the blooming of a flower. Previously, others^{10-13,23} have only described the use of two V-Y-plasties in the upper lip, orientated either transversely or vertically. In general, three V-Y-plasties are strategically needed in the upper lip to produce uniform enlargement along the entire lip. It also allows unparalleled control over shape. The placement of fat not only serves to plump the lips but also helps provide smooth transitions between each V-Y-plasty. The author has found that only one mucosal advancement is sufficient with the lower lip, providing the desired hypotonic pout of its central two-thirds of length. The appearance of the lower lip is also improved through elevation by the V-Y-plasty, thereby helping to eclipse part of the lower incisors; again, this stems from both the shortening of the horizontal component of the labial mucosa and the actual advancement of the mucosa (Fig. 4, right). Likewise, mucosal advancements of the upper lip can considerably

veil the upper incisors. This may impact negatively or positively on the perioral aesthetic outcome. Despite an impressive increase in eversive pout and volume, Figure 9 clearly demonstrates how fat transfer and simultaneous mucosal advancement resulted in an unfavorable decrease of upper incisor display. Conversely, this effect works to the advantage of patients with a preoperative excess of upper incisor visibility. Figures 10 and 11 are good examples of this concept put to use. Again, all of this serves to emphasize the need for detailed preoperative analysis. Although the efficacy of performing fat transfer and mucosal advancement separately has been documented, combining the two techniques provides synergistic results in both shape and size, heretofore not seen with other methods.

Generally, most candidates for lip reshaping require procedures on both their upper and their lower lips. Those who manifest an inverted upper lip will likely have a similarly inverted lower lip. Therefore, if an upper lip fat transfer and simultaneous mucosal advancement is performed in these common situations, a lower lip V-Y-plasty needs to be carried out as well to obviate a provocative disharmony between the two lips. This concept is a testament to the efficacy of the fat transfer and simultaneous mucosal advancement procedure. Figures 12 and 13 illustrate this point exactly. All three of these patients displayed upper lip inversion as compared with their naturally protuberant lower lip. Oblique views demonstrate this type of relationship effectively. Consequently, three mucosal advance-



FIG. 9. (Left) Patient after two previous "failed" lip augmentation procedures. (Right) Same patient 7 years after upper and lower lip augmentation with fat transfer and simultaneous mucosal advancement. Notice less upper incisor display.



FIG. 10. (Left) Patient with inverted and hypoplastic lips. Note excess upper incisor display. (Right) Two years after fat transfer and simultaneous mucosal advancement (upper and lower lip augmentation), rhinoplasty, buccal lipectomy, and submental liposuction.



FIG. 11. (Left) Patient desiring larger lips, citing Angelina Jolie's as an ideal. (Right) The same patient 2 years after upper and lower lip augmentation with the fat transfer and simultaneous mucosal advancement procedure. Notice favorable effect on excessive upper incisor show.

ments were executed on the upper lip to produce the pout necessary to match the lower lip while fat was transferred into both. No mucosal advancement of the lower lip was performed.

There are two types of upper lip lifts: those using perivermillion excisions^{9,24,25} (lip advancements), which are to be avoided because of unacceptable scarring, and those involving paranasal ones.^{21,26,27} The resultant scars from

paranasal lifts are generally very acceptable, provided a careful, layered closure is performed. Regarding these upper lip lifts, one must realize that this surgery not only shortens the cutaneous portion of the upper lip but also increases maxillary dental show and everts the vermilion to a mild degree. It is this latter effect that can create an imbalance in the aesthetic relation between the upper and lower lip



FIG. 12. Identical twins presenting with relative upper lip retrusion and inversion. (*Above, left*) Preoperative oblique view of twin 1. Notice relative upper lip inversion. Oblique views reveal both volume and balance between the upper and lower lips. (*Below, left*) One year after upper lip fat transfer and simultaneous mucosal advancement procedure, fat transfer to lower lip, and primary rhinoplasty. Note better balance between upper and lower lips, because of the increased upper lip pout. (*Above, right*) Preoperative oblique view of twin 2. Again, notice the relative upper lip inversion. (*Below, right*) One year after the upper lip fat transfer and simultaneous mucosal advancement procedure, fat transfer to lower lip, and primary rhinoplasty. Better balance between the lips is established.

unless a simultaneous lower lip V-Y-plasty is performed. This will be the subject of a forthcoming article.

The fat transfer and simultaneous mucosal

advancement procedure is relatively simplistic in concept, but its execution requires experience to produce consistent results in terms of shape, size, symmetry, and smoothness. Atten-



Fig. 13. (Above, left) Preoperative anteroposterior view of patient 3. She is unhappy with the size of her upper lip. (Below, left) Anteroposterior view of the same patient 2 years later. An obvious increased exposure of the wet mucosa is apparent, reflecting a degree of eversion (in excess of normal for her age) produced by the V-Y advancement. (Above, right) Preoperative oblique view. (Below, right) Oblique view of the same patient 2 years later. Note the favorable upper lip eversion, which generally cannot be obtained with filler agents alone.

Attention to detail is of paramount importance in the process of planning the V-Y position, obviating the formation of dog-ears during closure near the wet-dry vermilion junction, avoiding overadvancement of the V-Y, and finally achieving symmetrical transference of fat throughout the vermilion and underlying muscular substance. Both dog-ears at the base of the V-Y and overadvanced mucosa can be treated by direct excision, generally in a transverse manner. Localized, uneven augmentations of red vermilion respond well to secondary fat transfer. It is advisable to wait at least 3 months before proceeding with this step. In the not infrequent situation in which a patient has undergone recent collagen treatment, it is also advisable to wait 2 to 3 months until most of the collagen has absorbed before formulating a surgical plan. In those who have undergone previous surgical lip augmentation before presentation, the fat transfer and simultaneous mucosal advancement procedure may be carried out. However, there is one caveat to

fat transfer in these secondary cases. Performing it evenly and symmetrically may be difficult because of dense cicatrix and the possibility of creating false channels through which fat may travel, especially above the vermilion border. Constant vigilance with careful manual control should prevent this. Figure 14 illustrates a case in which a patient presented with a previous lip augmentation using Gore-Tex (W. L. Gore & Associates, Flagstaff, Ariz.). The polytetrafluoroethylene strip was removed through an elevated V-Y flap. The 1-year outcome is shown after a concomitant fat transfer and simultaneous mucosal advancement procedure.

CONCLUSIONS

The fat transfer and simultaneous mucosal advancement can be a powerful operation, one that is able to impart fuller lips and also to provide pout. In other words, it not only augments volume, it also controls shape. By regulating the amount of mucosal advancement



FIG. 14. (Left) Patient dissatisfied with lip size and shape despite implanted Gore-Tex SAM implant. Notice lack of shape to lips despite the alloplastic filler. (Right) The patient is shown 20 months after Gore-Tex removal and concomitant upper and lower lip augmentation with fat transfer and simultaneous mucosal advancement.

and fat transferred, this procedure can produce results ranging from the subtle to the dramatic. Fat transfer and simultaneous mucosal advancement (FATMA) can also be applied to either the upper or lower lip individually to correct imbalance because of relative inversion. Despite a moderate learning curve, this totally autologous operation has proven to be valuable in permanently enhancing the hypoplastic, inverted lip. In fact, it seems to be the only operation today that provides the degree of shape and size that patients expect from lip augmentation. Its main drawback is prolonged postoperative recovery, but with preoperative counseling, patients tend to accept this. The other distinct advantage of the fat transfer and simultaneous mucosal advancement operation is its permanency, a fact attested to by the 1-year to 7-year follow-up results that have been presented.

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