Aesthetic Facial Contour Augmentation With Microlipofilling

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Background: We have found that the use of microfat grafts can improve the contour of the face. Objective: We describe our technique for facial contour augmentation using microlipofilling and present the results of 32 cases treated between 1995 and 2002. Methods: We conducted a preoperative evaluation, including photographic and radiologic studies, to determine for which patients the procedure was appropriate and to identify the need for additional procedures. Fat was harvested with the use of 10-mL syringes with 14-gauge needles. Only 5 mL of fat was harvested in each syringe. After the donated fat was washed and fragmented, it was infiltrated by means of a percutaneous approach with 18- or 20-gauge needles to reduce trauma and avoid scarring. Thin (2-mm-wide) rolls of fat grafts were placed in well-vascularized tissues to prevent absorption. The amount of fat infiltrated depended on the flatness of the area. Results: All patients had satisfactory outcomes after follow-up ranging from 1 to 5 years. Complications were rare. Conclusions: With appropriate placement, facial contour augmentation with microlipofilling is a safe, simple, inexpensive aesthetic procedure that provides consistent, long-term aesthetic improvement. (Aesthetic Surg J 2003;23:239-247.)

In the past, surgeons have had 2 techniques with which to improve facial bony contour: osteotomy with mobilization of facial bony segments and placement of implants (foreign-body materials or autologous cartilage or bone) over the bone, under the soft tissue. In this article, we discuss a relatively new third alternative, the use of microfat grafts. Facial prebone contour augmentation can be obtained through the use of microfilling to thicken soft tissue adjacent to facial bones. The anatomic areas that can be augmented and contoured with the use of this technique include the malar, paranasal, chin, and mandibular regions.

In this article, we review the medical records and outcomes of 32 patients who underwent facial prebone contour augmentation with microlipofilling, performed at the Jalisco Plastic and Reconstructive Surgery Institute or the Guerrerosantos Plastic Surgery Clinic, between 1995 and 2002.

Preoperative Planning

Patient Evaluation

Before surgery, all patients underwent a thorough, individualized preoperative evaluation, including frontal, basilar, and oblique views and photographic and radiologic studies, to establish an accurate diagnosis. In this examination, flat or thinned facial bony contours were identified, asymmetries were evaluated, and the amount of contour augmentation to be performed was estimated. This evaluation permitted the selection of those patients for whom augmentation of the malar, paranasal, chin, and mandibular regions was appropriate and in some cases identified the need for additional procedures, such as removal of the buccal fat pad and neck lipoplasty.

With the patient seated, the areas to be augmented were marked before surgery to facilitate intraoperative evaluation of the contour of areas of flat or thinned bony contour. It was important to mark flatness in 3 dimensions to accurately determine the tissue requirements with respect to both surface area and volume. Generally, thinned soft tissues in the mandibular region are about 0.5 cm thick. Infiltration of fat grafts was aimed at producing a soft-tissue thickness of 1.5 cm. In other facial anatomic areas, such as the malar, paranasal, and chin areas, measurement of soft tissues was performed while the patient was under intravenous sedation, before infiltration of the local anesthetic. A 20-gauge needle was
introduced vertically toward the surface of the bone until the tip of the needle touched the bone, and the depth was measured with a ruler.

**Surgical Technique**

Each surgery was performed with the patient under intravenous infiltration of local anesthetic plus adrenaline into the donor areas of fat. Donor areas included any part of the body with excess fat, such as the abdominal wall or trochanteric region. In the past, we infiltrated the fat grafts after we performed the face lift, but currently we prefer to infiltrate microfat grafts before the local anesthetic is introduced and the face lift is performed, so that we can accurately judge the exact amount of fat to be grafted into each anatomic area. In addition, regional facial blocks to anesthetize greater facial areas were useful.

Fat was harvested from the donor area 10 minutes after infiltration. To harvest the fat, we used 10-mL syringes with 14-gauge needles. The syringes contained 3 mL of aspirated saline solution to mitigate the impact of the fat against the walls of the syringe during aspiration. We harvested just 5 mL of fat in each syringe. After the fat was harvested, we drew an additional 2 mL of saline solution into the syringe and washed the fat by performing maneuvers such as turning the syringe upside down and placing the fat against the walls of the syringe during aspiration. The saline solution was changed 4 or 5 times to obtain clean fat grafts without local anesthetic, blood, and oils.

The fat was then deposited in a medicine glass and fragmented in accordance with the methods of Carraway and Mellow. We developed 3 techniques for fragmenting the fat. One consisted of introducing scissors into the medicine glass and making multiple cuttings until the fat was sufficiently fragmented. An alternative method was to introduce the fat into a small mill and fragment it in the same manner in which baby food is prepared. The third alternative, which is our preferred method, was to introduce the fat into a 5- to 10-mL syringe with thin needles (originally 18-gauge but later 20-gauge) and transfer it from the syringe into a medicine glass several times. Initially, the unfragmented fat frequently obstructed the conduit of the needle. After 10 minutes, the fat was usually sufficiently fragmented to be infiltrated with a 20-gauge needle. Microfat-graft preparation required additional trained personnel for assistance. If properly trained in the technique, 1 or 2 medical staffers, such as a registered nurse and a surgical assistant, were able to offer support that shortened the duration of surgery substantially. Usually we harvested approximately 80 mL of fat to arrive at a final volume of roughly 50 mL because approximately 30% of the normal fat cells were lost during preparation.

Fat grafts were applied to the face through a percutaneous approach utilizing 5-mL syringes with 18- or 20-gauge needles. We performed aspiration after introducing the needle but before infiltrating the fat grafts to avoid serious complications, such as embolus, by ensuring that the needle did not penetrate a vein or an artery. The 18- and 20-gauge needles produced less trauma and thus helped avoid skin scars that could have been caused by the use of thicker needles or by incisions made to introduce blunt needles or cannulas. Two-millimeter-wide rolls of fat grafts were placed in well-vascularized tissues to prevent absorption. Our preferred method was to place these rolls under the SMAS, into the muscles, or over the peristeum with multiple passes and at multiple depths. The amount of fat infiltrated depended on the flatness of the prebone area. When augmenting the malar, chin, and mandibular regions, we placed 2 or 3 superimposed rolls of fat grafts, always surrounded by well-vascularized tissue, and avoided contact among the rolls. When fat graft infiltration was completed, gentle massage and modeling of the grafted areas was performed. Care was taken to avoid complications by avoiding damage to the facial nerves and thick vessels. Antibiotics were administered during the surgical procedure.

**Case Reports**

**Case 1**

A 25-year-old woman presented with an inadequate and underprojected nasal tip, minimal convexity of the dorsum, a receding chin, and submental adiposity (Figure 1, A, C, E, G). We performed aesthetic rhinoplasty, submental lipoplasty, and augmentation mentoplasty. We used 8 mL of microlipofrags in 3 layers to augment the chin 0.7 cm² and for contour augmentation of the mandibular area (6 mL on each side), resulting in a final augmentation of 0.4 cm (Figure 1, B). This patient was examined 2 years later and showed satisfactory aesthetic improvement. (Figure 1, D, F, H).

**Case 2**

A 24-year-old woman presented with a flat nasal dorsum, depressed paranasal areas, bulky cheeks, chin retrusion, and cervical adiposity (Figure 2, A, C, E, G). We performed buccal fat-pad removal, a temporoparietal fascia graft on the nasal dorsum, lipoplasty of the neck, and microlipofilling on the radix (1 mL), paranasal areas (1.5 mL each), chin (10 mL), and mandibular areas (6 mL).
Figure 1. Case 1: a 25-year-old woman with inadequate projection of the nasal tip, minimal convexity of the nasal dorsum, chin retrusion, and submental adiposis. **A**, Outline of the preoperative condition. **B**, Drawing of the proposed procedure, including rhinoplasty with cartilage tip graft and microfat grafting of the chin and mandibular region. **C, E, G**, Preoperative views. **D, F, H**, Postoperative results 2 years after surgery.
Figure 2. Case 2: a 24-year-old woman with a flat nasal dorsum, chin retrusion, and depressed paranasal areas, bulky cheeks, and cervical adiposity. 
each). We achieved 0.2-cm augmentation of the radix, 1.2-cm augmentation of the paranasal areas, 1.5-cm augmentation of the chin, and 0.5-cm augmentation of the mandibular areas (Figure 2, B). One year after surgery, the patient showed nice improvement in the frontal and lateral facial views (Figure 2, D, F, H).

Case 3
A 30-year-old woman presented with poor nasal definition, an acute nasolabial angle, retrusion of the paranasal areas, and chin retrusion (Figure 3, A, C, E, G). We performed augmentation rhinoplasty with crushed cartilage and a temporoparietal fascia graft, as well as augmentation with microlipofilling of the paranasal areas (1.2 mL), lower lip (2 mL), chin (8 mL), and mandibular border (6 mL each) (Figure 3, B). The following augmentation was achieved: paranasal areas, 1.2 cm; lower lip, 0.2 cm; chin, 1.5 cm; and mandibular borders, 0.5 cm. At 1-year follow-up, the patient showed a nicely balanced profile, with augmentation observed at the premaxillary area and at the mandibular region (Figure 3, D, F, H).

Case 4
A 22-year-old woman presented with a large nose with dorsal convexity, low radix, and underprojected nasal tip, retrusion of the paranasal areas, and severe chin retrusion (Figure 4, A, C, E, G). The patient underwent reduction rhinoplasty involving radix augmentation with a fascia graft and tip projection with a cartilage graft, as well as microlipofilling on the upper lip (8 mL), lower lip (6 mL), melolabial sulci (2 mL each), chin (12 mL), and mandibular borders (6 mL each) (Figure 4, B). Augmentation was as follows: upper lip, 0.4 cm; lower lip, 0.2 cm; melolabial sulci, 0.2 cm; chin, 1.3 cm; and mandibular border, 0.4 cm. At 10-month follow-up, improvement was noted on the facial front and profile views, with balanced features (Figure 4, D, F, H).

Case 5
A 34-year-old woman presented with paranasal and chin retrusion and maxillary prognathism (Figure 5, A, D, F). Premolar removal from each side of the upper arch and segmental osteotomies were performed, and a section of maxillary bone was resected to displace the premaxilla to the desired position. Augmentation of the chin (8 mL) and paranasal areas (1.2 mL each) with lipofilling was also performed (Figure 5, B, C) Six months after surgery, the results included a more aesthetic profile and good facial feature balance (Figure 5, D, F). Chin augmentation was 1.3 cm, and paranasal augmentation was 0.3 cm.

Discussion
A variety of methods have been used to improve facial contour. Malar implants were used by Gonzalez-Ulloa,2 Hinderer,3, 4 Wilkinson,5 Agaban,6 Kent,7 Brennan,8 Whitaker,9 Binder,10 and Terino.11 Chin-augmentation contour improvement with implants has been suggested by Millard,12 Aufricht,13 Gonzalez-Ulloa and Stevens,14 Pitanguy,15 Bell,16 Binder,17 Kent,7 Terino,18 and Mahler.19 Terino11, 18 has obtained excellent results using implants for malar, chin, and mandibular augmentation. Wolfe20,21 and Toranto22 advocated the utilization of advance genioplasty for chin correction. Paranasal contour improvement through the use of implants has been reported by Caronni,23 Hinderer,24 and Yaremchuck and Israel.25 Some cases of paranasal retrusion have been treated with bone and cartilage grafts alone or in combination with osteotomies by Hopkins,26 Obwegeser,27 Converse,28 Jackson et al,29 Henderson,30 Molina et al,31 and Psillakis and colleagues.32 The use of autogenous fascia and cartilage for paranasal augmentation was reported by Guerrerosantos.33 Marked cheek contour protrusion can be corrected with buccal fat pad removal, as suggested by Epstein,34 Ortiz-Monasterio and Olmedo,35 and Matarasso.36, 37 For improvement of the cheek, an intraoral meloplasty procedure involving removal of both the buccal fat pad and 2 pieces of oral mucosa has been reported by our group.38–40

We have used all of these procedures in our practice. Fat autografting is now routinely used in selected cases. Among those who have reported on this procedure are Chajchir,41 Guerrerosantos et al,42–46 Carraway,1 Carpaneda and Ribeiro,47 and Coleman.48

In Western culture, current facial aesthetics emphasize a prominent malar region and chin, a paranasal area that is not retracted or depressed, a well-defined mandibular border, adequate volume and good contour, and cheeks that are a little depressed with respect to other areas.

To achieve satisfactory improvement of these areas, we have used microfat grafts to fill out flat or depressed contours. With the removal of the buccal fat pad, the contour of protruding cheeks is improved, resulting in a hollow surface that contrasts beautifully with prominent malar, chin, and mandibular zones.

Microlipofilling is an easy and inexpensive technique. Adipose tissue is an ideal source of transplantation cells for augmentation of soft tissues because it is abundant, easy to obtain in large quantities, and safe to procure. We studied

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Figure 3. Case 3: a 30-year-old woman with poor nasal definition, an acute nasolabial angle, retraction of the paranasal areas, and chin retraction. A, Outline of the preoperative condition. B, Drawing showing proposed placement of the grafts. C, E, G, Preoperative views. D, F, H, Postoperative results 1 year after augmentation rhinoplasty and microlipofilling of the paranasal areas, lower lip, chin, and mandibular border.
Figure 4. Case 4: a 22-year-old woman with a large nose with dorsal convexity, a low radix, an underprojected nasal tip, and retrusion of the chin and paranasal areas. A, Outline of the preoperative condition. B, Drawing of the proposed correction showing placement of the grafts. C, E, G, Preoperative views. D, F, H, Postoperative views, 10 months after reduction rhinoplasty and microlipofilling of the upper and lower lips, melolabial sulci, chin, and mandibular borders, show aesthetic and functional improvement.
the procedures for fat augmentation and the stability of the resulting grafts in an experiment involving 120 rats.43

With appropriate placement, fat grafts heal and survive, with consistent long-term improvement. Two maneuvers are essential for success: the use of thin grafts in 2-mm-wide rolls and placement of the grafts so that they are surrounded by well-vascularized tissues and not associated closely with one another, which enables revascularization of the grafts and avoids absorption. Use of a 1-, 5-, or 10-mL syringe with an 18- or 20-gauge needle reduces the risk of small pits on the facial skin and consequent temporary or permanent scars; it also helps avoid bulges and irregularities in the infiltrated areas. A successful contour correction depends on maintenance of the volume of the grafts applied. Complications are extremely uncommon.43–45

Conclusion

Microlipofilling is effective in achieving permanent augmentation in volume and contour. When combined with procedures to reduce bulky cheeks, it can produce aesthetically pleasing, well-balanced facial contours. ■

References

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