

## MALAR REGION REJUVENATION THROUGH NON-INVASIVE TECHNIQUES: HYALURONIC ACID FILLERS AND LIPOFILLING

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Contour enhancements of the midface make up a dominant aspect of aesthetic surgery. The goal of midface rejuvenation is to decrease the prominence of grooves and creases as well as to provide volume to atrophied tissue. There are various options, including autologous tissue grafts, allogenic tissue grafts and alloplastic materials. In turn, patients' needs have led to an increasing trend of less invasive treatments. In the present study, 82 implants were used for midface augmentation in 41 patients (38 women, 3 men) between January 2014 and January 2016. Twenty-five patients were treated with Hyaluronic acid implants while the remaining 16 patients were treated with lipofilling. For both groups and in all cases, good integration of the filled material was observed in the malar region, with no significant treatment complications and the last follow-up visit demonstrated good results and overall satisfaction. Hyaluronic acid fillers and lipofilling are therefore the ideal answer to patients who aim for a natural and immediate result with manageable complications, but, unlike Hyaluronic acid, autologous fat allows us to obtain a long-lasting effect over time, resulting the closest thing to an ideal facial filler.

Contour enhancements of the midface, and particularly the malar region, make up a dominant aspect of aesthetic surgery, as well as traumatic, congenital and extirpative defect corrections (1-11). The characteristics of the ideal material for this purpose include easy harvesting with minimal donor site morbidity, good biocompatibility at the recipient site, minimal risk of perforation, ease at remodeling, desired form maintenance and consistency *in situ* and in body tissue inertness with an easy reproducibility of the technique (12, 13).

There are various options to take into careful consideration for the reconstruction of a malar depression, including autologous tissue grafts, allogenic tissue grafts and alloplastic materials.

Alloplastic materials are readily available, lack

donor-site morbidity, decrease surgical time and cost, and have relatively good post-operative tissue tolerance (14). Various alloplastic materials have been used in facial cosmetic and reconstructive surgery including silicone, Gore-Tex, Medpor, and expanded polytetrafluoroethylene (ePTFE) (1,15).

In comparison, autogenous grafts, such as grafted adipose tissue, have the advantage of relative resistance to infection, ease of incorporation into new tissues, absence of a foreign body reaction and decreased incidence of extrusion. With lipofilling one can get a more natural reconstruction of the face contour although they are lowly invasive with minimal donor site morbidity (15).

Furthermore, a number of various Hyaluronic acid fillers can be used for midface rejuvenation

*Key words: malar region, hyaluronic acid, rejuvenation, filler*

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0393-974X (2017)

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and malar enhancement due to their efficacy and durability. Hyaluronic acid, a glycosaminoglycan (GAG) that binds water molecules and is involved in tissue hydration, is markedly reduced in aged skin (16-25). Hyaluronic acid fillers are readily available, e.g. alloplastic material, and a lowly invasive strategy with an optimal tissue tolerance, e.g. lipofilling.

Alloplastic implants have been an attractive option for the augmentation of malar deficiency because of the unlimited amount of material, reduced surgical time, and easy handling. Among alloplastic materials, there is emphasis on high-density porous polyethylene-Medpor (Medpor, Porex Surgical Inc, Newman, GA) (26) extensively used on humans for the past several years and has proven stable for facial reconstructions. However, Medpor has disadvantages too as radiolucent on imaging studies, infection, hematoma, seroma, subcutaneous palpation, and deformation of the contours (27). The displacement of the implant may result in protrusions through the skin, compression of nerves and of other important structures (28).

The goal of midface rejuvenation is to decrease the prominence of grooves and creases as well as to provide volume to atrophied tissue. In turn, patients need to slow down post-operation retrieval times and at the same time, enjoy an optimal aesthetic outcome, which has led to an increasing trend towards less invasive treatments. What is more, the possibility, albeit minimal, of complications deriving from alloplastic prostheses implant has moved our sample towards a larger use of Hyaluronic acid fillers and lipofilling.

This study aims at evaluating different options as well as identifying and optimizing the right strategies, by analyzing different procedures and materials, in the management of midface enhancement in patients with malar depression.

## MATERIALS AND METHODS

Patients with malar hypoplasia and midface retrusion with an unbalanced profile and over-projecting mouth are considered the best candidates for augmentation with a malar or submalar implant. The selection of the appropriate implant is based on the physical exam. Analysis with the

patient both smiling and in repose help identification of areas of volumetric deficiency, with particular attention paid to asymmetries. After critical analysis of the patient's facial features, implants are selected that enhance volume and give the appearance of full, youthful cheeks.

In the present study, 82 implants were used for midface augmentation in 41 patients (38 women, 3 men) between January 2014 and January 2016. The age range was 26-68 years (mean age 43.7 years). Twenty-five patients were treated with Hyaluronic acid implants, the remaining 16 patients, with lipofilling.

The implants were used for augmentation in the paranasal area, malar area and orbital area. Post-operatively, patients were asked to come back for follow-up at weeks 2 and 4 and at months 3.6 and 12. At each follow-up visit, surgical complications were documented and patients were photographed. Position, facial expression, focal distance and camera settings were standardized. They were also asked to rate their overall satisfaction with the post-surgical facial appearance on a five-point scale (1: poor; 2: fair; 3: good; 4: very good; 5: excellent).

### *Procedures*

For patients treated with Hyaluronic acid fillers, a 2 mL of the product was injected in the subcutaneous layer of the right and left malar/submalar areas. Five injection sites for each side were identified detecting relatively avascular subdermal areas able to spread Hyaluronic acid along the interstitial spaces between lymphatic vessels. The product was administered with a 27-G needle using a bolus technique. Two sessions were performed, once a month, for 2 months.

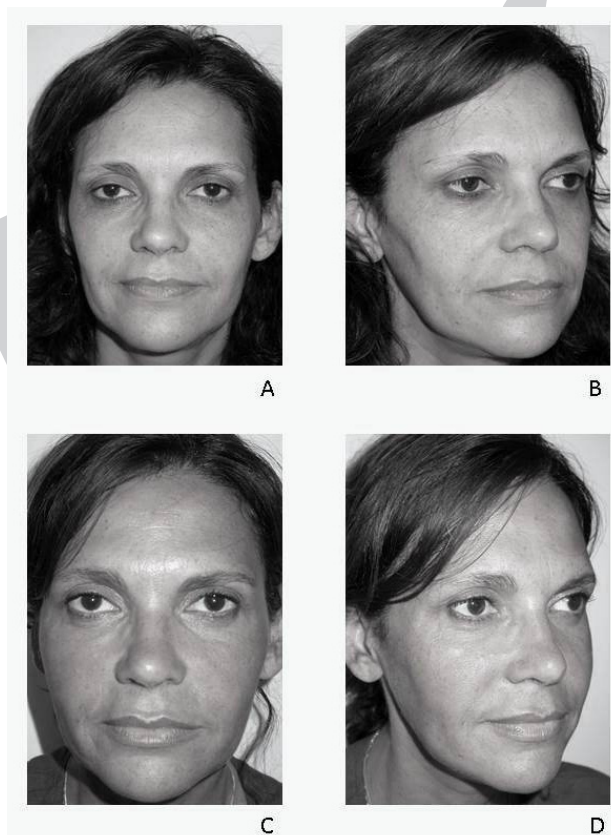
For patients treated with lipofilling fat harvest, preparation and reinjection were performed in a standardized fashion in accordance with Coleman's recommendations (29) by the same plastic surgeon.

The donor region was infiltrated with Klein solution (500 ml normal saline, 1 ml 2% lidocaine, 1 ml 0.1% epinephrine). After adequate anesthesia, a suitable amount of subcutaneous fat was harvested from the abdominal wall using manual suction with a 10 cc syringe and a 3 mm blunt cannula. Centrifugation was carried out at 3000 rpm for 3 min. Subsequently, the blood/tumescent fraction was drained and the oil was removed. The resulting purified fat layer was transferred into multiple 1-ml syringes

and used for grafting the malar region, according to the principles of structural fat grafting. Multiple access sites and a fan-like pattern technique using 1.4 mm and 1.8 mm blunt cannulas were used to transfer small aliquots of fat into various depths of the soft tissue (from the dermis to the muscular fascia or muscle). A three-dimensional network of tunnels was created to improve the contact between the graft and the local adipose tissue, in order to maximize its harvest. The quantity of transplanted adipose tissue was determined by attempting to obtain symmetry with the contralateral side with 30% overcorrection. Overcorrection was performed with the realization that there would be some loss of volume over time.

## RESULTS

For the Hyaluronic acid group, good integration of the filled material was observed in the malar region



**Fig 1.** Patient with moderate midface ptosis treated with HA filler: **1 A-B:** Frontal view and 3/4 view, before treatment; **1 C-D:** Frontal view and 3/4 view 12 months after the treatment.

in all cases. Retrospective analysis of photographic documentation showed a progressive volumetric decrease in the first week after treatment, due to edema reabsorption; after that the volume obtained remained stable. At 12 months after treatment a decrease in the increase in volume of the malar region was observed, that might need further treatment. There were no significant treatment complications. Mild edema occurred frequently during the first postoperative week. No hematomas, infections, vascular or nervous injuries were recorded.

Analysis of patient satisfaction after the last follow-up visit clearly demonstrated better results with a 4.6 rate in their overall satisfaction.

For the lipofilling group, good integration of the grafted fat was observed in the recipient sites in all cases. Retrospective analysis of photographic documentation showed progressive volumetric decrease for up to approximately 6 months after surgery. After that, graft volume remained relatively stable. No further treatment was required 12 months after surgery.

There were no significant surgical complications, either from the fat harvest site or from the reconstructed site. Mild edema and bruising were frequent during the first post-operative week. No hematomas, infections, vascular or nervous injuries were recorded. Four patients felt the need to have a second procedure while none needed a third one.

Analysis of patient satisfaction after the last follow-up visit clearly demonstrated better results with a 4.5 rate in their overall satisfaction.

## DISCUSSION

Volume restoration is not a new concept in midface rejuvenation. A number of authors believe that malar volume deflation actually precedes gravitational descent in facial aging, and consequently, optimal rejuvenation of the aging midface and malar area should involve repositioning of ptotic soft tissues, as well as correction of volume deficiency where present (29-43).

Surgical procedures involve mobilization of the midface flap and their repositioning according to an accurate pre-surgical planning. The midface flap, after

being adequately released, can be anchored either to the strong temporal aponeurosis with a long suture that authors have termed a “suspender-like” suture, or directly to the lower orbital rim bone with a suture that authors have termed a “belt-like” suture. Results are encouraging, but complications may be possible.

The need of patients to have good cosmetic results with early return to daily activities has increased the search for additional strategies. Use of alloplastic implants for facial augmentation has been well documented (44, 45) for several years. There remains some conflicting ideology as to the safety profile and utility of aesthetic facial augmentation with alloplasts.

Solid implant materials commonly used in facial reconstruction include silicone (polydimethylsiloxane), Silastic (solid silicone elastomer; Michigan Medical Corporation, Santa Barbara, CA), GoreTex (expanded polytetrafluorethylene; W. L. Gore, Associates

Inc., Flagstaff, AZ), Medpor (high-density porous polyethylene; Porex Industries, Fairburn, GA), and Mersilene (nonresorbable polyester fiber; Ethicon, Somerville, NJ). Other less common implant options include Supramid (polyamide nylon mesh; Ethicon), PMMA (polymethylmethacrylate), and Permacol (porcine dermal collagen; Tissue Science Laboratories PLC, Aldershot, United Kingdom).

Thus, among allografts, the porous high-density polyethylene (Medpor) has been extensively used in humans for many years and proved to be stable for craniofacial, orbital floor and ear reconstructions. It is a pure polyethylene with only one manufacturing process and pore size (150-200 $\mu$ m). Medpor is an alloplastic, biocompatible, flexible, resilient and nonabsorbable biomaterial and one of its main advantages are its pores, which permit vascularization through the implant installed.

Despite the possible benefits resulting from its use, Medpor has several disadvantages too, such as: radiolucent (46) on imaging studies, infection, hematoma, seroma, subcutaneous palpation, and deformation of the contour (27). Still, the displacement of the implant may result in skin protrusion, the compression of nerves and other important structures (28).

Infection in the setting of alloplastic implantation has always been an issue of concern as these materials lack the vascular ingrowth seen in autologous grafts and additionally, serve as a surface for bacterial colonization and biofilm formation. It remains controversial whether porous materials, like Medpor, have a greater risk of infection when compared to silicone, which has smooth counterparts.

Walker and Toriumi documented the presence of biofilms on explanted alloplastic facial implants (47) concluding that both silicone and Medpor are able to promote and harbor biofilm formation, although biofilms appear to grow more readily and more densely on implants with rougher surfaces such as Medpor.

Similarly, Berghaus and Stelter (48) have demonstrated that porous implants may have a higher risk of infection early on by providing scaffolding for bacterial growth.

Possible complications from Medpor implants



**Fig 2.** Patient with severe midface ptosis treated with lipofilling. 2 A-B: Frontal view and 3/4 view, before treatment; 2 C-D: Frontal view and 3/4 view 12 months after the treatment. It can be also noted a local improvements in skin quality.

are well documented in literature by de Moraes Ferreira, et al, in their review which includes diplopia, hypoesthesia, enophthalmos, limited eye movement, hematoma, infection, swelling, pain, displacement of implant, fistula formation, palpability of the implant, scar formation, seroma and dystopia.

Ridwan-Pramana, et al, looked at the outcomes from 69 Medpor facial implants placed in their institution and found an overall complication rate of 31.8% although it is correct to specify that the use of Medpor was not limited to the malar region only (49).

Finally, overcorrection must be avoided as this can promote extrusion of material, especially when skin is under tension and the soft-tissue mantle is damaged (48). What is recommended is fixation of the implant in place with osteosynthetic material that increases surgery time, cost and complexity (50). Because of likely complications deriving from the use of alloplastic material, we observe a higher and higher trend in the use of allogenic materials.

Midface rejuvenation with injectable Hyaluronic acid fillers have become an outstanding option for treatment of midface aging since it offers a versatile, safe and effective means of restoring a youthful appearance while being less invasive and disruptive than surgery (51, 52).

Correction with Hyaluronic acid fillers of the latest generation can last for up to 1 year, many patients choose to repeat the treatment in order to maintain their appearance.

Adverse events attributable to treatment with Hyaluronic acid are edema, erythema, and bruising although mild and resolve spontaneously within 14 days.

Furthermore, Hyaluronic acid is biodegradable filler. Fillers like these are generally preferred over permanent fillers. A major reason for this is safety; if complications occur they will generally disappear spontaneously. Biodegradable fillers also allow the possibility of surgical correction in the future, whereas with permanent fillers surgery may no longer be an option.

To patients who prefer a less invasive treatment, such as Hyaluronic acid fillers, even more stable and long-lasting, lipofilling of the malar region can be indicated. The benefits of this technique include a

readily available and autologous source of permanent filler, simultaneous body contouring in the process of fat harvesting, and relative ease of execution, negligible morbidity, low cost, with predictable and reliable results.

In addition, unlike synthetic fillers, autologous fat has the ability to change in structure with the patient's physiologic changes and adverse reactions are extremely uncommon.

Local improvements in skin quality (29) at the graft location are another benefit of lipofilling and may add to satisfaction with the post-operative result. Recent investigations on multipotent adipocyte-derived stem cells may enable thin patients to benefit from lipofilling (53-55).

## CONCLUSIONS

Complications found with midface solid implants include inadequate correction or overcorrection, malposition, implant migration, infection, extrusion, nerve hypesthesia/anesthesia, and facial nerve injury. For this reason, we cannot consider alloplastic implants as a valid non-invasive alternative to surgery.

On the contrary, Hyaluronic acid fillers and lipofilling turn out to be the ideal answer to patients who aim at obtaining a natural and immediate result with manageable complications.

In our view, autologous fat is the closest thing to an ideal facial filler. It is readily available, inexpensive, and simple to obtain. There is no risk of host rejection or other immunologic response. Finally, unlike Hyaluronic acid, it allows us to obtain a long-lasting result over time.

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