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CASE REPORT

Fat Grafting to the Nose: Personal Experience with 36 Patients

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Abstract
Background Clinicians are facing an increasing trend toward nonsurgical nose reshaping using synthetic injectables, mainly for patients who refuse standard rhinoplasties. Autologous fat grafting is a safer and convenient alternative to permanent or semipermanent injectables due to better results as well as fewer and milder side effects. The author reports his experience with fat grafting to the nose using his personal technique for 36 consecutive patients. The experience covers primary treatments of noses not treated by surgery, treatment of post rhinoplasty deformities, and combination fat grafting and rhinoplasties.
Methods The technique used by the author for fat grafting to the nose does not differ significantly from that used for other body or face areas. It is based in the atraumatic extraction of fat fragments using a multi-orifice cannula and injection of these fragments using 1.4- to 1.6-mm cannulas or needles. In combining rhinoplasties with fat grafting, fat grafts are used in the same location instead of a prosthesis or cartilage grafts.
Results The initial analysis of postoperative results showed a good to high level of patient satisfaction, particularly in primary cases, with virtually no complications or severe side effects. Some easily corrected side effects probably were learning curve dependent.
Conclusions Autologous fat grafting is an effective and reliable technique for aesthetic and reconstructive nose reshaping for patients who refuse surgical treatments. Although optimal results can be achieved with this technique, they are not comparable with those obtained by surgical rhinoplasties, and this is an important issue to discuss with the prospective patient.

Keywords Fat grafting · Lipofilling · Lipoimplant · Lipostructure · Nose

Recent years have found us facing an increasing number of patients desiring aesthetic improvement of nasal shape without having to undergo surgical rhinoplasty. Although surgical rhinoplasty must be the primary indication for any patient seeking aesthetic improvement of the nose, the ability to smooth out irregularities or contour deformities and asymmetries using an injectable material holds great appeal due to the apparent simplicity of the correction. The ability to fix a deformity with local or no anesthesia, less financial expense, and no downtime is appealing. The great majority of treatments I have witnessed involve the use of permanent or semipermanent fillers injected in the dorsum, tip, and columella.

Regarding semipermanent fillers, an acceptable degree of safety depends on an even and complete resorption, but some potential complications still must be faced [1, 2]. The patient must forego a permanent result unless he or she has repeat injections on a regular basis, and if the patient finally wishes to undergo a standard surgical rhinoplasty, we must wait for the complete resorption of the implant until surgical planning can be done with confidence. The use of permanent fillers in the nose poses additional risks of severe adverse reactions, skin necrosis, and extrusion in

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addition to the almost complete difficulty evacuating the filler thoroughly and the obvious difficulties in eventual surgical planning.

I discuss my experience in nonsurgical rhinoplasty using autologous fat grafting instead of injectable fillers for patients who refused primary or secondary surgical rhinoplasties. The discussion also deals with the combination of open or closed rhinoplasty with fat grafting to paranasal regions to achieve equal or better results than with cartilage grafts or solid prostheses in the same regions.

Patients and Methods

Since April 2007, I have analyzed 36 procedures for 33 patients, with a maximum follow-up period of 14 months (mean, 7 months). For 18 patients, nasal lipoimplantations were performed as the unique method of improving nasal aesthetics whether surgery had been performed previously or not (Figs. 1, 2, 3). The patients in these cases always refused a standard rhinoplasty although they all were informed and advised about the differences in final results, limitations, and aesthetic improvements associated with each technique. All the patients acknowledged the limitations of lipoimplantation compared with surgical rhinoplasty.

The remaining 15 patients underwent nasal lipoimplantation as a complement to surgical rhinoplasty (open or closed) with the aim of reshaping the bony dorsum, radix, glabella, or premaxillary region (Fig. 4). Traditionally, patients presenting with short nasal bones, frontal recession, or premaxillary retrusion have been treated with cartilage grafts or a solid prosthesis during rhinoplasties to supplement deficient bone in this area. In this study, fat grafts were used instead of cartilage or prosthesis to supplement deficient bone so their efficacy could be assessed.

Nasal reshaping performed with lipoimplantation alone was performed with the patient under local anesthesia using 3–12 ml of fat harvested from the lower abdomen or inner thighs. All lipoimplantations performed in combination with rhinoplasties were done with the patient under general anesthesia using 6–12 ml of fat harvested from the same areas. Due to severe postrhinoplasty deformities, three patients needed an additional procedure to refine the final result (Fig. 1).

Follow-up visits were scheduled at 7 days, 15 days, 3 months, 6 months, and 12 months, although unfortunately, it was not easy to get patients back in the office after postoperative month 6. Basic analysis including changes in volume and shape, aesthetic improvement, and patient satisfaction was performed by comparison with pre- and postoperative control photographs.

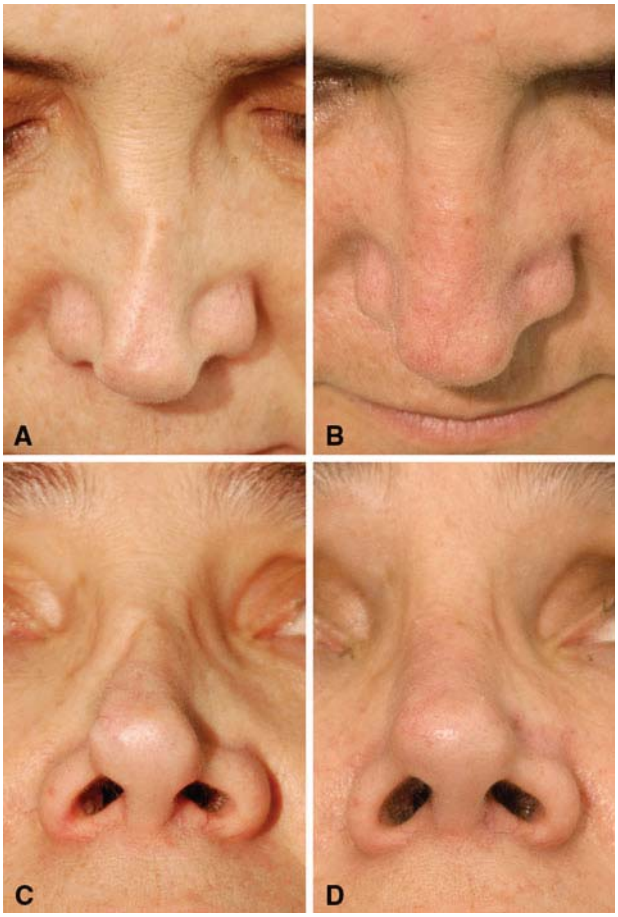


Fig. 1 **a, c** Preoperative view of a patient after a previous rhinoplasty performed by another surgeon. **b, d** Postoperative view at 6 months showing nasal lipoimplantation and touch-up procedure to improve dorsal and tip contours

Nasal Danger Zones

The arterial supply of the nose is derived from the ophthalmic and facial arteries (Fig. 5). The ophthalmic artery arises from the internal carotid just as that vessel is emerging from the cavernous sinus. The central retinal artery is the first and one of the smaller branches of the ophthalmic artery. The ophthalmic artery terminates in two branches: the supratrochlear artery and the dorsal nasal artery. The dorsal nasal artery emerges from the orbit above the medial palpebral ligament and divides into two branches. The first branch crosses the root of the nose and anastomoses with the angular artery. The other branch runs along the dorsum of the nose, supplying its outer surface in its route toward the nasal tip, and anastomoses with its fellow artery of the opposite side and with the lateral nasal branch of the facial artery.

The lateral nasal artery is derived from the facial artery as that vessel ascends along the side of the nose. It supplies the ala and dorsum of the nose, anastomosing with its

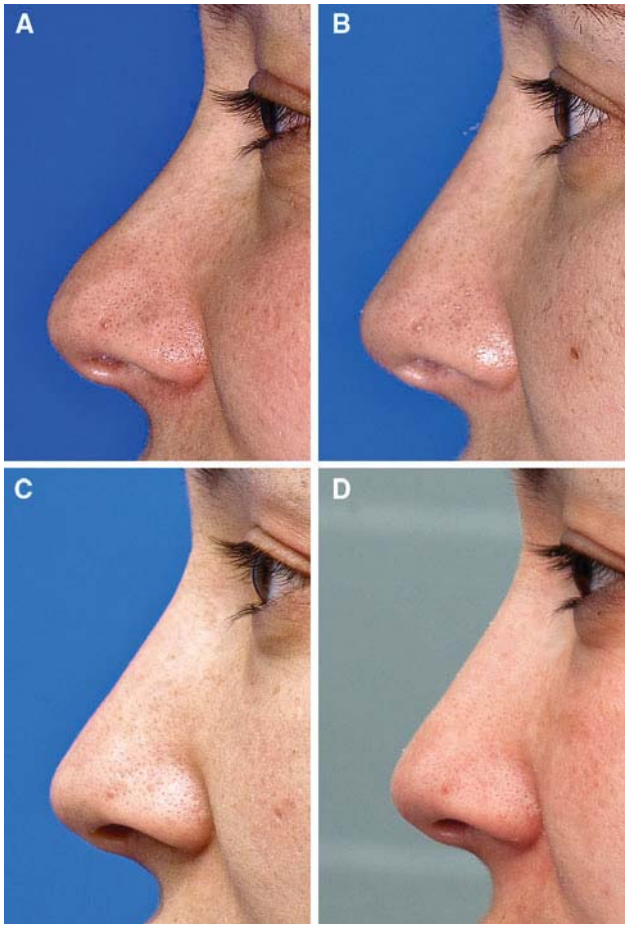


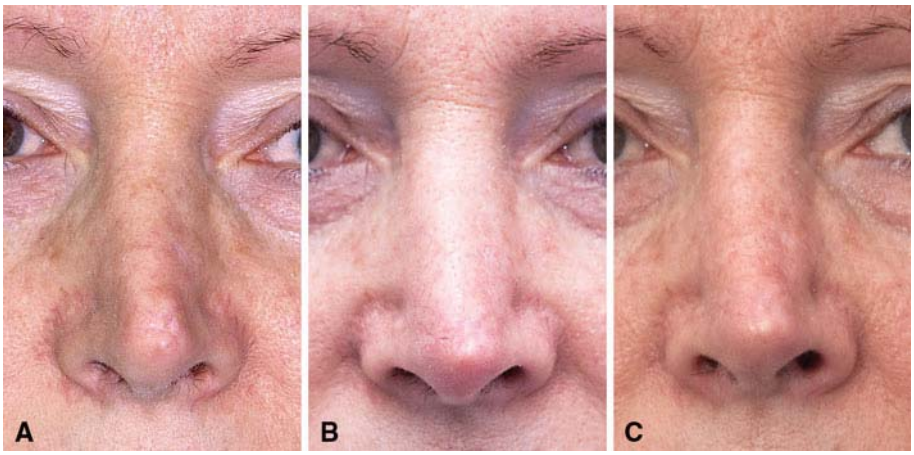
Fig. 2 Preoperative (**a**) and postoperative views 2 weeks (**b**), 6 months (**c**), and 14 months (**d**) after nasal lipoimplantation to improve tip and dorsum contours

fellow, with the septal and alar branches, with the dorsal nasal branch of the ophthalmic artery, and with the infraorbital branch of the internal maxillary. Finally, the columellar artery, a branch of the superior labial artery, runs up the columella, ending and anastomosing in the tip with branches of the lateral nasal artery.

Fig. 4 Preoperative and 12-month postoperative views of combined open rhinoplasty and lipoimplantation to the premaxillary area for improvement of facial profile and nasal base proportions

From this anatomic review, we can obtain the main conclusions. The proximal blood supply of the nose has direct and short connections with the internal carotid and retinal arteries. This means that embolization of this network during injection in the area of the dorsum, radix, or glabella can cause a variety of disastrous consequences such as blindness or brain infraction [1, 3]. The distal blood supply, mainly at the tip and in alar regions, also can be affected by embolization, causing a variety of ischemic phenomena.

Fig. 3 Preoperative (**a**) and postoperative views 5 months (**b**) and 12 months (**c**) after nasal lipoimplantation to correct slight dorsal deviation and pinching of the tip



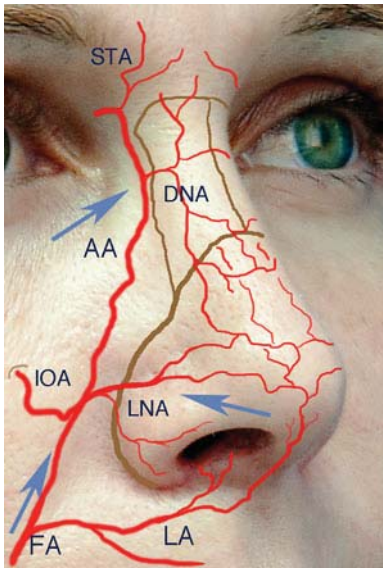


Fig. 5 Main arterial supply to the nose and danger zones regarding fat injection (*arrows*). *STA* supratrochelar artery, *DNA* dorsal nasal artery, *AA* angular artery, *IOA* infraorbital artery, *LNA* lateral nasal artery. *LA* superior labial artery, *FA* facial artery

Thus, it is of outmost importance to follow the same strict principles in performing fat grafting to the nose as would be followed for any other facial region if serious complications are to be avoided. Use of blunt-tip cannulas whenever possible reduces the chance of perforating the arterial wall and thus cannulating the arterial lumen. Applying soft pressure to the plunger of the syringe helps to deposit the smallest fat fragments possible and also to reduce the chance of propelling the fat through the arterial lumen in the event it is cannulated.

Unfortunately, at least in my experience, fat grafting to the nose for some patients with previous surgery is more challenging for two main reasons. First, the blood supply architecture usually is distorted and the tissue planes less identifiable. Second, fat grafting through blunt-tip cannulas can be difficult due to severe soft tissue scarring and adherence, particularly over the nasal dorsum. Only in this case do I perform fat grafting with 18-gauge needles.

Technical Details

The fat grafting to the nose that I perform does not differ much from the technique used for other body areas and reported previously [4–6] including treatment of perinasal areas such as the premaxillary region [6]. The technique consists basically of atraumatic harvesting of fat fragments with the patient under local anesthesia using a 3-mm multi-orifice cannula (Fig. 6) attached to a 10-ml syringe. This type of cannula allows harvesting of 2- to 3-mm fat fragments with ease.

Fig. 6 Cannulas used by the author since 1998 to perform atraumatic harvest of 2- to 3-mm fat fragments

Usually, it is not necessary to obtain more than 12 ml of fat ready for injection to treat the whole nose and perinasal areas. This usually means that the clinician needs to harvest at least 24 ml of lipoaspirate due to the loss of tissue during the washing and decanting process. Harvested fat is washed with Ringer lactate and allowed to decant for 20 min. Once decanted, fat can be cautiously passed to smaller syringes of 1 or 2.5 ml for easily handling.

Fat is injected routinely in a retrograde manner using 1.2- to 1.4-mm blunt-tip cannulas and applying very gentle pressure on the plunger. I use conventional 18-gauge needles only when dealing with highly adherent or fibrous tissues in the nasal dorsum of patients who have undergone previous surgery. Conventional sharp needles need not be used in primary cases. They pose an additional risk of intravascular injection with disastrous consequences. In any case, the clinician must have in mind all danger zones and vascular territories of the nose to prevent an unwanted intravascular injection. In dealing with the supratip and glabellar region, special care must be taken in introducing a cannula or needle from the tip because these approaches pose the greatest risk.

The clinician can take advantage of two main tissue planes when injecting fat in the nose. The submuscular aponeurotic system (SMAS) plane is present along the entire nasal dorsum and has continuity with the radix and glabella. The subcutaneous plane also is useful in the dorsum, and it is the only plane to be found over the tip and lateral crura of the lower lateral cartilages. In secondary cases, the clinician should be cautious because this plane probably will not be found with ease, and different degrees of fibrosis will impair cannula advancement and fat placement. The clinician should always try to evaluate and remember the vascular anatomy of the patient's nose and

glabellar area to avoid severe complications such us intravascular injection of fat.

Unlike other body and face areas, the soft tissues of the nose do not allow the creation of a three-dimensional mesh. For this reason, caution is needed in performing fat injection, both in the quantity and the location. Due to the relatively small caliber of the cannulas and needles used in nasal fat grafting, the clinician can choose whatever access point is needed. However, it is preferable to avoid entering the nasal skin directly or near the principal arterial trunks of the nose. I usually perform fat grafting to the nose under a regional block of the nose, avoiding direct infiltration of nasal tissues to avoid any distortion of profile. Once the procedure is completed, I routinely do not use any splint or tape to immobilize nasal tissues.

For the current series of patients, the nasal lipoimplantations performed in combination with rhinoplasties followed the principles described once the rhinoplasty was finished and all the wounds were closed. The glabellar region, the radix, and the premaxillary region were treated individually if deficient to improve the final nasal profile. The glabella and radix were approached from the middle frontal region 1 cm above the eyebrows, and the premaxillary region [6] was approached from the nasolabial fold 2 cm lateral to the nasal ala. In contrast to the technique described by Cárdenas and Carvajal [7], I do not place fat parcels in the dorsal nasal skin of these patients, but only in the radix, glabella, and piriform aperture, with the aim of adding volume if deficient to further enhance nasal profile and proportions. Final nasal dressings and splinting were done as usual at the end of the rhinoplasty.

Results

The follow-up visits and control photographs were scheduled at 24 h, 7 days, 15 days, 3 months, and 12 months for evaluation of improvement and stability of results. For the nasal lipoimplantations performed in combination with rhinoplasties, dorsal splints were removed at 7 days, and follow-up visits were scheduled at the same intervals.

After 24 h, nasal swelling was mild, with nearly complete absence of equimosis in primary cases. Patients were happy to resume daily activities and daily work in a fairly short time. Lipoimplantations performed for patients with previous surgery showed a bit more swelling and equimosis than in primary cases. When combined with rhinoplasties, the degree of swelling and equimosis was equivalent to that of cases managed without associated lipoimplantation except in the glabellar area.

Grafted fat volume slowly decreased over the first 15 days after treatment and until the first month but showed a high degree of stability thereafter. After 4–5 months, no patient showed changes in contour or volume. The percentage of final graft take was difficult to calculate due to the small volumes used, but based on control photographs, it was estimated to be 60% in secondary cases and 75% in primary cases.

Patient satisfaction was good to high in 80% of cases, particularly in cases of post rhinoplasty deformity. Only two patients were disappointed, expecting more profound changes from this technique. Only three patients presenting with severe post rhinoplasty deformities needed a touch-up procedure to add volume to an originally highly depressed and adhered dorsal skin and to two under projected and scarred tips that could not receive all the fat volume required in the first procedure. Swelling improvement in combined cases did not differ much from that in rhinoplasty cases with no lipoimplantation.

Beside pure modeling capabilities, fat grafts offer proven biologic benefits in cases of scarred, pigmented, and other skin disorders. It was not the purpose of this study to evaluate the biologic improvements provided by fat grafting to the nose. Nonetheless, I have witnessed improvements in skin quality, particularly in pigmentations, adherences, and texture, which were more evident after treatment of secondary cases (Fig. 3). Specific studies are needed for objective evaluation and measurement of these findings.

The current series of patients experienced no complications or untoward results that required additional treatment or surgical interventions. Only in one combined case did minimal displacement of the grafted fat in the radix occur, probably caused during the nasal splinting. This complication was easily treated without major consequences. None of the patients experienced significant changes in body weight during the follow-up period, so the impact of body weight changes in fat graft behavior could not be evaluated. Patients who reported functional or obstructive airway problems were informed about the inefficacy of fat grafting to correct the symptoms. No new symptoms of airway obstruction or worsening of previous symptoms were noticed in any patient.

Discussion

The tendency of patients to seek minimally invasive cosmetic treatments also reaches nasal aesthetics. Nonsurgical rhinoplasty, also called medical rhinoplasty, has been performed traditionally using permanent or semipermanent injectable fillers [2]. With semipermanent fillers, the patient must forego a permanent result unless he or she repeats the injections on a regular basis. The use of permanent fillers makes it impossible or quite difficult to remove the implant completely or to accomplish proper

safe surgical planning in the event that the patient desires an eventual surgical rhinoplasty. In either case, complications arising from the use of injectable fillers are already known. Some disastrous complications reported in the literature include blindness and strokes [3]. Other local complications are intolerance, granulomas, extrusion, and a subtotal necrosis tip or nasal ala.

Fat grafting to the nose must not be considered a risk-free technique because potential complications can be devastating. The use of fat grafting removes certain filler-dependent side effects such as the need to repeat treatments in the long term, intolerance or rejection of foreign material, or difficulty planning in the event that a patient eventually needs or wants a surgical rhinoplasty. Embolization of the arterial nasal network, a technique-dependent complication that can occur with fat grafting and also with other injectable fillers, has been well documented previously [3]. Therefore, to prevent its occurrence, every plastic surgeon dealing with this technique must have a thorough knowledge of the nasal arterial network and soft tissue anatomy. In this sense, arterial embolization of the angular or dorsal nasal artery in a cranial direction (via the tip approach) will cause immediate pain, blindness, or stroke, whereas arterial embolization of the dorsal nasal artery or lateral nasal artery in a caudal direction (via the glabellar, radix, or lateral alar approach) will cause necrosis of soft tissues to a variable degree. Using a proper technique that includes injection with blunt cannulas whenever possible, very gentle pressure applied on the syringe plunger, and placement of fat parcels in a retrograde manner is mandatory when nasal fat grafting is performed.

It is essential to understand that true nasal modeling is obtained through improving architectural elements of bone and cartilage, leaving soft tissues to adapt to changes and draw the final result. Autologous fat grafting applied to nasal aesthetics works oppositely by altering only soft tissues to mask architectural imbalances or irregularities except when it is used in combination with rhinoplasty to supplement deficient bone in the radix, glabella, and premaxillary region. In these later cases, fat grafting has worked with the same efficacy as cartilage grafts or solid prostheses in the same locations. Obviously, we will face patients with bone or cartilage architectures that cannot be camouflaged by fat grafts, for example, patients with a coarse boxy tip, an over projected tip, or a tension nose. For these reasons autologous fat grafting to the nose is an indication only for some selected nasal deformities of patients who refuse rhinoplasty as the primary choice and understand clearly the limitations in the final results.

Based on the biologic improvements I have observed in secondary cases, fat grafting to the nose could be the first choice for some selected cases in which a high degree of scarring or adherence might jeopardize dissection or blood supply during open or closed rhinoplasty. Fat grafts have demonstrated the ability to release tightly adherent skin in a way that provides better conditions and makes secondary surgical rhinoplasty safer.

Some other authors have previously reported their personal experiences with fat grafting to the nose [7–10]. Cárdenas and Carvajal [7] reported the use of lipoinjection of the nasal dorsum in combination with open rhinoplasties to obtain smooth dorsal contours with good results. Coleman [8] gave a thorough description of his nasal fat grafting technique in his last book, and Duskova et al. [10] reported their experience with cleft nose refinement.

Conclusions

Surgical rhinoplasty must be the primary approach for patients seeking aesthetic improvement of the nose. Fillers or fat grafts are no substitute for an adequate surgical technique and will never provide better results. Nonetheless, autologous fat grafting also shows itself as a first-line nonsurgical alternative to the modeling of nasal shape and profile in primary and secondary cases of patients who refuse surgical rhinoplasties and accept limitations in the results. The aesthetic nasal and paranasal units can be treated as a whole or as aesthetic subunits individually as needed. It also is possible to combine surgical rhinoplasty with lipoimplantation in the dorsum, radix, glabella, or premaxillary area to improve volume and shape in these areas without the need to use cartilage grafts or solid prostheses.

The described approach to nasal remodeling uses an easy, safe, and reliable procedure that lacks serious complications, side effects, or untoward results if properly performed. However, it is technically demanding if good results are to be obtained and serious complications are to be avoided. Unlike permanent injectable fillers, autologous fat grafts do not pose any risk or difficulties in terms of planning or performing an eventual rhinoplasty throughout the patient's lifetime.

Conflicts of interest The author declares that he has no conflicts of interest to disclose.

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