



Fat graft for facial contouring in patients with post-surgical and post- traumatic defects: A case series study

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Abstract

Background and objective: Facial deformities provide a considerable challenge for both the patient and the facial reconstructive surgeon. They can be caused by congenital, traumatic, and oncological ablative surgery. The aim of the study is to evaluate the reliability of autologous fat grafting in residual facial deformities.

Methods: This is a case series study of 10 patients with secondary facial defects induced by trauma, parotidectomy and orthognathic surgery. The patients were more than 18 years old age and of both sexes. The study was conducted at Sulaimani Teaching Hospital from May to December 2021. The defects were grafted with autologous fat grafts harvested from the abdomen and suprapubic region using two techniques, en-bloc and structural fat grafting (minimum 10 cc to maximum 35 cc).

Result: Mean graft volume (20.8 cc) Revision was required for 10% of patients. Mean satisfaction score (8.3). Patient's satisfaction score increased with graft volume p-value <0.01. No major complications were reported.

Conclusion: Autologous fat graft is a reliable and cost-effective method for correcting mild to moderate facial soft tissue and hard tissue asymmetry, resulting in a significant improvement in the patients' facial esthetics and psychology.

Key words: Fat graft, Facial deformities, Sulaimani.

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Introduction

For both the patient and the maxillofacial surgeon, facial deformities represent a significant difficulty. They can occur because of congenital, traumatic, or environmental factors, or oncological etiology, which can cause psychological suffering as well as functional impairment, normal facial morphology must be restored.¹ It's critical to allow patients to return to their regular routine's activities and a more successful reintegration into society. Furthermore, the quality of damaged people's lives is improving.² In the field of maxillofacial reconstruction, the use of autologous fat transfer has long been a standard technique for correcting both acquired and congenital deformities. In the year 1893, Neuber was the first person to describe it as a treatment modality for facial contour deformities that were caused by tuberculosis. fat grafts play an important part in both the prevention of gustatory sweating and the reconstruction of facial contour defects following parotidectomy.³ Oral and maxillofacial surgeons are the medical professionals who are most likely to recognize fat transfer as a modality that can prevent heterotopic bone formation. In the reconstruction of the temporomandibular joint (TMJ), as well as for the obliteration of the nasofrontal duct or the frontal sinus following trauma.⁴ According to Sydney R. Coleman, autogenous fat possesses many of the qualities of an ideal filler and can be used in a wide variety of contexts. An ideal filler would be one that is taken from the patient's own body, would be fully biocompatible, would be easily accessible in sufficient quantities, would naturally integrate into the host tissues, and would be removable if necessary. The observations of transplanted fat show size changes that are proportional to a patient's weight gain and loss, as well as improvements in the tissues that are surrounding the area where the fat was

placed.⁵ It was thought for a long time that adipose tissue was nothing more than a dormant reservoir of energy that could be used for either storage or production. It is now known that it plays an important role in homeostasis, the metabolism of energy, the function of the neuroendocrine system, the regulation of the immune system, structural support, and organ protection.⁶ Adipocytes make up approximately 35–70% of the total adipose tissue mass in adults and approximately 25% of the total cell population in the human body. Adipocytokines are proteins that are produced by adipocytes.⁷ Not only does adipose tissue contain adipocytes, but it also contains preadipocytes, adipokines, fibroblasts, endothelial cells, immune cells, and, most importantly, adipose-derived stem cells (ASCs).⁸ Many of facial problems results from multiple causes and origins, not purely due to a defect in one type of tissue defects, this is why not uncommonly the plastic or the maxillofacial surgeon conjugate and consider fat grafting with procedures like face lift, and correction of primary asymmetry or asymmetry developed after orthognathic surgery, trauma, post neoplastic surgery.

Patient and methods

This is a prospective case series conducted at Sulaimani Teaching Hospital from May to December 2021 using en-bloc and Coleman techniques on a total of 10 patients who underwent fat grafting for face reconstruction and defect correction. All patients were treated under General anesthesia. Vacuum extraction, syringe aspiration, and surgical excision are all methods for obtaining adipose tissue. Conventional liposuction methods that use high negative pressures for vacuum extraction are not ideal since they can cause up to 90% of adipocytes to rupture.⁹ Regarding the five patients who were chosen to undergo en-bloc grafting, the consent of the patients was required before any





operation could take place. The locations of both the donor and the receiver have been determined. If there was already a scar in that spot, it was examined to determine where the deficiencies were. It was determined whether a submandibular incision or a face-lift incision would be necessary based on the location of the deformity. It was necessary to perform superficial dissection in a subdermal plane using dissecting scissors with blunt ends in order to bring the graft and the subdermal plexus into close proximity with one another. The dissection of the subdermal pocket was extended one centimeter beyond the defect so that the surrounding skin could be rewrapped after the defect was repaired. The lower abdominal region, which had been marked in advance by blade no. 10, was the harvesting location for the graft. The harvested graft was moved into the surgical trolley so that it could undergo any necessary adjustments and finishing trimming in accordance with the parameters that had been predetermined. Beveling the graft in a gentle manner was accomplished with the dissecting scissors. The graft was placed into the pocket that had been prepared at the recipient site. It was determined whether or not the augmented region had the correct level of defect augmentation in all directions. In order to successfully implant the graft into the prepared location, first three to four pull-through 0.3 vicryl sutures were inserted into the skin flap, and then the corresponding corners of the graft were stitched with these sutures. Pull-through sutures were tied over a small piece of gauze before the incision was closed (tie overdressing). To close the wound, we used interrupted sutures by a 6-0 prolene suture. After the operation, the patient received analgesia and antibiotics for a period of seven days (Figure 1), For the other five patients we used structural fat grating which first described by (Sydney R. Coleman).¹⁰ Under general anesthesia, the lower abdomen of each patient was chosen as

the donor site for fat transplant harvesting. In order to inject the tumescent solution, which has lidocaine at a concentration of 0.05 percent and epinephrine at a concentration of 1:500,000, through lamis infiltration cannulas, into the donor site. Waiting for 10 to 15 minutes is recommended in order to ensure that the anesthetic is distributed evenly throughout the tissues and that the epinephrine has the opportunity to exert its full effect. In order to harvest fat grafts, a Coleman cannula measuring 2 millimeters by 230 millimeters is connected to a luer-lock syringe of 10 milliliters capacity that has a single hole drilled into its tip. In order to reduce the amount of tension that is applied to the fat parcels, a suitable quantity of fat is gently aspirated from the syringe by continuously applying 1.5 cc of negative pressure to the plunger. After properly harvesting the fat graft, we removed the plugger from the syringe and spun it in a centrifuge for three minutes at a speed of 3000 revolutions per minute. After centrifugation, you should be able to see three layers in the yellow supernatant of the syringe: the ruptured adipocyte and blood and injected solution colored at the bottom, and the middle layer, which primarily consists of usable fat parcels that can be used for fat injection. In order to get ready for the fat injection, the pure fat was put into syringes with luer-lock needles that were 1 cc in size. Fat grafts are injected into multiple tissue areas (within subcutaneous tissue and under the superficial musculoaponeurotic system) in multiple tunnels and multiple tissue planes using a 1 cc syringe that is connected to a blunt type I Coleman fat injection cannula with an external diameter of 1mm in a fan-like pattern. During the withdrawal process, only very small amounts of fat grafts are radially injected into any given area at any given time.¹¹ In order to prevent a direct injury to the facial nerve in the buccal region, the needle should be positioned parallel to the



nerve. Before administering each injection, the syringe should be withdrawn to check on the circulation of the blood and prevent the injection of fat grafts into blood vessels, which could result in the formation of fat emboli.

Results

All the patients completed the follow period. The patient details are shown in, Table (1). Five cases were due to trauma to (left angle

of mandible bullet injury, left buccal, right temple, right malar and left temple and frontal with RTA). other 2 cases with parotidectomy, Figure (1). In these 8 cases the vascularity of recipient bed decreased due to trauma and surgery.¹² Which had some degree of fat resorption, 5 cases done by en-bloc technique because they have previous scar and for scar revision.⁹



Figure (1): A 55 years old female. A: preoperative with obvious deformity in left angle of mandible. B: 3 months postoperative after en bloc autologous fat graft with face lift.

Table (1): Details of the patients and defects

Age	Sex	Defect site	Cause of defect	Harvest technique	Graft volume(cc)	Revision
55	Female	Left angle of mandible	Trauma	En-bloc	35	No
37	Male	Left parotid region	Parotidectomy	En-bloc	25	Yes
40	Male	Right parotid region	Parotidectomy	En-bloc	30	No
34	Female	Right parotid region	Parotidectomy	En-bloc	25	No
45	Female	Left buccal	Trauma	En-bloc	15	No
35	Female	Right temple	Trauma	Structural	20	No
37	Female	Right malar	Trauma	Structural	10	No
27	Male	Left temple and frontal	Trauma	Structural	25	No
22	Female	Right malar	Orthognathic	Structural	12	No
20	Female	Left mandible	Orthognathic	Structural	11	No





generally, we did about 15% overcorrection to overcome the resorption, one of our patients we did revision, at 6 months, the patient’s improvement was evaluated by visual analogue scale of patient and surgeon satisfaction on a 10-point scale with “10” being “most satisfied,” patients reported satisfaction ratings of 5-10, we found that structural fat grafting technique had better result, Table (2).

Table (2): Patient and surgeon satisfaction

Patient satisfaction			Surgeon satisfaction			
	Mini mum	Maxi mum	Mean	Mini mum	Maxi mum	Mea n
En-bloc	7	10	8.4	7	9	8
Struct ural	9	10	9.4	8	10	9

Patient satisfaction was improved with increased graft volume ($p < 0.001$), and greater defect correction had a more favorable effect on patient psychology. But en-bloc technique was better when there was need for scar revision and facial nerve protection. One patient needs repeating graft procedure due to asymmetry.

Discussion

As a result of recent advancements and a reduction in the risk of complications, the fat graft technique has garnered widespread acceptance as an option for the reconstruction of soft tissue in the craniofacial region.¹³ The transplantation of fat is a biocompatible tissue that is resistant to infection, has a minimal risk of morbidity at the donor site, is readily available, and has a high level of durability.¹⁴ To prevent graft resorption, it is necessary to take several factors into consideration. The thickness of the grafts does not exceed 2 centimeters¹⁵ there is careful handling of the grafts, an adequate vascular bed, appropriate graft immobilization, hematoma prevention, a sterilization protocol, and subsequent

infection prevention are all essential.¹⁶ For cosmetical reason the en-bloc graft should be harvested from a concealed area of the lower abdomen or the suprapubic region utilization of high negative pressures for vacuum extraction in conventional liposuction techniques is suboptimal due to the potential rupture of up to 90% of adipocytes. It is recommended that the transplant be taken from hairless areas of the body or from skin with very fine hairs to reduce the risk of epithelial cyst formation.¹⁷ It is possible for complications related to the en-bloc procedure to manifest themselves either immediately after surgery or several months later. Early consequences can include seroma, hematoma, liquefaction, infection, and ecchymosis within the donor or recipient site. Late complications include the development of cysts, inadequate correction, excessive correction, and graft resorption.¹⁸ Fat absorption leading to volume loss was the most common minor complication that was reported in 1 case that required secondary fat grafting six months after the initial procedure. The possibility of the patient requiring secondary fat grafting must be explained to all patients before any fat grafting procedure is performed. In this study, there were no cases of infection reported. Following glabellar fat grafting, Dreizen NG reported a case of blindness caused by ocular fat embolism; however, we did not experience any major complications such as blindness, and this is a very rare occurrence utilizing a technique known as structural fat grafting.¹⁹ According to S.R. Coleman, the risk of vascular penetration can be reduced by using a cannula with a blunt tip and performing an initial withdrawal before administering the injection. We avoided fat embolism by using a cannula with a blunt tip, a syringe with a capacity of 1 cc, and an injection technique that involved a gradual withdrawal of a relatively small quantity of fat under low injection pressure.





Conclusion

Both en-bloc and structural fat grafting are effective in the reconstruction of facial defects of various etiology and over correction is necessary to compensate for possible graft resorption. Further studies in larger samples with longer follow up periods are needed to further confirm the beneficial effect of facial defects reconstruction autogenous free graft.

Conflicts of interest:

There were no conflicts of interest.

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