

## FACE RECONSTRUCTION THROUGH LIPOSTRUCTURE

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### INTRODUCTION

Grafting adipose tissue to correct the soft parts in the maxillo-facial area was first used and described over 100 years ago by Neuber, in his search for an ideal natural material [1]. By sampling some block of adipose tissue from the abdomen, the author carried out a fine correction of volume flaws at the level of the cephalic extremity. In 1912, Hollander underlines and reports the facial modifications that appear after fat infiltration in the case of patients with facial lipoatrophy [2]. A step forward is taken in 1926 by Miller, who published data based on his own experience regarding fat injection, using his own cannulas [3]. This technique represented a huge step forward compared to the sampling of blocks of fat tissue, being somehow similar to the technique of lipostructure, the essential difference being that the sampled material was not centrifuged.

However, those attempts were later abandoned, because the excellent initial results were lost in time, sometimes the final results being even worse than that before the grafting. The degradation of the results was due to the fact that the volume of the fat graft did not allow for its quick revascularization and the adipocytes became necrotic in the centre, leading to fibrosis and sometimes to significant retractions at the level of the receiving area [4]. These deficiencies were

corrected by Sydney Coleman who, at the end of 1980, developed a new technique of sampling and processing at the fat, called lipostructure, used in order to redefine the facial contour and create a well-proportioned facial harmony in plastic surgery [5]. Sampling the fat through cannulas then centrifuging it allowed the preparation of a material made up only of viable adipocytes, easy to use [6]. Injecting thin layers with the help of cannulas leads to the formation of a tridimensional structure in which the adipocytes are easily vascularized so that their viability and functional character is preserved [7].

### MATERIAL AND METHODS

In the OMF Surgery Clinic in Iasi, over the period 2009-2014, this method was applied to 21 patients with defects of diverse etiology located in the cranian-maxillo-facial territory: traumatic, congenital or postoperative.

3 patients with posttraumatic defects

2 patients with Parry Romberg syndrome

18 patients with postoperative defects:

- 4 parotid gland tumours

- 6 post radiotherapy sequelae

- 1 voluminous maxillary cyst

- 1 carcinoma -mentoniera region

- 2 carcinomas- gingival alveolar

- 1 carcinoma- maseterina region

- 1 carcinoma - 1/3 medium genian region.

### Harvesting Protocol

Before the lipostructure intervention is required tridimensional vision of the existing defect. The quantity of fat harvested should be injected in several places of entry, so as to allow a good fat graft revascularization and a faithful reconstruction of facial symmetry.

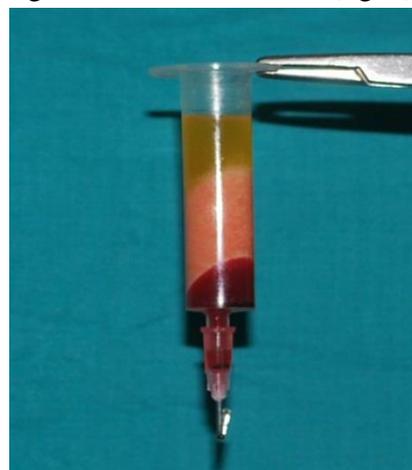
Afterwards, the procedure continues carefully with identifying the sampling areas.

Lipostructure can be performed under local anesthesia associated with intravenous sedation and general anesthesia. At the donor area, it is infiltrated anesthetic solution

consisting of combining two anesthetic solutions (ubistezin forte, lidocaine 1%), diluted in 500 ml saline . Then, through very small incisions of about 0.5 mm, placed in the natural folds, to penetrate with very fine cannula the adipose tissue layer damages, it is started the collection procedure.

The amount of harvested fat area is conditional by the necessity of the sampling area.

Then follows the fat centrifugation at 3000 rpm for 5 minutes, which gives a good density for the tissue harvested, with a cell viability having the best probability to keep a large number of stem cells (fig. 1).



Figures 1-2. Fat graft, before and after centrifugation

After the centrifugation are formed three layers: oil, adipocytes, blood (fig. 2). The oil and the blood layers (the top layer and the bottom layer) are removed. The middle layer containing the fat is injected into the affected area, referred to as the receiver area. The injection of the fat is performed in different directions and layers. The injected quantities vary between 10 and 45 ml. After about 6 months, in the cases where it is needed, the method can be repeated.

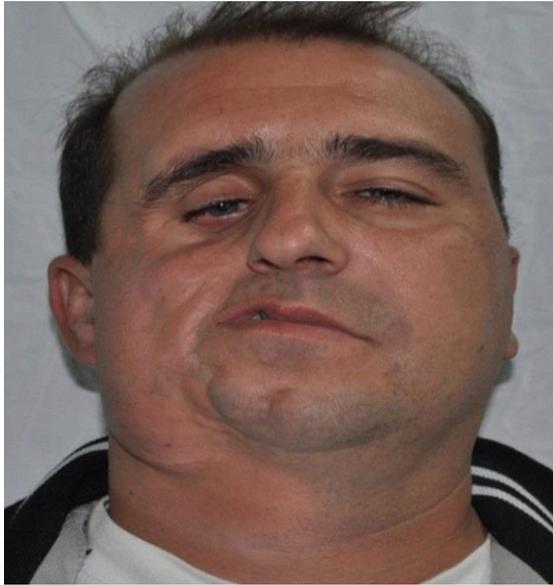
Postoperatively, the patient has a painful embarrassment both in the harvest area and in the receiving area that can be countered using analgesics, for two or three days. Also a discrete edema may occur, with or without

bruising.

Patient C.M, age 33, diagnosed at 8 years old with Parry Romberg Syndrome, for which, 13 years ago, in the Bucharest Plastic and Reconstructive Surgery Clinic, the correction of the defect situated at the level of the right hemifacies (genian and submandibular right) with muscular flap from latissimus dorsi was carried out. Later on, the syndrome continued its evolution, the patient presenting himself with a significant defect of both the soft and bony parts at the level of the right hemifacies.

Under local, regional anaesthesia and under sedation, in two operations six months apart, lipostructure with adipocyte injection

was effected at the level of the tight genion and maseterina (30, respectively 45 ml). The



**Figure 3. Parry Romberg Syndrome - Preoperative Aspect**

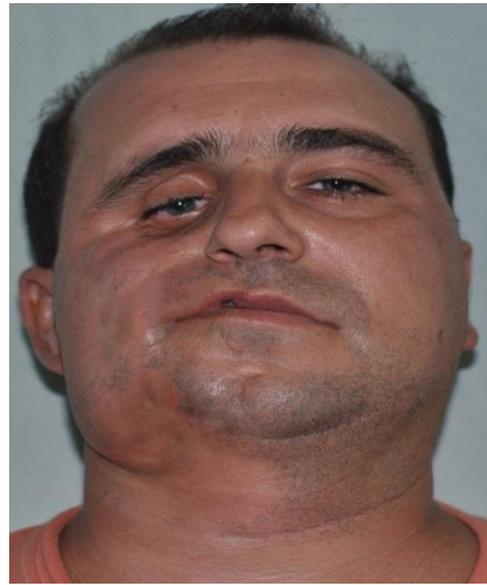
N.C, aged 49, was diagnosed with a mucoid sinus cyst of the right jaw, extended to the orbit, for which partial resection of the jaw bone and total resection of the zygomatic bone were effected, immediately followed by the correction of the postoperative defect with right osteofacial temporoparietal flap (fig.5).

Under loco-regional anaesthesia combined



**Figure 5. Preoperative aspect**

result of the surgery was satisfactory (fig.4).

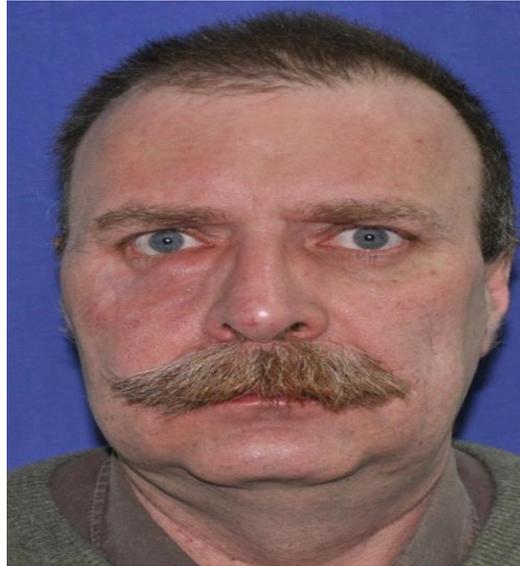


**Figure 4. Postoperative aspect, lipostructure in two operations (30 ml and 35 ml)**

with sedation, in 2 sessions that were separated by a 6 months interval, the lipostructure was performed by injecting adipocytes at the geniana and right maseterin regions (30 ml in the first session and 45 ml in the second session). The final result was satisfactory (fig.7).



**Figure 6. Postoperative aspect- facial asymmetry**



**Figure 7. Final postoperative aspect**

Patient M.I, 56 years old, suffering from trauma caused by an car accident and diagnosed with right posterior latero-facial fracture, is admitted a year later with facial asymmetry, situated in the right temporal area, following its vicious consolidation, with no other functional disorders (fig. 8-9).

To improve the facial relief, under local anesthesia with sedation was performed one session of lipostructure with injection of 45 ml of fat at the right temporo-zygomatic region with good aesthetic results (fig. 10-11).



**Figure 8. Preoperative aspect - face image - facial asymmetry**



**Figure 9. Preoperative aspect: reverse image-facial asymmetry through the sinking of the bony structure at the right temporal region**



**Figure 10. Postoperative aspect - face image**



**Figure 11. Postlipostructure aspect - reverse image**

## RESULTS

The study was carried out on a group of 21 patients, of an average age of 48.

The lipostructure indications included congenital or acquired defects of the bone or soft parts, situated at the level of the face.

For all these patients, the donor site was represented by the periombilical region.

A second intervention was necessary for two patients and a third intervention for three patients.

The postoperative results were good, all the fat grafts were integrated without any complications, with considerable improvement of these patients' aesthetic aspect, both for the short and the long term, the graft being stable.

## DISCUSSIONS

Though used in plastic surgery for a long time, the fat graft gained great popularity in the last 20 years. This was largely based on the qualities of the ideal filler of this material: natural, stable, uncomplicated, autologous,

thus entirely biocompatible, sufficient in large quantity for most patients, readily integrated in the host tissue [8].

Considering the facts mentioned above, it is not surprising that lipostructure represents the natural option for the reconstructive surgery of the face. Initially used only in plastic surgery, lipostructure has known numerous applications in the maxilla-facial and craniofacial surgery, too [10].

The indications are numerous: local atrophies, posttraumatic defects, post tumoral resection defects, complex congenital craniofacial deformities, burns, postirradiation lesions and progressive hemifacial atrophy (Romberg syndrome, sclerodermia) [10, 11].

Lipostructure is different from other techniques [12], in the sampling as well as in the processing and grafting of the adipocytes at the level of the receiving areas. By using the cannulas of different shapes and sizes, the adipocytes can be injected anywhere at the level of the maxilla-facial territory, filling some defects of various sizes and origins. The

techniques differ from one author to another, for the injection can be achieved either in a single plan or in a tridimensional one. The essential thing in all cases is that the grafting is effected in very thin layers which can be easily revascularized. The process is also facilitated by the significant proportion of stem cells that are found at the level of the adipose tissue. In this way, tissue regeneration is obtained simultaneously with restoring the deficiency volume, an even more important aspect when correcting postoperative deficiencies.

## CONCLUSIONS

Taking into account the results of the numerous studies that appeared over the years, lipostructure has gained a very important role in reconstructive surgery, being considered a basic technique used in facial reconstruction, even more as it is an important source of mesenchymal stem cells that permit tissue regeneration simultaneous with shaping the volume of the receiving technique.

Lipostructure represents an ideal technique of facial recontouring and reconstruction, with long term natural results and minimal consequences at the level of the donor site.

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