Original Article

Method for Elimination of Deformation of the Maxillofacial Region

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Abstract

The methodological recommendation presents the features of the use of different methods of the maxillofacial region for various deformities of the face. In recent decades, reconstructive and restorative operations are increasingly becoming an integral part of the treatment of patients with aesthetic deficiencies in various parts and areas of the body. The increasing interest of patients in restoring an aesthetically acceptable appearance prompts surgeons to introduce new techniques of reconstructive interventions. One of the promising directions in reconstructive surgery is the transplantation of one's own (autologous) adipose tissue (lipofilling), the interest in which among surgeons and patients has recently increased significantly. Lipofilling is a method of surgical removal of autologous adipose tissue from areas of excessive fat accumulation in order to correct the volume, shape of the contours or replace soft tissue defects in other anatomical areas of the so-called areas of interest. The autofat transfer technique has a history of over 100 years. The guidelines are intended for dentists, medical researchers, masters and clinical residents.

Keywords: Autofat, Lipofilling, Maxillofacial Region, Reconstructive Surgery, Auto Transplantation.

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INTRODUCTION

All available types of plastic surgery are used for the treatment of scar deformities of the face: flap plasty with local tissues, free skin plasty, flap pedicle plasty feeding from adjacent areas and distant parts of the body, flap plasty using microsurgical methods, use of dermatome, production of individually modeled silicone implants [4]. A relatively new method of eliminating scars is autotransplantation of adipose tissue. The use of lipofilling for scar deformations of soft tissues requires compliance with certain conditions in order to achieve the best result and maintain volume in the injection area. Autofat has long taken its place in aesthetic and reconstructive surgery as a biomaterial for volumetric contour plastics. Information on the study of the unique properties of adipose tissue is relevant and in demand.

Self-fat tissue transplantation was first reported in 1893 by the German surgeon Gustav Neuber (1850-1932), who transplanted a piece of fat tissue from the hand to the lower edge of the orbit. Repair of scar depression after osteomyelitis. During more than a century of plastic surgery, a lot of experience has been accumulated in the use of adipose tissue to solve various practical problems. Soft tissue scar deformities have always been a challenging problem in plastic surgery [11]. There remains a serious need for a comprehensive approach to the treatment of common deformities and soft tissue defects after burns, injuries and surgical interventions.

Adipose tissue autotransplantation is a widely accepted and generally accepted technique for filling or bulking soft tissue defects caused by trauma or involution process [2].

Analytical indicators in our research were prepared on the basis of information published on the website of the State Statistics Committee.

In this research, graphic tables of econometric equations were developed, the direction and density of the indicators were determined, correlation coefficients were determined, and regression models were built. The importance and necessity of export practice in the development of our country's economy was justified in the article using the method of scientific abstraction. Also, the econometric analysis of import and logistics services in the export volume of the national economy was considered, forecasted and evaluated with statistical mathematical methods [1].

The first publications on the isolation of cells from adipose tissue were described by M. Rodbell in the 60s of the last century. Through a combination of mechanical crushing of adipose tissue, proteolytic fractionation, and differential centrifugation, he was able to separate mature adipocytes from the denser cell mass, which he termed the stromal-vascular fraction (SVF). This suspension is heterogeneous

and is represented by blood cells, fibroblasts, pericytes, endothelial cells and pre-adipocytes [3-7]. In 2000, researchers at the University of Pittsburgh led by Bill Futrell conducted a study and proved that adipose tissue is a great source of mature multipotent mesenchymal stem cells (MSCs) that can differentiate in different directions depending on the conditions in which they are located. In 2001, R. Zuk et al noted that this feature shows a strong similarity to bone marrow MSCs. A comparative analysis showed that the bone marrow of an adult contains only 1 mesenchymal stem cell for every 50,000-100,000 cells. The content of stem cells in adipose tissue is 1 in 30,000 cells. Thus, adipose tissue can be considered as an alternative source of stem cells, as it can be harvested in large quantities from adipose tissue fragments and by liposuction [8].

In 2006, S. Coleman in one of his publications noted positive changes in the tissues of the recipient area after fat graft injection. Clinically, it is done to improve the quality of scars after the appearance of acne, as well as to improve the quality of irradiated tissue after the combined treatment of rhabdomyosarcoma of the masticatory muscles [10]. In 2007, plastic surgeon G. Rigotti from Verona showed the results of treatment of radiation injuries and scarring trophic ulcers with fat injections in his articles and speeches at congresses. The clinical presentation is characterized by a decrease in the level of radiation damage in all cases. The appearance of new vessels, an increase in capillary density, a decrease in fibrosis, and an improvement in tissue hydration have been confirmed histologically. Thus, the authors concluded that the high regeneration of irradiated tissue is associated with the presence of multipotent mesenchymal stem cells (MMSC), which are part of the fat graft. The procedure for obtaining MMSC described by Zuk et al. (2001) involves culturing nucleated cells in nutrient medium after isolation of the stromal-vascular fraction [9].

A complex of cell populations of the stromal-vascular fraction of adipose tissue, including MMSC, endothelial cells, smooth muscle cells of blood vessels and their precursors, pericytes, fibroblasts, tissue macrophages and blood cells [11]. The SVF isolation process is an intermediate step and represents an enzymatic treatment of the lipoaspirate to remove adipocytes and extracellular matrix. As a result, cells under the influence of collagenase detached from the tissue matrix. A special cell culture step to extract the cell product composed of MMSC. In 2012, Eva Guisantes, Joan Fontdevila et al conducted a study on the use of lipofilling in scar treatment. Patients underwent two lipofilling procedures three months apart with retracted abdominal scars. The first step was layer-by-layer dissection of the scar tissue by removing the tough fibrous tissue from the fibrotic areas with a sharp cannula. When they pass into the intergumentary tissue, the cannulas are replaced by blunt tips due to the low level of damage to the surrounding tissue.

One session was not enough to repair a complete scar. At the first stage, the goals were set - to loosen the fibrous tissue, thereby creating conditions for the transfer of fat cells. At the end of the third month, during the repeated procedure, as in the initial stage, no resistance was noted with the introduction of lipoaspirate. Improvement in the appearance and quality of scar tissue has been clinically noted. Thus, the use of lipofilling in scar treatment made it possible to judge the high regenerative properties of adipose tissue and its beneficial effect on the skin structure. Thus, additional incisions are not required and the scar itself does not increase in size. One of the most recent studies on the use of nanolipofilling in scar treatment was conducted by reconstructive and plastic surgeons Semra Uyulmaz, Nadia Sanchez Macedo, et al (2016). The procedure was performed once or twice with an interval of three months. Patients with scars, deep and medium wrinkles and hyperpigmentation participated in the study. Nanoaspirate has regenerative functions and helps rebuild scar tissue. The use of nanolipofilling for medium and deep wrinkles, as well as in areas with hyperpigmentation of the skin, improved the quality of the skin, as well as increased the elasticity of deep wrinkles. However, the authors did not implement methods for evaluating the obtained results [12].

Thus, the use of nanolipofilling can be considered as an alternative to surgical treatment, laser therapy and other cosmetic procedures.

However, it was not possible to find accurate data on the objective quantitative and qualitative indicators of cellular structures of the transplanted nanoaspirate in the existing literature.

The purpose of this work is to increase the effectiveness of treatment of post-traumatic deformations of the midface area using lipofilling.

Material and Methods

All patients were divided into 4 groups. Group 1 included 41 (58.5%) patients with residual facial soft tissue volume deficit after surgical treatment of primary anemia; Group 2 consists of 9 (12.8%) patients with various injuries of the face-jaw area; Group 3 included 5 (7%) people with consequences of radiation therapy; Group 4 included 4 (5.7%) patients with combined jaw deformity.

Study of recipient sites was performed at the following stages: before lipofilling, 2 weeks after lipofilling, 2, 3, 4 and 6 months after lipofilling, 1 and 3 years later.

The total number of patients is 70, aged from 25 to 54, of which 49 are women, 21 are men.

The high degree of clinical manifestations of volume deficiency in this category of patients largely depended on the causative factor that caused it and did not strictly adhere to age qualification.

Patients with insufficient residual tissue volume after reconstructive surgery for the main disease: the nature of the main disease: maxillofacial tumors - 32 (78.3%) patients,

systemic connective tissue diseases - 4 (9.7%), traumatic facial injuries - 5 (12%). In all cases, the anamnesis contains instructions for the microsurgical stage of treatment - autotransplantation of various types of flaps in the area of the tissue defect.

Patients with tissue volume deficiency as a result of trauma: tissue atrophy developed in 6 (66.6%) cases as a result of cut wounds, as a result of tissue damage in 3 (33.3%) cases.

Patients with combined deformity of the jaw: the clinical presentation corresponded to upper retrognathia, lower prognathia. Patients refused the proposed reconstructive surgery, explaining: not wanting radical changes in appearance, severe somatic history, and fear of the size of the operation.

The long-term results of surgical treatment were studied over a period of 6 months to 5 years. The ratio of the frequency of use of different donor sites in patients of all groups is presented (Table 1).

Table 1: The ratio of the frequency of use of different donor zones

Donor zone	Frequency of usage	%
Inner thigh	116	45
Inner knee	56	22
Abdominal area	43	16
Outer thigh	28	11
Side of abdomen	15	6

Most often, the inner surface of the thighs was used as a donor zone - 116 (45%), at least - the side of the waist during liposuction - 15 (6%) (Fig. 1).

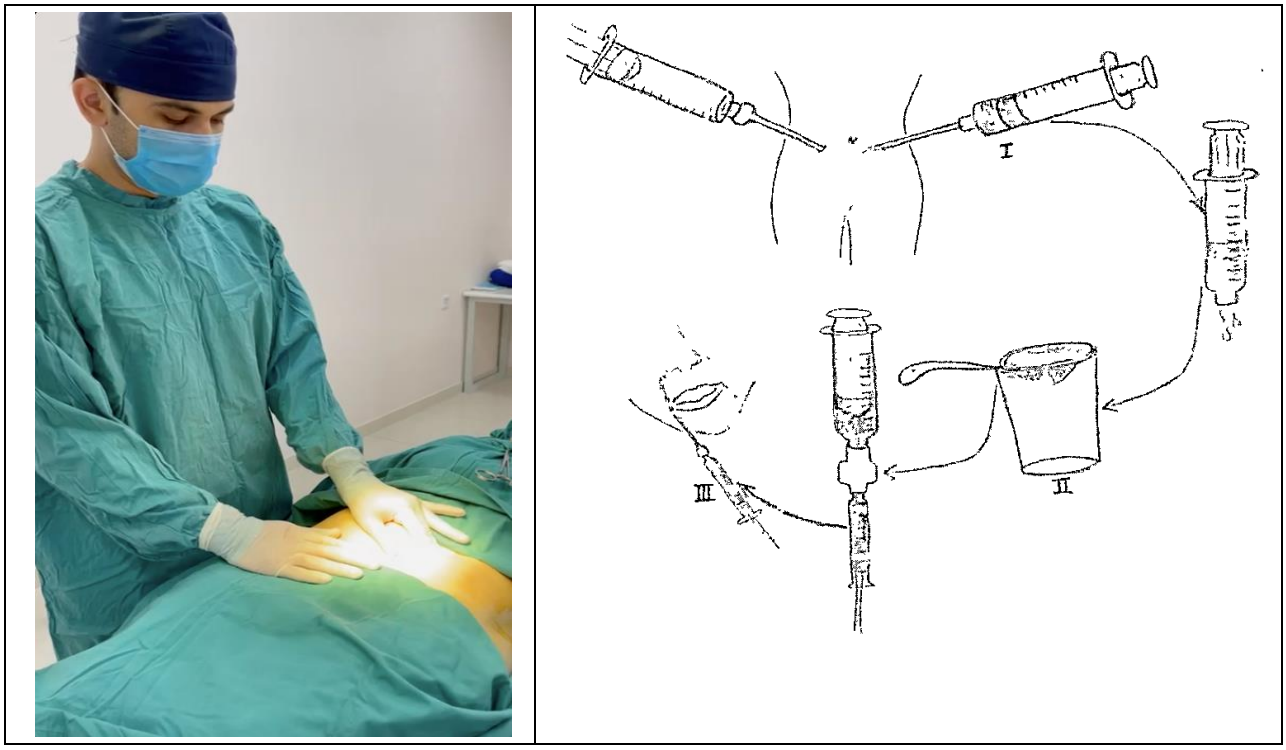

Figure 1. Stages of lipofilling

Before the operation, on the patient's standing position, markings were made with a special alcohol marker, a 1% solution of strong or brilliant green. Liposuction margins were determined in the donor area and volume deficit area was noted in the recipient area. Important characteristics of the donor site: a developed layer of deep adipose tissue, a relative lack of collagen trabeculae of the superficial fascial system.

On the patient's operating table, the points of insertion of the cannula in the donor and recipient zones, as well as the direction of movement of the cannula during the injection of fat tissue, were treated with an antiseptic solution. During liposuction, tissue was infiltrated with 0.25% lidocaine solution mixed with adrenaline (1:200000) or Klein's solution at the same time as liposuction. Anesthetic solution was injected suprafascially (Figure 2).

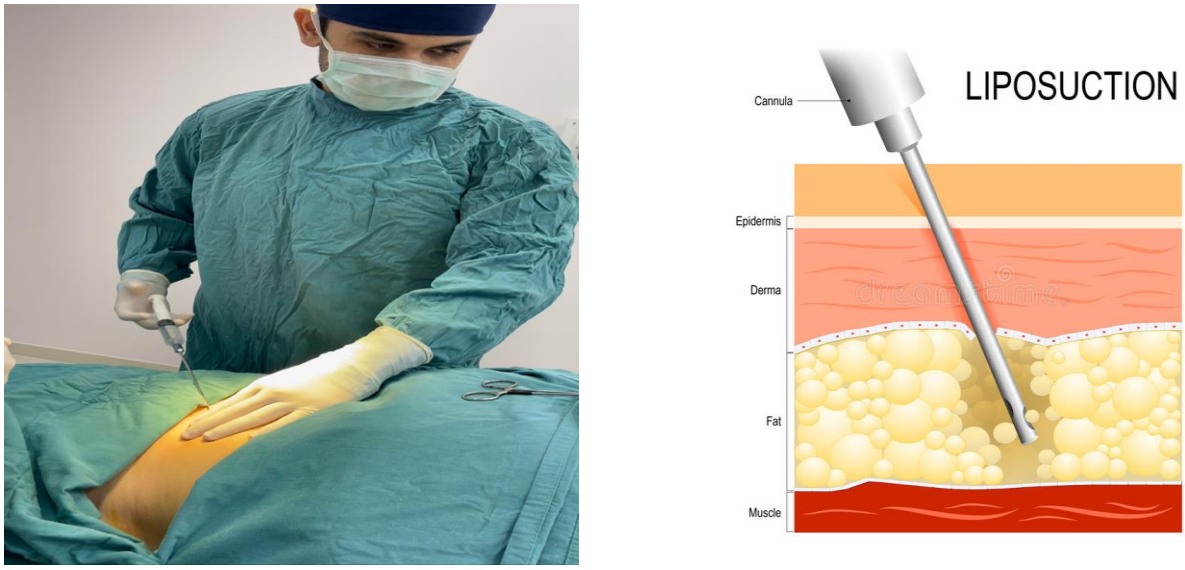

Figure 2. Infiltration of the tissues of the donor site with an anesthetic solution

Exposure was maintained for 15 minutes between infiltration and fat removal, which ensured the vasoconstrictor effect of adrenaline.

A special cannula for microlipoaspiration was inserted into the thickness of the subcutaneous fat tissue, and careful tunneling was performed using a 10 ml syringe attached to it with minimal movement (Fig. 3).

Figure 3. Adipose tissue obtained by MLA

Liposuction was performed in a deep layer, which is due to the fact that the fascial-vascular network closer to the skin is developed and the fat particles located in its cells are smaller.

In addition, superficial lipoaspiration requires more physical effort, at the same time, a large negative pressure is created in the syringe, due to damage to the subcutaneous vascular plexus, there are significant blood impurities in the lipoaspirate - all this is negative for the resulting quality characteristics affects.

In our practice, the Tulip Medical TM System (Tulip Medical Products, San Diego, CA) is used for fat collection and processing. The kits required for the procedure are Lola Gold Standard Facial SetTM and Tulip Nanotransfer Reusable Starter SetTM, standard Luer Lock syringes 1 cc, 10 cc, 20 cc and 11 no scalpel. In addition, we used a Bard-Parker blade, betadine solution, modified Klein's swelling solution, sterile gauze, 10.56% lidocaine cream, and 32 G needles.

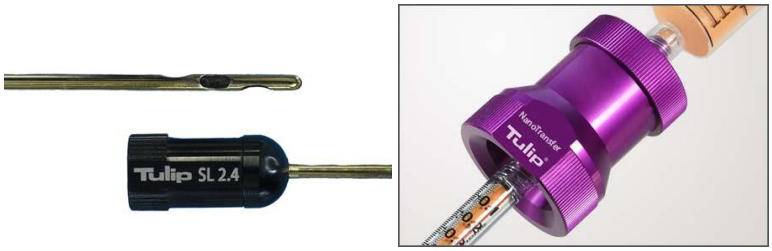

Figure 4. Tulip Medical TM system types of cannulas.

Adipose tissue processing stage.

The obtained adipose tissue was placed in the syringes used for microlipoaspiration for 5 minutes (Figure 5):

Figure 5. Deposition of derived adipose tissue after MLA.

Then, the adipose tissue was dispensed into 1 ml insulin syringes through an adapter (Figure 6).

Figure 6. Transfer of adipose tissue to insulin syringes.

In our practice, we have abandoned the centrifuge. Of course, this procedure accelerates the process of "refining" fat, but it can cause the rupture of cell membranes, similar to the effect of hemolysis.

Results and Discussion

An objective evaluation of the treatment results was carried out according to several parameters: The restoration of facial symmetry as a result of the increase in the volume of the tissues of the recipient zone is clearly visible when examining and comparing the photos of these patients before, during, and after surgical treatment. Patients were photographed using a digital camera inthe following projections (front view, left and right half-profile, left and right profile, nose-chin projection): the camera was mounted vertically on a tripod at the level of the face, the patient was in one position 1.5 m distance from the lens, artificial lighting using flash synchronized with the light box, flash mode M (AE), focal length 70 mm, automatic white balance.

A good result of the correction is characterized by the restoration of facial symmetry as a result of the increase in tissue volume in the receiving zone. The result can be considered satisfactory if the preoperative asymmetry is less against the background of tissue volume increase in the recipient area, but remains significant after surgical correction.

The described deformations can be considered insignificant and eliminated by repeated correction at the request of the patient.

An unsatisfactory result is characterized by the appearance of asymmetry before the operation.

Patients who underwent lipofilling according to age-related indications. By analyzing the results of lipofilling performed independently or in combination with other types of surgical treatment in different age groups, we were able to observe the dynamics of the aging process.

At the same time, the nature of changing the volumetric proportions of the face in patients of each age group determined different approaches to their correction.

Group 1 of patients: 31-40 years old.

The severity of age-related changes ranged from negligible to moderate. In this case, the main point of application of lipofilling was the middle zone of the face:

1. Nasolabial folds - 18.7%.
2. Lips and lip folds - 14.5%.
3. Lacrimal grooves - 11.9%.

As an independent plastic surgeon, lipofilling was performed in 61.1% of patients, combined with blepharoplasty in 21.6%, and endoscopic forehead lifting in 17.3%.

Patient L., born in 1978. Complaints: obvious tear grooves, flattening of the contours of the zygomatic regions, clear nasolabial folds.

History: does not smoke. No surgical treatment was performed to correct age-related changes in the face. About 1.5 years ago, contour correction of the nasolabial folds was performed with a biodegradable filler.

Local condition: the skin is dry, thin, tone and turgor decrease. Hernia tumors are identified in the area of the lower eyelids, the contours of the zygomatic-infraorbital regions are smoothed, the lacrimal and nasolabial grooves are expressed.

On 06.03.04, an operation was performed under m / a: correction of the contour of the face with autofat. 1.5 ml of auto-oil was injected into the area of the nasolabial folds, 2.5 ml from each side into the area of the lip folds. On 11.09.18, a second operation was performed under m / a: correction of the contour of the face with autofat. 1.5 ml of autofat was injected into the nasolabial folds, and 3 ml was injected into the zygomatic-infraorbital areas (Fig. 7).

Figure 7. Patient L., 1978 A) before lipofilling; B) 14 days after surgery.

The result of the operation was a clear reduction of the infraorbital and nasolabial folds, a sharp contour of the zygomatic regions.

Patient Sh., born in 1974. Complaints: clear tear ducts, flattening of the contours of the zygomatic-infraorbital regions.

From the anamnesis: no surgical procedures were performed to correct age-related changes in the face.

The skin is thin, tone and turgor decrease. In the region of the lower eyelids, hernia tumors, deep lacrimal ducts are identified, the contours of the zygomatic-infraorbital regions, the cheeks are smoothed, the lacrimal and nasolabial folds (under the wings of the nose) are expressed.

During the operation, a clear reduction of the lacrimal glands was achieved, the operation allowed to increase the volume and create a smooth transition of the eyelids/cheeks.

Volume of surgical treatment performed: removal of ptosis of facial soft tissues with displacement of PMAS and

lipofilling - 25.4%, blepharoplasty and lipofilling - 23.7%, endoscopic lifting of the upper 2/3 of the face and lipofilling - 20 was 3%.

CONCLUSION

Thus, volume contour plastic issues are the most relevant in reconstructive surgery. The multifactorial nature of the pathological process in the area of the defect creates a certain algorithm for eliminating the deformation. Each stage of treatment needs its own universal plastic material. If in the first stage of the treatment of large defects by autotransplantation using microsurgical methods, a tissue defect that is large in size and area is eliminated, then lipofilling can be considered as the method of choice in some cases at the stage of correction of the residual deformation of the contours. In addition, we have achieved good results with the combined use of silicone implants and adipose tissue, since in many cases the individual properties of these materials complement each other. Correct selection of patients, compliance with all features of the lipofilling technique ensures a comfortable and long-term result of voluminous-contour plastic with auto oil. The inclusion of fat tissue injection in the complex treatment plan of patients with various defects of the face-jaw area helps to achieve optimal results of corrective treatment. Thus, the effectiveness of the lipofilling method depends on the condition of the tissues of the receiving zone and the correct technique. The volume of adipose tissue injected at a single time should not exceed the recommended values, regardless of the degree of tissue deficiency. Optimal correction results are achieved by increasing the frequency of procedures. According to ultrasound data, 2 months after confirmation by clinical observations and patient survey (questionnaires), the loss of the maximum volume in the recipient area in the lipofilling area is accompanied by a decrease in the severity of tissue swelling fainted. 4 months after the operation, the tissues in the lipofilling area had the same consistency, which was considered as a period of adaptation of auto-oil with a clinically determined volume increase in the area of application.

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