

Fat Injection: Long-Term Follow-Up

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Abstract. We used this procedure of fat injection to correct soft tissue defects, using the patient's own fatty tissue obtained by liposuction. We show the results of long-term follow up from 1984 to 1994. The main idea was to find a successful procedure in order to attain good specimen graft and long-term results. It was not an easy goal because of the high reabsorption of fatty tissue.

Key words: Fat injection—Fat grafts—Long-term results

Many surgeons started to apply the technique, but the results were not satisfactory. We think that it was due to failures in the procedure of both fat suction and fat injection.

The first care must be to preserve the integrity of fat cells. The tissue must be treated carefully so as not to cause injury to the delicate cells. Then we must be careful during injection. The transplant will not graft when the material is crushed. Then the graft becomes scar tissue. Viñas points out these concepts in his work published in 1973 [13].

Infection was the main complication of fat grafts. Therefore, many surgeons stopped to practice the procedure. Some other followed the practice and we can now show the effectiveness of the procedure. Using chart review and photographic evaluation, patients treated between 1984 and 1994 were retrospectively evaluated for effectiveness of results.

Background

The first communication about fat transplant was presented by Neuber [10] to the 22nd Congress of the Ger-

man Surgical Society in 1893. Since then many authors had reported their works. We can mention Lexer [7], Peer [11], Longacre [8], Maliniac [9], and Bames [1]. A complete compilation on the matter was published by Teimourian et al. in 1989 [12].

Our purpose is not to discuss the history and evolution of autologous fat transplantation, but to show the effectiveness of the procedure and the long-term results.

Introduction

This methodology started with an idea of Illouz, between 1982 and 1983. At that time, it had already been proved that liposuction was a useful procedure. Surgeons were skeptical with respect to conventional fat transplantation because of the failures and the inconsistent results.

In 1984 we started to inject fat tissue in facial and body depressions after numerous experimental studies in mice (Fig. 1). The material was previously aspirated by liposuction from donor areas. This method had great advantages over traditional materials:

1. It is an autograft.
2. It is easily obtained.
3. There are no immunity phenomena.
4. The procedure can be repeated several times.
5. The cost is very low.
6. It can be applied to all depressions.

Patient Selection

Patients must be carefully selected and receive correct information from the doctor. In the first interview, the surgeon must explain clearly what the patient can expect from the procedure, so as not to create exaggerate expectations about long-term results of fat injection.

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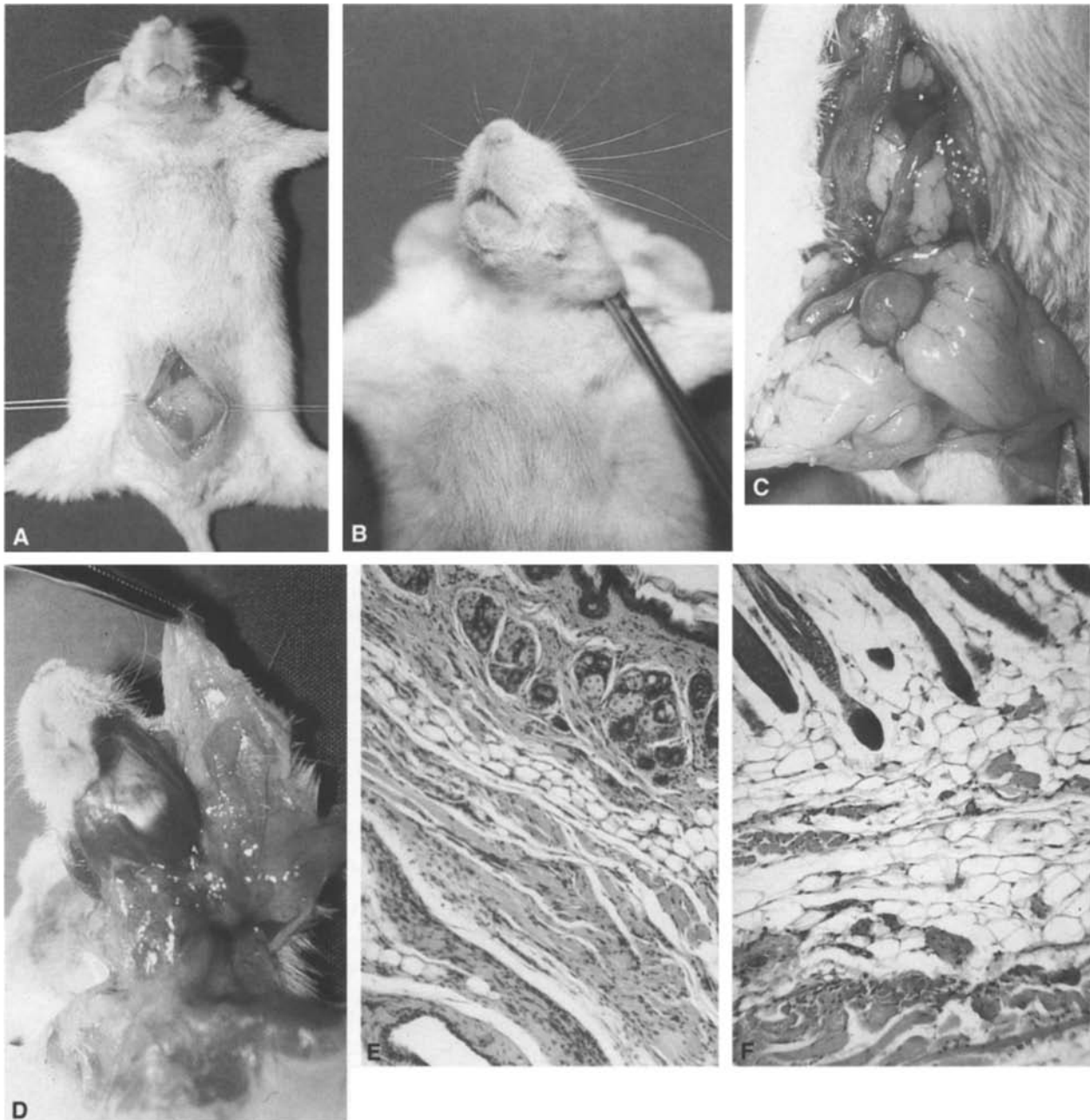


Fig. 1. (A) Fat obtained from the prevesicle area. (B) Receptor area in the mouse head. (C) Donor area of fat in mouse. (D) Receptor area in mouse head region 3 years after injection. (E) Skin is of mouse showing hairs, two fat cell bands, and the

muscle before injection. (F) The same skin area of the mouse 3 years after fat injection. Many fat cell bands indicate the long-term survival of injected fat tissue. Fat cells enter the dermis first and then the muscle.

Technique

We mark the areas to be treated on the standing patient with a special pencil and also take photographs. With the patient on the operating table, we make asepsis previous to anesthesia. In this procedure we prefer not to use local anesthesia because it would alter the anatomical condition of fatty tissue and the specimen graft. Recovery

from general anesthesia is more comfortable for the patient.

First, intravenous nabuphine (10 mg) with atropine (0.5 mg) is injected. Afterward, we inject intravenous propofol (2–2.5 mg), and then we use sevoflurane (3%–5%)/NO₂ (66%)/oxygen, with a mask and bag or respirator for 5–10 min. The patient is breathing spontaneously and analgesia persists. The donor area may be cho-

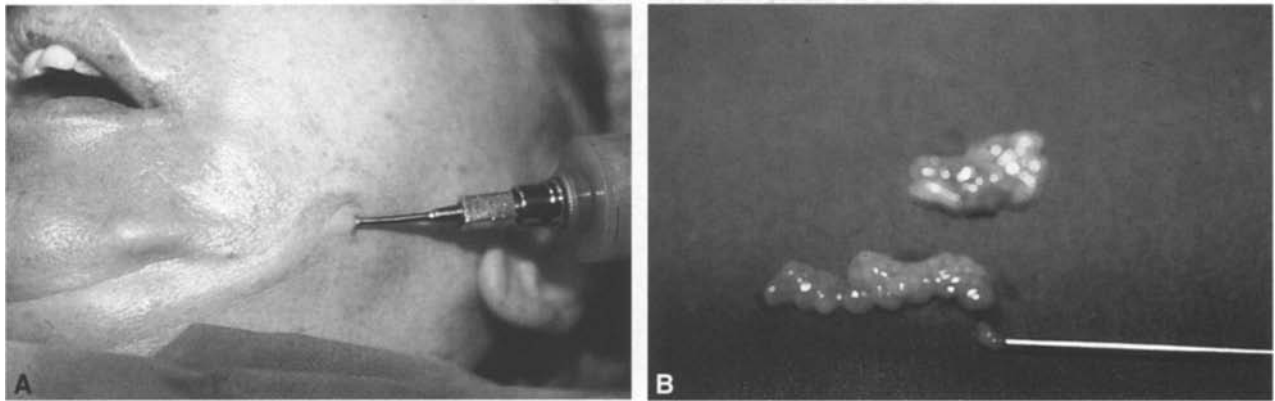


Fig. 2. (A) Donor fat in syringe being injected into deficient facial tissues. (B) Samples of donor fat for injection obtained with a small cannula (5–8 mm in diameter).

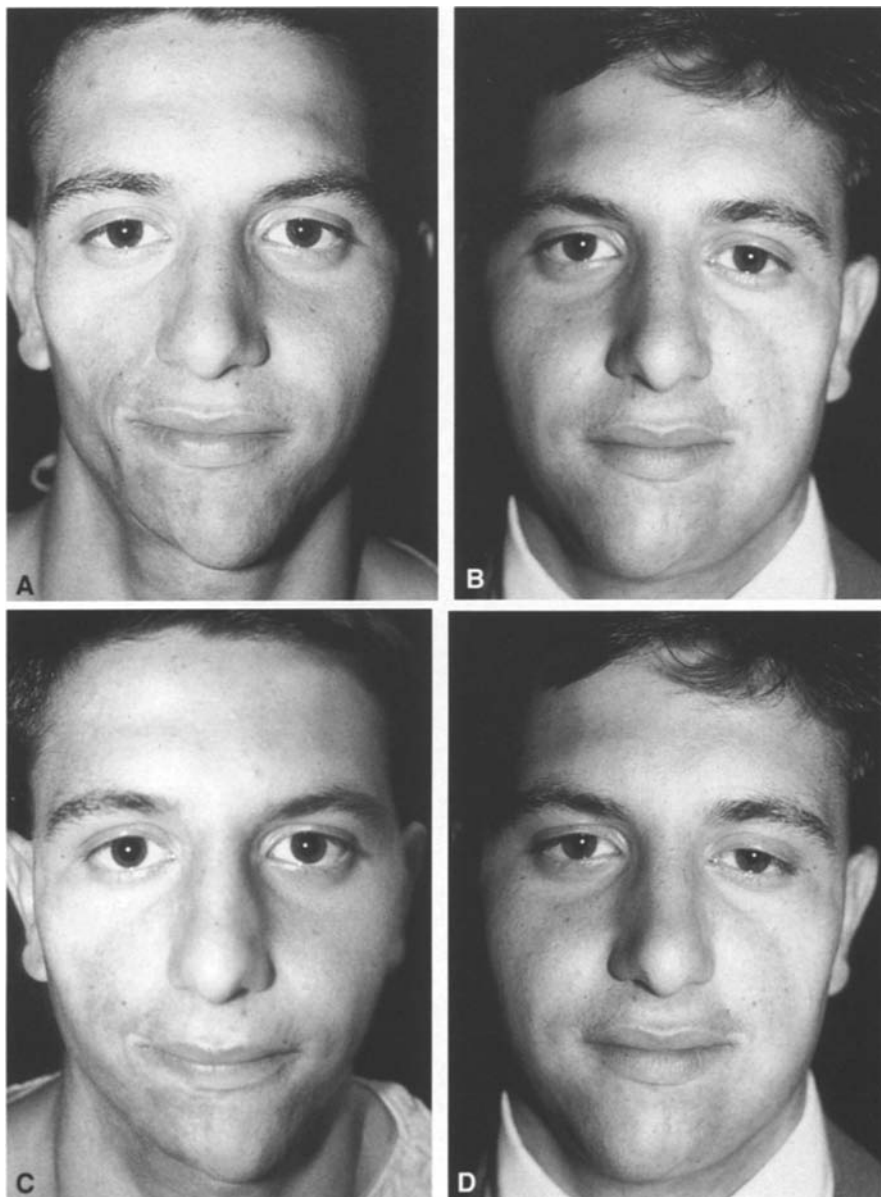


Fig. 3. (A) Patient with scleroderma. (B) After first fat injection. There was a notable improvement in all the tissues, skin, and cellular and muscle tissue, due to better irrigation of the area. (C) Same patient 3 years after the first fat injection. (D) Patient 2 years after the second fat injection. With this second injection we obtained a noticeable improvement in the volume.



Fig. 4. (A) Patient with hemifacial atrophy (Romberg's disease) and (B) 9 years after two fat grafts. The first one in 1984 and the second in 1987.

sen from the following: abdomen, trochanter, thigh, knee, and gluteals.

We must emphasize the importance of the procedure of fat suction. A small cannula (5–8 mm diameter) is used to take out the fat globules. The cannula is attached to a sterile glass receptacle, connected to a pump. The power must be only 20%–30% of that of the pump, in order to avoid fat cells damage. In the vacuum it must not surpass -10 in Hg or -30 Kpa in the manometer. When using a syringe to obtain the material, the vacuum with the plunger must not surpass one-third of that of the syringe.

Once we obtain the material, it is passed to a syringe. A 1-mm diameter trocar is needed. Then we inject it, applying the same care with the pressure (Fig. 2). When using high pressure, fatty tissue may be damaged. Therefore, it is important to be careful with the power of injection. The damage that high pressure causes to fat cells has been pointed out in our other studies [2–5]. Another author confirmed those results [6]. The effect of high pressure on fat cells has also been shown on histological samples [5].

The injection site must be well irrigated, such as muscle or nearby areas. There we inject parallel cylinders of fat with the diameter of the trocar. In this way we get a good blood supply in the area. Afterward, we massage the area gently with our fingers in order to evenly distribute the fat. We compress the donor area to prevent edema and hematoma.

In the face, we perform the procedure in nasolabial sulcus, cheeks, and malar area and sometimes in the lips and chin. Usually, it is performed together with blepharoplastia, face lift, neck lift, or other surgical practice. In reconstructive surgery, we have obtained excellent results in the treatment of Romberg's disease. In body contouring it is applied together with liposculpture. In the postoperative we prescribe antibiotics and analgesics

with anti-inflammatory. Cold compresses provide comfort for the patients.

Results

We control the patients three times a week during two weeks and then once a month in order to evaluate the results (Figs. 3–5). When the reabsorption of the material has been very high, we suggest to repeat the procedure, choosing another donor area.

When it was repeated 6–12 months later, we saw that the graft followed the changes of the patient's weight. We also observed an improvement in the quality of skin, cellular tissue, etc, perhaps, because of the hormones contained in the injected fat. These changes are more evident in women. To those who want to apply the technique, we suggest to evaluate these results before starting any dermatologic treatment, such as chemical peeling, AHA, Retin-A, etc.

Complications are the same as that for any surgical procedure: edema, hematoma, infection. In this technique we must add reabsorption due to inability to graft or bad application of technique, cysts, and deformities due to excessive material. An experienced plastic surgeon can manage all of these.

Conclusions

The objective of this communication to our colleagues is to present long-term results of the application of the technique of fat injection and describe the procedure for the best results. Our results are highly demonstrative, but, as we don't know how much fat tissue will actually remain, we are very cautious in our promises to patients. We do



Fig. 5. (A, C, E) Patient with hemifacial atrophy (Romberg's disease). (B, D, F) Ten years later after two procedures done in 1985 and 1989.

note that the fat graft takes a permanent place in the approach to contour correction.

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