Contour deformities after great weight loss encompass diverse and unexpected manifestations that potentially involve every area of the body. A great number of patients with good elasticity and moderate fat accumulation on the upper extremities can be treated only with liposuction. However, those with significant lipodystrophy and skin laxity invariably need a combination of liposuction and skin excision. With the increasing number of bariatric procedures being performed, dermolipectomy has grown in demand as well. Brachial dermolipectomy is one of the most challenging procedures for the treatment of these deformities and, despite the variety of techniques described, still has many limitations. Studies have shown that—aside from lipodystrophy, loss of muscular mass, and decreased cutaneous elasticity—the resulting ptosis of the inner side of the arm may result from excessive fat in the subcutaneous cellular tissue and weakening of the fascia superficialis. We describe a technique in which plication of the brachial fascia is performed before dermolipectomy in order to provide greater flap advancement, lessen tension on the final scars, and diminish postoperative complications.

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METHODS

Patient Selection

The study was conducted between March 1997 and February 2007. Forty-one patients presenting with moderate to severe adipose tissue deposit and significant skin flaccidity in the upper extremities were included. All patients were women; the age range was 36 to 75 years, with an average age of 55 years. Patients were examined preoperatively in a standing position with their arms extended laterally, demonstrating the topographic osteomuscular projection and thus determining the beginning of the ptotic tissue delimitation. Twelve patients had undergone bariatric surgery, and the remainder had lost the excess weight through diet and exercise, with or without medication. Each patient’s weight loss was determined by a specialized medical team and ranged between 17% (35 kg) and 32% (96 kg) of the total patient weight. The mean body weight of our study group was 71 ± 4.2 kg; mean body mass index (BMI) was 31 ± 2.7 kg. All patients had maintained their weight loss for a period of more than 12 months and had undergone prior skin-contouring procedures: abdominoplasty (39), associated mammoplasty (24), thigh dermolipectomy (17), facelift (10), and liposuction of selected areas (nine).

Surgical Technique

Demarcation of the incision lines was done preoperatively with each patient in the standing position, holding both arms in lateral abduction to reveal skeletal and muscle contours. An initial line was marked at the level of the inner brachial sulcus; through a bidigital maneuver, excessive tissue in the internal aspect of the arm was assessed. Seven reference points were marked. Point A was marked first at the midline of the armpit, equidistant from B and C, which extended into two curved parallel lines (BD and CE) representing the medioposterior limits of the vertical incision. Points D and E were placed on the medioposterior extension of the curved lines, simulating the cutaneous sulcus up to the level of the medial epicondyle at point F. In cases of forearm flaccidity, the marking continues along the inner side of the forearm en fuseau, up to point G.

The procedure was performed under general anesthesia when combined with other surgeries or under locoregional anesthesia with sedation when performed alone. The previously marked area (Figure 2) was infiltrated with a solution containing normal saline with 1:400,000 epinephrine in order to limit bleeding. First, vacuum-assisted liposuction was performed with a 3.5-mm diameter blunt-tip cannula in the internal and posterior regions of the arm to treat existing lipodystrophy and aid in subsequent dissection. An incision was then made along the upper side of the marking at the level of the inner brachial sulcus, and subcutaneous undermining of the flap over the brachial fascia was performed up to the limits of the inferior marking in an anteroposterior direction. Once exposed, the degree of brachial fascia laxity was assessed, marked with blue dye (Figure 3) and tested with Alyss clamps (Figure 4). Starting at the inferior margin of the superficial fascial undermining, the fascia was pulled superiorly with two Alyss clamps, confirming the extension of brachial fascial flaccidity. Plication of the fascia was then performed with separate inverted 3.0 nylon sutures along the whole premarked area. The skin and subcutaneous tissue of the flap (line BD) was pulled upward and the area to be excised was delimited by counter-tractioning the anterior border of the incision using the small Pitanguy flap demarcator at various points along the flap (Figure 5).

In cases of forearm flaccidity, cutaneous incisions were made along the premarked ellipse mentioned above, removing...
flaccid skin and subcutaneous tissue without undermining and without fascial plication. After excess skin removal, sutures were placed in four planes throughout both arms and forearms: in the deep subcutaneous tissue, the subdermal space, the intradermal space, and skin. A final suture line was obtained by joining points A, B, and C at the axillary crease; D and E at the distal third of the inner side of the arm; and F and G along the inner side of the forearm when necessary. No drains were used. Steri-strips (3M, St. Paul, Minnesota) were used on the whole length of the scars, and compressive dressings were placed on both upper extremities.

On the first postoperative day (Figure 6), patients were sent home and instructed to wear compressive garments at all times (24 hours a day) for 21 days. Restricted upper body activity was also recommended for six weeks. Antibiotics were given for seven days (second generation cephalosporin), with nonsteroidal anti-inflammatory and analgesic drugs for five days. Anti-inflammatories were rarely used. Analgesics used were IV dipirone during hospitalization and 500 mg or 1000 mg acetaminophen after. Lymphatic drainage was started on the third postoperative day. Sutures were removed starting on postoperative day 15 and the connecting key point sutures were removed on day 21. Patients were instructed to place silicone patches along the whole length of the scar for 12 hours each day, for a period of six months.

**RESULTS**

All 41 patients were followed-up retrospectively for a range of two to 12 years (mean follow-up, seven years). Examinations focused on the resulting scars.
A total of thirty-six patients underwent combined brachioplasty surgeries with mammoplasty (11), thigh dermolipectomy (10), liposuction of selected areas (six), cervical lift (four), facelift (three), and abdominoplasty (two). Twenty-three patients (56.1%) underwent both arm and forearm lift.

The scarring complications caused by the tension created on the skin no longer existed when this technique was used. Therefore, the complication rate was low, with only three cases of small foci of dehiscence in the axillary crease and the middle third of the arm, two cases of seromas that were drained with a small-caliber blunt cannula, and four cases of hypertrophic scars in certain areas (of which two underwent scar revision after six months and 10 months, respectively). These patients wanted to look as attractive and “normal” as possible, but they came to accept the scars in the postoperative period. These were patients who would have never shown their arms before the brachioplasty procedure but who have been comfortable wearing sleeveless clothes after this operation.

The results obtained were graded as “very good” by 33 patients (80.5%), “good” by five patients (12.2%), and “satisfactory” by three patients (7.3%) who presented with hypertrophic scars (Figure 7).

**DISCUSSION**

Flableness of the medial side of the arms is a common deformity in aging patients and those who were formerly obese. It is caused by a combination of changes in the skin, superficial fascia, and subcutaneous fat. Such changes consist of thinning and loss of elasticity of the skin with increasing age, laxity of the superficial fascia, excessive accumulation of subcutaneous fat, or marked weight loss compounded by inelasticity of the skin and superficial fascia. Surgical correction of this type of deformity should be restricted to very carefully selected cases because the procedure leaves scars, which—even if correctly placed, fully matured, and optimally pigmented—may be clearly visible in sleeveless clothing. Therefore, our goal was to improve the appearance and final position of these inevitable scars by diminishing as much as...
possible the tension generated during the brachial dermolipectomy procedure.

By marking the patient in orthostatic position with the arms extended laterally, commencing on the inner side of the arm where the ptosed portion begins and following the contour of the brachial biceps muscle, we obtained a sinuous lined shape (much like an italicized “S”) that blended well with the anatomy of the area. Inferiorly, the line advanced toward the elbow and continued along the inner side of the forearm. In its proximal portion, it passed through the axillary crease, where its harmony was broken with the aim of promoting relaxation of the tissues and minimizing the occurrence of scar retraction.

The arm deformity encountered in the category of patients selected was severe, as it is in most patients who have had massive weight loss, with excess skin crossing the axilla as an extension of the posterior axillary fold. Our incision followed the axillary contour in order to excise the redundant skin often encountered at this level. In some cases of lateral flabbiness of the thorax (not illustrated in this study), the demarcation was continued from the posterior axillary line until the outer portion of the submammary sulcus. Liposuction prior to skin excision significantly decreased the weight of the arm. The superficial fascial system extends from the axilla to the elbow, encompassing the subcutaneous fat. It is connected to the posteromedial fascial system of the arm that forms the clavicular aspect and inner side of the arm and elbow dermolipectomy.

CONCLUSIONS

Despite the multiplicity of procedures described for the correction of brachial deformities, there still are many problems associated with this surgery, including incorrectly placed incisions, widened hypertrophic scars, and postoperative contour deformities. By plicating the brachial fascia while performing the dermolipectomy procedure, these complications are significantly decreased, and satisfying results can be obtained in the great majority of patients.

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REFERENCES