Techniques in
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A Technique of Brachioplasty

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Various techniques for the management of upper extremity contour deformities have been suggested since aesthetic brachioplasty was first described. Such deformities are commonplace with aging, after normal weight loss, and especially after massive weight loss such as is seen following bariatric surgery. Despite the multiplicity of procedures described for the correction of these deformities, there are still problems associated with current brachioplasty techniques, including incorrectly placed incisions, widened hypertrophic scars, and postoperative contour deformities. In addition, postoperative skin laxity and ptosis in the axillary region are frequently encountered in the more extreme deformities. The authors present their technique for upper extremity brachioplasty. This technique is suitable for patients with severe brachial ptosis and skin laxity, with relatively little lipomatous tissue, which may extend from the olecranon to the chest wall. The described surgical approach provides excellent overall extremity contour with favorable scars while simultaneously addressing axillary contour deformities. (*Plast. Reconstr. Surg.* 113: 1044, 2004.)

Contour deformities of the upper extremity present a challenge to the surgeon and patient alike. Multiple techniques for upper arm rejuvenation have previously been described, but none is completely satisfactory for all deformities.[1–9] The authors believe that, depending on the extent of skin laxity and the degree and extent of arm lipodystrophy, the surgical approach should differ. Surgical approaches have been based on suction lipectomy,[10] resection brachioplasty,[1–9] or a combination of the two. The unresolved problems of current brachioplasty techniques continue to include postoperative residual contour deformities, hypertrophic scars, widened scars, and patient dissatisfaction with scar location.[8,9] For these reasons, particularly because of the preoccupation with scar sequelae, many patients are reluctant to undergo brachioplasty procedures.[8]

With the current safety and popularity of weight-reduction surgery for morbid obesity, the number of patients presenting with severely ptotic skin and relatively little excess lipomatous tissue is increasing significantly. An examiner of the American Board of Plastic Surgery,[11] to stretch the imagination and capability of the examinees, would ask the question: "How would you make wings?" The answer today would be to take 300- to 400-pound patients and have them undergo a bariatric surgical procedure. Many of the patients who lose 150 or more pounds develop a contour deformity similar to a bat's wing that extends from the olecranon across the axilla to the chest wall (Figs. 1 and 2). This produces a deformity that is particularly challenging to the surgeon because of the long incision length needed to adequately resect the ptotic skin of the arm and because of the laxity of skin within the axilla and chest-wall region that predisposes to postoperative contour deformities.

We propose a treatment algorithm based on four treatment zones to help the surgeon evaluate upper extremity contour deformities (Fig. 3). Zone II is defined as the region between the olecranon and the anterior axillary fold, zone III is defined by the borders of the axilla, zone IV is defined as the subaxillary lateral chest wall, and zone I is defined as the forearm. By systematically evaluating each of these zones, the surgeon can develop a surgical plan that avoids postoperative contour deformities.

We describe a technique of brachioplasty

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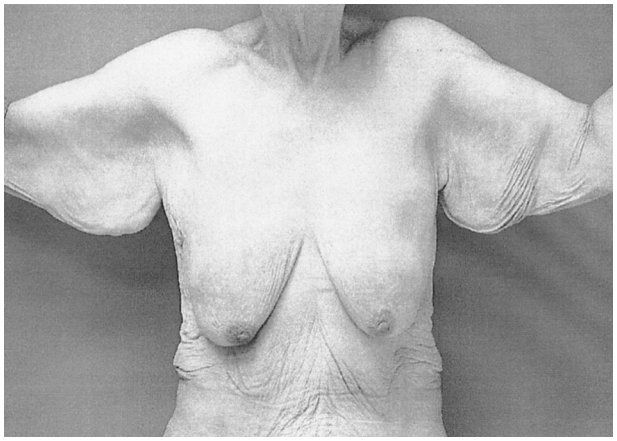

FIG. 1. Anterior view of brachioplasty preoperatively involving zones II, III, and IV.

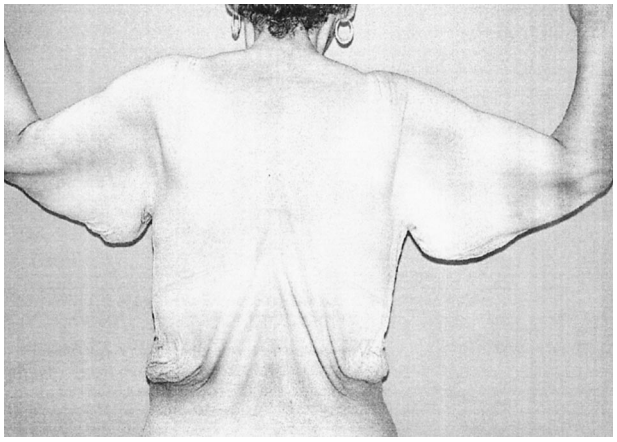

FIG. 2. Posterior view of brachioplasty preoperatively involving zones II, III, and IV.

and axillary restoration for the group of patients who present with deformities extending across a combination of zones II, III, and IV or zones II and III alone. The technique uniquely combines modifications of previously described approaches with a novel treatment for restoration of the axillary contour.

The authors believe that not all scars are equal. Patients object to bad scars, but the location of scars may make their presence more or less acceptable. There are many examples of this. An obvious example would be to compare a visible facial scar with a similar scar on the back of the head. The former is more objectionable because the scar is constantly visible to a patient looking into a mirror and to friends and family, who see the face more readily than the back of the head. This philosophy was kept in mind in our brachioplasty patients, by undulating the scar and placing the scar's ultimate resting place well posterior to the medial bicipital groove, to minimize the visibility of the final scar from the frontal position. The sinuous nature of the scar reduces the effects of the contractile tendency of the wound as well.

OPERATIVE TECHNIQUE

The procedure is performed under general anesthesia. The patient is marked immediately before surgery in the standing position; however, the final markings are completed and refined with the patient asleep. The patient is positioned supine with the arm abducted 90 degrees and the elbow in approximately 80 degrees of flexion. A line is then visualized along the axis of the arm from point A to the medial end of the excess tissue, either on the chest wall or in the axilla; the latter point is marked point B. This line serves as a reference about which two sinusoidal incisions are planned on either side of the excess skin fold, much as one would plan to separate syndactylous digits. The sinusoidal flaps are planned to interdigitate when the excess skin and fat are resected. The incisions are marked so that their proximal convergence is at point A and their distal convergence is at point B. The distance between the two skewed sinusoids is planned to produce a final scar that lies on the

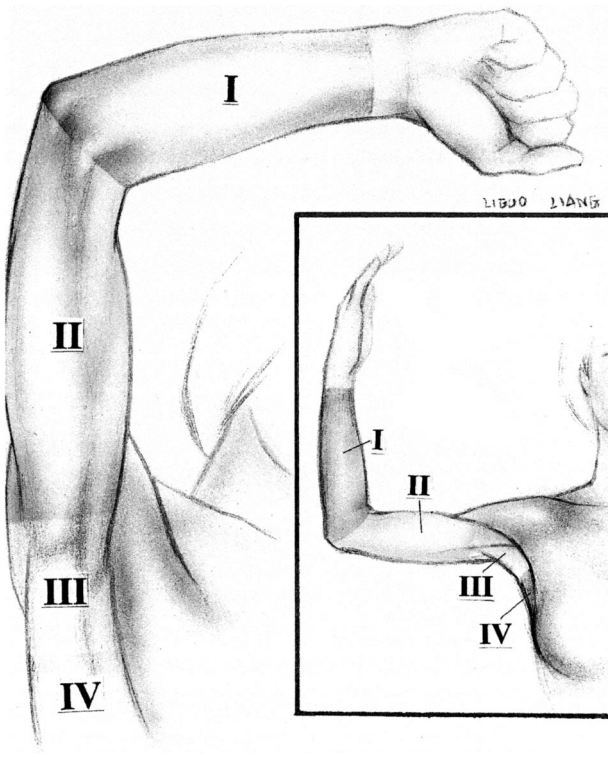

FIG. 3. Zones of treatment.

posteromedial aspect of the arm, slightly posterior to the medial bicipital groove. Markings are made on the bilateral upper extremities, as described. The olecranon and the medial epicondyle of the humerus are identified; the midpoint between these structures is identified as point A and marked on the skin surface (Fig. 4).

The skin and superficial subcutaneous tissue are next sharply incised along the sinusoidal markings down to the level of the underlying muscular aponeurosis. The subcutaneous tissue between the sinusoidal incisions is elevated off the muscular aponeurosis. Care must be taken to avoid injury to the ulnar nerve and superficial sensory nerves at this stage. There is no need to undermine wider than the margins of the surgical wound, as the laxity of the remaining skin should permit easy closure.

An axillary Z-plasty is planned with the final transverse limb lying in the apex of the axilla, extending between the two axillary folds, to restore the appearance of the axillary dome. The upper and lower limbs of the Z are marked at approximately 60-degree angles to the central limb on either side of the resection

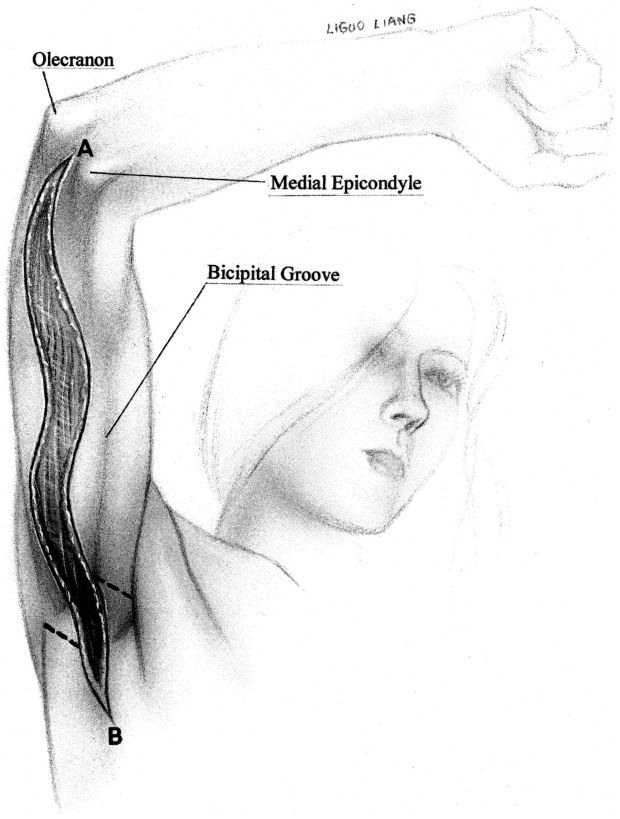

FIG. 4. Planned treatment and excision with Z-plasty in the axilla.

FIG. 5. After closure with transposed Z-plasty.

(Fig. 4). The central limb of the Z will ultimately lie in the transverse axis of the axillary dome, and the other limbs will run parallel to the anterior and posterior axillary folds. A portion of the sinusoidal incisions extends medial to the Z-plasty in those patients who have their excess extending into zone IV. The Z-plasty principle creates a longer length in the direction of the major scar, allowing the tissue to settle into the dome and, at the same time, allowing also for an anteroposterior tightening of the skin closure.

All incisions are closed using running 3-0 nylon sutures and a running over-and-over 4-0 nylon suture (Fig. 5). Closure of the sinusoidal incisions is begun at both ends. Jackson-Pratt drains are brought out of the chest wall closure site. Wounds are dressed with Xeroform (Sherwood Medical, St. Louis, Mo.) and saline-moistened gauze. The extremities are then wrapped from the wrist to the axilla with Kling (Johnson and Johnson Medical, Arlington, Texas) and a snugly applied Ace bandage (DE Healthcare Products, Denver, Pa.). A Spandage (Medi-Tech International, Brooklyn, N.Y.) dressing is then applied over the Ace wrap from the right wrist across to the left wrist, with an opening in the center for the head and chest.

RESULTS

Figures 6 through 9 demonstrate the results of the brachioplasty achieved using the technique described. The final surgical arm scar is along the posteromedial aspect of the arm, where it is relatively well hidden when viewed from either the patient's front or back with the arms at rest (Figs. 10 and 11). Normal lasting contour of the axilla has been achieved.

DISCUSSION

The sinusoidal type pattern used for the lengthy skin incision reduces the possibility of a straight-line linear contracture, and its more posterior placement makes the resultant scar less noticeable to the patient. Relatively normal contour is achieved throughout. This is in contrast to the typically described location along the medial bicipital sulcus, where the scar is more visible when viewed from the front or when the patient looks at a mirror.

By incorporating the long-axis arm incision into the Z-plasty rather than performing a separate procedure proximal to the arm brachioplasty such as T or V closures as others have previously described,[11–13] we are able to restore sharp definition to the axilla. A smaller axillary Z-plasty was first described in a drawing by Guerrero-Santos in his 1979 article.[14] However, the magnitude and extent of our described Z-plasty is intended to restore axillary contour and to lengthen the scar. This maneuver reduces axillary ptosis and restores a more natural dome shape to the axilla, thereby correcting deformities that extend through zones II and III and those in zones II, III, and IV. Finally, by extending the resection proximally to the subaxillary chest wall, we are able to reestablish a natural contour to the medial portion of the axilla and the subaxillary chest wall (zone IV). Further attempts at correcting the centripetal sagging of the back and breasts simultaneously with the brachioplasty[15] appear to create scar directions that are in competition with each other. Deeply placed anchoring sutures are not used or advisable, as vital structures in the axilla may be injured.

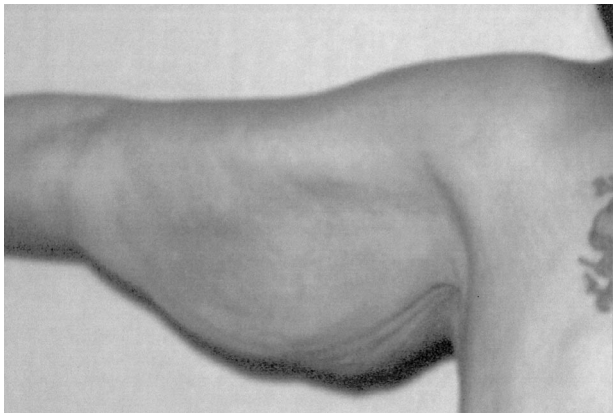

FIG. 6. Before brachioplasty.

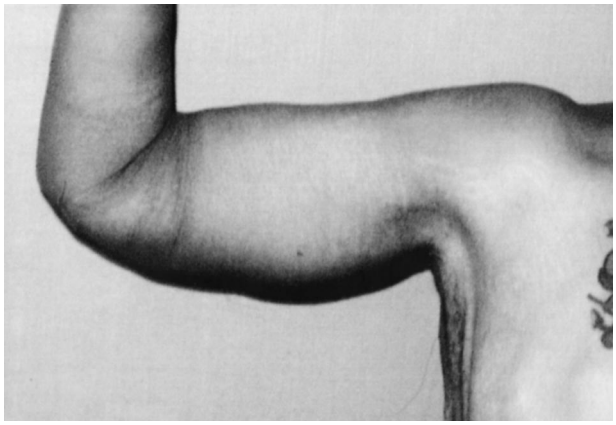

FIG. 7. Postoperative brachioplasty late result (6 months).

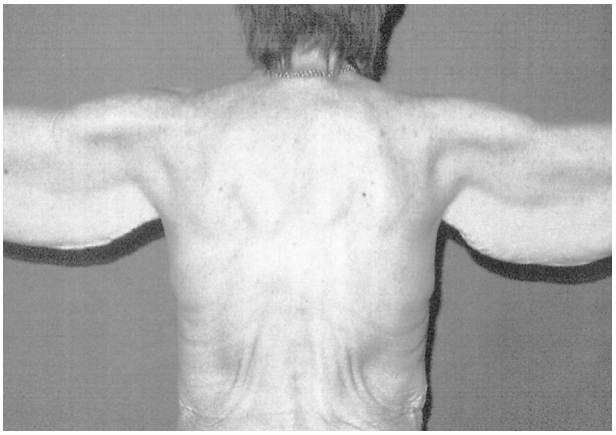

FIG. 8. Before brachioplasty.

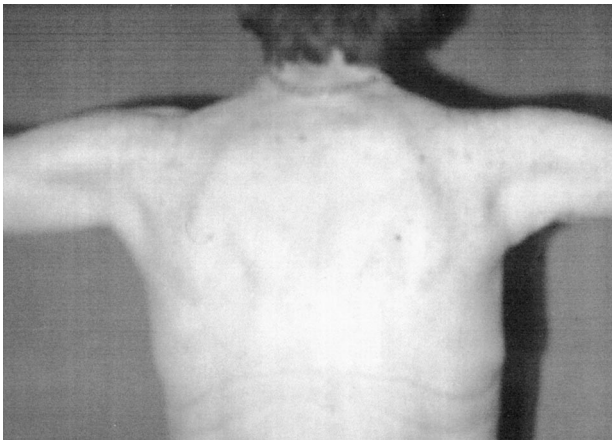

FIG. 9. Postoperative brachioplasty late result (1½ years).

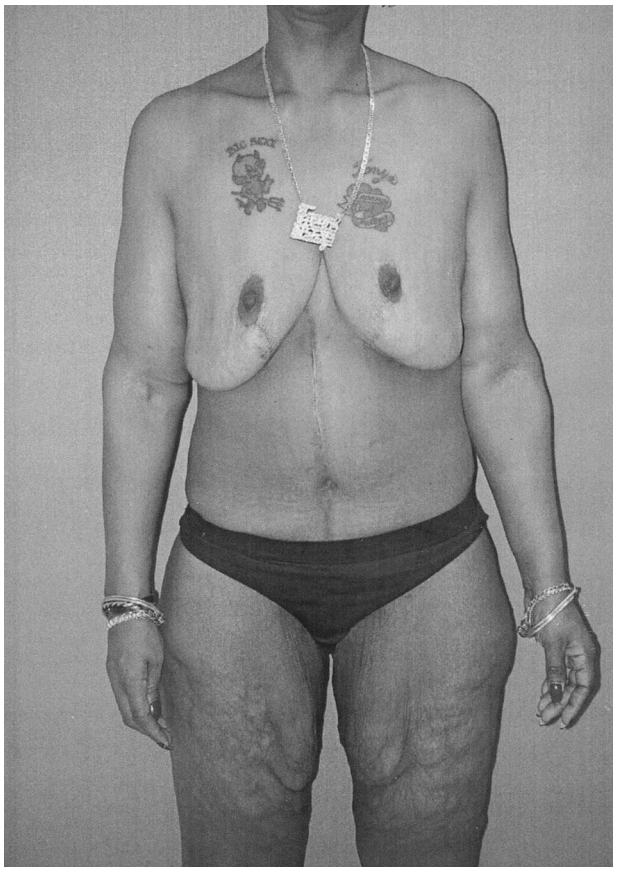

FIG. 10. View from the front 6 months postoperatively. The scars are not visible to the patient in this view.

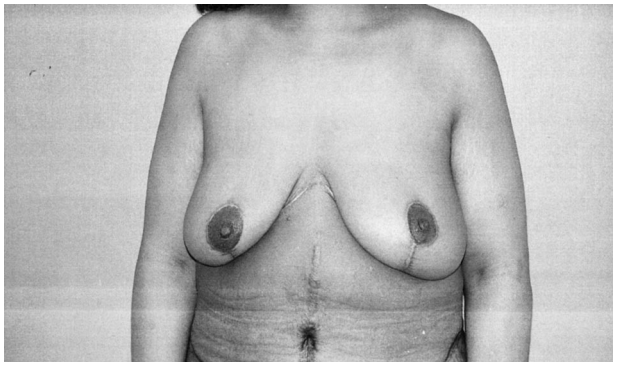

FIG. 11. View from the front 8 months postoperatively. The scars are not visible to the patient in this view.

For the brachioplasty patient, an algorithm can be developed that is dependent on the extent and involvement of each of the four zones. In zone II alone, we see patients with either excess fat only or with some excess tissue that extends to the beginning of the axilla. These patients may be treated with liposuction and sinusoidal excision or with liposuction alone, depending on the deformity present.

In those patients with tissue excess involving zones II and III, treatment consists of sinusoidal resection to the medial limits of the axilla, with a Z-plasty in zone III. In deformities involving zones II, III, and IV, generally seen in massive weight-loss patients, the sinusoidal incisions continue medial to the Z-plasty into zone IV. In this manner, the excess skin in this zone is contoured. Deformities of zone I alone are invariably excess volume without excess skin and can be treated with liposuction alone.

SUMMARY

An algorithm of treatment of brachial deformities involving the forearm, arm, axilla, and subaxillary chest wall is described. A technique of sinusoidal excision in the posterior medial arm position, combined with a generous Z-plasty to restore axillary contour, is described for treatment of excess skin in zones II and III or in zones II, III, and IV.

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