The author presents his preferred brachioplasty procedure, describing how he varies treatment according to the patient’s degree of upper arm flaccidity. In patients with mild flaccidity, short incisions are used, but patients with excessive flaccidity with adiposity are treated with lipoplasty and tissue removal involving a long incision to produce the best aesthetic contour. (Aesthetic Surg J 2004;24:161-169)

Preoperative Evaluation and Markings

Preoperative evaluation, including skin analysis and assessment of tissue flaccidity and subcutaneous fat, is the cornerstone of successful brachioplasty. Careful patient selection is the key to consistent success. In the last 3 decades I have classified patients into anatomical types to select the optimal brachioplasty procedure: Type 1 patients are thin individuals with flaccidity, wrinkles, or both (Figure 1). Type 2 patients have marked flaccidity after weight loss, as well as residual adiposity (Figure 2). Type 3 patients demonstrate a significant amount of fat tissue and marked flaccidity (Figure 3).

Close attention to the patient’s chief complaint and a detailed physical examination are of paramount importance. Examine the upper arm with the patient upright and the upper arm abducted and extended. Observe skin laxity and excess adipose tissue in the upper arm, elbow, and axilla.

Preoperative markings vary with the surgical plan and the amount of excess fat, but certain marks are standard. To hide the scar, I make the incision in the inside of the upper arm. Before marking the incision, I trace a straight line from the axillary apex to the medial epicondyle for use as an anatomic guide for the vertical longitudinal excision of the hanging skin fold, producing a T-shaped scar. This procedure resulted in contour improvement but very noticeable scar placement on the posterior arm. Zook and Vilain contributed important pointers on protecting veins and lymphatic vessels and suturing, but they did not describe this technique in detail.

Over the years I continued to seek the best brachioplasty technique, studying causes of arm flaccidity, reviewing upper arm anatomy, and focusing on patients with varied upper arm problems to determine the best surgical procedure for each. In the early 1970s, I developed an acceptable surgical procedure that was well received and quite similar to one that Baroudi was simultaneously performing in Brazil.

Primary Brachioplasty Technique

First I choose a surgical technique on the basis of the patient’s degree of flaccidity and adiposity. I use a combi-
nation of intravenous sedation, brachial plexus block, and tumescent solution infiltration. If I perform resection of excess skin and subcutaneous fat without lipoplasty, I infiltrate only the area to be resected. But if I perform lipoplasty simultaneously, I infiltrate the subcutaneous layer of the entire upper arm. I place the patient supine with the arms raised (Figure 4). Lifting both arms facilitates inner arm

Figure 1. A, B, Preoperative views of a thin 65-year-old man with type 1 flaccidity. C, Postoperative view 4 months after brachioplasty.

Figure 2. A, Preoperative view of a 63-year-old woman with type 2 flaccidity. B, Postoperative view 1 year after brachioplasty excision and lipoplasty.

Figure 3. A, Preoperative view of a 52-year-old woman with type 3 flaccidity. B, Postoperative view 1 year after lipoplasty and brachioplasty excision demonstrates good contour improvement.
surgery by providing a direct sight line for surgery, reducing the amount of bleeding, and enabling 2 surgical teams to work simultaneously.

Type 1 Patients

In Type 1 patients, I mark a short cutaneous incision, following the line between the axillary apex, the medial epicondyle, and the area to be removed. I then infiltrate the tumescent solution (Figure 5). I wait 10 minutes in an attempt to decrease bleeding in the area by giving the epinephrine sufficient time to work. In the meantime, I apply external ultrasound. I make the incision as short as possible and extirpate excess skin and subcutaneous fat tissue (Figure 6). As reported by Zook, it is important to protect the basilic and cephalic venous drainage, lymphatic drainage, and the superficial nerves at the base of the wound; I prefer to leave some fatty tissue to protect these upper arm structures. Then I perform careful hemostasis and, without undermining, suture in 4 layers, using absorbable material for the deep layers and 5-0 nylon for the skin (Figure 7). Avoiding damage to the venous and lymphatic drainage of the arm is essential. The most important technical points in preserving the veins and lymphatics are (1) to avoid undermining around the wound after removing skin and fat and (2) to leave a thin layer of fat over the fascia and muscles of the deep area of the wound.

Type 2 Patients

In type 2 patients, I mark the incision and calculate...
the amount of skin and subcutaneous fat to be removed, as well as the amount of fat I will remove with lipoplasty. I also draw horizontal lines at both sides of the area to be removed to guide me in suturing. After infiltrating the tumescent solution and waiting 10 minutes, I proceed with lipoplasty, using vertical maneuvers. I avoid horizontal maneuvers to prevent postoperative lymphatic circulatory complications (Figure 8). I perform lipoplasty first because in many patients, after fat is removed, the amount of skin and subcutaneous fat to be surgically extirpated is increased. After lipoplasty, I remove excess skin and fat, perform careful hemostasis, and suture (Figure 9).

Type 3 Patients

In type 3 patients the incision is longer, almost always extending from the axillary apex to the medial epicondyle, and the amount of skin and subcutaneous fat
that is extirpated is greater. To calculate with maximal accuracy the amount of tissue to extirpate, I grasp the excess skin and subcutaneous fat with sharp end clamps and then mark the amount of tissue to be removed, in addition to the horizontal skin lines (Figure 10, A-C). I then infiltrate tumescent solution around the incision line in the area to be extirpated and in the entire upper arm. After waiting 10 minutes, I perform lipoplasty (Figure 10, D). I then remove skin and subcutaneous fat, perform hemostasis, and close the wound in 4 layers (Figure 10, E-L) To produce the best scar possible, I make the brachial incision as short as I can, and I try to suture with as little tension as possible. Because I avoid undermining the subcuta-
Figure 10. (continued) F, G, H, By following the horizontal lines, I can make incisions accurately, calculating the surplus tissue to be extirpated to yield a nice contour and avoiding dog-ears. I, J, K, To obtain the best results, I make the borders of the vertical wound approximately equal. L, Final suture in a type 3 patient.
Figure 11. Goddio\(^9\) based her technique on rolling a deepithelialized flap around the rear of the arm and sliding it beneath the inside frontal arm skin, re-creating arm roundness.

Figure 12. A, In secondary brachioplasty I use Goddio’s\(^9\) technique, removing the surface epidermis of the scar and the surrounding skin. B, Wound after removal of the surface epidermis. C, I perform subcutaneous undermining of the deepithelialized flap and also of the opposite side. I bury the denuded flap beneath the skin flap on the other side. D, Final suture in secondary brachioplasty.
operative layer around the incisions, scarring is minimal in most of my patients.

Secondary Brachioplasty

Goddio\(^9\) has presented a primary brachioplasty technique based on aesthetic correction without skin excision. Her technique involves rolling a deepithelialized flap around from the rear and sliding it beneath the inside frontal arm skin, recreating a round arm contour (Figures 11 and 12). I have used this technique with success in secondary brachioplasty in patients in whom complications have developed (eg, notorious hypertrophic wide scar, poor aesthetic contour with fat and skin excess) (Figures 13-15).

Postoperative Care

Postoperative care actually begins during surgery with the placement of adherent, semipermeable synthetic

---

Figure 13. A, Preoperative view of a 48-year-old woman with type 3 flaccidity, fat excess, and a wide scar after primary brachioplasty. B, Postoperative view after secondary brachioplasty demonstrates nice contour and a minimal scar.

Figure 14. A, Preoperative view of a 45-year-old woman with type 3 flaccidity after unsuccessful primary brachioplasty performed elsewhere. She has a wide, inappropriately located scar and residual adiposis and flaccidity. B, Postoperative view 4 months after secondary procedure demonstrates aesthetic arm contour improvement and an early hypertrophic scar.

Figure 15. A, Preoperative view of a 51-year-old woman with type 3 flaccidity 2 years after primary brachioplasty. She demonstrates residual flaccidity, adiposis, and a hypertrophic scar. B, Postoperative view 1 year after secondary brachioplasty.
material over the wound. To achieve adequate dressing pressure, I apply a thick layer of gauze over the wound, then bandage it with moderate pressure. When lipoplasty is being performed simultaneously, it is important to apply pressure evenly all around the arm, avoiding too much pressure. This helps prevent circulatory problems, especially venous congestion in the entire upper arm, and postoperative swelling. Patients are able to go home on the day after surgery. I continue oral postoperative antibiotics for 7 days. I see patients 3 times a week after surgery for a period of 6 weeks to ensure that healing is adequate and then monthly to watch the progress of the scar.

I remove sutures 2 weeks after surgery. In the ensuing weeks, the main thing to look for is evolution of the scar and development of some dog-ear or irregularity. Also, I check arm sensitivity to make sure I have not caused superficial nerve damage. In most of my patients, I perform Z-plasty in the axillary apex to avoid vertical retractile scars. Aesthetic improvement can be adversely affected by hypertrophic scars, which may limit attractive contour improvement in the upper arm. To prevent this complication, for about 10 months after surgery I use pieces of silicone sheets around the scar, applying additional pressure with a garment and a thick gauze placed over the silicone sheets, especially at night. I also advise patients not to engage in physical exercise or strenuous upper body activities for 1 month after surgery.

**Conclusion**

Brachioplasty procedures performed in the 1950s and 1960s by me and by other plastic surgeons around the world yielded some success but were limited by problems such as inappropriate scar placement, excessive skin and fat resection, wide hypertrophic scars, horizontal cutaneous furrows, dog-ears, venous circulatory alteration (edema), and lymphatic circulatory alteration (lymphedema).

Since then, I have refined my technique to better achieve the aesthetic goals of brachioplasty: to eliminate or reduce brachial wrinkles and adiposity and to improve contour while minimizing visible scars.6-7,10,11 Brachioplasty has been proved safe, efficacious, and easily reproducible; in my experience, it consistently produces a high level of patient satisfaction.

**References**


**Bibliography**


Reprint requests: José Guerrerosantos, MD, Garibaldi 1793, Guadalajara, Jalisco 44680, Mexico. 1909-820X/$30.00