

Evaluation of Different Varieties of Brachioplasty

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ABSTRACT

Background: There has been a renewed interest in upper arm contouring secondary to recent advances in plastic surgery that have made it safer and more appealing to both the plastic surgeon and the patient. **Objectives:** the aim of the work was to describe the aesthetic outcome of different techniques used for correction of arm ptosis to try to obtain a new treatment-based algorithm for management of brachioplasty. **Patients and Methods:** This prospective study included a total of 40 patients with different degrees of arm ptosis, requesting arm contouring attending at Al-Hussein and Bab Al-Shairia, Al-Azhar University Hospitals. Different techniques used for brachioplasty as liposuction or skin excision by different types of skin incision according to the degree of fat deposit, redundancy and skin ptosis, or both were used in this study. **Results:** Patient's satisfaction within clothes was 100% in all techniques used in brachioplasty while patients' satisfaction without wearing clothes or light clothes was 84.6% in surgical resection due to the presence of complications in the form of wound dehiscence in 5 patients (19%) and hypertrophic scar in 4 patients (15.4%) and it was 100% in liposuction patients and it was 83.3 in combined method patients due to the resent of wound dehiscence with ugly scar in 1 patient (16.7%).

Conclusion: Brachioplasty operation whether liposuction alone or surgical excision or combined methods is a good method to treat patients with arm obesity or post massive weight loss skin ptosis. The proper method was selected according to the degree of fat deposit, redundancy and skin ptosis.

Keywords: Brachioplasty, arm contour, arm ptosis, liposuction.

INTRODUCTION

Upper arm excess in patients with arm ptosis is frequently a source of dis-satisfaction. The arms are visible in a variety of attire, and patients' express frustration with unsuccessful efforts to disguise this obvious deformity ⁽¹⁾. Brachioplasty was first described by Correa-Iturraspe and Fernandez1 in the 1950s, but it was associated with frequent complications and suboptimal results. Since then, numerous surgeons have modified the original technique, with a subsequent improvement in outcomes. Specifically, the incidence of axillary scar contracture was decreased with the advent of the T- or L-shaped axillary resection patterns and W or Z incisions crossing the axilla ⁽²⁾.

Cosmetically, the optimal placement of the final scar was found to lie in the brachial sulcus, such that with the patient's arms at the side, the incision is virtually imperceptible ⁽³⁾. Only with the patient's arms abducted can the incision be seen, and even so, it is often hidden by the shadow in the sulcus. Less undermining decreased the incidence of seromas and lymphedema flaps ⁽⁴⁾.

Finally, the incidences of scar widening and recurrence of the deformity were decreased with techniques that anchored the fascia of the arm into the axilla (clavipectoral fascia). As a result of these modifications, brachioplasty has become a safer, more effective operation ⁽⁵⁾.

The aim of the current study was to describe the aesthetic outcome of different techniques used for correction of arm ptosis to try to obtain a new treatment-based algorithm for management of brachioplasty.

PATIENTS AND METHODS

This prospective study included a total of 40 patients requesting arm contouring attending at Al-Hussein and Bab Al-Shairia, Al-Azhar University Hospitals. **Approval of the Ethics Board of Al-Azhar University and a written informed consent from all the subjects were obtained.** This study was conducted between January 2017 to March 2019. The included subjects were 14 obese patients and 26 with excess skin after massive weight loss. The patients' age was ranged from 26 to 56 years. Thirty-six patients were females and 4 were males. Thirty-two patients complained of skin redundancy of the arms post massive weight loss and 8 patients complained of generalized obesity with marked obesity in the arms and difficult in elevation of the arms with pain and numbness on elevation (table 1).

Different techniques used for brachioplasty as liposuction or skin excision by different types of skin incision according to the degree of fat deposit, redundancy and skin ptosis, or both were used in this study.

1. Patients with moderate to severe fat deposit and grade 1 ptosis (<5 cm) with good skin tone: liposuction was done.
2. Patients with severe fat deposit and grade 2 to 3 ptosis (5-10 cm) with moderate to poor skin tone: combined liposuction and brachioplasty were done.
3. Patients with minimal or no fat deposit and with grade 3 ptosis (> 10 cm) with poor skin tone: traditional brachioplasty was done.

The quality of the skin of the arms was evaluated for the presence or absence of striae, measurement of the dermal thickness and quantity of subcutaneous fat.

Operative procedure

Group A (26 patients) complained of minimal or no fat deposit and with grade 3 ptosis of skin of the arms post massive weight loss, (stage 4): were subjected to surgical resection, and were subdivided according to the type of surgical technique into subgroups:

- I- Elliptical or double ellipse marking techniques was done in 4 patients.
- II- Minimal incision brachioplasty was done in 3 patients
- III- Z brachioplasty technique was done in 2 patients
- IV- Fish-incision brachioplasty was done in 5 patients
- V- W brachioplasty technique was done in 5 patients.
- VI- L brachioplasty technique was done in 7 patients.

Group B (8 patients) complained of generalized obesity with marked obesity in the arms and no ptosis (stage 2a). Those patients were subjected to liposuction and were subdivided according to the type of surgical technique into 3 subgroups:

- I- CAST was done in 4 patients.
- II- Laser-assisted liposuction (LAL) was done in 2 patients.
- III- Ultrasound-assisted liposuction (UAL) was done in 2 patients, one of them with two-staged procedure for optimal result (staged-UAL).

Group C (6 patients) complained of generalized obesity with moderate to marked obesity in the arms and skin laxity (grade 2 or 3 ptosis) of the arms (stage 2b and 3). They were subjected to combined liposuction and skin excision.

(1) Surgical resection:

Marking:

Which differs from each technique of skin resection. It is discussed in details in every procedure details.

Anesthesia:

General anesthesia with endotracheal intubation was done in all cases. Local tumescent was injected also for hemostasis and relief of postoperative pain.

Positioning and disinfection:

The patients were lied in the supine position and the patient's arms were abducted by 90 degrees on the operating table. Disinfection with bovidon iodine 7.5% was carried out to the whole upper limbs up to the axilla and to the breast region.

Incision:

The incision started at the superior marked line with a size 21 scalpel.

Dissection and excision:

The skin flap was best dissected by pulling it upward with two to three Allis forceps. This enabled dissection from the fascia of the upper arm to be carried out quickly and avoid injury of important

structures. This was done with either scissors or scalpel.

Once the skin flap along the fascia of the upper arm had been dissected to deep fascia within the marked resection border and the first hatch mark was reached and all bleeding was cauterized, the resected segment was closed with temporary staples. The same process was repeated with the next hatch marks. The remaining segments were resected that bracket the axillary crease, making sure that the resection was more superficial at the axilla to avoid injuring the rich lymphatics in this area. So resection was carried out in stages while keeping an eye on the resulting skin tension. Following resection, subcutaneous tissue remained on the fascia without undermining.

Drains:

No. 14 Suction drains was inserted (if needed) in each arm and brought out through distal olecranon incision.

Closure:

The skin edges were closed with 3 layers: 1- Inverted subcutaneous interrupted 2.0 absorbable sutures, 2- Inverted subdermal interrupted or continuous 3.0 absorbable sutures. 3- Complete wound closure was then carried out with subcuticular 4.0 prolene™ or 4.0 Monocryl™ sutures.

Dressing:

Adhesive tapes were first applied as a dressing to relieve the tension on the cutaneous sutures, and then bulky gauze pads were placed over the arm and in addition; the arm was then loosely wrapped with elastic bandages from the wrist to the shoulder.

Postoperative care:

Antibiotics (3rd generation cephalosporin 1g I.V twice daily) were given for 4 days then continued with oral antibiotic and the arm should be elevated.

Drains (if applied) were removed after 3-5 days and the patient was discharged home after that. Daily dressing was done from the 2nd day with betadine™. Adhesive tapes were left in place for 14 days and sutures were removed after 14 days. The patients were advised to avoid physical exertion for a period of 2–3 weeks in order to permit undisturbed wound healing.

All patients were advised to use Scaro™ ointment or Spectragel™ ointment or Cerederm™ sheets after suture removal for 3 months.

(2) Liposuction:

Marking:

Marking started with the patient's arms abducted to 90 degrees and the elbow flexed to 90 degrees. The localized area of fat deposit to be sucked was marked which was in the anterolateral and posterolateral part of the upper part of the arm and over the deltoid area.

Anesthesia:

General anesthesia in the supine position was used.

Positioning and disinfection:

The patient was lied in the supine position and the patient's arms were abducted by 90 degrees on the

operating table. Disinfection with bovidon iodine 7.5% was carried to the whole upper limbs up to the axilla and to the breast region.

Incision:

2 incisions (0.5 cm) were done in the junction between the proximal 2/3 and distal 1/3 of anterolateral and posterolateral regions of the arm. A solution contains 2% lidocaine, 1 mg epinephrine/liter saline and saline making a total volume of 500 ml is injected in each arm.

Cannula:

A straight metal blunt cannula with blunt tip and 3 orifices, which were 6 mm in diameter for the main bulk of fat and 3 mm in diameter for refinement, connected with a high-vacuum suction system (0.8-1 par) were used.

Lipectomy:

The cannula was advanced into those areas which contains undesired fat (Fig. 29). Creating tunnels and the fat was aspirated from wherever it was located with the lumen sufficiently far back not to remove subdermal fat. Particular care was taken to taper the periphery.

Contour assessment:

Contour changes were constantly assessed by both the contralateral hand and repeated visual inspections. Wherever a full area existed, it was aspirated. Particular care was taken to taper the periphery.

Closure:

The 2 incision sites were closed by single suture for each.

Dressings:

Bulky gauze pads were placed over the arm and in addition; the arm was then loosely wrapped with elastic bandages from the wrist to the shoulder.

Postoperative care:

Antibiotics (3rd generation cephalosporin 1g I.V twice daily) were given for 2 days, and then continued with oral antibiotic prophylaxis and the arms were elevated.

(3) Combined method:

In all cases the procedure was started with liposuction first and then; completed with surgical brachioplasty. All cases were drained, and the drain came out from the incision of liposuction at the distal olecranon incision. The skin edges were closed in 3 layers. Adhesive tapes and Bulky gauze pads were applied and tight bandage for one week.

Postoperative care:

As mentioned in the surgical resection before.

Postoperative care:

Following surgery, patients were reviewed in the outpatient clinic for 6-9 months & postoperative photographs were taken. Patients were followed up for presence of any complications, scar and cosmetic result. All the results were tabulated and compared to those results mentioned in the literature.

RESULTS

This study included 40 patients requesting arm contouring, of them 14 were obese and 26 with excess skin after massive weight loss.

Arm circumference by centimeters was measured before and three months after the procedure done to evaluate the effect of the technique used for brachioplasty regardless any relative factor as shown in table (2).

It was measured after 3 months after complete resolution of the postoperative edema. It was a great decrease in the arm circumference postoperative especially with surgical resection and combined method patients.

Patient's satisfaction (table 3) within clothes was 100% in all techniques used in brachioplasty while patients' satisfaction without wearing clothes or light clothes was 84.6% in surgical resection due to the present of complications in the form of wound dehiscence in 5 patients (19%) and hypertrophic scar in 4 patients (15.4%) and it was 100% in liposuction patients and it was 83.3 in combined method patients due to the resent of wound dehiscence with ugly scar in 1 patient (16.7%).

Complications: (table 4)

Mild wound dehiscence occurred with 5 cases (19%) treated with surgical resection and 1 case (16.7%) treated with combined method and these cases was treated by regular daily dressing until complete closure was done with ugly wide scar. Scar hypertrophy and ugly scar occurred with 4 cases (15.4%) treated with surgical resection and 1 case (16.7%) treated with combined method, and those cases was advised to use anti-scar topical treatments and 1 case had another surgical resection of the scar. Temporary skin numbness of the arm specially the medial aspect of the arm postoperative occurred with 14 cases (53.8%) treated with surgical resection, 3 case (37.5%) treated with liposuction and 4 case (66.7%) treated with combined method, this complication was resolved spontaneously within 2 weeks postoperative when the edema was subsided. Contracted scar in the axilla with top of the T frequently drifts toward the inner arm which occurred in 1 surgical resected patient (3.9%) treated with T brachioplasty. Seroma occurred with 2 case (25%) of the liposuction group, and it was aspirated several times and hot fomentation was applied with no infection and subsided within 7 days.

Temporary sagging and wrinkled skin occurred in 2 case (25%) treated with liposuction and it was treated by wrapping the arms with compressive bandage for 3 months.

Recurrent skin relaxation occurred in 6 cases (23.1%) treated with surgical resection due to fluctuation of body weight of the patients as they increase postoperative then decreased later and the patients were satisfied with the results and refused another procedure.

Table (1): The patients' demographic data.

		No. of cases	Percentage
Age group (years)	20-30	6	15%
	31-40	23	57.50%
	41-60	11	27.50%
Main complaint	Skin Redundancy	32	80%
	Discomfort on arm elevation	8	20%
Gender	Female	36	90%
	Male	4	10%
Etiology	Post massive weight loss	26	65%
	Obesity	14	35%
Redundancy	Present	32	80%
	Absent	8	20%
The technique of brachioplasty used	surgical resection	26	65%
	Liposuction	8	20%
	Combined liposuction and skin excision	6	15%

Table (2): shows the arm circumference before and 3 months after the operation with great decrease in the arm circumference postoperative especially with surgical resection and combined method patients.

No.	Technique	Pre*	Post **	D ***	% ****
1	Surgical resection	40	32	8	20
2	Surgical resection	38	30	8	21
3	Combined method	55	46	9	16.3
4	Liposuction	49	42	7	14.3
5	Surgical resection	39	30	9	23
6	Surgical resection	38	31	7	18.4
7	Combined method	42	31	11	26
8	Surgical resection	40	31	9	22.5
9	Surgical resection	45	35	10	22.2
10	Surgical resection	38	30	8	21
11	Surgical resection	40	30	10	25
12	Liposuction	53	45	8	15
13	Surgical resection	42	34	8	19
14	Liposuction	51	44	7	13.7
15	Surgical resection	44	34	10	22.7
16	Surgical resection	39	30	9	23
17	Surgical resection	40	31	9	22.5
18	Surgical resection	41	33	8	19.5
19	Surgical resection	45	36	9	20
20	Surgical resection	39	30	9	23
21	Combined method	44	33	11	25
22	Liposuction	50	42	8	16
23	Surgical resection	44	35	9	20.5
24	Surgical resection	42	34	8	19
25	Liposuction	48	41	7	14.6
26	Liposuction	51	43	8	15.7
27	Surgical resection	39	31	8	20.5
28	Combined method	48	38	10	20.8
29	Surgical resection	42	34	8	19
30	Surgical resection	44	35	9	20.5
31	Surgical resection	41	33	8	19.5
32	Surgical resection	38	30	8	21
33	Liposuction	50	43	7	14
34	Surgical resection	40	30	10	25
35	Surgical resection	39	30	9	23
36	Combined method	53	42	11	20.8
37	Surgical resection	44	36	8	18.2
38	Combined method	51	40	11	21.6
39	Surgical resection	43	34	9	20.9
40	Surgical resection	41	33	8	19.5

*Pre = Rt. Arm circumference before operation in centimeters, **Post = Rt. Arm circumference after operation in centimeters. ***D = Rt. Arm circumference reduced in centimeters, ****% = Percentage of Rt. Arm circumference reduced.

Table (3): shows patient's satisfaction within and without clothes.

Technique	C1*	%	C2**	%
Surgical Resection	26	100	22	84.6
Liposuction	8	100	6	75
Combined	6	100	5	83.3

* Patient's satisfaction within clothes.

** Patient's satisfaction without clothes.

Table (4): shows the complications occurred with different technique of brachioplasty used in this study.

Technique	Complications	No.	%
Surgical Resection (26 cases)	Mild wound dehiscence	5	19
	Hypertrophic scar	4	15.4
	Temporary numbness of skin of medial aspect of the arm	14	53.8
	Fluctuation of body weight lead to skin relaxation	6	23.1
	Contracture with top of the T frequently drifts toward the inner arm	1	3.9
Liposuction (8 cases)	Seroma	2	25
	Temporary numbness of skin of medial aspect of the arm	3	37.5
	Temporary postoperative sagging and wrinkled skin	2	25
Combined (6 cases)	Wound dehiscence	1	16.7
	Hypertrophic scar	1	16.7
	Temporary numbness of skin of medial aspect of the arm	4	66.7

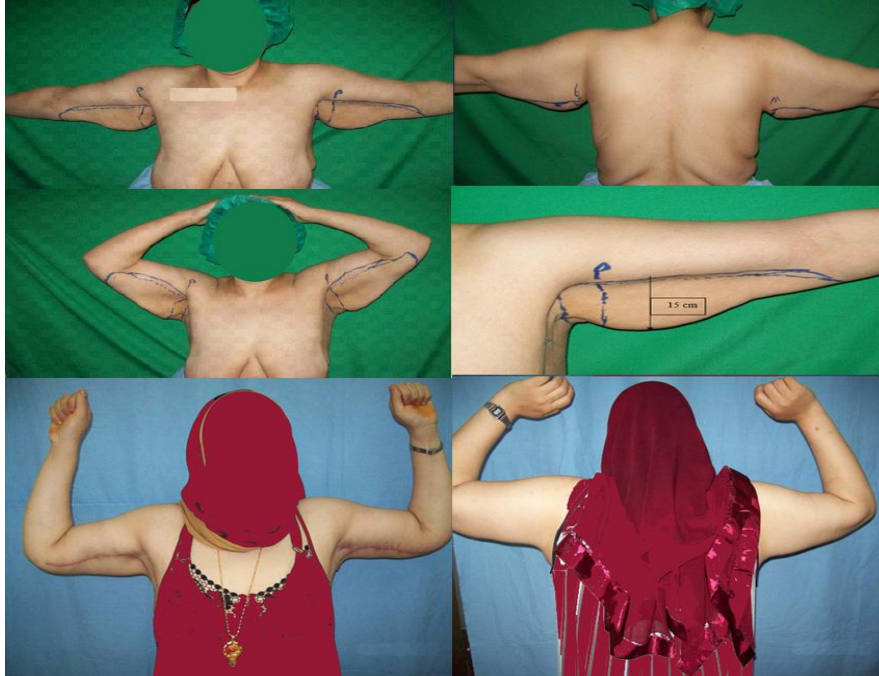


Figure (1): Z-brachioplasty technique in female 34 years old in steps.



Fig. (2): LAL in female 28 years old with early ecchymosis.



Fig. (3): Combined CAST + L-brachioplasty technique in female 48 years old with dehiscence in left wound.



Fig. (4): UAL brachioplasty in 25 years old female patient.

DISCUSSION

Cases of history of extreme overweight and massive weight loss (MWL) has risen since 2008. Majority of patients are left with redundancy with poor self-confidence⁽⁶⁾. Moderate to severe skin laxity of the arms with or without associated arm fat deposits is the primary indication for surgery in this study. Patients with significant postero-medial arm fat deposits and limited skin laxity should be treated with liposuction and postoperative compression for 3 to 4 months⁽⁷⁾. Brachial ptosis was clinically classified based on the amount of adipose tissue deposit and the degree of ptosis. This system offers guidelines for graduated treatment of fat deposit and brachial ptosis. Five groups of upper arm problems are described, as follows: stage 1, patients with minimal fat deposit and no ptosis; stage 2a, patients with moderate fat deposit and grade 1 ptosis; stage 2b, patients with severe fat deposit and grade 2 ptosis; stage 3, patients with severe fat deposit and grade 3 ptosis; and stage 4, patients with minimal or no fat deposit and with grade 3 ptosis⁽⁸⁾.

In this study the degree of skin ptosis and accumulation of subcutaneous fat varied from patient to patient so the clinical classification of El Khatib HA., was used to choose the strategy for treatment and the patients were divided into 3 groups as mentioned before.

Brachial dermolipectomy is an efficient method of treatment for dermolipodystrophy of the upper extremity resulting from weight loss or aging. The excessive skin and fat that hangs during abduction of the arm, and contributes to the contour deformity, is excised. Unfortunately, this has frequently resulted in unsightly scars and contour deformity⁽⁹⁾.

Different techniques used for brachioplasty as liposuction or skin excision by different types of skin incision according to the degree of fat deposit, redundancy and skin ptosis, or both were used in this study.

The excess skin and fat (if any is present), each of these components will determine which procedure is best for the patient. The incisions required are determined by the severity of the condition. Minimal skin excess may be treated with an incision in the armpit alone. Moderate laxity is treated with incision from the armpit to the elbow. Most patients fall into this category. More severe cases are rare and may require extension of the incision past the elbow onto the forearm. In moderate skin ptosis: elliptical or double ellipse marking techniques were used, and in severe skin ptosis with axillary skin laxity: T brachioplasty or L brachioplasty technique was used⁽¹⁰⁾.

In this study contracture in the axilla with top of the T frequently drifts toward the inner arm which occurred in 1 surgical resection patient (3.9%) treated with T brachioplasty.

Treatment of the upper arm deformity in the patient with massive weight loss most frequently requires excisional surgery that must cross the axilla onto the lateral chest wall. To avoid over-resection but still achieve the best possible result, a “double ellipse” marking technique is used. The excision is performed with a “segmental resection closure” technique that prevents the interference of soft-tissue swelling during wound closure. It places the scar along the inferior border of the arm (when in an abducted position), which is superior to the more

traditional bicipital groove placement. This technique is versatile and effective in producing the best possible upper arm contour in the patient with massive weight loss ⁽¹¹⁾.

In this study the patient's satisfaction within or without clothes was 100% with liposuction method because there was no scar in the arm, while the arm circumference postoperative was not greatly reduced in compared to the surgical resection or combined methods. Placement of the arm scar is also controversial. So by placing the scar in the bicipital groove, allowing the scar to be hidden when the arm is adducted. Placement of the scar more posteriorly can result in a scar that is visible from behind when the arm adducted.

Patients requesting brachial fat reduction were offered CAST liposuction as an alternative to traditional liposuction and/or brachioplasty. The possibility of a secondary procedure must be discussed preoperatively. Patient goals were defined as obtaining a straighter inferior brachial border without exacerbating wrinkling or sagging. Aesthetic results reviewed at 6–8 months and secondary procedures may be performed at the patient's request and when the surgeon planned for it. CAST liposuction is performed under local or general anesthesia, either alone or in combination with other brachioplasty procedures ⁽¹²⁾.

CAST liposuction offers a viable alternative to traditional liposuction and/or brachioplasty. CAST liposuction was developed to maximize skin retraction without a change in skin quality through differential fat extraction, and the use of smaller cannulas. The postoperative care is demanding to achieve accurate skin retraction necessitating complete patient compliance. Minor complications including seromas and wrinkling are not uncommon but are an acceptable alternative to the scar of a traditional brachioplasty. Well-executed CAST liposuction, although imperfect, allows for the creation of a straight brachial border without changes in the skin quality optimizing patient satisfaction for this challenging region ⁽¹³⁾.

Laser lipolysis and laser-assisted liposuction have proven to be safe and effective methods of body contouring. This capacity of the laser to produce skin contraction is very important in the treatment of patients with some degree of skin laxity who may not be candidates for traditional liposuction. Like traditional liposuction, laser-assisted liposuction is useful in combination with other surgical brachioplasty procedures ⁽¹⁴⁾.

Regarding ultrasound-assisted liposuction, there are three main physiological effects the ultrasound has. The micromechanical effect is the injury produced directly by the unidirectional action of the ultrasonic waves through intracellular, organic molecules. It has minimal effects. The cavitation effects, as previously mentioned, produces important

cell fragmentation and diffusion of the lipidic matrix through the intercellular space. The thermal effect is caused by acoustic waves, cannula friction, and the conversion of the ultrasonic waves into heat as they pass tissue. The heat must be dissipated by tissue infiltration. The principal change in second-generation ultrasonic liposuction devices was the introduction of perforated cannulas. Both perforated and solid cannulas used are titanium for more efficient energy transmission. The solid cannulas are more efficient at creating the cavitation effect because they maintain the local liquid environment created by the infiltration. Also, the solid cannulas seem to be less traumatic and more durable than perforated cannula ⁽¹⁵⁾.

Mild wound dehiscence occurred with 5 cases (19%) from 26 cases treated with surgical resection method and 1 case (16.7%) from 6 cases treated with combined method, and these complicated cases were treated by regular daily dressing until complete closure was done with ugly wide scar. Scar hypertrophy and ugly scar occurred with 4 cases (15.4%) from 26 cases treated with surgical resection method and 1 case (16.7%) from 6 cases treated with combined method, and those cases were advised to use antiscar topical treatments and 1 case had another surgical resection of the scar and was treated with postoperative radiation setting. Temporary skin numbness of the arm specially the medial aspect of the arm postoperative occurred with 14 cases (53.8%) from 26 cases treated with surgical resection method, 3 case (37.5%) from 8 cases treated with liposuction and 4 cases (66.7%) from 6 cases treated with combined method, this complication was resolved spontaneously within 2 weeks postoperative when the edema was subsided.

Contracted scar in the axilla with top of the T frequently drifts toward the inner arm which occurred in 1 case (3.9%) from 26 cases treated with surgical resection brachioplasty. Seroma occurred with 2 case (25%) from 8 cases treated with liposuction, and it was aspirated several times and hot fomentation was applied with no infection and subsided within 7 days. Temporary sagging and wrinkled skin occurred in 2 cases (25%) from 8 cases treated with liposuction and it was treated by wrapping the arms with compressive bandage for 3 months. Recurrent skin relaxation occurred in 6 cases (23.1%) from 26 cases treated with surgical resection due to fluctuation of body weight of the patients as they increase postoperative then decreased later and the patients were satisfied with the results and refused another procedure. In this study there was no wound infection due to prophylactic antibiotic and good aseptic technique.

Complications of liposuction include patient dissatisfaction and contour irregularity, which can be caused by improper selection of patients or by over-suctioning of patients with good tissue elasticity. They also include prolonged edema, hematoma, and

seroma. Infection may occur due to lack of intraoperative or postoperative antibiotic coverage. Skin hyperpigmentation is usually occurred as a result of impaired circulation caused by over-suctioning. Pulmonary fat embolism may occur as a result of fat particles dislodged during liposuction. Pulmonary edema may occur more commonly with tumescent technique. Necrotizing fasciitis, fluid overload, lidocaine toxicity, and toxic shock syndrome have been reported. Rare complications may occur, such as, thoracic and abdominal cavity perforation, aortic perforation, anaphylaxis secondary to metals sensitivity, acute renal failure and cerebrovascular accidents.

Temporary skin numbness of the arm postoperative occurred with 3 cases (37.5%) treated with liposuction, this complication was resolved spontaneously within 2 weeks postoperative when the edema was subsided. Seroma occurred with 2 cases (25%) of the liposuction group, and it was aspirated several

times and hot fomentation was applied with no infection and subsided within 7 days. Temporary sagging and wrinkled skin occurred in 2 cases (25%) treated with liposuction and it was treated by wrapping the arms with compressive bandage for 3 months.

This study was also aimed to provide a guideline algorithm to help select an appropriate technique to use for upper arm contouring. For that propose we can classify the patients into three types:

Type I:

Type I patients with a relative excess of fatty deposits in the upper arm but good skin tone and minimal skin laxity. These patients are candidates for upper arm contouring with liposuction alone. Laser assisted liposuction (LAL) and ultrasound-assisted liposuction (UAL) have a marked increase in aesthetic outcome especially with the patients with relatively young age.

Type II:

Type II patients have moderate skin laxity with minimal excess fat with poor skin elasticity. These patients are candidates for brachioplasty using excisional techniques. The location of their redundant skin determines what surgical technique is used. Patients with proximal laxity are candidates for minimal incision brachioplasty, patients with laxity of the entire arm are candidates for traditional brachioplasty, and patients with significant laxity of the arm and lateral chest wall are candidates for extended brachioplasty.

Type IIA

The type IIA patients with only proximal upper arm redundancy. Usually these patients will have significant anterior and/or posterior axillary folds. Patients with proximal laxity can be divided into two groups: those with isolated horizontal laxity and those with both horizontal and vertical laxity. Patients with

extensive isolated horizontal laxity can be treated with resection of a vertical ellipse, with the scar hidden in the axillary fold. Patients with both vertical and horizontal excess are best treated with a T-shaped resection along the proximal anterior aspect of the upper arm. Two-stages liposuction especially using UAL is a good choice also for those patients.

Type IIB

The type IIB patients with redundancy of their entire upper arm, from the elbow to the chest wall. There are two groups present in this subset of patients, depending on whether the patient has excessive isolated vertical redundancy in the axilla or a combination of horizontal and vertical redundancy.

For patients with isolated vertical redundancy, a horizontal excision can be performed along the brachial groove. For patients with moderate horizontal combined with vertical excess, an L-shaped excision is performed in the axilla.

Type IIC

For patients who have had massive weight loss, laxity may also be present on the lateral chest wall. For these patients, an extended brachioplasty onto the chest wall is the procedure of choice (Pitanguy, I, 2000).

Type III

Type III patients have both fatty tissue excess and redundant lax skin in the arm. Liposuction alone is not providing enough skin retraction to obtain a good aesthetic result. Several options are available for these patients. First, further weight loss can decrease the amount of subcutaneous fat, subsequently downstaging these patients. Second, patients with moderate, but not severe, skin laxity can be treated in a staged fashion beginning with ultrasound and suction-assisted liposuction.

Lastly, these patients can be treated with combined single-stage liposuction and resection. Liposuction is performed first, as previously described. After completion of the liposuction, markings are made and the resection of redundancy is performed.

The algorithm presented in this article is meant to provide a guideline to help select an appropriate technique to use for upper arm contouring. The algorithm is a compilation of techniques that can be used for upper extremity contouring that, when properly selected, can give the most aesthetic outcome.

CONCLUSION

It could be concluded that brachioplasty operation whether liposuction alone or surgical excision or combined methods is a good method to treat patients with arm obesity or post massive weight loss skin ptosis.

The proper method was selected according to the degree of fat deposit, redundancy and skin ptosis. Although with surgical excision there was some dissatisfaction with scars, yet the patient's satisfaction

within clothes was 100%, while patients treated with liposuction were satisfied within or without clothes. The overall procedures were tolerated well by the patients with acceptable complications.

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