

## Arm Liposuction With Moderate Ptosis Versus Brachioplasty

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### ABSTRACT

**Background:** Upper arm excess in patients with arm ptosis is frequently a source of dis-satisfaction. Arms are visible and become an important area for contouring. Patients with moderate arm ptosis are candidate for suction assisted liposuction or open suction-assisted brachioplasty. There is a controversy which is more suitable for the patient and has better results.

**Objectives:** The aim of this work was to compare the efficacy, patients' satisfaction, operative timing, recovery periods, scarring and aesthetic outcomes of liposuction alone versus open suction-assisted brachioplasty in moderate arm ptosis.

**Patients and Methods:** This is a multicentric study that was carried out on 30 patients with moderate brachial ptosis presented to Benha University Hospital and Alamiri General Hospital during the period from January 2023 to August 2024. Patients were classified into two equal groups: Group I: patients who underwent suction assisted liposuction and group II: patients who underwent open suction-assisted brachioplasty.

**Results:** There were 3 males (10%) and 27 (90%) females, the mean age in suction assisted liposuction group was 37.8±5.9 years compared to 35.0±4.4 years in open suction-assisted brachioplasty group. Both groups showed significant MAC reduction 6 months post operative compared to baseline ( $p < 0.001$ ). Open suction-assisted brachioplasty group had more procedure duration and time to drain removal compared to suction assisted liposuction group. A significant overall satisfaction rates more in open suction-assisted brachioplasty group than suction assisted liposuction ( $p = 0.040$ ).

**Conclusions:** Liposuction is an effective alternative to open suction-assisted brachioplasty without scarring and rapid recovery and more suitable for patients with comorbidities. But brachioplasty has more satisfaction rates than liposuction.

**Keywords:** Arm Liposuction, Moderate Ptosis, Brachioplasty.

### INTRODUCTION

Upper arm excess in patients with arm ptosis is a frequent source of dissatisfaction. The arms are visible in various attire, and patients often express frustration with unsuccessful attempts to disguise this noticeable deformity <sup>[1]</sup>.

The aesthetic arm is considered to be lean, with an anterior convexity of the deltoid merging with the convexity of the biceps. The posterior surface should be slightly convex from the axilla to the elbow. Glanz and Gonzalez-Ulloa have demonstrated that with age, the inferior posterior curve of the upper arm progresses, with loss of superior structures leading to ptosis or the bat-wing appearance <sup>[2]</sup>.

According to Lockwood, factors predisposing patients to soft tissue laxity of the arms include aging, heavy arm fat deposits, weight fluctuation, sun damage, and previous liposuction <sup>[3]</sup>.

Achieving aesthetic contouring of the arms without skin incisions remains a challenging goal, particularly when aiming to restore a youthful appearance. The primary obstacle is the skin's tendency to recoil relative to the surrounding anatomical structures of the arm and axilla <sup>[4]</sup>.

Understanding the concept of adherence is crucial for minimizing contour deformities in suction-assisted liposuction <sup>[5]</sup>.

The first brachioplasty was introduced by Correa-Iturraspe and Fernandez in 1954 <sup>[6]</sup>. Brachioplasty has become the most effective method for reshaping the arm in patients with lipodystrophy and significant skin

redundancy. However, the procedure is always associated with certain unpleasant complications, which has driven the evolution of multiple techniques to enhance aesthetic outcomes and reduce complications <sup>[7]</sup>.

Regardless of the technique used, scars from brachioplasty are often wide or hypertrophic, frequently necessitating revision. Unfortunately, many patients are hesitant to seek liposuction because they have been told that brachioplasty is the only way to achieve aesthetically pleasing arms. These patients are concerned about visible scars and the potential for complications <sup>[8]</sup>.

El-Khatib classified brachioplasty based on the amount of adipose tissue and the degree of ptosis. Stage I features a minimal amount of adipose tissue without skin ptosis; Stage IIA includes moderate adipose tissue with less than 5 cm of skin ptosis (Grade I ptosis); Stage IIB involves significant adipose tissue with 5–10 cm of skin ptosis (Grade II ptosis); Stage III is characterized by large adipose tissue with greater than 10 cm of skin ptosis (Grade III ptosis); and Stage IV has minimal adipose tissue but grade III ptosis <sup>[8]</sup>.

The aim of this work was to compare the efficacy, patients' satisfaction, operative timing, recovery periods, scarring and aesthetic outcomes of liposuction versus open suction-assisted brachioplasty in moderate arm ptosis.

### PATIENTS AND METHODS

This study was carried out on 30 patients with moderate brachial ptosis. The study was conducted at the Plastic Surgery Unit of Benha University Hospital and Plastic Surgery Unit at Alamiri General Hospital (Minia Governorate) from January 2023 to August 2024. Approval of the study protocol by the Ethical Scientific Committee of Benha University was obtained. Informed verbal and written consents were obtained from the patients before enrollment in the study and after clear explanation and discussion.

**Inclusion criteria:** Patients between 18 and 45 years with BMI <33 kg/m<sup>2</sup> and moderate arm ptosis (significant upper arm adiposity and a moderate degree of skin laxity), classified as grade IIb arm ptosis (5–10 cm) per the El-Khatib classification.

**Exclusion criteria:** Patients with BMI above 33 kg/m<sup>2</sup>, patients with unrealistic expectations, any major medical comorbidities such as uncontrolled diabetes mellitus, collagen skin disorder, smoking (until cessation of smoking for two months) or post-bariatric patients with severe arm ptosis.

#### **Preoperative assessment:**

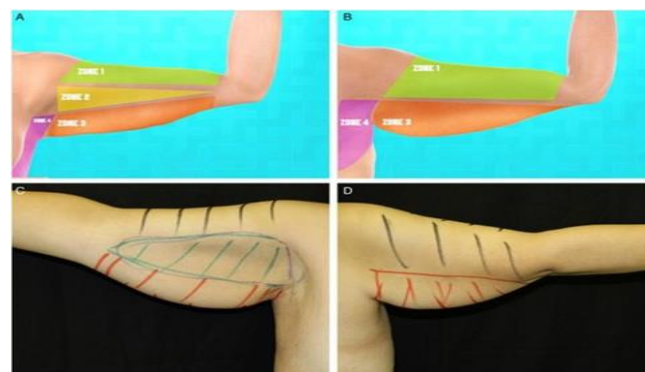
Patients were randomly classified into two groups: **Group I:** patients who underwent suction-assisted liposuction alone and **Group II:** patients who underwent open suction-assisted brachioplasty.

All cases were subjected to detailed history taking about weight loss, any previous bariatric operations, collagen skin disorder or any previous wound complications, any previous intervention to arms, any sensory abnormalities in arm and forearm, major medical comorbidities and smoking. Full clinical examination, calculation of the BMI and routine preoperative laboratory investigations.

Local examination of the whole upper limb with inspection of any previous scarring, measuring of the Mid Arm Circumference (MAC+) at the mid-point between the tip of shoulder and elbow while bending the arm (marking the mid-point between these two marks then, with the arm hanging straight down wrap the MAC with a tape around it and measuring it in cm).

#### **Operative procedures:**

**Group I (patients who had liposuction alone):** Preoperative markings with the patient standing with arm raised and abducted at 90°, and forearm supinated to expose the medial bicipital groove. A vertical line was first drawn from the anterior axillary dome to the posterior. Then, the distal end of the skin fold was marked, and a horizontal line was drawn from this point up to the axilla. The patient was positioned in a way that allowed easy access and visualization of the areas to be treated.



(Fig 1): Zones of the arm<sup>[9]</sup>.

The treatment areas were carefully marked using a skin marker, ensuring symmetry and consistency. The arm was divided into 4 zones: **Zone 1:** the anteromedial and anterolateral of arm treated by superficial liposuction. **Zone 2:** the bicipital triangle. **Zone 3 & 4:** the posteromedial and posterolateral arm and para-axillary region treated by liposuction. The patient was involved in reviewing the markings to confirm alignment with their expectations. This careful planning helped guiding the surgical process. Photographing the patient in anterior and posterior views.

General anesthesia was given to all patients, and the patient was positioned supine on the surgical table with arms abducted at 90°. Two grams of cefazolin were infused intravenously before the incision. 2 incisions 3mm each were made for inserting the 2mm cannula. Then, the areas were infiltrated with a 1mg epinephrine/L ringer lactate solution. After a period of about 10 minutes from the infiltration, liposuction was performed in the infiltrated areas using Mercedes 3mm and 4mm diameter cannulas. The infiltration–aspiration ratio was 1:1. Removing of all the fat between the skin and the arm muscle fascia so that at the end of liposuction, the skin was just 2 or 3mm thick. If necessary, “standard” liposuction was performed in other parts of the arm, leaving a final thickness of 1–1.5 cm. Drains were used and removed within 3–5 days. Compression garments were strictly used at the end of all operations. Patients were discharged after 6 hours.

After 5 days patients came to outpatient clinic, the compression garment was removed, observation of edema and ecchymosis, drain removal, reassurance of the patients and strict instruction for 6 weeks of wearing the compression garment all the time except for taking a shower. The next 6 weeks they could take it off while sleeping.

**Group II (patients who had open suction assisted brachioplasty):** Preoperative markings were made with the patient standing in an upright position with arm raised and abducted at 90°, and forearm supinated to expose the medial bicipital groove. A straight line was drawn along the bicipital groove from the medial condyle of the elbow to the axillary dome. This line indicated the approximate final scar location and the axis of the ellipse of resection. The width of the

ellipse, usually between 4 and 6 cm, was estimated with a pinch test not reaching the axilla. Then dividing of suture lines into 3 thirds. All patients received general anesthesia and were positioned supine on the surgical table with arms abducted at 90°. Two grams of cefazolin were infused intravenously before the incision. The procedure began with an infusion of 1mg epinephrine/L ringer lactate solution in the resection area. The operation began with aggressive liposuction directly under the area of to be removed through 2 holes of 3mm width inside the excised part. This allowed preservation of lymphatics while thinning out the flap of skin that was to be removed. Incising the lateral third of the incision with good hemostasis leaving some fat over the fascia to preserve the superficial lymphatic network and to protect the Medial Antebrachial Nerve and the basilic vein.

Wide interrupted stiches closing the fascia with 2/0 Vicryl and wide deep dermal sutures then incising the 2<sup>nd</sup> third and closing the fascia widely. This decreased intraoperative tissue edema. Insertion of a suction drain was done before closing the final third. The skin was closed with continuous subcuticular absorbable sutures (Monocryl® 3-0 and 4-0). Compression garments were strictly used at the end of all operations. Patients were discharged after 6 hours.

After 5 days patients came to outpatient clinic, the compression garment was removed, observation of edema and ecchymosis, reassurance of the patients and instruction for 3 weeks of wearing the compression garment all the time except for taking a shower. The next 3 weeks they could take it off while sleeping. Drains were removed after 7-10 days.

**Follow up of both groups:** at 3, 6 weeks, and 3, 6 months.

At 3 and 6 months postoperatively, the patients' aesthetic outcomes were assessed by two physicians using Vancouver Scar Scale (VSS) which consists of four parameters including: pigmentation, vascularity, pliability and height. The maximum possible score is 13 indicating the worst possible scare condition whereas a lower score indicates more desirable scar.

Patient aesthetic satisfaction was assessed by Likert scale that included three parameters: the shape, irregularities, scar and symmetry. A structured approach was used to develop an overall patient satisfaction scale over 1 to 10, where each level represented a specific degree of satisfaction (e.g., 1 = very dissatisfied, 5 = neutral, 10 = very satisfied).

**Ethical considerations:**

The study was done after being accepted by the Research Ethics Committee, Benha University. All patients provided written informed consents prior to their enrolment. The consent form explicitly outlined their agreement to participate in the study and for the publication of data, ensuring protection of their confidentiality and privacy. This work has been carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

**Statistical analysis**

The collected data was tabulated using the Statistical package for Social Science (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp). Qualitative data were represented as frequency and percentage. Quantitative data were presented as Mean Standard Deviations, Median, and Range. A two tailed P-value < 0.05 was considered significant.

**RESULTS**

Demographic data showed no statistically significant difference between the two studied groups. No significant difference between the studied groups according to BMI. No significant difference between the studied groups according to distribution of DM (**Table 1**).

Both groups showed significant MAC reduction 6 months post operative compared to baseline (p<0.001). Brachioplasty group had a higher MAC reduction ratio (21.9 ± 8.6%) compared to the liposuction group (19.3 ± 2.6%), but the difference was not statistically significant (**Table 2**).

According to procedure related data, brachioplasty group had more procedure duration and time to drain removal compared to liposuction group. A significant difference between the two groups in duration of procedure (p<0.001) and time to drain removal (p<0.001). According to procedure related data, brachioplasty group had more procedure duration and time to drain removal compared to liposuction group. A significant difference between the two groups in duration of procedure (p<0.001) and time to drain removal (p<0.001) (**Table 3**).

In terms of patient satisfaction, a significant overall satisfaction rates more in brachioplasty group than liposuction (p=0.040) (**Table 4**).

**Table 1: Baseline demographic data and BMI of the studied groups**

Variable	Liposuction group n=15		Brachioplasty group n=15	P-value
Age, years	37.8±5.9		35.0±4.4	0.202
Gender, n (%)	Male	1(6.7%)	2(13%)	0.543
	Female	14(93.3%)	13(87%)	
BMI, kg/m2	33.57±3.14		34.66±3.39	0.171
DM	4(26.6%)		2(13.3%)	0.684

Data is expressed as the mean ±SD

**Table 2: MAC (cm) measurements and MAC reduction ratio among the studied groups.**

Variable	Liposuction group n=15	Brachioplasty group n=15	P-value
Pre-operative MAC (cm)	42.8(40.2-46)	40.5(39.3-44.3)	0.067
2 months MAC (cm)	39.3(37.6-43.4)	36.5(35.1-40.3)	0.548
4 months MAC (cm)	36.3(35.5-39.9)	33.8(32.1-39)	0.065
6 months MAC (cm)	33.3(33.3-37.2)	33.2(31-37.2)	0.145
	P1 <0.001*	P2 <0.001*	
MAC reduction ratio (%)	19.3 ± 2.6	21.9 ± 8.6	0.436

MAC (Mid Arm Circumference), Data is expressed as Median (Range), \* =p<0.05; **p1**: (Pre-Post MAC liposuction); **p2** (Pre-Post MAC brachioplasty).

**Table 3: Procedure related data and complication frequencies in the studied groups.**

Variable	Liposuction group n=15	Brachioplasty group n=15	P-value
Duration of procedure (min)	66.0 ±3.38	141.0 ±12.13	<0.001*
Time to drain removal (days)	2.0±0.0	5.0±0.0	<0.001*
<b>Complications</b>			
Residual ptosis	3(20%)	0(0%)	0.08
Wound gapping	0(0%)	4(26.7%)	0.032*
Poor scar	0(0%)	2(13.3%)	0.143
Seroma	2(13.3%)	0(0%)	0.143
Revision surgery	2(13.3%)	0(0%)	0.143

Data represented as Mean ± Standard deviation, \* = p <0.05.

**Table 4: Satisfaction grading of outcome.**

	Liposuction n=15	Brachioplasty n=15	p-value
Insufficient	3(20%)	0(0%)	0.040*
Sufficient	1(6.6%)	0(0%)	
Good	4(26.6%)	5(33.3%)	
Excellent	7(46.6%)	10(66.6%)	
	<b>p</b>	<b>OR</b>	<b>95% C.I</b>

\* = p <0.05

**Table 5: Likert scale of patient satisfaction**

	Very satisfied		Satisfied		fair		unsatisfied		Very unsatisfied		P-value
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	
Shape	4 (26.6%)	8 (53.3%)	7 (46.6%)	6 (40%)	3 (20%)	1 (6.6%)	1 (6.6%)	0	0	0	0.333
Irregularity	5 (33.3%)	10 (66.6%)	6 (40%)	5 (33.3%)	3 (20%)	0	2 (13.3%)	0	0	0	0.081
Symmetry	6 (40%)	11 (73.3%)	4 (26.6%)	2 (13.3%)	2 (13.3%)	2 (13.3%)	3 (20%)	0	0	0	0.162
Scar	14 (93.3%)	5 (33.3%)	1 (6.6%)	6 (40%)	0	1 (6.6%)	0	2 (13.3%)	0	1 (6.6%)	<b>0.019</b> *

**Table 6: Vancouver Scar Scale (VSS)**

Item	Data	Score	Excellent	Good	Moderate	Hypertrophic	Keloid
<b>Pigmentation (0-2)</b>	Normal	0	0	0-1	0-2	0-2	0-2
	Hypopigmentation	1					
	Hyperpigmentation	2					
<b>Vascularity (0-3)</b>	Normal	0	0	0-1	0-2	0-1	0-2
	Pink	1					
	Red	2					
	Purple	3					
<b>Pliability (0-5)</b>	Normal	0	0	0	0	0-1	0-3
	Supple (flexible)	1					
	Yielding	2					
	firm	3					
	Banding	4					
Contracture	5						
<b>Height (0-3)</b>	Normal	0	0	0	0	0-1	1-2
	0-2 mm	1					
	2-5mm	2					
	>5 mm	3					

**Table 7: Results of VSS**

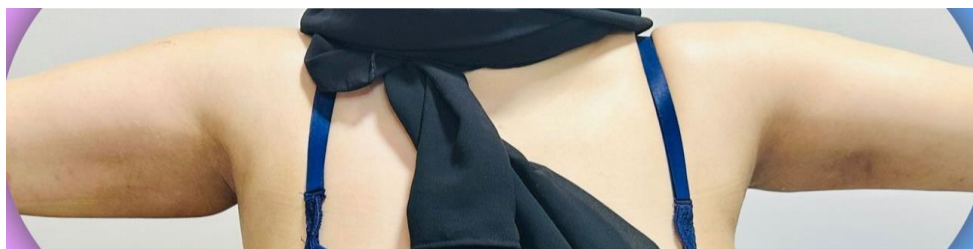
VSS	Physician overall score	
	Group A	Group B
<b>Excellent</b>	14	5
<b>Good</b>	1	7
<b>Moderate</b>	0	2
<b>Hypertrophied</b>	0	1
<b>Keloid</b>	0	0

**CASES**

**CASE 1:** Female patient 32years old, BMI 29 and MAC was 37cm. Suction assisted liposuction was done.



**(Fig. 2):** Preoperative.



**(Fig. 3):** 2 weeks postoperative.

**CASE 2:** Female patient 44 years old **diabetic with BMI 31 and** the MAC was 40cm. Suction assisted liposuction was done.

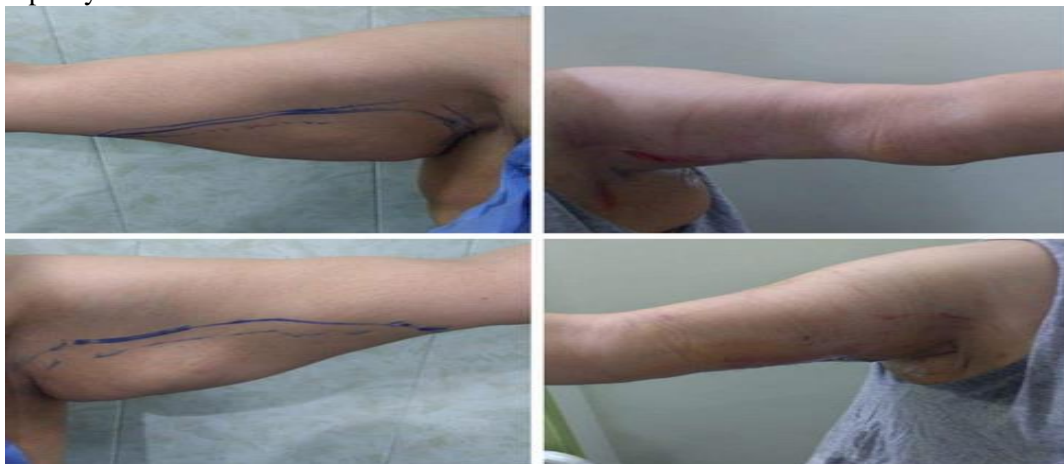


**(Fig. 4):** Preoperative.



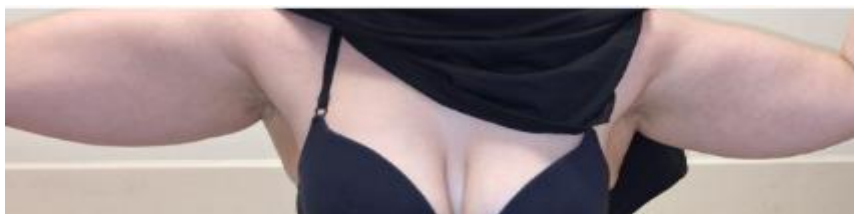
**(Fig. 5):** 3 months postoperative.

**CASE 3:** Female patient 28 years old, BMI 27, with history of moderate arm ptosis the MAC was 34 cm. Open suction assisted brachioplasty was done.



**(Fig. 5):** Preoperative. **(Fig. 6):** 3 weeks postoperative.

**CASE 4:** female patient 30 years old, BMI 28, with history of moderate arm ptosis the MAC was 36 cm. Open suction assisted brachioplasty was done.



**(Fig. 7):** Preoperative.



**(Fig. 8):** 3 weeks postoperative.

## DISCUSSION

In Suction Assisted Liposuction (SAL) group the Mean age was  $37.8 \pm 5.9$  years, 93.3% female, mean BMI  $33.57 \pm 3.14$  kg/m<sup>2</sup>, 26.6% with diabetes. In brachioplasty group the Mean age was  $35.0 \pm 4.4$  years, 87% female, mean BMI  $34.66 \pm 3.39$  kg/m<sup>2</sup> and 13.3% with diabetes. No statistically significant differences were found between the groups in terms of age, sex, BMI, or comorbidities.

**Logistic regression analysis** identified BMI as a risk factor for complications. **Nguyen et al.** [10] found that BMI  $\geq 30$  significantly increased overall complications ( $P = 0.021$ ). **Gusenoff et al.** [11] found that a higher change in BMI correlated with an increased risk of wound infection (OR 1.1,  $p = 0.028$ ) [11].

The median range of **preoperative MAC** in SAL group was 42.8 cm while in brachioplasty group was 40.5 cm. The median range of **postoperative MAC (after 6 months)** in SAL group was 33.3 cm while in brachioplasty group was 33.2 cm. Both groups showed significant MAC reduction at 6 months ( $p < 0.001$ ). In agreement with these findings, **Elsaka et al.** [12] found significant reductions in arm circumference measurements after brachioplasty in post-massive weight loss patients.

**MAC Reduction Ratio** in brachioplasty group was ( $21.9 \pm 8.6\%$ ) while in SAL group was ( $19.3 \pm 2.6\%$ ). No statistically significant difference in MAC reduction ratios. **Fayek et al.** [13] found similar outcomes between conventional open suction-assisted brachioplasty and combined liposuction/laser skin tightening.

**Procedure duration and time to drain removal** were significantly higher in the brachioplasty group ( $p < 0.001$ ). **Di Pietro et al.** [14] reported a similar finding in their study comparing standard brachioplasty (2.18 days for drain removal) and liposuction-assisted brachioplasty (0.25 days for drain removal).

**Wound gapping** was higher in the brachioplasty group (26.7%,  $p = 0.032$ ). **Residual ptosis** was more common in the SAL group (26.7%), but not statistically significant ( $p = 0.08$ ). **Poor scars:** 13.3% in the brachioplasty group vs. 0% in the liposuction group. **Seroma and revision surgeries:** 13.3% of the SAL group versus 0% in the brachioplasty group. **Gusenoff et al.** [11] found that combining liposuction with brachioplasty increased complication rates, though not statistically significant (OR 2.5).

**The Overall satisfaction** was significantly higher in the brachioplasty group ( $p = 0.040$ ). **Meky et al.** [15] reported 81% satisfaction in the second group (likely referring to brachioplasty) compared to 55.5% in the first group. **Fayek et al.** [13] found higher satisfaction scores with liposuction/laser skin tightening ( $p < 0.05$ ), which may be due to the different techniques used in their study.

This study's limitations include a small sample size, a short follow-up period of six months, and variability in techniques across the two centers. The exclusion of patients with higher BMI or severe comorbidities limits the generalizability of the findings. Additionally, subjective measures like patient satisfaction may introduce bias, warranting larger-scale studies with standardized assessments.

## CONCLUSION

Suction Assisted Liposuction is a safe procedure with less operative timing and without scars. It is effective alternative to open suction-assisted brachioplasty in patients with moderate brachial ptosis with good satisfaction. But brachioplasty has more satisfaction rates and less needing for redo-surgery than SAL. Brachioplasty had more procedure duration and time to drain removal compared to Suction Assisted Liposuction. Long visible scars made some patients preferring SAL. Higher BMI was associated with higher risk of complications.

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## REFERENCES

1. **Hota A, Meky M, Nasef M et al. (2019):** Evaluation of Different Varieties of Brachioplasty. *Egypt J Hosp Med.*, 75(3):2505-13. doi:10.21608/ejhm.2019.31077.
2. **Glanz S, Gonzalez-Ulloa M (1981):** Aesthetic surgery of the arm. Part I. *Aesthetic Plast Surg.*, 5(1):1-17.
3. **Lockwood T (1995):** Brachioplasty with superficial fascial system suspension. *Plast Reconstr Surg.*, 96(4):912-20.
4. **Smith J, Brown M (2023):** Ultrasound-Assisted Liposuction (UAL) Arm Contouring in Non-Post-Bariatric Patients: No Rush for Brachioplasty. *Aesthetic Plast Surg.*, 47(1):260-8. doi:10.1007/s00266-022-03070-8.
5. **Smith J, Martinez R (2012):** A multicenter, prospective, randomized, single-blind, controlled clinical trial comparing VASER-assisted Lipoplasty and suction-assisted Lipoplasty. *Plast Reconstr Surg.*, 129(4):681e-9e. doi:10.1097/PRS.0b013e3182442274.
6. **Correa-Iturraspe M, Fernandez J (1954):** Dermolipectomia braquial. *Prensa Med Argent.*, 34(34):2432-36.
7. **Ferreira D, Vieira I, Pedro M et al. (2023):** Patient Satisfaction with Healthcare Services and the Techniques Used for its Assessment: A Systematic Literature Review and a Bibliometric Analysis. *Healthcare*, 11(5):639.
8. **El Khatib H (2007):** Classification of brachial ptosis: strategy for treatment. *Plast Reconstr Surg.*, 119(4):1337-42. doi:10.1097/01.prs.0000254796.40226.92.
9. **Ibrahiem S (2022):** Investigating the Safety of Multiple Body Contouring Procedures in Massive Weight Loss Patients. *Aesthetic Plast Surg.*, 46:2891-2902.
10. **Nguyen L, Gupta V, Afshari A et al. (2016):** Incidence and Risk Factors of Major Complications in Brachioplasty: Analysis of 2,294 Patients. *Aesthetic Surg J.*, 36(7):792-803. doi:10.1093/asj/sjv267.

11. **Gusenoff J, Coon D, Rubin J (2008):** Brachioplasty and concomitant procedures after massive weight loss: a statistical analysis from a prospective registry. *Plast Reconstr Surg.*, 122(2):595-603. doi:10.1097/PRS.0b013e31817d54a9.
12. **Elsaka S, Ibrahim M, Swain M (2011):** Titanium dioxide nanoparticles addition to a conventional glass-ionomer restorative: influence on physical and antibacterial properties. *J Dent.*, 39(9):589-98.
13. **Fayek M, Rizk I, Hashem A *et al.* (2022):** Outcomes of Combined Liposuction/Laser Skin Tightening versus Open Suction-Assisted Brachioplasty in Moderate Arm Ptosis. *Plast Reconstr Surg.*, 149(5):881e-92e. doi:10.1097/prs.0000000000009058.
14. **Di Pietro V, Colicchia G, Cervelli V *et al.* (2018):** Arm Contouring After Massive Weight Loss: Liposuction-Assisted Brachioplasty Versus Standard Technique. *J Cutan Aesthet Surg.*, 11(2):73-8. doi:10.4103/jcas.Jcas\_102\_17.
15. **Meky M (2018):** Laser Liposuction-Skin Tightening in Body Contouring of Massive Weight Loss Patients. *Egypt J Plast Reconstr Surg.*, 42(2):317-22. doi:10.21608/ejprs.2018.79718.