

Improved double-fuse technique for post-bariatric brachioplasty

Técnica aprimorada de duplo fuso para braquioplastia pós-bariátrica

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A B S T R A C T

Objective: To evaluate the use of modified brachioplasty, investigating in late postoperative complications and satisfaction with the outcome, in women previously submitted to bariatric surgery. **Methods:** The population (N = 18, age 49.2 ± 11.3 years), which had undergone brachioplasty 25.2 ± 11.9 months after the bariatric procedure, was contacted after 31.7 ± 38.8 additional months. Surgical complications and satisfaction with the operation were estimated by interviews, including a questionnaire designed for this purpose. **Results:** pre-bariatric body mass index (BMI) was 57.1 ± 11.1 kg / m², being 28.3 ± 6.0 kg/m² before the brachioplasty, without significant changes thereafter. Three minor surgical complications were recorded (3 / 18, 16.7%), namely, temporary paresthesia, seroma and small imperfection of the scar. The satisfaction rate was approximately 90%, with the three most rewarding results for the patients being the ease of dressing (P = 0.01), decreased weight of the arm (P = 0.03) and absence of edema (P = 0.04). There was a negative correlation between severe weight loss and degree of satisfaction, however, no patients regretted the procedure. **Conclusion:** the modified brachioplasty was successful in cases with severe brachial ptosis with possible extension to the chest. The study confirmed functional and aesthetic benefits, and thanks to the technique applied, most of the complications and disappointments could be avoided.

Key words: Bariatric surgery. Surgery/complications. Weight loss. Surgery, plastic. Patient satisfaction.

INTRODUCTION

The restoration of the contour of the arm may be required after substantial weight loss when a large brachial ptosis settles, eventually crossing the axilla and extending to the chest wall. The decrease in collagen and elastin content¹, as well as distention and laxity of the *fascia superficialis*, could be the phenomena behind this anomaly.

Several types of brachial ptosis were established by El Khatib², omitting, however, those that reach the armpit or further. Still this classification it is a useful instrument to define the defects and plan a surgical approach. Early stages can be handled only by liposuction, dermolipectomy supplemented by liposuction, or minibrachioplasty. The most advanced (stage 4) requires extensive brachioplasty^{2,3}.

We decided to assess whether, in a relatively homogeneous series with respect to background and aberrations, a surgical technique adapted to the circumstances would provide improved long-term results and higher satisfaction of patients previously submitted to bariatric surgery.

METHODS

Ethical considerations

This protocol was approved by the Institutional Ethics (0574/09- 11/24/09) and all patients provided written informed consent.

Population

Adult females (N = 18, 49.2 ± 11.3 years old) who had undergone brachioplasty 25.2 ± 11.9 months after bariatric surgery, underwent an interview after 31.7 ± 38.8 additional months to confirm the results. All patients had type 4 brachial ptosis, with or without extension to the chest. They were all operated by the same team, which adopted the same surgical approach.

Inclusion criteria were ability to respond to the questionnaire, stable body weight since the time of brachioplasty and the informed consent. Exclusion criteria were consumptive disease (cancer, HIV / AIDS, organ failure), vigorous weight gain (failure of bariatric intervention, re-operation or dismantling of the operation),

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cognitive impairment (dementia, including Alzheimer's disease and other neurological diseases) or refusal to participate.

Bariatric Mode

The original procedure consisted of subtotal gastric exclusion with gastrojejunal bypass (Fobi-Capella surgery, 88.9%, 16/18), except for one malabsorptive surgery of the Scopinaro type, and a partial resection of the stomach and the jejunum (operation Santoro III)⁴ (5.6%, 1/18 each).

Brachioplasty Technique

In participants without redundancy in the chest skin, a skin fragment, not deepened beyond the transversalis fascia, was removed. The marking was performed in a seated position with the arm abducted 90° and elbow flexed at 80 degrees, following a previous line parallel and 1-2cm above the brachial groove. By clamping maneuver the extent of resection was estimated and the posterior line outlined. The fragment started was above the elbow, near the medial epicondyle of the humerus, extending to the capillary edge of the axillae. A second transverse zone continued from the first, beginning in the anterior axillary fold and ending in the posterior axillary fold along the anterior margin of the hairy area. The shape of the incision was of a fish, with the body in the arm and the tail angled inside the axilla (Figures 1, 2).

In cases of excess skin extending to the lateral chest wall, the skin fragment was prolonged towards that direction. Within the armpit we took care to respect the *fascia superficialis*, as well as to break the line of incision with the aid of a Z-plasty, aiming not only to minimize retractions and adhesions, but also reconstructing the morphology of the axillae (Figure 3).

Before closure, the superficial fascia of the arm was elevated and sutured to the corresponding fascia of the axilla through separate 4.0 polyamide stitches in order to prevent sagging and harmonize the arm contour. We

then proceeded to the subdermal approximation and intradermal synthesis, with separate 4.0, and continuous 5.0, poliglecaprone stitches, respectively. We applied gauze with antibacterial ointment, and the incision was externally reinforced with intersecting strips of micropore. The anesthetic technique used was always the general, and single-dose antibiotic prophylaxis was also administered in all patients.

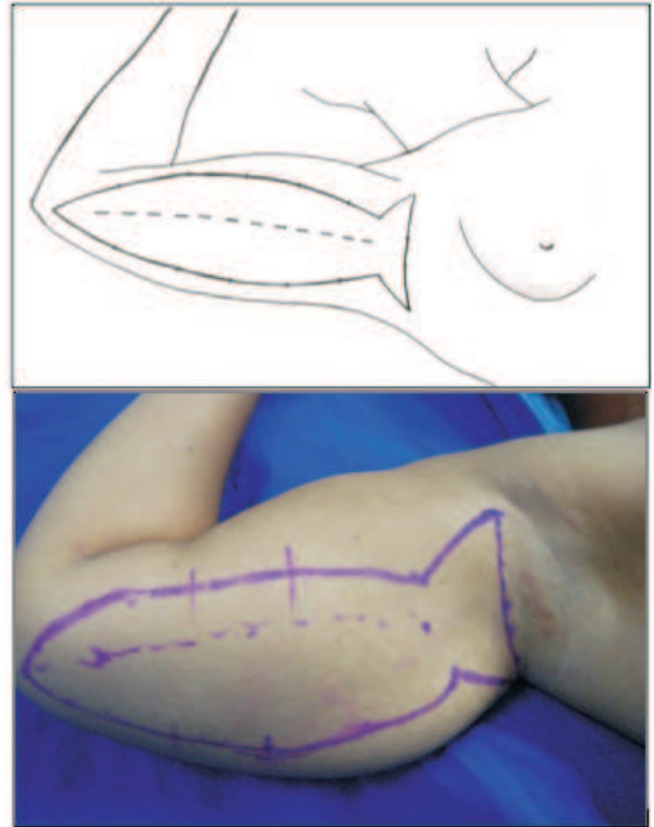


Figure 1 - Marking of the skin of the arm and armpit. The dual zone resembles a fish with its tail inside the axillae.



Figure 2 - Marking of the skin in case extending to the chest.

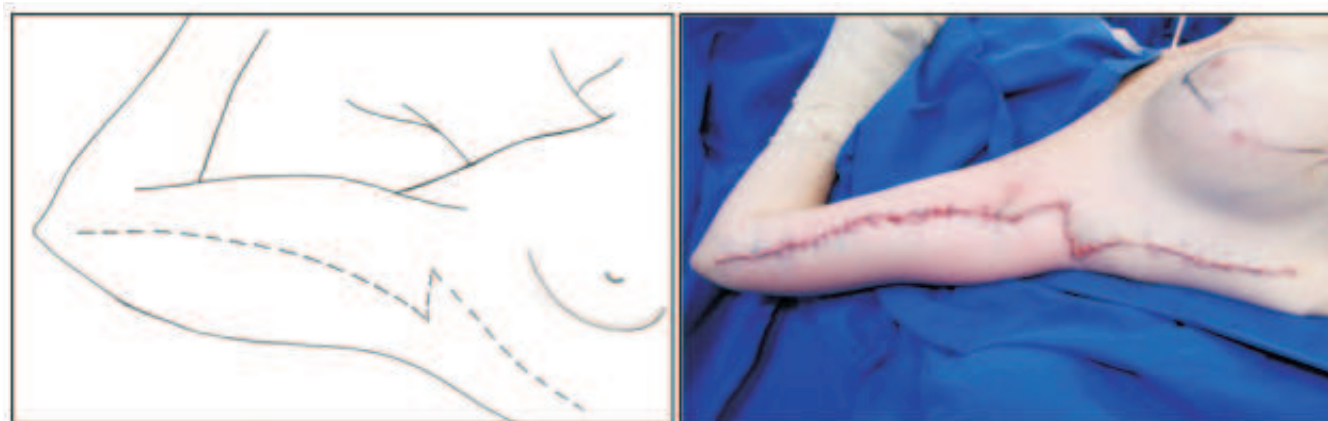


Figure 3 - Z-plasty in the armpit.

Satisfaction survey

Based on other experiences⁵, ten anatomical and functional items were evaluated, emphasizing local changes (scarring, edema, symmetry, sensitivity, contour of the arm), along with discomforts of daily living (weight of the arm, loss of mobility, agility, ability to dressing and undressing). The esthetic result was the last item, summarizing the social and emotional feelings of the patient. Each question contained three responses (1 = inadequate, 2 = good, 3 = very good), so the score could vary from 10 to 30.

Statistical analysis

The numerical results are presented as mean \pm standard deviation, and comparison of the questionnaire items was made by Student's "t" test. Pearson linear regression was used to scrutinize factors related to patient satisfaction. A significance level of 5% ($P < 0.05$) was defined.

RESULTS

All patients contacted agreed to the investigation and there were no exclusions. Half of the series (50%, 9 / 18) needed resection only in the arm; the other nine, suffering from excess skin to the chest, required extended resection.

A total of 1.8 ± 0.9 plastic previous interventions had been performed, namely abdominoplasty of any kind (83.3%, 15/18), breast (55.6%, 10/18) and thigh plastic (44, 4%, 8 / 18). The body mass index (BMI) was, initially, 57.1 ± 11.1 kg/m², falling to 28.3 ± 6.0 kg/m² at the time of brachioplasty, without significant changes as of the interview 31.7 ± 38.8 months later.

Three brachioplasty complications were recorded (3/18, 16.7%). One case of seroma responded to drainage (5.6%, 1/18). The second patient had temporary paresthesia, probably subject to damage from the medial cutaneous nerve of the forearm by electrocautery. Only

the final case would consider surgery revision because there was a little scar imperfection left.

Overall satisfaction with the operation reached 26.7 ± 2.2 points (approximately 90% success rate) (Figure 4). The three most pleasing outcomes were easiness to get dressed ($P = 0.01$), lightness of the arm ($P = 0.03$) and absence of edema ($P = 0.03$) (Figure 5). Patients did not repent resection and confirmed satisfaction with the outcome.

Linear regression analysis indicated few associations between the questionnaire score and clinical variables. Nevertheless, the negative correlation with weight loss became clear, and a trend toward pre-bariatric BMI was also seen (Table 1). Although the number of previous cosmetic procedures does not correlate directly with the results, patients with greater weight loss also tended to require more interventions and plastic brachioplasty extension to the chest ($r = 0.417$, $P = 0.09$).

DISCUSSION

The cranial portion of the skin flap removed in the current study was angled to the front edge of the armpit hairy line with the purpose not to create a potentially dysfunctional scar in the middle of the armpit, though defended by some⁶. This way, a second area of incision was created between the anterior and posterior axillary lines, in continuity with the larger area along the anterior margin of the hairy area.

Through this maneuver, the incision is not interrupted in the armpit and its longitudinal extent reduced, thus decreasing the risk of major retractions. Furthermore, we obtained excellent access to the superficial fascia of the axilla, which was subsequently sutured to its counterpart in the arm. According to Lockwood⁷, the soft tissues of the arm, which do not spontaneously shrink during weight loss, are in this manner elevated and restored towards a more normal anatomy.

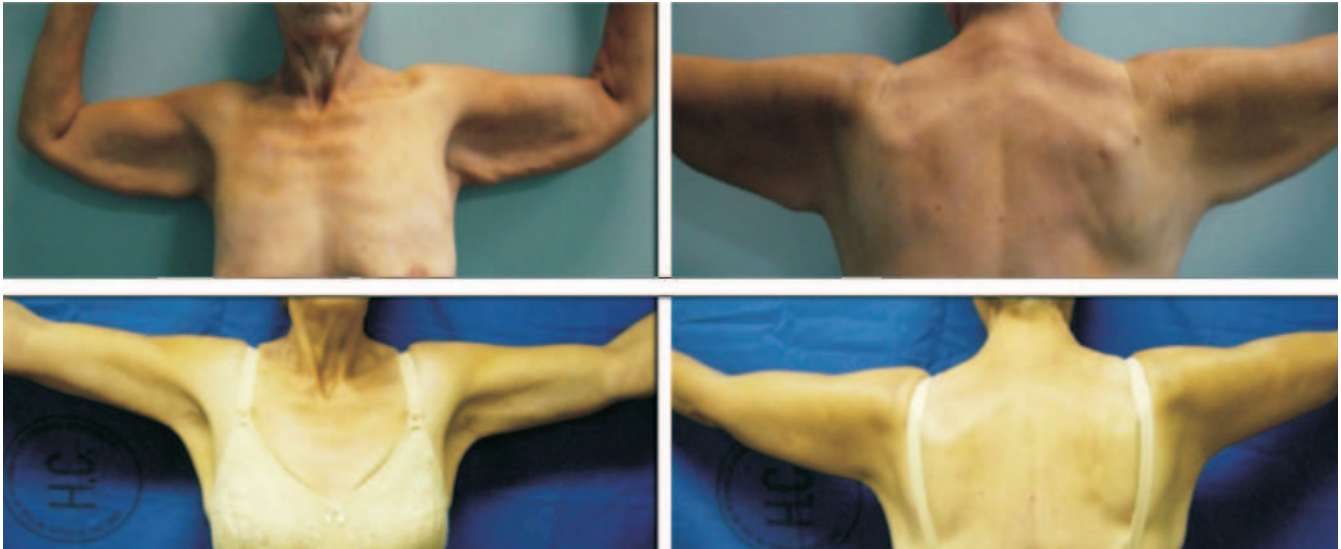


Figure 4 - Patient (59 years) who underwent brachioplasty. Before operation and after six months.

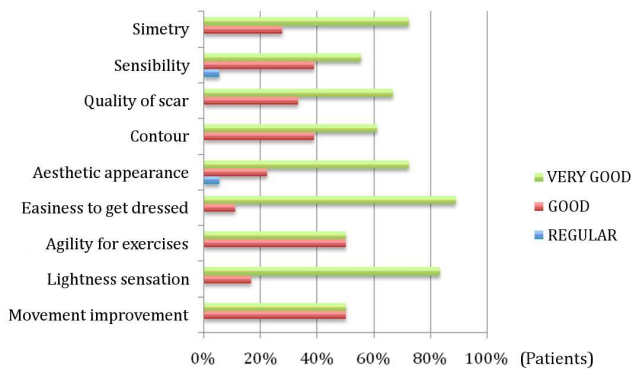


Figure 5 - Responses to the variables of the interview.

In the event of “bat wing” deformity, or redundant skin fold extending to the rib cage, the incision area was elongated in the same direction^{8,9}. However, a Z-plasty was added in order to interrupt the long incision, thereby mitigating the risk of adhesions and retraction of the arm and chest. This alternative also allows to reshape the armpit like a dome, repeling the serious drawback of axillary flattening^{8,10,11}.

Lockwood⁷ notes that the *fascia superficialis* derives from the *fascia cervicalis*, is anchored in the acromial bone and continues toward both the armpit and arm and

towards the chest. In severe obesity this structure is stretched, perhaps in association with disorders of collagen and elastin content¹, a phenomenon that may be irreversible, thus requiring plication and surgical reconstruction.

As a rule, skin zones limited to the region above the *fascia superficialis* do not lend themselves to the radical elimination of dermal excess. Yet here the final results were gratifying, thanks to the preservation of vascular and lymphatic drainage and innervation, abundant in the medial segment of the arm, which remained untouched. The absence of lymphedema, lymphocele or cysts, next to the poorly expressive profile of complications, compare favorably with other samples from the literature^{12,13}.

Patients with weight loss, particularly large, bear watching. It is known that they are more susceptible to wound infection¹³ and multiple cosmetic procedures are also more likely in those circumstances^{13,14}. This was the first study to our knowledge to emphasize its negative correlation with satisfaction after brachioplasty (P = 0.02).

Several factors could converge to such a finding. If, on the one hand, these candidates with expressive BMI falls are usually accustomed to multiple scars from plastic surgeries and therefore should not be disappointed with another one, on the other it is undeniable that sequential operations always generate some degree of depression. At

Table 1 – Correlations of surgical results.

Variable	Correlation index (r)	Significance
Age	0.160	P=0.52
Prior operations	0.213	P=0.41
Pre-bariatric BMI	-0.408	P=0.09
Weight loss	-0.576	P=0.02
Current BMI	0.207	P=0.42

Obs: BMI = Body mass index.

the same time, the universal laxity, often present after the loss of many tens of kilograms, is a barrier to perfect aesthetic results.

One should not overestimate the impact of such an association. Brachioplasty, as formulated here, is technically safe and clinically successful, even when an additional plastic to the chest had proved indispensable.

Note that the principle of dual zone or double ellipse had been advocated in occasional brachioplasty

studies^{8,12}, however differing in position, design and extension from the current proposal. In our context, the scar was on the posterior brachial groove, ideal for sinusoidal scars according to a recent survey of plastic surgeons¹⁵. Consequently, most patients approved treatment, even those with massive weight loss, since they could use the arms more freely and choose short sleeves again. The feeling of heaviness in the arms and the difficulties in dressing essentially disappeared.

R E S U M O

Objetivo: Avaliar o emprego da braquioplastia modificada investigando no pós-operatório tardio as complicações e a satisfação com o resultado, em mulheres previamente submetidas à cirurgia bariátrica. **Métodos:** A população ((N=18, idade $49,2 \pm 11,3$ anos), que havia sido submetida à braquioplastia $25,2 \pm 11,9$ meses após o procedimento bariátrico, foi contactada após $31,7 \pm 38,8$ meses adicionais. As complicações cirúrgicas e a satisfação com a operação foram estimadas através de entrevista, incluindo-se um questionário concebido para esta finalidade. **Resultados:** O índice de massa corporal (IMC) pré-bariátrico era de $57,1 \pm 11,1 \text{ kg/m}^2$, situando-se antes da braquioplastia em $28,3 \pm 6,0 \text{ kg/m}^2$, sem alterações significativas subsequentes. Três complicações cirúrgicas menores foram registradas (3/18, 16,7%), a saber: parestesia temporária, seroma e pequena imperfeição da cicatriz. A taxa de satisfação foi de aproximadamente 90%, sendo os três resultados mais gratificantes para as pacientes a facilidade de se vestir ($P=0,01$), a diminuição do peso do braço ($P=0,03$) e a ausência de edema ($P=0,04$). Ocorreu correlação negativa entre perda de peso acentuada e grau de satisfação, todavia, nenhuma doente arrependeu-se da intervenção cirúrgica. **Conclusão:** A braquioplastia modificada foi bem sucedida em casos de ptose braquial grave com possível extensão para o tórax. Confirmaram-se benefícios funcionais e estéticos, e, graças à técnica adotada, a maioria das complicações e desapontamentos pôde ser evitada.

Descritores: Cirurgia bariátrica. Cirurgia/complicações. Perda de peso. Cirurgia plástica. Satisfação do paciente.

REFERENCES

- Orpheu SC, Coltro PS, Scopel GP, Gomez DS, Rodrigues CJ, Modolin ML, et al. Collagen and elastic content of abdominal skin after surgical weight loss. *Obes Surg* 2010; 20(4):480-6.
- El Khatib HA. Classification of brachial ptosis: strategy for treatment. *Plast Reconstr Surg* 2007; 119(4):1337-42.
- Abramson DL. Minibrachioplasty: minimizing scars while maximizing results. *Plast Reconstr Surg* 2004; 114(6):1631-4; discussion 1635-7.
- Santoro S. Adaptive and neuroendocrine procedures: a new pathway in bariatric and metabolic surgery. *Obes Surg* 2008; 18(10):1343-5.
- Alsarraf R. Outcomes research in facial plastic surgery: a review and new directions. *Aesthetic Plast Surg* 2000; 24(3):192-7.
- Hurwitz DJ, Holland SW. The L brachioplasty: an innovative approach to correct excess tissue of the upper arm, axilla and lateral chest. *Plast Reconstr Surg* 2006; 117(2):403-11.; discussion 412-3.
- Lockwood T. Brachioplasty with superficial fascial system suspension. *Plast Reconstr Surg* 1995; 96(4):912-20.
- Aly A, Pace D, Cram A. Brachioplasty in the patient with massive weight loss. *Aesthet Surg J* 2006; 26(1):76-84.
- Pitanguy I. Correction of lipodystrophy of the lateral thoracic aspect and inner side of the arm and elbow in dermosenescence. *Clin Plast Surg* 1975; 2(3):477-83.
- Strauch B, Greenspun D, Levine J, Baum T. A technique of brachioplasty. *Plast Reconstr Surg* 2004; 113(3):1044-8; discussion 1049.
- de Souza Pinto EB, Erazo PJ, Matsuda CA, Ragazzini DV, Burgos DS, Acosta HA, et al. Brachioplasty technique with the use of molds. *Plast Reconstr Surg* 2000; 105(5): 1854-60; discussion 1861-5.
- Symbas JD, Losken A. An outcome analysis of brachioplasty techniques following massive weight loss. *Ann Plast Surg* 2010; 64(5):588-91.
- Gusenoff JA, Coon D, Rubin JP. Brachioplasty and concomitant procedures after massive weight loss: a statistical analysis from a prospective registry. *Plast Reconstr Surg* 2008; 122(2):595-603.
- Coon D, Michaels J 5th, Gusenoff JA, Purnell C, Friedman T, Rubin JP. Multiple procedures and staging in the massive weight loss population. *Plast Reconstr Surg* 2010; 125(2):691-8.
- Samra S, Sawh-Martinez R, Liu YJ, Samra F, Persing JA. Optimal placement of brachioplasty scar: a survey evaluation. *Plast Reconstr Surg* 2010; 126(Suppl 4S):77 (Abstract)

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