



New Approach for Post-bariatric Abdominoplasty with Extended Vertical Resection: A Prospective Cohort Study

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Received: 28 October 2018 / Accepted: 11 February 2019 / Published online: 13 March 2019
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Abstract

Introduction As the number of bariatric surgeries has increased, so has the demand for post-bariatric abdominoplasty. The aim of this study was to describe a new approach to anchor-line abdominoplasty for the treatment of post-bariatric surgery patients.

Methods This prospective, longitudinal, single-center study was conducted with 20 women, 23–47 years of age, with a body mass index < 30 kg/m², who had undergone gastroplasty. The vertical amount of tissue to be excised was estimated preoperatively by the pinch test. The amount of tissue to be removed by transverse resection was determined intraoperatively. Patient satisfaction with the body contour result was assessed.

Results Patient self-assessment showed that 85% of patients were very satisfied, 10% were satisfied, and 5% were not very satisfied with the surgical results. There were no cases of flap necrosis or surgical wound dehiscence.

Conclusion The described technique resulted in improved body contour, good scar quality, and a high level of patient satisfaction.

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Keywords Abdominoplasty · Bariatric surgery · Gastroplasty · Weight loss · Patient satisfaction

Introduction

In 2005, it was estimated that globally, 1.6 billion people over 15 years of age were overweight, and 400 million were obese. In 2015, it was estimated that 2.3 billion adults were overweight, and 700 million were obese [1–3]. The epidemic of obesity has led to an increased indication for bariatric surgery for the treatment of morbid obesity. Gastroplasty has been considered the most effective treatment by many authors [4–7]. There is continued growth in the demand for plastic surgery after gastroplasty, with abdominoplasty being the first surgical option [8]. According to the American Society for Aesthetic Plastic Surgery (ASAPS), the number of abdominoplasty procedures in the USA increased from 34,002 in 1997 to 181,540 in 2016 [9, 10].

Post-bariatric surgery patients have redundant skin in the abdomen in both the vertical and horizontal directions. Classic abdominoplasty includes a transverse incision, but some authors have developed surgical techniques using a combination of vertical and transverse incisions in the treatment of patients who have experienced massive weight loss [11–14]. Other abdominoplasty techniques have been described, including abdominoplasty with total abdominal liposuction [15], fleur-de-lis abdominoplasty [16], inverted-Y techniques [17], and anchor-line techniques [13, 14].

The study was conducted at the Postgraduate Program in Translational Surgery, Universidade Federal de São Paulo (UNIFESP), São Paulo, SP, Brazil.

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The use of anchor-line techniques in post-bariatric patients may lead to several complications, including surgical wound dehiscence, vascular distress, and consequent necrosis in the intersection of flaps in the suprapubic area [8, 18, 19]. Most of these techniques use the pinch test to preoperatively estimate the amount of skin to be removed both vertically and transversely [13, 14]. However, because the pinch test is not accurate, these techniques may cause difficulty in the final positioning of flaps due to insufficient or excessive tissue removal, requiring resection of additional tissue or further undermining. There is the circumferential abdominoplasty technique, but the complication rate is higher, and the surgery time is longer [20, 21]. Insufficient tissue removal may negatively affect the cosmetic results, whereas excessive tissue removal may create tension in the flaps, resulting in vascular distress and leading to flap necrosis or surgical wound dehiscence.

Objective

The aim of this study was to describe a new approach to anchor-line abdominoplasty for the treatment of post-bariatric surgery patients to improve body contour.

Methods

This prospective, longitudinal, single-center study was approved by the Research Ethics Committee of the Hospital Santo Amaro (approval number 002/2015), located in Guarujá, São Paulo (Brazil), and was performed in accordance with the ethical standards of the 1964 Declaration of Helsinki and its subsequent amendments as well as Resolution 466/2012 of the Brazilian National Health Council (CNS) on research involving human beings. Written informed consent was obtained from all patients prior to their inclusion in the study, all details about the scars were explained, and patient anonymity was assured. The study was conducted between January 2014 and October 2015. All surgeries were performed at the Hospital Santo Amaro, which is a philanthropic general hospital.

The non-probability convenience sample was composed of 20 female patients from private practice referred for abdominoplasty who had experienced massive weight loss after gastroplasty.

The inclusion criteria were female sex, an age ranging from 20 to 55 years, a body mass index (BMI) < 30 kg/m², a history of one to three pregnancies, a history of gastroplasty, and at least a 2-year lapse between gastroplasty and inclusion in the study. There were no restrictions regarding ethnicity, education level, or social status.

The exclusion criteria were the presence of neoplasia, diabetes mellitus, systemic arterial hypertension, disorders of the lymphatic system, immune diseases, psychiatric disorders, or preexisting abdominal scars, except those resulting from bariatric surgery or Pfannenstiel incision. Patients who did not return for scheduled follow-ups were excluded from the sample.

Surgical Technique

With the patient in the supine position, point A was marked on the inferior projection of the xiphoid process, and point B was marked on the projection of the pubic symphysis. The two points were then connected by a straight line. A straight, latero-lateral line was defined on the abdomen passing through the upper edge of the umbilicus. The vertical amount of tissue to be excised was estimated by the pinch test, and points C and D were marked on the latero-lateral line and connected by two elliptical arcs. The lower line was marked on the groove formed by the redundant skin on the abdominal wall. Two straight line segments were traced from points C and D to the lower line, defining the intersection points E and F (Fig. 1).

All patients received epidural anesthesia. All injections were performed by the same anesthesiologist. The patient was placed in the supine position on an operating table,



Fig. 1 The markings of points A to F. (a) Inferior projection of the xiphoid process; (b) projection of the pubic symphysis; (c, d) points defined by the pinch test on the latero-lateral line passing through the upper edge of the umbilicus; and (e, f) points obtained by the intersection of two straight line segments traced from points C and D to the lower line

which was maintained in the horizontal position throughout surgery. Following infiltration of the abdominal wall with 0.9% saline and 1:500,000 epinephrine, incisions were performed with a #23 scalpel blade; electrocautery was used for hemostasis.

An elliptical incision was made around the umbilicus. The skin strip defined by the line segments ACE and ADF was excised with preservation of the umbilicus (Fig. 2). Next, the infraumbilical lateral flaps were undermined up to the anterior superior iliac spines and brought to the pubis, and the amount of tissue to be removed from the lower abdominal area was marked (Fig. 3). The two flaps were trimmed to remove excess tissue and were sutured in three layers (i.e., fat, dermal, and superficial skin layers). A 4.8-mm-gauge suction drain was placed 3 cm from the inferior scar at the level of the symphysis pubis. The umbilical scar was reinserted at the same original position after a round 2.5-cm-diameter skin area was removed from the abdominal flaps. In all cases, abdominoplasty could be combined with liposuction.

In the postoperative period, patients were treated with cephalexin (an oral cephalosporin antibiotic) for 7 days and paracetamol with codeine for pain and were observed in the hospital for 24 h. All patients wore elastic stockings intra- and postoperatively for 5 days and abdominal compression for 3 months. The drain was removed when the output was lower than 30 ml/24 h.



Fig. 2 Elliptical skin strip to be excised. The skin strip was excised with preservation of the umbilicus

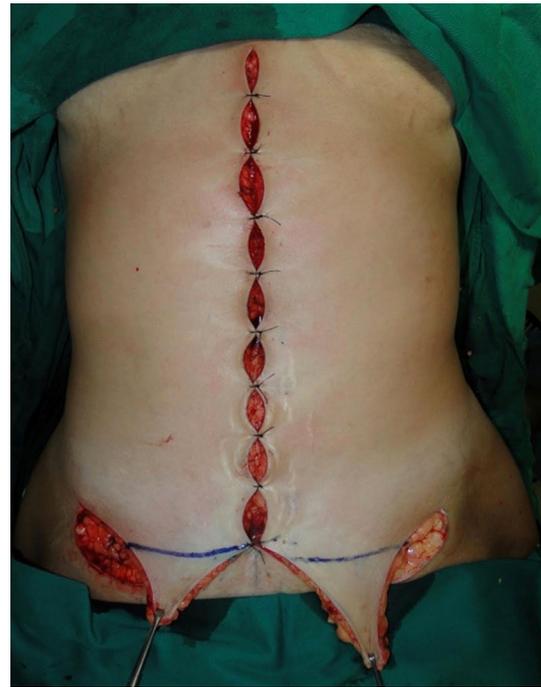


Fig. 3 Marking of infraumbilical excess tissue on the abdominal flaps. The undermined flaps were trimmed to remove excess tissue from the lower abdominal area

Outcome Assessment

Patient satisfaction with the body contour and scar appearance was assessed 6 months after abdominoplasty. The patient was positioned 1 m from a mirror and was asked to compare her reflection with her preoperative photographs. Patients rated the surgical outcome as “very satisfied” if they were satisfied with both the body contour and scar appearance, “satisfied” if they were satisfied with one of the features and considered the other to be regular in appearance, “not very satisfied” if they considered both features to be regular in appearance, and “dissatisfied” if they disapproved of the surgical results.

The body contour was classified postoperatively as follows:

- Good abdominal contour: Well-defined contour with no excess skin in the abdominal region.
- Regular abdominal contour: Well-defined contour with excess skin in the abdominal region.
- Poor abdominal contour: Poorly defined contour with excess skin in the abdominal region.

The scars were classified as follows:

- Good quality scar (normal scar): Clear scar and no scar widening.
- Hypertrophic scar: Signs of hyperemia and skin raised within the limits of the original scar.

- Keloid scar: Reddish scar raised beyond the limits of the original scar.

McNemar's test for paired proportions was used to compare the ratings of two independent observers. The statistical test was performed at a significance level α of 0.05 or 5% ($P < 0.05$).

Results

A total of 20 patients participated in the study and were assessed at the 6-month follow-up. The mean age of patients was 36.7 years (range 23–47), and the mean BMI was 25.6 kg/m² (range 23.2–29).

No intra- or postoperative complications occurred, such as flap vascular distress, surgical wound dehiscence, infection, or necrosis. Small lateral displacements of the flaps occurred, but they were limited to the lateral infraumbilical area and up to the anterior superior iliac spine.

With regard to patient satisfaction, 17 (85%) patients were very satisfied, 2 (10%) were satisfied, and one (5%) was not very satisfied with the surgical results. The two (10%) patients who were satisfied with the results claimed that the scar appearance was not as expected, and the patient who was not very satisfied (5%) complained of excess skin.

Some examples of pre- and postoperative photographs are shown in Figs. 4, 5, and 6.

Discussion

Increases in morbid obesity have led to an increased demand for abdominoplasty worldwide. Thus, a new surgical approach was designed to improve body contour with a reduced risk of complications (Fig. 7).

In 1935, Babcock was the first surgeon to suggest vertical excision for the correction of excess fat from the abdomen. However, Castañares and Goethel [11] were the first to make a critical analysis of excess skin in the upper abdomen in patients with a large abdominal panniculus. These authors proposed a technique combining vertical and transverse incisions involving the entire anterior abdominal wall to eliminate the excess tissue [11]. The abdominal approach after massive weight loss to remove excess tissue in the supraumbilical area has been the subject of several studies [12–14] and may be combined with liposuction [15].

In the approach described in this study, the pinch test was used to estimate the amount of tissue to be removed in the vertical direction to improve the lateral body contour.

The amount of tissue to be removed by transverse resection was determined intraoperatively to prevent tension at the intersection of flaps in the suprapubic area. This approach also allows extensive vertical resection with an improvement in body contour, a decreased risk of complications at the area of the intersection of the lower ends of the flaps, and a reduced horizontal scar. No cases of dehiscence or necrosis occurred in this study. Small lateral displacements of the flaps, which have been described for other techniques [12–17], also occurred in this case series, but they were limited to the lateral infraumbilical area and up to the anterior superior iliac spine and did not affect flap viability. The use of the technique described herein allows to treat the tissues as well as occurs in the fleur-de-lis technique [12] without the need for a pubic scar.

A low tensile force was applied to bring the flaps to point B, as shown in Fig. 1; excess tissue was then removed. The surgical table was maintained in the horizontal position throughout the surgery. This positioning does not facilitate wound closure but reduces abdominal tension during the postoperative period, favoring the quality of scars.

Overall, 85% of patients were “very satisfied with the surgical results”; none were “dissatisfied.” The two patients who reported being “satisfied” with the results complained about the appearance of the scars, and one patient, who was “not very satisfied,” complained of remaining excess skin (Fig. 5). The assessments by the surgeons and the patients indicated that this surgical approach provided good results, especially in cases in which the excess of tissue is not primarily vertical, requiring a larger horizontal component.

After massive weight loss, some patients show a larger amount of excess skin in the transverse direction than in the vertical direction, one of the premises on which this technique was developed. Circumferential abdominoplasty is one of the techniques that can be used, but the overall complication rate was high, although the great majority were minor complication, and the surgery time is longer. The preoperative markings of the amount of excess tissue to be removed in the vertical direction were based on the pinch test, without concern for the tissue to be removed in the transverse direction. Transverse resection, as in classic abdominoplasty, became more objective because it was determined intraoperatively and not preoperatively. This approach contributed to a good body contour following abdominoplasty.

The described surgical technique resulted in a small horizontal scar, improved body contour, and patient satisfaction without flap necrosis or surgical wound dehiscence in both the vertical and transverse incisions and at the points of flap intersection.

Fig. 4 Pre- and postoperative photographs. Preoperative photographs in the anterior (top, left) and lateral (top, right) views of a 55-year-old female patient and postoperative photographs of the same patient in the anterior (bottom, left) and lateral (bottom, right) views taken 6 months postoperatively



Fig. 5 Pre- and postoperative photographs. Anterior view of preoperative (left) and 6-month postoperative (right) photographs of a 36-year-old female patient



Fig. 6 Pre- and postoperative photographs. Preoperative photographs in the anterior (top, left) and lateral (top, right) views of a 47-year-old female patient and postoperative photographs of the same patient in the anterior (bottom, left) and lateral (bottom, right) views taken 6 months postoperatively



Fig. 7 Pre- and postoperative 6 months. Silhouette detail without liposuction



Conclusion

This new abdominoplasty approach led to improved body contour, good quality scars, and patient satisfaction.

Compliance with Ethical Standards

Conflict of interest We have no conflicts of interest to disclose.

Ethical Approval This prospective, longitudinal, single-center study was approved by the Research Ethics Committee of the Hospital Santo Amaro (approval number 002/2015), located in Guarujá, São

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Informed Consent Written informed consent was obtained from all patients prior to their inclusion in the study, all details about the scars were explained, and patient anonymity was assured.

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