



The main abdominoplasty techniques used in post-bariatric patients after massive weight loss: systematic review

As principais técnicas utilizadas de abdominoplastia em pacientes pós-bariátricos após massiva perda de peso: Revisão sistemática

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■ ABSTRACT

Introduction: Obesity is defined by a body mass index (BMI) ≥ 30 kg/m², and today approximately 2.1 billion adults are obese. With this high number of obese people, the demand for treatment via bariatric surgery has been increasing to reduce weight, resolve comorbidities and improve quality of life. However, intense weight loss can cause adverse physical, aesthetic, and psychological effects. Plastic surgery becomes essential to resolve these adverse effects. According to the International Society of Plastic Surgery, 112,116 abdominoplasties were performed in 2020, representing 8.6% of all plastic surgeries performed in Brazil. The objective is to present the main abdominoplasty techniques in post-bariatric patients. **Method:** Studies that met the previously defined inclusion criteria were included. **Results:** A total of 28 references were included in this systematic review. **Discussion:** Most seek abdominoplasty due to the excess skin remaining in various body regions and the impact on post-bariatric patients' quality of life and mental health. The surgical techniques addressed are classic abdominoplasty; fleur-de-lis or anchor; circumferences; and Scarpa's fascia. The total number of complications was 42%; the main ones observed were scarring, skin dehiscence, infection, and necrosis; the three added up to 32%. **Conclusion:** The improvement in the quality of life of patients undergoing abdominoplasty is evident, but further research is needed to relate abdominoplasty techniques to these patients with postoperative complications.

Keywords: Abdominoplasty; Patients; Bariatric surgery; Reconstructive surgical procedures; Body contouring.

■ RESUMO

Introdução: A obesidade é definida pelo índice de massa corporal (IMC) ≥ 30 kg/m², e hoje cerca de 2,1 bilhões de adultos são obesos. Com esse alto número de obesos, a procura por tratamento via cirurgia bariátrica vem aumentando com o intuito de redução de peso, resolução de comorbidades e melhora da qualidade de vida. Entretanto, a intensa perda de peso pode ocasionar efeitos adversos físicos, estéticos e psicológicos. A cirurgia plástica passa a ser fundamental para resolução desses efeitos adversos. Segundo a Sociedade Internacional de Cirurgia Plástica, foram realizados 112.116 abdominoplastias em 2020, representando 8,6% de todas as cirurgias plásticas realizadas no Brasil. O objetivo é apresentar as principais técnicas de abdominoplastia em pacientes pós-bariátricos. **Método:** Foram incluídos estudos que cumprissem os critérios de inclusão previamente definidos. **Resultados:** Foi incluído nesta revisão sistemática um total de 28 referências. **Discussão:** Devido ao excesso de pele remanescente em

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várias regiões do corpo e o impacto na qualidade de vida e saúde mental dos pacientes pós-bariátricos, a maioria procura por abdominoplastia. As técnicas cirúrgicas abordadas são abdominoplastia clássica; flor-de-lis ou âncora; circunferências; e fásia de Scarpa. O total de complicações foi de 42%, as principais observadas foram de cicatrização; deiscência de pele, infecção e necrose; as três somaram 32%. **Conclusão:** A melhora na qualidade de vida dos pacientes submetidos a abdominoplastia é evidente, porém é necessária a realização de mais pesquisas que relacionem as técnicas de abdominoplastia nesses pacientes com suas complicações pós-operatórias. **Descritores:** Abdominoplastia; Pacientes; Cirurgia bariátrica; Procedimentos cirúrgicos reconstrutivos; Contorno corporal.

INTRODUCTION

Obesity is initially characterized by a body mass index (BMI) $\geq 30 \text{ kg/m}^2$, it is a condition that has grown in many countries, and today it has become a serious public health problem in most of them; around 2.1 billion adults are obese^{1,2}. In Europe, the United Kingdom has the largest population of obese people on the continent, reaching a rate of 28%; in the United States of America, there are about 150 million obese adults, while in Brazil, according to the Brazilian Institute of Geography and Statistics (IBGE), 41.2 million people over 18 years old are obese³⁻⁶.

The National Health System in the United Kingdom invests 5.3 billion pounds a year in actions to control obesity, as it understands the seriousness of this problem, as it is linked to the development of several comorbidities, such as hypertension, cardiovascular diseases, hyperlipidemia, stroke, osteoarthritis, obstructive sleep apnea, diabetes mellitus, and carcinomas. All can directly affect the health of these people and reduce their life expectancy^{3,7}.

The first step in treating patients with a BMI of 30 kg/m^2 to 34.9 kg/m^2 is lifestyle changes, physical exercise, and nutritional and endocrinological follow-up⁷. Those with a BMI $> 40 \text{ kg/m}^2$ or $> 35 \text{ kg/m}^2$ with severe comorbidities are eligible for bariatric surgery⁷.

The search for treating type II obesity with comorbidities and type III obesity has been increasing, considering that gastroplasties can be associated with reducing weight and secondary comorbidities to this disease^{8,9}. Of course, always in conjunction with changes in lifestyle, habits, and nutritional and endocrine monitoring, making it the most effective way to accelerate weight loss⁹.

However, this intense and rapid loss of adipose tissue can also involve adverse effects. The main disadvantages are dermoadipose ptosis caused by collagen changes in post-bariatric patients, characterized by dimorphism in regions of the thighs, arms, breasts, and abdomen^{7,10,11}. In addition to the psychological damage caused, poor hygiene, skin infection, dermatitis, and difficulty walking are also observed, which can aggravate the psychological condition¹¹.

Plastic surgery then plays a fundamental role in tissue replacement and psychological and social reintegration of these individuals who underwent gastroplasty and with weight loss, and abdominoplasty is the most requested procedure for treating post-bariatric treatment patients. According to the International Society of Plastic Surgery, 112,116 abdominoplasties were performed in 2020, representing 8.6% of all plastic surgeries in Brazil¹².

However, there are indication criteria: a minimum of 12 to 18 months after bariatric surgery, weight stability for at least 3 to 4 months, and BMI below 30 kg/m^2 . These parameters are important, as nutritional homeostasis is a positive nitrogen balance necessary to heal large surgical wounds¹³. Thus, the theme's relevance and its main and most current techniques for the scientific society are highlighted.

OBJECTIVE

This systematic review aims to present the main abdominoplasty techniques in post-bariatric patients, their main postoperative complications, and the improvement in the patient's quality of life and psychosocial status after the surgery.

METHOD

A systematic literature review was carried out following the PRISMA statement using epidemiological data from the Brazilian Institute of Geography and Statistics (2019) and the International Society of Plastic Surgery (2020) in order to answer the PICO question - What are the main techniques used of abdominoplasty in post-bariatric patients after massive weight loss? -.

The search was carried out on 07/19/2022 in the PubMed, BVS, SciELO, and Cochrane databases, applying the following descriptors, respectively: "Abdominoplasty" AND "Patients" OR "Bariatric surgery" AND "Plastic surgery" AND "Body contouring." All descriptors were validated in DeCS/MeSH. Time limitation between 2017 and 2022 and articles in Portuguese, English, Spanish, Italian, and French were used.

Therefore, studies that met the following criteria were included in this review: (1) case reports, randomized or quasi-randomized clinical trials, prospective/retrospective case series, retrospective/prospective cohorts; (2) in humans; (3) revisions; (4) post-bariatric patients; (5) the most used abdominoplasty techniques in post-bariatric patients. Finally, all papers that did not meet the inclusion criteria were excluded.

The main techniques to be addressed in this review are traditional or classic horizontal abdominoplasty, fleur-de-lis or anchor, circumferential, and with Scarpa's fascia. These four techniques can be associated with other surgeries, for example, neophalloplasty and liposculpture; however, they are not addressed in this research^{8,12-14}.

Traditional or classic horizontal abdominoplasty

Vernon, Callia, Pitanguy, Regnault, Grazer, and Baroudi described it. The markings of this technique may have anatomical variations. In general, a straight line begins above the pubic symphysis and extends parallel to the height of the iliac crest, then the clamping test occurs to delimit the region to be removed, and it is then possible to delimit the upper marking, which can have variation concerning its positioning. At the end of the marking, something similar to an ellipse is expected^{8,14} (Figure 1).

Fleur-de-lis or anchor abdominoplasty

Castanhares and Goethel described it. The markings begin at the xiphoid process and extend to the pubic symphysis region, forming a large ellipse. In sequence, the inferior marking is performed in the region of the pubic symphysis through the "pinch test" for marking the base of the T, containing a slight convexity, which will extend from one iliac crest to the other. In this way, the markings will overlap, forming a single marking with the shape of a fleur-de-lis^{8,14} (Figure 1).

Circumferential abdominoplasty

Gonzalez Ulloa described it. Markings must be performed with the patient in a supine position. In the anterior part, the standards of the classical technique must be followed, respecting the anatomical variations already described above. In the posterior part, the intergluteal groove must be identified to start the marking where a point just above it is indicated, called the "A" point. Superior to point "A", a new point is marked, which is called point "B", which is the upper limit of the resection¹⁴ (Figure 2).

Abdominoplasty with preservation of Scarpa's fascia

Described by Saldanha. Patient marking is the same as the fleur-de-lis and traditional technique^{8,9,14}. However, there are differences regarding the surgical technique (Figure 1).

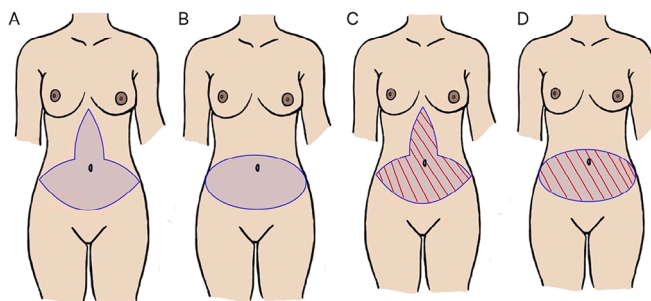


Figure 1. Markings of Abdominoplasty techniques. (A) Fleur-de-lis; (B) Classical; (C) Fleur-de-lis with Scarpa's fascia; (D) Classic with Scarpa's fascia. Copyright image.

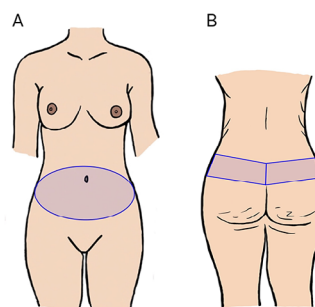


Figure 2. Marking of the Circumferential technique. (A) Anterior portion of the marking; (B) Posterior portion. Copyright image.

RESULTS

In the identification of studies via databases and registrations, the electronic search carried out in PubMed (n=111), Medline (n=30), LILACS (n=5), SciELO (n=1), Cochrane (n=102), Binacis (n=1). Two hundred fifty references were found, and duplicated, or ineligible records or records that did not open were excluded before screening (n=11).

Soon after, screening was performed, divided into three phases. All 239 titles were read in the first, and 119 were excluded, as they did not contemplate the theme. In phase 2, all 120 abstracts were analyzed, and 89 references, which were not relevant to the study, were excluded. In phase 3, the 31 full texts were deeply examined, and 6 articles were removed because they did not pass the eligibility criteria: Portuguese, English, Spanish, Italian, French, and last 5 years. This resulted in an n=25.

In addition, studies were identified using other methods at the Brazilian Institute of Geography and Statistics - IBGE (n=44) and the International Society of Plastic Surgery (n=7). In the screening, 48 records were excluded, as they were not surveys carried out in the last 5 years and did not address the subject of abdominoplasty or obesity, which resulted in three findings. Therefore, 28 references were included in this systematic review (Figure 3).

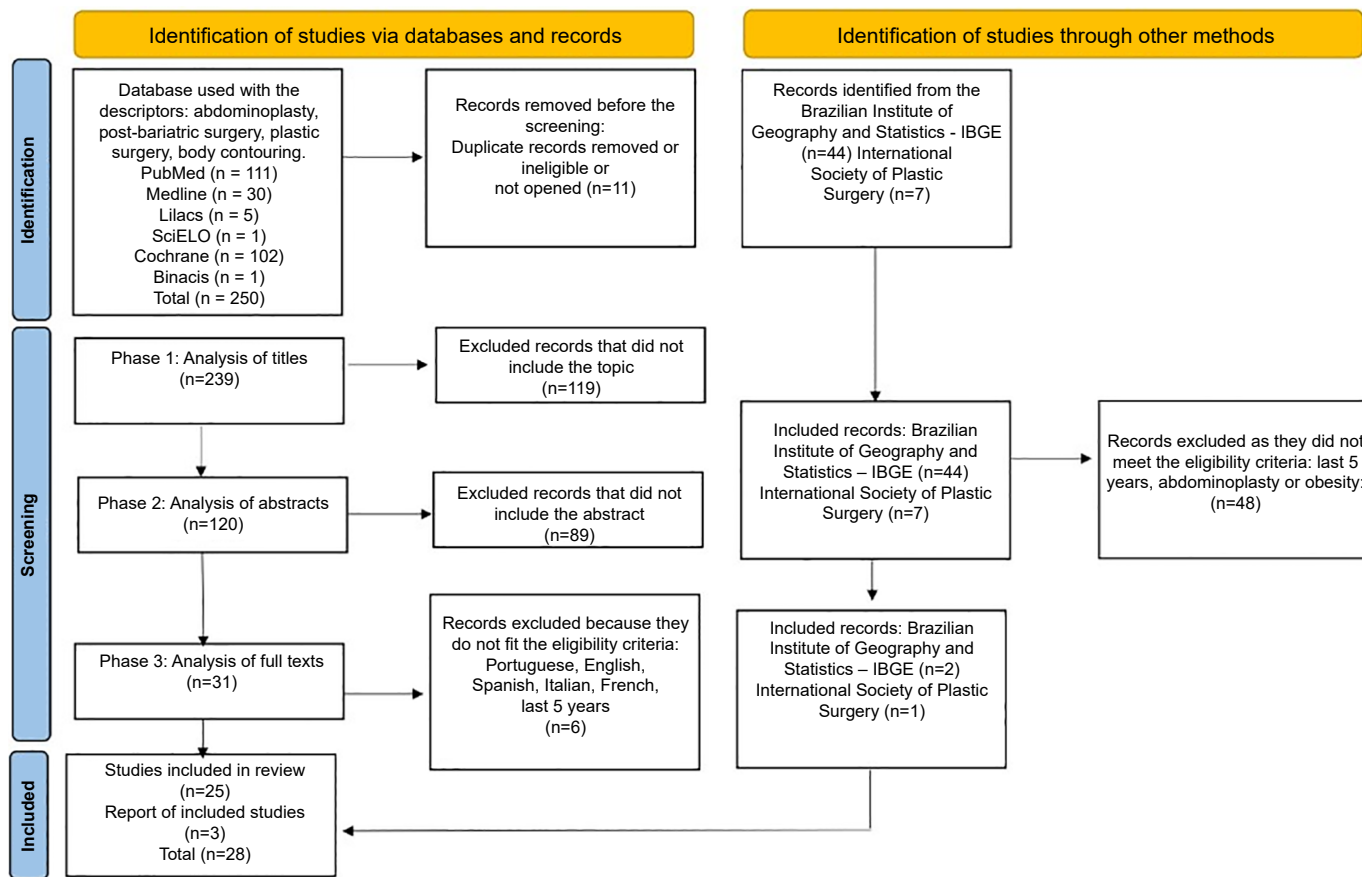


Figure 3. Organization chart of the results obtained in this systematic review, which used the PRISMA method.

DISCUSSION

Post-bariatric patients undergoing sleeve gastrectomy or Roux-en-Y gastric bypass can usually develop a lack of vitamin B12, folic acid, iron, calcium, vitamin D and vitamin K, minerals, and protein-caloric malnutrition, with iron deficiency and nutritional deficiency the most frequent^{7,8,13,15-19}. It is noteworthy that vitamin K is necessary for normal blood clotting; its deficiency can lead to major secondary bleeding⁸.

Therefore, follow-up with the nutritional team is essential to improve the parameters before the abdominoplasty mentioned in the present study^{8,20}.

Most patients with marked weight loss after bariatric surgery seek body contouring surgery due to excess skin in various body regions (arms, thighs, lower abdomen, breasts, and inguinal region). This loss of skin elasticity can cause skin folds, resulting in fungal infections, eczema, ulcers, and edema, in addition to a worsening in the quality of life, leaving them socially isolated, without practicing daily activities and with low self-esteem, feeling even dissatisfied with their aesthetic image after the bariatric procedure^{3,7,15,20-22}.

In this sense, body contouring surgery improves the quality of life and promotes psychosocial reintegration^{17,20}. A study in the United Kingdom showed that patients who underwent abdominoplasty significantly improved their body image and quality of life. 92% of these patients recommended plastic surgery to their friends, and 96% have no regrets³.

Patients with the so-called “apron abdomen” are recommended to undergo abdominoplasty due to the possible complications generated by this condition²³. It is clear that the plastic surgeon must perform a thorough physical examination to identify all deformities and detect comorbidities, BMI, body type, amount of adipose tissue, localized fat deposits, the existence of diastasis of the abdominal muscles, folds, and the presence of hernias²⁴⁻²⁶.

The body fat distribution in these patients is variable, influencing the surgical options²⁴. To facilitate the analysis of deformities in each anatomical region of the body, Luján applied a four-point scale called the Pittsburgh Scale, which serves as a guide for choosing the best abdominoplasty technique related to the specificities of the patients^{7,20}. Abdominoplasty techniques have their specificities for each indication²³.

The conventional one is indicated for the correction of abdominal diastasis, as well as correction of ptosis, removal of stretch marks, and dermo adipose panicle in the lower abdomen⁸. The traditional fleur-de-lis technique for patients with medium-sized scars on the abdomen, abdominal hernias, and/or excess horizontal/vertical dermo adipose panicle^{8,24}. The circumferential technique, in cases where, even after a great loss of body mass, there is a trace of adipose tissue together with excess skin in the lower abdomen, flanks, and back and in the elevation of the trochanteric fossa^{11,17}. Finally, the one that maintains Scarpa's fascia is still not very clear^{9,25}.

The applicability of abdominoplasty techniques may contain some similarities and differences. The classic one begins with a scalpel incision in the delimited area, without a specific order, and can then occur in the suprapubic region up to the anterior superior iliac spine, bilaterally as the fleur-de-lis. With the preservation of Scarpa's fascia, since in the circumferential one, the incision occurs in the posterior region of the patient, the anterior part is a traditional abdominoplasty^{9,13,14,24,25,27}.

In sequence, the first part of the adipose tissue dissection takes place in its entirety until the depth of the aponeurosis of the abdominal muscles, following the height of the navel in the traditional technique, fleur-de-lis; in contrast, the circumferential one starts from point "A" and goes towards the flanks, leaving only the deep fat fascia as in the abdominoplasty with preservation of Scarpa's fascia^{9,20,25,26}.

The second part of the subcutaneous dissection occurs up to the height of the xiphoid process (vertical) and costal margin (horizontal) in the classic and anchor⁸. In the latter and the technique of preserving Scarpa's fascia, an incision is made from the navel to the xiphoid process, forming a flower⁸. So, at this moment, it is evident that the abdominoplasty with the preservation of the deep subcutaneous tissue is very similar to the classic fleur-de-lis; however, it differs only in terms of the maintenance of the deep fat layer. In all techniques, the flaps are resected, and diatheses are treated^{8,9,27}.

A detailed analysis of possible surgical complications between the techniques above is essential⁸. In this way, the plastic surgeon can potentially reduce risks and determine the most convenient choice for post-bariatric surgery⁸. De Macedo et al.²⁸ divided post-bariatric patients into two groups (n=207) with BMI $\geq 30\text{kg/m}^2$ and $< 30\text{kg/m}^2$. The authors observed that patients with a BMI $\geq 30\text{kg/m}^2$ did not have a higher risk of postoperative complications than those with a BMI $< 30\text{kg/m}^2$; however, there is no exposure of which abdominoplasty techniques were used.

Schlosshauer et al.⁸, in a retrospective study at the Agaplesion Markus Hospital, Frankfurt, Germany, with 406 post-bariatric patients undergoing abdominoplasty, compared the three techniques - traditional abdominoplasty, fleur-de-lis, and mini-abdominoplasty with preservation of Scarpa's fascia - and just like Macedo et al. they were also divided according to the same BMI criteria. The two most used techniques were the traditional one (64%; n=261), followed by fleur-de-lis (27%; n=141), and with preservation of deep adipose tissue (8.4%; n=4)⁸. The total number of complications was 42%; the main ones observed were scarring, skin dehiscence, infection, and necrosis; the three added up to 32%. The horizontal had fewer total complications than the anchor (38.7% and 47.7%, respectively)⁸. Therefore, the importance of reducing BMI is notorious, regardless of the technique used, because, in this way, the patient is less susceptible to postoperative complications

As mentioned above, the most reported complication was skin healing; however, it is not understood whether seroma formation is directly related to quality^{9,25}. For this reason, two other studies that compare the anchor and classic techniques with and without preservation of Scarpa's fascia observed that the maintenance of deep adipose tissue is beneficial, simply because drainage is more efficient because in both studies in the postoperative bariatric patients, there was no development of seroma and complications. However, when evaluating scar satisfaction using the Pittsburgh Scale, there was no difference between the two groups^{9,25}. It is understood, then, that seroma, when analyzed in isolation, does not directly interfere with the quality of healing.

Finally, circumferential abdominoplasty has little statistical data to compare it with complications. In a retrospective study with 180 post-bariatric patients, only four patients underwent surgery; Bunting also cited only two patients out of a total of 16^{11,17}.

CONCLUSION

It is concluded that the improvement in the quality of life of patients submitted to any abdominoplasty is evident; however, there is still a lack of research that relates abdominoplasty techniques in post-bariatric patients with their postoperative complications. It is extremely important to use evidence-based medicine in the applicability of techniques in these patients, as surgeons can reduce this way risks and complications.

COLLABORATIONS

EASJ	Final manuscript approval, Formal Analysis, Supervision, Validation, Writing - Review & Editing
TCDBA	Supervision, Writing - Review & Editing
MLMM	Analysis and/or data interpretation, Conception and design study, Conceptualization, Data Curation, Formal Analysis, Methodology, Project Administration, Software, Supervision, Writing - Original Draft Preparation, Writing - Review & Editing
TFFN	Analysis and/or data interpretation, Conception and design study, Conceptualization, Investigation
RC	Conceptualization, Investigation
CLS	Conception and design study, Conceptualization, Methodology

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