What Is the Impact of Residual Obesity on the Risk for Postoperative Body-Contouring Surgery Complications in Postbariatric Patients?

Jefferson Lessa Soares de Macedo, Simone Corrêa Rosa, Lucas Ribeiro Canedo & Luiz Augusto Casulari

Obesity Surgery
The Journal of Metabolic Surgery and Allied Care

ISSN 0960-8923

OBES SURG
DOI 10.1007/s11695-020-04711-0

Springer

Obesity Surgery
https://doi.org/10.1007/s11695-020-04711-0

BRIEF COMMUNICATION

What Is the Impact of Residual Obesity on the Risk for Postoperative Body-Contouring Surgery Complications in Postbariatric Patients?

Jefferson Lessa Soares de Macedo[1] · Simone Corrêa Rosa[1,2] · Lucas Ribeiro Canedo[3] · Luiz Augusto Casulari[2]

Abstract

Background There are an increasing number of patients presenting for plastic surgery after massive weight loss, and many of these patients have residual obesity that may compromise outcomes. The impact of residual obesity on the development of postoperative complications in postbariatric patients undergoing plastic surgery procedures is unclear.

Methods We report the outcomes of 207 patients who underwent plastic surgery following RYGB from January 2011 to December 2018.

Results Two hundred and seven patients (196 females, 11 males) with a mean age of 42 years underwent 335 separate operations. The average BMI at the time of plastic surgery was 27.43 kg/m^2. The average weight loss was 47.08 kg. The prevalence of comorbidities was 26.6% and the most important presurgery comorbidities were arterial hypertension (10.1%) and diabetes mellitus (4.8%). Of the 207 patients who underwent surgery, 78.3% (168/207) underwent abdominoplasty and 45.0% underwent mammoplasty. The overall rate of complications was 27.5%. The prevalence of postoperative complications was not significantly different between patients with a BMI ≥ 30 kg/m^2 and patients with a BMI < 30 kg/m^2 (33.3% vs 25.9%, respectively; $p = 0.344$).

Conclusion In this group of patients, with specified anthropometric and clinical profiles, the residual obesity did not influence the incidence of postoperative complications in postbariatric patients after plastic surgery.

Keywords Bariatric surgery · Plastic surgery · Abdominoplasty · Wound dehiscence · Body-contouring surgery · Postoperative complications

Introduction

A common sequela of successful weight loss after bariatric surgery that remains stigmatized is excess skin and soft tissues. Body-contouring plastic surgery promotes social and psychological reintegration for these patients. In addition, plastic surgery procedures after gastric bypass aim to optimize the functional results obtained by bariatric surgery by removing excess skin [1]. However, these postbariatric patients often present to plastic surgeons with residual medical comorbidities, which causes this group of patients to be at risk for postoperative complications. Complications in wound healing are common after body-contouring surgery in postbariatric patients, with studies showing rates ranging from 8 to 66%. These complications include seroma, infection, dehiscence, necrosis, lymphorrhea, asymmetry, and thrombosis [2].

Previous studies showed a correlation between preoperative body mass index (BMI) and the incidence of postoperative complications in both postbariatric patients [2–4] and nonpostbariatric patients [5]. Thus, a maximal reduction in BMI should be the aim preoperatively to reduce the risk of postoperative complications. However, this reduction in body weight is unachievable for some patients; these postbariatric patients can have residual obesity, that is, while they lost some weight after the bariatric surgery, they remain classified as patient with obesity of lower grade. This study aims to evaluate the impact of residual obesity on the development of postoperative complications in postbariatric patients with a BMI ≥ 30 kg/m^2 who are undergoing plastic surgery procedures.

✉ Jefferson Lessa Soares de Macedo
jlsmacedo@yahoo.com.br

[1] Department of Plastic and Reconstructive Surgery, Asa Norte Regional Hospital, SQS 213 Bloco H Apto 303. Asa Sul, CEP, Brasília, DF 70 292-080, Brazil

[2] Post-Graduation Course in Health Sciences, University of Brasília, Brasília, DF, Brazil

[3] Superior School of Health Sciences/FEPECS, Brasília, DF, Brazil

Published online: 25 May 2020

Methods

We carried out a prospective study at a public reference hospital for bariatric surgery, with which individuals who underwent Roux-en-Y gastric bypass (RYGB) and subsequently underwent body contouring from 2011 to 2018 following massive weight loss were eligible for enrollment. The same team performed all of the operations at the Regional Hospital of Asa Norte, Brasília, DF, Brazil.

Patients with BMI ≥ 40 kg/m^2 or with BMI ≥ 35 kg/m^2 and associated comorbidities who underwent bariatric surgery according to international standards were included. Following bariatric surgery, the patients were followed up by the multidisciplinary team until weight stabilization and control of comorbidities were achieved, and then, they were referred to the plastic surgery

The inclusion criteria for postbariatric plastic surgery were as follows: weight stability for at least 6 months after achieving the goal of weight loss for each case, absence of illicit drug use or alcoholism, absence of moderate or severe psychotic features, and an understanding of the need for weight maintenance and postoperative follow-up with a multidisciplinary team throughout life. All different types of body-contouring surgery were included.

The exclusion criteria were smoking, gestational intention, weight instability with no maintenance of weight for 6 months, individuals who did not sign the informed consent form (ICF), and patients who underwent other bariatric procedures after RYGB. Additionally, patients with < 12 months of postoperative body-contouring surgery follow-up were excluded. Patients who underwent other bariatric procedures after RYGB were excluded because they could skew the analysis of the residual obesity prevalence after RYGB.

All patients received nondrug thromboprophylaxis, such as early ambulation and lower limb bandaging. We performed bladder catheterization, with catheter removal on the first postoperative day, and prophylactic antibiotic therapy with 2 g of IV cefazolin at anesthetic induction.

We aimed to optimize weight reduction and skin condition preoperatively (i.e., in cases of active cellulitis or fungal infection/acute infection). Further, concomitant diseases such as hypertension or diabetes were evaluated and optimized. In the case of abdominoplasty, preoperative abdominal imaging (ultrasonography or computed tomographic scan of the abdomen) was performed in order to evaluate the presence of an abdominal hernia. During the operation, we performed tissue reduction without unnecessary mobilization of tissue. Additionally, we attached great importance to extensive hemostasis. In the case of abdominoplasty, omphaloplasty was always indicated. Wound drains were used routinely. A drain was removed once output decreased to less than 30 mL per day.

The complications evaluated included hematomas, seromas, wound dehiscence, wound infection, tissue necrosis, deep venous thrombosis, and pulmonary embolism. According to the Clavien-Dindo classification, postoperative complications were categorized as major whenever they presented with a grade equal to or greater than 3 and as minor whenever the grade was lower than 3. Major complications were those requiring a new surgical procedure for hematoma drainage, seroma drainage, suturing of dehiscence areas, or rehospitalization for systemic antibiotic therapy [6].

We performed statistical analyses using SPSS software version 21.0 (Statistical Package for Social Studies, IBM Corp., Armonk, NY). We described the continuous variables using the mean and standard deviation and categorical variables with relative frequencies. We performed comparisons between groups with the Chi-square test for dichotomous variables, Student's t test for continuous variables with a normal distribution, and the Mann-Whitney U test for continuous variables without a normal distribution. The minimum acceptable significance level was 5% ($p < 0.05$).

All individuals involved in this study were informed and signed the ICF for the execution of consent. Informed consent was obtained from all individual participants included in the study. In the present study, there were no conflicts of interest. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and the 1964 Helsinki declaration and its later amendments. The project was approved by the Ethics in Research Committee of the Health Department of the Federal District, number CAAE number 93368918.5.0000.5553.

Results

There were 229 patients who sought body-contouring surgery in the Plastic Surgery Department of North Wing Regional Hospital, Brasília, DF. Twenty-two patients were excluded from the study based on the exclusion criteria (7 patients for smoking habits, 4 patients for an intention to get pregnant, and 11 patients for weight instability). No patient was excluded for uncontrolled medical comorbidities. Therefore, 207 patients who met the stated criteria were. all 207 patients who underwent plastic surgery procedures following RYGB. In relation to RYGB, 66.2% (137 patients) by laparoscopy and 33.8% (70 patients) by laparotomy. The mean age was 42.4 ± 9.57 years (range 22 to 66). The majority of the study population were women (196 patients; 94.7%). All 207 patients returned for the 6-month follow-up after plastic surgery, and there were no missing data points. Only 14 patients needed a telephone call to return, and three patients needed home visits to complete the follow-up.

The mean maximum BMI before bariatric surgery was 45.23 ± 7.74 kg/m^2. Before postbariatric plastic surgery, the mean BMI was 27.43 ± 4.09 kg/m^2. We also observed that patients who underwent postbariatric plastic surgery were most frequently overweight (50.7%; 105/207), followed by patients with normal BMI (27.5%; 57/207), together comprising 78.2% of the sample.

The difference between the maximum BMI before bariatric surgery and the BMI before plastic surgery (ΔBMI) was 17.81 ± 5.79. The mean weight loss prior to the body-contouring procedure was 47.08 ± 15.87 kg. The vast majority of patients reported improvement in or complete resolution of the various comorbidities after surgical treatment for obesity. However, some patients still had diseases at the time of the postbariatric plastic surgery, mainly arterial hypertension (10.1%), diabetes (4.8%), and metabolic syndrome (3.9%).

One hundred and seventy-eight patients (86.0%) underwent only one surgical procedure per stage, and 29 (14.0%) had more than one operation associated with the same surgical procedure, that is, two or more surgical procedures per stage. The majority of patients underwent abdominoplasty, accounting for 48.3% of the procedures, followed by mastoplasty (27.6% of the procedures). For the other less frequent surgical procedures, we performed facial plastic surgery (rhytidectomy) in 17.4% (36/207) of the patients, arm plastic surgery (brachioplasty) in 14.0% of the patients (29/207), and thigh plastic surgery (cruroplasty) in 7.2% of the patients (15/207).

The presence of diabetes, arterial hypertension, and metabolic syndrome were more prevalent in patients with a BMI ≥ 30 kg/m^2, but these comorbidities were not significantly related to this degree of obesity. However, abdominal flaps weighing more than or equal to 2000 g were significantly related to BMI ≥ 30 kg/m^2 ($p < 0.001$) (Table 1).

In relation to the anthropometric profiles, the comparison of the patients who had residual obesity (BMI ≥ 30 kg/m^2) and those who did not showed some statistically significant variables. A maximum BMI before bariatric surgery > 50 kg/m^2, weight loss > 60 kg, and ΔBMI > 20 were found to be significantly associated with the presence of residual obesity in postbariatric patients (Table 2). No difference was found regarding age, female sex, the mean weight loss before plastic surgery, or the mean ΔBMI (Table 2).

Regarding the complications of the postbariatric plastic surgery, the minor complications were more frequent than major complications. The overall complication rate was 27.5% (57/207). The major complication rate was 9.7% (20 patients), consisting of ten cases of dehiscence with the need for resection, four cases of seroma requiring reoperation, three cases of internal hernia with intestinal obstruction, and three cases of wound infection requiring treatment with intravenous antibiotic therapy. The rate of minor complications was 17.9% (37 patients), comprising 14 cases of dehiscence without the need for resection, nine cases of seroma requiring repeated punctures, seven cases of hematoma with drainage or spontaneous resolution, and seven cases of wound infection requiring treatment with oral antibiotic therapy alone. No patients experienced large wound dehiscence or extensive necrosis.

Patients with BMI ≥ 30 kg/m^2 prior to plastic surgery had more frequent postoperative complications from plastic surgery, especially minor complications (26.7%), compared to patients who did not have a BMI > 30 kg/m^2. However, these differences were not significant ($p = 0.121$) (Table 2).

The mean hospitalization time was 2 days in 187 (90.3%) cases, with only 20 (9.7%) patients remaining hospitalized

Table 1 Clinical and surgical profile of postbariatric patients with or without residual obesity (determined by body mass index) following gastric bypass

Variable	BMI ≥ 30 kg/m^2 ($N = 45$)	BMI < 30 kg/m^2 ($N = 162$)	p value	OR	95%CI
Diabetes, %	8.9 (4/45)	3.7 (6/162)	0.229	2.54	[0.68; 9.41]
Arterial hypertension,%	17.8 (8/45)	8.0 (13/162)	0.089	2.48	[0.96; 6.42]
Metabolic syndrome, %	8.9 (4/45)	2.5 (4/162)	0.070	3.85	[0.92; 16.07]
Depression (%)	28.9 (13/45)	28.4 (46/162)	0.948	1.02	[0.49; 2.13]
Weight of removed tissue ≥ 2000 g, %[a]	77.1 (27/35)	30.7 (39/127)	< 0.001*	3.54	[2.16; 5.67]
Associated procedures,%	13.3 (6/45)	14.2 (23/162)	0.883	0.93	[0.35; 2.44]

BMI body mass index

[a] Weight of removed tissue after abdominoplasty

*$p < 0.05$

Table 2 Demographic and anthropometric profiles of patients with or without residual obesity determined by body mass index (BMI ≥ 30 kg/m^2) following gastric bypass and the development of postoperative complications after plastic surgery

Variable	BMI ≥ 30 kg/m^2 (N = 45)	BMI < 30 kg/m^2 (N = 162)	p value	OR	95%CI
Age, years, mean ± SD	44 ± 10.48	41 ± 9.28	0.206	–	–
Female gender, %	95.6 (43/45)	94.4(153/162)	0.767	0.79	[0.17; 3.80]
Premassive weight loss BMI ≥ 50 kg/m^2, %	55.6 (25/45)	11.7 (19/162)	< 0.001*	9.41	[4.41; 20.08]
Weight loss, kg, mean ± SD	50.98 ± 19.51	46.00 ± 14.59	0.062	–	–
Weight loss > 60 kg, %	28.9 (13/45)	13.0(21/162)	0.011*	2.73	[1.24; 6.02]
ΔBMI, kg/m^2, mean ± SD	19.02 ± 6.89	17.47 ± 5.43	0.113	–	–
ΔBMI > 20, %	44.4 (20/45)	25.3 (41/162)	0.016*	2.36	[1.19; 4.69]
Overall complication, %	33.3 (15/45)	25.9 (42/162)	0.344	1.46	[0.72; 2.99]
Major complication, %	6.7 (3/45)	10.5 (17/162)	0.576	0.61	[0.17; 2.18]
Minor complication, %	26.7 (12/45)	15.4 (25/162)	0.121	1.99	[0.91; 4.37]

BMI body mass index, Δ*BMI* change in BMI was calculated by subtracting current BMI from max BMI

*$p < 0.05$

longer. We followed patients for at least 12 months postoperatively. There were no cases of deep venous thrombosis, pulmonary embolism, or deaths in the present study.

Discussion

For ideal preoperative conditions, postbariatric surgery patients should have reached a normal and stable weight and present with a low-fat content of excess skin. However, despite significant weight loss after bariatric surgery, numerous patients still have a BMI ≥ 30 kg/m^2 when presenting for body-contouring procedures because of stagnating weight reduction [7, 8]. With the increasing number of patients undergoing bariatric surgery, more patients with residual obesity will present for postbariatric reconstructive surgery. To what extent a BMI ≥ 30 kg/m^2 influences the rates of complications needs to be examined in a prospective analysis. In our study, those with a normal BMI accounted for 27.5%, and patients with residual obesity accounted for 21.8%.

In this study, the overall postoperative complication rate in postbariatric patients with a BMI ≥ 30 kg/m^2 was 33.3%, which is less than other studies, which had rates ranging from 40 to 55% [4, 5, 8]. Suture dehiscence was the main complication, followed by seroma, as observed in other studies [2, 4, 7, 9]. The major complication rate was 6.7% and the minor complication rate was 26.7% in postbariatric patients with a BMI ≥ 30 kg/m^2. Our rate of major complications was similar to those reported by Zuelzer et al. [7] (10.7%), Parvizi et al. [4] (10.2%), Hauck et al. [8] (10.3%), and Hammond et al. [10] (8.7%). However, Momeni et al. [5] found a 20.8% major complication rate in abdominoplasty in patients with BMI > 30 kg/m^2.

In our study, the presence of BMI ≥ 30 kg/m^2 in postbariatric patients who underwent to plastic surgery failed to predict an increased risk of complications. Residual obesity was a poor predictor of complications in postbariatric patients. One possible reason for this was the low prevalence of residual diseases at the time of postbariatric plastic surgery, and the residual disease that was present was easily controlled with the use of drugs at a low dosage. Therefore, these comorbidities were easily controlled and did not increase the risk of developing of postoperative complications in postbariatric patients with a BMI ≥ 30 kg/m^2 who underwent to plastic surgery [11].

Another possible reason for the low impact of presence of BMI ≥ 30 kg/m^2 on outcomes following plastic surgery procedures in postbariatric patients was the low prevalence of postbariatric patients with BMI > 40 kg/m^2. In our study, the prevalence of postbariatric patients with BMI > 40 kg/m^2 was 1.4%. AlQataan et al. [12] reported that nonpostbariatric grade III obesity patients were at significantly increased risk of adverse outcomes following abdominal contouring. Patients with grade III obesity had higher rates of comorbidities. Postoperatively, patients with grade III obesity were more likely to develop wound complications [12].

Thus, the impact of residual obesity on outcomes following plastic surgery procedures remains controversial, especially in nonpostbariatric patients. A chart review performed by Zannis et al. [13] evaluating postoperative complications in 563 nonpostbariatric patients who underwent a panniculectomy

found a significantly higher prevalence of high BMI in patients with wound complications than in patients without wound complications (43.7 vs. 30.7%; $p < 0.0001$). Furthermore, Zannis et al. [13] found that nonpostbariatric patients with a BMI between 40 and 49 kg/m^2 were 3.4 times more likely to develop wound complications than the reference group (BMI < 30).

In our study, a prospective cohort study of 207 patients who underwent postbariatric plastic surgery procedures, we reported that patients with a BMI ≥ 30 kg/m^2 did not have a greater risk of postoperative complications compared to the reference group (BMI < 30), similar to other studies [7, 9, 14, 15]. Residual obesity of the postbariatric patient at the time of plastic surgery did not adversely affect the results of the surgery.

Some studies have shown that comorbidities have a low impact on outcomes following plastic surgery procedures in postbariatric patients [11, 14]. Interestingly, another study with nonpostbariatric patients showed that patients with metabolic syndrome or diabetes mellitus undergoing abdominoplasty were at a significantly higher risk of developing postoperative complications [16].

Thus, patients meeting the criteria for bariatric surgery (BMI > 40, BMI 35–39.9 with at least one obesity-related comorbidity and BMI 30–34.9 with uncontrolled diabetes mellitus or metabolic syndrome) can be referred for evaluation by a bariatric surgeon prior to proceeding with plastic surgery procedures, especially panniculectomy or abdominoplasty.

In this study, the low rate of major complications, such as thromboembolic events, flap necrosis, and the low number of reoperations, may also be associated with the low number of associated surgeries. Studies with the highest rates of complications generally had a higher percentage of associated procedures. An increased number of associated operations leads to increased surgical time (> 6 h), greater blood loss, and an increased need for blood transfusions, factors that may increase the rate of major postoperative complications [9].

In the present study, 86.0% of the patients underwent only one surgical procedure per stage, and only 14.0% had associated operations in the same surgical procedure. We usually do not recommend associated surgical procedures, except in selected cases, and even then only after careful analysis of the clinical, nutritional, emotional, and social conditions. We also advocated and prioritized nonpharmacological preventive management for deep venous thrombosis, such as reducing surgical time, early ambulation, and good preoperative patient preparation.

Given the increasing demand for plastic surgery among postbariatric patients, it is imperative that we improve our current knowledge of risk factors for complications in these patients. One major challenge moving forward will be selecting the best candidates for body contouring in postbariatric individuals. The next logical step must involve the creation of a clinically relevant score to define individual risk of complications following common body-contouring procedures based on preoperative risk factors [17].

The limitations of our study include the small sample size of the postbariatric patients with BMI > 40 kg/m^2 after RYGB and the fact that the study was conducted in a single institution. Our results may therefore not be representative of every practice setting. These limitations are commonly reported in the literature for this kind of prospective study. However, studies with larger sample size are crucial to determine the impact of BMI ≥ 30 kg/m^2 on the development of postoperative complications in postbariatric patients undergoing plastic surgery procedures.

Conclusion

In this group of patients with anthropometric and clinical profiles specified, the residual obesity failed to influence the incidence of postoperative complications in postbariatric patients after plastic surgery. Our data show that residual obesity is not an absolute contraindication to body-contouring surgery independent of the body region if an interdisciplinary and elaborated approach is followed. Procedures can be performed safely and with satisfactory outcomes.

Compliance with Ethical Standards

All individuals involved in this study were informed and signed the ICF for the execution of consent. Informed consent was obtained from all individual participants included in the study. In the present study, there were no conflicts of interest. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and the 1964 Helsinki declaration and its later amendments. The project was approved by the Ethics in Research Committee of the Health Department of the Federal District, number CAAE number 93368918.5.0000.5553.

Conflict of Interest The authors declare that they have no conflict of interest.

References

1. Beek ESJ, Geenen R, Heer FAG, et al. Quality of life long-term after body contouring surgery following bariatric surgery: sustained improvement after 7 years. Plast Reconstr Surg. 2012;130:1133–9.
2. Kerviler S, Husler R, Banic A, et al. Body contouring surgery following bariatric surgery and dietetically induced massive weight reduction: a risk analysis. Obes Surg. 2009;19:553–9.
3. Bertheuil N, Thienot S, Huguier V, et al. Medial thighplasty after massive weight loss: are there any risk factors for postoperative complications? Aesth Plast Surg. 2014;38:63–8.
4. Parvizi D, Friedl H, Wurzer P, et al. A multiple regression analysis of postoperative complications after body- contouring surgery: a retrospective analysis of 205 patients. Obes Surg. 2015;25:1482–90.

5. Momeni A, Heier M, Bannasch H. Complications in abdominoplasty: a risk factor analysis. J Plast Reconstr Aesthet Surg. 2009;62:1250–4.
6. Clavien PA, Barkun J, De Oliveira ML, et al. The Clavien-Dindo classification of surgical complications: five-year experience. Ann Surg. 2009;250:187–96.
7. Zuelzer HB, Ratliff CR, Drake DB. Complications of abdominal contouring surgery in obese patients: current status. Ann Plast Surg. 2010;64:598–604.
8. Hauck T, Schmitz M, Horch RE, et al. Operating on the edge? Body contouring procedures in patients with body mass index greater 35. Obes Surg. 2019;29:1563–70.
9. Botero AG, Wenninger MG, Loaiza DF. Complications after body contouring surgery in postbariatric patients. Ann Plast Surg. 2017;79:293–7.
10. Hammond DC, Chandler AR, Baca ME, et al. Abdominoplasty in the overweight and obese population: outcomes and patient satisfaction. Plast Reconstr Surg. 2019;144:847–53.
11. Rosa SC, Macedo JLS, Canedo LR, et al. What is the impact of comorbidities on the risk for postoperative body-contouring surgery complications in postbariatric patients? Obes Surg. 2019;29:552–9.
12. AlQataan HT, Mundra LS, Rubio GA, et al. Abdominal contouring outcomes in class III obesity: analysis of the ACS-NSQIP database. Aesth Plast Surg. 2018;42:13–20.
13. Zannis J, Wood BC, Griffin LP, et al. Outcomes study of the surgical management of panniculitis. Ann Plast Surg. 2012;68:194–7.
14. Krauss S, Medesan R, Black J, et al. Outcome of body-contouring procedures after massive weight loss. Obes Surg. 2019;29:1832–40.
15. Coon D, Gusenoff JA, Kannan N, et al. Body mass and surgical complications in the postbariatric reconstructive patient: analysis of 511 cases. Ann Surg. 2009;249:397–401.
16. Zavlin D, Jubbal KT, Balinger CL, et al. Impact of metabolic syndrome on the morbidity and mortality of patients undergoing panniculectomy. Aesth Plast Surg. 2017;41:1400–7.
17. Rufkin WJ, Kantar RS, Cammarata MJ, et al. Body contouring following massive weight loss: the evolving role of plastic surgeons and risk stratification tools. Obes Surg. 2019;29:1661–2.