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Evaluation of weight loss and quality of life in long-term post-bariatric surgery

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How to cite this article: Castro I, Péres A, Bernhardt J, Tibolla V. Evaluation of weight loss and quality of life in long-term post-bariatric surgery. *Metab Target Organ Damage* 2024;4:26. <https://dx.doi.org/10.20517/mtod.2023.60>

Received: 15 Dec 2023 **First Decision:** 30 Jan 2024 **Revised:** 23 May 2024 **Accepted:** 9 Jul 2024 **Available Online:** 31 Jul 2024

Academic Editors: Amedeo Lonardo, Jennifer Lee **Copy Editor:** Yanbing Bai **Production Editor:** Yanbing Bai

Abstract

Aim: Obesity is a chronic disease that can lead to many consequences and is directly related to the development of other non-communicable chronic diseases. Since medical treatment for this comorbidity does not always yield satisfactory results, bariatric surgery ends up being the best option for many cases. Thus, the present study aims to analyze long-term weight loss in patients undergoing bariatric surgery, compare weight loss according to the surgical technique performed, and assess the quality of life of patients in the long-term postoperative period.

Methods: This is a descriptive and cross-sectional study analyzing a pre-existing database along with new data collected through telephone interviews according to the modified Bariatric Analysis and Reporting Outcome System (BAROS) questionnaire. Medical records for those who underwent the procedure within the specified period were analyzed.

Results: Records for a total of 208 patients were analyzed, of whom 181 underwent the Bypass surgical technique and 27 underwent the Sleeve technique. Based on the BAROS score, the majority of patients (64.9%) had a "good" or "very good" outcome. Regarding weight loss, 70.68% of the interviewed patients lost over 50% of weight, with this loss occurring in 74.58% of those who underwent Bypass and 44.44% of those who underwent Sleeve. Additionally, 95.2% of respondents reported feeling "better" or "much better" after surgery.

Conclusion: Our results indicate that bariatric surgery is effective both in long-term weight loss and in improving the quality of life of patients. Meanwhile, our study suggests that the BAROS questionnaire may be insufficient to assess long-term quality of life.



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Keywords: Bariatric surgery, weight loss, obesity

INTRODUCTION

Obesity is a chronic disease featuring excessive accumulation of body fat, which can lead to various impairments including arterial hypertension, type 2 diabetes mellitus, dyslipidemia, obstructive sleep apnea, and metabolic dysfunction-associated steatotic liver disease^[1-3]. According to the 2019 National Health Survey conducted by the Brazilian Institute of Geography and Statistics^[4], obesity was observed in 21.8% of men and 29.5% of women aged 20 and older in the country. Obese individuals represent more than one-third of overweight men and almost half of overweight women^[5]. The peak of obesity occurs between the ages of 40 and 60 for both sexes and is related to factors such as sedentary lifestyle, hypertension, and age^[6]. For women, obesity is associated with aging and the post-menopausal period^[7]. For men, obesity increases with age, but is more influenced by ethnic and socio-cultural factors^[6,7].

Medical treatment for obesity often proves ineffective, as few people can maintain the new lifestyle and consequent long-term weight reduction^[8]. Due to the failure of clinical treatment, bariatric surgery has become the best option for many cases in the treatment of severe obesity. The criteria indicating surgery include body mass index (BMI) equal to or greater than 35 kg/m² or between 30 and 35 kg/m² with metabolic disease^[9,10]. The ultimate benefit of weight reduction is related to the remission of comorbidities, improved quality of life, and a reduction in all-cause mortality^[3,11-13]. There are several types of bariatric surgical procedures. All procedures initially aimed at weight loss, and later progressed to metabolic goals. Today, vertical gastrectomy and Roux-en-Y gastric bypass (RYGB) are the most common bariatric surgical methods, and in the medium term, i.e., 3-5 years postoperatively, both methods have shown similar results regarding excess weight loss and resolution or improvement of comorbidities^[12,14].

Bariatric surgery has been utilized for over 30 years in the treatment of obesity, resulting in a population of long-term postoperative patients. Research on this group of patients becomes relevant, which evaluates the treatment outcomes in the late postoperative periods and applies quality of life assessment tools at this stage of treatment. Thus, the current study aims to analyze weight loss and quality of life in patients who underwent bariatric surgery at a Reference Hospital in the Vale do Itajaí region, Santa Catarina, Brazil. Our analysis will compare the body weights of patients before surgery and during a follow-up period of 6 to 20 years post-operation.

METHODS

The surgical procedures were performed by either laparotomy from 2001 to 2006, or by laparoscopy from 2007 and afterwards. The RYGB technique was standardized with alimentary and biliopancreatic limbs of one meter each, and a gastrojejunal anastomosis calibrated to 2.0 cm in diameter which was associated with a gastric band in surgeries performed until 2012. The Sleeve technique was standardized with the initial stapling at 4.0 cm from the pylorus and the gastrectomy shaped by a 36fr Faucher tube.

A descriptive, cross-sectional study was conducted through database analysis, supplemented by new data collection via telephone questionnaire for patients who received operation between 2001 and 2016. The postoperative periods for the patients range from 6 to 20 years. In the first stage, virtual medical records managed by the Clinmedi Clinic in the municipality of Itajaí-SC were utilized. The variables investigated in the database included patient phone number, BMI, sex, age, date of surgery, technique used, and preoperative weight. Subsequently, another telephone survey was conducted using the modified Bariatric Analysis and Reporting Outcome System (BAROS) questionnaire. The BAROS questionnaire is a widely used tool globally for post-bariatric evaluation, developed to standardize the assessment of surgical outcomes, facilitating data analysis and comparison based on the type of surgery. The BAROS questionnaire

analysis includes weight loss, quality of life, complications, and reoperation^[15]. A modification was made in Question 06 of Appendix A, which asks about the percentage of excess weight lost by the patient. This question was replaced with the following: "What is your current weight?" Based on the patient's response, excess weight loss was calculated. The BAROS questionnaire scoring [Appendix B] was used to assess the quality of life and the outcomes of the surgical treatment.

From the collected data, qualitative data were correlated with quantitative values based on the BAROS response scores. For percentage and incidence calculations, a 95% confidence interval (CI) was considered, and frequencies were compared using the Chi-square test. For quantitative data, the mean and standard deviation were calculated, and the progression comparison between periods was performed using the *T*-test. The results were presented in tables and charts, prepared with the assistance of Microsoft Excel software (2016).

RESULTS

A total of 822 patients who underwent bariatric surgery between 2001 and 2016 were identified. Due to loss of records and incorrect contact information, only 599 patients were included in the analysis. Of these, 208 responded to the questionnaire [see [Scheme 1](#)]. The low response rate was attributed to the extended postoperative period and the data collection method via telephone. The missing responses could have provided additional insights into the long-term behavior of post-bariatric patients or further reinforced the findings described below.

Postoperative time at data collection

Among the participating patients, 29 patients (13.9%) had data collected 16 to 20 years after surgery, 43 patients (20.7%) had data collected 11 to 15 years after surgery, and 136 patients (65.4%) had data collected 6 to 10 years after surgery [[Table 1](#)]. Of the total patients, 181 underwent the Bypass method with or without a band, and 27 underwent the Sleeve method. There was no difference in outcomes between Bypass with and without a band when considering the compared variables. Data regarding the types of surgery and the postoperative period are presented in [Table 1](#).

Results from assessment using the modified BAROS questionnaire

The responses from the patients to the Baros questionnaire, questions 01 to 06, are illustrated in [Figure 1](#).

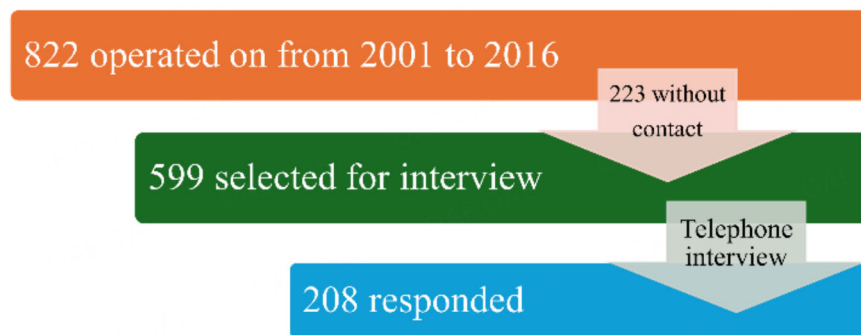
The first question asked how patients generally feel after undergoing surgery. No patients answered "much worse," 3 patients (1.4%) said they feel "worse", 7 patients (3.4%) said they feel "the same", 45 patients (21.6%) responded that they feel "better", and 153 patients (73.6%) responded that they feel "much better".

In the second question, patients were asked about their physical activity after surgery. 6 patients (2.9%) responded that they are doing "much less", 16 patients (7.7%) are doing "less", 72 patients (34.8%) said their physical activity remains "the same", 90 patients (43.5%) said they are doing "more physical activities", and 23 patients (11.1%) responded that they are doing "much more".

The third question inquired about participation in social and family gatherings after surgery. Only 1 patient (0.5%) responded that they attend social and family gatherings "much less", and 11 patients (5.3%) responded that they attend "less". Most of these patients attributed this to COVID-19 pandemic restrictions that prevented them from attending these gatherings. Additionally, 99 patients (47.6%) responded that there is "no change" compared to the period before surgery, 42 patients (20.2%) said they are participating "more", and 55 patients (26.4%) said they are participating "much more" in social and family gatherings

Table 1. Number of patients who underwent Bypass or Sleeve bariatric surgery according to postoperative time intervals at the data collection (n= 208)

Time of surgery (in years)	Bypass		Sleeve		Total	
	n	(%)	n	(%)	n	(%)
6 to 10	113	(54.3)	23	(11.1)	136	(65.4)
11 to 15	40	(19.2)	3	(1.4)	43	(20.7)
16 to 20	28	(13.5)	1	(0.5)	29	(13.9)

**Scheme 1.** Selection of patients aged 6 to 20 years after bariatric surgery.

after surgery.

Regarding the fourth question, patients were asked about their work capacity after surgery. No patient responded that their work capacity is “much reduced”, 7 patients (3.4%) said it is “reduced”, 23 patients (11%) said it is “unchanged”, 82 patients (39.4%) said it is “increased”, and 96 patients (46.2%) said it is “much improved”.

In the fifth question, patients were asked about their interest in sexual activity after surgery. 12 of the patients (5.8%) responded that their libido is “much lower” after surgery, 12 patients (5.8%) said it is “lower”, 68 patients (32.7%) said it is “the same”, 76 patients (36.5%) said it is “higher”, and 40 patients (19.2%) said it is “much higher”.

The sixth question assessed the percentage of excess weight lost based on the patients' current weight. The results showed that 1 patient (0.48%) gained weight, 11 patients (5.28%) lost 0%-24% of excess weight, 49 patients (23.55%) lost 25%-49% of excess weight, 87 patients (41.82%) lost 50%-74% of excess weight, and 60 patients (28.84%) lost 75%-100% of their excess weight. Overall, 70.66% of respondents lost more than 50% of their excess weight. The results of question six are also illustrated in [Figure 2](#) according to the postoperative periods.

The seventh question inquired about postoperative complications that bother the patients, with varied results. 124 patients (59.61%) reported no complications causing discomfort, 68 patients (32.69%) reported only mild complications, and 16 patients (7.69%) reported severe complications, with or without mild complications [[Table 2](#)]. Among the mild complications, the most frequently mentioned were dumping syndrome, anemia, hypovitaminosis, hair loss, weakness, gas, food impactions, difficulty ingesting certain foods such as red meat, and the constant need for vitamin supplementation. Severe complications included intense vomiting and diarrhea impacting daily life, internal bleeding, intestinal volvulus, twisted intestinal

Table 2. Number of complications in a postoperative period of 6 to 20 years (n = 208), by type of surgery (n = 208)

Postoperative complications	Bypass		Sleeve		Total	
	n	(%)	n	(%)	n	(%)
None	103	(49.5)	21	(10.1)	124	(59.6)
Mild	62	(29.8)	6	(2.8)	68	(32.7)
Severe	16	(7.7)	0		16	(7.7)

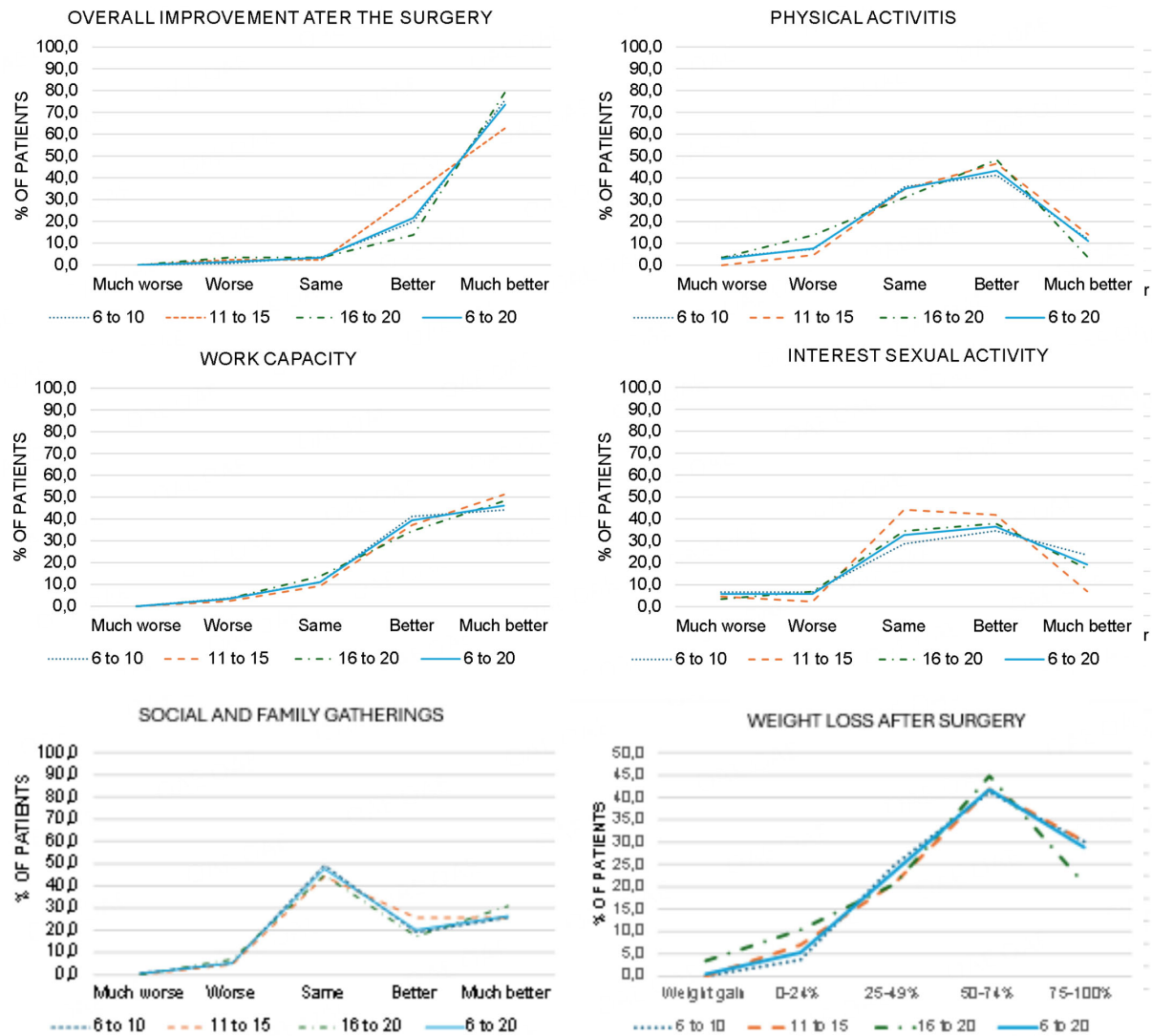


Figure 1. Comparative responses to questions 1 to 6 of the modified BAROS questionnaire from 208 patients who underwent bariatric surgery with 6 to 20 years of postoperative follow-up, according to their postoperative periods. To assess quality of life as a function of surgery time, the number of patients in the first three categories (no improvement) was compared with the number of patients in the last two response categories (improvement). The Chi-square test was applied and there were no significant differences between postoperative periods ($P > 0.05$).

hernia, Petersen's hernia, and perforated ulcer. Overall, more than half of the participants reported no complications, and among those who did, the majority had mild complications. When asked about the need for revisional surgery, 3 patients (1.44%) responded that they had undergone band removal.

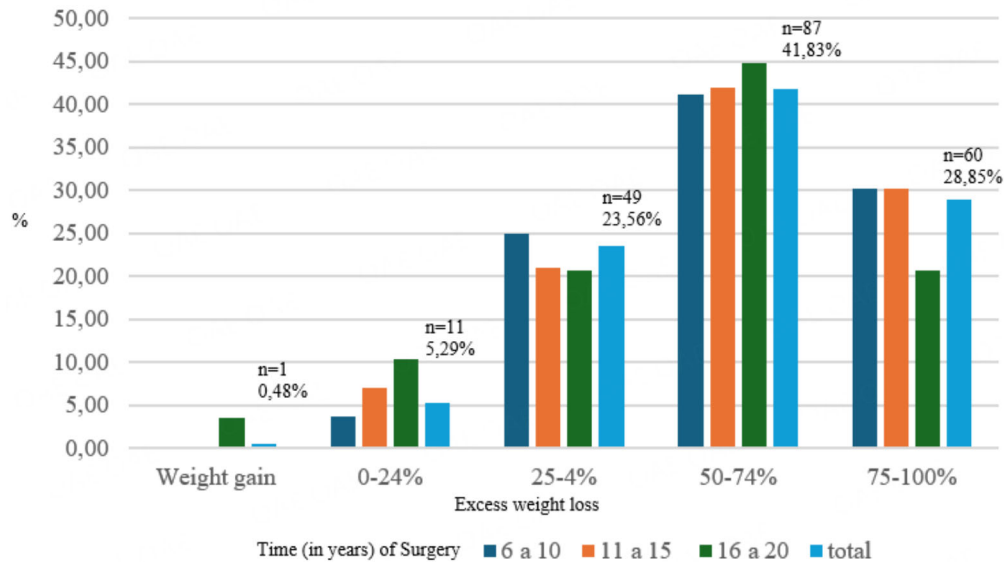


Figure 2. Number of patients undergoing bariatric surgery in a postoperative period of 6 to 20 years, in absolute values and as a percentage, in percentage value intervals for excess weight loss and by postoperative periods ($n = 208$).

Based on the questionnaire responses, the BAROS score was calculated with the following results: 17 patients (8.2%) scored 1 or less indicating failure, 56 patients (26.9%) scored between 1 and 3 showing a fair result, 99 patients (47.6%) scored between 3 and 5 points indicating a good result, and 36 patients (17.3%) patients scored between 5 and 7 indicating a very good result. No patient achieved an excellent result, which would be a score of 7 to 9 points. The results are shown in [Figure 3](#).

Long-term analysis according to the postoperative periods

To facilitate the long-term analysis and comparison, results were divided into three postoperative periods: 6 to 10 years, 11 to 15 years, and 16 to 20 years. For each period, the following variables were selected: time since surgery, total weight loss, excess weight loss, and BAROS score [[Table 3](#)].

Between 6 and 10 years postoperative, 136 patients responded to the questionnaire with an average postoperative period of 7.9 years. Regarding weight loss, the average was 32.5 kg, with a maximum of 70 kg and a minimum of 7 kg. As for the excess weight loss of these patients, the average was 63.4%, with a maximum of 117% and a minimum of 8%. Finally, the BAROS score ranged from -1 to 6, with an average of 3.4 points.

The second group of the analysis comprised 43 patients who received operation between 11 and 15 years ago, with an average postoperative period of 12.4 years. In this group, the average weight loss was 29.4 kg, with a maximum of 53.4 kg and a minimum of 5 kg. Regarding the excess weight loss in these patients, the average was 63.4%, with a maximum of 129% and a minimum of 7%. The BAROS score ranged from -0.25 to 5.5, with an average of 3.4 points.

The last group of the analysis consisted of patients who were 16 to 20 years postoperative, corresponding to 29 responses, with an average postoperative period of 18.4 years. Weight loss ranged from 49.5 kg to -0.96 kg, with an average reduction of 29.7 kg. Concerning excess weight loss in these patients, the average was 55%, with a maximum of 95.9% and a minimum of -1.1%. Additionally, the BAROS score had an average of 3 points, with a maximum of 6 and a minimum of -1.7.

Table 3. Average post-surgery time, total weight loss, percentage of excess weight loss, and BAROS score of patients who underwent bariatric surgery, by period of postoperative time (n = 208)

Time from surgery (years)	Average	SD	Max	Min	P value
Time post-surgery					
6 to 10	7.9	1.4	10	6	
11 to 15	12.4	1.4	15	11	
16 to 20	18.4	1.3	20	16	
Weight loss (Kg)					
6 to 10	32.5	12.5	70	7	
11 to 15	29.4	11.4	53.4	5	ns
16 to 20	29.7	13.0	49.5	-0.96	ns
Weight loss (%)					
6 to 10	28.5	9.5	53.8	4.5	
11 to 15	27.4	10.3	45.5	3.5	ns
16 to 20	25.2	10.8	38.7	-0.9	ns
% excess weight loss					
6 to 10	63.4	21.9	117.0	8.0	
11 to 15	63.4	23.9	129.0	7.0	ns
16 to 20	55.0	24.3	959.0	-1.1	ns
BAROS score					
6 to 10	3.4	1.4	6.0	-1.0	
11 to 15	3.4	1.4	5.5	-0.25	ns
16 to 20	3.0	1.9	6.0	-1.7	ns

T-test, P > 0.05. ns: not significant.

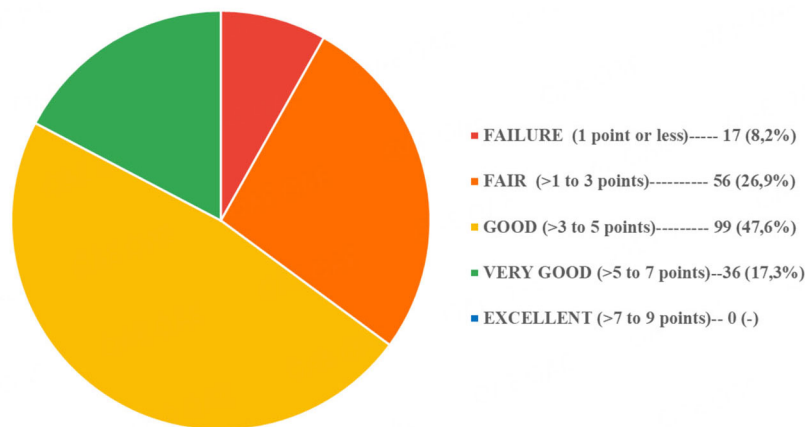


Figure 3. Distribution of patients who underwent bariatric surgery according to their individual BAROS questionnaire scores 6 to 20 years postoperatively (n = 208).

Therefore, the average excess weight loss for patients operated on within 6 to 10 years was 63.4%, a result that remained the same for the 11 to 15 years interval. In the 16 to 20 years period, the average excess weight loss dropped to 55%. Thus, it can be observed that overall, there was no significant variation in weight regain over the years. The results are described in [Table 3](#).

Results of excess weight loss and BAROS score according to surgical technique

Finally, for a more comprehensive analysis of the obtained data, a comparison was made between excess weight loss and the BAROS score based on the types of surgeries performed.

Among the 181 patients who underwent Bypass surgery, 1 patient (0.55%) experienced weight regain, 9 patients (4.97%) lost 0%-24% of excess weight, 36 patients (19.89%) lost 25%-49% of excess weight, 78 patients (43.09%) lost 50%-74% of excess weight, and 57 patients (31.49%) lost more than 75% of excess weight. Therefore, 74.58% of the patients lost more than 50% of their excess weight [Figure 4].

On the other hand, among the 27 patients who underwent Sleeve surgery, none experienced weight regain, 2 patients (7.41%) lost 0-24% of excess weight, 13 patients (48.15%) lost 25%-49% of excess weight, 9 patients (33.33%) lost 50%-74% of excess weight, and 3 patients (11.11%) lost more than 75% of excess weight. Thus, 44.44% of the patients lost more than 50% of their excess weight.

Regarding the BAROS score classification of patients who underwent bypass surgery, 13 patients (7.18%) had failure, 56 patients (30.94%) had a fair result, 87 patients (48.07%) had a good result, 25 patients (13.81%) had a very good result, and no patient (0%) achieved an excellent result. Among those who underwent Sleeve surgery, 4 patients (14.81%) had failure, 12 patients (44.44%) had a fair result, 11 patients (40.74%) had a good result, and no patient (0%) scored high enough to be classified as a very good or excellent result [Figure 5].

Based on the outcome from modified BAROS score, the Bypass technique is proven to be superior to the Sleeve, as Bypass had a higher number of “good” and “very good” results. In contrast, Sleeve had a higher percentage of “fair” and “failed” results and did not provide “very good” results. However, this comparative analysis of the methods poses a research challenge due to the significant discrepancy in the number of patients in each group.

From the obtained data, we observed that the number of patients who underwent Bypass surgery was much higher than the number of patients who underwent Sleeve surgery at the analyzed clinic. Additionally, using the modified BAROS questionnaire, no patient achieved an excellent result, regardless of the surgical method performed. Excess weight loss was greater in patients who underwent Bypass, despite the significant difference in the number of patients undergoing each method.

DISCUSSION

The main finding of our study is that 41.82% of the patients in this study lost 50%-74% of their excess weight and 28.84% of the patients lost 75%-100% of their excess weight. Thus, 70.68% of the patients showed a weight loss greater than 50%, which is a significant finding from our analysis. According to the Brazilian Association for the Study of Obesity and Metabolic Syndrome, 2016 (ABESO)^[16], a loss of more than 50% of excess weight is considered a successful outcome, and several authors report weight loss results between 50%-60% in the medium and long-term postoperative periods. In this study, only one patient experienced weight regain relative to their preoperative weight, and this patient was in the Bypass surgery group. Thus, the effectiveness of surgery for long-term weight loss is evident^[11,12,17-19]. Previous studies by Castanha *et al.* (2018)^[20] and Felsenreich *et al.* (2016)^[17] reported similar weight loss rates to those of the present study in the medium term and in cases of reintervention, respectively, using the BAROS questionnaire. The results indicated “very improved” or “very efficient” quality of life.

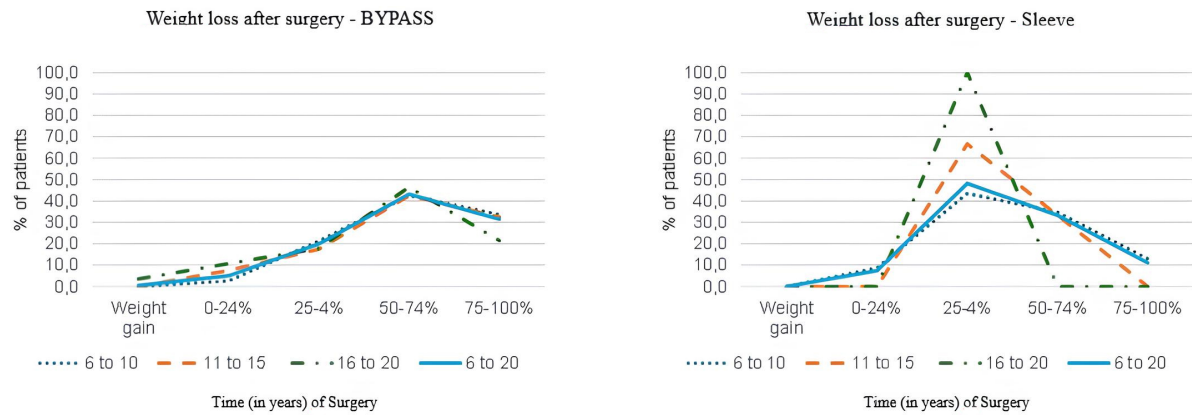


Figure 4. Percentage of patients who underwent bariatric surgery in a postoperative period of 6 to 20 years, in absolute values in percentage intervals for excess weight loss, separated by surgical technique and by postoperative periods ($n = 208$). For Bypass there is no statistical difference in surgery time. Sleeve does not support statistical testing due to small sample size for surgery times 11 to 16 ($n = 3$) and 16 to 20 ($n = 1$).

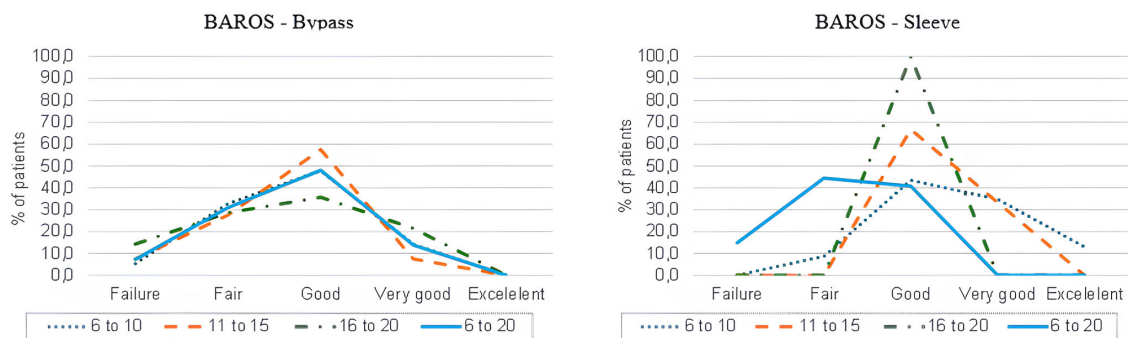


Figure 5. Percentage of patients undergoing bariatric surgery in a postoperative period of 6 to 20 years according to the BAROS questionnaire score, distributed by results within score intervals, separated by surgical technique and by postoperative periods ($n = 208$). For Bypass there is no statistical difference in surgery time. Sleeve does not support statistical testing due to small sample size for surgery times 11 to 16 ($n = 3$) and 16 to 20 ($n = 1$).

The comparison of weight loss between the two techniques studied presents some divergence in the literature. Some authors report the superiority of Bypass over Sleeve in systematic reviews^[21], yet there are also robust studies that assert the similarity between the procedures^[12]. In this study, it is noteworthy that the comparison between the two surgical methods is biased due to the difference in the size of the evaluated groups, with 181 patients undergoing the Bypass method and 27 patients undergoing the Sleeve method. More than half of the respondents of the present study reported no complications (54.1%), and among those who did, the vast majority reported mild complications. There was no predefined parameter for participants to classify complications as severe or mild, so the interviewers' judgment on their responses was considered. In the literature, postoperative complications are more frequent after Bypass (9%-21%), with a higher rate of reoperations for Bypass (5%) compared to Sleeve (3%), considering both early and late complications^[11,12,22-24]. The Clavien-Dindo classification is commonly used to evaluate complications within 30 days, assessing risk predictors for complications^[25-28]. The Clavien-Dindo Classification was used as a severity parameter when the reported complications were related to the perioperative period.

Current revision surgery rates range from 3%-36% for various causes, the most common being gastroesophageal reflux, protein-calorie malnutrition, and weight regain^[15,29,30]. The difference between the literature and the data found in this study may be due to the small number of patients who received Sleeves surgery in the present cohort, with the removal of the band being the most performed revision surgery in the studied population.

Based on the modified BAROS questionnaire, among patients who underwent Bypass surgery, there was a predominance of good results (48.07%) and fair results (30.94%). The study published by Askari *et al.* (2020)^[31] used the BAROS questionnaire for 92 patients who underwent Bypass surgery, with an average postoperative period of 130 months (ranging from 123 to 134 months). It was observed that 20.7% of the patients had a failure result, 26.1% had a fair result, 34.8% had a good result, 13% had a very good result, and 5.4% had an excellent result. This study also showed a predominance of “fair” and “good” results, but with a larger number of patients analyzed and a longer analysis period. Regarding the Sleeve method, this study showed a predominance of fair results (44.44%) and good results (40.74%). The study published by D'Hondt *et al.* (2011)^[32] evaluated 83 patients who underwent Sleeve surgery with an average follow-up of 49 months (ranging from 17 to 80 months). Results from the study indicated 9.6% of the patients with a failure outcome, 16.9% with a fair outcome, 37.3% with a very good result, and 36.1% with an excellent result. These results differ from those found in our study, although the average postoperative period analyzed is shorter and the number of patients in the study is larger. In the study published by Felsenreich *et al.* (2016)^[17], 53 patients were followed up after 10 years of Sleeve surgery using the BAROS questionnaire. Of the total patients, 19 patients (36%) were converted to another surgical method. For patients who were not converted to another surgical method, the results were as the following: 20% had a failure result, 35% had a fair result, 20% had a good result, and 15% had a very good result. When compared with this study, the results become somewhat more similar, despite the larger number of patients analyzed.

Based on these results, it can be inferred that bariatric surgery is effective in the long term for excess weight loss and overall quality of life improvement. Although 95% of respondents reported “feeling better” or “much better” after surgery, the final BAROS score did not show any “excellent” results. This is primarily due to the loss of points in questions that may have negative responses. However, as this is a long-term study, these responses are not necessarily directly linked to bariatric surgery. A good example of such cases, as mentioned earlier, is those patients who report attending fewer social and family gatherings due to COVID-19 pandemic restrictions. Social measures affect the patient's quality of life, creating a confounding factor in the analysis of the effects of bariatric surgery during this period. Another similar and important point to highlight is the loss of points in the question about libido after the procedure; 44.3% of respondents reported no change or that their interest was lower or much lower. This disinterest is related to issues inherent to aging and hormonal changes over years. All of this is also influenced by the pandemic period and the generalized quarantine with a depressive atmosphere, factors that could not be altered by the effect of the surgery. Finally, regarding the overall improvement in quality of life in the first question of the BAROS questionnaire, 95.2% of patients feel better or much better after bariatric surgery. When evaluating the various aspects of the questionnaire individually, many other questions show a significant number of responses as only “the same”, “worse”, or “much worse”. Thus, the question arises: what are the real improvements for patients after surgery? Does the BAROS questionnaire adequately evaluate the long-term quality of life post-bariatric surgery? Additionally, the absence of open-ended questions limits the possibility of responses and does not assess the improvement of comorbidities, which is a very important factor in patients' lives. Therefore, there is a need to develop new, more qualified tools for evaluating and quantifying the quality of life of patients undergoing bariatric surgery in the long-term postoperative period.

Strengths and weaknesses

The strengths of this study include demonstrating good and excellent long-term outcomes of bariatric surgery concerning weight loss and quality of life, with an evaluation of detailed aspects identified in the literature that influence quality of life. The analysis raised hypotheses that may improve tools for evaluating long-term quality-of-life outcomes, as divergent results were shown.

The different number of patients in each group complicates the comparison of the methods, which the authors consider as a weakness of the research. No difference was demonstrated for cases that received a band, which would be possible with a more robust sampling. Therefore, more long-term studies comparing these three methods with a similar number in each group of patients are needed.

Finally, as there is no consensus on what should be considered a severe complication versus a mild complication for the participant, some scores on the BAROS questionnaire may have been compromised. The impact of these complications on the patient's life varies according to each individual's perception and experiences. Thus, complications were classified considering the clinical complexity as evaluated by the researchers.

In conclusion, Based on the findings of this research on the quality of life, it is concluded that the majority of patients feel better or much better after bariatric surgery. In relation to the score of the modified BAROS questionnaire, 64.9% of patients had a good or very good result. The dimension with the best evaluation was work capacity to be increased or very improved, and the worst was the frequency of social and family meetings. Regarding the loss of excess weight, in the long term, it was greater than 50%, reinforcing the lasting effects of bariatric surgery^[11,12,16,17,18,33]. Therefore, bariatric surgery is efficient both in long-term weight loss and in improving patients' quality of life.

The BAROS quality of life assessment tool may not include aspects that influence patient satisfaction on the result of surgical treatment of obesity in the long term, because the general result was not so good whereas results on specific aspects were mostly good. This discrepancy suggests the existence of unevaluated worsening factors.

DECLARATIONS

Acknowledgments

We would like to thank all the patients who served us, willing to respond and pass on their information, especially in a time of uncertainty and many scams over the phone and via email.

Author contributions

The article was created based on a medical course conclusion thesis by the authors, who conceived the theme, collected and interpreted data, in addition to writing the initial text: Peres A, Tibolla V

Agreed to guide the work, contributed to the choice of the topic, and made data from his clinic available for evaluation, in addition to helping correct the text: Bernhardt J

Agreed to co-supervise the work, helped correct the text, encouraged publication of the article, restructured the initial text of the article according to peer review and completed the publication: Castro I

Availability of data and materials

The data belong to a private clinic, and therefore, we chose not to share them. Patients' personal data are protected by Brazil's General Data Protection Law and will not be shared.

Financial support and sponsorship

None.

Conflicts of interest

All authors declared that there are no conflicts of interest.

Ethical approval and consent to participate

The data from 2001 to 2015 were used in a research project approved by the Research Ethics Committee of the University of Vale do Itajaí, with protocol number 1,289,545, dated October 21st, 2015. Additionally, a request was made to extend the study period by adding the years 2015 to 2018. On August 1st, 2018, the amendment (E1)/CAAE: 49483015.1.0000.0120 was approved to expand the data collection for the years 2015-2018. Finally, this study was approved by the committee through protocol number 5,175,067 on December 17th, 2021. All participants agreed to participate in the research by signing the Informed Consent Form (ICF), which thoroughly explains how the study works and what information would be used by the researchers.

Consent for publication

Not applicable.

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