








# Intraoperative, sociodemographic, and postoperative parameters in individuals undergoing bariatric surgery

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## SUMMARY

**OBJECTIVE:** This study aimed to comparatively analyze sociodemographic data and postoperative parameters of patients undergoing bypass and sleeve surgeries in a private hospital in São Luís, MA.

**METHODS:** The study was descriptive, prospective, observational, and comparative, with a quantitative approach between August 2020 and July 2021. We analyzed 74 participants of both genders, aged between 18 and 70 years, with 31 undergoing Roux-en-Y gastric bypass surgery and 43 undergoing sleeve gastrectomy surgery. In the postoperative period, sociodemographic characteristics, surgery and anesthesia duration, pain levels, adverse effects, weight loss, and complications from the surgical procedure were analyzed.

**RESULTS:** Males predominated in Roux-en-Y gastric bypass and females in sleeve gastrectomy surgery. Clinical characteristics regarding self-declared ethnicity, age and place of birth, education, and marital status were similar between the studied groups. Roux-en-Y gastric bypass had an average surgery time of 112.14±10.06 min and sleeve gastrectomy 91.11±23.69 min, with a significant difference ( $p<0.001$ ). Regarding anesthesia time, gastric bypass averaged 160.36±13.99 min and sleeve gastrectomy 154.88±29.10 min, with no statistical difference between groups ( $p=0.335$ ). Nausea, vomiting, and drowsiness were more common in Sleeve gastrectomy, with no significant difference ( $p=0.562$ ). Roux-en-Y gastric bypass showed a higher rate of weight loss from 1 month after surgery (14.2±4.15) and more variation in body mass index within 3 months after surgery (32.17±4.76). Complications occurred in a small number of patients.

**CONCLUSION:** The two surgical techniques proved effective in delivering the best results for patients, with the group undergoing bypass showing statistically significant weight loss from 1 month after the surgical procedure.

**KEYWORDS:** Obesity. Gastric bypass. Gastrectomy.

## INTRODUCTION

Obesity, according to the World Health Organization (WHO), is defined as the excessive accumulation of body fat<sup>1</sup>. This condition is commonly associated with an increased risk for chronic diseases, functional disability, and psychosocial harm<sup>2,3</sup>. Furthermore, the WHO estimates that the global obesity epidemic in 2025 will reach approximately 167 million new people, considering there are already more than 600 million obese people<sup>4</sup>.

Besides the physical impact, which increases the risk of several chronic diseases, obesity also impacts the psychosocial aspect of individuals, being closely related to several psychiatric disorders, such as depression and anxiety<sup>5</sup>.

Therapeutic strategies consist of physical exercises, dietary approaches, and drug use, some of the pillars of clinical treatment. However, although widely used, it has lower success rates than surgical treatment, which has already proven more effective<sup>6-8</sup>.

As a result, considering that most morbidly obese patients do not respond satisfactorily to clinical therapy, bariatric and metabolic surgeries have been increasingly indicated as an alternative for treating this morbidity and its associated pathologies<sup>9</sup>. This procedure proved an effective alternative, bringing numerous benefits to patients regarding physical health and psychosocial aspects<sup>10</sup>.

The sleeve gastrectomy and Roux-en-Y gastric bypass stand out among the bariatric surgery options. The latter was the most used among the main techniques for a long time. However, sleeve surgery, being more pragmatic and with lower rates of side effects, is already the most commonly performed bariatric surgery in the United States of America<sup>9</sup>.

Considering this scenario, this study searched to comparatively analyze sociodemographic data, intraoperative parameters, and postoperative parameters of patients' techniques of bypass and sleeve gastrectomy.

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## METHODS

### Study design

This is a cross-sectional and comparative study. This study was approved by the Institutional Research Ethics Committee (CAAE 28324720.0.0000.5085/No. 4.364.508).

In convenience sampling, patients aged 18–70 years who underwent Roux-en-Y gastric bypass or sleeve gastrectomy, of both genders, between August 2020 and July 2021, were included in the study. Exclusion criteria included patients using drugs, who had cardiac arrhythmias, dilated cardiomyopathy, and cardiac conduction disorder, or even those who were lost to follow-up in the postoperative period and did not respond to the questionnaires.

### Data collection instrument

Data were collected from clinical charts and evaluation sheets of patients undergoing bariatric surgery in a private hospital in the northeastern capital. The sociodemographic variables analyzed were age and gender, self-declared ethnicity, marital status, and education level. Anthropometric measurements analyzed were height, weight, body mass index (BMI), and total weight loss percentage.

The surgical techniques were performed the same way in all patients according to the group to which they belonged. In addition, all surgeries were performed by the same team of digestive system surgeons at the service, ensuring that the surgical procedures were performed homogeneously and ensuring comparability.

Intraoperatively, the beginning and end of the surgery and the time to wake up were evaluated. In the postoperative period, the occurrence of nausea, vomiting, drowsiness, and dizziness from 0 to 24 h and up to 7 days after surgery and pain intensity up to 6 months postoperatively were assessed. Indicators of pain intensity at rest and after movement were measured using a verbal numeric scale from 0 (no pain) to 10 (most intense pain possible).

Data on possible complications in the postoperative period, such as cholelithiasis and dumping syndrome, were also analyzed, as was the comparison between the weight loss of the two groups in an interval extending up to 6 months after surgery.

In the postoperative period, complications were evaluated according to the Clavien-Dindo classification of surgical complications. The following grade I complications, such as nausea, vomiting, drowsiness, and dizziness, were evaluated from 0 to 24 h and up to 7 days after surgery. Pain intensity, also classified as grade I, was evaluated up to 6 months postoperatively, and pain intensity indicators at rest and after movement were

measured using a verbal numeric scale from 0 (no pain) to 10 (pain as intense as possible)<sup>11</sup>.

In addition, dumping syndrome, also classified as grade I, and cholelithiasis, a complication that can reach grade III, depending on the need for surgical intervention, were analyzed and compared regarding weight loss in these two groups at intervals of up to 6 months after surgery. Also, the main complications, according to other studies, of bariatric surgery were evaluated, such as fistula, classified as grades II or III, depending on the intervention, intestinal obstruction, grade I, and pulmonary thromboembolism, grade III<sup>11</sup>.

After approval by the hospital's Research Ethics Committee and signing the Informed Consent Form, patients between 18 and 70 years of age undergoing bariatric surgery were included in the study. Patients using drugs, with cardiac arrhythmias, dilated cardiomyopathy, or cardiac disorder, or who have lost postoperative follow-up and did not reply to the questionnaires were excluded.

### Statistical analysis

Data were statistically analyzed using the SPSS 26.0® program. For the analysis of numerical variables, the results are presented with the mean and standard deviation; categorical data show them through absolute (n) and relative (%) frequencies. Normality was verified using the Kolmogorov-Smirnov test. Student's t-test was used to compare numerical variables, while Pearson's chi-square test was used to analyze categorical variables comparatively.

## RESULTS

A total of 74 patients were enrolled in the study, of whom 31 were in G1 and 43 were in G2. Regarding the clinical data of the patients, there was a predominance of males in bypass surgery, and females in sleeve surgery, with 79.07% (n=34), with a statistical difference (p=0.005). Concerning anthropometric data, there was a relevant statistical difference (p<0.05): G1 had higher means of weight and BMI (p<0.001 for weight and BMI and p<0.027 for height). Clinical characteristics regarding self-declared ethnicity (p=0.828), age (p=0.893), place of birth (p=0.395), education (p=0.294), and marital status (p=0.779) were similar between the studied groups (Table 1). Data regarding surgery time showed a statistically significant difference between groups (p<0.001): Roux-en-Y gastric bypass had a mean surgery time of 112.1±10.06 min, while the gastrectomy time was 91.1±23.6 min. There was no statistical difference between groups regarding anesthesia

time ( $p=0.335$ ), with averages of  $160.3\pm 13.9$  and  $154.8\pm 29.1$  min, respectively.

When analyzing postoperative pain at rest and during movement at the intervals studied, similar values were observed, although the sleeve group had slightly more severe pain, with a progressive reduction in both groups over time without a statistical difference ( $p>0.05$ ).

Regarding the evaluation of side effects, nausea, vomiting, and drowsiness have occurred more frequently in the group that underwent the sleeve. On average, about

60% of patients reported some of these symptoms within 7 days after surgery, with no statistical difference ( $p=0.562$ ). Concerning dizziness, a more significant occurrence of these symptoms was observed in the group submitted to bypass at different times of the postoperative period ( $p<0.001$ ) (Table 2).

Regarding the occurrence of postoperative complications, it was noted that there was no relevant statistical difference regarding the occurrence of postoperative complications between the two techniques in the 6-month interval of the surgical

**Table 1.** Sociodemographic data.

Variables	Bypass	Sleeve	p-value*
	Mean±SD	Mean±SD	
Age (years)	37.32±10.46	37.02±8.23	0.893
Weight (kg)	116.64±27.56	97.26±13.34	<0.001
Height (cm)	167.97±11.01	162.67±9.12	0.027
Initial BMI (kg/m <sup>2</sup> )	40.93±5.87	36.70±3.50	<0.001
	n (%)	n (%)	p-value**
Gender			
Male	16 (51.61%)	9 (20.93%)	0.005
Female	15 (48.39%)	34 (79.07%)	
Self-declared ethnicity			
Black	3 (9.68%)	2 (4.65%)	0.828
Brown	17 (54.84%)	26 (60.47%)	
White	10 (32.26%)	13 (30.23%)	
Not registered	1 (3.23%)	2 (4.65%)	
Place of birth			
Maranhão	28 (90.32%)	41 (95.35%)	0.395
Other state	3 (9.68%)	2 (4.65%)	
Marital status			
Married/civil partnership	17 (54.84%)	22 (51.16%)	0.779
Single	9 (29.03%)	11 (25.58%)	
Cohabitation	1 (3.23%)	1 (2.33%)	
Divorced	-	2 (4.65%)	
Not registered	4 (12.90%)	7 (16.28%)	
Education			
Complete middle school	-	1 (2.33%)	0.294
Incomplete high school	-	1 (2.33%)	
Complete high school	10 (32.26%)	6 (13.95%)	
Incomplete higher education	3 (9.68%)	10 (23.26%)	
Complete higher education	15 (48.39%)	21 (48.84%)	
Not registered	3 (9.68%)	4 (9.30%)	

\*Student's t-test. \*\*Pearson's chi-square test. SD: standard deviation.

procedure. Concerning the rate of total weight loss, a more significant reduction was observed in the group submitted to bypass 1 month after the surgical procedure ( $p < 0.05$ ). There was a more significant reduction in BMI over the same period, in which a significant difference was already observed in the first postoperative week ( $p < 0.001$ ), which was not reproduced over time since the same finding could not be made, for example, 6 months after the surgical procedure ( $p = 0.117$ ) (Table 3).

**Table 2.** Postoperative adverse effects.

Variables	G1	G2	p-value*
	n (%)	n (%)	
Nausea			
Without	14 (45.16)	17 (39.53)	0.562
0 h	10 (32.26)	12 (27.91)	
2 h	-	2 (4.65)	
6 a.m.	3 (9.68)	6 (13.95)	
6 p.m.	1 (3.23)	1 (2.33)	
24 h	-	3 (6.98)	
7 days	3 (9.68)	2 (4.65)	
Vomiting			
Without	14 (45.16)	17 (39.53)	0.790
0 h	15 (48.39)	21 (48.84)	
2 h	-	1 (2.33)	
6 a.m.	2 (6.45)	2 (4.65)	
6 p.m.	-	1 (2.33)	
24 h	-	1 (2.33)	
Dizziness			
Without	14 (45.16)	17 (39.53)	<0.001
0 h	10 (32.26)	18 (41.86)	
2 h	14 (45.16)	2 (4.65)	
6 a.m.	14 (45.16)	2 (4.65)	
6 p.m.	2 (6.45)	-	
24 h	14 (45.16)	1 (2.33)	
7 days	2 (6.45)	3 (6.98)	
Somnolence			
Without	14 (45.16)	17 (39.53)	0.865
0 h	5 (16.13)	7 (16.28)	
2 h	4 (12.90)	5 (11.63)	
6 a.m.	3 (9.68)	8 (18.60)	
6 p.m.	3 (9.68)	2 (4.65)	
24 h	2 (6.45)	3 (6.98)	
7 days	-	1 (2.33)	

\*Pearson's chi-square test.

## DISCUSSION

In the present study, it was possible to observe that males predominated in Roux-en-Y gastric bypass and females in sleeve gastrectomy. Roux-en-Y gastric bypass had a longer mean surgery and anesthesia time than sleeve gastrectomy. In weight from 1 month after surgery and more considerable variation in BMI at 3 months after surgery. Nevertheless, these complications occurred in a small number of patients.

Bariatric surgery is a theme constantly analyzed from different perspectives by several studies. Although Roux-en-Y gastric bypass is still the most used technique in Brazil, sleeve gastrectomy, or sleeve, has increased considerably in recent years<sup>12</sup>. The current study covers the comparative analysis of two primary forms of bariatric surgery: bypass and sleeve. It proposes to evaluate different aspects within the postoperative period, such as weight loss, possible postoperative complications, pain intensity, nausea, vomiting, dizziness, and sociodemographic aspects.

From an epidemiological point of view, the Brazilian Society of Bariatric and Metabolic Surgery (BSBMS) shows that about 7 out of 10 patients undergoing bariatric surgery in the country are women<sup>9</sup>. These data are reinforced by the statistics present in the study, in which 66.2% of patients undergoing surgical treatment were female. These significantly higher rates in females, although obesity has no relevant epidemiological difference between both genders, are related to several psychosocial, cultural, and economic factors that influence the substantial search for surgery for weight loss by women<sup>13</sup>. In addition, the mean age of the patients in this study was approximately 37 years old, which is similar to those reported in other studies, which indicate a mean age of 39 years<sup>8</sup>.

Among the factors, we can mention the socio-cultural pressure to which women are subjected to seek an ideal lean body, fertility problems resulting from obesity, and an increased risk of complications during pregnancy. Therefore, women who perform bariatric surgery tend to be younger than men since, in this age group, they are more affected by cultural pressure and social problems. For seeking health services later, the male gender has higher rates of comorbidities, such as a history of myocardial infarction and coronary artery disease. Consequently, the surgical treatment in the latter group presents higher rates of morbidity, disability, and mortality and has a higher probability of giving up surgery throughout the process<sup>13</sup>.

In the economic aspect, bariatric surgery significantly reduces direct and indirect costs for long-term health. Although the decrease in bariatric surgeries performed by the public system can provide anticipated savings, this would lead to higher health costs later<sup>14</sup>.

**Table 3.** Postoperative complications and weight loss.

Variables	Bypass	Sleeve	p-value*
	Mean±SD	Mean±SD	
Complications			
Until 1 month			
No	31 (100.00)	43 (100.00)	-
In 1–3 months			
Dumping syndrome	1 (3.23)	-	0.235
No	30 (96.77)	43 (100.00)	
In 3–6 months			
No	25 (80.65)	36 (83.72)	0.300
Appendicitis	1 (3.23)	-	
Cholelithiasis	2 (6.45)	6 (13.95)	
Dumping syndrome	1 (3.23)	-	
Nephrolithiasis	1 (3.23)	-	
Intestinal obstruction	-	1 (2.33)	
Ulcer in anastomotic mouth	1 (3.23)	-	
Anthropometry			
Weight total lost (kg)			
In 1 week	6.26±1.98	6.68±2.08	0.384
In 1 month	14.28±4.15	12.40±3.67	0.044
In 3 months	24.40±7.28	19.27±5.68	0.001
In 6 months	27.48±3.77	23.95±5.52	0.003
BMI (kg/m <sup>2</sup> )			
In 1 week	38.48±5.79	34.24±3.44	<0.001
In 1 month	35.64±6.05	31.99±3.49	0.002
In 3 months	32.17±4.76	29.43±2.73	0.003
In 6 months	28.98±3.57	27.83±2.65	0.117

BMI: body mass index; \*Student's t-test.

Regarding access to the health service for bariatric surgery, there must be well-structured multidisciplinary action to properly manage patient care before and after the procedure to avoid discontinuity of treatment. When it comes to the public system, factors such as the difficulty of accessing the health service, lack of knowledge on the part of the population about the flow of care, and delay in referrals further worsen the patient's biopsychological situation, causing distress, anxiety, weight gain, and deterioration of physical health in the waiting period<sup>15,16</sup>.

Previous studies have shown that surgery time averaged 93.7 min<sup>17,18</sup>, close to the times found in the present study, which showed 91.1 and 112.1 min in the sleeve gastrectomy and Roux-en-Y gastric bypass groups, respectively. There was divergence regarding the data observed in the literature regarding the duration of anesthesia.

There was divergence concerning the data observed in the literature regarding the time of anesthesia. The duration of anesthesia during bariatric surgery is an essential factor in the perioperative course of patients and is strictly related to the duration of surgery. However, according to previous studies, these times differ substantially between the authors. Therefore, this heterogeneity can be reduced by standardizing surgical procedures and the anesthetic protocol<sup>19</sup>.

Already widely discussed, the anesthetic techniques used in surgical procedures have an essential effect on several clinical aspects of patients<sup>20</sup>. In this sense, the half-life of the anesthetics used may be directly related to an anesthesia time of fewer than 100 min, as some studies have shown<sup>18</sup>, while in the present study, the average was superior to 150 min in both groups.

Nevertheless, the more intense postoperative pain in the group submitted to the sleeve in the first hours after surgery may be intrinsically related to the anesthetics used intraoperatively, as observed in another study<sup>21</sup>, with the choice of anesthetic drugs being a factor that should be taken into account during the intraoperative period of patients undergoing bariatric surgery.

Regarding the side effects, the two surgical techniques are related to adverse effects during the operation, so nausea and vomiting were the most reported follow-up to the study already carried out in the Bariatric Surgery Unit after the Surgical Gastroenterology Service of the Public Server Hospital State<sup>22</sup>.

Dumping syndrome is also frequently associated with the late postoperative period of patients undergoing bariatric surgery and is found in up to 50% of patients who underwent gastric bypass<sup>23</sup>. However, it was found at a much lower rate in this study, which can be explained by the limiting factor of the tools used in detecting it, considering that factors such as readmissions and visits to the emergency sector were not evaluated in the patients studied.

As previously discussed, these procedures are consolidated as forms of substantial weight loss. Thus, previous studies<sup>7,24</sup> showed data that coincided with those presented in the present study: the average annual loss of total weight was 31.2% for the group submitted to bypass and 25.2% for the group submitted to sleeve. In the present study, in the 6-month follow-up, weight and BMI showed a reduction without significant differences.

Bariatric surgery is widely available in the public health system; however, the disparity between regions is striking: while the South-Southeast axis realized, respectively, in 2018 the amount of 7.307 and 2.991 bariatric surgeries, the northeast region had only 476 procedures performed<sup>12</sup>. In addition to the different access to bariatric surgery faced by regional disparities, there is unequal access between patients in the public system and those who have health insurance. Data from the Brazilian Society of Bariatric and Metabolic Surgery ratify

this information, since in 2017, the private sector performed 105.642 bariatric operations while the single health system performed 10.089<sup>25</sup>.

Given this, it is noted that the data obtained correspond mostly to those found in the literature, reinforcing this study's relevance. As for the divergent data, one factor that may explain this occurrence is the length of postoperative follow-up of the patients and the influence of qualitative variables, such as the experience and technical skill of the surgical team.

Therefore, one of the limiting factors of this study was the evaluation of the impact of access to public health services in the perioperative period and socioeconomic aspects, considering that it was performed in a private hospital. Notwithstanding, the small sample size, limited to 74 patients, and the follow-up time, which was 6 months, are worth mentioning.

## CONCLUSION

The two surgical techniques proved effective in delivering the best results for patients, with the group undergoing bypass showing statistically significant weight loss from 1 month after the surgical procedure. In addition, there was no statistically significant difference between the two techniques regarding sociodemographic data and adverse effects in the postoperative period. However, given the global scenario pointing to an increasing number of obese people, more studies are needed to elucidate more questions related to this problem.

## AUTHORS' CONTRIBUTIONS

**LLFL:** Conceptualization, Data curation, Formal Analysis, Validation. **KCC:** Conceptualization, Validation, Writing – original draft. **TTF:** Conceptualization, Validation, Writing – original draft. **IMT:** Conceptualization, Validation, Writing – original draft. **CMBO:** Writing – review & editing. **ECRM:** Writing – review & editing. **PCL:** Writing – review & editing.

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