

ORIGINAL ARTICLE

Risk factors associated with insufficient weight loss or significant weight regain in patients undergone to bariatric surgery

Factores de riesgo asociados a la pérdida insuficiente o ganancia significativa de peso en pacientes sometidos a cirugía bariátrica

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Abstract

Introduction. Bariatric surgery is highly effective in inducing rapid excess body weight loss but there are doubts about its effect on long-term. This study seeks to identify the number of patients that underwent bariatric surgery who present insufficient weight loss or significant weight regain and the possible related factors.

Methods. Retrospective cohort study of adult patients who underwent bariatric surgery. Demographic and clinical variables are described. A multivariate analysis was performed to identify factors related to patient weight outside the set goals postoperatively.

Results. One hundred-eighty-seven patients were included (117 gastric bypass, 70 sleeve gastrectomy). The median preoperative body mass index was 41 kg/m² and 28.8 kg/m² postoperatively. 94.7% of the patients in both groups achieved adequate excess body weight loss. Weight regain (>20%) occurred in 43.5% of the patients, with the probability being higher in the gastric sleeve group (p<0.004). Independent factors for weight regain were male gender (OR 5.5), gastric sleeve surgery (OR 3.4), sleep apnea syndrome (OR 2.9), and mental illness under treatment (OR 2.8).

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Conclusions. Bariatric surgery produces sufficient loss of excess weight in almost all patients, but a good number of them regain weight after 3 years. The main factors associated with weight regain are male gender and gastric sleeve surgery.

Keywords: morbid obesity; bariatric surgery; gastric bypass; vertical gastropasty; weight loss.

Resumen

Introducción. La cirugía bariátrica es efectiva para inducir una rápida pérdida del exceso de peso, pero existen dudas sobre la duración de este efecto a largo plazo. Este estudio busca identificar la proporción de pacientes operados que presentaron una pérdida insuficiente o una ganancia significativa de peso y los posibles factores relacionados.

Métodos. Estudio de cohorte retrospectivo en pacientes adultos sometidos a cirugía bariátrica. Se describieron variables demográficas y clínicas. Se realizó un análisis multivariado para identificar factores relacionados con un peso fuera de metas posterior a la cirugía.

Resultados. Se incluyeron 187 pacientes, 117 con bypass gástrico y 70 con manga gástrica. La mediana de índice de masa corporal preoperatorio fue 41,3 kg/m² y postoperatorio de 28,8 kg/m². El 94,7 % de los pacientes en ambos grupos logró una adecuada pérdida del exceso de peso. La ganancia de peso mayor del 20 % se presentó en el 43,5 % de los pacientes, siendo mayor en el grupo de manga gástrica ($p < 0,004$). Los factores independientes para ganancia de peso fueron el sexo masculino (OR 5,5), cirugía tipo manga gástrica (OR 3,4), síndrome de apnea del sueño (OR 2,9) y enfermedad mental medicada (OR 2,8).

Conclusión. La cirugía bariátrica produce una pérdida del exceso de peso suficiente en casi la totalidad de los pacientes, pero un buen número recuperan peso luego de 3 años. Los principales factores asociados a ganancia de peso son el sexo masculino y la cirugía tipo manga gástrica.

Palabras claves: obesidad mórbida; cirugía bariátrica; derivación gástrica; gastroplastia vertical; pérdida de peso.

Introduction

Overweight and obesity have been increasing rapidly in recent years, so much so that it is expected that by 2030 more than 70% of the world population will be overweight and 30% obese ^{1,2}. The control of this disease includes multiple treatment strategies, such as lifestyle modifications that include changes in diet and regular exercise, psychotherapeutic support, pharmacotherapy, endoscopic procedures and surgical interventions. However, comparative studies have shown limited effectiveness of medical and endoscopic management options when compared with the results of surgical procedures, especially in those patients who present with morbid obesity or any degree of obesity that is associated with comorbidities such as cardiovascular diseases, obstructive sleep apnea, arthropathies or urinary incontinence,

among others ³⁻⁶. Consequently, bariatric surgery is currently a fundamental pillar in the treatment of severe obesity because, apart from generating excellent weight loss, it improves related diseases and the individual's quality of life, and it also produces potent beneficial metabolic effects for the control and even regression of diseases such as diabetes and arterial hypertension ^{7,8}.

Different methods have been used to measure the impact of bariatric surgery on weight loss. According to most publications, an adequate response to surgery is defined as a loss of excess body weight (EBW) of at least 50% ⁹⁻¹¹. The patient who achieves this goal is called a "primary responder" and those who have a EBW of less than 50% are considered a "primary non-responder" to the procedure. On the other hand, the patient who maintains weight loss during follow-up is called

“secondary responder” and the one who has an adequate initial weight loss but then presents a significant weight regain during follow-up is called “secondary non-responder”.

Determining exactly what a “significant” weight regain after surgery is still a matter of controversy, since a large proportion of patients gain a small percentage of the weight lost, which is why multiple definitions have been proposed in this regard^{9,11}. For most researchers, the most practical definition of inadequate weight regain after bariatric surgery is greater than 15-20% weight regain compared to the minimal weight obtained after the procedure⁴. In this sense, the ideal scenario after bariatric surgery would be that patient who has significant weight loss (primary response) and maintains it over time (secondary response).

Significant weight regain in the postoperative period has been related to various factors, such as gender, race, marital status, eating habits, sedentary lifestyle, and alcohol consumption^{7,12}. Anatomical causes are also mentioned, such as a large or dilated gastric reservoir¹². Several international studies have even linked some predictive factors for weight regain after bariatric surgery, such as lack of control when eating (OR 5.1), the use of alcohol and drugs (OR 12.27), low scores on the well-being scale (OR 2.1), and lack of follow-up (OR 2.6)^{11,13}.

In our population, there is no accurate medium- or long-term information on changes in weight and body mass index (BMI) of patients undergoing bariatric surgery. The objective of this study was to describe a population of patients undergoing bariatric surgery in a highly complex institution in the city of Medellín, Colombia, to identify, among other variables, the proportion of patients who present insufficient weight loss or significant weight regain after the procedure and the possible risk factors related to them. Similarly, we sought to establish a comparison of effectiveness between the types of surgery performed.

Methods

This is a retrospective cohort study, which included patients over 18 years of age who underwent bariatric surgery at Clínica Soma, a private hos-

pital in Medellín, Colombia, between the years 2014 and 2019, who complied with a minimum follow-up of 18 months. Patients who acquired some type of malignant disease during follow-up, who had previous bariatric surgery, and patients who could not be contacted to obtain the information were excluded.

All patients met the US National Institutes of Health (NIH) eligibility criteria for bariatric surgery. Only two types of procedures were performed, Roux-en-Y gastric bypass (RYGB) or vertical gastrectomy or sleeve gastrectomy (SG). The type of procedure to be performed was determined according to the degree of obesity, associated diseases, age and preference of the patient, after an analysis of each case in a multidisciplinary medical board. All procedures were performed by the same surgeon (JPT) using a standardized laparoscopic technique. After discharge, all patients entered an outpatient follow-up plan by a bariatric surgeon, sports physician, and nutritionist, according to the institution's protocol.

The demographic variables analyzed included sex, age, education, and socioeconomic status. Multiple variables were considered to determine which were possible risk factors for insufficient weight loss or significant weight regain after surgery, including the type of surgery, associated comorbidities, attendance at bariatric surgery control appointments, follow-up by nutrition and sports medicine, daily calorie consumption, weekly physical activity, alcohol consumption and smoking.

Patients were selected from a prospectively completed database. To collect the information, the medical records were reviewed in detail and to obtain the variables that were not in the hospital records, contact was made with the patients through phone calls. Quantitative variables such as weight and BMI were taken from the last medical consultation.

The ideal weight was based on a BMI of 22 kg/m² according to the recommendations of the Colombian Ministry of Health. Insufficient weight loss was defined as a EBW < 50% and significant gain as an increase > 20% of the weight lost, taking as reference the minimum weight recorded during follow-up. The daily caloric intake was estimated

based on a survey where the food consumed each day was recorded and then a weighting of the calories ingested in 3 consecutive days was made, to then take an average. Physical activity time was calculated taking into account the number of minutes of physical activity that the patient performed per week and patients were classified as sedentary (less than 150 minutes of physical activity per week) or not, according to the World Health Organization (WHO) definition.

An univariate analysis was performed to explore the behavior of the independent variables and the results in terms of insufficient weight loss and significant gain after surgery. Quantitative variables were presented with mean and standard deviation or with median and interquartile range, depending on the parametric behavior of the variables. In turn, the qualitative variables were presented as frequency and percentage. A multivariate analysis was performed to establish the association between the independent variables and the dependent variable, which included those primary and secondary responders. For data analysis, the STATA® v.14 software was used.

Results

Sociodemographic characteristics

Out of the eligible 327 patients identified, 187 were included in the analysis; 136 patients were excluded because it was not possible to contact them and four due to a diagnosis of some type of cancer. The median age was 40 years and the majority were women, belonging to socioeconomic strata 1 to 4 (Table 1). RYGB was performed in 117 (62.6%) and GS in 70 (37.4%) patients. The median initial BMI was 41 kg/m², which was significantly higher in the RYGB group (42.4 vs 39 kg/m²; p=0.001); 64% of the included patients completed at least 4 years after surgery, with a median follow-up of 54 months (IQR 23-77).

Caloric intake, exercise and adherence to follow-up

An average consumption of 838 calories per day (340 - 2041) was found; most patients (97%) reported an intake of less than 1,500 calories

per day. The average physical activity was 90 minutes per week (0 - 840) and almost two-thirds (62%) exercised less than 150 minutes per week. There was a low rate of alcohol and tobacco consumption. Regarding adherence to postoperative follow-up, there was a greater attendance at the follow-up consultation with a nutritionist (81.8%) and less attendance at the consultation with a sports specialist (54.6%). The control consultation with a bariatric surgeon was scheduled at 3, 6, 12, and 18 postoperative months, with attendance at 3 or more controls in 83% of the patients.

Table 1. Sociodemographic characteristics of patients undergoing bariatric surgery at Clínica Soma, Medellín, Colombia. 2014-2019 (n=187).

Variable	Categories	n	%
Sex	Female	167	89.3
	Male	20	10.7
Age	18-49 years	143	76.5
	50-67 years	44	23.5
Education	None	1	0.5
	Elementary	36	19.3
	Middle-High School	57	30.5
	College	53	28.3
	University	33	17.7
	Postgraduate	7	3.7
Social stratum	1 - 2	90	48
	3 - 4	90	48
	5 - 6	7	3.7
Comorbidities	Hyperthyroidism	4	2.1
	Hyperthyroidism	36	19.3
	Diabetes	25	13.4
	Hypertension	60	32.1
	Dyslipidemia	39	20.9
	OSAHS	31	16.6
	Medicated mental illness	33	17.7
	Alcohol consumption	22	11.8
	Smoking	15	8.02
Type of surgery	Gastric sleeve	70	37.4
	Roux-en-Y gastric bypass	117	62.6
Time of follow-up	2-3 years	67	35.8
	>4 years	120	64.2

*OSAHS: obstructive sleep apnea-hypopnea syndrome.
Source: Own authors.

Weight loss and related factors

The median BMI went from 41.3 kg/m² preoperatively to 28.8 kg/m² after surgery ($p < 0.001$) (Table 2). An EBW $\geq 50\%$ was obtained in 94.7% of the cases. The percentage of patients with EBW $< 50\%$ was 4.3% in RYGB and 7.1% in GS ($p = 0.4$). Significant weight regain occurred in 43.5% of the patients; this post-procedure weight regain was 18.8% higher in the GS patients (55%) compared with the RYGB group (36%) ($p = 0.004$) (Figure 1).

There were no significant differences in the median BMI at the end of follow-up according to the type of surgery (Table 3), but a trend towards greater weight regain was demonstrated in the GS group over time (Figure 2).

In the multivariate analysis of the primary response to surgery, the presence of arthropathy (OR 10.4) and attendance at two or fewer postoperative control visits by the surgeon (OR 48) were found to be a risk factor for insufficient weight loss. (Table 4). The multivariate analysis of the secondary response to surgery identified male sex (OR 5.5), gastric sleeve surgery (OR 3.4), apnea-hypopnea syndrome as independent risk factors for significant weight regain. (OSAHS) (OR 2.9), and medicated mental illness (OR 2.8) (Table 5).

In the subgroup analysis, it was found that 100% of the patients with insufficient weight loss

were women, although it was not representative in the multivariate analysis. In the group of patients with significant weight regain, 64% performed physical activity for less than 150 minutes a week; however, this finding was not statistically significant.

Three patients (1.6%) reported pregnancy status after surgery. Two late complications occurred in the analyzed cohort: one patient who required conversion from GS to RYGB due to severe gastroesophageal reflux and another RYGB patient who presented an internal hernia and required subsequent surgical revision. These two complications did not impact the weight loss variables evaluated. There was no mortality in this series.

Table 2. Quantitative variables of patients undergoing bariatric surgery at Clínica Soma, Medellín, Colombia. 2014-2019 (n=187).

Variable	Median	Standard deviation
Initial weight (kg)	104	14.4
Current weight (kg)	72	3.6
Initial BMI (kg/m ²)	41.3	12.7
Current BMI (kg/m ²)	28.8	3.6
Daily calorie consumption (cal)	838	240.5
Weekly physical activity (min)	90	184.0

* BMI: Body Mass Index. Source: Own authors.

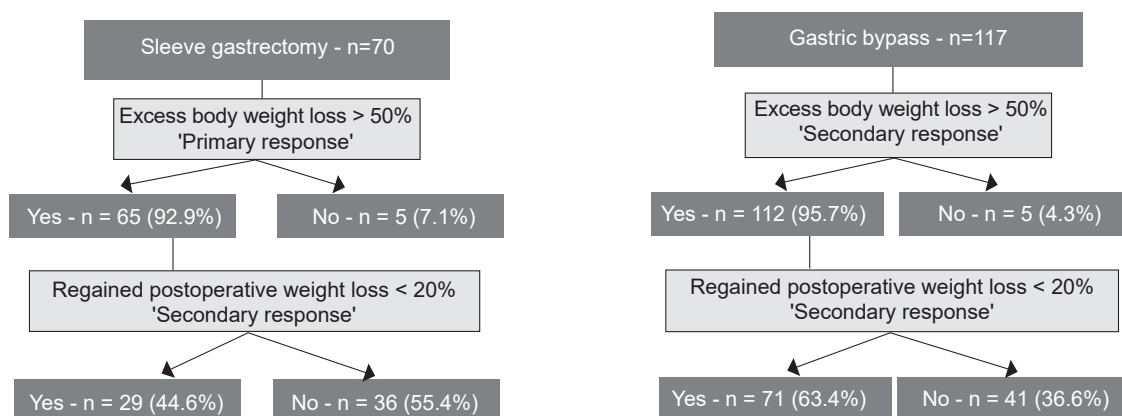
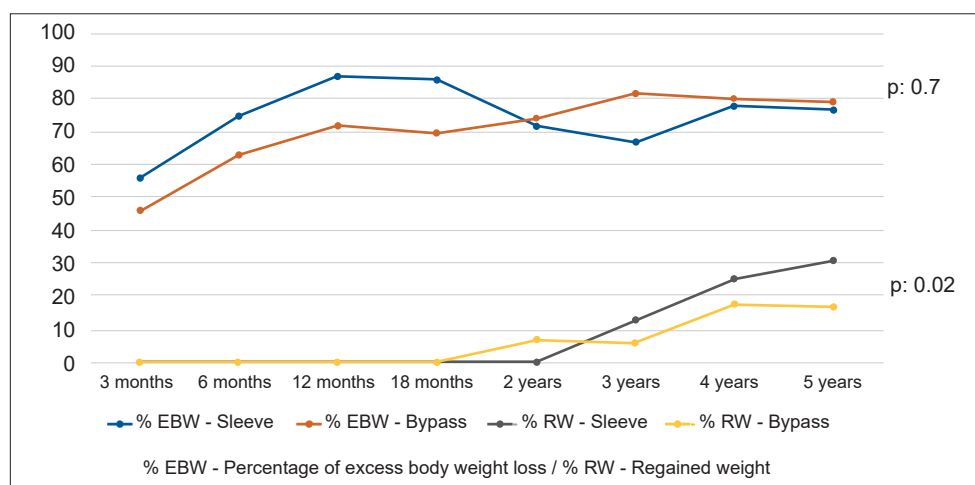


Figure 1. Primary and secondary response to bariatric surgery according to type of procedure. Source: Own authors.

Table 3. Comparison of change in median Body Mass Index by type of surgery.

Body Mass Index (kg/m ²)	Total (n=187)	Gstic bypass (n=117)	Gastric sleeve (n=70)	p
Initial	41.3	42.4	39	<0.001
Minimum reached	26	26.3	25.2	0.7
Last reported	28.8	28.7	29	0.2

Source: Own authors.

**Figure 2.** Average weight loss and gain in relation to postoperative time. Source: Own authors.**Table 4.** Multivariate analysis for excess weight loss greater than 50% (Primary response).

Variable	OR	95% CI	p
Age > 50 years	2.2	0.2 - 19	0.4
Gastric sleeve surgery	2.3	0.3 - 15	0.3
Not attending an appointment with a nutritionist	0.26	0.01 - 5	0.4
No attendance at an appointment with a sport doctor	0.67	0.06 - 6	0.7
Alcohol consumption	0.68	0.02 - 22	0.8
Smoking	3.7	0.1 - 75	0.3
Hypothyroidism	0.32	0.02 - 4.1	0.3
Arthropathy	10.4	1.3 - 83	0.027
Diabetes	5.9	0.6 - 56	0.1
Hypertension	1.9	0.2 - 13	0.5
OSAHS	0.36	0.02 - 44	0.4
Medicated mental illness	1.9	0.2 - 17	0.5
Consumption >1500 calories/day	1.8	0.01 - 216	0.8
Physical activity less than 150 minutes/week	0.92	0.1 - 6.5	0.9
Postoperative period > 4 years	0.78	0.08 - 7.5	0.8
Initial BMI 40-50 kg/m ²	1.44	0.1 - 12	0.7
Initial BMI > 50 40-50 kg/m ²	1		
Initial weight 100-120 kg	3.8	0.4 - 33	0.2
Weight > 120 kg	4.8	0.1 - 142	0.3
Attendance at two or fewer controls per surgeon	48	2.1 - 108	0.007

* OSAHS: obstructive sleep apnea/hypopnea syndrome; BMI: Body Mass Index. Source: Own authors.

Table 5. Multivariate analysis for weight gain lost less than 20% (Secondary response).

Variable	OR	IC95%	p
Age > 50 years	0,84	0,3 - 2,1	0,7
Male	5,5	1,02 - 30	0,04
Gastric sleeve	3,4	1,4 - 8,5	0,007
Surgical reoperation	2,2	0,1 - 42	0,5
Not attending an appointment with a nutritionist	0,42	0,1 - 1,2	0,1
No attendance at an appointment with a sport doctor	1,5	0,6 - 3,4	0,3
Alcohol consumption	2,2	0,6 - 7,8	0,2
Smoking	0,4	0,08 - 1,9	0,2
hypothyroidism	0,38	0,1 - 1,07	0,06
Arthropathy	1,3	0,5 - 3	0,5
Diabetes	0,86	0,2 - 2,7	0,8
Hypertension	1,4	0,6 - 3,3	0,4
OSAHS	2,9	1,06 - 7,9	0,03
Medicated mental illness	2,8	1,03 - 8	0,04
Consumption > 1500 calories/day	2	0,1 - 39	0,6
Physical activity < 150 minutes/week	1,1	0,5 - 2,5	0,6
Postoperative period > 4 years	0,96	0,4 - 2,1	0,9
Initial BMI 40-50 kg/m ²	1,1	0,4 - 2,9	0,7
Initial BMI > 50 kg/m ²	6,4	0,2 - 153	0,2
Initial weight 100-120 kg	1,3	0,5 - 3,2	0,4
Initial weight > 120 kg	1,7	0,3 - 8,2	0,4
Attendance at two or fewer controls per surgeon	1,2	0,4 - 3,8	0,6

* OSAHS: obstructive sleep apnea/hypopnea syndrome; BMI: Body Mass Index. Source: Own authors.

Discussion

The present study describes the results in 187 patients undergoing bariatric surgery with prolonged postoperative follow-up (23 to 77 months). Overall, the effectiveness of bariatric surgery in producing excess weight loss in virtually all patients has been demonstrated. However, it was found in this cohort that around 40% of patients have difficulty maintaining ideal weight and regain more than 20% of the lost weight. Despite the above, most of the patients went from the morbidly obese category to the overweight category, with a postoperative BMI of 28 kg/m².

Regarding the demographic characteristics of our patients, the findings are similar to the data

reported in the reviews of other international groups, with a higher prevalence of obesity in women and low socioeconomic strata^{4,13-17}. There were no evident differences in terms of schooling or age, which have been determining factors in the degree of obesity in other published series^{7,18,19}.

Analyzing insufficient weight loss, which is expected to be influenced by the patient's preoperative characteristics and technical aspects of the surgery, in our series we found the presence of arthropathy and low attendance at check-ups for postoperative bariatric surgery as a risk factor. These events could be explained, in the first place, by the limitation of adherence to exercise plans in patients with severe arthropathy, which

made them even more sedentary. Secondly, there could have been a delay in the identification of patients who had insufficient weight loss due to their failure to attend scheduled check-ups, thus making it difficult to take the necessary measures to maintain a body weight within goals. Recently, some groups of researchers have explored possible genetic and metabolic factors that are related to a poor response to surgery, but this is still a developing area with solid conclusions to be determined²⁰.

Regarding the significant weight regain during the postoperative period, there was a significant proportion of patients who gained more than 20% of the weight lost. This was especially true in male patients and in those who underwent GS. In any case, it should be noted that despite the fact that some operated patients recovered a certain percentage of weight, the percentage of individuals with sustained weight loss is higher. Additionally, it should be taken into account that obesity, according to the WHO, is a chronic and recurrent disease, therefore, during follow-up, it is fully expected that a number of individuals present a relapse, regardless of the type of therapy used²¹.

Therefore, we share the opinion of several experts in bariatric surgery that the use of terms such as "failure" of the surgery is inappropriate, since no treatment can be considered as failed when we are facing an incurable disease.

Various risk factors for weight regain after surgery have been found in the literature, such as age, eating disorders, altered psychological state, sedentary lifestyle, and low attendance at follow-up controls^{3,4,7,12,14,22}. In our group of patients, the male gender, gastric sleeve surgery, and comorbidities such as OSAHS and medicated mental illness were representative as independent factors for postoperative weight regain. Regarding these factors, we found discordant results in the literature in the male sex, where Masood et al¹⁴ showed a greater weight regain in the male sex ($p=0.06$), while Shantavasinkul et al²³ found it as a factor protective in univariate analysis (OR 0.65; $p=0.025$), without representation in multivariate analysis.

Regarding OSAHS, the reviews by Livhits et al³ and Shantavasinkul et al²³ found no relationship

with weight behavior. Regarding the presence of mental illness, in the systematic review carried out by Athanasiadis et al²⁴, they found in 5 of 9 studies a relationship between depression and weight recovery. Some of these studies were that of Livhits et al³, where they found a relationship with low self-esteem (OR 6.86; $p=0.008$), and that of Nicolau et al²⁵, where a postoperative weight regain of 70 in patients with depression ($p=0.024$).

Regarding the type of surgery, Hofso et al²⁶ in a randomized and triple-blind study (OSEBERG) reported a 6% greater decrease in BMI at one year in bypass vs gastric sleeve ($p=0.0001$), while Salminen et al²⁷ in a randomized study (SLEEVE-PASS) did not report equivalence between GS and RYGB, with a 5-year weight loss of 49% vs 57%, respectively, with no statistically significant difference in the multivariate analysis. Rondelli et al²⁸ conducted a multicenter retrospective review of 581 patients, finding a lower excess weight loss at one year for GS (49%) vs RYGB (61%) ($p=0.001$). These three studies are consistent with the results obtained in our review.

It is interesting that the reported daily calorie consumption found in our population was on average less than 1500 calories/day, which seems to be within target values and should have an impact on weight regain. The previous finding does not agree with what was previously reported in the literature where it is mentioned that weight regain after surgery is associated with bad eating habits and low adherence to the postoperative diet^{4,7,14,18}. However, it should be considered that there is difficulty in collecting this data accurately and the risk of possible omission of information during the survey by the patients.

Other factors without a protective or risk statistical effect, such as physical activity time and attendance at follow-up appointments, leave the question as to whether the way in which these variables are currently measured (using scales and goals for the general population) are appropriate, and if they have a real impact on the main results. All of the above raises an invitation to seek strategies to improve the postoperative follow-up of patients, which is complex and expensive in this regard.

In the same way, the measurement of the response to surgery contemplating only variables such as weight and BMI can be somewhat arbitrary. There are other tools that could be valuable, but are not taken into account in the follow-up of operated patients, such as changes in body composition (percentage of body fat and muscle mass) and functionality, quality of life, and well-being scores.

There are several limitations in conducting this study. One is that data collection was made very difficult because most outpatient services were suspended for a long time to attend due to the COVID-19 pandemic. This prevented face-to-face evaluation of patients and caused many of them to be lost to follow-up. In addition, it was necessary to take some of the data based only on what was reported by the patients through a phone survey, with the possible biases of omission of information that could impact the results of our study. Secondly, the evaluation of postoperative nutritional support represented a real challenge, since we do not have a strictly supervised diet or objective measurement scales for caloric intake and percentage of macronutrients. In this study we used theoretical tools to calculate daily caloric intake, but we are aware of the gaps in these models to quantify whether adherence to the postoperative diet was adequate. In this same sense, we did not obtain very precise information regarding physical activity and whether the patients met the goals of intensity and type of exercise required for each case. Low rates of alcohol consumption and smoking were reported, which could be affected by the same previously mentioned omission of information bias.

Despite what has been stated above, we believe that the results of our study are very important because they broadly illustrate the medium and long-term results of bariatric surgery in terms of weight loss and maintenance and, in addition, describe some of the socioeconomic and cultural differences of our patients with respect to other previously published international studies.

Conclusions

Bariatric surgery is highly effective in producing adequate excess weight (EBW) loss, regardless of the technique used. However, a significant proportion of patients who presented significant weight regain during follow-up was found, with an incidence of 55% for gastric sleeve and 36% for gastric bypass. The independent risk factors associated with this outcome were male sex (OR 5.5), gastric sleeve surgery (OR 3.4), OSAHS (OR 2.9), and medicated mental illness (OR 2.8). Although no significant relationship was found with factors reported in other series, such as calorie consumption and weekly physical activity time, it was found that there is a tendency to obtain worse results in terms of weight loss and maintenance in patients who do not comply with the goals established regarding lifestyle changes. This study raises several questions, including what should be the best strategies to ensure adequate control and postoperative follow-up.

Compliance with ethical standards

Informed consent: Since the study is of retrospective characteristics by medical records review, and that no type of medical intervention is carried out, it is considered in accordance with Resolution 008430 of 1993 of the Republic of Colombia issued by the Ministry of Health, that this is a study without risk for patients, so it is not necessary to obtain informed consent. The use of the information obtained will only be for academic purposes and its management will be carried out under the guidelines of confidentiality and other regulations required by the institution involved in the study. This study was approved by the ethics committee of the institution where the research was performed.

Conflict of interest: none declared by the authors.

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Author's contributions

- Conception and design of the study: Sebastián Herrera-López, Sandra Milena Sepúlveda-Bastilla, Juan Pablo Toro-Vásquez
- Acquisition of data: Sebastián Herrera-López, Sandra Milena Sepúlveda-Bastilla, María Carolina Aguilar y María Salomé Martínez

- Data analysis and interpretation: Sebastián Herrera-López, Sandra Milena Sepúlveda-Bastilla, María Carolina Aguilar y María Salomé Martínez

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