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Effect of preoperative weight loss on 12-month postoperative weight loss outcomes in patients undergoing gastric bypass in a mexican tertiary care center

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Abstract

Introduction: Although weight is associated with the occurrence of surgical complications, there is no conclusive evidence that achieving a weight loss goal before a bariatric procedure improves operative outcomes. Objective: To evaluate the association between preoperative weight loss and weight outcome. Material and methods: We performed a retrospective analysis of 1-year weight loss in patients who underwent a primary laparoscopic gastric bypass (LRYGB) at our center categorized on the basis of preoperative total body weight loss (TBWL) greater or less than 10%. Results: A total of 195 patients were included. Forty-nine percent achieved the preoperative weight loss target. Weight loss parameters preoperatively, at 3, 6 and 12 months presented no difference. The preoperative weight reached a significant correlation with the weight at one year (R= 0.795). Conclusion: The result in weight at one year correlate with the weight at the time of surgery however, achieving a 10% loss of the initial weight before the procedure did not influence it. This highlights the importance of assessing this parameter during the preoperative evaluation to select the appropriate procedure and provide objective and individualized counseling.

Keywords:

- Laparoscopic gastric bypass
- Obesity
- Weight loss
- Preoperative diet

Introduction

The criteria for considering a patient a candidate for a surgical weight loss procedure are limited to ensuring that they meet the definition of class III obesity in the absence of an untreated psychological or psychiatric disorder. Most centers prescribe a low-calorie (800-1200 kcal/d) or very low-calorie (<800 kcal/d) diet for 2-3 weeks prior to surgery for its benefits in reducing intra-abdominal and liver fat volume[1-3] and possible better adaptation to lifestyle modifications[4]. There are even reports suggesting that preoperative weight loss may improve subsequent outcomes[5,6]. However, it is currently considered futile by the American Society for Bariatric Surgery because there is insufficient scientific evidence to demonstrate a positive effect on weight and metabolic results and major surgical complications [7], probably due to the heterogeneity of the interventions used for this purpose and the small number of patients included in most studies [8,9].

Therefore, we proposed to evaluate the impact of this practice on weight outcomes in a Mexican sample to determine the usefulness of this practice in our setting and to contribute to the standardization of care protocols in patients undergoing bariatric surgery.

Material and methods

Study Design

We conducted a retrospective cohort study in a non-probability sample of patients who underwent LRYGB between January 1st 2019 and January 1st 2023 at our unit comparing weight loss achieved at 12 months between patients who reduced more than 10% of their initial weight prior to surgery and those who did not. Patients with incomplete information in the medical record, loss to follow-up, postoperative complications (e.g. anastomotic leak, wound infection, bowel obstruction, bleeding, reoperation, conversion), chronic diseases unrelated to metabolic syndrome or *de novo* diagnosis of comorbidities after surgery were excluded.

Data collection

Information of variables (demographic characteristics and somatometry) were retrieved from the electronic and paper medical record. All patients were evaluated and followed up by an endocrinologist and a clinical nutritionist adjunct to the metabolic unit, according to the criteria of these professionals for each particular case. Weight was always measured with the same scale at the initial visit, at admission for surgery and at quarterly follow up visits during the first year from surgery. They were stratified into two groups according to the Total body weight loss (TBWL) percentage greater or less than 10%. We defined ideal weight using Devine's formula; (50 + [(height in cm - 150) x 0.92)] for men and (45.5 + [(height in cm - 150) x 0.92)] for women. TBWL was calculated as weight in the given period - preoperative weight. Excess body weight was equal to preoperative weight (Kg)– ideal body weight (Kg); excess body weight loss (EBWL) percentage was calculated as (total weight loss (Kg)/excess body weight (Kg)) x 100. BMI difference was calculated as preoperative BMI (Kg/m^2) minus BMI at the period. The percentage of excess BMI loss (EBMIL) percentage was equal to [BMI at the period (Kg/m^2)-25) /(Preoperative BMI (Kg/m^2) - 25)] × 100. In the case of the pre-operative period, the values were calculated for the initial weight.

Statistical analysis

Statistical Package for Social Sciences version 26 software was used for data analysis. The results of the qualitative variables (gender, comorbidity, weight loss of more than 10%) are presented as percentages and frequencies, and quantitative values (age, weight, BMI and weight loss) as means with standard deviation or median and percentiles according to normality. Statistical inference for categorical results was performed using Chi square and Student's t test in the case of continuous data. A statistically significant relationship was considered with a p-value ≤ 0.05.

Ethical Standards

The study was approved by the Local Ethics and Research Committee No. 1308 and the Local Health Research Committee No. 1301 of the Mexican Social Security Institute Health Investigation Coordination and was conducted in accordance with the ethical standards as set forth in the 1964 Declaration of Helsinki and its subsequent amendments, modifications and revisions.

Results

Baseline characteristics

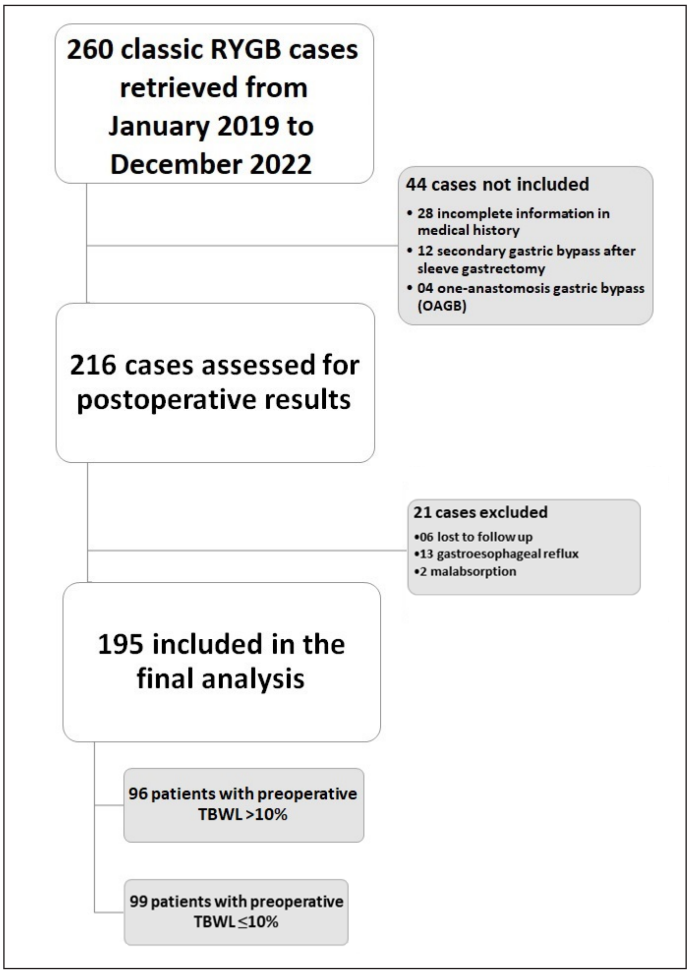
A total of 260 LRYGB cases were performed during the established period with 195 patients meeting the inclusion criteria (Figure 1). The majority of patients were female (70%), and the average age was 42 years. The incidence of comorbidities in the population was 66% for hypertension, 47% for OSAHS, 45% for diabetes mellitus and 18% for dyslipidemia. In data not disclosed, 58 % of patients presented other conditions such as hypothyroidism, heart failure, hiatal hernia and hepatic steatosis. The average ideal weight was 59.1±9 kilograms, the mean pre-surgical weight was 125.1±25.9 Kg with a body mass index of 45.8±7.6 Kg/m^2. The study group's mean excess weight was 81 kilograms and the achieved preoperative weight loss was 15 kilograms on average. Eighty six percent of patients achieved successful weight loss at 12 months after surgery. (Table 1).

Variable	Number of patients [a] n=195
SOCIODEMOGRAPHIC	
Age (years)	42±9.2
Gender (female)	137 (70%)
COMORBIDITIES	
Diabetes mellitus	83 (42%)
Hypertension	129 (66%)
Dyslipidemia	35 (18%)
Obstructive sleep apnea	91 (47%)
SOMATOMETRY	
Height (cm)	1.65±1
Initial weight (Kg)	140.4±29.2
Initial BMI (Kg/m2)	51.5±8.8
Excess Weight (Kg)	81.3±25.2
Ideal weight (Kg)	59.1±9
Preoperative weight (Kg)	125.1±25.9
Preoperative BMI (Kg/m2)	45.8±7.6
TBWL (preoperative) (Kg)	15.3±10.3
TBWL (preoperative) (%)	10.7±6.4
EBWL (preoperative) (%)	18.7±10.7
Change in BMI (preoperative) (Kg/m2)	5.7± 3.9
TBWL at 12 months (Kg)	53.9±19.9
TBWL at 12 months (%)	38.1±10.4
EBWL at 12 months (%)	67.2±18.1
EBMIL at 12 month (%)	77.3±22.1
Patients with EBWL>50% at 12 months	168 (86.2%)

Abbreviations: BMI, body mass index; TBWL, total body weight loss; EBWL, excess body weight loss, EBMIL, excess body mass index loss.

[a]Data are median (SD) or percentage (%)

Table 1. Baseline demographic, somatometric and clinical characteristics of patients in the cohort



Abbreviations: TBWL%, Total Body Weight Loss, RYGB; Roux-en-Y Gastric Bypass

Figure 1. Flowchart of patient selection.

Comparison of baseline characteristics per group

Table 2 shows the comparative analysis between groups before surgery. Ninety-six patients (49%) lost more than 10% of their initial weight. Patients with preoperative TBWL greater than 10% had a higher initial weight (144 ± 31 kg vs 137 ± 27Kg, p=0.05), BMI (53.2±9.6 Kg/m^2 vs 49.9±7.7 Kg/m^2), an excess body weight (86±27 Kg vs 77.2±22.2 Kg) compared to those with a weight loss ≤ 10 %. The rest of the variables were not statistically significant.

Variables	Preoperative TBWL > 10% [a] n=96	Preoperative TBWL ≤ 10% n=99	p
SOCIODEMOGRAPHIC			
Age (years)	42±8	43±10	0.94
Female	70 (73%)	67 (68%)	0.42
	62 (64%)	68 (69%)	0.38
COMORBIDITIES			
Diabetes mellitus	44 (46%)	39 (39%)	0.36
High blood pressure	62 (64%)	68 (69%)	0.38
Dyslipidemia	18 (19%)	17 (17%)	0.77
Apnea	49 (51%)	42 (43%)	0.25
ANTHROPOMETRIC			
Height (cm)	1.64±1	1.65±1	0.73
Ideal weight (Kg)	58.9±9.1	59.5±8.9	0.64
Initial weight (Kg)	144±31	137±27	**0.05**
Initial BMI (Kg/m2)	53.2±9.6	49.9±7.7	**0.005**
Excess Body Weight (Kg)	86±27	77.2±22.2	**0.01**

Abbreviations: BMI, body mass index.

[a]Data are median (SD) or percentage (%)

Table 2. Univariate analysis of demographic, anthropometric and clinical characteristics of patients with weight preoperative TBWL loss greater than 10% versus those who did not

Weight loss parameters over time per group

When comparing changes in weight loss parameters before and after surgery, there was no difference except for the change in BMI at 6 months (Table 3, Figures 2, 3 and 4).

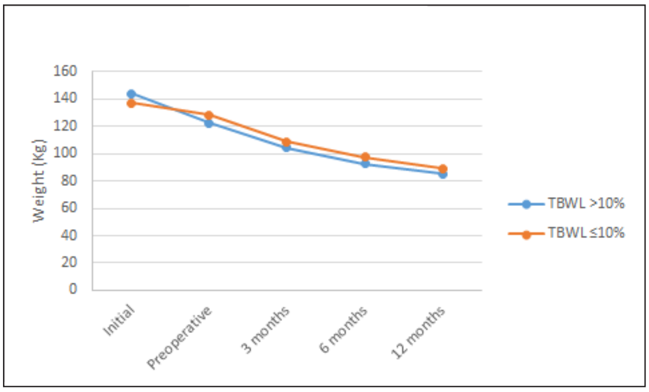
Figure 5 shows the scatter plot with a weak association between preoperative TBWL% and EBWL% at 12 months (R=0.102). On the other hand, preoperative weight did show a strong association with weight at 12 months with a Pearson correlation coefficient of 0.795 (Figure 6).

Variable	Preoperative TBWL > 10% N=96	Preoperative TBWL ≤ 10% N=99	p
PREOPERATIVE			
Weight (Kg)	122.3±27.2	128.3±24.6	0.10
BMI (Kg/m2)	44.9±8.1	46.9±7.2	0.07
BMI Change (Kg/m2)	8.3±3.6	3.04±1.7	**<0.001**
TBWL (Kg)	22.6±9.7	8.4±5	**<0.001**
TBWL (%)	15.5±5.1	6±3.2	**<0.001**
EBWL (%)	26.7±8.3	10.9±6	**< 0.001**
EBMIL (%)	30.6±9.9	12.6±7.1	**< 0.001**
3 MONTHS			
Weight (Kg)	104.5±24.5	108.8±22.1	0.20
BMI (Kg/m2)	38.0±8.5	39.8±6.8	0.10
BMI Change (Kg/m2)	6.9±5.8	7.1±2.8	0.36
TBWL (Kg)	18.8±16.8	19.4±8.1	0.37
TBWL (%)	15.03±11.5	15.2±5.6	0.46
EBWL (%)	29.71±21.68	29.46±12.47	0.46
EBMIL (%)	35.7±24.8	34.8±15.6	0.38
6 MONTHS			
Weight (Kg)	92.7±25.5	97.4±21.1	0.25
BMI (Kg/m2)	33.9±7.9	35.5±6.4	0.12
BMI Change (Kg/m2)	11.2±6.3	11.3.±3.7	0.46
TBWL (Kg)	30.5±17.9	30.9±10.4	0.43
TBWL (%)	25±13.4	24.1±6.98	0.28
EBWL (%)	50.2±26	46.5±15.2	0.11
EBMIL (%)	61.6±33.2	54.9±19.8	**0.043**
12 MONTHS			
Weight (Kg)	85.1±23.4	89.2±20	0.29
BMI (Kg/m2)	31.2±7.4	32.5±5.8	0.17
BMI Change (Kg/m2)	13.97±6.6	14.3±4.4	0.32
TBWL (Kg)	38.02±19.2	39.1±12	0.32
TBWL (%)	30.9±13.3	30.5±7.6	0.38
EBWL (%)	61.77±26	58.54±16.43	0.15
EBMIL (%)	75.6±33.5	69.1±22.3	0.057

Abbreviations: BMI, body mass index.TBWL, total body weight loss; EBWL, excess body weight loss; EBMIL, excess body mass index

Table 3. Univariate analysis of weight loss parameters during the period.

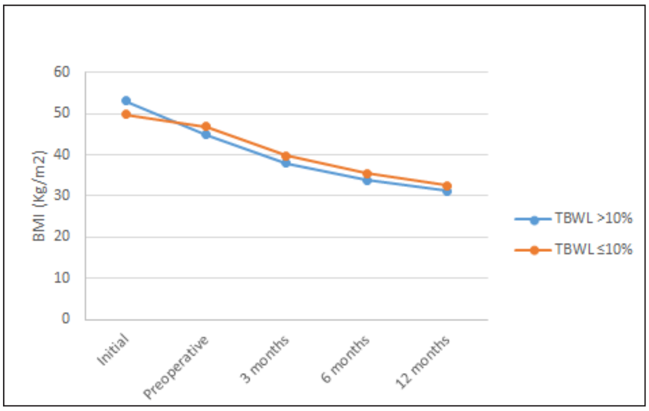
Figure 2. Mean total weight curve overtime.



Abbreviations:

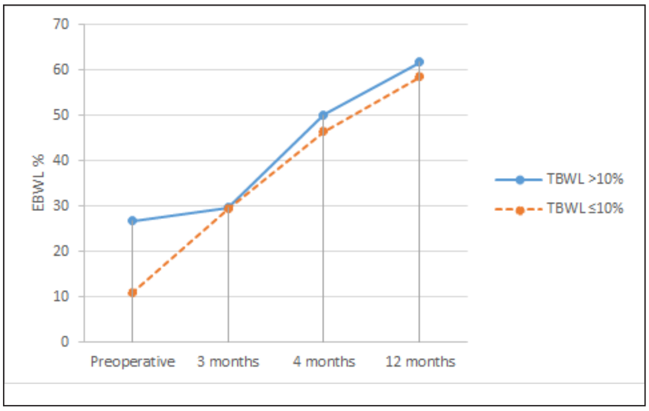
TBWL, total body weight loss

Figure 3 BMI curve over time.



Abbreviations: BMI, body mass index
TBWL%, Total body weight loss.

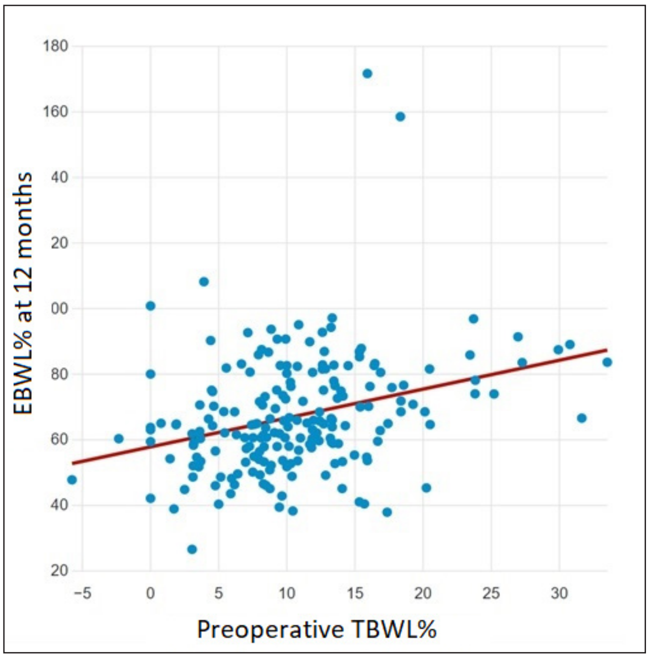
Figure 4. EBWL% curve over time.



Abbreviations: EWL%, Excess body weight loss percentage
TBWL%, Total body weight loss.

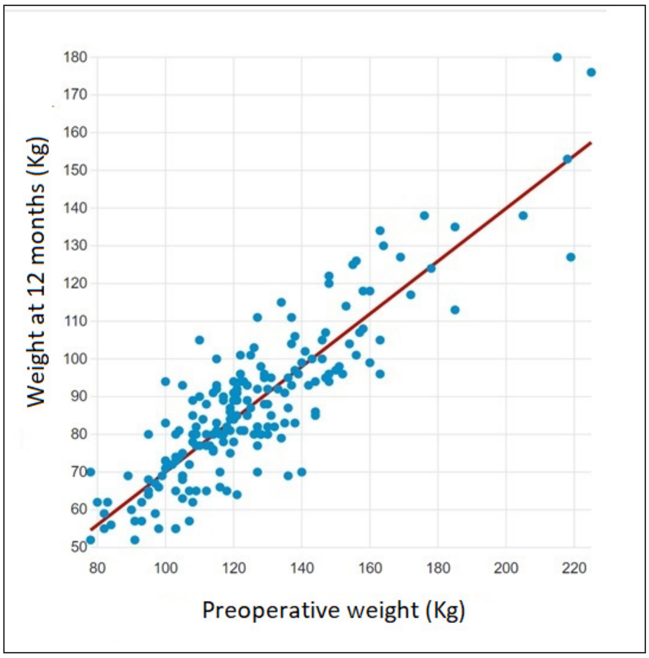
Correlation analysis

Figure 5. Scatter plot comparing preoperative TBWL% vs. EBWL% at 12 months.



Abbreviations: TBWL%, total body weight loss percentage; EBWL%, Excess body weight loss percentage

Figure 6. Scatter plot comparing preoperative weight vs. weight at 12 months



Discussion

Although preoperative weight loss by means of low-calorie diets remains a common practice, the results regarding improved weight loss after LRYGB remain inconclusive and there are no previous studies in our country. Alvarado et al[6] estimated that a 1% increase in preoperative weight loss leads to a 1.8% improvement in postoperative excess weight loss at 1 year. In contrast, Becouarn al. [10] found no significant association between weight loss in the previous year and 36 months after the operation. Moreover, Pekkarinen and Limbach et al suggested worse outcomes [11,12].

In our population, the intervention had no effect on the percentages of EBWL, TBWL and EBMIL during the first 12 months. However, the weight at the time of the procedure did correlate with the resulting weight at the end of follow-up. This suggests a consistent metabolic effect of surgery, with the loss achieved before surgery being an additional contribution as discussed by Ali [13] and Kadeli et al [14].

Studies that have contrasted different percentages of weight loss observed benefit from a 5% reduction, being more substantial with the 10% [13,15–17]. Therefore, this amount was established as our division criterion for the groups and the reported proportion of individuals who achieved this goal in our sample and that of the aforementioned authors suggests it approaches 50%.

The publications by Lutfi et al and Melton and colleagues stated that a higher BMI was related to suboptimal weight loss [18,19], defined as EBWL <50% along with being male and having diabetes. Thus, patients with any of these factors could benefit from a previous weight loss strategy. Still et al [12] established that individuals with more than 10% EBWL prior to surgery were more likely to achieve 70% EBWL at 1 year, with an odds ratio of 2.12, with the relationship being the strongest for patients with a baseline BMI <50 Kg/m^2. However, a systematic review showed that studies in this regard are heterogeneous and even patients with superobesity (baseline BMI>50 kg/m^2) can lose significant weight after bariatric surgery [20] which is also supported by our results. In fact, our population presented a higher initial weight and BMI in those patients who lost more than 10% of their total weight before the procedure, with the mean being equal between groups at the time of surgery even when both groups received the same nutritional counseling. This is consistent with the report by Carlin et al. in which patients in the higher BMI group tended to have higher percentages of preoperative weight loss [21].

Further research is required to determine the role of patient motivation and adherence, which are difficult to define objectively. Publications with follow-up beyond one year have shown that the observed effect may be lost after the first 12 months, although their results could be biased due to the low number of patients at this time point [21,22].

Our results corroborate that indicating a 10% weight loss before the procedure, although attainable, does not influence the surgical outcome itself in the first year as has been pointed out by other authors.

The strengths of this study lie in its standardized methodology, in a homogeneous population undergoing the same surgical procedure and with minimal loss to follow-up. This study defined the preoperative weight loss goal using total weight loss rather than excess weight as a reference, demonstrating for the first time that this metric is also a useful parameter. Despite this, the retrospective, single-center design limits the external applicability of the data. It is beyond the scope of this study to analyze outcomes related to complications or control of comorbidities.

Larger prospective studies are required to evaluate the effect of weight loss interventions prior to surgery on patient adherence to lifestyle changes, control of comorbidities, and long-term quality of life to determine the clinical relevance of recommending weight loss interventions prior to obesity surgery in selected subgroups.

Conclusion

The weight outcome one year after BPGLYR correlated with the weight at the time of surgery; however, achieving a 10% loss of the initial weight did not influence the weight outcome. This highlights the importance of assessing this parameter during the pre-surgical evaluation to select the appropriate procedure and provide objective, individualized counseling.

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