

Excess Weight Loss Variation in Late Postoperative Period of Gastric Bypass

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Published online: 16 June 2010
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Abstract

Background In the late postoperative period of gastric bypass surgery, we observe that many patients weight regain. The objective of this study was to determine the excess weight loss variation at 24 and 60 months postoperative. A secondary objective was to evaluate in the period described, the association of weight regain with red meat intolerance, age, gender, and body mass index.

Methods Historical cohort study includes only patients who had completed a follow-up of up to 60 months postoperative (93 patients). The variation in percent excess weight loss was determined at 24 and 60 months postoperative to assess any association with the variables preoperative body mass index (BMI), gender, age, and red meat intolerance.

Results The excess weight loss varied about -8.7% (95% CI: -12.1 to -5.4). This weight regain showed a significant association with the variable age, where the patients who regained the least weight tended to be younger than those who regained more ($p=0.012$). When comparing the intolerance level to red meat with weight regain, we observed that the lower the intolerance the greater the weight loss, although this finding did not reach statistical significance ($p=0.13$).

Conclusions Weight regain did not compromise therapeutic success. Less weight regain was seen in younger patients. Patients with lower intolerance to red meat tended to show less weight regain. Further studies are needed to elucidate the role of protein intake in weight regain in patients

submitted to gastric bypass. No association between weight regain and preoperative BMI or gender was observed.

Keywords Morbid obesity · Gastric bypass · Weight gain · Protein

Introduction

Among the surgical techniques for morbid obesity treatment, gastric bypass is considered the gold standard [1, 2]. According to Herrera et al. [3], there is a 75% excess weight reduction between 18 and 24 months after surgery. However, the long-term stabilization of this weight is still one of the great challenges, since we know that, in general, 20% of patients submitted to this procedure regain weight when observed for a period of 5 to 10 years [4, 5].

The significant weight regain after gastric bypass surgery leads to little satisfaction for the morbidly obese patient when BMI begins to increase [6]. The mechanisms that lead these patients to regain weight are not clear, and there are various factors that can have an influence, such as caloric intake, physical activity, possible dilation of the gastric sac or jejuno-gastric anastomosis, metabolic, and hormonal changes (ghrelin, yy peptide, and glucagon-like peptide) [7]. Therefore, the study of weight regain in bariatric patients over a long follow-up has been of interest to various professionals who are dedicated to this area.

From clinical nutritional experience, we find that many patients who show weight regain also have some intolerance to red meat ingestion. It is observed that red meat is not well tolerated due to the lack of adequate mastication, as well as to a decrease in gastric secretions, thereby restricting protein in the diets consumed by some of these patients [8]. A low protein intake predisposes to low satiety

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Table 1 Characterization of sample

Characteristic	n=93
Age (years)—mean ± SD	35.0±11.1
Gender—n (%)	
Male	17 (18.3)
Female	76 (81.7)
BMI, baseline (kg/m ²)—mean ± SD	48.2±9.43
Red meat intolerance to at 60 months—n (%)	31 (33.3)

SD standard deviation, BMI body mass index

and consequently, to an increase in the desire to eat [9]. Another factor is that low protein intake exposes the individuals to a greater risk of gaining weight [10, 11].

The objective of the present study was to determine the excess weight loss variation at 24 and 60 months postoperative, and in a secondary manner, to evaluate the association of this weight regain with red meat intolerance, age, gender, and preoperative body mass index.

Methods

A historical cohort study was conducted by reviewing the data from the medical charts of patients seen by the Center for Obesity and Metabolic Syndrome of Hospital São Lucas, Pontificia Universidade Católica do Rio Grande do Sul, Porto Alegre, Brazil.

We analyzed the data of only those patients who had completed a 60-month postoperative follow-up of and who fulfilled all the criteria for inclusion in the study. These patients were of both gender submitted to Roux-en-Y gastric bypass by the Fobi–Capella technique, who completed 60 months of postoperative follow-up and whose medical charts contained all the data relative to BMI prior to surgery, intake or not of red meat, and follow-up of the excess weight loss percentage during the periods defined for the study (24 and 60 months postoperative). The patients excluded were all those who had revision surgeries or any other surgical procedure performed in the study period, besides those patients who had diseases that could interfere with nutritional metabolism. After classification

Table 2 Description of percent excess weight loss at 24 and 60 months and of the variation between the two time points

Excess weight loss (%)	24 months ^a	60 months ^a	Variation (Δ) ^a
Mean ± SD	83.0±21.7	74.3±23.7	−8.73±16.2
Minimum	18.4	−13.3	−88.0
Percentile 25	69.6	59.5	−19.6
Percentile 50	80.0	73.4	−8.44
Percentile 75	95.6	91.2	0.35
Maximum	137.1	129.6	29.1

Percentile was written out
SD standard deviation

^aNegative values indicate weight regain

Table 3 Descriptive measures of the variable percent excess weight loss at 60 months (compared to preoperative weight) of the patients divided into quartiles

Initial excess weight loss at 60 months (%)	Quartile 1 (n=23)	Quartile 2 (n=23)	Quartile 3 (n=24)	Quartile 4 (n=23)
Mean ± SD	44.6±16.2	67.5±4.3	81.2±5.1	103.6±11.3
Minimum	−13.3	59.7	73.4	92.1
Percentile 25	44.8	64.2	76.9	94.8
Percentile 50	47.7	67.3	80.2	98
Percentile 75	56.2	71	84.9	114.6
Maximum	59.3	73.3	90.3	129.6

Percentile was written out
SD standard deviation

based on these criteria, 93 patients were available for analysis of their data.

The patients included in the study had their excess weight measured at 60 months postoperative, and this value was compared with their excess weight at 24 months postoperative. The difference in excess weight between the 24th month and 60th month was compared with the following variables: preoperative BMI, gender, age, and red meat intolerance. Excess weight loss was calculated according to Deitel and coworkers [12].

The present study was approved by the Research Ethics Committee of Hospital São Lucas of the Pontificia Universidade Católica do Rio Grande do Sul, Porto Alegre, Brazil, Registration no. 09/04570.

Statistical Analysis

The quantitative variables were described by mean, standard deviation, 25th percentile, 50th percentile, 75th percentile, and minimum and maximum values. The categorical variables were described by absolute and relative frequencies. The initial excess weight loss at 60 months postoperative was divided into quartiles in order to evaluate the associations between the characteristics of the individuals who lost more weight and those who lost less weight. The groups were compared using *one-way*

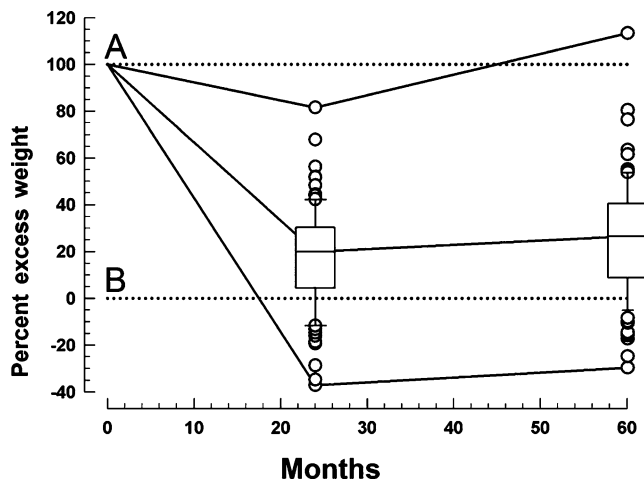


Fig. 1 Variation in percent excess weight at 24 months and 60 months. *Line A:* initial preoperative weight (all patients initially showed 100% of their excess weight). *Line B:* ideal weight (BMI=25 kg/m²). This plot shows the percent excess weight and its variation during follow-up

ANOVA for the quantitative variables or Pearson’s chi-squared test for the categorical variables. In addition, we used when necessary the chi-squared linear trend test. Statistical significance level was set at 5% ($p \leq 0.05$). Data analysis was performed with software SPSS (Statistical Package for the Social Sciences) version 16.0.

Results

The sample consisted of 93 patients, primarily women (81.7%), between 19 and 61 years old and with a BMI baseline ranging between 35.3 and 82.5 kg/m². The characterization of the sample is presented in Table 1.

Tables 2 and 3 are descriptive and show in details the excess weight loss observed in the patients studied. Table 2 describes all the groups at specific times, at 24 and 60 months postoperative. This table shows that at 24 months, 75% of patients had an excess weight loss

equal to or greater than 70% (69.6%) and that at 60 months, only 50% of patients maintained similar weight loss (note 73.4% in 50th percentile, at 60 months). It is evident that between 24 and 60 months, there is a variation in excess weight loss of -8.7% (95% CI: -12.1 to -5.4). A graphic representation of Table 2 is given in Fig. 1. It is important to point out that negative values represent weight regain.

It was seen that at 60 months postoperative, 83.9% of patients showed an excess weight loss of more than 50%, where the mean loss was 74.3%.

Table 3 shows the patients divided into quartiles, according to the extent of weight loss at 60 months. In this manner, the patients who lost the least weight are grouped into quartile 1 and those who lost the most are grouped into quartile 4.

Table 4 shows the associations between loss of excess weight and the other factors studied. As can be seen, only age was found to differ significantly between the weight loss groups. This difference appeared to be between quartiles 2 and 4, where patients who regained less weight were younger than those who regained more weight ($p=0.012$).

When measuring the red meat intolerance level and excess weight loss, we observed that the greater the intolerance the greater the weight loss, although this finding did not reach statistical significance ($p=0.13$). The other variables such as preoperative BMI and gender did not show statistically significant differences.

Discussion

As suggested by Deitel et al. [12], one attempt to standardize the measures when comparing weight loss in bariatric surgery would be to consider the percent excess weight, which was used to describe the results.

In our study, the patients profile as indicated in Table 1 matches that of patients described in the literature. We compared the initial excess weight loss occurring at

Table 4 Description of the characteristics of the sample grouped according to variation in percent excess weight loss at 60 months

Characteristic	Quartile 1 (n=23)	Quartile 2 (n=23)	Quartile 3 (n=24)	Quartile 4 (n=23)	p
Mean excess weight loss (%)	44.6	67.5	81.2	103.6	
Age (years)	34.2±10.3	42.0±10.7	38.5±12.0	32.4±9.1	0.012a
Gender (n, %)					
Male	7 (30.4)	3 (13.0)	4 (16.7)	3 (13.0)	0.367b
Female	16 (69.6)	20 (87.0)	20 (83.3)	20 (87.0)	
Baseline BMI (kg/m ²)	51.0±9.6	48.2±9.1	48.7±8.2	44.±10.4	0.185a
Red meat intolerance	8 (34.8)	11 (47.8)	8 (33.3)	4 (17.4)	0.130c

Variables described as mean ± standard deviation or n (%). The letters indicate the test (one-way ANOVA (a), Pearson’s chi-squared test (b), and linear trend test (c)) used to assess the variable more precisely

24 months postoperative with one occurring at 60 months postoperative. Excess weight loss was not evaluated in the first year postoperative because the objective of the present study was to evaluate late weight regain and to compare it with weight loss attained at 24 months. According to the literature, this is the time in the postoperative period where weight loss is maximal, in general [3, 4, 13].

At 60 months, the patients showed a decrease in excess weight loss when compared with the loss that occurred at 24 months postoperative. There was a regain of 8.73% in their initial weight.

Magro et al. [13] described in their study that at 24 months after surgery there was no more significant weight loss and that at 48 months after surgery weight regain became significant ($p < 0.01$), with a mean BMI increase of 0.84 kg/m² or 4% of excess weight in the body mass index.

Christou et al. [4] studied 228 patients and reported that 80% of these showed a reduction in initial weight of greater than 50% after 10 years of follow-up. In our study, there was also a large number of patients (83.9%) who maintained their excess weight loss of more than 50% at 60 months postoperative, where the mean loss was 74.3%, thereby demonstrating that excess weight regain did not impair the surgical results.

Hsu et al. [14] and Malone et al. [15] considered factors that could influence weight regain, namely the lack of follow-up by a multidisciplinary team, compulsive eating, and preoperative body mass index.

Kalarchian et al. [16] reported the possibility of weight regain being associated with adaptation of the individual in response to the surgical procedure, to the alterations in levels of gastrointestinal hormones related to the increase in ghrelin and leptin, to reduction in physical activity, and to the presence of psychopathologies.

One of the hypotheses evaluated in our study was the influence of intolerance to red meat on weight regain, since according to some authors (Samaha et al. [17] and Foster et al. [18]), a diet low in carbohydrates and high in protein can provide earlier satiety. In their study, Moize et al. [19] reported that patients submitted to bariatric surgery tend to consume an inadequate amount of protein. A low protein diet is not advisable, once it leads to a loss of lean mass and consequently a reduction in basal metabolism, which would make weight loss and its maintenance more difficult.

Our finding suggests that red meat intolerant patients can regain weight more easily compared with those who have a good intake of this food.

We found, nonetheless, a significant association between age and weight regain at 60 months postoperative. Patients who regained less weight tended to be younger than those who regained more; this was not observed in previous studies.

In conclusion, although weight regain occurred at 60 months postoperative, this variation did not compromise the surgical success. There was less excess weight regain in younger patients. The association between excess weight loss at 60 months and red meat intolerance, although not significant, pointed toward an inverse relationship. That is, patients with less intolerance to red meat showed a greater weight loss. This association needs to be further investigated to elucidate the role of protein intake in weight regain in gastric bypass patients.

Disclosure There are no external sources of funds supporting this work. There is no financial interest by any of the authors.

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