

Long-term Weight Regain after Gastric Bypass: A 5-year Prospective Study

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Abstract

Background A certain weight gain occurs after obesity surgery compared to the lower weight usually observed between 18 and 24 months postsurgery. The objective of this study was to evaluate weight regain in patients submitted to gastric bypass over a 5-year follow-up period. **Materials and Methods** A longitudinal prospective study was conducted on 782 obese patients of both genders. Only patients with at least 2 years of surgery were included. The percentage of excess body mass index (BMI) loss at 24, 36, 48, and 60 months postsurgery was compared to the measurements obtained at 18 months after surgery. Surgical therapeutic failure was also evaluated. **Results** Percent excess BMI loss was significant up to 18 months postsurgery ($p < 0.001$), with a mean difference in BMI of 1.06 kg/m^2 compared to 12 months postsurgery. Percent BMI loss was no longer significant after 24 months, and weight regain became significant within 48 months

after surgery ($p < 0.01$). Among the patients who presented weight regain, a mean 8% increase was observed within 60 months compared to the lowest weight obtained at 18 months after surgery. The percentage of surgical failure was higher in the superobese group at all times studied, reaching 18.8% at 48 months after surgery.

Conclusion Weight regain was observed within 24 months after surgery in approximately 50% of patients. Both weight regain and surgical failure were higher in the superobese group. Studies in regard to metabolic and hormonal mechanisms underlying weight regain might elucidate the causes of this finding.

Keywords Morbid obesity · Gastric bypass · Gastroplasty · Weight regain

Introduction

The course of excess weight loss after bariatric surgery continues to be a subject of investigation. It is a fact recognized by bariatric surgeons that a certain weight regain occurs after obesity surgery compared to the lowest weight observed between 18 and 24 months after surgery, a period characterized by higher excess weight loss. Apparently, this regain mainly occurs between 2 and 5 years after gastric bypass. Factors that influence weight maintenance or regain after surgery include the type of surgery performed, presence of binge eating disorders [1–3], patient adherence to the support groups, and presurgical body mass index (BMI).

In a meta-analysis, Buchwald et al. [4] found that patients lose between 56.7 and 66.5% excess weight within the first 24 months after gastric bypass. Another study showed that weight regain occurred between 18 and

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24 months after surgery in 30% of patients [5]. Other weight regain studies have not quantified the average weight increase over time. Studies comparing weight loss failure between 5 and 7 years after surgery, with losses of less than 50% excess weight, reported failure rates of surgical treatment ranging from 5 and 7% [6–8]. Higher failure rates have been observed in superobese patients (BMI>50) during the same follow-up period, ranging from 20% [5] to 33% [9].

The objective of the present study was to evaluate weight regain between 18 and 60 months after surgery in patients submitted to Fobi–Capella gastric bypass using a nonelastic ring.

Materials and Methods

A prospective longitudinal (follow-up) study was conducted on 782 morbidly obese and superobese patients of both genders seen at the Obesity Surgery Center of Campinas, State of São Paulo, Brazil. The follow-up period comprised the period from June 2000 to June 2005 (5 years). Only patients with at least 2 years of surgery participated in the study, and the initial time chosen for comparative analysis of weight regain was 18 months postsurgery.

Among the patients followed up, 594 (76%) were reevaluated at 18 months of follow-up, and of these, 422 (54%) were reassessed at 24 months after surgery, 500 (64%) at 36 months, 470 (60%) at 48 months, and 363 (46.5%) at 60 months.

Surgical Procedure

Gastric bypass with a nonelastic silicone ring consists of the fabrication of a small vertical pouch of approximately 30 ml in the lesser curvature of the stomach, which is separated from the rest of the stomach with staples, with an anastomosis measuring 1.5 cm in diameter. The silastic ring is placed around the pouch, 3 cm above the distal point. Reconstruction is performed by Roux-en-Y gastroenterostomy, with a jejunal limb measuring 150 cm and a biliopancreatic limb measuring 100 cm.

Measurement

Percent excess BMI loss (EBL) and BMI at 24, 36, 48, and 60 months postsurgery were always compared with the measurements obtained at 18 months after surgery, a time characterized by higher weight loss. An evaluation window of up to 3 months was accepted. Percent EBL was calculated using the formula: %EBL=(preoperative BMI–current BMI/preoperative BMI–25)×100 [10].

Therapeutic failure of weight loss surgery was defined as the presence of one of the following factors: excess weight loss≤50% or BMI>35 for patients with a preoperative BMI<50 and BMI>40 for patients with a preoperative BMI>50 [9].

Statistical Analysis

Data are expressed as mean±SD for continuous variables or as percentage for categorical data. The *t*-test for paired samples was used to evaluate weight regain, which compared the means of two variables in a single group. The results were considered to be significant when $p\leq 0.05$. The chi-square test (χ^2) was used to determine the relationship between the proportion of surgical failure and weight regain according to gender, adopting a level of significance of 5% ($p<0.005$). The data were analyzed using the SPSS v.10.0 statistical program.

Results

The characteristics of the patients submitted to gastric bypass are shown in Table 1. Percent EBL was significant up to 18 months after surgery ($p<0.001$), with a mean BMI reduction of 1.06 kg/m² when compared to 12 months postsurgery. Weight loss was no longer significant after 24 months, and weight regain became significant 48 months after surgery ($p<0.01$), with a mean BMI increase of 0.84 kg/m² or 4% excess BMI. These findings show an increase in weight regain after surgery, ranging from 46.0 to 63.6% between 24 and 48 months postsurgery, respectively. Among the patients who presented weight regain, the mean

Table 1 Characteristics of the patients submitted to gastric bypass over 5 years of follow-up

Characteristics	
Number of patients studied	782
Female gender (%)	72.6
Mean initial age (years)	37.5±11.5
Mean initial weight (kg)	124.9±25.6
Mean initial BMI	
Morbidly obese (78.25%)	42.06±4.1
Superobese (21.75%)	56.00±5.6

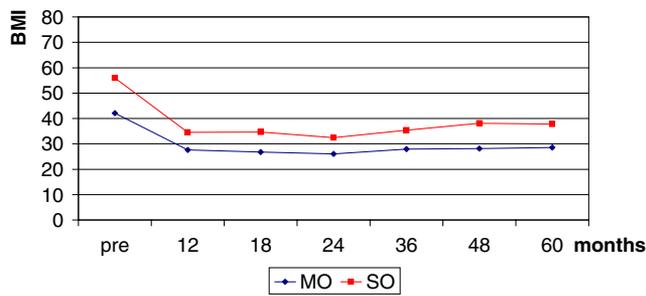


Fig. 1 Trend of BMI in morbidly obese (MO) and superobese (SO) patients during follow-up

increase was 8.8 kg within 60 months or 8.0% when compared to the lowest weight observed 18 months after surgery. However, the highest percentage of weight regain was observed at 48 months of follow-up.

Figure 1 confirms that weight recovery was higher 48 months after surgery in both morbidly obese and superobese patients. Analysis of weight regain according to gender showed no significant difference between men and women during follow-up. In the group of patients who presented weight regain, percent EBL was 78% at 18 months after surgery; however, this rate decreased to 69% within 60 months of follow-up. Age did not influence weight regain. The mean age was 37.1±11.4 years in the morbidly obese group and 38.4±10.7 years in the superobese group ($p=0.338$).

With respect to surgical failure, morbidly obese and superobese patients responded differently to treatment. The percentage of surgical failure based on excess weight loss less than 50% was higher in the superobese group at all times studied, reaching 18.8% at 48 months after surgery (Fig. 2). Similar findings were observed for surgical failure based on BMI (Fig. 3). The failure rate was higher in superobese patients than in morbidly obese patients at all times studied.

When comparing patients who presented weight regain and those who did not, no significant difference in BMI was observed at 60 months, irrespective of initial

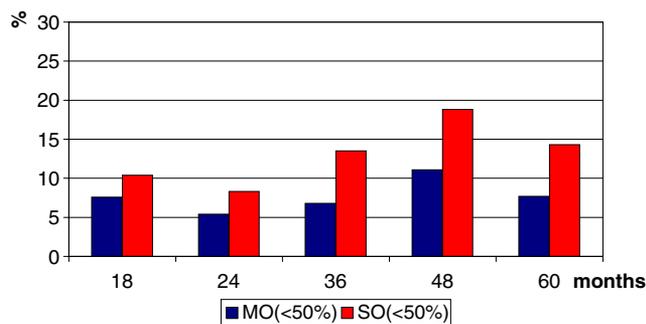


Fig. 2 Percentage of surgical failure in morbidly obese (MO) and superobese (SO) patients based on excess weight loss (EWL) less than 50% during follow-up

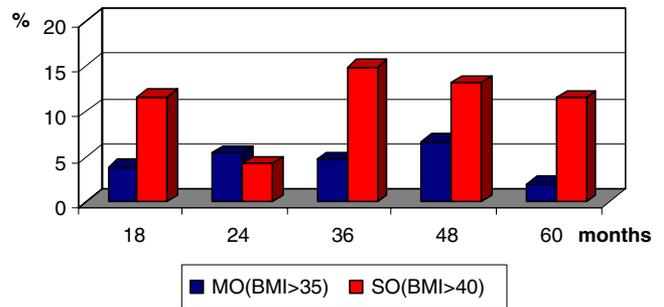


Fig. 3 Percentage of surgical failure in morbidly obese (MO) and superobese (SO) patients, based on BMI during follow-up

(presurgical) obesity (Fig. 4). However, analysis of weight regain in morbidly obese and superobese patients showed a BMI increase in superobese patients from 34.2 kg/m² at 18 months after surgery to 39.36 kg/m² at 60 months ($p<0.000$; Fig. 5).

Discussion

Percent EBL after gastric bypass for obesity treatment ranges from 56.7 to 80% over 24 months postsurgery [4, 6]. Different results have been reported for other types of surgery, i.e., 47.5% for gastric banding, 61.6% for pure gastric bypass, and 70.1% for biliopancreatic diversion or duodenal switch [4]. Another less common way of reporting bariatric surgery outcomes is based on the reduction of BMI. In a recent meta-analysis, Buchwald et al. [4] reported a BMI decrease of 14.2 (CI=13.3–15.1 kg) in 8,232 patients and an absolute weight loss of 39.7 kg (CI=37.2–42.2 kg) in 7,588 patients. In most cases, weight loss did not differ significantly over the first 2 years or less of surgery when compared to more than 2 years after surgery.

Weight regain has been a matter of intensive discussion. Some degree of weight regain is observed 2 years after surgery, with few reports being available in the literature [5]. Capella et al. [7] reported an average excess weight loss of 77% and failure because of excess weight loss less than 50% in 7% of the patients after 5 years of follow-up. MacLean et al. [11] demonstrated an excess weight loss less

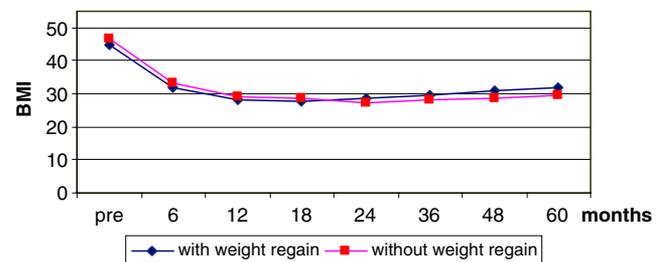


Fig. 4 Trend of BMI patients with or without weight regain

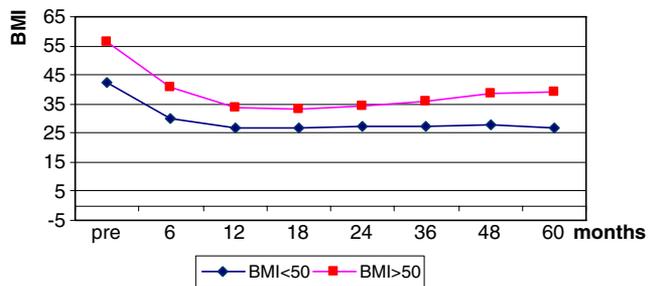


Fig. 5 Trend of BMI in patients presenting weight regain according to initial BMI

than 50% in 7% of morbidly obese patients over 3 years of follow-up and in 43% of superobese patients. Brolin et al. [6] demonstrated a 33% failure rate in superobese patients 7 years after surgery. Over an 8-year follow-up period, Biron et al. [9] demonstrated 10% failure in morbidly obese patients who still maintained a BMI ≥ 35 kg/m² and 26% failure in patients with superobesity who maintained a BMI ≥ 40 kg/m² after biliopancreatic diversion with duodenal switch. In the present study, the rate of surgical failure was higher in the superobese group, with this difference trending to be significant (18.8 vs. 11.0%, $p=0.065$).

The nadir of weight loss was observed at about 18 months after surgery, with regain lasting from 24 to 60 months ($p<0.001$).

In the present study, some weight regain was observed in approximately 50% of the patients (46% within 24 months and 63.6% within 48 months) submitted to gastric bypass. This result is quite good, as patients recover, on average, 8% of their lowest weight obtained during the postoperative period, without compromising the outcomes and beneficial effects of surgical treatment. However, it is difficult to know what will happen to patients who will present weight regain over the next 10 years, as follow-up rates are low in continental countries such as Brazil and the USA.

Although follow-up by a multidisciplinary team is recommended during surgical treatment for obesity, this study found that, among patients in whom surgery failed, 60% never underwent nutritional follow-up, and 80% never underwent psychological follow-up. The intensity or frequency of care or follow-up visits probably contributes to the failure or success of surgery. Some studies have reported an increase in the frequency of psychological disorders according to the severity of obesity (morbid obesity and superobesity), i.e., 50% when compared to 2–3% in the general population [14, 15]. Multidisciplinary support groups including psychologists, psychiatrists, nutritionists, surgeons, and endocrinologists assist in the search for solutions and alternatives to help patients maintain their weight and control binge eating disorders [13].

According to Saunders [12], the importance of dietary and behavioral habits after bariatric surgery still needs to be

defined. Several questions still remain unanswered, for example, whether binge eating influences weight loss during the postoperative period and the true impact of surgery on binge eating. In this respect, it is fundamental to start binge eating treatment during the preoperative period and to determine whether the treatment is effective.

In conclusion, weight regain was observed 24 months after gastric bypass in approximately 50% of patients. Both regain and surgical failure were higher among superobese patients. A long-term follow-up of more than 10 years is necessary to precisely determine the extent of weight regain and its metabolic impact. In addition, studies on metabolic and underlying hormonal mechanisms might elucidate the causes of weight regain.

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