

Outcomes of a Third Bariatric Procedure for Inadequate Weight Loss

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ABSTRACT

Background and Objectives: The robust volume of bariatric surgical procedures has led to significant numbers of patients requiring reoperative surgery because of undesirable results from primary operations. The aim of this study was to assess the feasibility, safety, and outcomes of the third bariatric procedure after previous attempts resulted in inadequate results.

Methods: We retrospectively identified patients who underwent a third bariatric procedure for inadequate weight loss or significant weight regain after the second operation. Data were analyzed to establish patient demographic characteristics, perioperative parameters, and postoperative outcomes.

Results: A total of 12 patients were identified. Before the first, second, and third procedures, patients had a mean body mass index of 67.1 ± 29.3 kg/m², 60.9 ± 28.3 kg/m², and 49.4 ± 19.8 kg/m², respectively. The third operations (laparoscopic in 10 and open in 2) included Roux-en-Y gastric bypass (n = 5), revision of pouch and/or stoma of Roux-en-Y gastric bypass (n = 3), limb lengthening after Roux-en-Y gastric bypass (n = 3), and sleeve gastrectomy (n = 1). We encountered 5 early complications in 4 patients, and early reoperative intervention was needed in 2 patients. At 1-year follow-up, the excess weight loss of the cohort was $49.4\% \pm 33.8\%$. After a mean follow-up

time of 43.0 ± 28.6 months, the body mass index of the cohort reached 39.9 ± 20.8 kg/m², which corresponded to a mean excess weight loss of $54.4\% \pm 44.0\%$ from the third operation. At the latest follow-up, 64% of patients had excess weight loss >50% and 45% had excess weight loss >80%.

Conclusion: Reoperative bariatric surgery can be carried out successfully (often laparoscopically), even after 2 previous weight loss procedures.

Key Words: Reoperative, Revision, Conversion, Weight regain, Bariatric surgery.

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INTRODUCTION

Bariatric surgery has gone through many changes in its dynamic history. In the past, procedures such as ileocolic bypass, jejunoileal bypass, vertical banded gastroplasty (VBG), and nonadjustable gastric banding have resulted in unacceptable complications and outcomes and have since been abandoned. Roux-en-Y gastric bypass (RYGB), sleeve gastrectomy (SG), adjustable gastric banding, and biliopancreatic diversion with duodenal switch have now replaced these procedures.^{1,2} A keen understanding of the history and evolution of all bariatric procedures past and present is paramount when preparing for the challenges that reoperative bariatric surgery can pose.

As bariatric surgery becomes more widely accepted, we see a corresponding increase in the number of reoperative cases because of undesirable results or complications associated with the primary procedure.^{3,4} Importantly, obesity is a chronic disease, and first- and second-line therapy may not be effective for every patient. Therefore, when further therapy is needed for this disease, additional surgical options must be considered to provide effective therapy.

Estimates of the overall reoperative rate for all bariatric procedures vary from 5% to 60% depending on the primary procedure.^{4,5} Reoperative bariatric surgery requires careful patient selection and extensive surgical experience to achieve acceptable outcomes. Sequential revisions of

bariatric procedures pose an even greater technical challenge, and there are few published data on the safety and efficacy of repeat revisions to improve weight loss. The aim of this study was to assess the feasibility, safety, and outcomes of cases in which a third bariatric procedure was performed for inadequate weight loss or recidivism in morbidly obese patients.

METHODS

After obtaining institutional review board approval, we conducted a retrospective analysis of 211 reoperative bariatric procedures performed at our institution between 2004 and 2012. These cases were identified from the prospectively maintained database of all bariatric procedures carried out at our center. All procedures were performed by 1 of 5 bariatric surgeons and included revisions, conversions, and reversals. Patients who underwent a third bariatric procedure for inadequate weight loss or significant weight regain after the second operation were identified for this study.

Preoperative patient characteristics, intraoperative data, and postoperative outcomes were identified for the third bariatric procedure. Preoperative data extraction included age, sex, height, and weight before each procedure; number and types of previous abdominal surgical procedures; and comorbidities. The date of reoperation, need for conversion to open surgery, intraoperative complications, estimated blood loss, lysis-of-adhesion time, and complete operative time were extracted from the intraoperative data. Postoperative data included early complications, need for early reoperation, length of hospital stay, duration of follow-up, and body mass index (BMI) at follow-up. These data were then used to calculate the percent excess weight loss (EWL) of the cohort. The EWL was defined as the operative weight minus the follow-up weight, divided by the excess weight, multiplied by 100. Excess weight was defined as the operative weight minus the ideal body weight based on a BMI of 25 kg/m². Categorical variables were reported as frequencies (percentages). Continuous variables with normal and non-normal distributions were presented as mean \pm standard deviation and median (range), respectively.

RESULTS

A total of 12 patients undergoing their third bariatric operation were identified. At the time of the third operation, patients had a mean age of 46.2 \pm 11.5 years and a median of 5 previous abdominal operations (range, 2–8) and 7 comorbidities (range, 4–13). Before the first, sec-

ond, and third procedures, patients had a BMI of 67.1 \pm 29.3 kg/m², 60.9 \pm 28.3 kg/m², and 49.4 \pm 19.8 kg/m², respectively.

The third operations (laparoscopic in 10 patients and open in 2) included RYGB (n = 5), revision of pouch and/or stoma of RYGB (n = 3), limb lengthening after RYGB (n = 3), and SG (n = 1). The preceding operations included RYGB (n = 4), SG (n = 4), VBG (n = 2), and revision of pouch and/or stoma after RYGB (n = 2). The primary bariatric procedures included jejunoileal bypass (n = 5), SG (n = 2), RYGB (n = 2), adjustable gastric banding (n = 2) and VBG (n = 1) (**Table 1**).

A small enterotomy during an open RYGB was the only intraoperative complication, and it was easily repaired. There were no conversions to laparotomy for laparoscopic cases, and the mean estimated blood loss for this series was 106.0 \pm 75.6 mL. The mean adhesiolysis and operative times were 91.1 \pm 56.7 minutes and 202.9 \pm 55.7 minutes, respectively.

In total, 5 early complications occurred in 4 patients, including laparotomy incision wound infection (n = 2, both after open RYGB), laparoscopy incision infection (n = 1, after laparoscopic SG), simultaneous laparoscopic hernia repair infection (n = 1, after laparoscopic Roux limb lengthening and complex ventral hernia repair), and necrosis of the gastric remnant after RYGB (n = 1, after open RYGB). Early reoperative intervention was needed in 2 of these patients because of procedure-related complications; this included partial gastrectomy of a necrotic gastric remnant in 1 patient and explantation of the aforementioned infected biosynthetic mesh. The median length of hospital stay was 4.5 days (range, 1–27 days).

One patient was lost to follow-up, with the patient's last assessment occurring at the 30-day postoperative visit; this patient's data were included in the perioperative analysis but not the follow-up results. At 1 year after the third bariatric operation, the EWL of the cohort was 49.4% \pm 33.8%. After a mean follow-up time of 43.0 \pm 28.6 months (range, 12–93 months), the BMI of the cohort reached 39.9 \pm 20.8 kg/m², which corresponded to a mean EWL of 54.4% \pm 44.0% from the third operation. At the latest follow-up point, 64% of patients had EWL >50% and 45% had EWL >80%. Two patients had complete weight regain at the latest follow-up (**Table 2**).

DISCUSSION

Bariatric surgical procedures continue to gain acceptance as greater emphasis is placed on the favorable metabolic

Table 1.
Sequence of Bariatric Procedures and BMI at Time of Surgery

Case No. ^a	First Procedure	BMI ^b (kg/m ²) at First Procedure	Second Procedure	BMI (kg/m ²) at Second Procedure	Third Procedure	BMI (kg/m ²) at Third Procedure
1	JIB ^b (O ^b)	59.3	VBG ^b (O)	55.6	SG ^b (L)	50.2
2	JIB (O)	81.2	SG (O)	71.1	RYGB ^b (O)	62.7
3	JIB (O)	63.7	VBG (O)	58.4	RYGB (O)	54.6
4	JIB (O)	69.3	RYGB (O)	55.2	Band over pouch (L)	39.7
5	SG (L ^b)	NA	RYGB (L)	NA	Band over pouch (L)	52.9
6	AGB ^b (L)	129.9	SG (L)	109.6	RYGB (L)	101.1
7	VBG (O)	49.8	SG (L)	39.1	RYGB (L)	40.1
8	JIB (O)	39.8	RYGB (O)	31.2	Revision pouch/stoma (L)	29.4
9	SG (L)	NA	RYGB (L)	NA	Distal bypass (L)	37.1
10	RYGB (O)	53.4	Band over pouch (L)	47.3	Distal bypass (L)	38.5
11	RYGB (L)	74.7	Revision pouch/stoma (L)	94.8	Distal bypass (L)	55.8
12	AGB (L)	48.6	SG (L)	45.3	RYGB (L)	35.8

^aSorted based on date of third procedure.

^bAGB = adjustable gastric band, JIB = jejunioileal bypass; L = laparoscopic; NA = not available; O = open; RYGB = Roux-en-Y gastric bypass; SG = sleeve gastrectomy; VBG = vertical banded gastroplasty.

Table 2.
Outcomes After Third Bariatric Surgery

Case No. ^a	BMI ^b at Last Follow-Up (kg/m ²)	EWL ^b (%)
1	46.9	13.3
2	63.7	-2.4
3	Lost to follow-up	NA
4	41.6	-12.8
5	28.7	86.6
6	91.5	12.5
7	31.6	55.7
8	25.1	97.7
9	29.5	62.5
10	24.7	102.4
11	31.1	80.1
12	24.8	102.1

^aSorted based on date of third procedure.

^bBMI = body mass index; EWL = excess weight loss; NA = not available.

effects of these operations. After the introduction of the laparoscopic approach a decade ago, a sharp increase in the number of bariatric operations occurred and the sub-

sequent cumulative number of patients who have undergone bariatric surgery continues to rise.⁶ Despite modern advances in techniques, obesity is a chronic disease and some degree of weight recidivism is seen regardless of the operative approach. Even after RYGB, which results in excellent weight loss and resolution of obesity-related comorbidities, weight recidivism occurs in 10%–20% of patients; this number climbs to 20%–33% in reports that deal with the superobese.^{7,8} Thus it is not surprising that the volume of reoperative cases is rising in parallel with the overall number of bariatric patients.

Reoperative bariatric surgery requires careful patient selection and extensive surgical experience if satisfactory results are to be achieved. Strategies require intensive preoperative evaluation in the form of multidisciplinary assessment, thorough imaging, and careful review of preceding operative notes. Patients must also be screened for behavioral patterns that could be contributing to weight loss failure and could predispose them to further therapeutic failures.⁹ It cannot be stressed enough that patient assessment and selection are of the utmost importance if repeat revision surgery is to be carried out safely and effectively. Even with thorough perioperative assessment, patients and surgeons must be prepared for the possibility of ongoing inadequate weight loss, as seen in this report. Patients who require repeat revision bariatric surgery have

failed to achieve adequate results in the past, and multifactorial issues contributing to their morbid obesity may persist.

There are observational reports documenting institutional experience in reoperative bariatric surgery, but the long-term outcomes are relatively unknown.³⁻⁵ Significant EWL continues to be reported after reoperative series, albeit with increased morbidity compared with primary procedures; the incidence of major complications after reoperative bariatric surgery has been quoted as 22%–50%, with a mortality rate of 1%–2%.³ Not surprisingly, the weight loss outcomes and morbidity encountered also seem to depend on the primary procedure and subsequent reoperative approach.^{10,11} For instance, Brodin and Cody¹⁰ showed that weight loss was superior after revising purely restrictive procedures when compared with failed operations with malabsorptive components. Stefanidis et al¹¹ showed escalating morbidity rates as the complexity of the revision case increased. These findings must be taken into consideration when tailoring the approach to this population.

Our center has recently shown that reoperative surgery can effectively treat undesirable results from primary bariatric surgery without a prohibitive complication rate, and these findings are supported by studies from other groups.^{3,5,12,13} In our study of 106 reoperations for weight recidivism, we observed a mean EWL of 53% after revision of primary restrictive procedures and 37.6% after revision of bypass procedures at 1-year follow-up and beyond.⁵ Similarly, Nasset et al¹⁴ had previously reported more modest results in 94 reoperative cases for weight regain and found that successful weight loss, defined as EWL >50%, was achieved in 46% of patients, with 75% of all patients being satisfied with the outcome. The overall serious complication and mortality rates were 26% and 0.9%, respectively, and this included revisions for all indications (unsuccessful weight loss, intolerable side effects/complications from the primary procedure, metabolic complications).¹⁴

To our knowledge, none of the previous reports addressed repeat reoperative bariatric surgery and its associated outcomes. In this study we provide some data regarding this complex situation by assessing the outcomes of 12 patients with ongoing recidivism after 2 prior bariatric operations. Conversion of other procedures to RYGB and revision of failed RYGB were the most common procedures. Although the case numbers were low, the results were promising and showed a mean EWL of $54.4\% \pm 44.0\%$ after the third bariatric procedure, with

45% of the patients achieving >80% EWL. However, 4 patients still had recidivism or inadequate weight loss at the latest follow-up visit. Five early complications were encountered in 4 patients, with 2 of these patients requiring early operative intervention. One of the cases involved explantation of infected biosynthetic mesh that was used to repair a large ventral hernia at the time of laparoscopic Roux limb lengthening, a problem that can be seen in any gastrointestinal procedure. The other case required resection of a necrotic gastric remnant, an outcome that was likely directly related to repeat upper abdominal dissections and resulting devascularization of the remnant stomach. This patient was noted to have purulent discharge (positive for amylase and lipase) draining from the laparotomy incision on postoperative day 10 and was emergently taken to the operating room, where a necrotic gastric remnant was discovered and resected. All other complications were easily managed without invasive intervention, and the patients ultimately had satisfactory outcomes.

The field of bariatric surgery continues to mature, and reoperative surgery will play an important role in the future of this specialty. As the field becomes more about metabolic outcomes in conjunction with weight loss, it is still important to emphasize that obesity is a chronic disease that may require additional therapy if initial treatment fails.¹⁵⁻¹⁸ Like any other chronic disease, conversion to another procedure, corrective procedures, or adjuvant procedures may be indicated to achieve a better therapeutic effect. This paradigm is well accepted for many other chronic medical and surgical diseases (cardiovascular disease, joint disease). Unfortunately, many insurance companies do not cover reoperative bariatric surgery.

The limitations of this study include the sample size and retrospective nature of the data. In addition, these data represent a heterogeneous group of procedures with varying follow-up periods. Further prospective research looking at both weight loss and resolution of obesity-associated comorbidities is needed to gain more insight into reoperative bariatric surgery for recidivism and weight loss failure.

CONCLUSION

Repeat reoperative bariatric surgery can be carried out successfully (and often laparoscopically) in experienced bariatric centers, even in patients with multiple previous abdominal or bariatric procedures. Surgeons and patients should recognize that, in selected patients, significant weight loss can still be achieved with reoperative ap-

proaches, albeit with increased morbidity compared with primary procedures. Specifically, conversion of other procedures to RYGB and revision of failed RYGB can be associated with excellent salvage rates. Insurance companies should consider including reoperative bariatric surgery as a “covered” procedure; it offers the chance for significant improvement of an inadequately treated disease process.

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