Editorial Commentary



# Revisional bariatric surgery for weight recurrence or surgical nonresponse

**Erin Briggs, Sunjay Kumar, Francesco Palazzo, Talar Tatarian**

Department of Surgery, Thomas Jefferson University, Philadelphia, PA, USA

*Correspondence to:* Talar Tatarian, MD, FACS, FASMBS. Assistant Professor, Department of Surgery, Thomas Jefferson University, 1100 Walnut Street, Suite 500, Philadelphia, PA 19107, USA. Email: talar.tatarian@jefferson.edu.

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## Introduction

Obesity continues to be a rising health concern as worldwide prevalence has nearly tripled since 1975 and currently affects over 650 million people (1). The World Obesity Federation predicts that in 2030, 1 in 5 women and 1 in 7 men will be living with obesity (2). Bariatric and metabolic surgery has been a steadfast treatment for obesity and its related comorbidities. As the prevalence of obesity continues to rise, the number of bariatric procedures performed has continued to increase. In 2019, just prior to the coronavirus disease 2019 (COVID-19) pandemic, 260,000 bariatric procedures were performed in the United States alone (3).

Over the last decade, there has been a steady increase in the prevalence of revisional bariatric surgery. It accounted for 16.8% of all bariatric operations in 2019, making revisional surgery the third most common procedure type in the United States (3). Revisional bariatric surgery is an umbrella term encompassing conversion to another procedure type, correction of the index procedure, or reversal to normal or near-normal anatomy (4). The most common indication for revision is often weight recurrence or return of co-morbidities, accounting for two thirds of cases (5,6). Herein, we review the epidemiology of weight changes after the most common bariatric procedures and discuss treatment options for the management of weight recurrence or surgical non-response.

## Terminology

Historically, when discussing postoperative weight changes, terms such as ineffective weight loss or weight regain were used to describe unsuccessful weight loss or maintenance following bariatric surgery. Such terminology imply that weight changes are a patient-related rather than a disease-related process. The AMSBS Post-Operative Weight Recurrence (or POWER) Task Force recently proposed implementing new terminology, using the terms "weight recurrence" and "surgical nonresponse" to describe weight changes following bariatric surgery, putting the onus on the disease rather than the patient (7).

Additionally, these terms are often used interchangeably but should likely be thought about and treated as different problems. Patients with weight recurrence may have behavioral, metabolic, and/or genetic factors that prevent long-term maintenance of treatment response. Those with surgical nonresponse may have a biologic or genetic predisposition causing early resistance to treatment effects. It is important to distinguish weight recurrence and surgical nonresponse as they are two separate disease-specific conditions. Unfortunately, there are no standardized definitions for these terms, limiting the ability to assess true incidence, clinical outcomes, and treatment algorithms.

## Adjustable gastric banding (AGB)

AGB gained popularity in the early 2000's as a reversible restrictive procedure. As long-term data became available, it quickly fell out of favor due to the risk of band complications and weight recurrence. AGB is now rarely performed as a primary operation, making up only 1.2% of

bariatric surgeries in 2020 (3). A 2012 retrospective review by Spivak *et al.* reported a >50% failure rate 10 years after AGB, defined as the percentage of patients with excess weight loss (EWL) <25% plus the cumulate percentage of band explants (8). In a systematic review by Puzziferri *et al.*, the mean sample-size-weighted EWL was 45%, with less than 31% of cohorts reporting >50% EWL 2 to 5 years after AGB (9). In studies with long-term follow-up beyond 10 years, over 50% of patients had their band removed (10-12). Of these, 40% underwent revisional surgery for weight recurrence (10).

AGB removals and conversions make up the majority of revisional bariatric surgeries. A retrospective review of the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database from 2015–2017 found conversions to sleeve gastrectomy (SG) to be the most common, followed by conversion to Roux-en-Y gastric bypass (RYGB) (13). In patients undergoing conversion for weight recurrence or non-response without apparent band complications, a malabsorptive procedure is favored. In patients with non-response, superior weight loss has been demonstrated at 24 months after conversion to RYGB compared to SG (EWL 55% *vs.* 28%) (14). Patients who demonstrated successful weight loss and are presenting with band-associated complications (i.e., band erosion, slippage, pouch dilation), can be considered for restrictive or malabsorptive revisional options (15). Patient co-morbidities should be taken into consideration to choose the optimal procedure. Patients with gastroesophageal reflux disease (GERD) or diabetes may be optimal candidates for conversion to RYGB, whereas those with super morbid obesity could be considered for biliopancreatic diversion/duodenal switch (BPD/DS) (16).

The decision to perform AGB conversion as a single- or two-stage procedure has been a matter of debate. Advocates for a staged procedure cite concerns for higher risk of morbidity and abdominal sepsis (specifically staple line leak) with a single-stage surgery (17). Delaying conversion to a second operation can allow the capsule to become thinner, minimizing the risk of staple line disruption. Alternatively, a single-stage operation can minimize the need for additional dissection in a re-operative field, as additional scarring is expected to occur after band removal. A recent analysis of the MBSAQIP database for the years 2020 and 2021 found that the majority of conversions are performed as two-stage procedures (59%) and most undergo conversion to SG (63%) (18). The authors found no difference in anastomotic leak, postoperative bleeding, reoperation, or mortality rates between the one- *vs.* two-stage cohorts. Compared to SG, conversions to RYGB had higher rates of serious complications and mortality, but there was no difference between one- *vs.* two-stage procedures. In those undergoing SG, the one-stage cohort experienced a higher rate of non-operative interventions (1.2% *vs.* 0.7%, P=0.04). In general, we prefer to perform a single-stage conversion except in cases of erosion, or in the setting of esophageal dilation and dysmotility when SG is favored by the patient.

## SG

SG is the most common bariatric procedure performed worldwide. It gained popularity in 2012 due to favorable outcomes with weight loss and co-morbidity control with lower morbidity and mortality relative to other surgical options (i.e., AGB). In 2020, SG accounted for 61.6% of all bariatric surgeries and 71.3% of primary bariatric surgeries in the United States (3). The incidence of weight recurrence after SG is reported between 9–91%, depending on the definition used (19). This wide range further reinforces the need for a standardized evidence-based definition of weight recurrence in order to assess the true incidence and outcomes of proposed treatment strategies. An estimated 18–36% undergo revision for weight recurrence or non-response (20,21).

In patients presenting with weight recurrence or non-response, initial assessment should include anatomic evaluation for sleeve size or dilation. This is best accomplished with an upper gastrointestinal contrast study. Additionally, a thorough assessment should be made for maladaptive lifestyle behaviors. Complications such as reflux or vomiting can lead to maladaptive behavior and improper food choices, impacting weight loss outcomes. Pharmacotherapy should be considered as adjunct treatment while correcting dietary and lifestyle behaviors.

Re-SG has been reported for management of primary sleeve dilation or poorly constructed sleeve. In a single-center retrospective study, Andalib *et al.* reported comparable short-term (>6 and ≤18 months) EWL (re-sleeve 29.2%, RYGB 27.6%, BPD/DS 31.6%, P=0.707) and total weight loss (TWL, re-sleeve 7.6%, RYGB 10.1%, BPD/DS 14%, P=0.194) (22). Noel *et al.* recommended re-SG for non-super obese patients with localized dilation due to a poorly constructed sleeve, citing long-term success in 53.8% of patients [defined as excess body mass index (BMI) loss >50%] (23). A recent Delphi consensus of best practices recommended against re-SG as an acceptable option in

cases of "symptomatic GERD after SG + inadequate weight loss/weight recurrence" (24), as these patients would likely be better served by conversion to RYGB for concurrent management of GERD.

When considering surgical conversion, the indication for revision should be taken into consideration. In the setting of GERD or functional problems of the gastric sleeve (i.e., stricture, twisting, or narrowing at the incisura) conversion to RYGB is favored (25,26). If the primary indication is weight recurrence or non-response in the absence of functional issues, both RYGB and conversion to BPD/DS or single anastomosis duodenoileal bypass (SADI) are options (25,26). The choice of procedure should be tailored based on patient co-morbidities and weight loss goals. In a multicenter cohort study, Dijkhorst *et al.* found superior weight loss with conversion to SADI *vs.* RYGB (5-year TWL 29.4% *vs.* 17.9%) (25). The authors did not find significant difference in the rate of complications, micronutrient deficiencies, or quality of life scores. Along the same line, Surve *et al.* assessed long term outcomes of SG conversion to SADI *vs.* RYGB in a retrospective cohort matched for sex, BMI, and baseline weight (26). TWL was higher after SADI (37.9% *vs.* 32.5%, P<0.001). Interestingly, approximately a third of patients remained surgical non-responders after conversion to RYGB (36.0% *vs.* 21.3%, P=0.028). The 30-day complication rates were similar between the two groups. In addition to superior weight loss outcomes, SADI showed significantly lower long-term complication (19.6% *vs.* 62.2%, P>0.001) and reintervention (14.7% *vs.* 39.3%, P=0.004) rates compared with RYGB. Two recent expert consensus panels favored BPD/DS to RYGB after SG for the treatment of super morbid obesity or as a secondary operation in a reliable patient with insufficient weight loss after SG (27,28). Conversely, conversion to RYGB is superior to BPD/DS in patients with gastroesophageal reflux and failed SG. Resolution of GERD after conversion of SG to RYGB is reported to be as high as 85% (29).

## RYGB

RYGB is the second most common bariatric procedure in the United States, comprising approximately 18% of primary procedures in 2019 (3). At 5 years post-RYGB, randomized controlled trials have reported 23% total body weight loss [Surgical Treatment and Medications Potentially Eradicate Diabetes Effectively (STAMPEDE)], 57% EWL [Laparoscopic Gastric Bypass Versus Sleeve Gastrectomy to Treat Morbid Obesity (SLEEVEPASS)], and 68.3% excess BMI loss [Swiss Multicentre Bypass or Sleeve Study (SM-BOSS)] (30-32). Surgical non-response or weight recurrence can pose a treatment challenge. As with all cases of weight recurrence, psychosocial and behavioral factors must be investigated. Upper endoscopy and upper gastrointestinal fluoroscopy should be performed to assess for anatomic factors. The presence of a gastrogastric fistula, enlarged gastric pouch (>6 cm long or >5 cm wide), or dilated gastrojejunostomy (>2 cm) may all contribute to weight recurrence and can be addressed surgically with pouch revision and recreation of the gastrojejunostomy (33). Endoscopic plication or stoma reduction is a newer endoscopic option that has shown promising results. Callahan *et al.* reported 5-year outcomes in a retrospective cohort of 70 patients who underwent endoscopic gastrojejunostomy revision 2–10 years after gastric bypass surgery (34). After endoscopic revision, patients were able to sustain 7.0%±23.8% EWL up to 5 years post-procedure with slightly favorable outcomes with a pursestring technique compared to interrupted sutures. There was, however, little effect on comorbidities.

Another anatomic factor that deserves consideration is limb distalization to reduce total alimentary limb length. This most commonly involves dividing the alimentary limb close to the jejunojejunostomy and moving it distally to create a longer biliopancreatic limb with more malabsorption. Different placements of the alimentary limb have been proposed, however the shorter the common channel, the greater the risk for protein calorie malnutrition. EWL is typically reported around 50%, with total alimentary limb length (roux length + common channel length) of at least 350 cm favored (35). Conversion of gastric bypass to DS may also be considered. Single institution studies have shown this to be an effective salvage procedure with up to 25–35% TWL (36,37) and 71% EWL (38) at 2 and 3 years, respectively. Similar to limb distalization, protein malnutrition and nutritional deficiencies are a concern and more intensive nutritional supplementation is required. As such, it is imperative to assess patient compliance and comorbidities before choosing this procedure. Conversion to DS can be performed in one or two stages. Parikh *et al.* found no stsatistical difference between these two approaches. Paatients underoing one-stage conversion showed 80.2% EWL overall compared to 78.44% EWL in the two-stage group. There was no difference in mortality, but it was noted that single-stage conversion is preferred due to the decreased risk of

complications such as adhesions (39).

## Conclusions

With the projected increase in the prevalence of obesity, there remains a need for bariatric surgery for the durable treatment of obesity and its related comorbidities. As the post-bariatric surgery population grows, a subset will need revisional surgery for the management of weight recurrence/non-response. After thorough psychosocial, behavioral, and anatomic workup, medical and surgical management should be tailored to patient specific goals and co-morbidities.

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## References

1. World Health Organization. Obesity and overweight. 2021. Cited 24 March 2023. Available online: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight
2. World Obesity Federation. World Obesity Atlas 2022. 2022. Cited 24 March 2023. Available online: https://s3-eu-west-1.amazonaws.com/wof-files/World_Obesity_Atlas_2022.pdf
3. Clapp B, Ponce J, DeMaria E, et al. American Society for Metabolic and Bariatric Surgery 2020 estimate of metabolic and bariatric procedures performed in the United States. Surg Obes Relat Dis 2022;18:1134-40.
4. Lyons W, Omar M, Tholey R, et al. Revisional bariatric surgery: a review of workup and management of common complications after bariatric surgery. Mini-Invasive Surgery 2022;6:11.
5. Shimizu H, Annaberdyev S, Motamarry I, et al. Revisional bariatric surgery for unsuccessful weight loss and complications. Obes Surg 2013;23:1766-73.
6. Vanetta C, Dreifuss NH, Schlottmann F, et al. Bariatric Surgery Conversions in MBSAQIP Centers: Current Indications and Outcomes. Obes Surg 2022;32:3248-56.
7. Majid SF, Davis MJ, Ajmal S, et al. Current state of the definition and terminology related to weight recurrence after metabolic surgery: review by the POWER Task Force of the American Society for Metabolic and Bariatric Surgery. Surg Obes Relat Dis 2022;18:957-63.
8. Spivak H, Abdelmelek MF, Beltran OR, et al. Long-term outcomes of laparoscopic adjustable gastric banding and laparoscopic Roux-en-Y gastric bypass in the United States. Surg Endosc 2012;26:1909-19.
9. Puzziferri N, Roshek TB 3rd, Mayo HG, et al. Long-term follow-up after bariatric surgery: a systematic review. JAMA 2014;312:934-42.
10. Kowalewski PK, Olszewski R, Kwiatkowski A, et al. Life with a Gastric Band. Long-Term Outcomes of Laparoscopic Adjustable Gastric Banding-a Retrospective Study. Obes Surg 2017;27:1250-3.
11. O'Brien PE, MacDonald L, Anderson M, et al. Long-term outcomes after bariatric surgery: fifteen-year follow-up of adjustable gastric banding and a systematic review of the bariatric surgical literature. Ann Surg 2013;257:87-94.
12. Aarts EO, Dogan K, Koehestanie P, et al. Long-term

 

results after laparoscopic adjustable gastric banding: a mean fourteen year follow-up study. Surg Obes Relat Dis 2014;10:633-40.
13. Clapp B, Harper B, Dodoo C, et al. Trends in revisional bariatric surgery using the MBSAQIP database 2015-2017. Surg Obes Relat Dis 2020;16:908-15.
14. Marin-Perez P, Betancourt A, Lamota M, et al. Outcomes after laparoscopic conversion of failed adjustable gastric banding to sleeve gastrectomy or Roux-en-Y gastric bypass. Br J Surg 2014;101:254-60.
15. Oyefule O, Do T, Karthikayen R, et al. Secondary Bariatric Surgery-Does the Type of Index Procedure Affect Outcomes After Conversion? J Gastrointest Surg 2022;26:1830-7.
16. Gutschow CA, Collet P, Prenzel K, et al. Long-term results and gastroesophageal reflux in a series of laparoscopic adjustable gastric banding. J Gastrointest Surg 2005;9:941-8.
17. Schneck AS, Lazzati A, Audureau E, et al. One or two steps for laparoscopic conversion of failed adjustable gastric banding to sleeve gastrectomy: a nationwide French study on 3357 morbidly obese patients. Surg Obes Relat Dis 2016;12:840-8.
18. Dang JT, Clapp B, Ahmad M, et al. One- versus two-stage conversions of adjustable gastric bands: an analysis of the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program database. Surg Obes Relat Dis 2023;19:735-41.
19. Lauti M, Lemanu D, Zeng ISL, et al. Definition determines weight regain outcomes after sleeve gastrectomy. Surg Obes Relat Dis 2017;13:1123-9.
20. Felsenreich DM, Langer FB, Kefurt R, et al. Weight loss, weight regain, and conversions to Roux-en-Y gastric bypass: 10-year results of laparoscopic sleeve gastrectomy. Surg Obes Relat Dis 2016;12:1655-62.
21. Hauters P, Dubart JW, Desmet J, et al. Ten-year outcomes after primary vertical sleeve gastrectomy for morbid obesity: a monocentric cohort study. Surg Endosc 2021;35:6466-71.
22. Andalib A, Alamri H, Almuhanna Y, et al. Short-term outcomes of revisional surgery after sleeve gastrectomy: a comparative analysis of re-sleeve, Roux en-Y gastric bypass, duodenal switch (Roux en-Y and single-anastomosis). Surg Endosc 2021;35:4644-52.
23. Noel P, Nedelcu A, Eddbali I, et al. Five-year results after resleeve gastrectomy. Surg Obes Relat Dis 2020;16:1186-91.
24. Kermansaravi M, Parmar C, Chiappetta S, et al. Best practice approach for redo-surgeries after sleeve gastrectomy, an expert's modified Delphi consensus. Surg Endosc 2023;37:1617-28.
25. Dijkhorst PJ, Al Nawas M, Heusschen L, et al. Single Anastomosis Duodenoileal Bypass or Roux-en-Y Gastric Bypass After Failed Sleeve Gastrectomy: Medium-Term Outcomes. Obes Surg 2021;31:4708-16.
26. Surve A, Cottam D, Richards C, et al. A Matched Cohort Comparison of Long-term Outcomes of Roux-en-Y Gastric Bypass (RYGB) Versus Single-Anastomosis Duodeno-ileostomy with Sleeve Gastrectomy (SADI-S). Obes Surg 2021;31:1438-48.
27. Kichler K, Rosenthal RJ, DeMaria E, et al. Reoperative surgery for nonresponders and complicated sleeve gastrectomy operations in patients with severe obesity. An international expert panel consensus statement to define best practice guidelines. Surg Obes Relat Dis 2019;15:173-86.
28. Merz AE, Blackstone RB, Gagner M, et al. Duodenal switch in revisional bariatric surgery: conclusions from an expert consensus panel. Surg Obes Relat Dis 2019;15:894-9.
29. Boru CE, Greco F, Giustacchini P, et al. Short-term outcomes of sleeve gastrectomy conversion to R-Y gastric bypass: multi-center retrospective study. Langenbecks Arch Surg 2018;403:473-9.
30. Schauer PR, Bhatt DL, Kirwan JP, et al. Bariatric Surgery versus Intensive Medical Therapy for Diabetes - 5-Year Outcomes. N Engl J Med 2017;376:641-51.
31. Salminen P, Helmiö M, Ovaska J, et al. Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss at 5 Years Among Patients With Morbid Obesity: The SLEEVEPASS Randomized Clinical Trial. JAMA 2018;319:241-54.
32. Peterli R, Wölnerhanssen BK, Peters T, et al. Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss in Patients With Morbid Obesity: The SM-BOSS Randomized Clinical Trial. JAMA 2018;319:255-65.
33. Heneghan HM, Yimcharoen P, Brethauer SA, et al. Influence of pouch and stoma size on weight loss after gastric bypass. Surg Obes Relat Dis 2012;8:408-15.
34. Callahan ZM, Su B, Kuchta K, et al. Five-year results of endoscopic gastrojejunostomy revision (transoral outlet reduction) for weight gain after gastric bypass. Surg Endosc 2020;34:2164-71.
35. Hamed H, Ali M, Elmahdy Y. Types, Safety, and Efficacy of Limb Distalization for Inadequate Weight Loss After Roux-en-Y Gastric Bypass: A Systematic Review and

 

Meta-analysis With a Call for Standardized Terminology. Ann Surg 2021;274:271-80.
36. Moon RC, Alkhairi L, Wier AJ, et al. Conversions of Roux-en-Y gastric bypass to duodenal switch (SADI-S and BPD-DS) for weight regain. Surg Endosc 2020;34:4422-8.
37. Lind R, Ghanem OM, Ghanem M, et al. Duodenal Switch Conversion in Non-responders or Weight Recurrence Patients. Obes Surg 2022;32:3984-91.
38. Keshishian A, Zahriya K, Hartoonian T, et al. Duodenal switch is a safe operation for patients who have failed other bariatric operations. Obes Surg 2004;14:1187-92.
39. Parikh M, Pomp A, Gagner M. Laparoscopic conversion of failed gastric bypass to duodenal switch: technical considerations and preliminary outcomes. Surg Obes Relat Dis 2007;3:611-8.

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