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Original article

## Gastric bypass reversal: a 7-year experience

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**Abstract**

**Background:** After gastric bypass, some patients develop conditions that ultimately require reversal of the bypass. There are currently few publications on the topic to guide clinicians.

**Objectives:** To describe the indications, techniques, and outcomes for gastric bypass reversal.

**Setting:** Two academic medical centers.

**Methods:** We conducted a retrospective chart review of all patients who underwent gastric bypass reversal at our institutions between 2008 and 2015. Information regarding the original operation, the indications for reversal, procedures performed, and the postoperative outcomes were collected and analyzed.

**Results:** Nineteen patients underwent gastric bypass reversal. All but 4 reversal operations were performed laparoscopically. The indications for reversal were malnutrition or excessive weight loss (6 patients); chronic nausea, vomiting, and abdominal pain (5); neuroglycopenia (4); massive small bowel loss due to internal hernia (3); and need for surveillance gastric endoscopy (1). In the perioperative period, 4 patients had a complication that required intervention. Five patients required additional delayed procedures. One patient was lost to follow-up. The remaining patients' mean follow-up was  $22 \pm 18$  months. Symptoms that prompted reversal of the gastric bypass resolved in the majority of patients. However, 1 patient's hypoglycemia did not resolve and 2 continued to have diarrhea. Six patients were weaned off of total parenteral nutrition.

**Conclusions:** Laparoscopic gastric bypass reversal is feasible and well tolerated. The procedure can be employed to treat a variety of conditions that may occur after gastric bypass and the majority of patients benefit, with resolution of symptoms. In a carefully selected patient population, gastric bypass reversal should be considered if conservative approaches to adverse conditions fail. (*Surg Obes Relat Dis* 2016;■:00–00.) © 2016 American Society for Metabolic and Bariatric Surgery. All rights reserved.

**Keywords:** Gastric bypass; Reversal; Malnutrition; Complications; Laparoscopic

Approximately 35% of the US population carries a diagnosis of obesity, and it is estimated that approximately \$190 billion is spent on treating obesity and its comorbidities and complications [1]. Gastric bypass is a well-accepted surgical procedure for the treatment of morbid obesity [2,3]. While patients can expect good outcomes, with weight loss and concomitant improvement

or resolution of co-morbidities [4], reoperations after gastric bypass are not infrequent and include exploration for early leaks or revisions for indications such as intractable ulcers or inadequate weight loss [5]. Full reversal of the gastric bypass is rarely performed and is reserved for indications such as neuroglycopenia, short bowel syndrome, and poor tolerance of the gastric bypass presenting as nausea, vomiting, and excessive weight loss [5,6]. Patients who develop short bowel syndrome due to an internal hernia causing bowel infarction may also be offered reversal. The goal of reversal is to effectively lengthen available enteric

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length to potentially reduce and even eliminate the need for lifelong total parenteral nutrition (TPN).

Several centers have described their experience with gastric bypass reversal [7–15], mostly in case reports [7,11,13,15] or small series [8–10,12,14]. In this study we reviewed our experience with gastric bypass reversal at 2 major academic bariatric surgery centers over a 7-year period to expand the available literature on the indications, techniques, and expected outcomes.

## Methods

Patients who underwent reversal of gastric bypass at our institutions were identified from prospectively maintained bariatric surgery databases. The patients' charts were retrospectively reviewed to extract relevant data. We obtained information regarding the patients' demographic information; original operation if performed at our institutions; indication for reversal; surgical procedures performed to achieve reversal; postoperative course; and outcomes including complications, need for additional interventions, and weight at follow-up.

For laparoscopic reversal, after administration of chemoprophylaxis for deep venous thrombosis prevention, the patients were placed supine on the operating room table and mechanical leg-compression devices were applied. After induction of anesthesia, appropriate antibiotic prophylaxis was administered. A 5-port technique was used, with setup analogous to that for a primary Roux-en-Y gastric bypass with a Nathanson liver retractor placed through a sub-xiphoid stab incision. The Roux limb, biliopancreatic (BP) limb, and common channel were identified. The lesser sac was entered behind the gastric pouch and Roux limb, and the Roux limb was stapled off the pouch and brought into the lower abdomen. The excluded stomach was mobilized and gastrotomies were made in the gastric pouch and the excluded stomach. A liner cutting stapler was introduced to create a gastrogastrotomy, which was then sewn closed in 2 layers using an Endostich. If the Roux limb was to be removed, it was then stapled off the jejunojejunal anastomosis with care taken not to narrow the anastomosis, and the Roux limb was brought out through a 12-mm port and passed off the field. If the Roux limb was brought back into continuity, the BP limb was stapled off the jejunojejunostomy with care taken not to narrow this anastomosis. Then enterotomies were made in the distal BP limb and the proximal Roux limb, through which a linear cutting stapler was introduced and fired. The common enterostomy was then sewn closed in a single layer using an Endostich. Pyloroplasty or sleeve gastrectomy of the reconstructed stomach were performed on a case-by-case basis. Decisions regarding handling of Roux limb and addition of procedures, pyloroplasty, or sleeve gastrectomy of the reconstructed stomach were individualized for patients. If a patient was undergoing bypass reversal because of

nutritional complications, an effort was made to bring the Roux limb back into continuity. Pyloroplasty was added selectively by 1 surgeon if the original gastric bypass had been performed at another institution. This was done if the surgeon was not sure if vagal branches had been divided during the original operation when the gastric pouch was created (i.e., if operative notes were lacking entirely or in detail). Sleeve gastrectomy was added selectively if the patients explicitly wanted another procedure at the same time to prevent weight regain; it was never offered if the bypass reversal was performed while the patient was on TPN. Drains were left per surgeon preference, all incisions were closed, and the patient was awakened from anesthesia. Diet progression after surgery was analogous to diet progression after primary bariatric procedure, with thin liquids offered on the morning of the first postoperative day and then a full liquid diet by the second postoperative day.

Body mass index (BMI) means before and after reversal were compared using paired *t* test, with statistical significance set at  $P < .05$ .

The study was conducted under a protocol approved by an Institutional Review Board.

## Results

### Patient characteristics

Patient characteristics are summarized in Table 1. Between March 2008 and May 2015, 19 patients underwent reversal of their gastric bypass at our 2 academic medical centers. Of these patients, 14 (74%) were female. At the time of their primary gastric bypass operations, the patients' average age was  $43.3 \pm 8.9$  years and average BMI was  $47.1 \pm 7.7$  kg/m<sup>2</sup> (Table 1). Thirteen patients (68%) had undergone laparoscopic Roux-en-Y gastric bypass; of these, 1 was performed with concomitant cholecystectomy and 1 with concomitant splenectomy. Five patients underwent open Roux-en-Y gastric bypass. One patient underwent a laparoscopic loop gastric bypass as the original procedure.

At the time of the gastric bypass reversal, the patients' average age was  $48.1 \pm 8.1$  years and average BMI was  $27 \pm 6.8$  kg/m<sup>2</sup>. The average elapsed time between the original operation and the reversal was approximately  $54 \pm 25.7$  months.

Patient information was available for an average of  $22 \pm 18$  months after the reversal operation; 1 patient was lost to follow-up after reversal. The average BMI at last documented follow-up appointment was  $31.1 \pm 8.7$  kg/m<sup>2</sup>; this represented an average cumulative weight loss of  $90.1 \pm 95.2$  pounds from their prebypass baseline, average percentage excess weight loss of  $87.4 \pm 46.7\%$ , and average percentage total weight loss of  $65.6 \pm 14.1\%$ . The difference between BMI before and after bypass reversal was statistically significant ( $P = .04$ ).

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