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Modern Surgery: Technical Innovation

A New Approach for Treatment of Gastro-Gastric Fistula after Gastric Bypass

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We report a novel technique for gastro-gastric fistula (GGF) repair. A 44-year-old woman was found to have a fistula between her gastric pouch and bypassed stomach 18 years after Roux-en-Y gastric bypass (RYGBP) for morbid obesity. She underwent an attempted open surgical repair, which was complicated by postoperative abdominal sepsis. An upper gastrointestinal series, abdominal CT scan and upper endoscopy confirmed the diagnosis of failed surgery with recurrent GGF. Under endoscopic and fluoroscopic guidance, two ports were inserted percutaneously into the stomach. The fistula was closed with a percutaneous, transgastric, totally extraperitoneal approach. She remains well 7 months after this intervention. This procedure appears to be a safe and effective minimally invasive approach for closure of GGF after RYGBP. This is the first description of an intragastric, percutaneous closure of a GGF after RYGBP in the medical literature. Further experience with this technique is needed to define the selection criteria, limitations, advantages, and disadvantages.

Key words: Gastro-gastric fistula, gastric bypass, morbid obesity, endoluminal laparoscopy, transgastric surgery, minimally invasive surgery, intragastric, percutaneous

Introduction

The prevalence of morbid obesity is increasing rapidly in the developing world.[1] Surgery is the most effective treatment for weight loss and control of comorbid conditions in morbidly obese patients.[2] The most frequently performed gastrointestinal operation for weight reduction in the United States is Roux-en-Y gastric bypass (RYGBP).[3,4] Fistulization between gastric segments is a late complication after RYGBP surgery, and its incidence varies depending on the technique.[5-7]

During the past two decades, surgical interventions have been replaced by progressively less invasive laparoscopic operations, flexible endoscopic procedures, and interventional radiologic techniques.[8] Laparoscopic surgery has been widely adapted for numerous traditional open operations, from cholecystectomy to pancreaticoduodenectomy.[9-12] Development of minimally invasive surgery has helped to decrease blood loss, postoperative discomfort and narcotic requirement, has reduced operative time and hospital stay, and has allowed an earlier return to work for a variety of procedures.

An additional level of operative innovation is exemplified by intraluminal laparoscopic surgery, a technique that has been applied for many years successfully in the urinary tract. The stomach's distensibility and its relatively large intraluminal space foster consideration of intragastric approaches to gastric pathology. A variety of access devices, including a modified percutaneous endoscopic gastrostomy, are now available, allowing direct intraluminal gastric access for laparoscopic instruments, which is called *endo-organ surgery*. Transgastric laparoscopy has been used for a variety of gastric, duodenal, and pan-

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creatic indications,[13-21] but has not yet been applied to the closure of gastro-gastric fistula after RYGBP. We describe the successful closure of a gastro-gastric fistula after RYGBP using laparoscopic instruments via an intragastric, percutaneous approach.

Case Report

The patient is a 44-year-old woman with rheumatoid arthritis, gastroesophageal reflux disease, asthma and urinary stress incontinence. The patient's surgical history included diagnostic laparoscopy for endometriosis, cholecystectomy, appendectomy, right salpingo-oophorectomy, dilation and curettage, and open Roux-en-Y gastric bypass (RYGBP) in 1988. Six years after the RYGBP, she was diagnosed with a gastro-gastric fistula (GGF). Open revision with GGF repair was attempted, but her postoperative course was complicated by abdominal sepsis from gastric leak and required re-operation. She improved after a long stay in the intensive care unit, and her incision healed by secondary intention. Since that episode in 1994, she has regained a significant amount of weight and has failed numerous medical weight loss attempts. She was referred to our surgical service for re-evaluation of her GGF.

Physical examination revealed a morbidly obese woman with a body mass index of 54.5 kg/m^2 (weight 136 kg and height 158 cm). Upper gastrointestinal series demonstrated a relatively small gastric pouch and a large GGF. Endoscopy (Figure 1) and abdominal CT (Figure 2) confirmed the diagnosis. Understanding that her peritoneal cavity would harbor numerous adhesions from intraabdominal sepsis and her prior operations, we decided to avoid the peritoneal cavity by performing an intragastric, percutaneous closure of the GGF.

The patient was placed supine, and general anesthesia was administered. Ultrasound was used to evaluate the upper abdomen for a safe path to the bypassed stomach, and the edge of the liver was marked on the skin. The abdomen was then prepped and draped sterilely. Gastroscopy identified a relatively large proximal pouch, a widely patent fistula from the proximal pouch to the distal stomach, and a widely patent gastrojejunal anastomosis. The gastroscope was passed through the GGF into the distal stomach, which was insufflated. Fluoroscopy and ultrasound confirmed that the stomach was below the liver margin and the transverse colon was inferior to the stomach. With the stomach fully insufflated, one site just proximal to the mid-body and a second site in the distal body of the stomach were chosen for port placement. Under fluoroscopic and endoscopic guidance, two T-tacks (Boston Scientific, Natich, MA) were used to affix the stomach to the anterior abdominal wall at each port location. A 19-gauge thin wall needle was then used to percutaneously puncture the stomach at its mid-body, and a floppy 0.035 inch diameter Benson wire was passed into the stomach. The tract was then dilated with a 12 cm long 10 mm diameter Trackmaster balloon (Boston Scientific, Natich, MA) and a 30-French peel-away sheath (Cook, Bloomington, IL) was passed over the balloon into the stomach. The balloon and sheath were removed and exchanged over a guidewire for the Step trocar device (AutoSuture, Norwalk, CT). Positioning of the 12-mm inner trocar for the Step device was confirmed with gastroscopy. A second Step port with a smaller 5-mm inner trocar was placed between the two T-tacks into the distal stomach under direct visualization without the use of wires or dilation of the tract because the port was significantly smaller (Figure 3). Using the 5-mm laparoscopic camera and the gastroscope for visualization, EndoStitch (Autosuture, Norwalk, CT) was used to place several figure-of-eight sutures across the fistula (Figure 4); each suture was tied with the knot-pushing device. The GGF was completely obliterated (Figure 5). The gastro-jejunostomy was not compromised. Insufflation of the gastric pouch showed no air-leak into the distal stomach. The 12-mm and 5-mm ports were exchanged over a wire for 26-French and 16-French Foley catheters, respectively. The Foley balloons were inflated with dilute contrast. Each catheter was secured to the skin with nylon sutures and placed to gravity drainage. Estimated intraoperative blood loss was negligible. Final fluoroscopic inspection demonstrated excellent position of both balloons, and both catheters appeared to flush and drain adequately.

The patient tolerated the procedure well and had an uneventful postoperative course. A Gastrografin® contrast study on the first postoperative day demonstrated no evidence of a fistula between the gastric pouch and bypassed stomach (Figure 6). She was discharged 24 hours after surgery tolerating a regular diet and resumed her normal activities. At 2

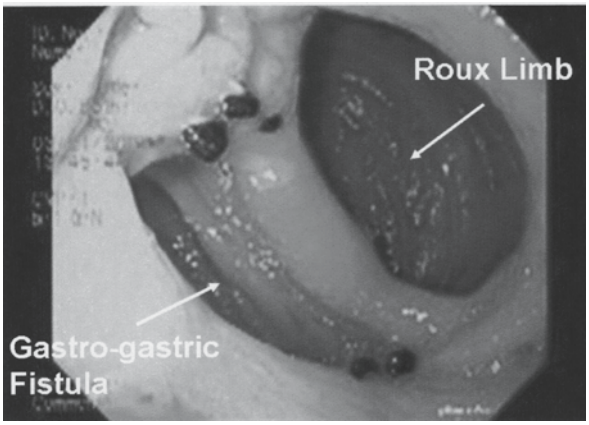

Figure 1. Endoscopic view from the gastroesophageal junction shows the large gastro-gastric fistula and the Roux limb of the gastrojejunostomy.

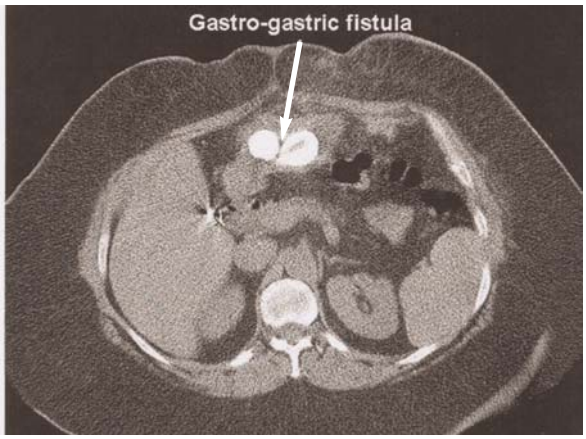

Figure 2. Preoperative abdominal CT scan. Arrow points to GGF.

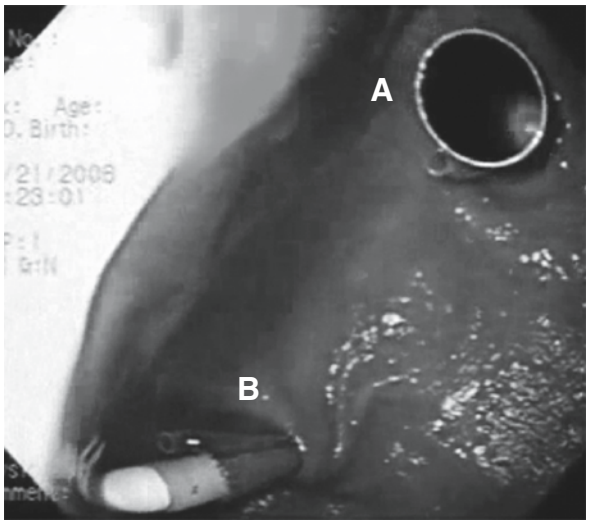

Figure 3. Endoscopic view of trocar positions. **A.** 12-mm trocar for Endostitch. **B.** 5-mm step trocar (still containing obturator), for camera.

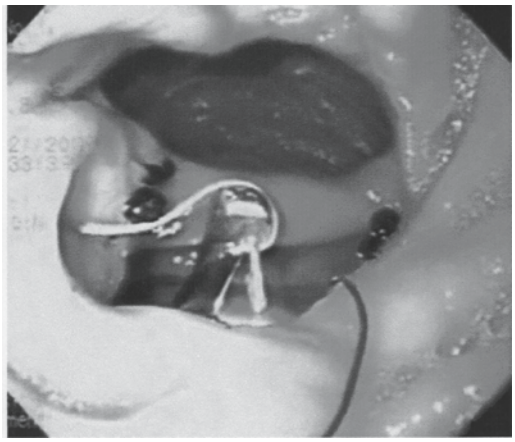

Figure 4. Endoscopic view from the gastroesophageal junction demonstrates the EndoStitch (Autosuture, Norwalk, CT) suturing device being used to perform gastro-gastric fistula closure.

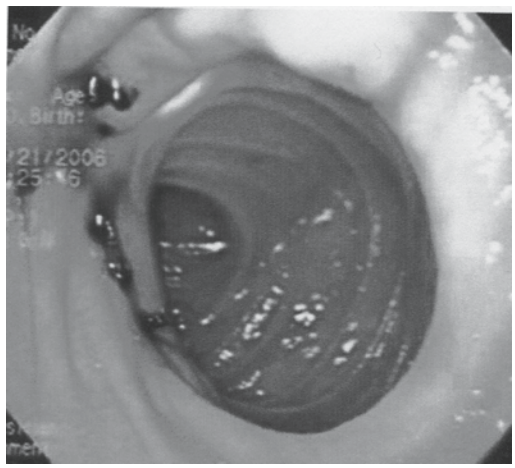

Figure 5. The GGF was located on the left side of this image, but is now obliterated.

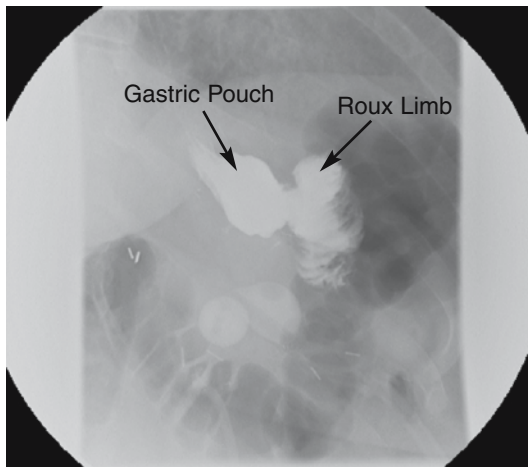

Figure 6. Gastrografin® contrast study on postoperative day 1 demonstrates no evidence of a GGF.

weeks follow-up, her weight loss was 7 kg, and her gastrostomy tubes were removed. At the 1-month, 4-month and 7-month clinic follow-ups, the weight loss amounts were 13.5 kg, 17.2 kg and 23.2 kg respectively, and she had no interval complications.

Discussion

Since the introduction of divided RYGBP, the incidence of staple-line breakdown leading to GGF has been greatly reduced. When fistulization does occur, it is usually followed by weight gain.[5] A subset of patients will be asymptomatic and achieve good weight loss, despite the presence of a GGF.[22,23] Morbidity and mortality rates after reoperative bariatric surgery are higher than after primary procedures.[24-27] Extensive, highly morbid surgical procedures which combine laparotomy with either gastrotomy or gastrectomy are required for the open repair of a GGF.[6]

In the past two decades, there has been a progressive decrease in the invasiveness of surgical interventions. Progress in laparoscopic surgery and the employment of minimally invasive techniques have led to the emergence of a new branch in this field: laparoscopic, endoluminal surgery or endo-organ gastric surgery. This approach is now an alternative for the effective management of some gastric diseases. Direct access to the lumen of the stomach affords a magnified high-resolution image for precise repair using laparoscopic instruments. The indications for endo-organ surgery are evolving as technology and operative expertise begin to meet the need for continued advancements in minimally invasive surgery.[28] These novel techniques have been used for the treatment of both benign and malignant disease.[13-18,20,21] The stomach is perhaps the most acceptable organ in which to perform intraluminal surgery. This large-volume elastic organ is easily accessible by the oral route, and during inflation its anterior boundaries reach the abdominal wall, facilitating placement of endoluminal trocars. These unique features, in contrast to most other organs, make the stomach an excellent organ for intraluminal surgery.

Given the previous surgical history and sepsis of this patient, we decided to perform an intragastric percutaneous closure of the GGF. In this one patient, we showed that an otherwise highly complex and morbid procedure can be performed with minimal blood loss, short hospital stay, and minor discomfort. This procedure allows simple and controlled fistula closure without the potential complications and prolonged recovery typically seen in patients requiring open reoperative bariatric surgery. The combined endoscopic, laparoscopic, and interventional radiology approach is a truly minimally invasive technique. It requires a proficient endoscopist and laparoscopist along with an interventional radiologist to facilitate a coordinated repair. Placement of the operating trocars is an important aspect of the operation, with the goal of triangulating the two trocars; this requires maximal intertrocar distance and adequate distance from the working site. The endoluminal approach appears to be safe and well tolerated. The guiding principles for the application of minimal access surgery apply here perfectly.

No attempt was made to prevent the insufflated air in the bypassed stomach from passing through pylorus and distending small bowel. We had no problem with this during the procedure. However, mechanical or pharmacologic intervention can be used with the technique described, to occlude the pylorus.

This report supports previous data showing the feasibility of a laparoscopic transgastric approach. In our experience, the intragastric approach is a technically feasible, safe, and useful method. It also underscores the synergy of laparoscopic and endoscopic procedures in minimally invasive gastric surgery. This is the first description of an intragastric, percutaneous closure of a GGF after gastric bypass in the medical literature. This could represent a paradigm shift in the management of GGF. Further experience with this technique is needed to define the selection criteria and its limitations, advantages, and disadvantages.

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