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Original article

Surgical management of gastrogastric fistula

Ricard Corcelles, M.D., Ph.D.[a,b], Mohammad H. Jamal, M.D.[a,c], Christopher R. Daigle[a], Tomasz Rogula, M.D. Ph.D.[a], Stacy A. Brethauer, M.D.[a,*], Philip R. Schauer, M.D.[a]

[a]*Bariatric and Metabolic Institute, Cleveland Clinic, Cleveland, Ohio, USA*

[b]*Fundació Clínic per la Recerca Biomèdica. Hospital Clínic of Barcelona, Universitat de Barcelona, Spain*

[c]*Department of Surgery, Kuwait University, Kuwait*

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Abstract

Background: Gastrogastric fistula (GGF) is a rare complication after Roux-en-Y gastric bypass (RYGB) that can be challenging to treat.

Objective: The aim of this study is to examine our surgical experience in the management of GGF after RYGB.

Setting: Academic center, United States.

Methods: We report a consecutive series of 36 patients who underwent surgery for GGF at our institution between 2005 and 2013.

Results: The cohort had a mean age of 48.0 ± 10.8 years, mean body mass index (BMI) of 34.6 ± 11.3 kg/m^2, and an average number of 5.0 ± 2.0 co-morbidities at the time of GGF revision. Of the 36 patients, 16 (44.4%) had previous open RYGB. Endoscopy confirmed GGF in 26 patients (72.2%), whereas upper gastrointestinal (GI) series indicated GGF in 21 of 30 cases (70.0%). The GGF surgery was on average 6.4 ± 3.8 years after the primary procedure. All patients underwent surgical management either in the form of a redo gastrojejunal anastomosis with excision of fistula (77.7%) or a remnant gastrectomy with excision of fistula (22.2%). Mean operative time, blood loss, and length of stay were 248.4 ± 103.3 minutes, 232.7 ± 270.2 mL, and 8.5 ± 8.6 days, respectively. One major intraoperative and 6 early postoperative complications occurred. After a mean follow-up of 38.4 ± 30.0 months, the mean BMI was 35.5 ± 6.2 kg/m^2 in patients with weight regain before GGF revision ($P < .05$) versus 25.0 ± 6.1 kg/m^2 in patients without weight regain ($P = .7$).

Conclusion: GGF is a rare complication of RYGB. Surgical treatment should be tailored to the presenting symptoms and associated anatomic abnormality. Anastomotic revisions are associated with higher complication rates. (Surg Obes Relat Dis 2015;▮:00–00.)

Keywords: Bariatric surgery; Gastrogastric fistula; Gastrogastric fistula treatment

Gastrogastric fistula (GGF) is a potential complication after gastric bypass that was first recognized in association with nondivided Roux-en-Y gastric bypass (RYGB) as a result of disruption of the staple line [1]. The exact incidence of GGF reported in the literature is very wide, ranging from 0% to 46% [2–4]. With complete partition of the stomach, the risk of GGF formation still remains a concern among bariatric surgeons [4]. When it occurs, GGF is often associated with abdominal pain, weight regain, and marginal ulcer formation [3].

This study was presented at the Obesity Week 2013 meeting in Atlanta, Georgia.

*Correspondence: Stacy A Brethauer, M.D., Bariatric and Metabolic Institute, Cleveland Clinic, 9500 Euclid Avenue, M61, Cleveland, OH, 44195.

E-mail: BRETHAS@ccf.org

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There are few reports examining the incidence of GGF in patients undergoing divided laparoscopic RYGB [5]. Also, the surgical management of GGF in the laparoscopic era is not well described. Different surgical strategies have been performed to treat GGF including remnant gastrectomy [6] or a redo of the gastrojejunal anastomosis [7]. In this report, we aim to describe our experience with the surgical management of GGF and to estimate the incidence of GGF in divided laparoscopic RYGB.

Methods

Approval for this retrospective study was granted by the Cleveland Clinic Institutional Review Board. We reviewed the prospective database of all patients who had a diagnosis of GGF between 2005 and 2013. Data collected for this study included baseline patient demographic characteristics, perioperative parameters, and mid-term follow-up outcomes. Patient demographic characteristics included age, sex, height, weight, body mass index (BMI), co-morbidities, and type of first RYGB procedure. Data analysis also included symptoms and diagnostic method used to diagnose GGF. Operative data extracted included operative time, estimated blood loss, and intraoperative complications. Follow-up outcomes assessed were length of hospital stay, short- and medium-term complications, and BMI at follow-up.

Surgical technique

Two types of revisional procedures were performed to treat GGF: (a) revision of the gastrojejunal anastomosis and pouch or (b) remnant gastrectomy with resection of the fistula. In the first procedure, the pouch is transected above the gastrojejunal anastomosis (the pouch was large in these cases), creating a new pouch of 15 mL volume. The alimentary limb is then mobilized and transected distal to the gastrojejunal anastomosis. A new anastomosis is then created using either a circular end-to-end anastomosis (25 mm) or the linear stapled technique [7,8]. The remnant gastrectomy technique was performed in this series as described by Carrodeguas et al. [9]. After complete mobilization of the remnant stomach along the greater curvature of the stomach, the remnant is transected by firing the linear stapler vertically up to the angle of His to exclude the fistula from the pouch.

Statistical methods

Categorical variables were reported as frequencies (%). Continuous variables with normal and nonnormal distributions were expressed as mean ± SD. Statistical comparisons were performed using χ^2 and *t* test, where applicable. Descriptive analysis was performed in SPSS for Windows statistical software (SPSS, Inc, Chicago, IL, USA).

Results

A total of 36 patients underwent revisional surgery for GGF at our institution during an 8-year period. The cohort had a male-to-female ratio of 1:8, a mean age of 48.0 ± 10.8 years, a mean BMI of 34.6 ± 11.3 kg/m^2, and an average of 5.0 ± 2.0 co-morbidities at the time of GGF revision. Only 3 patients (8%) had their first RYGB procedure at our center. With respect to the first operation, 16 were open divided RYGB, 14 were laparoscopic RYGB, and 6 underwent open nondivided RYGB. Patient characteristics are listed in Table 1.

Preoperative GGF symptoms and clinical findings included abdominal pain (n = 26, 72.2%), heartburn (n = 19, 52.7%), vomiting (n = 18, 50%), weight regain (n = 18, 50%), failure to thrive (n = 8, 22.2%), and upper gastrointestinal (GI) bleeding (n = 2, 5.5%). Of the patients with weight regain, mean BMI before GGF surgery was 43.6 ± 8.4 kg/m^2 versus 25.6 ± 6.0 kg/m^2 for those within the no weight regain group. All patients underwent preoperative upper GI endoscopy and 30 (83.3%) had an upper GI series as well. Endoscopy confirmed GGF in 26 cases

Table 1
Patient characteristics with GGF

Characteristic (n = 36)	Results
Age (yr)	48.0 ± 10.8
Gender, n (%)	
Female	32 (89)
Male	4 (11)
BMI (kg/m^2) at RYGB	49.1 ± 6.2
BMI (kg/m^2) at GGF	34.6 ± 11.3
Type of RYGB, n (%)	
Open	16 (44.4)
Laparoscopic	14 (38.8)
Open nondivided	6 (16.6)
Co-morbidities (n)	5.0 ± 2.0
Smoking, n (%)	8 (22)
Diabetes, n (%)	8 (22)
HTN, n (%)	16 (44)
Time of GGF diagnosis after RYGB (yr)	6.4 ± 3.8
Symptoms, n (%)	
Abdominal pain	26 (72.2)
Heartburn	19 (52.7)
Vomiting	18 (50.0)
Weight regain	18 (50.0)
Failure to thrive	8 (22.2)
Bleeding	2 (5.5)
Initial diagnostic method, n (%)	
Esophagogastroduodenoscopy	26 (72.2)
Upper GI series	21 (58.3)
Type of GGF procedure, n (%)	
Redo of GJ anastomosis	29 (80.5)
LRG with fistula excision	7 (19.5)

BMI = body mass index; GGF = gastrogastric fistula; GI = gastrointestinal; GJ = gastrojejunal anastomosis; HTN = hypertension; LRG = laparoscopic remnant excision; RYGB = Roux-en-Y gastric bypass.

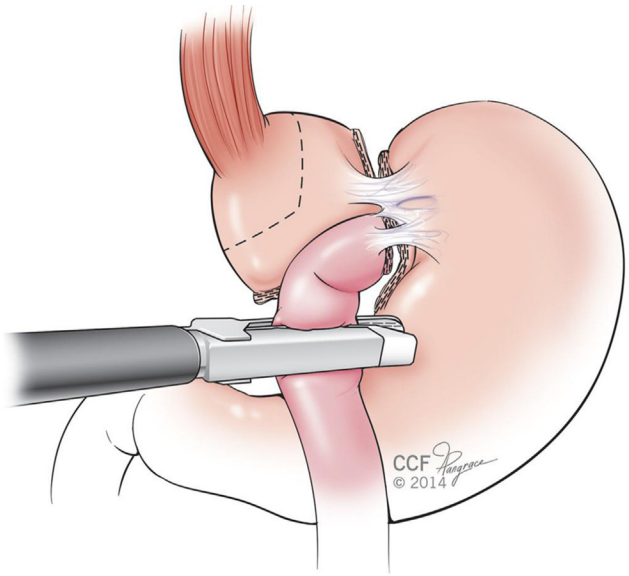

Fig. 1. Revision of the gastrojejunal anastomosis and pouch.

(72.2%), and upper GI series identified GGF in 21 cases out of 30 (70.0%). Additionally, we detected GGF upon endoscopy in these 21 patients. In 10 patients, GGF diagnosis was established intraoperatively. Other findings at endoscopy included marginal ulceration in 22 patients (61.1%), large gastric pouch in 10 patients (mean size, 6.3 ± 2.5 cm long and 5.1 ± 0.4 wide), and anastomotic stenosis in 3 patients (8.3%). The pouch was considered enlarged if found to be >6 cm long or >5 cm wide [10] by an experienced surgical endoscopist. Fourteen patients had the GGF in the distal pouch, 13 in the mid pouch, and 8 at the proximal pouch. All patients who had marginal ulceration and pain symptoms were treated with a twice-daily dose of proton pump inhibitor and sucralfate 1 mg 4 times daily for at least 6 months preoperatively. The time from first operation to start of symptoms was 2.2 ± 3.6 years, and the time to GGF surgery was 6.4 ± 3.8 years (Figs. 1–3).

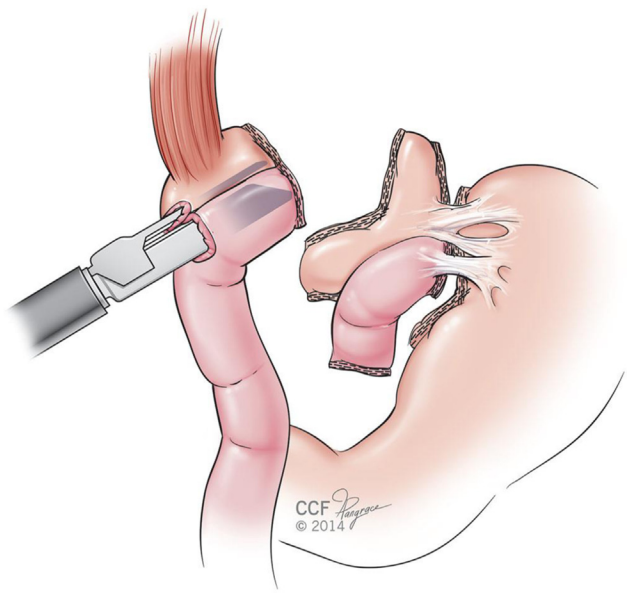

Fig. 2. Revision of the gastrojejunal anastomosis and pouch.

Twenty-nine patients (80.5%) underwent revision of the gastrojejunal anastomosis and pouch and 7 (19.5%) had remnant gastrectomy with fistula excision. Twenty-nine cases were completed laparoscopically and 7 (19.5%) required conversion to open surgery. There were no deaths in this series. Overall complications after GGF surgery were significantly higher in the anastomotic revision group compared with the remnant gastrectomy group ($P = .01$). One intraoperative complication (splenic injury requiring open splenectomy) was reported during an extensive lysis of adhesions in a subject with previous open RYGB. The mean operative and adhesiolysis times were 248.4 ± 103.3 minutes (>3 hr in 68.4% of cases) and 93 ± 51 minutes, respectively. The mean estimated blood loss was 232.7 ± 270.2 mL (≥100 mL in 58.4% of cases). Thirty-one patients had enteral access placed via gastrostomy (n = 24) or jejunostomy (n = 7) tube insertion at time of surgery for early postoperative feeding. The mean length of post-operative hospital stay was 8.2 ± 8.8 days.

Early complications (first 30 d after surgery) developed in 6 patients (16.6%) and included leak (n = 4, 11.1%) and intraabdominal hematoma (n = 2, 5.5%). All these complications were in patients who had anastomotic redo as their GGF treatment procedure and all required reoperation. Late complications were observed in 3 (8.3%) patients and included gastrojejunal anastomosis stenosis (n = 2) and deep venous thrombosis (n = 1). Both patients with stenosis were successfully treated by endoscopic dilation. The mean follow-up was 38.4 ± 30.0 months (range .9–84.4). At the last follow-up point, the mean BMI in patients with weight regain and no weight regain were 35.5 ± 6.2 kg/m^2 ($P = .002$) and 25.0 ± 6.1 kg/m^2 ($P = .7$), respectively.

Discussion

GGF is a rare but well-described complication after RYGB. Stapled partitioning without division of the stomach in early open RYGB operations led to a high rate of GGF formation (49%) as a result of failure of the staple line over time [3]. Divided RYGB utilizing current linear cutting staplers was introduced in 1994 and resulted in a reduction of GGF formation [11]. However, even with advanced stapling technology, GGF remains a potential and important complication of RYGB (3%–6%) (Table 2) [12,13].

The most common symptoms of GGF are weight regain and epigastric abdominal pain. From our experience, we notice that patients present with 1 of 3 different symptom constellations: (1) abdominal pain with marginal ulcer-related symptoms; (2) asymptomatic weight regain; (3)

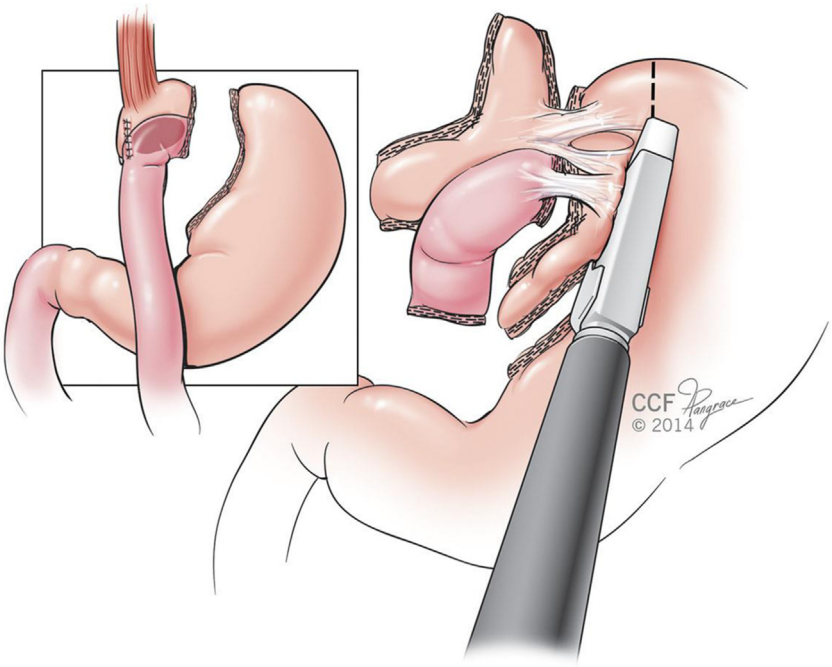

Fig. 3. Revision of the gastrojejunal anastomosis and pouch.

weight regain with epigastric pain. Patients with abdominal pain typically have marginal ulcers and complain of symptoms caused by pain associated with eating. Marginal ulcers can be associated with GGF and could either be a result of GGF or a cause itself (as in the case of a penetrating marginal ulcer). However, the exact pathogenesis of marginal ulceration after RYGB is not known [2,3,6]. It has been suggested that large pouches containing part of the fundus (rich in parietal and oxyntic cells) can predispose to ulcer formation after RYGB. Capella et al. [3] reported the presence of marginal ulceration in all their patients with GGF. Similar findings were reported by Gumbs et al. [13] with the presence of marginal ulceration in all 5 patients with GGF after laparoscopic RYGB. Our results confirm the strong relationship between marginal ulceration and GGF. We found that 61% of patients had marginal ulceration at endoscopy. All patients who had abdominal pain and marginal ulcerations were treated first medically but did not have complete symptom resolution.

Diagnosing GGF can be challenging, but upon suspicion, combining upper GI endoscopy and contrast studies as a dual method of investigation has utility [14]. This approach allowed us to detect the GGF before operating in >70% of patients. Importantly, through the use of endoscopy we detected GGF in 5 patients in whom it was not discovered by upper GI series, further suggesting that endoscopy may provide a greater sensitivity in detecting GGF.

Endoscopy is a well-tolerated and feasible method described in the literature for management of small GGF but associated with poor long-term results [15,16]. Fernandez-Esparrach et al. [17] endoscopically managed 95 patients who had a GGF between 2003 and 2007. They used the EndoCinch suturing system or clips to close the GGF and were successful in achieving initial closure in 90 patients

Table 2
GGF Incidence studies

Lead author	Year of publication	Type of RYGB, n	GGF, %
Cucchi	1995	Open divided, 100	6
MacLean	1997	Open nondivided, 123	3
		Open divided, 376	29
Carrodeguas	2005	Laparoscopic and open divided, 1292	1.2
Gumbs	2006	Laparoscopic divided, 28	1.8
Salimath	2009	Laparoscopic and open divided, 1796	1.1
Yao	2010	Open nondivided, 670	2.1
		Open divided, 58	0
		Laparoscopic, 308	0

GGF = gastrogastric fistula; RYGB = Roux-en-Y gastric bypass.

(95%), but with a mean follow-up of 395 ± 49 days, only 14 (19%) patients maintained GGF closure (failure rate = 81%). They concluded that fistula size is the most predictive factor of fistula closure. The authors did not comment on symptom resolution or weight loss after endoscopic management.

We performed either a revision of the gastrojejunal anastomosis and pouch or a remnant gastrectomy with fistula excision. Laparoscopic revision of the anastomosis and pouch resizing has been effective in small case series of patients with pouch enlargement, insufficient weight loss, and poor pouch emptying [7]. Muller et al. reported successful weight loss outcomes at 12-month follow-up in their small case series report (n = 5 patients) [7]. However, 2 severe complications (40%) were documented, including iatrogenic jejunal perforation and an anastomotic stricture. High complication rates have also been recently reported by Iannelli et al. [18]. A total of 20 patients underwent pouch resizing for suboptimal weight loss and regain, with 6 patients (30%) developing complications, including acute abdomen, intraabdominal abscess, and pulmonary embolus. Although we do not report any mortality, we did have an early major complication rate of 16.6%, all occurring in patients who had an anastomotic revision procedure.

Over sixty percent of our cohort had previous open RYGB, with 4 patients having anastomotic leakage after their first RYGB, 2 with previously failed GGF endoscopic treatment (fibrin glue injection), and 1 with previous ulcer perforation. The local conditions associated with any chronic GGF in addition to these factors (open surgery and first RYGB complications) likely contributed to the long operative times and perioperative complication rate observed in our study. This highlights the challenging nature of these operations and the importance of tailoring the procedure to the presenting symptom. Laparoscopic remnant gastrectomy has been reported as a well-tolerated and effective surgical procedure for selective patients [6]. Cho et al. reported no mortality and no GGF recurrence in their experience with 15 patients [6]. In our study, we reported no early complications with this approach, but the indications were only met in 7 patients who had epigastric pain without weight regain.

The type of surgery chosen was based on surgeon preference, patient symptoms, and anatomic findings, but we do generally perform an anastomotic revision with fistula excision in the presence of weight regain, enlarged pouch, gastrojejunal anastomosis stenosis, or intractable marginal ulcers. In patients with weight regain, endoscopy revealed a large gastric pouch in 55.5% of cases. We hypothesize that the surgical treatment of GGF is dependent on the symptomatology, so in those with weight regain, a revision with fistula excision would be more appropriate to address the increase acidity of the pouch and to reduce its size to enable weight loss. Our study does not answer the question of which surgery is the most appropriate because of the small number of patients. We observed significant decreases in BMI after pouch and anastomotic revision for GGF in weight regain patients ($P = .002$), but we could not adequately compare outcomes with the remnant gastrectomy approach because of the low number of patients. Although the follow-up time was short, we also found maintenance of BMI reduction in patients who underwent the operation for symptoms of pain and difficulty maintaining weight loss. Only 1 patient with distal RYGB reported persistent symptoms of malnutrition after GGF repair that required J tube feeding maintenance for nutrition control and vitamin/iron supplementation therapy.

Although we have presented a relatively large series of patients with GGF who underwent surgical management, the study was limited by its retrospective design. There are no criteria agreed upon for selecting the most appropriate operation for patients with GGF, making prospective studies difficult to design. Also, most of our patients were referred from outside centers, thus introducing a selection bias [19].

Conclusion

In conclusion, GGF is a rare complication after RYGB. Common clinical presentations include abdominal pain, weight regain, and failure to thrive, all usually associated with marginal ulcers. Performing both upper GI contrast studies and endoscopy has the highest chance of detecting GGF preoperatively. Surgical treatment should be tailored to the presenting symptom, but anastomotic revision is associated with higher complication rates. More studies are needed to determine long-term outcomes after corrective surgery and the natural history of asymptomatic GGF.

Disclosures

The authors have no commercial associations that might be a conflict of interest in relation to this article.

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