



Gastric Remnant Perforation Caused by Peterson's Hernia Following One Anastomosis Gastric Bypass: a Rare Complication

Noura AlZarooni¹ · Bassem Abou Hussein¹ · Omar Al Marzouqi¹ · Ali Khammas¹

Published online: 6 March 2020

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Abstract

Introduction One anastomosis gastric bypass (OAGB) has gained popularity over the recent years; it appears to be an effective bariatric procedure with acceptable weight loss, co-morbidity resolution, and complication rates in the short and medium term. However, it still continues to have concerns in the bariatric community due to a spectrum of potential complications. To our knowledge, there are few published cases of internal hernia, but no published reports of gastric remnant perforation following OAGB.

Case Presentation We report a case of a 32-year-old female who developed a perforation of the remnant stomach along the gastric fundus secondary to bowel obstruction 5 years after OAGB. The perforation was managed by stapled resection of the perforated fundus and closure of Peterson's space for potential hernia as a causative factor, and the patient had a smooth postoperative recovery.

Discussion Early diagnosis is crucial in post bariatric emergencies with a low threshold of early intervention. Gastric remnant perforation was previously described in some reports following Roux-en-Y gastric bypass (RYGB) but not after OAGB. Etiology of perforation can be rationalized to primary gastric remnant pathology or secondary to external factors such as back pressure of mechanical/functional bowel obstruction.

Conclusion Peterson's hernia and gastric remnant perforation are rare, yet serious, complications that need to be kept in mind while dealing with post-OAGB patients presenting with abdominal pain. Early diagnosis and treatment are essential for a better outcome.

Keywords One anastomosis gastric bypass · Internal hernia · Peterson's space · Remnant · Perforation

Introduction

Laparoscopic one anastomosis gastric bypass (OAGB) was proposed as a simple and effective treatment for morbid obesity [1]. Although it has raised severe criticism after its introduction, it has favorable results in weight loss and obesity-related comorbidities resolution, with a low rate of mid- and

long-term complications [1]. Some long-term series in recent years showed that it is a promising procedure with good results and low complication rate while being technically a simpler operation comparing to RYGB [2], while other studies showed a higher rate of nutritional deficiencies as compared to Roux-en-Y gastric bypass (RYGB) [3].

Case Presentation

We present a 32-year-old female patient who presented to the emergency department with 12 h history of sudden upper abdominal pain that is associated with continuous vomiting and multiple episodes of watery diarrhea. She denied any fever, abdominal trauma, or other associated symptoms. The patient is known to have systemic lupus erythematosus (SLE) on oral steroids and had undergone laparoscopic OAGB 5 years earlier during which she lost 96 kg. Recent history was negative for non-steroidal anti-inflammatory drug (NSAID) use, alcohol abuse, and smoking.

✉ Bassem Abou Hussein
bassem.abouhussein@gmail.com

Noura AlZarooni
noura.alzarooni@gmail.com

Omar Al Marzouqi
dromar.almarzouqi@gmail.com

Ali Khammas
ali.khammas@gmail.com

¹ General Surgery Department, Rashid Hospital-DHA, PO Box: 4545, Oud Meitha Street, Dubai, United Arab Emirates

On examination, the patient was vitally stable (T, 36.5; P, 70/min; and BP, 99/56 mmHg). The abdomen was soft, mildly distended with epigastric tenderness.

The patient was started on intravenous (IV) fluids, proton pump inhibitors (PPI) and analgesia.

CT scan of the abdomen with IV contrast was done and showed dilatation of the remnant stomach, duodenum, and proximal jejunal loops with narrowing and twisting of the loop noted just before the anastomotic site with serous fluid noted in the lower abdomen (Figs. 1 and 2).

Emergency diagnostic laparoscopy was done and showed the following:

- Dilated remnant stomach with dilatation at the gastro-jejunal anastomotic site, pouched stomach, and proximal part of the alimentary limb
- Internal herniation of distal alimentary limb into Peterson's defect
- Perforated fundus of the remnant stomach with a thin serosal cover over the perforation (Fig. 3)
- Turbid fluid collection around the stomach (aspirated and showed a positive culture for *Enterobacter cloacae*)

Reduction of the internal hernia and closure of Peterson's space was done, and the perforated fundus was resected using Endo-GIA stapler. Postoperatively, the patient was kept on IV hydration, PPI, analgesia and antibiotic coverage, and an enhanced recovery protocol after surgery was implemented. The patient was mobilized few hours after surgery, and oral clear fluids were started and tolerated on the first day after surgery.

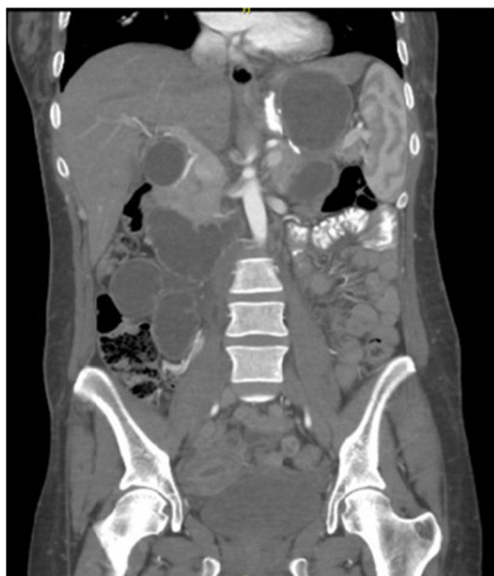


Fig. 1 Coronal section of CT scan showing dilatation of the remnant stomach, duodenum, and proximal jejunal loops

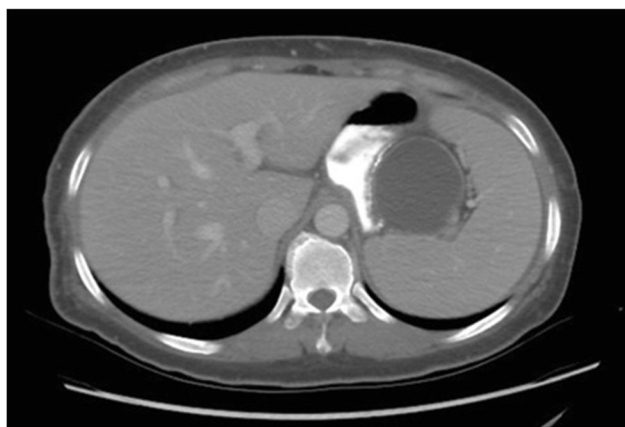


Fig. 2 Cross-section of CT scan showing dilatation of the remnant stomach with contrast in the gastric pouch

The patient had a smooth postoperative course and was discharged home on the fourth day after surgery. During outpatient follow-up, the patient was in a good general condition with no significant complaints.

Pathologic examination of the resected stomach showed gastric wall with a small area of prominent mucosal ulcerations with transmural dense acute (neutrophilic) inflammation with disrupted muscle layers, favoring gastric perforation and no evidence of intestinal metaplasia.

Discussion

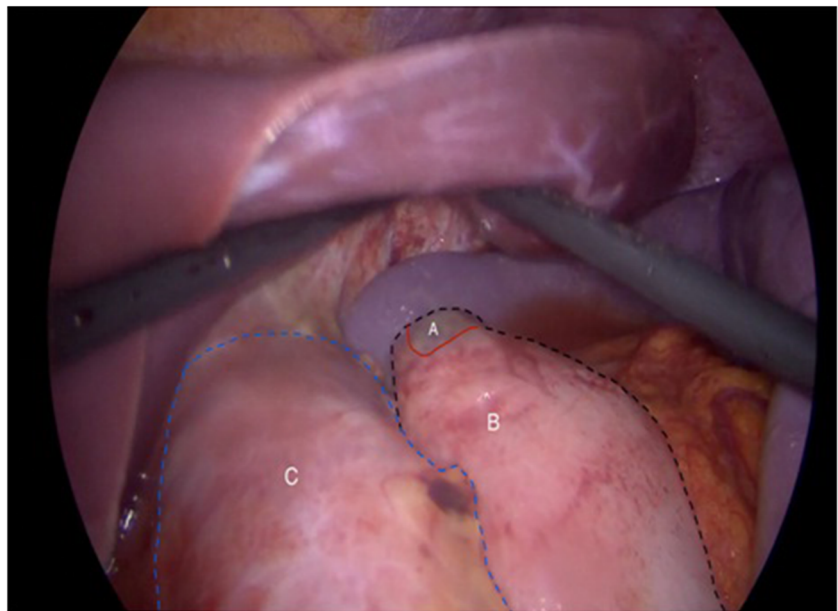
The frequency of performing OAGB has increased considerably in the current decade [1]. It proposes a simplification of RYGB by performing a single anastomosis, with a significant reduction of technical complexity, shorter operative time, and potential reduction in morbidity and mortality [1]. Several studies have demonstrated the benefits provided by this procedure, including excess weight loss and resolution of comorbidities equivalent to or even higher than those observed after the RYGB [4]. A comparison of OAGB to other standard bariatric procedures is being thoroughly studied at the level of randomized controlled trials and meta-analysis with no globally concurrent conclusions been established till now [5].

OAGB holds a small risk of developing potential complications including marginal ulcers, symptomatic bile reflux, anastomosis leakage, and stenosis and may require revisional surgery [6].

Internal herniation, anastomotic ulcer perforation, and gastric remnant perforation are rare but serious complications following bariatric surgery.

Unlike the RYGB, OAGB technique has the advantage of avoiding mesentery opening, thus reducing the risk of internal hernia. Petersen's space is the space between the afferent loop mesentery of gastro-jejunostomy and the lower part of

Fig. 3 (A) Perforation site, (B) gastric remnant (after aspiration), (C) gastric pouch. Diagnostic laparoscopy showing perforated fundus of the remnant stomach with a thin serosal cover over the perforation



transverse colon mesentery that is created after gastrojejunostomy [7]. According to the Delphi consensus paper on OAGB [8], 82.0% of the experts agreed that the routine closure of Petersen's space was unnecessary. However, increasing evidence indicates the need for closing of Petersen's defect as described by Mahawar [9] as it is probably commoner after OAGB than previously reported. Up to now, there are four cases of Petersen's hernia after OAGB [10–13]. In our unit, we are performing OAGB since 2011, and 1155 cases were done between January 2011 and June 2019 and resulted in three cases of internal hernia (0.25%). The first two patients were managed by laparoscopic reduction of the internal hernia and closure of the Peterson's defect, while the third patient is the one reported in this paper and needed resection of the perforated remnant.

Gastric remnant perforation following RYGB is very rare but has been described previously in some reports [14]. A literature search was performed, and no reports on perforation of gastric remnant post OAGB were found.

Etiology of gastric remnant perforation can be rationalized to primary gastric remnant pathology that includes ulcer diseases. Recent studies examining the histological changes of the gastric remnant observed changes of the mucosa including chronic gastritis, pan gastritis, atrophy, and intestinal metaplasia [15]. On the other hand, gastric remnant perforation secondary to remote pathology as proposed in this case of distal obstruction triggering back pressure, dilatation, and ischemic perforation, supported by the location of perforation being at the greater curvature, near the remnant cardia in consistence with the distinctive location of ischemic perforation [14, 16].

Never the less, other risk factors which are to be considered in pathogenesis of gastric remnant perforation is the use of

oral steroids, although a meta-analysis, which is based on an appreciably large number of double-blind RCTs ($n = 93$) and patients ($n = 6602$), has failed to find a statistically significant association between steroid administration and peptic ulcer [17].

In fact, according to our findings, in this case, the proposed reason for jejunal and gastric remnant dilatation was due to Peterson's space hernia (herniation without complete obstruction) that leads to back pressure effect and ischemic perforation at the gastric remnant.

Such rare cases have always a big diagnostic challenge and need to be managed by an experienced team. Our bariatric unit is routinely involved in bariatric complications referred from different institutes for definitive management. Early diagnosis is usually helpful in reducing both morbidity and mortality in such cases.

The proposed treatment of perforated gastric remnant is resection of the bypassed stomach as mentioned in published case reports [14].

Conclusion

Internal hernia following OAGB is probably not as common as in RYGB, but it seems to be definitely more frequent than it is reported. Gastric remnant perforation following OAGB is one of the rare complications following different bariatric procedures. However, such rare complications should be kept in mind while dealing with patients presenting with abdominal pain after surgery to avoid any delay in the diagnosis and treatment.

Compliance with Ethical Standards

Statement of Informed Consent Informed consent was obtained from all individual participants included in the study.

Ethical Approval All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflict of Interest The authors declare that they have no conflict of interest.

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