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## Gastric remnant mesentero-axial volvulus following Roux-en-Y esophagojejunostomy: A rare complication

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## ABSTRACT

**INTRODUCTION:** Acute gastric volvulus is a surgical emergency with a mortality as high as 15–20%. The rarity of gastric volvulus requires high index of clinical suspicion especially in the patients with altered anatomy, to allow immediate surgical intervention and reduce the morbidity and mortality.

**PRESENTATION OF CASE:** We present an unusual case of gastric remnant volvulus several months following Roux-en-Y esophagojejunostomy performed in an obese patient for severe, recurrent gastroesophageal reflux disease (GERD) and failed prior fundoplication. The patient was treated with gastropexy and Stamm gastrostomy tube.

**DISCUSSION:** Gastric volvulus is a rare phenomenon, in which the stomach rotates around the short (mesentero-axial) or longitudinal (organo-axial) axes. Diagnosis of gastric volvulus is challenging due to non-specific presentation and rarity of this clinical condition. The diagnosis of volvulus in patients with altered anatomy is even more challenging, requiring a high index of suspicion, and heavily relies on cross sectional imaging.

**CONCLUSION:** Extensive gastric mobilization is a key step in several foregut and bariatric surgeries, this will leave the stomach with no attachments posteriorly and along the greater curvature and increases the likelihood of volvulus.

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## 1. Introduction

Acute gastric volvulus is a surgical emergency with a mortality as high as 15–20% [1]. It is characterized by abnormal rotation of the stomach by more than 180°, creating a closed loop obstruction with the risk of strangulation, necrosis and perforation. Acute gastric volvulus is more common in children; however, some upper gastrointestinal (GI) tract surgeries commonly performed in adult population alter the anatomy and predispose for the complications that are considered rare in preserved anatomy. The rarity of gastric volvulus requires high index of clinical suspicion especially in the patients with altered anatomy, to allow immediate surgical intervention and reduce the morbidity and mortality.

The stomach is fixed in place by four “ligaments”: gastrohepatic, gastrosplenic, gastrocolic and gastrophrenic. Extensive gastric mobilization is a key step in several foregut and bariatric surgeries, this will leave the stomach with no attachments posteriorly and along the greater curvature and increases the likelihood of volvulus. Roux-en-Y esophagojejunostomy (RYEJ) is the procedure offered to patients with multiple failed fundoplication or those with persistent gastroesophageal reflux disease (GERD) following Roux-en-Y

gastric bypass (RYGB). Here we present an unusual case of gastric remnant volvulus several months following RYEJ in an obese patient performed for severe, recurrent GERD and failed prior fundoplication. This work has been reported in line with the SCARE 2020 criteria [2].

## 2. Case presentation

Patient is a 43-year-old, morbidly obese female with history of laparoscopic hiatal hernia repair with Nissen fundoplication, performed 10 years prior at another institution. She presented to our clinic in October 2019 with recurrent symptoms of heartburn, regurgitation as well new upper respiratory and pulmonary symptoms. Patient underwent standard evaluation per institutional protocol including barium esophagram, upper endoscopy, wireless pH monitoring, 4-h gastric emptying study, and high-resolution manometry. She was found to have a partial disruption of the prior fundoplication, 3 cm hiatal re-herniation, Los Angeles Grade D esophagitis, DeMeester score of 73.8 on combined 48 h Bravo pH monitoring and delayed gastric emptying. Patient was optimized on maximal antisecretory therapy and underwent laparoscopic Roux-en-Y esophagojejunostomy gastric bypass. Intraoperatively, the left gastric pedicle appeared to have been previously divided during the original fundoplication surgery. The Roux limb was created in an antecolic, retrogastric fashion. Patient recovered well and was discharged on post-operative day three. Outpatient course

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**Fig. 1.** Axial view of the abdominal CT scan showing volvulized and dilated gastric remnant, with the fundus positioned in the pelvis.

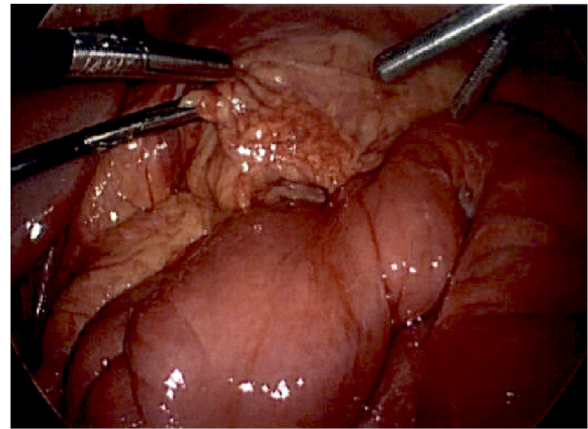


**Fig. 2.** Coronal view of the abdominal CT scan showing volvulized and dilated gastric remnant, with the fundus positioned in the pelvis.

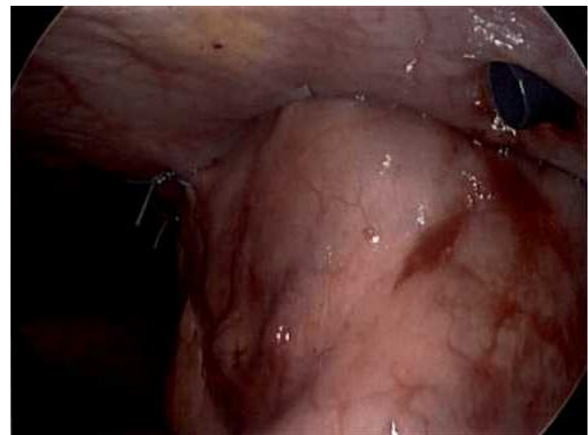
was significant for esophagojejunal anastomotic stricture and was successfully managed with serial endoscopic dilation.

Three months later, in February 2020 patient represented with epigastric pain and severe regurgitation. Imaging revealed herniation of the esophagojejunal anastomosis with paraesophageal herniation of an additional loop of jejunum posteriorly. She underwent laparoscopic reduction and paraesophageal hernia repair. All bowel was viable, however extensive adhesiolysis and gastric remnant mobilization was required to properly expose the posterior hiatus. At the conclusion of the procedure the proximal Roux limb was pexied to the crura, and the retrogastric Roux limb configuration was reestablished. Post-operative course was unremarkable, diet was advanced per protocol and patient was discharged.

Two months later, in April 2020, patient represented with two days of progressive mid-abdominal pain, dyspnea, and retching. Vitals were significant for a heart rate of 120 and oral temperature of 38.8C. Patient appeared in mild distress with vague abdominal tenderness to palpation without peritonitis. Laboratory workup was remarkable for mild leukocytosis; however, liver function tests and pancreatic enzymes were normal. COVID-19 testing was negative.



**Fig. 3.** Intraoperative image showing mesentero-axial volvulus with the gastric remnant flipped 180 degrees anteriorly.



**Fig. 4.** Intraoperative image after repositioning of gastric remnant in the upper abdomen, and gastropexy of the remnant to the left hemidiaphragm and anterior abdominal wall.

CT scan of the chest, abdomen, and pelvis revealed a volvulized and dilated gastric remnant, with the fundus positioned in the pelvis (Figs. 1 and 2). Patient was taken for emergent diagnostic laparoscopy. Intraoperatively a mesentero-axial volvulus was confirmed with the gastric remnant effectively flipped 180-degrees anteriorly (Fig. 3). The viable gastric remnant was repositioned in the upper abdomen, and remnant gastropexy was performed to the left hemidiaphragm and anterior abdominal wall (Fig. 4). A Stamm gastrostomy tube was also placed for decompression, feeding access and addition anchoring. Over the subsequent days the patient's diet was advanced with supplemental tube feedings, and she was discharge on post-operative day five. Gastrostomy tube was removed in June 2020 and patient is currently doing well tolerating a solid diet.

### 3. Discussion

Gastric volvulus is a rare phenomenon, in which the stomach rotates around the short (mesentero-axial) or longitudinal (organo-axial) axes. This clinical condition was first described by Berti on an autopsy of a 61-year-old women in 1866 [3] and Berg was the first to report successful surgical treatment of gastric volvulus in 1897 [4]. Depending on the degree and duration of twisting, it may be classified as acute or chronic. Presentation includes abdominal pain and obstructive symptoms of regurgitation and retching. It may rapidly progress to ischemia, perforation, and sepsis. Acute gastric volvulus represents a true surgical emergency, requiring prompt recogni-

tion and management, with mortality rates approaching 20% [1]. Diagnosis of gastric volvulus is challenging due to non-specific presentation and rarity of this clinical condition. The classic presentation is referred to as Borchardt's triad and consists of retching without vomiting, epigastric pain and inability to place a nasogastric tube. The diagnosis of volvulus in patients with altered anatomy is even more challenging and heavily relies on cross sectional imaging.

Primary or idiopathic gastric volvulus occurs without clear etiology. More commonly, secondary gastric volvulus may result from disruption of native anatomy or development of new non-native torsion forces. The condition is most classically associated with large paraesophageal hernias however has also been reported in pediatric malrotations [5], following gastrostomy tube placement [6] as well as with bariatric procedures including sleeve gastrectomy [7,8], gastric plication [9], and after adjustable gastric band placement or removal [10,11]. In a primary RNY gastric bypass there is minimal dissection performed of the remnant stomach and the posterior attachments to the stomach remain mostly intact. Roux-en-Y gastric bypass after failed antireflux surgery has additional factors that could confer an increased risk of volvulus. There have been several reports of gastric volvulus after laparoscopic gastric banding and sleeve gastrectomy due to excessive posterior dissection as well as division in of the greater omentum from the greater curvature in the case of sleeve gastrectomy [12]. The likelihood of volvulus can be even higher after significant weight loss following these procedures as the laxity may be further increased in all structures. Several cases of volvulus have been reported after laparoscopic gastric banding placement and even after removal. This resulted in recommendation of minimizing the extent of posterior gastric dissection during the placement of band as this maneuver increases the mobility of stomach [11]. During antireflux surgery, the short gastric and posterior gastric vessels are divided to mobilize the fundus and relieve tension on the fundoplication. Without these attachments the stomach is more prone to volvulus.

Acute volvulus requires immediate intervention to prevent vascular compromise. Endoscopic reduction has been reported but does not address the underlying pathology, and has no utility for RNY anatomy. There have been also reports of stenting for cases of gastric volvulus after sleeve gastrectomy, but the treatment of gastric volvulus is almost always surgical that allows addressing the intraabdominal pathology. A number of different surgical options have been described including, gastric decompression with gastrostomy, different types of gastropexy and gastrectomy [13]. Gastrectomy is indicated in the presence of full thickness necrosis.

#### 4. Conclusion

The rapid increase in the number of bariatric procedures has resulted in a large number of patients with altered anatomy. This alteration in anatomy and attachments are associated with increase in complications that were known to be rare in the setting of preserved anatomy. Some bariatric and foregut procedures leave stomach with no posterior attachments, which may predispose it to volvulus. Non-specific clinical presentation of gastric volvulus highlights the need for high degree of suspicions for this rare cause of abdominal pain in patients with altered gastrointestinal tract anatomy.

#### Declaration of Competing Interest

The authors have no relevant conflict of interest to disclose.

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#### Consent

No identifying characteristics/features are noted throughout the case report. Written informed consent was obtained from the patient. Patients in our institution provide consent to allow use of their deidentified clinical information for research purpose.

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