

## Single Case

---

# The Key Role of Upper Endoscopy in Diagnosing Gastric Herniation and Volvulus in Acute Gastrointestinal Obstruction

Dhruv Sarwal Na Yu Nirmal Veeramachaneni Florence Aslinia

University of Kansas Medical Center, Kansas City, KS, USA

### Keywords

Esophagogastroduodenoscopy · Upper endoscopy · Gastric volvulus · Gastric herniation · Laparoscopy · Upper abdominal pain · Nausea and vomiting · Chest wall reconstruction · Omental flap transposition

### Abstract

The diagnosis of gastric volvulus can be a clinical challenge as it is rare, and the symptoms are often nonspecific and intermittent. Upper endoscopy is a minimally invasive intervention that may be repeated more than once to provide key information and ultimately establish such a diagnosis. To emphasize the role of upper endoscopy in surgical cases with recurrent upper gastrointestinal obstructions, we present a case of intermittent gastric volvulus in a patient with a remote history of complex chest wall reconstruction for invasive breast cancer using an omental flap. She presented with substernal chest pain, belching, nausea, and vomiting. Although the initial imaging suggested duodenal obstruction, exploratory laparotomy and intraoperative upper endoscopy did not show any pathology in the stomach or duodenum. Repeat upper endoscopy due to recurrence of obstructive symptoms shortly after the initial exploratory laparotomy revealed a gastric volvulus. This resulted in abnormal duodenal orientation which caused intermittent duodenal obstruction while the pathology was in the stomach. Gastric volvulus may be spontaneously reducible, leading to discordance in findings during the clinical course. This could explain the absence of visible twisting on initial exploratory laparotomy in this patient and the subsequent findings of volvulus on upper endoscopy. Thus, it is important to consider gastric volvulus as a possible cause of symptoms despite initial negative findings as it is a dynamic process and may only be discovered through relook upper endoscopy and imaging.

© 2022 The Author(s).  
Published by S. Karger AG, Basel

---

Correspondence to:  
Florence Aslinia, [faslinia@kumc.edu](mailto:faslinia@kumc.edu)

## Introduction

Reconstruction of sternal excision defects using omental flaps is a well-described and widely practiced procedure [1, 2] which can be performed laparoscopically [3] for various indications, including management of breast cancer metastatic to the chest wall. Several possible issues may be encountered with these omental flap reconstructions. These include common complications of abdominal surgery as well as the risk of herniation of abdominal contents through the tunnels created for omental flap transposition [4].

Herniation of the stomach through such a portal may predispose to the formation of a gastric volvulus, with twisting occurring most commonly along the long axis of the stomach (organo-axial volvulus). While rotations of more than 180° present acutely, a lesser degree of twisting may result in symptoms that are insidious and chronic [5]. Such herniation is prevented via use of gastropexy stitches at the time of the omental mobilization, but these stitches may fail in the years beyond the original procedure.

We present a case of gastric herniation several years after sternal excision for metastatic breast carcinoma, which was reconstructed with an omental flap transpositioned through an iatrogenic Morgagni defect within the diaphragm. This case demonstrates the clinical challenge of diagnosing a gastric volvulus in this setting. This case emphasizes the importance of considering gastric herniation among the differential diagnosis for proximal gastrointestinal tract obstruction, identified on imaging, especially in the context of postsurgical anatomy.

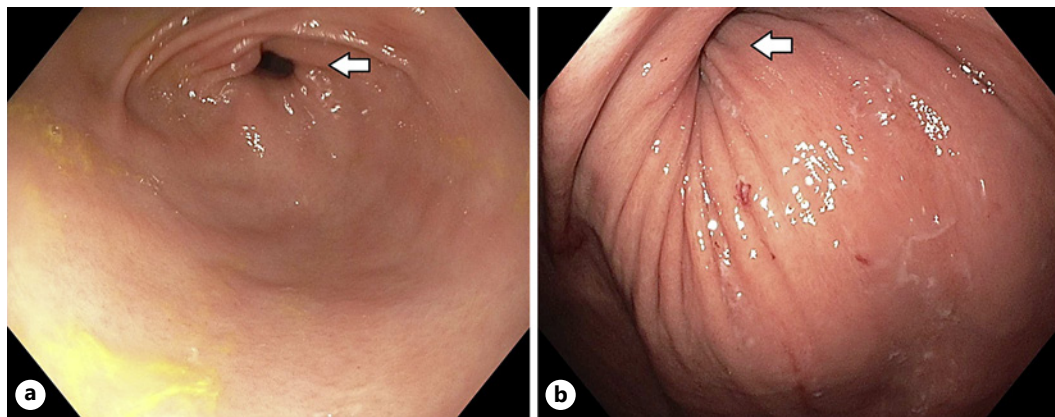
## Case Presentation

A 72-year-old woman presented to the emergency department with substernal chest pain, belching, nausea, and vomiting, concerning for acute bowel obstruction. Her history was notable for metastatic breast cancer, with sternal and left chest wall invasion, for which she underwent full-thickness chest wall excision with an omental flap reconstruction and polytetrafluoroethylene mesh placement for the resulting defect, 5 years prior to her presentation to the emergency department. Other significant medical history included obesity, diabetes, hypertension, and chronic opioid use. Prior to her acute presentation, she had been experiencing early satiety with meals and intermittent bloating, abdominal distension, and nausea and vomiting.

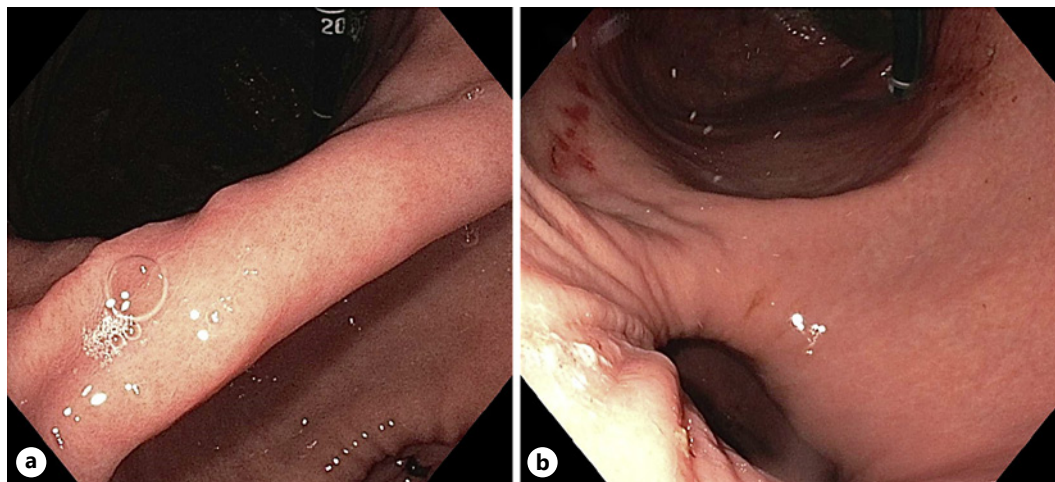
A CT scan of the abdomen and pelvis performed at presentation for suspected bowel obstruction revealed a stable mild ectasia of the ascending thoracic aorta without dissection, stable configuration of previous anterior wall pectus deformity repair, and high-grade obstruction of the transverse duodenum. Due to a concern for an internal paraduodenal hernia as a possible cause of her obstructive symptoms, she underwent exploratory laparotomy which showed acute angulation of the duodenum at the ligament of Treitz without internal hernia. The transverse mesocolon was noted to be in a cephalad direction secondary to the omental flap repair but did not appear to be contributing to the obstruction.

One day after the exploratory laparotomy, her symptoms recurred. A video-fluoroscopic small bowel series was performed, which showed a distended stomach without passage of contrast into the duodenum. This was believed to be due to persistent or new obstruction at the gastric outlet or duodenum following the exploratory laparotomy on the previous day.

A push enteroscopy was performed to evaluate the duodenum and proximal jejunum. The stomach showed an abnormal orientation of the antrum on forward view (Fig. 1b, compared with normal view in Fig. 1a) as well as on retroflexion of the endoscope (Fig. 2b, compared with normal view in Fig. 2a), concerning for gastric volvulus. Intubation of the pyloric channel was performed with great difficulty due to looping. The duodenum had the appearance of a



**Fig. 1.** Normal endoscopic view of antrum (a) compared with abnormal orientation (b).

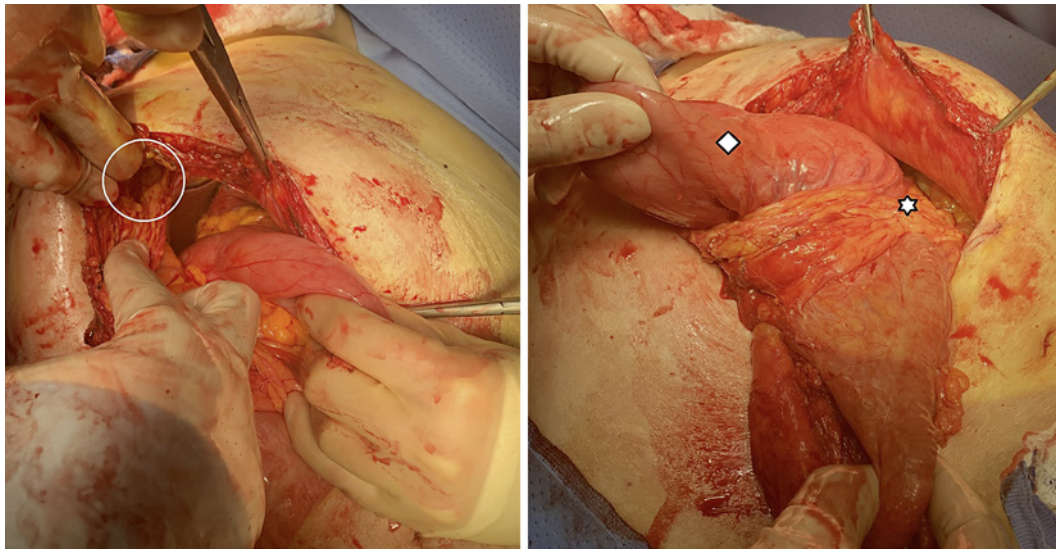


**Fig. 2.** Normal orientation on endoscopic retroflexed view (a) compared with abnormal orientation (b).

blind pouch with twisted mucosal folds, findings concerning for volvulus. This torsion was relieved by introducing a large amount of fluid into the duodenum during the procedure. Only after this intervention could the collapsed segment of duodenum be traversed. While examining the stomach, the endoscope light was observed through the reconstructed chest wall defect, which was believed to be due to herniation of the stomach into the surgical defect created in the diaphragm at the time of her operation several years ago.

A contrast CT scan of the chest, abdomen, and pelvis performed subsequently showed herniation of the distal body of the stomach into the region of the old chest wall defect. None of the administered contrast could be seen beyond the herniated portion of the stomach. This confirmed the diagnosis of gastric herniation and volvulus.

She underwent surgery for repair of the defect resulting in gastric herniation (encircled in Fig. 3). Intraoperative findings were significant for development of a volvulus in the herniated portion of the stomach, with omentum along the greater curvature (Fig. 3, labeled) within the presternal space, anterior to the mesh that was used for sternal reconstruction. The stomach was reduced and gastropexy was performed. The defect was repaired to prevent future recurrence with no compromise of the omental flap due to sufficient interval to establish local



**Fig. 3.** Diaphragmatic defect permitting gastric herniation (circled). Herniated portion of stomach (diamond) with omentum along greater curvature (star).

vascularity. She presented for follow-up a year after the surgery, and there was no report of recurrent upper gastrointestinal obstructive symptoms.

### Discussion

The highlight in this case was the role of upper endoscopy in the discovery of gastric volvulus when repeated attempts at imaging and an exploratory laparoscopy failed to make the diagnosis. Upper endoscopy revealed a key finding for the diagnosis – an unusual anatomical configuration of the stomach only explained by gastric herniation and volvulus. Interestingly, in our literature search, we found only 1 case describing gastric herniation through such a diaphragmatic defect [6], highlighting the unusual nature of this patient's pathology.

Omental flaps may be used for a variety of purposes, including chest wall repair after sternal excision or sternotomy procedures [7], as was the case for our patient. The flap may be mobilized via a diaphragmatic [8] or a subcutaneous tunnel [9]. Herniation of abdominal viscera through the iatrogenic defect created for omental mobilization is a possible complication of such omental flap transfers [9]. These hernias may be managed either with conventional surgery or laparoscopic reduction [10]. Internal herniation in this context may lead to development of a gastric volvulus if the stomach is involved, like that seen with paraesophageal or diaphragmatic herniation.

Upper endoscopy can be a valuable diagnostic tool in situations where the cause for upper intestinal obstruction is not identified via imaging or surgical intervention. Visualization of the stomach in these patients may reveal tortuosity of gastric folds, sometimes in a spiraling configuration, sometimes with an inability to intubate the pyloric channel [11, 12] that may be amenable to endoscopic detorsion [13]. In summary, this case underlines two things: first, the importance of considering the possibility of volvulus and herniation of internal organs as a cause of gastrointestinal obstruction in the setting of altered thoracoabdominal anatomy after surgery, and second, the utility of endoscopy in elucidating this challenging diagnosis when conventional diagnostic modalities are insufficient.

### Statement of Ethics

The authors have no ethical conflicts to disclose. Written informed consent was obtained from the patient for publication of this case report and the accompanying images. This retrospective review of patient data did not require ethical approval in accordance with the University of Kansas Medical Center Institutional Review Board guidelines. The University of Kansas Medical Center Institutional Review Board does not require ethics approval for publication of a descriptive report of a small number of cases.

### Conflict of Interest Statement

The authors have no conflicts of interest to declare.

### Funding Sources

No funding was received for this article.

### Author Contributions

D.S. and N.Y. were responsible for drafting the manuscript under the supervision of N.V. and F.A., who participated in the care of the patient as the attending physicians. N.V. and F.A. made critical revisions as necessary and provided clinical images to support the manuscript.

### Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

### References

- 1 Jurkiewicz MJ, Arnold PG. The omentum: an account of its use in the reconstruction of the chest wall. *Ann Surg.* 1977;185:548–54.
- 2 Fix RJ, Vasconez LO. Use of the omentum in chest-wall reconstruction. *Surg Clin North Am.* 1989;69:1029–46.
- 3 Acarturk TO, Swartz WM, Luketich J, Quinlin RF, Edington H. Laparoscopically harvested omental flap for chest wall and intrathoracic reconstruction. *Ann Plast Surg.* 2004;53:210–6.
- 4 Hultman CS, Carlson GW, Losken A, Jones G, Culbertson J, Mackay G, et al. Utility of the omentum in the reconstruction of complex extraperitoneal wounds and defects: donor-site complications in 135 patients from 1975 to 2000. *Ann Surg.* 2002;235:782–95.
- 5 Rashid F, Thangarajah T, Mulvey D, Larvin M, Iftikhar SY. A review article on gastric volvulus: a challenge to diagnosis and management. *Int J Surg.* 2010;8:18–24.
- 6 Taeger CD, Kneser U, Horch RE. Four-flap compound repair of thoracic hernia after sternum osteomyelitis and omentum flap. *J Thorac Cardiovasc Surg.* 2012;144:e117–9.
- 7 Rocco G. Anterior chest wall resection and reconstruction. *Oper Tech Thorac Cardiovasc Surg.* 2013;18:32–41.
- 8 Vyas RM, Prsic A, Orgill DP. Transdiaphragmatic omental harvest: a simple, efficient method for sternal wound coverage. *Plast Reconstr Surg.* 2013;131:544–52.
- 9 Poris S, Goldberg L, Miner J. Laparoscopic repair of a subxiphoid hernia after omental flap reconstruction. *CRSLS.* 2015;19.
- 10 Muysoms FE, Cathenis KK, Hamerlijnck RP, Claeys DA. Laparoscopic repair of iatrogenic diaphragmatic hernias after sternectomy and pedicled omentoplasty. *Hernia.* 2009;13:617.

- 11 Cardile AP, Heppner DS. Gastric volvulus, Borchardt's triad, and endoscopy: a rare twist. [Hawaii Med J](#). 2011; 70:80–2.
- 12 Aslinia C, Strickler S, Aslinia F. Lost in the stomach. [J Dig Endosc](#). 2016;7(1):36–7.
- 13 Tsang TK, Walker R, Yu DJ. Endoscopic reduction of gastric volvulus: the alpha-loop maneuver. [Gastrointest Endosc](#). 1995;42:244–8.