

CLINICAL VIGNETTE

A Case of Gastric Volvulus

Zahir Basrai, MD and Manuel Celedon, MD

A 59-year-old male with past history of atrial fibrillation (on warfarin), ventricular fibrillation (status post AICD placement) and prior surgeries for Zenker's diverticulum resection 1995, and perforated duodenal ulcer after endoscopy in 2013 presents to the emergency department with "immediate emesis." He reports multiple episodes of immediate postprandial vomiting for the last 4 days. The emesis is nonbloody, nonbilious and consists of undigested food. He reports early satiety and a 15-pound weight loss since his symptoms started. He denies dysphagia or odynophagia. He reports no associated abdominal pain and the patient denies fevers, chills, chest pain, or shortness of breath. His review of systems is otherwise negative.

On physical exam he was in no distress with normal vital signs. Abdominal exam was nondistended with normal bowel sounds and free of tenderness, rebound, guarding or rigidity.

Labs included white blood cell count of 6.75 k/uL, hemoglobin of 13.8 g/dL, hematocrit of 41.0%, platelets of 234 k/uL, and INR of 2.3 and unremarkable basic metabolic panel.

He was initially treated with intravenous (IV) fluids and ondansetron 4mg. The gastrointestinal team was consulted and emergent barium swallow KUB revealed a sliding hernia in addition to a paraesophageal hernia with a component of gastric volvulus (Figure 1). The general surgery team was consulted and the patient was taken to the operating room for emergent reduction of gastric volvulus and laparoscopic paraesophageal hernia repair with biogenic mesh.

Discussion

Acute gastric volvulus, a rare cause of abdominal pain, is a surgical emergency that is associated with a high morbidity and mortality.^{1,2} This rare and difficult to diagnose entity was first described by Berti in 1866. Gastric volvulus can be acute or chronic and occurs when the stomach rotates onto itself creating a closed-loop obstruction that, if left untreated, leads to strangulation.³

Anatomically, the stomach is held in place at the esophageal hiatus and pylorus by the gastrophrenic, gastrohepatic, gastrosplenic, and gastrocolic ligaments. Primary gastric volvulus (Type 1 or idiopathic) typically occurs in adults when there is ligamentous laxity, and makes up two thirds of total cases. In secondary gastric volvulus (Type 2 or acquired), predisposing factors facilitate the rotation of the stomach along its axis. Risk factors for secondary gastric volvulus include: paraesophageal

hernia, hiatal hernia, eventration of the diaphragm, gastric ulcer, gastric neoplasm, extrinsic pressure on the stomach from enlarging organs, low insertion of the esophagus, or phrenic nerve damage causing diaphragmatic paralysis.⁴



Figure 1: Barium KUB images revealing abnormal anatomy of the GE Junction. The direction of emptying into the expected stomach is opposite of normal anatomy. A paraesophageal hernia is identified, with a component of transverse or mentero-axial type of gastric volvulus.

The stomach can rotate along two axis, the organoaxial and mesenteroaxial axes and these form the basis for the most commonly used classification system. The Singleton classification system describes 3 forms of gastric volvulus: organoaxial, mesenteroaxial, and combined type.⁵ Organoaxial volvulus is the most common and occurs when the stomach wraps along a line that runs between the pylorus and the gastro-esophageal axis. This results in the greater curvature swinging anteriorly and upward so that the stomach is upside-down. Gastric volvulus along this axis is usually associated with diaphragmatic hiatus defects. Rotation along this axis often results in vascular compromise, strangulation, and gangrene.⁶ The second axis along which the gastric volvulus occurs is the mesentero-axial axes. In this type of gastric volvulus, the pyloric area rotates from right to left along the plane that runs from the center of the greater curvature to the porta hepatis. Mesen-

teroaxial rotation is more commonly associated with chronic gastric volvulus.

Diagnosing gastric volvulus is incredibly difficult due to vague presenting symptoms. The symptoms vary depending upon the rapidity of onset and degree of torsion and may help differentiate acute versus chronic gastric volvulus. Acute gastric volvulus should be considered in patients presenting with the sudden onset of constant severe epigastric or left upper quadrant abdominal pain and minimal findings on abdominal exam. The classic Borchardt's triad usually associated with acute gastric volvulus includes: severe epigastric pain, retching without vomiting, and inability to pass nasogastric (NG) tube.⁷ Patients can also present with nonspecific symptoms consistent with gastric outlet or bowel obstruction including: nausea, vomiting, and inability to tolerate oral intake. Gastric distention can result in diaphragmatic irritation and hiccups.⁸ The diagnosis of gastric volvulus should be considered in patients with unexplained hiccups. Gastric hemorrhage may also occur and is a late sign resulting from gastric ischemia.⁹ Abdominal signs may be minimal, especially when the stomach becomes totally intrathoracic.¹⁰ The diagnosis is more difficult in chronic gastric volvulus because the symptoms are blunted as well as intermittent, often leading to misdiagnosis as peptic ulcer disease or gallbladder pathology.

The gold standard imaging modality for diagnosis of gastric volvulus in stable patients is a barium swallow study. CT imaging may also be used and has the added benefit of detecting predisposing factors, excluding perforation, gastric pneumatosis as well as other abdominal pathology.¹¹⁻¹³ In hemodynamically unstable patients, a plain abdominal X-ray series is preferred and may reveal a gas filled stomach in the thorax or an "upside-down stomach", where the greater curvature is displaced superiorly and the lesser curvature inferiorly.^{11,14}

The initial management of hemodynamically unstable patients with acute gastric volvulus includes medical resuscitation and preparation for definitive surgical management. Patient should be NPO and receive aggressive intravenous volume resuscitation. Gastric decompression is performed by NG tube placement. However, NG tube placement is contraindicated if there is evidence of pneumatosis or perforation on imaging. The goal of surgical management is to reduce the stomach torsion and resect any gangrenous tissue. In cases of secondary volvulus, the surgical management may also include correction of any predisposing factors that increase risk of recurrence of gastric volvulus. Minimally invasive laparoscopic surgery has been successfully adopted in the management of select hemodynamically stable patients not requiring emergent surgery.¹⁵ Patients may also be managed non-operatively with emergency endoscopic reduction if there are contraindications to surgery.¹⁶ This conservative approach results in a high recurrence rate but allows for medical optimization of poor surgical candidates prior to definitive surgical repair.

In summary, the diagnosis of gastric volvulus is elusive and a high index of suspicion should be held in patients presenting

with severe epigastric or left upper quadrant abdominal pain with an otherwise unremarkable abdominal examination. This diagnosis should also be considered in patients with unexplained intermittent chronic epigastric abdominal pain with symptoms suggestive of gastric outlet or bowel obstruction, peptic ulcer, or gallbladder disease. Barium swallow or CT imaging should be ordered on patients where there is concern for gastric volvulus. Once the diagnosis is made, standard resuscitation is initiated while awaiting definitive surgical management.

REFERENCES

1. **Tanner NC.** Chronic and recurrent volvulus of the stomach with late results of "colonic displacement". *Am J Surg.* 1968 Apr;115(4):505-15. PubMed PMID: 5642730.
2. **Gabor ME.** Volvulus of the stomach. *Am J Surg.* 1940; 50(1):104-7. doi:10.1016/S0002-9610(40)90368-3.
3. **Berti A.** Singolare attortiglia mento dele esofago colduodeno seguita da rapida morte. *Gazz Med Ital.* 1866;9:139. <https://ci.nii.ac.jp/naid/10021831981/>. Accessed September 16, 2018.
4. **Milne LW, Hunter JJ, Anshus JS, Rosen P.** Gastric volvulus: two cases and a review of the literature. *J Emerg Med.* 1994 May-Jun;12(3):299-306. Review. PubMed PMID: 8040585.
5. **Singleton AC.** Chronic gastric volvulus. *Radiology.* 1940; 34(1):53-61. doi:10.1148/34.1.53
6. **Sleiwah A, Thomas G, Crawford I, Stanek A.** Gastric volvulus: a potentially fatal cause of acute abdominal pain. *BMJ Case Rep.* 2017 Mar 8;2017. pii: bcr2016217708. doi: 10.1136/bcr-2016-217708. PubMed PMID: 28275016.
7. **Borchardt M.** Zur pathologie und therapie des magenvolvulus. *Arch Klin Chir.* 1904;74:243-250. <https://ci.nii.ac.jp/naid/10027859273/>. Accessed September 16, 2018.
8. **McElreath DP, Olden KW, Aduli F.** Hiccups: a subtle sign in the clinical diagnosis of gastric volvulus and a review of the literature. *Dig Dis Sci.* 2008 Nov;53(11): 3033-6. doi: 10.1007/s10620-008-0258-2. Epub 2008 May 9. Review. PubMed PMID: 18465247.
9. **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(1):18-24. doi: 10.1016/j.ijsu.2009.11.002. Epub 2009 Nov 10. Review. PubMed PMID: 19900595.
10. **Ellis H.** Diaphragmatic hernia--a diagnostic challenge. *Postgrad Med J.* 1986 May;62(727):325-7. PubMed PMID: 3763538; PubMed Central PMCID: PMC2418708.
11. **Al-Balas H, Hani MB, Omari HZ.** Radiological features of acute gastric volvulus in adult patients. *Clin Imaging.* 2010 Sep-Oct;34(5):344-7. doi: 10.1016/j.clinimag.2010.02.001. PubMed PMID: 20813296.
12. **Woon CY, Chung AY, Low AS, Wong WK.** Delayed diagnosis of intermittent mesenteroaxial volvulus of the stomach by computed tomography: a case report. *J Med Case Rep.* 2008 Nov 11;2:343. doi: 10.1186/1752-1947-2-343. PubMed PMID: 19014426; PubMed Central PMCID: PMC2588627.

13. **Millet I, Orliac C, Alili C, Guillon F, Taourel P.** Computed tomography findings of acute gastric volvulus. *Eur Radiol.* 2014 Dec;24(12):3115-22. doi:10.1007/s00330-014-3319-2. Epub 2014 Oct 4. PubMed PMID: 25278244.
14. **Tsang TK, Walker R, Yu DJ.** Endoscopic reduction of gastric volvulus: the alpha-loop maneuver. *Gastrointest Endosc.* 1995 Sep;42(3):244-8. PubMed PMID:7498690.
15. **Gourgiotis S, Vougas V, Germanos S, Baratsis S.** Acute gastric volvulus: diagnosis and management over 10 years. *Dig Surg.* 2006;23(3):169-72. Epub 2006 Jul 10. PubMed PMID: 16837785.
16. **Kulkarni K, Nagler J.** Emergency endoscopic reduction of a gastric volvulus. *Endoscopy.* 2007 Feb;39 Suppl 1:E173. Epub 2007 Jul 5. PubMed PMID: 17614069.

Submitted September 19, 2018