Percutaneous Endoscopic Gastrostomy Fixation of Intrathoracic Gastric Volvulus and Giant Paraesophageal Hernia

by Karmen Gill, David Wozny, Satinder Gill

Displacement of the stomach into the chest occurs secondary to a weakening of gastric anchoring ligaments and an enlargement of the esophageal hiatus.[1] When the stomach moves above the diaphragm, patients may present with obstruction-like symptoms. These symptoms make up the Borchardt triad, signifying a surgical emergency.[7] We present a 94-year-old female with displacement of the stomach who underwent laparoscopic reduction and endoscopic fixation via single PEG tube placement. Despite the patient's age and intrathoracic extrusion, we report positive quality of life outcome. As a result, we suggest single PEG tube fixation as the least invasive solution for recurrent gastric volvulus.

CASE PRESENTATION

A 94-year-old female with past medical history of hypertension, asthma, and depression presented to the emergency department with shortness of breath, bloating, epigastric pain, nausea and vomiting. The patient stated she was sitting at home when her symptoms began abruptly at rest. She lives with her adult daughter who is her primary caregiver.

Over the past year, the patient had been experiencing worsening dysphagia, food regurgitation, globus sensation, gagging without vomiting, frequent constipation and gastroesophageal reflux (GERD) symptoms.

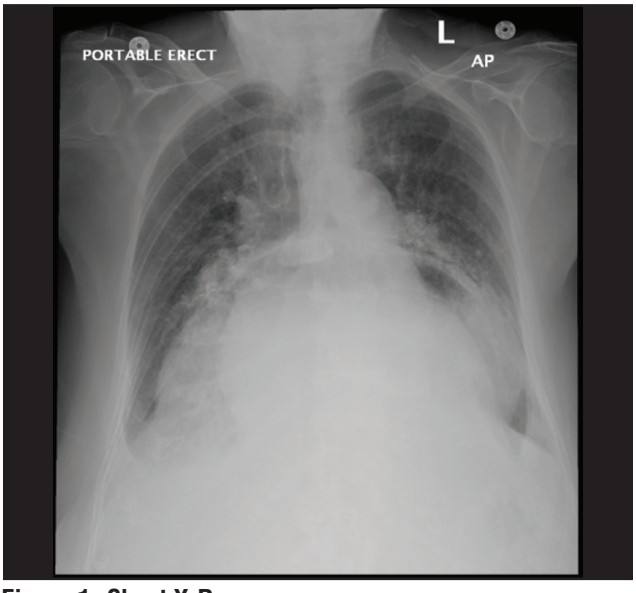

Figure 1. Chest X-Ray
Impression: Large hiatal hernia. Basilar atelectasis and right greater than left pleural effusions.

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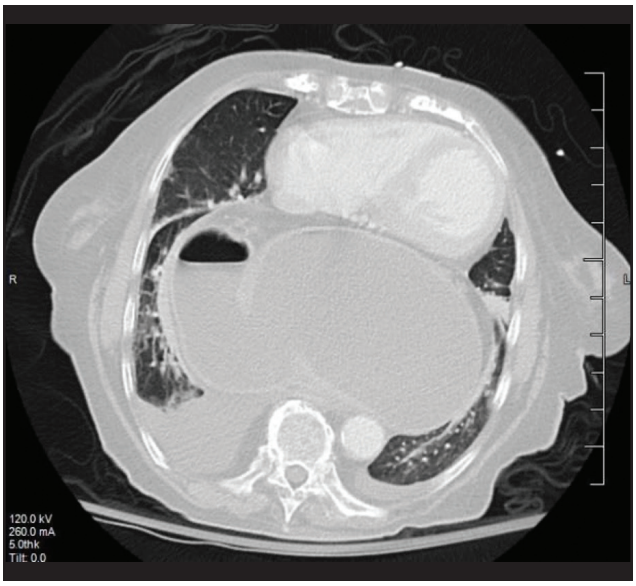
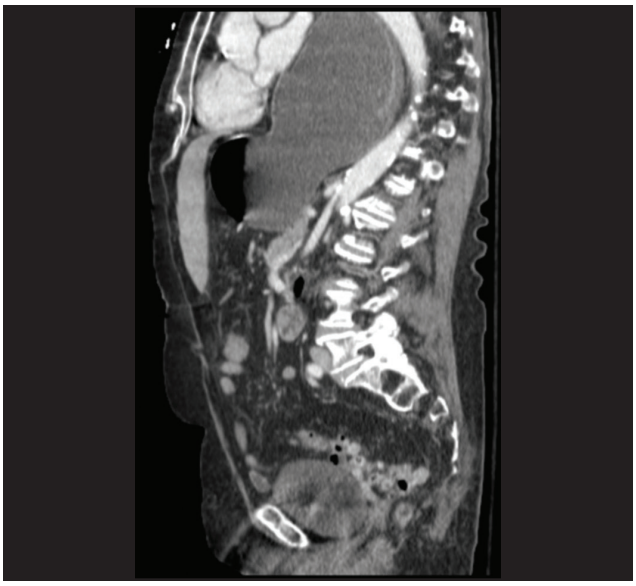




Figures 2 & 3. CT Abdomen and Pelvis Impression: Very large hiatal hernia containing the entire stomach which is fluid-filled.

She denied similar episodes in the past and has no prior abdominal surgery or recent imaging. Her daughter reports that she maintains most of her mental capacities but does require caregiver assistance at home.

On physical exam, the patient was acutely tender to palpation in the epigastric region without rebound tenderness. Bowel sounds were diminished in the abdomen but noted diffusely on auscultation of the chest. Cardiac auscultation was normal. Vital signs were positive for tachycardia and tachypnea.

Chest x-ray (Figure 1) and abdominal computed tomography (CT) (Figures 2 and 3) at that time indicated a large hiatal hernia with a significantly distended stomach located above the diaphragm. The patient was admitted to the hospital where she was kept NPO, given intravenous fluid resuscitation and a nasogastric tube placed. The patient and her family were counseled on possible options to repair the defect, but they expressed reluctance given her frailty and advanced age. The patient was discharged home after four days.

Two months later, the patient returned to the emergency room with epigastric pain, nausea and vomiting. Physical exam was nearly identical to her first admission. Chest x-ray (Figure 4) and CT abdomen and pelvis without contrast (Figures 5 and 6) at that time indicated a very large hiatal hernia with the majority of the stomach located within the mediastinum. The patient was treated,

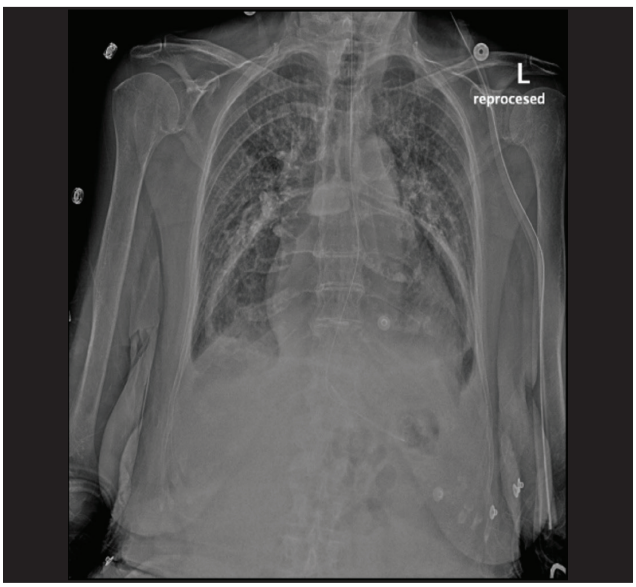


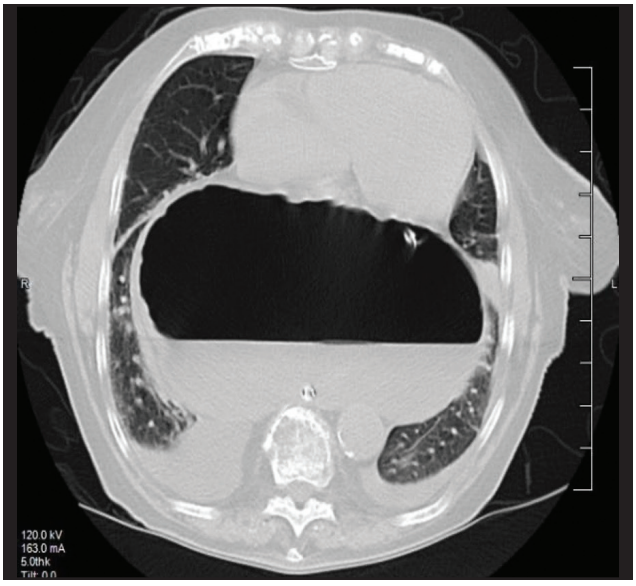
Figure 4. Chest X-Ray
Impression: Large air-containing density overlying lower chest corresponding to large hiatal hernia. Adjacent atelectasis. Small bilateral pleural effusions.

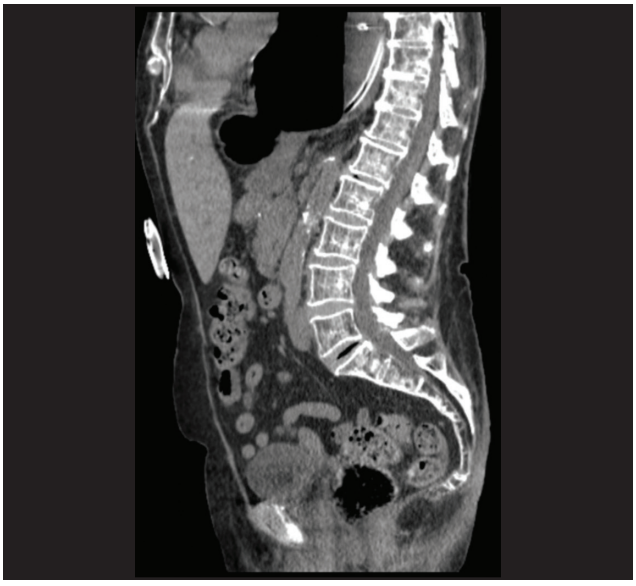
as before, with nasogastric tube and intravenous fluid resuscitation. The patient and her family opted for her to undergo gastropexy using single PEG tube placement.

Description of the Procedure

Percutaneous endoscopic gastrostomy (PEG) was offered to the patient as an alternative to hernia

A CASE REPORT





Figures 5 & 6: CT Abdomen and Pelvis Impression: Markedly distended stomach, the majority of which resides within the lower mediastinum. Similar in appearance to the previous CT scan.

sac resection with mesh cruroplasty due to her frailty and advanced age. Endoscopic approach was preferred as the least invasive option. The endoscopic approach was attempted first, but despite multiple attempts at endoscopic reduction, trans illumination through the abdominal wall was not possible. The endoscopic reduction of gastric volvulus approach was abandoned, and the patient's abdomen prepped for laparoscopic surgery.

Upon laparoscopic approach, gas distended bowel loops were noted to occupy the majority of the abdomen and the patient's large hiatal hernia was easily visualized. The entire transverse colon was incarcerated within the hiatal hernia. It was carefully grasped, and a gentle traction applied until the herniated tissue and the omentum could be fully reduced. The stomach was carefully reduced using laparoscopic grasping forceps into the abdominal cavity. The endoscope was reintroduced and the light was visualized through the abdominal wall despite a distended abdominal cavity with insufflation. The PEG tube was then placed via pull technique.

The patient tolerated the procedure well. She was extubated in the operating room and taken to the recovery room in a stable condition. She was allowed to resume oral fluids and light diet intake from the first postoperative day and was discharged on the second postoperative day.

Post Operative Follow Up

Outpatient follow up occurred 20 days after the procedure. She reported complete resolution of food regurgitation. Her GERD symptoms were now episodic and nocturnal where they had been persistent. The percutaneous endoscopic gastrostomy tube was not used for feeding, and the patient continues to advance her oral intake. At the time of follow up she had resumed a near-normal diet with accommodations made to remain roughly 70% fiber free. Her bowel movements were formed and occurred once daily.

DISCUSSION

Hiatal hernia is a condition where a portion of the stomach lies above the esophageal hiatus, within the thoracic cavity. The most common type, sliding hiatal hernia, occurs when the lower esophageal sphincter and portion of the stomach are pulled cephalad so the esophageal hiatus contains the stomach alone.[9] One rarer form of hiatal hernia is the rolling hiatal hernia which occurs when the lower esophageal sphincter remains below the

esophageal hiatus and a portion of the stomach moves through the hiatus into the thoracic cavity. This condition can progress until most, or all, of the stomach enters the thoracic cavity.[1]

Surgery is the treatment of choice for symptomatic large hiatal hernia. However, the timing of surgery and methodology are still in contention. One single center study of 270 patients estimated the annual probability of requiring emergency surgery of a large hiatal hernia was 1%.[12] The most common symptoms patients report include GERD, early satiety, dyspnea, chest pain, dysphagia, regurgitation and anemia secondary to Cameron's ulcers.[5] Post-operative follow up has demonstrated symptom resolution of heartburn (93%), regurgitation (92%), dysphagia (81%) early satiety (79%), and chest pain (76%).[12] Although surgery has proven successful option for symptom relief in these patients, some conditions can result from an enlarged esophageal hernia which require surgical intervention.

One condition which may result from an enlarged hiatal hernia and require immediate surgical intervention is gastric volvulus. Gastric volvulus, from the Latin *volvere* meaning "to roll", describes a rotation of the stomach more than 180 degrees.[6] This condition is potentially life threatening with mortality rates as high as 50%[10] secondary to progressive complications including hemorrhage, perforation, shock and potentially a closed loop obstruction.

There are three subtypes of gastric volvulus classified by the stomach's axis of rotation: mesenteroaxial, organoaxial and the combined type.[7] As a hiatal hernia progresses, the chance of organoaxial volvulus increases as the stomach extrudes into the thorax and rotates around its long axis causing potential obstruction at the level of the gastroesophageal junction or at the pylorus.[12] Normally, ligamentous structures keep the stomach in place. The main attachments of the stomach are the gastrophrenic, gastrocolic and gastrosplenic ligaments as well as peritoneal fixation of the duodenum. It has been suggested that a weakening of these ligaments, specifically the gastrocolic and gastrosplenic, can lead to gastric volvulus.[10]

The majority of gastric volvulus, 80-90%, occur in the fifth decade of life with no reported associated to race or sex.[7] The key diagnostic features of gastric volvulus are described by Borchardt's triad of severe epigastric pain, vomiting followed by uncontrollable retching without the ability to vomit, and difficulty or inability to pass nasogastric tube.[7,10,12] The Borchardt triad has been described in up to 70% of gastric volvulus cases.[5] This is a potentially life-threatening condition that has been shown to progress to perforation or infarct.[12]

Diagnosis of hiatal hernia commonly occurs during endoscopic evaluation and can be confirmed on CT scan.[12] The degree of herniation and diagnosis of chronic gastric volvulus are visualized using CT or upper GI studies. CT studies of gastric volvulus demonstrate two air fluid levels with a transition line while barium studies can show if the stomach is laying vertically or horizontally with possible migration of the gastroesophageal junction into the chest.[11,12]

The correction of Grade III hiatal hernias and intrathoracic gastric volvulus requires surgical intervention. The traditional surgical therapy for gastric volvulus is based on an open approach.[7,10] An analysis of paraesophageal hernia repair from the National Inpatient Sample (NIS) between 1991 and 2008 showed 91% of repairs were performed open and 9% were performed laparoscopically.[12]

Endoscopic derotation of gastric volvulus has shown positive results but given the nature of this condition, derotation without fixation is considered a temporary measure.[10] The technique for endoscopic derotation requires manipulation of the endoscope into a J-shape then rotating clockwise or counter clockwise. However, depending on the extent of stomach extrusion within the chest, derotation and reduction may not be possible with endoscopy alone.[6] In these situations, laparoscopy can assist in stomach visualization reduction.

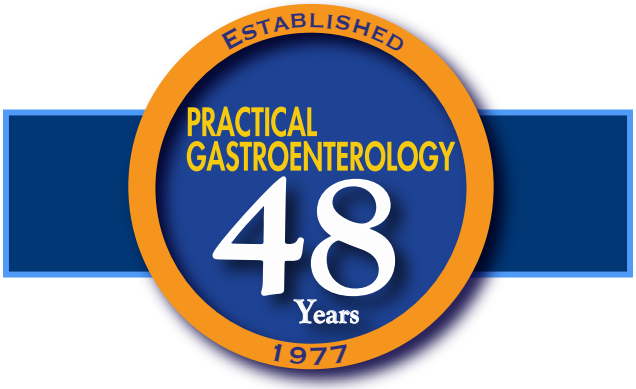
Once the stomach has been returned to a near-normal anatomic position, it should be fixed in place to prevent recurrence. The two main methods of fixation are percutaneous endoscopic gastrostomy tube placement and mesh cruroplasty. Mesh cruroplasty resulted in 27% recurrence in one-year imaging despite quality-of-life improvements and four patients required repeat surgery.[8] Although PEG tube placement

has much smaller sample size, results have been favorable compared to mesh cruroplasty.[13]

One study of five patients who underwent laparoscopic correction of paraesophageal hernia with 2-point PEG fixation reported 80% returned to normal oral intake post-procedure and were discharged home within three days.[11] Gastropexy with a single gastrostomy tube has been reported as sufficient management of gastric volvulus in multiple case reports.[2,3,13] Only one study published in 1985 has speculated that single PEG tube fixation may have served as the site of recurrent volvulus.[5] Given that both one and two PEG tubes have been efficacious in the fixation of paraesophageal hernia we suggest that one PEG tube is preferable as it halves the chance of common PEG tube complications.

CONCLUSION

The method of surgical correction of gastric volvulus and hiatal hernia is generally a question of patient tolerance and preference. Other studies that have shown dual PEG tube placement[11] and mesh cruroplasty[8] are effective treatment for gastric volvulus, but they are not without complications. The technique described in this case report is unique for the extent of intrathoracic stomach and concomitant gastric volvulus in a patient of advanced age. A small number of similar studies have been published regarding the use of single PEG tube correction of gastric volvulus.[2,3,13] Based on the positive results of this study, further investigation is warranted to determine if single PEG tube fixation of gastric volvulus and intrathoracic stomach, as described in this report, is a preferred method of repair. ■



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