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Is surgical intervention avoidable in cases of emphysematous gastritis? A case presentation and literature review



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ABSTRACT

INTRODUCTION: Gas located within the gastric wall is a rare finding that is associated with a mortality rate of 50%. It confers two main diagnoses: gastric emphysema and emphysematous gastritis. Due to its high mortality rate, emphysematous gastritis must be differentiated from gastric emphysema early to avoid adverse outcomes and plan the management of these patients.

PRESENTATION OF CASE: We introduce a 55 year-old male who presents with diffuse abdominal pain associated with fever, nausea, vomiting, and diarrhea. Patient has positive peritoneal signs with fever and leukocytosis. Air in the gastric wall and portal venous system was visualized on Computed Tomography (CT). The patient underwent emergent laparotomy which showed normal bowel with few adhesions.

DISCUSSION: Various etiologies can cause gas within the gastric wall but concomitant air in the hepatic venous system is highly suspicious for emphysematous gastritis. CT imaging is the most sensitive and specific way to differentiate emphysematous gastritis versus gastric emphysema. Although rare, there are many cases of emphysematous gastritis that undergo prompt surgical exploration. Recently, however, medical treatment has become more common and surgical management reserved for complications.

CONCLUSION: We conclude by stating that this case of emphysematous gastritis, due to gastric ulcers, would have no difference in outcome if treated medically instead of surgically. Historically, patients with emphysematous gastritis warranted surgical intervention. More recently, case reports of emphysematous favoring conservative management. The consensus still remains that there is no standard these patients and most patients in extremis are undergoing surgical intervention.

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1. Introduction

Various etiologies can cause a patient to present with diffuse abdominal pain of acute onset. Many are medical emergencies that can lead to further complications or even mortality. Visualization of gas within the gastric wall on imaging narrows the etiologies to gastric emphysema or emphysematous gastritis. Gastric emphysema is the dissection of air into the gastric wall through an insult caused by damage to the gastric mucosa.¹ Emphysematous gastritis is a rare form of gastritis due to invasion of gas producing organisms.¹ Due to its fulminant course, emphysematous gastritis can become a medical emergency with life-threatening complications usually resulting in emergent surgery with a high mortality rate of 60–80%.² Therefore, early diagnosis and treatment is warranted in order to prevent further complications and decrease mortality.

2. Presentation of case

A 55 year-old male, nursing home resident, with a past medical history of hypertension, obstructive sleep apnea, depression, dementia, valvular heart disease, peptic ulcer disease, dysphagia, psychosis, cerebrovascular attack and diverticulitis, presented to the Emergency Department with diffuse abdominal pain of sudden onset. The pain was associated with nausea, vomiting and diarrhea. The patient's mentation at baseline was dulled and made the history difficult to obtain.

The patient was awake and alert during the physical exam but was not oriented to person, place or time; he was in moderate painful distress. Vital signs on admission were: temperature 36.8 °C, pulse 133 bpm, respiratory rate 29 rpm, and blood pressure 121/95 mmHg. The patient had diminished breath sounds in the bases of the lungs bilaterally. The skin on his abdomen was mottled with diffuse bruising; bowel sounds were absent (Fig. 1). The abdomen was diffusely tender with rebound, guarding, and tympanic distention. Rectal exam showed dark, heme-positive stool. A nasogastric tube was placed and the aspirate was gastrocuccult positive without frank blood.

Laboratory evaluation showed an elevated white blood cell count of $36.9 \times 10^3/\mu\text{L}$ with 2% bands and 93% neutrophils.

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Fig. 1. Physical appearance of the patient's abdomen on presentation to the emergency department.

Hemoglobin and hematocrit were 21.9 g/dl and 60.9% respectively and his platelet count was $257 \times 10^3/\mu\text{L}$. The PTT, INR, and PT were 31.1 s, 2.4 s, and 23.5 s, respectively; he was not on anticoagulants. An ABG showed a pH of 7.29 and a lactic acid level of 6 mmol/L.

The patient was sent for a Computed Tomography (CT) scan without contrast that showed a significant amount of portal venous air and air within the mesenteric veins (Fig. 2). He had severe distention of the stomach, air within the wall of the stomach, and diffuse lower lobe infiltrates bilaterally.

The findings were discussed with the family and the patient underwent an exploratory laparotomy. No evidence of any necrotic bowel was seen. The entire colon had a normal appearance. The small bowel was examined from the ligament of Treitz to the terminal ileum and no evidence of obstruction, ischemia or necrosis was appreciated. The stomach, appendix, spleen, and kidneys were also normal. The lesser sac was not opened. The liver appeared normal without signs of necrosis or ischemia, however, there was a small, punctuate, 3 mm, white lesion on the edge of segment 5 that was biopsied. Pathology showed a bile duct adenoma. Adhesions were found in the lower abdomen between the small bowel, omentum and the anterior abdominal wall; these were carefully taken down. After thorough exploration of the 4 quadrants of the abdomen, no obvious pathology was seen, and a diagnosis of negative exploratory laparotomy was made. The patient underwent esophagogastroduodenoscopy (EGD) and colonoscopy 2 weeks later. He was found to have a gastric ulcer on EGD (Fig. 3).

The patient had an unremarkable recovery post-operatively, was subsequently extubated on post-operative day 0 and was discharged to his prior residence after an unremarkable recovery. A repeat CT scan 2.5 weeks after admission showed resolution of both portal venous air and gastric wall air (Fig. 4). The decision to repeat the CT scan at 2.5 weeks was made in order to allow some resolution of swelling and post-operative changes.

3. Discussion

Air within the stomach wall has several different etiologies including: gastric outlet obstruction, damage from instrumentation (nasogastric tube, endoscopy), extensive cardiopulmonary resuscitation, vomiting, ulcers, steroids, duodenal obstruction, caustic pneumatosis, and rupture of pulmonary bullae.¹ The presence of gastric dilatation with gastric and portal venous air on CT imaging raises high suspicion for emphysematous gastritis or gastric

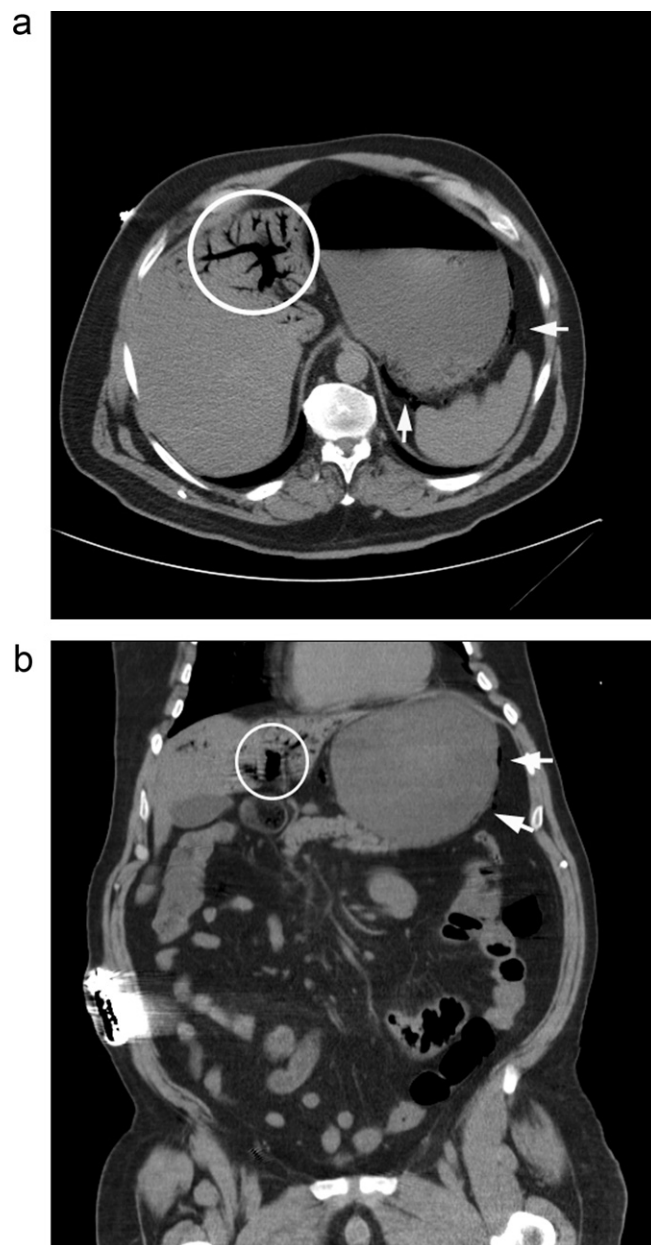


Fig. 2. CT scans of abdomen and pelvis (axial first, then coronal views) demonstrating portal venous air (circle) and air within the wall of a distended stomach (arrows).

emphysema. Gastric emphysema is typically asymptomatic and resolves spontaneously.³ On the other hand, emphysematous gastritis is a severe and rare form of gastritis with increased risk of further complications and mortality.⁴ What differentiates emphysematous gastritis from gastric emphysema is the invasion of gas-producing bacteria through the wall of the stomach. The most frequently isolated organisms are streptococci, *Escherichia coli*, *Enterobacter* species, *Pseudomonas aeruginosa* and *Clostridium perfringens*.⁵

Patients with emphysematous gastritis present with fever, chills, nausea, and hematemesis or occult gastric bleeding.⁵ The patient's laboratory work will reveal a leukocytosis.^{3,4,7} On physical exam the patient will appear toxic, have severe abdominal pain and tachycardia.^{1,5} In contrast, gastric emphysema patients are afebrile, hemodynamically stable, and usually asymptomatic or have mild symptoms including abdominal discomfort and diarrhea.¹

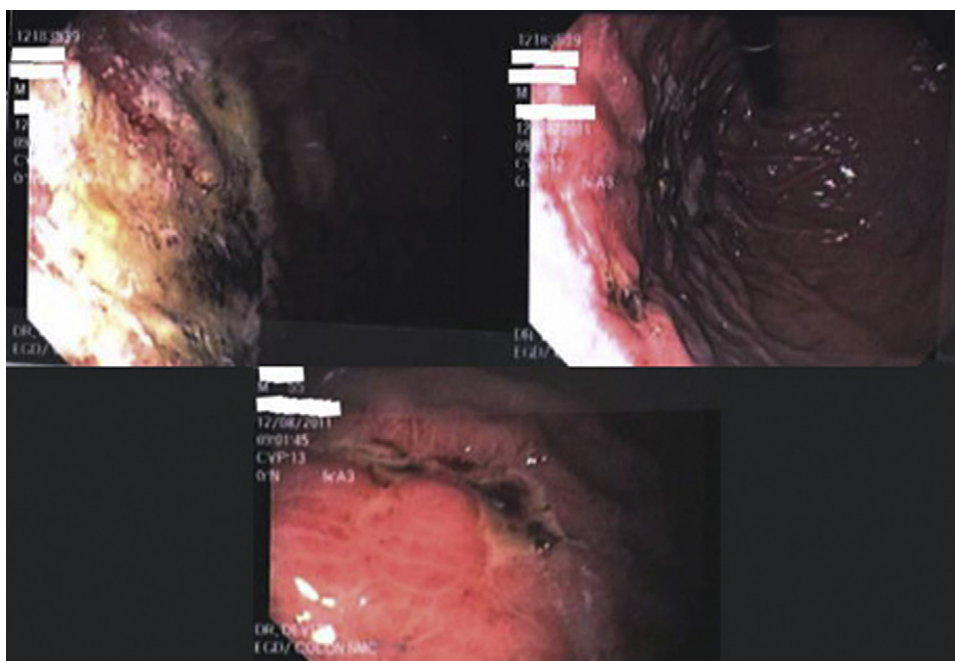


Fig. 3. EGD with findings of gastric ulcer.

The best imaging to distinguish emphysematous gastritis from gastric emphysema is a CT scan of the abdomen.⁸ Radiographically, gastric emphysema and emphysematous gastritis both show air in the stomach wall; however the character of the air can differentiate the two. In gastric emphysema the air will have the characteristic of round air bubbles while emphysematous gastritis will have air that has a streaky and linear consistency.⁹ Concomitant portal venous air visualized on CT imaging is suspicious for mesenteric ischemia or bowel necrosis but has other etiologies as well.¹⁰ These causes include but are not limited to intestinal obstruction, necrotizing enterocolitis, Crohns disease, ulcerative colitis, caustic ingestion, iatrogenic causes, gastric dilation, medications, and seizures. Ischemia involving collaterals to the stomach increase the risk of stomach wall damage and subsequent invasion by gas forming organisms. If one has high suspicion of an ischemic or necrotic etiology, emergent exploratory surgery is warranted.¹⁰



Fig. 4. CT scan 2.5 weeks after admission showing resolution of both portal air and gastric wall air.

Late complications of emphysematous gastritis include strictures and perforations which are an absolute indication for surgery.¹¹ The population at risk for emphysematous gastritis includes patients with: diabetes, COPD, renal failure, and the immunocompromised.⁹ Other risk factors include: gastroenteritis, recent abdominal surgery, long term steroid use, alcohol abuse, pancreatitis, and patients on non-steroidal anti-inflammatory drug (NSAID).⁹

Our patient presented with the classical symptoms of emphysematous gastritis with further evidence provided during examination. The patient was unstable in septic shock with air visualized in the gastric wall and portal venous system on CT imaging. Since the patient showed positive peritoneal signs, the suspicion for bowel necrosis with possible perforation was high on the differential. We elected to do an emergent exploratory laparotomy over laparoscopy due to patient presentation and surgeon preference. Intra-operative findings were normal despite signs and symptoms suggestive of bowel ischemia and perforation. On review of literature, we found that in the past other cases resulted in surgical intervention, but lately medical management has been as successful. Arezzo et al., cited a case of emphysematous gastritis that was treated with Total Parenteral Nutrition (TPN) and bowel rest that resulted in complete resolution.¹² A similar case by Paul et al., was treated with antibiotics, TPN, and bowel rest and also resulted in complete resolution.⁵ After resolution, an EGD performed showed a gastric ulcer which we determined is the site of invasion by the gas-producing organism.

4. Conclusion

Emphysematous gastritis and gastric emphysema are two similar sounding entities with nearly opposite clinical outcomes. Early recognition of emphysematous gastritis is critical in reducing mortality. Historically, patients with emphysematous gastritis warranted surgical intervention. More recently, however, case reports of emphysematous gastritis are favoring conservative management. We conclude that more studies are needed to

appropriately stratify patients that can be treated conservatively versus those that must undergo prompt surgical intervention.

Conflict of interest

None.

Funding

None.

Ethical approval

Consent was obtained.

Author contributions

Mauricio Szuchmacher, MD had done a few works pertained to this study, such as literature review, data analysis, and study design. Tyler Bedford, MD and Melanie Nukala, MD had written the thesis and made data collection with the help of Prashant Sukharamwala, MD.

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