

# Non-Operative Management of Emphysematous Gastritis: A Case Report

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**Abstract** Gastric pneumatosis, air within the gastric wall, is a rare finding on imaging. Gastric pneumatosis is seen in both benign and life-threatening conditions. Emphysematous gastritis is a rare, and potentially life-threatening, form of gastritis. Early and effective non-operative management with bowel rest, nutritional support, intravenous hydration, and intravenous broad-spectrum antibiotics is a reasonable option for management of emphysematous gastritis. There is still no consensus and strict guidelines in management of emphysematous gastritis, but as this and a handful of other case reports show, immediate surgical intervention may not always be the answer.

**Keywords:** gastric pneumatosis, emphysematous gastritis

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## 1. Introduction

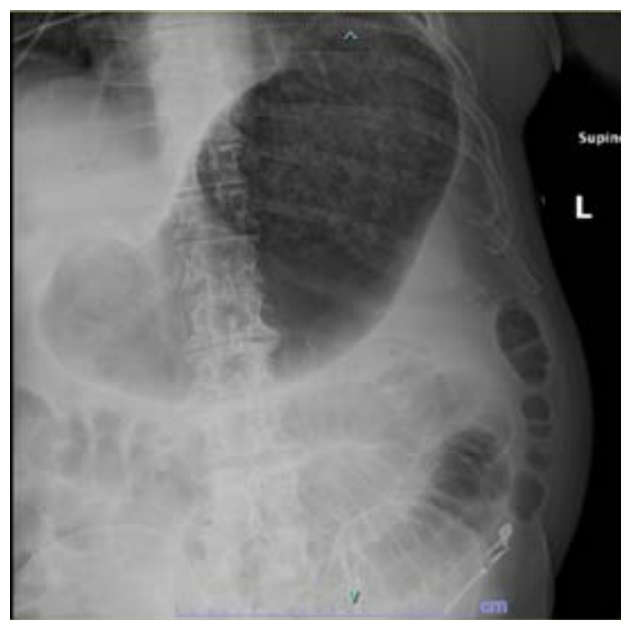
Gas within the gastric wall, gastric pneumatosis (GP), is a rare finding on radiologic imaging. Conditions associated with GP range from benign to a surgical, life-threatening emergency. GP suggests two main diagnoses that must be differentiated in a timely manner: Gastric emphysema and emphysematous gastritis. Gastric emphysema occurs when air dissects into the gastric wall through a damaged gastric mucosa, whereas emphysematous gastritis is a rare form of gastritis caused by the invasion of gas-producing organisms [1,2,4,6]. Early diagnosis is critical, as the latter can become a surgical emergency and carry a mortality rate as high as 60-80% [4,6].

## 2. Case Report

A 77 year-old male with past medical history of dementia, type II diabetes mellitus, obstructive sleep apnea, and a history of cerebrovascular accident and a past surgical history of laparoscopic cholecystectomy presented to the emergency department for altered mental status, generalized fatigue, tachypnea, and abdominal distention associated with a day of nausea, vomiting, and diarrhea per family. Due to patient's baseline dementia, no further history could be obtained at the time of presentation.

Upon presentation in the emergency department, the patient was febrile to 38.2°C (100.7°F), tachycardic up to 112 bpm, hypotensive to 95/50, a respiratory rate of 21, and an oxygen saturation of 85%. The patient was

lethargic but able to follow commands. His abdomen was softly distended with moderate tenderness to palpation in the mid-abdomen without guarding, rebound, or rigidity, and bowel sounds were present.



**Figure 1.** Abdominal x-ray showing dilated stomach and small bowel

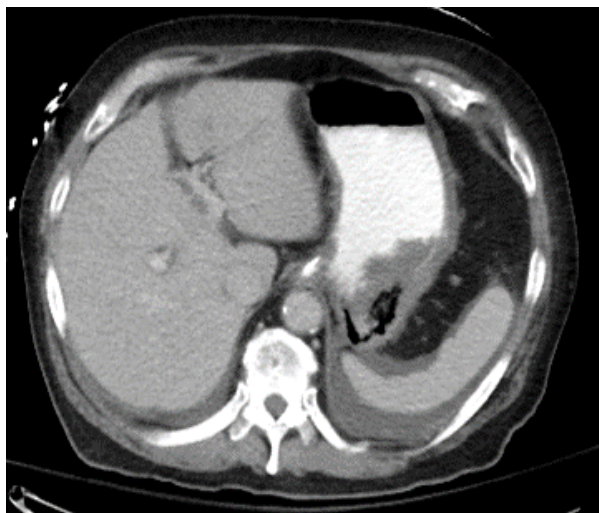
Laboratory evaluation showed a normal white blood cell count of  $10.5 \times 10^3/\mu\text{L}$  with 83% neutrophils. Hemoglobin and hematocrit were 15.2 g/dL and 49.2%, respectively, and a platelet count of  $227 \times 10^3/\mu\text{L}$ . The patient was hypokalemic at 3.4, hyperglycemic at 433, and acidotic with a bicarbonate level of 15 and a lactic acidosis of 7.4. Patient also had an acute kidney injury with an elevated creatinine of 2.09 (baseline of 0.9). The

patient had an abdominal radiograph that showed a grossly distended stomach and small bowel loops (Figure 1). Further workup was performed with a CT of chest/abdomen/pelvis that showed gastric pneumatosis (posterior intraluminal air) and pneumobilia (Figure 2).



**Figure 2.** CT scan of abdomen demonstrating gastric pneumatosis and pneumobilia

The patient underwent fluid resuscitation and received 3 liters of normal saline in the emergency department, and his vital signs responded appropriately and normalized. After the patient was properly resuscitated and his abdomen remained non-acute, the decision was made to perform a trial of non-operative management of suspected emphysematous gastritis. Management involved bowel rest, aggressive intravenous fluid hydration, broad-spectrum intravenous antibiotics with Vancomycin and Zosyn, initiation of PPI, and serial abdominal exams. The patient continued to have multiple loose bowel movements so stool cultures, ova and parasite test, and *Clostridium difficile* toxin were sent, and all eventually resulted as negative.

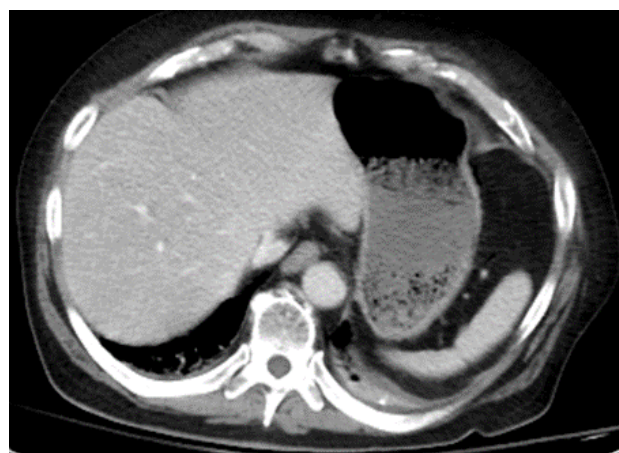


**Figure 3.** Repeat CT scan that shows persistent gastric pneumatosis with resolution of pneumobilia

The patient's lactic acidosis improved with hydration and antibiotic therapy, and the patient's abdominal pain

and distention improved over the next few days as well. A repeat CT abdomen/pelvis with PO and IV contrast was performed that showed persistent gastric emphysema but resolution of pneumobilia (Figure 3). Non-operative management was continued with the addition of total parenteral nutrition as the patient's clinical picture improved, including vitals, abdominal exam, laboratory values, and pneumobilia on imaging.

A second repeat CT abdomen/pelvis was performed on hospital day nine and showed interval resolution of gastric wall thickening and pneumatosis (Figure 4). The patient's abdomen remained benign throughout the remainder of his clinical course, and he was started on clear liquids and his diet was advanced to a regular diet and tolerated without nausea or vomiting. The patient was discharged on hospital day thirteen, and instructed to follow up with a gastroenterologist to discuss an outpatient EGD.



**Figure 4.** Repeat CT scan showing resolution of gastric pneumatosis

### 3. Discussion

The presence of gas within the wall of the gastrointestinal tract is referred to intestinal pneumatosis, and can occur along any site from the stomach to the rectum. However, the stomach is the least common site of intramural air, likely due to the rich blood supply, effective mucosal barrier, and the acidic pH [1,3]. The cause of gastric pneumatosis must be differentiated early in patient presentation, as the diagnoses can range from benign to a life-threatening surgical emergency. The two etiologies are gastric emphysema and emphysematous gastritis, with the latter having a mortality rate as high as 80% [4].

Emphysematous gastritis, a rare disease first described in 1889, is a result of gas-forming organisms that colonize the gastric mucosa and produce air within the stomach wall with associated diffuse gastric wall inflammation [2,3,5]. The most common organisms associated with this disease process are *Streptococcus* spp., *Escherichia coli*, *Enterobacter* spp., *Clostridium* spp., *Pseudomonas aeruginosa*, and *Klebsiella pneumoniae* [1,4,5]. Pre-disposing factors have been associated with the development of emphysematous gastritis, including diabetes mellitus, immunosuppression, alcohol use disorder, ingestion of corrosives (either alkaline or acid), gastroenteritis, nonsteroidal anti-inflammatory drug use, abdominal

surgeries, and phytobezoars [1,2,5,6]. These pre-disposing risk factors can result in gastric mucosal damage and set the stage for possible superinfection with gas-forming bacteria.

Gastric emphysema is a more benign condition and involves the dissection of air into the gastric wall through a damaged gastric mucosa due to a non-infectious source [1,2,4,5]. It tends to result from processes that increase intraluminal pressure, such as gastric outlet obstruction, small bowel obstruction, or recurrent and forceful vomiting [5]. Chronic inflammation (e.g., gastroenteritis) and iatrogenic/traumatic injuries, such as nasogastric tube insertion, endoscopic biopsies, cardiopulmonary resuscitation (CPR), and laparoscopic gastric band erosion, can result in gastric emphysema as well [5].

Computed-tomography (CT) scan is the most effective diagnostic imaging modality, and can help differentiate between emphysematous gastritis and gastric emphysema. The former tends to have a streaky and linear pattern of air distribution and associated gastric wall thickening, whereas the latter have round hypodense bubbles in a linear or curvilinear appearance along the gastric wall without associated inflammation [2,3,4,5]. Moreover, emphysematous gastritis is highly suspicious with the radiologic finding of concomitant air in the hepatic venous system in addition to gastric air, and generally carries a poorer prognosis [1,4,5]. If repeat imaging is performed, the location of the gas will not change with patient positioning which confirms that it is located within the gastric wall [5].

The clinical presentations of emphysematous gastritis and gastric emphysema also differ and are important to recognize as management and prognosis are different. Emphysematous gastritis typically presents in a sick, potentially hemodynamically unstable patient, and is often associated with nausea, vomiting, abdominal pain, hematemesis, and/or melena [1,5]. Treatment is usually aggressive, with bowel rest, intravenous fluid hydration, intravenous antibiotics, and surgical intervention if patient becomes unstable [1,4]. In contrast, patients with gastric emphysema generally present with milder symptoms of dyspepsia and epigastric discomfort but may even be asymptomatic [1,5]. Patients with gastric emphysema tend to be self-limited and requires no intervention [2,5].

## 4. Conclusion

Non-operative management is a viable strategy in patients who present with early emphysematous gastritis. While historically a surgical diagnosis, this case report proves that a trial of aggressive resuscitation with bowel rest and broad spectrum antibiotics is a viable approach when diagnosed in the early stage of the disease process. This case, and other similar cases, will hopefully prevent unnecessary surgeries in the future. It is important for providers to consider all treatment options of emphysematous gastritis and to pursue surgical intervention only when necessary. While successful in this case, there is still limited data on the treatment of emphysematous gastritis and there will always be a role for surgery in patients presenting late in the disease process or those who do not respond to non-operative management.

## Acknowledgements

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