Emphysematous Gastritis and Its Differential Considerations

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Case Presentation

A 68-year-old diabetic woman presented to the emergency department complaining of a 1-day history of generalized abdominal pain, coffee ground emesis, and dark stools. She was found to be afebrile but hypotensive. Physical examination was remarkable for abdominal distention and generalized tenderness to palpation. Laboratory findings revealed leukocytosis. The patient was further evaluated with a noncontrast computed tomography (CT) examination of the abdomen and pelvis due to concern for diverticulitis or possible perforation (Figure 1).

FIGURE 1. Axial (A), coronal (B), and sagittal (C) unenhanced computed tomography (CT) images of the abdomen demonstrate marked gastric distention and wall thickening with intramural gastric air along the greater curvature (arrows). An intraoperative photo from subsequent surgical intervention (D) reveals focal areas of gastric necrosis (arrows).
Key Imaging Finding(s)
Intramural gastric air

Differential Diagnoses
- Soft-tissue sarcoma
- Emphysematous gastritis
- Gastric emphysema
- Iatrogenic/traumatic injury
- Nongastric source

Discussion
Gastric intramural air is a rare radiologic finding with causative etiologies ranging from benign and self-limiting to potentially lethal. It typically occurs when the gastric mucosa is disrupted, allowing for air to track between the various layers that compose the stomach wall. While different imaging modalities may reveal associated pathologic findings, CT is the most sensitive. Several etiologies of intraluminal gastric air have been described in the literature, and distinguishing between them is necessary as they are distinct pathologic entities with varying prognoses and management strategies.

Emphysematous Gastritis
First described in 1889, emphysematous gastritis is the result of gas-forming organisms that colonize the gastric mucosa, most commonly Klebsiella pneumonia, Escherichia coli, Pseudomonas aeruginosa, and Enterobacter subspecies. Diabetes, immunosuppression, and alcohol abuse have all been reported as predisposing factors. Clinical presentation is variable and often includes nausea, vomiting, mild to severe abdominal pain, hematemesis, and/or melena. Most reported cases have followed an acute to subacute clinical presentation. Radiologic evaluation is typically performed with CT, which demonstrates a streaky and linear pattern of distribution of air within the gastric wall. The location of the gas does not change with patient positioning, confirming that it is located within the gastric wall. Additional associated findings include gastric wall thickening and the presence of portal venous gas. Management depends on patient stability.

Patients often become toxic, prompting surgical intervention. However, several cases have described successful conservative management of an otherwise stable patient with bowel rest and gram negative and anaerobe antibiotic coverage. Overall prognosis is poor, with mortality rates of 60% to 80%.

Gastric Emphysema
Gastric emphysema is often used to refer to a noninfectious source of intramural gastric air. It is often seen in the setting of chronic inflammation such as gastroenteritis or any process with increased intraluminal pressure, including gastric outlet obstruction, small bowel obstruction, or forceful vomiting. As with emphysematous gastritis, these patients will demonstrate linear hypodensities along the gastric wall on CT, although there is typically no wall thickening or portal venous gas. It is primarily the clinical picture that differentiates the two entities, as these patients will often be asymptomatic and hemodynamically stable. Gastric emphysema is usually self-limited and requires no intervention.

Iatrogenic/Traumatic Injury
Many different iatrogenic or traumatic mechanisms have been described in the literature that may result in intramural gastric air, including nasogastric tube placement, laparoscopic gastric band erosion, and motor vehicle accidents. Additionally, ingesting caustic substances may damage the gastric lining, allowing for the presence of intramural air. While alkaline and acidic substances will vary in their mechanism of insult (ie, coagulative vs. liquefactive necrosis), they both result in mucosal damage and possible superinfection with gas-forming bacteria. Similar to emphysematous gastritis, hemodynamically unstable or rapidly deteriorating patients benefit from prompt surgical intervention, while stable patients may be managed conservatively.

Nongastric Source
Air within the gastric wall does not necessarily have a gastric origin, as cases of air tracking from adjacent sites to include the gallbladder or bowel have been reported. A common nongastric source of intramural air is from the pulmonary system. Several studies have described the presence of intramural gastric air in the setting of bullous emphysema, specifically after rupture of alveoli. This allows free air to dissect along the vascular sheaths and reach the parasphageal space, ultimately tracking down and settling within the gastric mucosa. Patients in this category typically demonstrate no abdominal symptoms and the finding is often made incidentally.

Patient Management
Due to the CT findings and the patient’s continued decomposition, she underwent a partial gastrectomy and focal areas of gastric necrosis were found. Both gastric tissue and peritoneal fluid samples were positive for Staphylococcus epidermidis and Enterococcus faecalis.

Diagnosis
Emphysematous gastritis

Summary
Gastric intramural air is a rare but important radiologic finding that is best appreciated on CT. Multiple pathologic mechanisms have been described, each of which carries a different prognosis and management strategy. Familiarization with the various etiologies, as well as a detailed clinical history, is crucial in making the correct diagnosis and guiding appropriate management. The most severe form, emphysematous gastritis, refers to an infectious source resulting in the formation of gas within the gastric mucosa. If not promptly diagnosed and treated, it has a high rate of mortality.

References