

Gastric Pneumatosis: Emphysematous Gastritis versus Gastric Emphysema

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Abstract

Presence of air in the wall of the stomach is known as gastric pneumatosis. It may be associated with a benign condition like gastric emphysema (GE) to life threatening condition emphysematous gastritis (EG). Differentiation between two entities based on clinical presentation, predisposing factors, and radiological findings is important as EG has more complications and higher rates of mortality. The treatment in GE is conservative while treatment in EG is evolving. We present a case of a diabetic patient who developed EG following abdominal surgery and managed conservatively with favorable outcome.

Keywords

- ▶ emphysematous gastritis
- ▶ gastric emphysema
- ▶ gastric pneumatosis

Introduction

Air in the wall of the stomach is called gastric pneumatosis, which is a rare finding and may be associated with a benign condition like gastric emphysema (GE) to life threatening condition emphysematous gastritis (EG).¹ We present a case of a diabetic patient who developed EG following abdominal surgery and managed conservatively with favorable outcome.

Case Report

A 64-year-old known diabetic female underwent rectopexy for rectal prolapse. On third post-op day, she developed severe pain in the epigastric region with vomiting. Clinically, she had fever (temperature: 100.8°F), tachycardia (pulse: 108/min), and hypotension (blood pressure: 86/60 mm Hg). She also had tenderness in the epigastric region, no guarding with sluggish bowel sounds. Infraumbilical laparotomy wound was healthy. Her biochemical profile revealed leukocytosis with neutrophil predominance. Rest of the biochemical investigations were normal. Radiograph of abdomen (▶**Fig. 1**) revealed free air under the diaphragm which was expected in post-op setting; however, few loculi of air were also noted just inferior to fundal air. Patient underwent contrast enhanced computerized tomography (CECT) for further evaluation. CECT abdomen

(▶**Fig. 2**) revealed air in walls of the stomach suggestive of pneumatosis consisting of both round as well as few streaky loculi, with subtle wall thickening. No significant air was seen

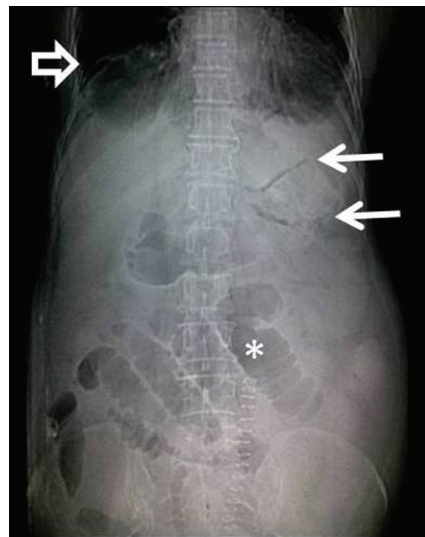


Fig. 1 Supine anteroposterior (AP) radiograph abdomen: free air under the diaphragm (white open arrow), air loculi in the stomach wall suggestive of gastric pneumatosis (white solid arrows), and dilated small bowel loops (white star).

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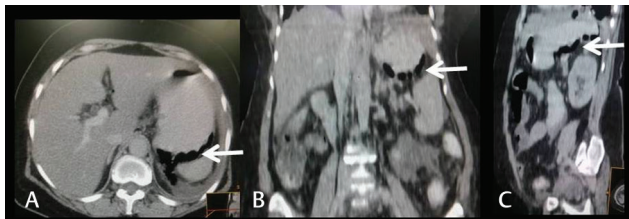


Fig. 2 CECT abdomen: air in the wall of the stomach suggestive of gastric pneumatosis (white solid arrow). (A) axial CECT, (B) coronal MPR, and (C) sagittal MPR. CECT, contrast-enhanced computed tomography; MPR, multiplanar reconstruction.

within the portal vein. No obvious extravasation of oral contrast observed. In given clinical setting, imaging impression of emphysematous gastritis was offered and patient was managed conservatively. Repeat CT scan after 1 week revealed resolution of air in the gastric wall.

Discussion and Review of Literature

Gastric pneumatosis is a rare finding with less than 100 cases of gastric pneumatosis described in literature in last three decades.² Pneumatosis is uncommon in the stomach due to its acidic contents, abundant blood supply and an efficient mucosal barrier.^{3,4} Gastric pneumatosis signifies presence of an underlying disease with spectrum form of good clinical outcome in GE to high mortality in emphysematous gastritis.^{1,2} Few authors have also described a third condition associated with gastric pneumatosis termed as cystic pneumatosis; however, it appears to be related to gastric emphysema only with same etiologies.⁵⁻⁷ Gastric emphysema was first described by Brouardel in 1895 while first case of gastric emphysema was described by Fraenkel in 1889.^{1,5,7}

Both conditions have different postulated etiologies with disruption in gastric mucosa is indicated for GE due to dissection of air into the gastric wall while EG is mostly secondary to gas production by bacteria.^{1,2} Various predisposing conditions for GE are raised intragastric pressure mostly secondary to gastric outlet obstruction, instrumentation like postgastroscopy, severe vomiting, or dissection of air from the mediastinum.

For EG, predisposing conditions are alcohol abuse, gastric surgery, recent gastroenteritis, corrosive ingestion, chronic consumption of nonsteroidal anti-inflammatories (NSAIDs)/steroids, diabetes mellitus, chronic obstructive pulmonary disease (COPD), and immunosuppression.^{1,2,5} The clinical features are nonspecific in both conditions with EG being more severe with high mortality. EG manifests as low-grade fever, chills, nausea, vomiting, severe abdominal pain, hematemesis, or occult gastric bleeding. On examination, the patient is toxic with tachycardia and hypotension suggesting shock like state with severe abdominal tenderness in epigastric region along with reduced bowel sounds. On the other hand, GE has milder symptoms and patient is hemodynamically stable.^{1,2,5,7}

Biochemical parameters are generally deranged in EG revealing leukocytosis, elevated lactate, anion gap metabolic acidosis, and acute kidney injury.^{5,8} Imaging is the investigation of choice for diagnosis wherein the radiograph of abdomen may show air in the wall of the stomach.¹ CT clearly depicts the presence of air in the stomach wall. Differentiating GE from EG is difficult on basis of CT findings alone; however, in GE the air in the stomach wall usually seen as round air bubbles while in EG air has a streaky and linear consistency with associated gastric wall thickening. Portal venous air may or may not be seen in both GE or EG (→ Fig. 3).^{1,2,5,7,9}

Upper gastrointestinal (GI) endoscopy may show a pebble-like gastric mucosa due to presence of air bubbles in the wall.^{1,5} Management in GE is usually conservative while in EG management is still evolving, Watson et al² in their study on predictors of mortality and management strategies in emphysematous gastritis observed that treatment of choice in EG before year 2000 was exploratory laparotomy with mortality rate of 60% while after the year 2000, early endoscopic evaluation and good medical management were treatment of choice leading to reduced mortality rate of approximately 33%. Thus in EG if clear surgical indications like perforation or bowel necrosis is absent, conservative management with bowel rest by keeping patient nil orally and placing nasogastric tube, providing adequate nutritional support using total parenteral nutrition (TPN), intravenous (IV) fluids, and broad-spectrum antibiotics results in good outcome.^{1,2,5,10}

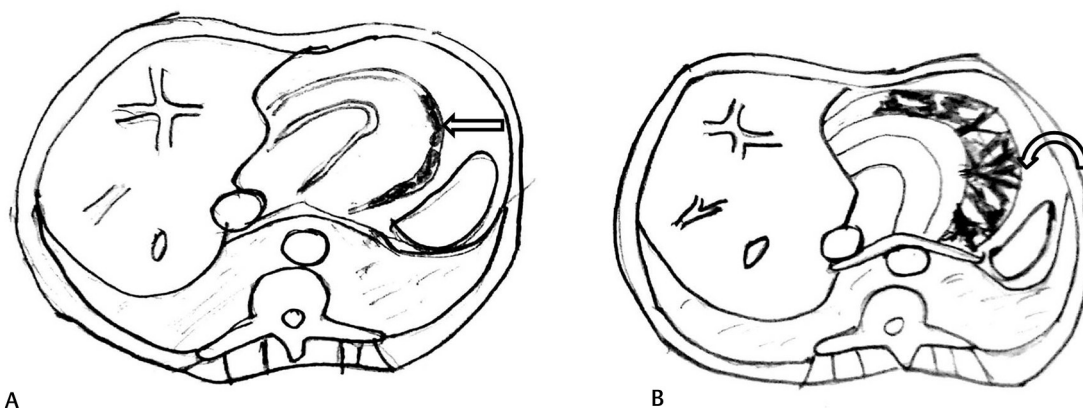


Fig. 3 Diagrammatic representation of gastric pneumatosis: axial CECT abdomen images. (A) Gastric emphysema near normal wall thickness with thin round to flat air bubbles in gastric wall (straight open arrow). (B) Emphysematous gastritis Mottled/streaky air in thickened gastric wall (curved open arrow).

Table 1 Differences between gastric emphysema and emphysematous gastritis

Serial number	Features	Gastric emphysema	Emphysematous gastritis
1	Etiology	Disruption in gastric mucosa with dissection of air into the gastric wall	Secondary to gas production by bacteria
2	Predisposing conditions	<ul style="list-style-type: none"> • Raised intragastric pressure mostly secondary to gastric outlet obstruction • Instrumentation like postendoscopy • Severe vomiting • Gastric ischemia • Dissection of air from the mediastinum 	<ul style="list-style-type: none"> • Alcohol abuse • Gastric surgery • Recent gastroenteritis, • Corrosive ingestion • Chronic consumption of NSAIDs/steroids • Diabetes mellitus • COPD • Immunosuppression
3	Clinical features	<ul style="list-style-type: none"> • Asymptomatic/mild symptoms • Hemodynamically stable 	<ul style="list-style-type: none"> • Fever • Nausea/vomiting, • Severe abdominal pain • Hematemesis or occult gastric bleeding • Patient is toxic with tachycardia and hypotension (hemodynamically unstable) • Severe abdominal tenderness in epigastric region • Reduced bowel sounds
4	Biochemical parameters	Usually normal	<ul style="list-style-type: none"> • Leukocytosis • Elevated lactate • Anion gap metabolic acidosis • Acute kidney injury
5	Imaging	<ul style="list-style-type: none"> • Gastric pneumatosis pattern is of round air bubbles • Portal vein air may or may not present 	<ul style="list-style-type: none"> • Gastric pneumatosis pattern is of streaky/mottled/linear air • Gastric wall thickening may or may not present • Portal vein air may or may not present
6	Treatment	Conservative	Early endoscopic evaluation and conservative management if no clear surgical indication
7	Mortality	Low	High

Abbreviations: COPD, chronic obstructive pulmonary disease; NSAIDs, nonsteroidal anti-inflammatories.

Differentiating features between GE and EG are summarized in ►Table 1 with representative images from literature are shown in ►Fig. 3. In our case, patient had predisposing conditions for EG like diabetes and abdominal surgery. Clinically, patient had fever, severe epigastric pain, reduced bowel movements with shock like state, and neutrophilic leukocytosis. On imaging, findings of air within the stomach wall with given clinical setting were suggestive of EG. Patient showed clinical improvement with conservative management in form of gut rest and broad-spectrum antibiotics. Also the repeat CT after 1 week revealed resolution of air in the wall of the stomach.

Conclusion

Gastric pneumatosis is a spectrum ranging from GE to EG. Differentiation between two entities based on clinical presentation, predisposing factors, and radiological findings is important as EG has more complications and higher rates of mortality. The treatment in GE is conservative while treatment in EG is evolving with current emphasis

toward conservative management in absence of absolute indications for surgery.

Conflict of Interest

None declared.

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