

Emphysematous Gastritis – A Rare Cause of Porto-mesenteric Venous Gas

Jen Heng Pek¹, Hwee Leong Tan¹
¹ Sengkang General Hospital

Abstract

Porto-mesenteric venous gas is an ominous radiologic sign. It is associated with severe intra-abdominal diseases that often require surgical management. In this case report, we present a 66-year old male who was brought to our Emergency Department for multiple episodes of vomiting and non-bloody diarrhea. Computed tomography of the abdomen showed porto-mesenteric venous gas due to emphysematous gastritis. He subsequently developed multi-organ failure from *Klebsiella pneumoniae* septicemia but made a full recovery after a prolonged course of supportive therapy and systemic antibiotics in the Intensive Care Unit. This case report highlights why it is clinically important and relevant for emergency physicians to be aware of this rare clinical condition associated with high mortality rate.

Key words: Abdominal Pain, Computed Tomography, Emphysematous Gastritis

Introduction

Porto-mesenteric venous gas is an ominous radiologic sign – it is often associated with severe intra-abdominal diseases such as bowel ischemia or mesenteric vascular accident¹. This accumulation of gas in the porto-mesenteric system can be attributable to the presence of gas-forming organisms in the porto-mesenteric system, or the circulation of gas produced by gas-forming organisms in the bowel wall or intra-abdominal abscess to the porto-mesenteric system². The diagnosis of porto-mesenteric venous gas can be made by x-ray, ultrasound, colour Doppler flow study or computed tomography (CT) scan. With the ubiquitous use of CT scan in the emergency departments (EDs), the presence of porto-mesenteric venous gas is being detected earlier and with higher sensitivity³. Here, we present a case report on porto-mesenteric venous gas due to emphysematous gastritis.

Case Report

A 66-year-old male with a past medical history of diabetes mellitus and dyslipidemia presented with a 3-day history of diffuse colicky abdominal pain associated with multiple episodes of vomiting and non-bloody diarrhea. He otherwise had no fever nor any significant contact or travel history. He was afebrile, in sinus tachycardia with a heart rate of 162 beats per minute and hypotensive with a blood pressure

of 88/63mmHg. Physical examination revealed dry mucous membranes, a soft but distended abdomen without peritonism, and an empty rectum on digital rectal examination.

Initial laboratory investigations revealed a raised white blood cell count of $33.2 \times 10^9/L$, lactic acidosis with a serum lactate of 12.3mmol/L, serum pH of 7.33 and serum bicarbonate of 13.3mmol/L and acute kidney injury with a serum creatinine of 275mcmol/L from a previously normal baseline. A CT scan of the abdomen and pelvis revealed diffuse gas within the porto-mesenteric venous system including the intra-hepatic portal venous branches of the right hepatic lobe, splenic vein and mesenteric venous tributaries, as well as intramural gas in the posterior gastric wall, (Figures 1 to 3). The small bowel loops were diffusely dilated in keeping with ileus without obvious mechanical obstruction. There was otherwise no obvious pneumoperitoneum or free intra-abdominal fluid, and assessment of mesenteric ischemia was limited by the non-contrasted CT scan performed in view of the significant risk of contrast-induced nephropathy.

With a clinical suspicion of acute mesenteric ischemia, the patient was counselled for and underwent an exploratory laparotomy. Surgical exploration revealed healthy and viable stomach, small bowel and colon down to the rectum, without any evidence of perforation or free peritoneal fluid. With the exclusion of acute mesenteric ischemia, a clinical diagnosis of septic shock secondary to emphysematous gastritis was made. The abdomen was closed primarily, and the patient was sent to the intensive care unit for further



Figure 1: Computed tomography scan of the abdomen and pelvis without intravenous contrast. Portal venous gas (arrow) within the right lobe of the liver is shown in coronal view.

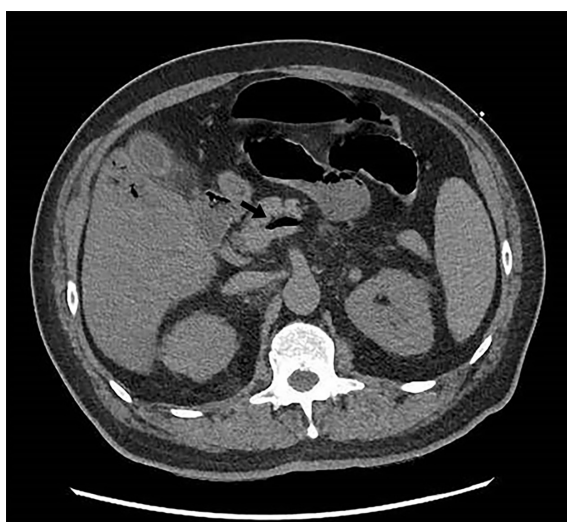


Figure 2: Computed tomography scan of the abdomen and pelvis without intravenous contrast. Gas (arrow) within the splenic vein is shown in axial view.

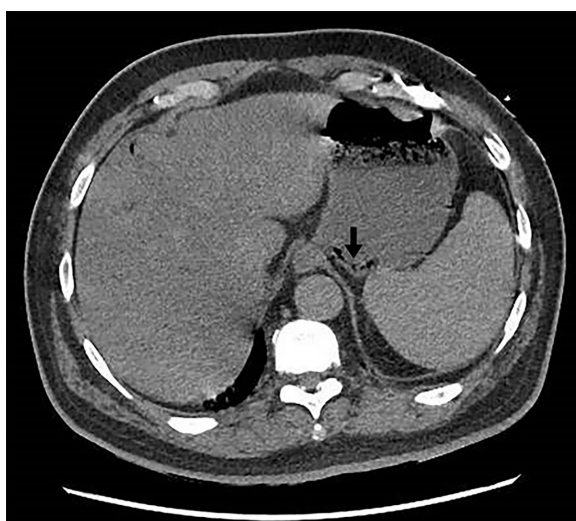


Figure 3: Computed tomography scan of the abdomen and pelvis without intravenous contrast. Gas (arrow) within the posterior gastric wall is shown in axial view.

management. After a stormy inpatient stay complicated by multi-organ failure from *Klebsiella pneumoniae* septicemia, he made a full recovery after a prolonged course of supportive therapy and systemic antibiotics.

Consent was obtained from the patient for this case report.

Discussion

Emphysematous gastritis is caused by gas forming organisms invading the gastric mucosa with resultant necrotizing infection of the gastric wall^{4,6}. Common causative organisms include *Streptococcus* species, gram-negative bacilli such as *Escherichia coli*, *Enterobacter* species and *Klebsiella* species, as well as anaerobes such as *Clostridium perfringens*⁴. These organisms can invade the gastric mucosa by either local infection or hematogenous spread. The gastric wall is usually resistant to infection as its rich blood supply and acidic pH make it an efficient barrier. However, predisposing factors including diabetes mellitus, use of alcohol and non-steroidal anti-inflammatory drug, as well as toxic ingestion to corrosive agents can threaten the integrity of the gastric wall, thus making a patient susceptible to this rare but lethal condition^{4,5}. Necrotic gastric tissue may be found in vomitus or aspirate from nasogastric tube and is pathognomic⁵.

The CT images of this case report demonstrated the florid findings of porto-mesenteric venous gas and intramural gas within the gastric wall effectively. In the clinical context of this case report, the two key differential diagnoses to consider are acute mesenteric ischemia and emphysematous gastritis. Differentiating the two may be challenging clinically, but a potential diagnostic clue supporting a diagnosis of emphysematous gastritis include the absence of large vessel occlusive disease on cross sectional imaging. While surgery is often mandatory in the treatment of acute mesenteric ischemia, emphysematous gastritis can be treated medically with broad spectrum intravenous antibiotics, proton pump inhibitors, as well as supportive management for hemodynamic stabilization and nutritional support^{5,6}. However, a high index of suspicion is paramount as treatment must be instituted promptly in order to reduce the high mortality rate of up to 60% associated with the condition⁷. Surgery is required when there is clinical deterioration, failure of medical therapy, gastric perforation and stricture formation. Surgery is also required when the case is indeterminate such as ours, for the definitive exclusion of acute mesenteric ischemia.

The radiologic finding of porto-mesenteric venous gas has conventionally been associated with severe intra-abdominal diseases often necessitating surgical management. However, emergency physicians must be aware that with CT scan being available as a ubiquitous imaging tool, the presence of porto-mesenteric venous gas may not by itself be an indication for surgery or adverse outcome. Accurate history and thorough physical examination remain crucial so that clinical symptoms and signs can be correlated with radiological findings. Ultimately, the treatment and prognosis of the patient must be based on the underlying disease pathology suspected on clinical grounds.

Conclusion

Emphysematous gastritis is associated with significant morbidity and mortality for the patient, necessity prompt diagnosis and management in the ED.

Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

References

1. Hussain A, Mahmood H, El-Hasani S. Portal vein gas in emergency surgery. *World J Emerg Surg.* 2008;3:21.
2. Liebman PR, Patten MT, Manny J, Benfield JR, Hechtman HB. Hepatic-portal venous gas in adults: etiology, pathophysiology and clinical significance. *Ann Surg.* 1978;187:281-287.
3. Abboud B, El Hachem J, Yazbeck T, Doumit C. Hepatic portal venous gas: physiopathology, etiology, prognosis and treatment. *World J Gastroenterol.* 2009;15(29):3585-3590.
4. Weaver A, Weintraub R, Smith B. Recognizing emphysematous gastritis. *JAAPA.* 2019;32:27-29.
5. Al-Jundi W, Shebl A. Emphysematous gastritis: case report and literature review. *Int J Surg.* 2008;6:e63-66.
6. Nasser H, Ivanics T, Leonard-Murali S, Shakaroun D, Woodward A. Emphysematous gastritis: A case series of three patients managed conservatively. *Int J Surg Case Rep.* 2019;64:80-84.
7. Nemaakayala DR, Rai MP, Rayamajhi S, Jafri S. Role of conservative management in emphysematous gastritis. *Case Reports* 2018;2018:bcr-2017-222118.