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## 6 **Emphysematous Gastritis on Computed Tomography**

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14 A 67 years old Omani man with multiple comorbidities of diabetes, hypertension, ischemic heart  
15 disease, recurrent urosepsis and a bedridden on permanent suprapubic catheterization due to  
16 previous history of spinal trauma and surgery presented to the emergency department, Sultan  
17 Qaboos University Hospital(SQUH), in 2017 with a complaint of acute onset of severe  
18 abdominal pain, abdominal distention and multiple episodes of vomiting for two days. The pain  
19 was localized in the epigastric region with mild localized tenderness.His vitals were within  
20 normal. He had a temperature of 37 °, pulse of 80 beats per minut, blood pressure of 125/75  
21 mmHg, and oxygen saturation of 98% on room air. Initial workup showed white blood cell  
22 count of 12,000/microliter and normal lipase level.Plain radiograph of the abdomen showed a  
23 grossly distended stomach without signs of pneumoperitoneum or small bowel obstruction.  
24 Computed Tomography(CT) scan of the abdomen was requested to exclude the possibility of  
25 gastric outlet obstruction. It showed extensive intramural air involving the stomach with multiple  
26 air loculi seen within the draining perigastric and intrahepatic portal veins. Emergent exploratory  
27 laparotomy was done as the patient condition deteriorated, It showed completely gangrenous  
28 stomach.A total gastrectomy was performed.The patient, was kept in the intensive care unit and  
29 treated with sepsis protocol, later recovered. The histopathology report revealed emphysematous  
30 gastritis with acute ischemic infarction. Literature review shows few case reports of this  
31 condition. We report a CT findings of emphysematous gastritis associated with gastric infarction

32 in a diabetic patient. It is the first case of emphysematous gastritis reported in SQUH using only  
33 radiological modality.

34

35 **Comment:**

36 Emphysematous gastritis is a rare and potentially lethal condition which requires prompt  
37 diagnosis and urgent aggressive management.<sup>1</sup> However, the presentation can be overlapped with  
38 other diagnosis like gastric emphysema and gastric ischemia.<sup>2</sup> Differentiation is very crucial  
39 between these as the management and prognosis will also be different. History of diabetes,  
40 ingestion of alcohol or corrosive material, adenocarcinoma of the stomach, peptic ulcer,  
41 infarction, trauma, or invasion of submucosa by gas-forming organism are considered to be  
42 predisposing factors to this condition.<sup>1,3</sup> The literature shows that commonly isolated organisms  
43 are Streptococci, Escherichia coli, Enterobacter and Pseudomonas.<sup>3</sup> Our patient had two risk  
44 factors including history of diabetes and recurrent urosepsis. Patients with emphysematous  
45 gastritis are usually symptomatic and may present with sudden acute abdominal pain,  
46 hematemesis, fever, leukocytosis or septic shock with sign of instability and systemic toxicity.<sup>4</sup>  
47 Emphysematous gastritis is an emergency condition which needs to be considered in differential  
48 diagnosis of acute abdomen especially in presence of risk factors and needs urgent CT abdomen  
49 for early diagnosis and intervention.<sup>5</sup>

50

51 Compared to gastric emphysema which is a benign condition caused by disrupted mucosa and  
52 secondary air entry to the wall due to variable causes like after endoscopy, extension of  
53 pneumomediastinum or pneumothorax, severe vomiting or pneumatosis cystoides.<sup>2</sup> However the  
54 patient remain asymptomatic and condition will resolve spontaneously.

55

56 Both emphysematous gastritis and gastric emphysema can be manifested in plain abdominal  
57 radiograph as linear thin lucencies along the stomach wall.<sup>2,5</sup> CT is the most sensitive method  
58 and the best diagnostic modality which helps to differentiate further between them as  
59 emphysematous gastritis is usually associated with thickened gastric mucosal folds and edema  
60 along with cystic pockets of air in the gastric wall and sometimes air in the gastric venous  
61 drainage and portal vein in severe conditions.<sup>2,4,5</sup> CT also helps to exclude the other differential  
62 diagnosis of acute abdomen like acute pancreatitis or perforated viscus.<sup>2</sup> Plain radiograph of the

63 abdomen of our patient showed a grossly distended stomach without signs of pneumoperitoneum  
64 or small bowel obstruction (figure 1). CT scan was requested to exclude the possibility of gastric  
65 outlet obstruction. It showed grossly distended stomach with mild thickened wall and extensive  
66 intramural air involving fundus, body and pyloric region (Figure 2A,2B). Multiple air loculi were  
67 seen within the draining perigastric veins (Figure 2C) and within the intrahepatic portal vein in  
68 the left lobe of the liver (Figure 2D).

69  
70 Patients with gastric emphysema are usually asymptomatic and have a benign course compared  
71 to the patient with emphysematous gastritis, in which most of them are clinically ill and need  
72 urgent management.<sup>2</sup> The mortality from emphysematous gastritis is more than 60% and the non-  
73 lethal complication like gastric strictures is up to 25%.<sup>1,3</sup> Early non-operative medical  
74 management with good hydration, broad-spectrum intravenous antibiotics and bowel rest  
75 improve the clinical outcomes.<sup>4</sup> Surgery is not indicated in acute setting even in the presence of  
76 portal venous air or pneumoperitoneum as it is associated with increased mortality and post-  
77 operative complications like anastomotic leak and fistula formation. Surgery is indicated in case  
78 of clinical deterioration, peritonitis, gastric infarction, perforation or failed medical  
79 management.<sup>2,3</sup> Our patient underwent emergent exploratory laparotomy as his condition  
80 deteriorated, it showed completely gangrenous stomach in which a total gastrectomy was  
81 performed. Early detection and management of emphysematous gastritis based on clinical  
82 presentation and CT findings will improve the clinical course and reduce the mortality and  
83 morbidity.<sup>4</sup>

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#### 85 **Disclosure**

86 The reporting of the current case does not contravene with the regulations of the local  
87 institutional review board. No conflicts of interest declared concerning the publication.

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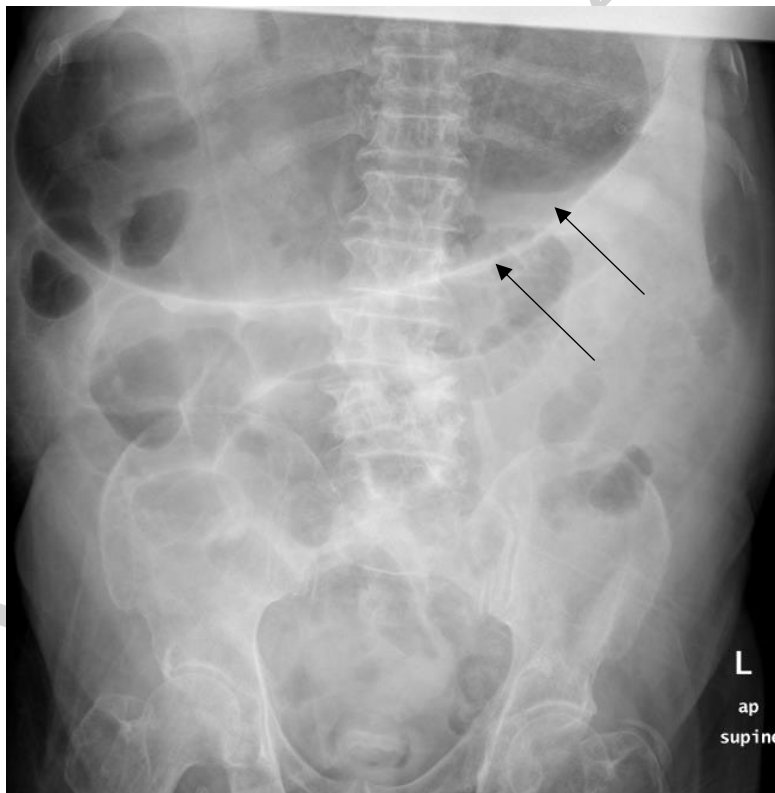
#### 89 **Authors' Contributions**

90 AA collected the clinical data, medical images, did the literature review, wrote the manuscript  
91 draft, and editing after review. SBR reviewed the manuscript drafts before submissions with  
92 error correction. AM chose the appropriate images and wrote the captions and citations.

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94 **References:**

- 95 1. Suwannachod C, Rujitanon P. “A case report: emphysematous gastritis.” Int Surg J. 2017  
96 Aug;4(8):2819-2822. : <http://dx.doi.org/10.18203/2349-2902.isj20173426> .
- 97 2. Matsushima K, Won EJ, Tangel MR, Enomoto LM, Avella DM, Soybel DI. Emphysematous  
98 gastritis and gastric emphysema: similar radiographic findings, distinct clinical entities. World J  
99 Surg. 2015 Apr;39(4):1008-17. <https://doi.org/10.1007/s00268-014-2882-7>.
- 100 3. Shipman PJ, Drury P. Emphysematous gastritis: case report and literature review. Australas  
101 Radiol. 2001 Feb;45(1):64-6.<https://doi.org/10.1046/j.1440-1673.2001.00878.x>
- 102 4. Paul M, John S, Menon MC, Golewale NH, Weiss SL, Murthy UK. Successful medical  
103 management of emphysematous gastritis with concomitant portal venous air: a case report. J  
104 Med Case Reports. 2010;4:140. <https://doi.org/10.1186/1752-1947-4-140>
- 105 5. Guniganti P, Bradenham CH, Raptis C, Menias CO, Mellnick VM. CT of Gastric  
106 Emergencies. RadioGraphics2015;23(1):75–87. <https://doi.org/10.1148/rg.2015150062>



122 **Figure 1:** Plain radiograph of the abdomen of a 67-year-old male patient anteroposterior supine  
123 view shows grossly distended stomach (black arrows) without signs of pneumoperitoneum or  
124 small bowel obstruction.

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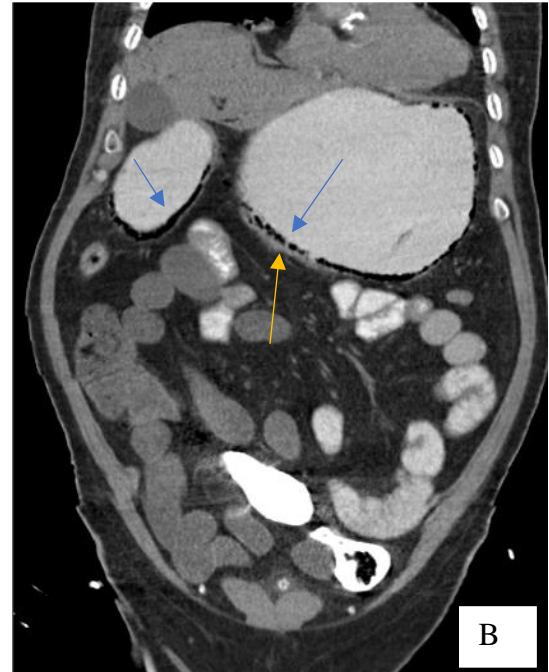
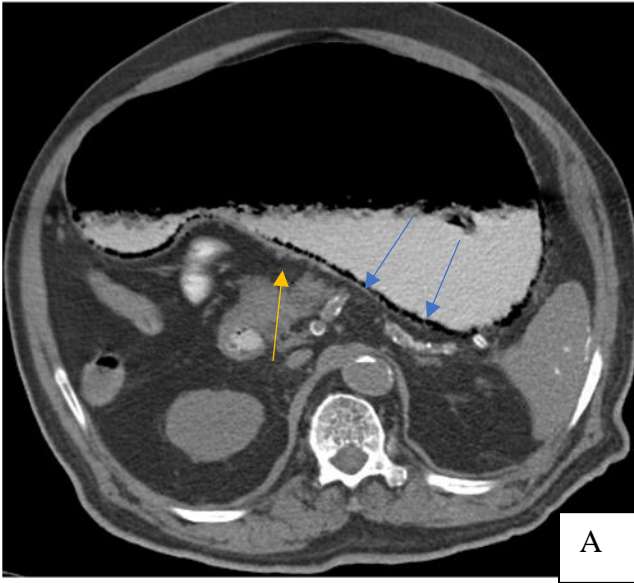
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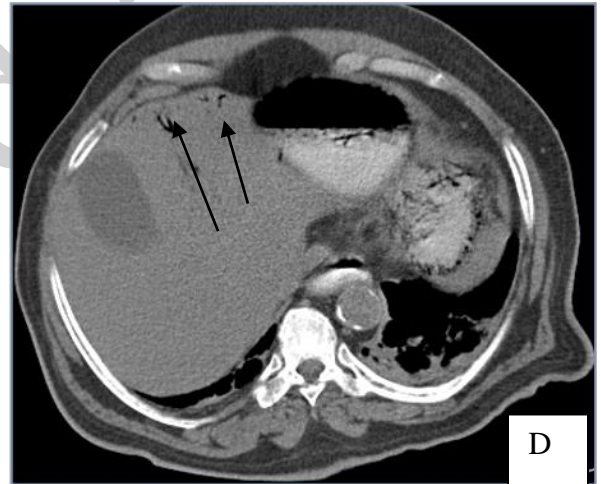
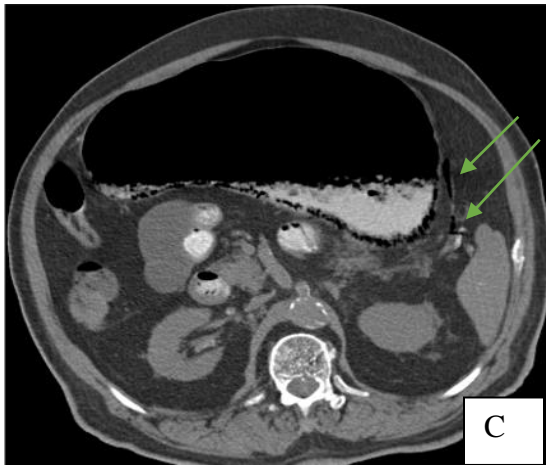
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**Figure 2:** Non-contrast computed tomography scan of the abdomen of a 67-year-old male patient from (A-D): **A,B**) Axial image at upper pole of right kidney and coronal image obtained at mid abdomen level show grossly distended stomach with tiny bubbly intramural air (blue arrows) and mild perigastric fatty streakiness (orange arrows). **C**) Axial image at mid renal pole shows minimal air within perigastric draining vein( green arrows). **D**) Axial image obtained at level of gall bladder fossa shows peripheral branching linear lucencies in left lobe of liver consistent with portovenous air (black arrows).