

Emphysematous Gastritis: A Complication of Rare *Sarcina Ventriculi* Infection

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CASE REPORT: A 79-year-old Caucasian man with a history of constipation, uncomplicated umbilical hernia and chronic obstructive pulmonary disease (COPD) requiring 2L O₂ via nasal canula at night, presented to the emergency department with increasing shortness of breath of 2 days duration. He was found to be saturating 87% on 5L nasal canula with his remaining vital signs within normal limits. Physical examination revealed mild retractions with wheezing and rhonchi bilaterally, in addition to mild abdominal distention.

Laboratory investigation revealed a hemoglobin of 14.6 g/dL, creatinine of 1.5 mg/dL and blood urea nitrogen of 26 mg/dL. Arterial blood gas displayed a pH of 7.38, pCO₂ 40 mmHg, pO₂ 64 mmHg. Chest x-ray was negative for acute cardiopulmonary findings. The patient was initiated on high flow nasal canula, intravenous fluids, macrolide and prednisone, after receiving 125 mg methylprednisolone, and admitted for COPD exacerbation.

The following night, the patient had sudden onset coffee-ground emesis. Repeat laboratory values displayed a hemoglobin of 13.2 g/dL, creatinine of 1.4 mg/dL, blood urea nitrogen of 36 mg/dL. Gastric occult



Figure 1. Sagittal CT at the level of the stomach demonstrates nondependent air within the posterior wall of the gastric body consistent with emphysematous gastritis.

blood test was positive. An abdominal radiograph demonstrated constipation with mild gaseous distention of multiple bowel loops. With respect to the patient's renal insufficiency, a CT of the abdomen was obtained without contrast which exhibited gastric pneumatosis with wall thickening and adjacent fat stranding in the greater curvature and, to a lesser extent, within the sigmoid colon and rectum (figure 1). Left lower lobe pneumonia was also visualized with superimposed emphysematous change, in addition to an uncomplicated umbilical hernia. Prednisone and azithromycin were

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discontinued and intravenous piperacillin/tazobactam 3.375 g every 8 hours was added. After, a nasal gastric tube was placed with a nothing per oral (NPO) diet.

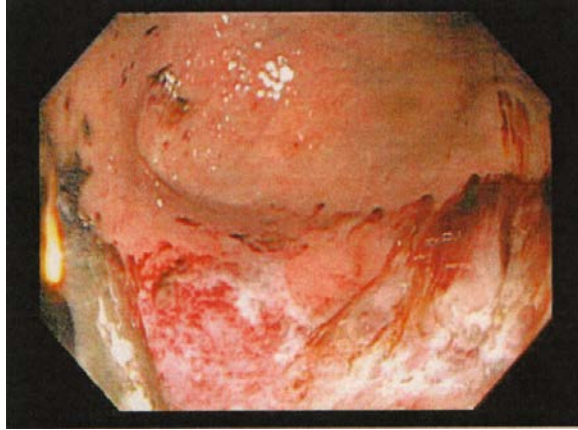


Figure 2.1. Upper endoscopy images of the stomach demonstrating diffuse gastritis and a gastric body mass.

Upper endoscopy was performed revealing LA Grade D reflux esophagitis with a moderate amount of bezoar found in the stomach. A large, infiltrative and ulcerated, non-circumferential mass was found and biopsied in the greater curvature with cold forceps, which appeared to be a malignant gastric tumor (figure 2.1-2.2). The examined duodenum was normal. A proton pump inhibitor continuous infusion and metoclopramide were initiated. Ammonia levels were found within normal limits. Gastric biopsy results found marked ulcerative and hemorrhagic gastritis with tissue necrosis and numerous bacterial organisms whose morphologically was consistent with *Sarcina ventriculi* (figure 3.1-3.2). *S. ventriculi* is an organism which has been increasingly recognized in the setting of delayed gastric emptying, with complications associated with gastric perforation, emphysematous gastritis, peritonitis, and rarely malignancy.¹

Oral metronidazole 500mg four times per day was added as an adjuvant to the

piperacillin/tazobactam already administered. After 72 hours, renal function had improved and a repeat CT of the abdomen with contrast revealed resolution of the pneumatosis with mild constipation. Six

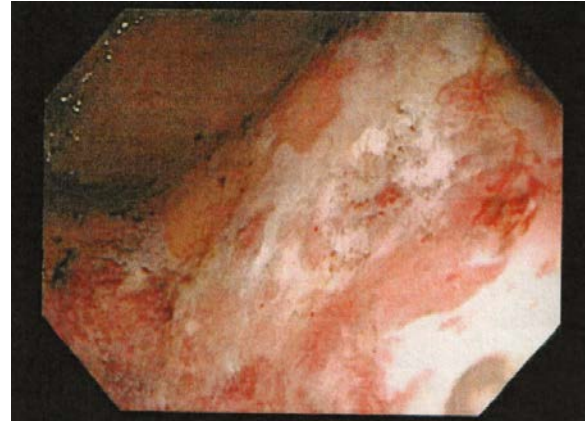


Figure 2.2. Upper endoscopy images of the stomach demonstrating diffuse gastritis and a gastric body mass.

days later, intravenous piperacillin/tazobactam was discontinued and metronidazole frequency was reduced to three times per day. Repeat upper endoscopy revealed many non-obstructing, non-bleeding serpentine gastric ulcers with no evidence of perforation, which were biopsied using cold forceps. The duodenum was normal. Biopsy results showed ulcerative gastritis with reactive epithelial changes and no evidence of previously seen organisms. At the time of discharge, the patient tolerated a full diet and metronidazole was continued for a total of 14 days, in which the patient's status continued to improve in the outpatient setting. However, 10 days following discharge, the patient returned to the emergency department with bright-red blood per rectum with blood loss anemia, in which a colonoscopy and chest CT revealed well-differentiated rectosigmoid adenocarcinoma with numerous pulmonary nodules scattered bilaterally.

DISCUSSION: Emphysematous gastritis is a life-threatening complication of *Sarcina ventriculi* infection diagnosed by imaging, clinical and endoscopic findings. It requires an urgent initiation of antibiotics given the high mortality rate.² Scant literature sources reveal emphysematous gastritis as a complication of, *Sarcina ventriculi*, a strictly anaerobic, carbohydrate-fermenting, CO₂ producing bacterium capable of thriving in environments with a pH ~2.^{3,4} The organism was first discovered as a potential human pathogen in 1842 by Goodsir,⁵ which has been a heavily controversial topic in today's literature. Although early literature advocated such colonization in the feces of healthy human host, particularly those with vegetarian diets,⁶ a couple theories proposed by Canale-Parola and Lam-Himlin confront the concept of such a bacterium being present without gastrointestinal pathology. Canale-Parola strongly suggested that although *Sarcina* had been visualized in various stomach contents, it is not found in the

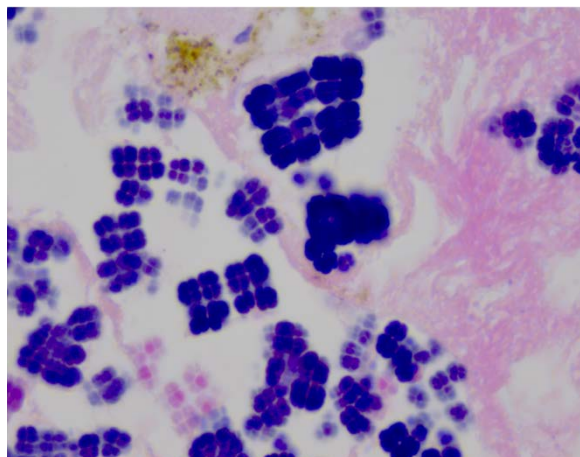


Figure 3.1. Hematoxylin-eosin (H&E) stained gastric mass biopsy revealing basophilic-cuboidal *Sarcina* organisms in tetrad arrangement and background submucosal necrosis in a patient with idiopathic gastric outlet obstruction.

healthy human stomach.⁷ Lam-Himlin et al,⁸ stated that as opposed to mucosal invasion,

that rather an initial insult to the gastric mucosa preceded invasion of the *Sarcina* species.

Most interestingly, has been the association of such species with various gastrointestinal adenocarcinomas, particularly gastric and pancreatic.⁸ What makes the above case interesting is the patient's short return to ED

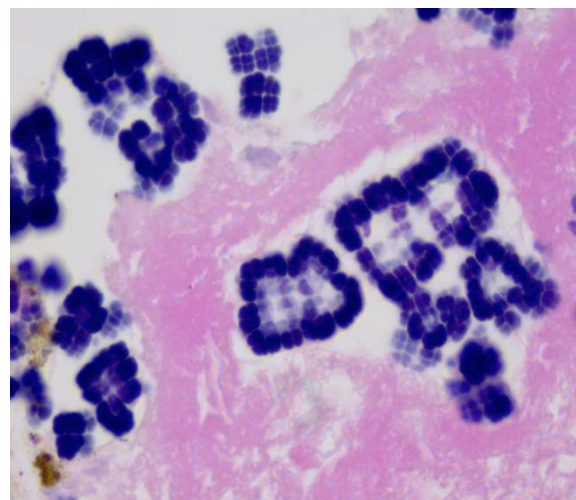


Figure 3.2. Hematoxylin-eosin (H&E) stained gastric mass biopsy revealing basophilic-cuboidal *Sarcina* organisms in tetrad arrangement and background submucosal necrosis in a patient with idiopathic gastric outlet obstruction.

with findings of rectosigmoid adenocarcinoma and subsequent pulmonary metastasis, making what we believe to be the first rectosigmoid case found in association to this pathogen in the medical literature to date. Of course, one cannot discern which preceded first. It does, however, draw special consideration, given this association in previous published studies as to whether treatment of this particular bacterial species could lead to a decrease in the incidence of associated gastrointestinal adenocarcinoma. This expresses considerable resemblance to the prevention of adenocarcinoma and MALToMa caused by *H. pylori* species. This theory is most limited by inconsistent consensus on the type and duration of

treatment seen in Haroon Al Rasheed-Senseng's systematic review of treatment in relation to histopathology.¹ Medlicott and Adams⁹ have also compiled various approaches to treatment based upon clinical status, none of which provides ultimate treatment.

In conclusion, as the above bacterial organism becomes more prevalent in medical literature, it may be a worthwhile differential diagnosis in the workup of such findings on radiological imaging. Challenges including the complex nutritional requirements for culture and the lack of molecular biological test available, which may prove to be a fruitful development for early intervention, which could aid in lowering the morbidity and mortality of this emerging gram-positive bacterium.

DISCLOSURE: No competing interest or financial relationships were declared in relation to this publication. Patient and related family member verbal consent was obtained.

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