

Sarcina ventriculi: A case report of gastric perforation in a 85-year-old male with history of colon cancer

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ABSTRACT

Introduction: *Sarcina ventriculi*, a Gram-positive organism, which has been reported in gastric specimens of patients with delayed gastric emptying. Only 19 cases of human infection have been reported, mostly in the last five years; in most cases the organism was found incidentally or with mild gastrointestinal symptoms such as nausea. However, there were two reported cases of gastric perforation and also in two patients with *S. ventriculi* infection an occult gastrointestinal malignancy was found. **Case Report:** We report a case of gastric perforation with *S. ventriculi* involvement in an 85-year-old male with a history of colon cancer and partial colectomy. A total gastrectomy was performed; the final histopathological examination revealed the presence of *S. ventriculi* organisms in ischemic and necrotic gastric mucosa associated with perforation. **Conclusion:** *S. ventriculi* pathogenicity is still debated, but its

association with life-threatening conditions like gastric perforation and its increasing frequency requires further understanding of this organism.

Keywords: Colon cancer, Gastric perforation, Gram-positive, *Sarcina ventriculi*, *Sarcina*

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INTRODUCTION

Sarcina ventriculi, a Gram-positive, non-motile, anaerobic coccus. It is an environmental organism found in soil that is tolerant of the acidic environment of the stomach and grows via the fermentation of carbohydrates. *S. ventriculi* is identified by light microscopy and has a basophilic staining with hematoxylin and eosin. The organism presents on the surface of the mucosa as cocci approximately the size of yeast occurring in characteristic tetrads of 4 or 8 cells, abutting each other at flattened interfaces [1]. *S. ventriculi* has been involved in numerous cases of fatal disease in livestock, causing bloat and gastric dilatation [2]. The first case of human infection was identified by Goodsir J. in 1842 [3]. However, since then only 19 cases have been reported, and almost all of them within the last five years [4]. This infection is implicated in a variety of gastrointestinal conditions such as an asymptomatic carriage, gastritis, and rarely,

bacteremia, gastric ulcers and gastric perforation [4–9]. The scarcity of reported cases in English literature and limited association of the bacterium with life-threatening conditions prompted us to report this case of gastric perforation.

CASE REPORT

An 85-year-old male, with the history of colon cancer and a colectomy performed six years ago, was admitted to the emergency room after an acute onset of severe abdominal pain and distention. The week before the emergency room visit, the patient had complained of mild abdominal pain and diarrhea. Shortly after arrival, he developed respiratory distress and confusion. After a plain chest radiograph demonstrated massive pneumoperitoneum the patient was emergently taken to the operating room for a perforated viscus. Peripheral blood count, biochemistry panel and acid-base studies were remarkable for leukocytosis, lactic acidosis and increased venous oxygen saturation. At the time of laparotomy, a large perforation on the lesser curve of the stomach abutting the gastroesophageal junction was identified and a total gastrectomy was performed. During the operation the patient was hemodynamically unstable requiring vasopressors and his gastrointestinal tract was left in discontinuity with a temporary abdominal closure. After stabilization in the intensive care unit he returned to the operating room to undergo reconstruction with a Roux-en-Y esophagojejunostomy. He had a prolonged hospital course complicated by aspiration pneumonia and respiratory failure requiring a tracheostomy. Ultimately the patient was discharged to a rehabilitation facility and subsequently had his tracheostomy decannulated and he is tolerating a post-gastrectomy diet.

The gross specimen of the removed stomach had a 5.0x1.5 cm transmural defect on the lesser curvature (Figure 1). The gastric mucosa was pink-tan to red-tan, extensively hyperemic, with fairly loose rugal folds. The edge of perforation was dark red-brown and congested. Microscopic examination showed perforation with associated acute ischemic changes and necrosis of mucosa with acute inflammation. The specimen was extensively sampled to rule out any evidence of thromboemboli, vasculitis, amyloidosis or malignancy. Tetrads of microorganisms compatible with *S. ventriculi* were identified on hematoxylin and eosin stain, and were embedding in the mucosal tissue (Figure 2). Gram staining was strongly positive (Figure 3) and immunohistochemistry for *Helicobacter pylori* was negative. Two reactive lymph nodes were identified in perigastric fat along the greater curvature.



Figure 1: Gastrectomy specimen showing transmural defect.

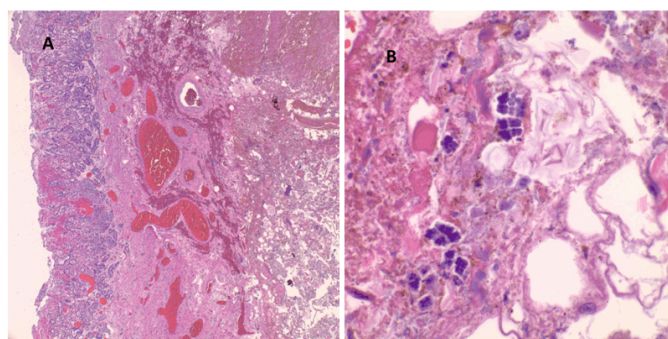


Figure 2: (A) Low-power view of ischemic and necrotic gastric mucosa from the area of perforation (H&E stain, x4). (B) High-power view of *Sarcina ventriculi* with a clear tetrad morphology. (H&E stain, x60).

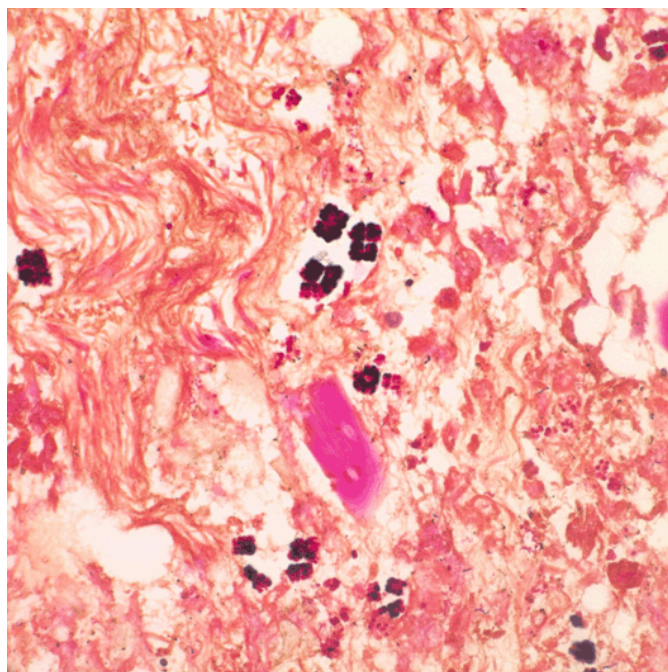


Figure 3: Gram stain on high-power view reveals positive microorganisms (Gram stain, x40).

DISCUSSION

Sarcina ventriculi is the most commonly found in patients 11–64 years old, with a higher incidence in women with a female to male ratio of 2:1. Prevalent number of cases of *S. ventriculi* infection occur in patients with a history of gastric outlet obstruction, gastroparesis (e.g., due to diabetes mellitus) or gastrointestinal surgery [4]. The delayed gastric emptying and the acidic pH of the stomach in these patients favor a rapid growth of this organism [1]. Patients can present with abdominal pain, nausea and frothy (sarcinous) vomit, but many a times *S. ventriculi* is found incidentally on gastrointestinal biopsies in asymptomatic patients. In most of the cases, histopathology reveals chronic gastritis without bacterial invasion of the mucosa. Only two cases have been associated with life-threatening illness from emphysematous gastritis with perforation and necrosis on histopathology. Both of those patients had a history of gastric ulcers that could have become a nidus for development of emphysematous gastritis [4, 9]. However, the patient in the present case did not have any known history of ulcers, which raises a possibility that *S. ventriculi* itself can cause direct invasion into the gastric wall and lead to perforation.

The relationship between *S. ventriculi* infection and neoplastic process is still unclear. Lam-Himlin et al. [9] reported a case of an adenocarcinoma of the pylorus that was subsequently diagnosed after treatment of *S. ventriculi* infection. Another patient in their report had a history of surgery for pancreatic adenocarcinoma. The patient in our case had a prior colectomy for colon cancer. Our findings and the previous reported cases may suggest a possible relationship between *S. ventriculi* and other gastrointestinal malignancies.

S. ventriculi is usually identified by light microscopy on routine hematoxylin and eosin stain. The main differential diagnosis is with *Micrococcus* species, Gram-positive cocci that are also packed in tetrads, but are much smaller than *S. ventriculi* organisms. Molecular studies such as polymerase chain reaction can be performed to confirm the species, if necessary [1].

Concurrent infection with *S. ventriculi* and other organisms has been reported in a few cases [4, 10, 11]. Co-existence of *S. ventriculi* and *H. pylori* was reported only once in pediatric patients [10]. Concurrence with *Giardia* and *Candida* is also known [4]. Haroon al Rasheed et al. [11] found the presence of *S. ventriculi* after treatment of *H. pylori* and this prompted a thought that these organisms are mutually exclusive.

Treatment of mild, limited disease involves a combination of metronidazole, second antibiotic and a gastrointestinal agent that provides complete eradication of the infection [4, 7]. For severe disease, such as gastric perforation, gastrectomy is required. Mild disease has an excellent prognosis, but mortality can be high in cases of severe disease [1].

CONCLUSION

S. ventriculi has been shown to be involved in a variety of gastrointestinal conditions, but scarce information about this infection in humans warrants further investigation. The previously published cases and frequency of incidental finding of *S. ventriculi* in asymptomatic patients suggest that this bacteria unlikely can be a contributory factor in ulceration or neoplastic process. The present case introduces the area of possible research related to mucosal invasion by *S. ventriculi* with behavior of a true pathogen.

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Author Contributions

Maria Mironova – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

Nariman Gobara – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Christopher P. Pennell – Acquisition of data, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

Danny A. Sherwinter – Acquisition of data, Revising it critically for important intellectual content, Final approval of the version to be published

Adela Camic – Substantial contributions to conception and design, Revising it critically for important intellectual content, Final approval of the version to be published

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Conflict of Interest

Authors declare no conflict of interest.

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