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CASE REPORT PEER REVIEWED | OPEN ACCESS

Sarcina ventriculi-associated with chemotherapy-induced ischemic-like gastric injury in a patient with transformed high-grade B-cell lymphoma: A case report

Waed Alkaram, Weimin Liu, Baraa Alosh

ABSTRACT

Introduction: *Sarcina ventriculi* is a Gram-positive coccus bacterium that has a distinctive morphologic appearance resembling the chambers of a heart. It is widely spread in the soil and can contaminate the food. However, it rarely causes a disease in a healthy individual. There has been a recent surging in the reporting of *S. ventriculi* in the medical literature, particularly in patients with delayed gastric emptying for various reasons. It can be associated with life-threatening conditions, such as emphysematous gastritis and perforation. **Case Report:** We report here the first case of *S. ventriculi* in association with a chemotherapy-treated patient for a lymphoma. An 81-year-old man with a history of high-grade B-cell lymphoma status-post-chemotherapy, presented with abdominal pain, loss of appetite, and weight loss. There was no evidence of relapsed lymphoma by imaging studies. An esophagogastroduodenoscopy showed a gastric mucosa with a large mass effect and erythema. Histologic examination showed ischemic-like gastritis with numerous basophilic microorganisms with morphology consistent with *S. ventriculi*. The patient was discharged with a course of antibiotics, including metronidazole, ciprofloxacin, and vancomycin. **Conclusion:** Recognizing *S. ventriculi* in gastric biopsies is essential because some cases can be associated with severe morbidity and mortality, particularly in patients with previous morbidities like malignancies.

Keywords: Chemotherapy, Gastritis, Lymphoma, *Sarcina ventriculi*

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INTRODUCTION

Sarcina ventriculi are strict anaerobic Gram-positive cocci bacteria [1]. They were first reported in 1842 by John Goodsir in a young patient with voluminous frothy vomiting [2]. Carbohydrate fermentation is the sole metabolic pathway used by these bacteria to generate energy, allowing them to survive in an acidophilic environment, such as the stomach [3]. These bacteria are most commonly found in patients with delayed gastric emptying or gastric outlet obstruction [4]. *S. ventriculi* cocci organize into tetrads imparting the chambers of a heart appearance [5]. This distinctive morphologic appearance makes their diagnosis relatively straightforward by light microscope. We report here the first case of *S. ventriculi* in association with chemotherapy-induced ischemic-like gastric injury in a patient with transformed high-grade B-cell lymphoma.

CASE REPORT

An 81-year-old Caucasian man presented to our emergency department complaining of abdominal pain, intermittent diarrhea, loss of appetite, and weight loss. The pertinent past medical history included diabetes mellitus type II, and follicular lymphoma with a transformation

to Burkitt's-like high-grade B-cell lymphoma, status-post-EPOCH chemotherapy regimen. The patient denied fever, chills, or night sweats. There was no evidence of relapsed lymphoma by imaging studies. The patient had undergone a colonoscopy in an outside institute and showed no evidence of abnormality or malignancy. A computed tomography (CT) scan with contrast showed gastric dilatation, bilateral pulmonary fibrosis, and an atrophic pancreas. An esophagogastroduodenoscopy showed a large mass effect with marked erythema and edema involving the fundus and body of the stomach. Ischemic changes were noted in the antrum. The esophagus showed grade C erosive esophagitis. Multiple gastric biopsies were obtained from the lesion and antrum.

Histologic examination by light microscope showed an edematous oxyntic-type gastric mucosa with surface epithelial degeneration, shedding, and a superimposed layer of fibrin-leukocytic membrane. Fragments of gastric epithelium with coagulative necrosis admixed with eosinophilic hyaline materials were noted. The basal gastric glands are lined by cells that appear reactive and have distinct nucleoli (Figure 1). Hyaline thrombi in few small blood vessels identified (Figure 1). Focal emphysematous changes were noted (Figure 2). The aforementioned morphologic findings are reminiscent of ischemic gastritis, which is rare because of the abundant vascular supply serving the stomach. The luminal mucosal surface showed numerous basophilic microorganisms that had a cuboid shape with a tetrad configuration that resembles the cross-section of a heart (Figure 3). The microorganisms were strongly Gram-stain positive. The morphologic findings were consistent with *S. ventriculi*. Antral gastric biopsy showed moderate chronic inactive gastritis with no evidence of *S. ventriculi* or *Helicobacter pylori* organisms. The gastric biopsy showed no morphologic evidence of lymphoma or other malignancies. The patient was discharged with a course of antibiotics, including metronidazole, ciprofloxacin, and vancomycin.

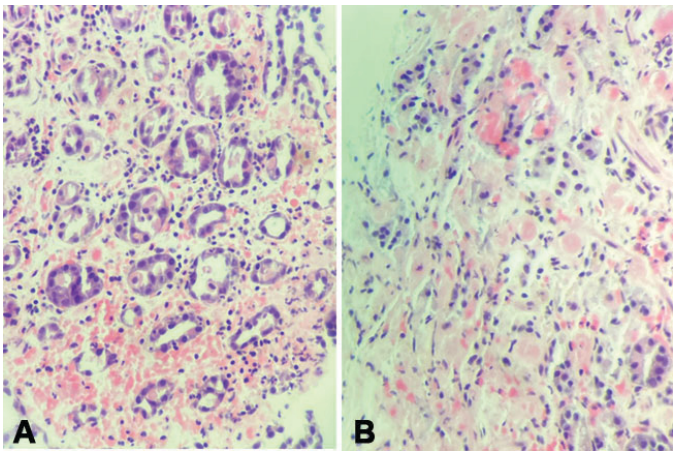

Figure 1: Hematoxylin and eosin stain (H&E) gastric mucosa with reactive epithelial changes, hemorrhagic lamina propria (left) and microthrombi (right).

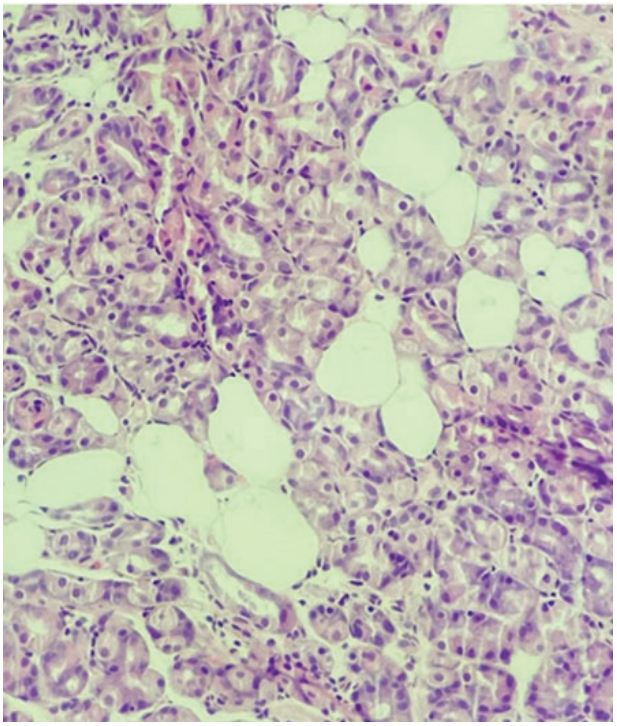

Figure 2: Hematoxylin and eosin stain (H&E) gastric mucosa with emphysematous changes.

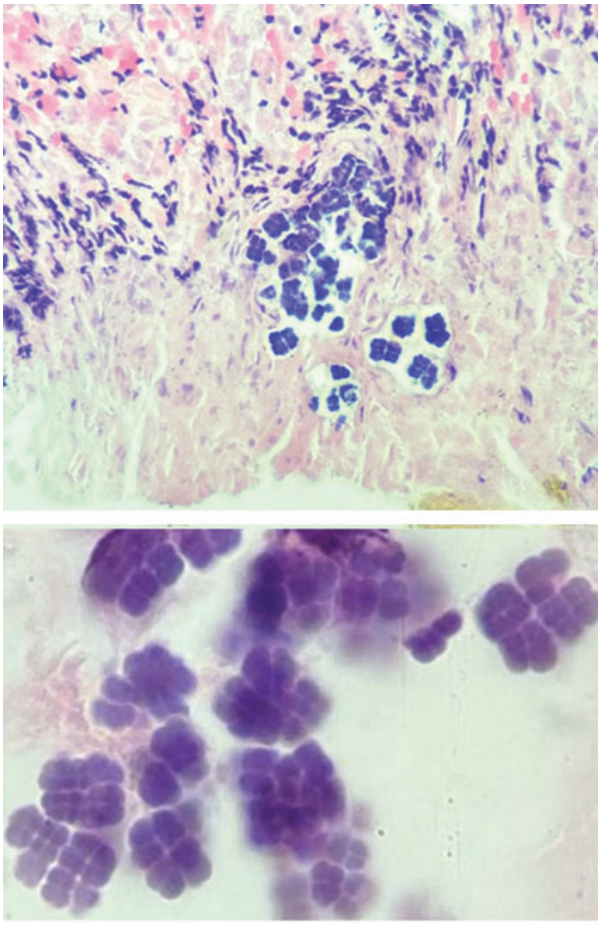

Figure 3: Hematoxylin and eosin stain (H&E) low-power (top) and high-power (bottom) views: Basophilic microorganisms in a tetrad arrangement resembling the cross-section of a heart.

DISCUSSION

Whether *S. ventriculi* is pathogenic, or the stomach is its natural habitat remains a question; however, *S. ventriculi* is a well-known cause of mortality in livestock [6]. These bacteria are widely spread in the soil, which means the ingestion of food contaminated with *S. ventriculi* is unavoidable [1]. There is a recent increase in reports that link *S. ventriculi* to variable morbidity, and even mortality, in humans, particularly in patients with delayed gastric emptying [7]. In such patients, these bacteria may have a survival advantage because of the low PH environment created by delayed gastric emptying or gastric outlet obstruction. *S. ventriculi* is less likely to be pathogenic in healthy individuals; however, it may exacerbate a pre-existing condition and contribute to patient morbidity, as in our patient.

In a recent literature review by Al Rasheed et al., *S. ventriculi* was reported predominantly in adults with a female-to-male ratio of 2:1. Its clinical presentation varies between epigastric pain, anorexia, vomiting, and diarrhea to more life-threatening conditions, such as emphysematous gastritis and perforation. The pre-existing conditions observed in the review included diabetes mellitus, cystic fibrosis, gastroesophageal reflux disease, gastric banding, cystic fibrosis, bowel resection, refractory gastric ulcers treated by Billroth II antrectomy, and pylorus sparing pancreaticoduodenectomy for pancreatic adenocarcinoma [5]. Coinfection with *Candida* species, *Giardia*, *H. pylori*, and *Staphylococcus* has been reported [5, 8]. Some cases of life-threatening emphysematous gastritis and gastric perforation with mortality have been reported [7]. In our case, the patient has ischemic-like changes induced by chemotherapy in the gastric mucosa, which has not been reported before in the literature.

The endoscopic findings, which were observed in cases of infection with *S. ventriculi*, varied between normal-appearing gastric mucosa to erythematous, edematous mucosa, erosions, ulcers, food bezoar, and restriction [5].

Hematoxylin and eosin (H&E) stain is usually sufficient to recognize and diagnose *S. ventriculi* by light microscope. This bacterium has a cuboid shape and measures 1.8–3 μm in size with a tetrad-packet arrangement that resembles the chambers of a heart [4]. Gram stain can be helpful, but it is not necessary. Polymerase chain reaction (PCR) might be used as a confirmatory test if needed [4]. The main differential diagnosis is *Micrococcus* species, which are smaller (0.5 μm) aerobic microorganisms that are catalase-positive, in contrast to the larger *S. ventriculi* that show a negative catalase test [5]. *S. ventriculi* can be identified in pyloric and duodenal brushing cytologic specimens [9].

No standard treatment regimen has been developed for *S. ventriculi*; however, treatment with combined antibiotics like metronidazole and ciprofloxacin successfully eradicates the organisms in some cases [5]. Stable patients and healthy individuals may not require therapy. Some patients may need proton pump inhibitors (PPIs) and prokinetic agents [10].

CONCLUSION

There has been a recent surging in reporting *S. ventriculi* in the medical literature, particularly in patients with delayed gastric emptying. Identifying these bacteria in gastric biopsies is essential because some cases can be associated with severe morbidity and mortality. Additional studies are necessary to shed more light on the pathogenicity of *S. ventriculi* and to optimize a treatment regimen.

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Author Contributions

Waed Alkaram – Acquisition of data, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Weimin Liu – Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Baraa Alosh – Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Conflict of Interest
Authors declare no conflict of interest.

Data Availability
All relevant data are within the paper and its Supporting Information files.

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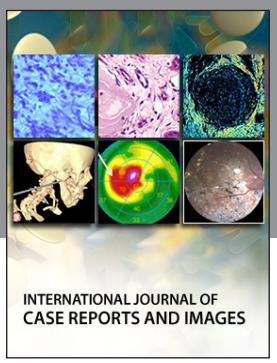

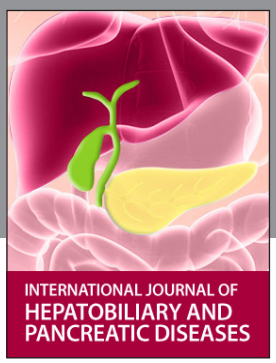

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