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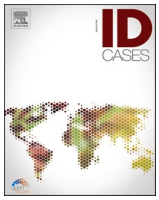

Case report

Campylobacter gastroenteritis and bacteremia in an asplenic patient with a recent history of *Yersinia Enterocolitis*: Case report and literature review

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ABSTRACT

In this case report, we present a patient with a history of splenectomy and two recent hospital admissions for severe gastroenteritis with sepsis. The first hospital admission was for *Yersinia enterocolitica* and the second admission was for *Campylobacter fetus* gastroenteritis with bacteremia. During both admissions, the patient was treated with a prolonged course of antibiotics and later discharged with full recovery. In our review, we address the risk of enterocolitis in splenectomized patients.

Introduction

The spleen is the largest secondary lymphoid organ in the body. It houses memory B-cells that produce opsonizing antibodies, macrophages that eliminate infection by phagocytosis, and T-cells that produce inflammatory molecules [1,2]. Therefore, individuals with splenectomy are at risk of overwhelming infections associated with high mortality [2]. Serious infections with encapsulated bacteria such as *Streptococcus pneumoniae*, *Neisseria meningitidis*, and *Hemophilus influenzae* type B have been well described, underlining the importance of routine vaccinations against these bacteria [3]. In this report, we describe serious gastrointestinal infections with *Yersinia enterocolitica* and *Campylobacter* in a patient with splenectomy.

Case presentation

A 24-year-old male patient with a past medical history of beta thalassemia intermedia with hypersplenism who had splenectomy at age fourteen presented with diarrhea, fever, dizziness, and generalized weakness of 2 days duration. He had five watery, greasy bowel movements a day. He denied abdominal pain. He was first seen in urgent care where he fainted and was sent to the emergency department. He was found to be febrile with a temperature of 104.9 °F and otherwise normal vital signs. Physical examination revealed icteric sclera and mild tenderness on both lower quadrants of abdomen. His laboratory workup was significant for a white blood cell count of 21.1 $\times$ 10^3 cells/μL, hemoglobin of 7.4 g/dL, total bilirubin of 10.2 mg/dL (indirect bilirubin of 8 mg/dL), and acute kidney injury with estimated glomerular filtration rate (eGFR) of 62 mL/min/1.73 m^2. Computerized tomography (CT) of the abdomen showed prominent right lower quadrant mesenteric lymph nodes, suggestive of mesenteric adenitis.

He received 4 units of packed red blood cells. He subsequently developed acute hypoxic respiratory failure, with a heart rate up to 140 beats per minute, respiratory rate up to 40 breaths per minute and oxygen saturation of 77% on room air. Sepsis and transfusion-related acute lung injury were suspected. He was started on BiPAP and transferred to the intensive care unit (ICU). CT chest showed extensive mixed ground glass and consolidative nodular opacities within the upper lobes bilaterally. Because of suspicion of sepsis, he was also started on vancomycin, ceftriaxone, azithromycin, and metronidazole. Stool cultures grew *Y. enterocolitica*. Blood cultures collected on admission were negative and *Francisella tularensis* serology was negative. On day 3 of antibiotics, the patient improved. He received intravenous antibiotics for five days and discharged on oral ciprofloxacin and metronidazole for an additional five days.

Timeline of events is summarized in Fig. 1. Sixteen months later, the patient was readmitted for a similar problem. He presented with diarrhea and fever of one day duration. He had associated abdominal pain. He had six watery bowel movements in a day. The pain was localized to the right lower quadrant and characterized as sharp. He denied dysuria.

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He had a blood pressure of 79/44 mmHg, temperature of 101.6 °F, a heart rate of 157 beats per minute, and oxygen saturation of 97% on room air. Physical examination showed generalized abdominal tenderness. Laboratory results were significant for a hemoglobin of 5.2 g/dL and lactic acid of 3.5 mmol/L. Vancomycin and Cefepime were started, and he was transfused with two units of packed red blood cells. Due to a history of appendectomy, appendicitis was not suspected, and a CT abdomen showed no acute findings. Stool cultures were also negative. However, blood cultures in BD BACTEC culture media grew curved gram-negative rods (Fig. 2), later confirmed to be *Campylobacter fetus* via Matrix Assisted Laser Desorption/Ionization time-of-flight (MALDI-TOF) technique with a 99.9% confidence value. The stool culture was later found to be negative. Antibiotics were changed to ceftriaxone and metronidazole for continued inpatient therapy. Upon discharge on day 5, antibiotics were changed to oral azithromycin to complete a 14-day total course of treatment.

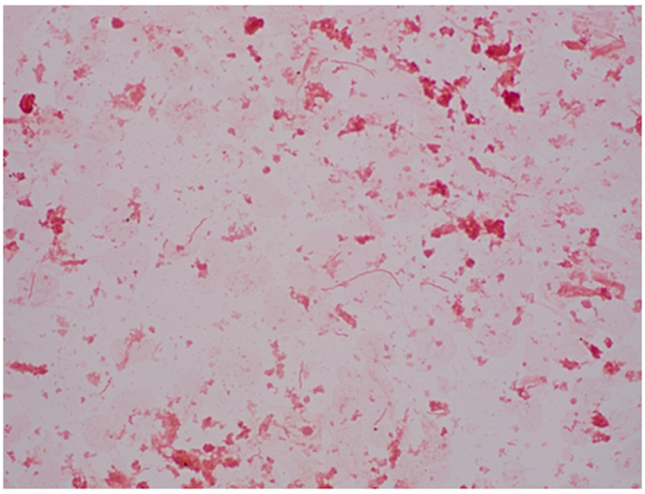

Fig. 2. Gram-stain results showing *C. fetus*.

Discussion

Campylobacter bacteremia is a known but rare complication occurring in < 1% of the estimated 1.5 million patients per year in the United States affected by *Campylobacter* gastroenteritis [4,5]. While infection is most common in younger patients, severe infection with bacteremia is more commonly seen in older patients [6]. Pathogenic *Campylobacter* species are classified into three groups: major human enteric pathogens, minor pathogens, and major veterinary pathogens. *C. fetus* specifically is a curved, fastidious, motile bacterium and the only *Campylobacter* species which is both a major human and a major veterinary pathogen [7]. It is also known to cause septic abortion in farm animals. Human infections with *C. fetus* are acquired through direct contact with animals, consumption of contaminated animal products, or ingestion of water and food contaminated by animal feces [7]. In our patient, the blood culture was initially reported as growing curved, gram-negative bacteria before final identification was available. While the bacterial blood culture was confirmed to be *C. Fetus*, the stool culture was ultimately negative. This may have been due to the culture being incubated at 42 °C, the optimal temperature for other enteric pathogens but not *C. fetus*.

In those with *Campylobacter* bacteremia, the infection poses a risk of serious morbidity and mortality. These patients are at risk of endocarditis, osteomyelitis, pyogenic arthritis, and mortality [8]. A nationwide study of *campylobacter* bacteremia in Finland showed that mortality from *Campylobacter* is more common in patients with underlying lung diseases such as malignant diseases, severe kidney disease and liver disease [9]. Similarly, a retrospective population-based study from Sweden has shown that *Campylobacter* bacteremia is rare and occurs mainly in the elderly with comorbidities [10]. Treatment for *Campylobacter* bacteremia involves empiric antibiotic therapy with azithromycin, with further subsequent modification based on drug susceptibility results [11,12].

Among patients with *Campylobacter* bacteremia, 36.1% are caused by C. fetus and 1.9% had splenectomy as a risk factor [8,11,13,14]. Table 1 summarizes reports of bacteremia from other enteric pathogens including *Campylobacter* among patients with a history of splenectomy. In other immunocompromised patients such as patients with cancer, *Yersinia enterocolitica* may cause serious illnesses with higher mortality [15]. Our patient is unique in that he developed a serious *Campylobacter* infection following an episode of *Yersinia* colitis. Recurrent gastroenteritis in a splenectomized patient with pathogens that are known to cause serious infections has not been reported. The exact reason why enteric pathogens cause serious illnesses in splenectomized patients is not clear. It may be due to enteric pathogens such as *Y. enterocolitica* and *C. fetus* having a lipopolysaccharide (LPS) component of the cell

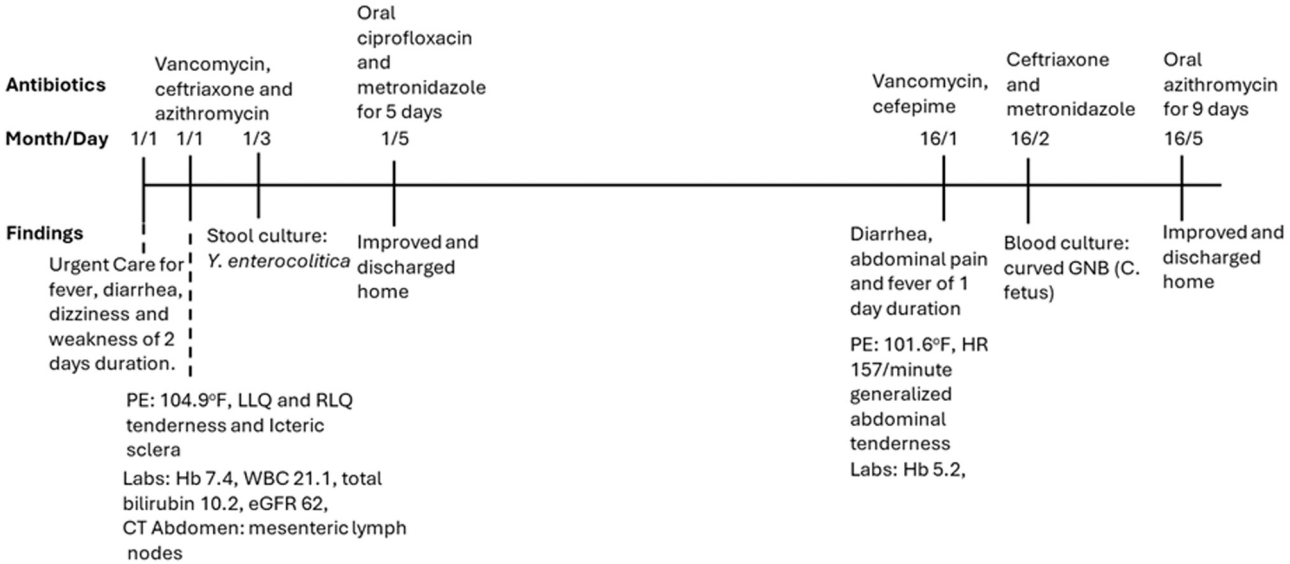

Fig. 1. Timeline of events. LLQ, left lower quadrant; RLQ, right lower quadrant; Hb, hemoglobin in g/dL; WBC, white blood cell in x10^3 cells/μL; bilirubin in mg/dL; eGFR, glomerular filtration rate in mL/min/1.73 $m^{2,}$.

Table 1
Reported cases of enteric pathogen bacteremia in asplenic patients.

Enteric pathogen	Number of Cases in the Article	Presenting complaint	Treatment response	References
Campylobacter fetus	1	Diarrhea, fever, abdominal pain	Complete resolution	Current case report
Campylobacter fetus	1	Influenza-like symptoms	Complete resolution	[18]
Campylobacter Jejuni	1	Fever and dry cough	Complete resolution	[18]
Campylobacter Jejuni	1	Fever	Septic shock and death	[19]
Campylobacter Jejuni	1	Fever, dyspnea on exertion, myalgias, and arthralgias	Complete resolution	[20]
Campylobacter Jejuni	1	Diarrhea, fever, chills, myalgia, and abdominal bloating	"Responded well" to treatment	[21]
Escherichia coli	8	Not described	1 reported death	[22]
Escherichia coli	10	Not described	*(Not described)*	[23]
Helicobacter Cinaedi	1	Dyspnea	Complete resolution	[24]
Klebsiella pneumoniae	1	Fever and epigastric pain	Complete resolution	[25]
Salmonella spp.	1	Not described	Death	[26]
Streptococcus agalactiae	1	Not described	Death	[27]
Streptococcus agalactiae	1	Not described	*(Not described)*	[28]
Vibrio Cholerae	1	Fever, upper abdominal pain, malaise, and vaginal bleeding	Complete Resolution	[29]
Yersinia enterocolitica	1	Diarrhea, fever, abdominal pain	Complete resolution	Current case report

membrane which can function as an endotoxin to which splenectomized patients are more susceptible [16,17].

Conclusion

Campylobacter fetus and *Yersinia enterocolitica* can cause serious illness in patients with a history of splenectomy. Understanding the possibility of severe recurrent gastroenteritis in patients with a history of splenectomy is essential for early diagnosis and prompt initiation of empiric treatment.

Author Statement

All comments have been addressed in the revised manuscript.

CRediT authorship contribution statement

Robin Chamberland: Writing – review & editing, Methodology. **Kevin Reilly:** Writing – review & editing, Methodology. **Getahun Abate:** Writing – review & editing, Methodology, Investigation, Conceptualization. **Jacob Beery:** Writing – original draft, Investigation. **Kevin Roberston:** Writing – review & editing, Investigation. **Ashley Hynes:** Writing – review & editing, Investigation. **Adam Douglas:** Writing – review & editing, Investigation. **John Peters:** Writing – review & editing, Investigation. **Ryan Freedle:** Writing – review & editing, Investigation.

Declaration of Competing Interest

All authors have no conflict of interest.

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A consent was obtained from the patient described in this report.

Author Agreement

The work described has not been published previously, that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder.

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