

Case report

***Clostridium* bacteremia and its implications: A case report**Sruthi Bonda^{a,*}, Kevin Lee^a, John Rovig^a, Shadaba Asad^b^a Department of Internal Medicine, University of Nevada, Las Vegas, 1707 W Charleston Blvd. Suite 100, Las Vegas, NV 89102, United States^b Department of Infectious Disease, University Medical Center, 1800 W Charleston Blvd, Las Vegas, NV 89102, United States

ARTICLE INFO

Keywords:

Clostridium
Septicum
Tertium
Bacteremia
Abdominal

ABSTRACT

Background: The *Clostridium* species is a gram positive, anaerobic, rod-shaped microbe that is known to produce many toxins. Most infections by the *Clostridium* species involve *C. botulinum*, *C. difficile*, and *C. perfringens*. However, other types of *Clostridium* species are also clinically relevant, such as *C. septicum* and *C. tertium*.

Case summary: We discuss a case of a 79-year-old patient with a past medical history of prostate cancer and alcohol abuse who presented to the hospital after being found down. They were admitted to the ICU for septic shock, and initial blood cultures grew *C. septicum*, *C. tertium*, and *E. coli*. A CT of the abdomen and pelvis with IV contrast showed pneumoperitoneum and a loculated pericolic fluid collection concerning for colon perforation. Initially the patient had a benign abdominal exam, but later developed significant distention and tenderness that required an emergent exploratory laparotomy and total abdominal colectomy. The patient was found to have three separate colon perforations, and no malignancy on histopathology.

Discussion: *C. septicum* is a highly virulent pathogen, and there are several cases reporting *C. septicum*-associated endocarditis, aortitis, and endophthalmitis. It is also associated with colon and hematologic malignancies and neutropenia. Common risk factors for *C. tertium* include immunocompromised status, neutropenia, hematologic malignancy, exposure to beta-lactam antibiotics, cirrhosis, and intestinal mucosal damage. It seems to have low virulence and low mortality when treated correctly. It is important that any patient found to have *Clostridium* bacteremia be evaluated for a gastrointestinal source and treated promptly and appropriately.

Introduction

The *Clostridium* species is a gram positive, anaerobic, rod-shaped microbe. It is known to produce a large number of toxins compared to other bacteria [1]. It is usually found in the natural environment, the gastrointestinal tract, and female genital tract [2]. Most infections by the *Clostridium* species involve *C. botulinum*, *C. difficile*, and *C. perfringens*¹. However, other types of *Clostridium* species are also clinically relevant, such as *C. septicum* and *C. tertium*.

In the following report, we present a rare case of a patient who initially presented with *C. septicum*, *C. tertium*, and *E. coli* bacteremia with benign abdominal findings. While blood cultures during the hospital course persistently grew only *E. coli* with resolved *C. septicum* and *C. tertium*, the patient developed an increasingly distended and tender abdomen. Further evaluation revealed multiple perforations of the intestinal tract that required emergent surgery.

Case

A 79-year-old patient with a past medical history of prostate cancer and alcohol abuse presented to the hospital after being found down by a family member. Further history revealed that they suffered a mechanical fall five days prior to being found. They were admitted to the ICU for septic shock. Initial blood cultures grew *C. septicum*, *C. tertium*, and *E. coli*, and the patient was started on ceftriaxone 2 g IV. Repeat blood cultures three days later were negative, and one week later the patient was able to be weaned off vasopressors and downgraded from the ICU. Another set of blood cultures were drawn due to persistent fevers and grew *Bacteroides ovatus*. At this time, the Infectious Disease team was consulted who switched the patient to Zosyn 3.375 g IV. A CT of the abdomen and pelvis with IV contrast was obtained due to mild abdominal distension in the setting of recent *C. septicum* and *C. tertium* bacteremia. The imaging showed pneumoperitoneum and a loculated pericolic fluid collection concerning for colon perforation, as seen in Fig. 1. The location raised suspicion for cecal versus ascending colon

* Corresponding author.

E-mail addresses: sruthi.bonda@unlv.edu (S. Bonda), kevin.lee@unlv.edu (K. Lee), john.rovig@unlv.edu (J. Rovig), shadaba.asad@umcsn.com (S. Asad).<https://doi.org/10.1016/j.idcr.2022.e01516>

Received 29 March 2022; Accepted 16 May 2022

Available online 20 May 2022

2214-2509/Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

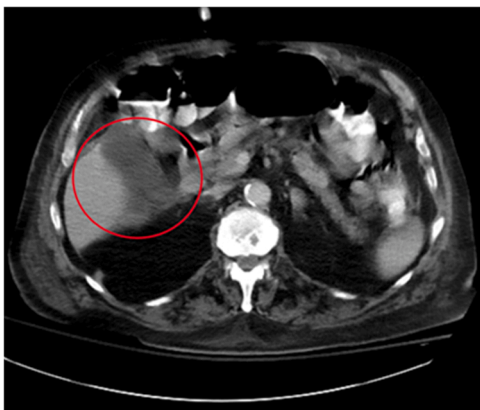


Fig. 1. CT abdomen pelvis with IV contrast showing pericolic fluid collection.

neoplasm. General surgery was consulted for further evaluation, and initially no surgical interventions were performed due to a relatively benign abdominal exam. That same evening, however, the patient developed significant abdominal distention with diffuse tenderness requiring an emergent exploratory laparotomy, total abdominal colectomy, and end ileostomy.

Intraoperatively, there were three separate perforations found in the large bowel at the cecum, splenic flexure, and proximal sigmoid colon. Pathology results showed that the colon had patchy areas of ischemic colitis and ulceration, focal transmural necrosis, serosal adhesions, and acute and chronic serositis, without any malignancy identified. Three days postoperatively, the patient developed a diffuse maculopapular rash that was concerning for a beta lactam reaction, so they were switched from Zosyn to meropenem 1 g every 8 h. They continued to spike fevers, so another CT abdomen and pelvis with oral and IV contrast was performed. The imaging showed a right subhepatic fluid collection concerning for abscess, as seen in Fig. 2. Micafungin 100 mg was added to the antimicrobial regimen, and they underwent drainage of the abscess by Interventional Radiology a few days later. Fluid studies revealed light growth of yeast. Three sets of blood cultures after the procedure remained negative. The patient was continued on meropenem and micafungin to complete 14 days of treatment. One month after the initial presentation, the patient was discharged to hospice.

Discussion

As previously mentioned, both *C. septicum* and *C. tertium* infections are relatively uncommon. *C. septicum* only accounts for about 5% of total Clostridial infections, while *C. tertium* even less [1,3]. Nevertheless, the literature shows that these infections are clinically relevant since they can cause multiple complications and have a high morbidity. *C. septicum*



Fig. 2. CT abdomen and pelvis with oral and IV contrast showing right subhepatic fluid collection.

is a highly virulent and aggressive pathogen, and there are several cases reporting *C. septicum*-associated endocarditis, aortitis, and endophthalmitis [4]. *C. septicum* is also strongly associated with colon and hematologic malignancies and neutropenia [5]. It is thought that colorectal tumors create an acidic environment in which *C. septicum* can survive due to its anaerobic and spore-forming properties [5]. Given this, all patients found to have *C. septicum* infection should be evaluated for any colon malignancy. Our patient interestingly did not have any findings concerning for malignancy on histopathology.

C. tertium is different from other *Clostridium* since it does not produce a toxin [6]. This infection is most common in immunocompromised hosts [7]. Other common risk factors include neutropenia as a result of hematologic malignancy, previous exposure to beta-lactam antibiotics, particularly third generation cephalosporins, cirrhosis, and intestinal mucosal damage [8,9]. Though our patient had a history of prostate cancer, they were not undergoing active treatment at the time of admission, nor did they have any known hematologic malignancies. They also did not have any recent antibiotic use. Many patients with *C. tertium* infection present with fever and generalized abdominal complaints, but there have also been cases in which patients are completely asymptomatic. It seems to have low virulence and low mortality when treated correctly, so effective treatment should not be delayed [7].

About 0.5–2% of positive blood cultures are due to *Clostridium* species [2]. Yamamoto et al reviewed 40 cases of patients with *Clostridium* bacteremia and found that the most common species isolated was *C. perfringens*. Two of the patients had *C. septicum*, and one had *C. tertium*, which were the 4th and 5th most common species, respectively. Twenty-five of these patients had polymicrobial bacteremia, with *E. coli* being the most common species identified. Our patient was also found to have *E. coli* in the blood, likely from the same gastrointestinal source. There have not been many reported cases of patients like ours with initially asymptomatic colonic perforations causing *Clostridium* bacteremia. Symptoms such as nausea, vomiting, abdominal pain, hypotension, and acute hemolysis have been associated with an increased 7-day mortality [10].

Our patient initially had no abdominal symptoms. They were thought to have a relatively stable bacteremia but were later found to have multiple bowel perforations of unclear etiology. It is peculiar that they did not develop any abdominal symptoms until almost two weeks after their initial presentation. Though the gastrointestinal tract is a known source of *Clostridium*, it is not often considered in the differential for patients found to bacteremic secondary to such. Our patient unfortunately did not undergo a CT of the abdomen until almost halfway through the hospitalization, which likely delayed the overall recovery. This case also shows the importance of accurately identifying the causative microbe and providing timely and adequate treatment, since clostridium bacteremia has a high rate of almost 60% mortality [10].

Ethical approval

Not applicable.

Consent

Verbal informed consent was obtained from the patient for publication of this case report and accompanying images.

CRedit authorship contribution statement

Sruthi Bonda: Conceptualization, Writing – original draft, Writing – review & editin. **Kevin Lee:** Conceptualization, Writing – review & editing. **John Rovig:** Writing – review & editing. **Shadaba Asad:** Supervision.

Conflict of interest statement

The authors report there are no competing interests to declare.

Acknowledgments

None.

References

- [1] Gosbell IB, et al. Clostridium tertium bacteremia: 2 cases and review. Pathology 1996;28(1):70–3. <https://doi.org/10.1080/00313029600169573>.
- [2] Yamamoto Yasumasa, et al. Clinical features of Clostridium bacteremia in cancer patients: a case series review. J Infect Chemother: J Jpn Soc Chemother 2020;26(1):92–4. <https://doi.org/10.1016/j.jiac.2019.07.019>.
- [3] Gray Kelsey M, et al. Distant myonecrosis by atraumatic Clostridium septicum infection in a patient with metastatic breast cancer. IDCases 2020;20:e00784. <https://doi.org/10.1016/j.idcr.2020.e00784>.
- [4] Khalid Muhammad, et al. Clostridium septicum sepsis and its implications. BMJ Case Rep 2012;2012:bcr2012006167. <https://doi.org/10.1136/bcr-2012-006167>.
- [5] Chirikian David, et al. Concurrent Clostridium septicum bacteremia and colorectal adenocarcinoma with metastasis to the brain - a case report. IDCases 2021;25:e01189. <https://doi.org/10.1016/j.idcr.2021.e01189>.
- [6] Vanderhofstadt Maud, et al. Clostridium tertium bacteremia: contamination or true pathogen? A report of two cases and a review of the literature. Int J Infect Dis: IJID: Publ Int Soc Infect Dis 2010;14(Suppl 3):e335–7. <https://doi.org/10.1016/j.ijid.2010.03.004>.
- [7] Shah Sweta, et al. Clostridium tertium in neutropenic patients: case series at a cancer institute. Int J Infect Dis: IJID: Publ Int Soc Infect Dis 2016;51:44–6. <https://doi.org/10.1016/j.ijid.2016.08.013>.
- [8] Milano Victoria, et al. Clostridium tertium bacteremia and hepatic abscess in a non-neutropenic patient. IDCases 2019;15:e00510. <https://doi.org/10.1016/j.idcr.2019.e00510>.
- [9] Wazir Mohammed, et al. Clostridium tertium bacteremia in a non-neutropenic patient with liver cirrhosis. Cureus 2019;11(4):e4432. <https://doi.org/10.7759/cureus.4432>.
- [10] Holub Michal, et al. Fatal neutropenic colitis and Clostridium Septicum bacteremia in a breast cancer patient. Prague Med Rep 2021;122(3):212–5. <https://doi.org/10.14712/23362936.2021.18>.