Infection and Drug Resistance

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CASE REPORT

Clostridioides difficile Bacteremia in an Elderly Female Patient After Colon Cancer Surgery

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Abstract: *Clostridioides difficile* infection (CDI) is a major healthcare-associated concern, particularly in the elderly. While CDI typically manifests as toxin-mediated colitis, hematogenous dissemination leading to bacteremia is relatively rare and associated with high mortality. We report an unusual case of *C. difficile* bacteremia in an octogenarian female patient occurring shortly after right hemicolectomy for ascending colon adenocarcinoma. This critically ill patient presented with bloodstream infection in the ICU following surgery. Multiple risk factors converged, including advanced age, extensive colorectal surgery with mucosal disruption, malignancy, and broad-spectrum antibiotic exposure. Blood culture identification required specific anaerobic processing. Combined intravenous and high-dose oral vancomycin therapy, guided by rapid microbiological confirmation, led to successful resolution of the bacteremia. This case underscores the potential for life-threatening *C. difficile* bacteremia in vulnerable elderly patients post-colorectal cancer surgery, highlights the diagnostic challenges (necessitating anaerobic blood cultures), and emphasizes the critical importance of early suspicion, aggressive multimodal therapy, and meticulous antimicrobial stewardship in this high-risk population. It serves as a crucial reminder of this devastating complication.

Keywords: *Clostridioides difficile*, bacteremia, colon cancer

Introduction

C. *difficile* is a gram-positive spore-forming obligate anaerobe with flagella. The spores are usually located in the subterminal position. This bacterium is widely distributed in the intestines of humans and animals as well as in the environment.[1,2] In recent years, there has been an increase in cases and severity of *C. difficile* infections (CDI) worldwide, and it has emerged as one of the common causative agents of healthcare-associated infections.[3,4] Several studies have also reported an increasing trend in community-acquired infections caused by *C. difficile*.[1,5–8]This pathogen is mainly transmitted through the fecal-oral route.[9] Major risk factors include clinical treatment with multiple antibiotics, the use of immunosuppressive agents and proton pump inhibitors (PPIs), advanced age, intensive care unit (ICU) admission, chronic kidney disease, and other underlying conditions.[10–13] Clinical features of CDIs may vary from being an asymptomatic carrier to experiencing different degrees of diarrhea to the most serious life-threatening toxic megacolon, intestinal perforation, and septicemia.[1,14,15] Recurrent and refractory infections are common after treatment, and demand scientific attention.[16,17] Herein, we report a case of *C. difficile* bacteremia in an elderly female patient following colon cancer surgery. Our findings will improve the present understanding of this pathogen.

Case Report

An octogenarian woman, diagnosed with diabetes 10 years ago, has had irregular medication adherence. She was hospitalized in the Neurology Department of our hospital for diabetic peripheral neuropathy. Her most recent Hemoglobin A1c (HbA1c) result was 9.1% (NGSP units),fasting glucose result was 8.69mmol/L. During her hospitalization, she experienced intermittent fever and had a history of cephalosporin use. Nine days after admission, enhanced

Received: 31 July 2025
Accepted: 30 September 2025
Published: 4 October 2025

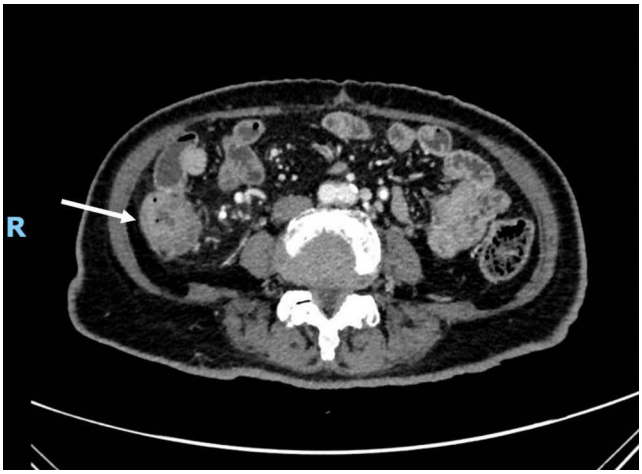

Figure 1 Enhanced abdominal CT results on nine days after admission. The white arrow indicates the irregular thickening of the ascending colon wall.

abdominal computed tomography (CT) revealed irregular and significant thickening of the ascending colon wall (Figure 1), which was considered as colon cancer. Ten days after admission, the patient underwent colonoscopy wherein a colon mass in the ascending colon were detected (Figure 2A), the remaining bowel showed no luminal narrowing or spasm, and no mucosal congestion, edema, erosion, ulceration, or pseudomembranes were identified. Biopsy indicated ascending colon adenocarcinoma (Figure 2B). After that, the patient was admitted to the gastroenterology department of our hospital and diagnosed with colonic malignant tumor and type 2 diabetic peripheral neuropathy. Considering her advanced age, the doctor in charge communicated with the patient's family. As the family refused to accept intravenous chemotherapy, the patient was orally treated with the chemotherapy drug capecitabine. Routine bloodwork conducted on the fourth day after transfer to gastroenterology department, due to the cough and elevated white blood cells, a nosocomial infection was suspected and the patient was empirically started on ceftriaxone. On the tenth day after transfer to gastroenterology department, owing to the progressive aggravation of abdominal pain and distension, the patient underwent an emergency abdominal enhanced CT scan. Compared to the previous abdominal CT scan, this scan showed an increase in the thickness of the ascending colon wall, multiple retroperitoneal enlarged lymph nodes, and multiple intrahepatic metastases. The dilated intestinal tract in the near part of the lesion was obviously dilated (Figure 3), the gas was scattered in the abdominal cavity, and a small amount of fluid accumulated in the pelvic cavity. The patient was considered to have acute mechanical obstruction caused by colon tumor. After consultation, the patient was recommended to be transferred for treatment to the general surgery department where preoperative preparation was actively improved and emergency surgical treatment was arranged. The surgery showed more yellow-brown turbid

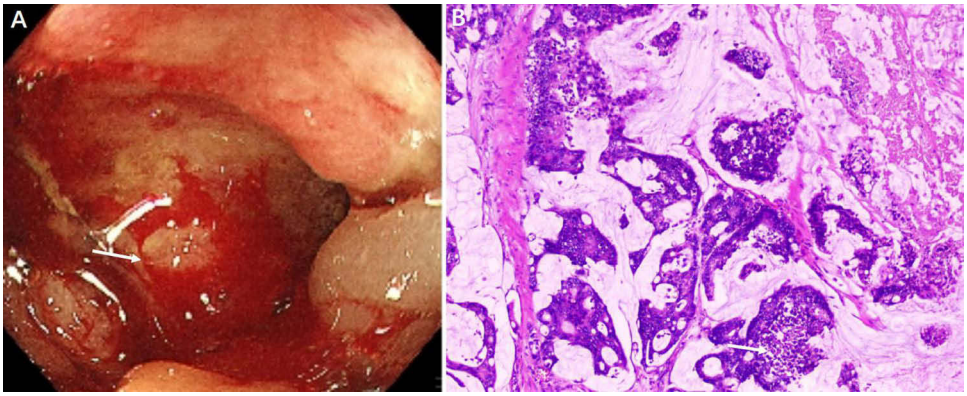

Figure 2 Colonoscopy and biopsy results. (**A**) Neoplasm the ascending colon near the hepatic variculus. The white arrow indicates an ulcerative mass. (**B**) HE staining results of tumor biopsy. The white arrow indicates poorly differentiated mucinous adenocarcinoma, magnification, ×100.

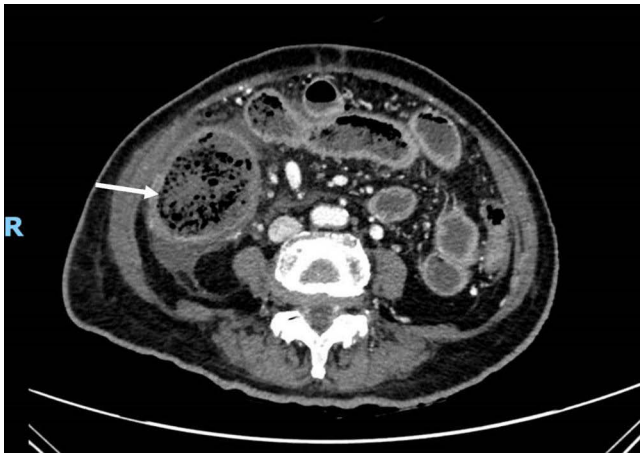

Figure 3 Enhanced abdominal CT scanning results on the tenth day after transfer to gastroenterology department. The white arrow indicates the significant expansion of the proximal bowel. R stands for right.

purulent ascites in the abdominal cavity, mainly in the pelvic cavity, recess between the liver and the kidney, and the splenic fossa, with an amount of about 300mL. The greater omentum was attached to the abdominal wall; A tumor measuring approximately 5×6 cm size was located in the hepatic region of the colon and had invaded the whole layer, which resulted in intestinal stenosis and expansion of the ascending colon along with gathering of a large amount of stool that caused perforation of the anterior wall of the middle part of the ascending colon. Therefore, it was decided to perform right hemicolectomy and ileotranscolon side to side trans-ileocolonic anastomosis. The operation was smooth, and the vital signs were stable Considering the patient's advanced age and severe surgical trauma, she was transferred to intensive care unit (ICU) for further treatment after surgery. A few hours after the ICU admission, the patient's body temperature gradually increased and procalcitonin and white blood cell levels elevated (Table 1). Immediately, the patient's doctor in charge issued a blood culture order (a set of blood cultures). The patient was empirically treated with a combination of imipenem and fluconazole as anti-infective therapy. After 19 hours of incubation, the instrument (BD BACTEC FX200) showed microbial growth. The positive blood culture bottle was removed for routine gram staining, which revealed gram positive bacilli (Figure 4A). Positive cultures were then routinely inoculated on Colombia blood plates, MacConkey agar plates, and chocolate agar plates (Chongqing Pangtong Medical Equipment Co., Ltd)., cultured in an incubator at 35°C and 5% CO2. However, no signs of microbial growth were shown after 24h of incubation. Considering that the patient had abdominal infection and the possibility of anaerobic bacteria was high, the positive culture was inoculated into another Colombia blood plate, cultured in an anaerobic bag (Chongqing Pangtong Medical Equipment Co., Ltd)., and incubated at 35°C. Microbial growth was shown after 24h (Figure 4B). Identification by matrix-assisted laser desorption/ionization time of flight mass spectroscopy (MALDI-TOF-MS) (Chongqing zybio Co., Ltd. ESX2600) confirmed *C. difficile*, the identification score was 2.30, and the result showed a high confidence identification. We also tested the bacterial isolate and the positive blood culture broth using the rapid membrane enzyme

Table 1 Infection-Related Lab Results on Various days of Illness

	Preop Day 3	Day of Surgery	Postop Day 1	Postop Day 2	Postop Day 3	Postop Day 5	Postop Day 6	Postop Day 7	Postop Day 8
White blood cell (10^9/L)	9.7	4.95	8.16	13.44	16.1	9.23	–	8.58	9.07
Neutrophil (%)	55.8	84.3	90.8	93	91.5	75.2	66.2	66	55.8
C-reactive protein (mg/L)	2.45	48.13	115.18	212.03	141.1	33.26	9.41	4.81	–
Procalcitonin (ng/mL)	0.05	–	22.04	18.01	11.9	6.28	1.92	0.62	–

https://doi.org/10.2147/IDR.S557503

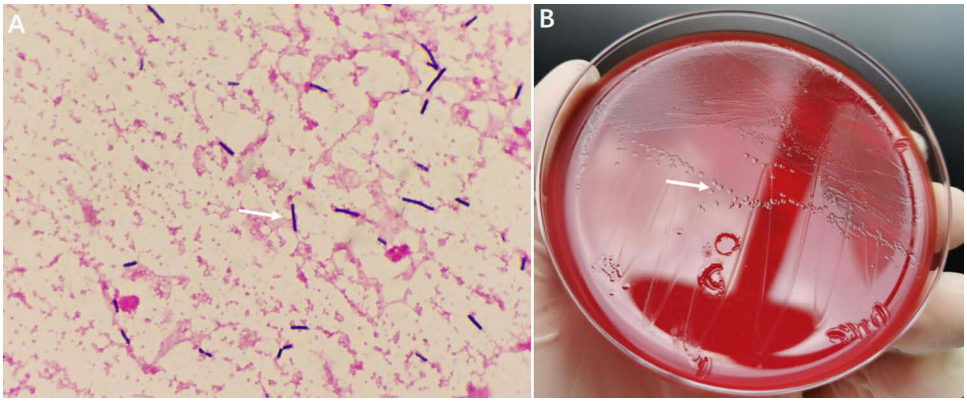

Figure 4 Gram staining results after positive blood cultures. (**A**) The white arrow indicates *C. difficile* as a gram-positive macrobacillus, magnification, ×1000. (**B**) Colony morphology of the inoculum after 48 h of culture in anaerobic environment. The white arrow indicates *C. difficile* colony morphology.

immunoassay (TECHLAB® C. DIFF QUIK CHEK COMPLETE®), which returned positive results indicating the presence of toxins. However, since both the positive broth and the bacterial isolate do not meet the manufacturer's specified sample type requirements (the instructions stipulate stool specimens only), the reliability of these results may be questionable. To further validate the findings from the immunoassay, we performed additional testing using the Cepheid GeneXpert system. The results confirmed the presence of toxigenic *C. difficile* producing *tcdB* (Ct value: 19), while no binary toxin (*cdtA/cdtB*) was detected. The clinical microbiology laboratory proactively shared the patient's culture results with the clinicians. The physicians adjusted the antibiotic regimen to intravenous vancomycin (125mg 4 times daily). Given the patient's severe infection symptoms, metronidazole was not chosen as the initial treatment. To investigate the potential source of *C. difficile* in the blood, the microbiology laboratory subsequently performed a rapid membrane enzyme immunoassay on the patient's stool sample, which also returned a positive result. Considering the likely intestinal origin of the *C. difficile* infection, the physicians further administered oral vancomycin ((125mg 4 times daily)) to the patient. After 2 weeks of targeted therapy, the patient's condition stabilized, she was safely discharged from our hospital.

Discussion

This case highlights the severe and potentially fatal complication of *Clostridioides difficile* bacteremia in a vulnerable elderly patient following colorectal cancer surgery. While *C. difficile* infection is predominantly associated with toxin-mediated colitis,[18] hematogenous dissemination is rare,[19] occurring in less than 2% of CDI cases, often linked to severe colitis, immunosuppression, or profound gut barrier disruption. This patient exemplifies several critical risk factors: advanced age, recent major colorectal surgery with inherent mucosal injury, malignancy, and exposure to broad-spectrum antibiotics.[20] These factors collectively foster an environment conducive to bacterial translocation from a compromised colonic mucosa into the bloodstream.

The pathogenesis of *C. difficile* bacteremia likely involves massive mucosal damage from severe colitis or direct surgical trauma, combined with dysbiosis from antibiotics, allowing *C. difficile* access to the portal circulation and subsequent systemic spread. Our patient's presentation, with infection following recent surgery, underscores the diagnostic challenge. *C. difficile* should be considered in high-risk patients with bloodstream infections where conventional pathogens are not identified, particularly if there's concurrent or preceding diarrhea or known CDI risk factors. Blood cultures remain essential, though growth can be slow and requires specific anaerobic processing.

Management is complex and not standardized due to rarity. We utilized intravenous vancomycin (targeting systemic infection and achieving adequate colonic luminal levels via secretion) combined with high-dose oral vancomycin (targeting luminal toxin production and spore formation), guided by the severity and bacteremic nature of the infection, alongside source control efforts. This approach aligns with the principle of aggressive intervention in severe or complicated CDI. The high mortality associated with *C. difficile* bacteremia emphasizes the critical importance of

early suspicion, rapid diagnostic confirmation, and aggressive multimodal therapy in high-risk cohorts like the elderly post-surgical population. This case reinforces the devastating consequences of gut barrier failure in CDI and stresses the need for meticulous antimicrobial stewardship, especially regarding perioperative prophylaxis in colorectal surgery patients, and vigilant monitoring for atypical CDI presentations.

Conclusion

This case illustrates the severity of *C. difficile* bacteremia as a rare but life-threatening complication in elderly patients following colorectal cancer surgery. The convergence of advanced age, major abdominal surgery, malignancy, and broad-spectrum antibiotic use created a high-risk scenario for bacterial translocation. Successful management relied on early suspicion, appropriate anaerobic blood cultures, and timely transition to combined intravenous and high-dose oral vancomycin therapy. This report underscores the importance of considering *C. difficile* in febrile, high-risk postoperative patients with bloodstream infections, even in the absence of classic colitis symptoms. Enhanced vigilance, rapid diagnostics, and aggressive targeted therapy are essential to improve outcomes in such vulnerable populations.

Ethical Approval

Patient provided informed consent for the case details and images to be published. No ethics committee approval was required for this study, as the data were analyzed in a retrospective manner.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Czepiel J, Drozdz M, Pituch H, et al. Clostridium difficile infection: review. *Eur J Clin Microbiol Infect Dis*. 2019;38(7):1211–1221. doi:10.1007/s10096-019-03539-6
2. Chisholm JM, Putsathit P, Riley TV, Lim SC. Spore-forming Clostridium (Clostridioides) difficile in wastewater treatment plants in Western Australia. *Microbiol Spectr*. 2023;11(1):e0358222. doi:10.1128/spectrum.03582-22
3. Bentivegna E, Alessio G, Spuntarelli V, et al. Impact of COVID-19 prevention measures on risk of health care-associated Clostridium difficile infection. *Am J Infect Control*. 2021;49(5):640–642. doi:10.1016/j.ajic.2020.09.010
4. Waqar S, Nigh K, Sisler L, et al. Multidisciplinary performance improvement team for reducing health care-associated Clostridium difficile infection. *Am J Infect Control*. 2016;44(3):352–354. doi:10.1016/j.ajic.2015.09.022
5. Banaei N, Anikst V, Schroeder LF. Burden of Clostridium difficile infection in the United States. *N Engl J Med*. 2015;372(24):2368–2369.
6. Khanna S, Pardi DS, Aronson SL, et al. The epidemiology of community-acquired Clostridium difficile infection: a population-based study. *Am J Gastroenterol*. 2012;107(1):89–95. doi:10.1038/ajg.2011.398
7. Gerding DN, Lessa FC. The epidemiology of Clostridium difficile infection inside and outside health care institutions. *Infect Dis Clin North Am*. 2015;29(1):37–50. doi:10.1016/j.idc.2014.11.004
8. Hiraki M, Suzuki R, Tanaka N, et al. Community-acquired fulminant Clostridioides (Clostridium) difficile infection by ribotype 027 isolate in Japan: a case report. *Surg Case Rep*. 2021;7(1):137. doi:10.1186/s40792-021-01220-9
9. Goudarzi M, Seyedjavadi SS, Goudarzi H, Mehdizadeh Aghdam E, Nazeri S. Clostridium difficile infection: epidemiology, pathogenesis, risk factors, and therapeutic options. *Scientifica*. 2014;2014:916826. doi:10.1155/2014/916826
10. Dai W, Yang T, Yan L, et al. Characteristics of Clostridium difficile isolates and the burden of hospital-acquired Clostridium difficile infection in a tertiary teaching hospital in Chongqing, Southwest China. *BMC Infect Dis*. 2020;20(1):277. doi:10.1186/s12879-020-05014-6
11. De Roo AC, Regenbogen SE. Clostridium difficile infection: an epidemiology update. *Clin Colon Rectal Surg*. 2020;33(2):49–57. doi:10.1055/s-0040-1701229
12. Miqdad MA, Kosaraju K, Mohamad A, et al. Clostridium difficile infection: risk and poor prognostic factors at a Tertiary Hospital in the Eastern Region of Saudi Arabia. *Cureus*. 2023;15(5):e39193. doi:10.7759/cureus.39193
13. Predrag S, Kuijper EJ, Nikola S, Vendrik KEW, Niko R. Recurrent community-acquired Clostridium(Clostridioides)difficile infection in Serbianchildren. *Eur J Clin Microbiol Infect Dis*. 2020;39(3):509–516. doi:10.1007/s10096-019-03751-4
14. Sun X, Hirota SA. The roles of host and pathogen factors and the innate immune response in the pathogenesis of Clostridium difficile infection. *Mol Immunol*. 2015;63(2):193–202. doi:10.1016/j.molimm.2014.09.005

15. Wang L, Li D, Chen Z, He L, Wang X, Tao L. An atypical case of monomicrobial Clostridioides difficile septicemia with no gastrointestinal manifestations. *Front Cell Infect Microbiol*. 2022;12:853252. doi:10.3389/fcimb.2022.853252
16. Song JH, Kim YS. Recurrent Clostridium difficile infection: risk factors, treatment, and prevention. *Gut Liver*. 2019;13(1):16–24. doi:10.5009/gnl18071
17. AlKhormi A, Altheyabi AM, AlGhamdi SA, Alshahrani O, Alotay AA, Deeb A. The prevalence and clinical characteristics of Clostridium difficile infection in Saudi patients admitted with inflammatory bowel disease: a case-control study. *Saudi J Gastroenterol*. 2023;29:251–255. doi:10.4103/sjg.sjg_476_22
18. Pumiglia L, Wilson L, Rashidi L. Clostridioides difficile Colitis. *Surg Clin North Am*. 2024;104(3):545–556. doi:10.1016/j.suc.2023.11.005
19. Kachrimanidou M, Protonotariou E, Kaiafa G, et al. Bacteremia due to a toxin A-negative, B-positive Clostridioides difficile ribotype 017 strain. *Anaerobe*. 2020;63:102195. doi:10.1016/j.anaerobe.2020.102195
20. Wu B, Song X, Liu Y, Zheng X. Clostridium difficile bacteremia in an elderly patient with multiple comorbidities: a case report. *Surg Infect*. 2025;26(2):112–115. doi:10.1089/sur.2024.223