CLINICAL VIGNETTE

B. Cereus Bacteremia in an IV Drug Abusing Patient

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Case Report

A 27-year-old female with history of injection drug use presented to the emergency room with a chief complaint of fever for 5 days and severe left knee pain and swelling for 2 days. She had recently begun using injection drugs 2 weeks prior and most recently used intravenous cocaine and oxycodone the day prior to presentation. She denied any trauma to the knee or injection into the knee. She additionally noted headaches, nausea with one episode of emesis, and mild epigastric pain. Her past medical history was significant for a history of pelvic inflammatory disease.

In the emergency room, she was febrile to 102.2 and tachycardic in the 130s with normal blood pressure. On physical exam, she was a thin female in no apparent distress; cardiovascular, pulmonary and abdominal exams were within normal limits. She had no stigmata of endocarditis. Her exam was remarkable for a left knee with mild pre-patellar swelling, warmth, tenderness to palpation, and limited range of motion secondary to pain. There was no peripheral edema, and her vascular and neurological exams were normal. Fluids were given, blood cultures were obtained, and she was started on vancomycin and cefotaxime. A left knee arthrocentesis produced 15mL of cloudy synovial fluid. The fluid analysis showed a white blood cell count of 19,000 (88 polymorphonuclear cells), no crystals, and had a negative gram stain and culture. The patient was initially admitted to the intensive care unit for sepsis due to septic arthritis and orthopedics was consulted. Initial blood cultures grew out Bacillus cereus in four out of six bottles, susceptible to vancomycin and clindamycin, but resistant to cefotaxime. She continued to spike fevers on vancomycin and cefotaxime. Blood cultures on hospital days 4 and 9 continued to grow B. cereus, and on hospital day 6 grew Serratia liquifaciens. Repeat arthrocentesis on hospital day 6 removed 27mL of clear yellow synovial fluid. Fluid analysis showed WBC 48,600 (68% polymorphonuclear cells) no crystals, and negative gram stain. The repeat synovial fluid cultures grew methicillin sensitive Staphylococcus aureus. Antibiotics were changed to vancomycin and gentamicin. Because of persistent B. cereus bacteremia, and different organisms growing in the blood and synovial fluid, workup for metastatic infection was pursued and included a negative transesophageal echocardiogram, lumbar puncture, CT of the chest, abdomen, and pelvis, and gallium scan. Repeat urine toxicity screen was positive for cocaine on hospital days 8 and 11, raising concerns for continued injection drug use while in the hospital.

On hospital day 11, she underwent surgical debridement of the left knee. Cultures from this procedure were negative and no organisms were seen on pathology. Blood cultures on hospital day 12 again grew B. cereus. On hospital day 13, the patient defervesced and remained afebrile for the remainder of her hospital stay. Subsequent blood cultures were negative as well as subsequent urine toxicity screens. The patient was discharged home with a 6-week course of daptomycin 400mg intravenous once daily to cover the B. cereus and levofloxacin 750mg po once daily to cover the S. liquifaciens. Given her history of injection drug use, the patient was not sent home with a peripherally inserted central catheter but was discharged with a peripheral IV and the aid of a home health nurse. She was discharged on hospital day 18 with orthopedic and infectious disease follow-up. She was seen for follow up with orthopedics once and at that time was doing well without recurrence of fevers and chills and improvement in knee pain. The patient was then lost to follow up.

Discussion

Members of the Bacillus genus are aerobic or facultative anaerobic spore-forming gram positive or gram variable rods that are ubiquitous in the environment. B. cereus is traditionally associated with foodborne illness. However it may cause many different types of infections that can be classified into six broad categories: 1) local infections, particularly in burns, traumatic wounds or postsurgical sites, and the eye, 2) bacteremia and septicemia, 3) central nervous system infections, including meningitis, abscesses, and shunt-associated infections, 4) respiratory infections, 5) endocarditis and pericarditis and 6) food poisoning, characterized by toxin-
induced emetic or diarrheal syndromes\(^1\). Nosocomial outbreaks of \textit{B. cereus} have been associated with environmental contamination, including contaminated hospital linens\(^2,3\) and alcohol prep pads\(^4\). Despite this, it is an infrequent cause of blood borne illness, and when isolated from a single blood culture is often considered a contaminant\(^5\). A retrospective review of \textit{Bacillus} species blood isolates in one hospital over a five-year period concluded that isolation of \textit{Bacillus} species from blood cultures is clinically significant in 5% to 10% of cases though the incidence of bacteremia is increasing\(^6\).

Several populations are at risk for \textit{B. cereus} endocarditis including those with prosthetic valves, valvular heart disease, pacemakers, and injection drug users\(^7\). Injection drug users are vulnerable to infection with \textit{B. cereus} from contamination of injection paraphernalia, though it has also been isolated from heroin itself\(^8\). In general, patients with IVDA-associated, native valve \textit{B. cereus} endocarditis respond well to antibiotic therapy, whereas patients with prosthetic valve endocarditis have higher mortality and frequently require valve replacement\(^7\).

\textit{B. cereus} produces B-lactamases, which confers resistance to B-lactam antimicrobial agents, including third-generation cephalosporins. It is usually susceptible to aminoglycosides, clindamycin, vancomycin, chloramphenicol, and erythromycin\(^9\). Clindamycin resistance has been described, however, and should not be used as empiric therapy\(^10\). For systemic infections, a combination of vancomycin and an aminoglycoside is appropriate empiric therapy\(^11\). Antibiotics with high rates of susceptibility in vitro include gatifloxacin, levofloxacin, moxifloxacin, rifampin, and linezolid, though clinical experience is limited\(^10\). Daptomycin has also showed high rates of susceptibility in vitro, but has been little clinical experience with this drug.\(^1\) There are no guidelines for the management of \textit{B. cereus} endocarditis; 6 weeks of intravenous therapy was selected for this patient given the persistent bacteremia despite vancomycin.

Our patient had risk factors for \textit{B. cereus} endocarditis, and had persistent bacteremia despite adequate antibiotic treatment. We were unable to identify another source of infection despite an extensive workup, including a negative TEE. The patient did have septic arthritis, though we were unable to identify \textit{B. cereus} as the cause of this infection. Additionally, \textit{B. cereus} is rarely described as a cause of septic arthritis. A complicating factor was the suspicion for continued IV drug use during the hospitalization, which may have contributed to persistent bacteremia. Given the persistent bacteremia and the patient’s risk factor of intravenous drug use, she was treated for an occult endovascular infection and received a prolonged course of antibiotics.

In conclusion, \textit{B. cereus} should not be considered a contaminant when isolated from patients with active intravenous drug use. Extensive work up is necessary as \textit{B. cereus} has many different clinical manifestations and complications. Consideration for prolonged antimicrobial treatment should be strongly considered in patients with persistent bacteremia, even when an endovascular source cannot be positively identified.

REFERENCES

10. Luna VA, King DS, Gulledge J, Cannons AC, Amuso PT, Cattani J. Susceptibility of \textit{Bacillus} anthracis, \textit{Bacillus cereus}, \textit{Bacillus mycoides}, \textit{Bacillus pseudomyces} and \textit{Bacillus thuringiensis} to 24 antimicrobials using Sensitive


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