A cluster of *Bacillus cereus* bacteremia cases among injection drug users

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**CASE REPORT**

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Bacillus cereus is a ubiquitous spore-forming organism that is frequently implicated in extraintestinal infections. The authors report three cases of *B cereus* bacteremia among injection drug users presenting within one month to an urban tertiary care hospital. Treatment with intravenous vancomycin was successful in all three cases. While temporal association suggested an outbreak, molecular studies of patient isolates using pulsed-field gel electrophoresis did not suggest a common source. A review of the association of *B cereus* infections with heroin use and treatment of this pathogen is provided.

**Key Words:** Bacillus cereus; Bacteremia; Contamination; Heroin; Injection drug users

*Bacillus cereus* is a spore-forming Gram-positive bacillus that is pervasive in nature. This organism is commonly implicated in food-poisoning outbreaks associated with contaminated rice, and typically produces a self-limited emetic or diarrheal illness. Extraintestinal infections caused by *B cereus* are rare and studies are limited mainly to case reports. Bacteremia, temporally associated with injecting heroin, has been sporadically reported in the literature (1-3). Only one previous study has positively linked (through molecular analysis) a *B cereus* bacteremia with a contaminated source of heroin (4). In the present report, we describe a cluster of *B cereus* bacteremia among three injection drug users presenting independently within one month.

**CASE PRESENTATIONS**

**Case 1**
A 41-year-old male injection drug user was brought to the emergency department unresponsive, febrile and hypotensive. Physical examination showed numerous track marks but no obvious source of infection. Initial investigations revealed a white blood cell count of 19.3×10⁹/L; urinalysis, chest x-ray and abdominal computed tomography were all unremarkable. Fluid resuscitation, vasopressor support and empirical antibiotic therapy with intravenous (IV) piperacillin/tazobactam, vancomycin and clindamycin were initiated. Following resuscitation, the patient provided a vague history: he was well until the day of admission, at which time he developed a headache, severe fatigue and generalized malaise. His most recent heroin use had been the night before symptom occurrence. His medical history was significant for hepatitis C and previous episodes of *B cereus* related to injection drug use. Blood cultures collected on admission grew *B cereus* (four of four bottles) and *Serratia marcescens*. The patient’s antibiotics were changed to IV vancomycin and ciprofloxacin. Blood cultures were persistently positive for *B cereus* until day 14 of admission. On day 29, the patient developed a small antecubital abscess that was drained and cultured *B cereus*. A transthoracic echocardiogram showed no signs of endocarditis. The patient received a total of six weeks of IV vancomycin and was discharged home.

**Case 2**
Nine days following the admission of case 1, a 49-year-old man with a history of daily heroin and crystal methamphetamine injection drug use presented to hospital with confusion and agitation. He was afebrile, with no obvious focus of infection on history or physical examination. His medical history was significant for recently diagnosed HIV infection and hepatitis C. Initial laboratory results showed a white blood cell count of 13.1×10⁹/L. Empirical therapy with IV piperacillin/tazobactam and vancomycin was initiated. Blood cultures collected on admission grew *B cereus* and *Lactobacillus*, and the patient was switched to IV vancomycin and ciprofloxacin. A transthoracic echocardiogram showed evidence of a vegetation on the mitral valve. Three subsequent blood cultures were positive for *B cereus*; blood cultures eventually cleared on day 14 of admission. IV vancomycin was continued for a total duration of eight weeks and the patient was discharged.

**Case 3**
Twenty days after case 1 was admitted to hospital, a 33-year-old man with a history of heroin and cocaine injection drug use presented to the emergency department with confusion. He was afebrile and his physical examination was unremarkable. His medical history included hepatitis C and previous episodes of methicillin-resistant *Staphylococcus aureus*.

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The patient left hospital against medical advice, but was called to return the following day when blood cultures cleared over a two-week period. Although case 3 had a prosthetic tricuspid valve, there was no evidence of endocarditis and only a single initial positive blood culture. He received a two-week course of IV vancomycin, despite the possibility that this was a culture contaminant. All patients in the cluster shared the risk factor of injection drug use, having recently injected heroin. B. cereus infections have been sporadically associated with injection drug use, particularly with heroin. These rare occurrences were first reported (9) and reviewed (1) in the 1970s. B. cereus, a known contaminant related to drug use, is resistant to heat and capable of surviving in harsh environments. A report from 1983 conducted in Washington, DC, found that nearly one-half of injection paraphernalia and 32% of heroin samples were contaminated with Bacillus species (13). The microbial burden was significantly higher on the injection paraphernalia than the heroin itself, and brown heroin (mainly from Mexico) was found to have a higher burden compared with white heroin (mainly from overseas). The authors speculated that heroin users experience frequent transient episodes of Bacillus species bacteria, which are rarely of clinical significance. In the literature, one case exists with a largely conclusive link of a B. cereus infection to contaminated heroin (4). A patient with cellulitis provided a heroin sample, and both his wound aspirate and heroin cultured B. cereus, which was found to be indistinguishable through PFGE. In our cluster, PFGE did not identify relatedness among the patients’ isolates. Possible explanations for our cluster not having a common source include increasing microbial burden of heroin in general, supported by the burden found on the randomly acquired heroin or, particularly, contaminated injection paraphernalia among users.

CONCLUSION

B. cereus infections are an underappreciated cause of bloodstream infections in injection drug users, for which the treatment requires prompt identification and antibiotic coverage. Our observation of three unrelated but temporally associated cases of B. cereus infection in heroin users suggests that suspicion of B. cereus infection in this patient population may become increasingly warranted.

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REFERENCES

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