



Case report

Clostridium tertium bacteremia and hepatic abscess in a non-neutropenic patient

Victoria Milano^a, Lauren Biehle^{b,*}, Shalvi Patel^c, John Hammer^d

^a Mayo Clinic, Rochester, MN, USA

^b University of Wyoming School of Pharmacy, Laramie, WY, USA

^c University of Colorado Anschutz Medical Campus, Aurora, CO, USA

^d Rose Medical Center, Denver, CO, USA

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ABSTRACT

A 43-year-old previously healthy man presented with altered mental status, diaphoresis, and fevers following a ruptured appendicitis and appendectomy. The patient had growth of *Clostridium tertium* and *Escherichia coli* in blood cultures and imaging of the abdomen revealed a large hepatic abscess. *Clostridium tertium* is an uncommon cause of bacteremia in non-neutropenic patients. There is currently no universally accepted treatment for *Clostridium tertium* bacteremia. We report successful treatment with ertapenem.

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Introduction

Clostridium tertium is an aerotolerant, gram-positive, spore forming bacillus belonging in the genus *Clostridium*. The bacterium is unique from other *Clostridium* species because it is aerotolerant and non-toxin-producing. *C. tertium* is typically found in the soil and in the gastrointestinal tracts of humans and animals. It has a low pathogenic potential and accounts for approximately 5% of all clostridial bacteremias. *C. tertium* is frequently misidentified as *Lactobacillus*, *Bacillus*, or *Corynebacterium* spp. [1].

C. tertium is a rare cause of infection in healthy adults. Most reported cases involve patients with neutropenia as a result of a hematologic malignancy [2–8]. An example of a case of *C. tertium* infection in a non-neutropenic patient was described in a previously healthy female who underwent abdominal surgery. This patient developed *C. tertium* septicemia following surgery for mechanical ileus [9]. Here we present a case of *C. tertium* bacteremia in a 43-year-old non-neutropenic patient as a post-operative complication of surgery for a ruptured appendix.

Presentation of case

A 43-year-old Eritrean male presented to the emergency department with altered mental status, diaphoresis, and subjective

fevers. Four weeks prior to presentation, he was treated at an outside hospital for ruptured appendix and discharged on amoxicillin-clavulanate. His vital signs in the emergency department were significant for a fever of 38.7 °C and tachycardia of 142 beats per minute. Pertinent laboratory values included a white blood cell count of 14,500/uL and lactate of 5.24 mmol/L. His aspartate aminotransferase (AST) was 219 units/L and alanine aminotransferase (ALT) was 155 units/L. His serum sodium was 131 meq/L, potassium was 3.4 meq/L and serum creatinine was 0.93 mg/dL. The primary concern at presentation was sepsis, so the patient received a 30 mL/kg crystalloid bolus of 0.9% saline, blood cultures were collected, urine cultures were collected, and empiric piperacillin-tazobactam was initiated.

The patient's past medical history was significant for hypertension, for which he reported taking hydrochlorothiazide. His reported surgical history was the recent appendectomy. He had only been in the United States for the previous month and was visiting from East Africa. He denied the use of tobacco, alcohol, or illicit drugs and had no known drug allergies.

The patient's physical exam was significant for tachycardia and electrocardiogram showed sinus tachycardia. He had active bowel sounds, a soft abdomen, no guarding, no rebound, no distention, and mild tenderness to palpation diffusely throughout the abdomen.

In the emergency department, a computed tomography (CT) scan of the abdomen and pelvis demonstrated a large right hepatic abscess (measured 7.3 × 5.2 × 7.4 cm) that contained air and had mass effect on the liver (Fig. 1). There was also a smaller air-fluid collection in the right lobe measuring 2.4 × 2.2 cm. Edema was

* Corresponding author at: 1000 E. University Ave., Dept. 3375, Laramie, WY 82071, USA.

E-mail address: lbiehle@uwyo.edu (L. Biehle).



Fig. 1. Computed tomography scan of the abdomen and pelvis demonstrating hepatic abscess.

present in the liver. An ultrasound guided percutaneous drainage catheter was placed and yielded 100 ml of purulent fluid, which was sent for bacterial culture.

The patient's initial blood cultures demonstrated growth of *Clostridium tertium* in three out of four bottles. *Escherichia coli* (*E. coli*) was identified in one out of four bottles and *Fusobacterium mortiferum* was later identified in one out of four bottles. Results from the fluid drained from the hepatic abscess demonstrated growth of abundant *E. coli*, moderate gram positive bacilli, abundant *Bacteroides fragilis*, and abundant other mixed anaerobic flora. The urine culture demonstrated contamination with mixed flora.

After drainage of the fluid collection and broad spectrum antimicrobial therapy with piperacillin-tazobactam, the patient's lactate improved from 5.24 to 2.48 mmol/L and he defervesced within 48 h. His liver function tests also improved from AST of 219 units/L to 34 units/L and ALT from 155 units/L to 79 units/L within the first 48 h. Blood cultures repeated on days 3 and 5 of hospitalization remained negative. Repeat CT scan on day 5 of hospitalization demonstrated a reduction of the abscess to minimal rim-enhancing fluid around the drain measuring 4.5 × 1.4 cm. The patient continued to clinically improve, with his only complaint of mild pain around the drain site.

Following the patient's clinical improvement and with documented clearance of bacteremia, a peripherally inserted central catheter was placed for outpatient management. The patient was switched to ertapenem daily infusions for four weeks. He was discharged with the drain in place with a plan to repeat an abdominal CT scan two weeks after discharge. This repeat CT scan showed complete decompression of the hepatic fluid and the drain was removed. The patient remained asymptomatic during the course of ertapenem treatment, and did not have any recurrent fevers or leukocytosis.

Discussion

We present a case report of *Clostridium tertium* bacteremia following surgery for ruptured appendicitis. *C. tertium* is the

second most frequently identified species of clostridial bacteremia following *Clostridium perfringens* [1]. The major risk factors commonly found in case reports and case series for *C. tertium* bacteremia are neutropenia, intestinal mucosal damage, and previous exposure to beta-lactam antibacterials, particularly third generation cephalosporins [2,3]. The patient described in this case report had a perforated appendix with an appendectomy performed prior to this admission likely contributing to an increased risk for *C. tertium* bacteremia. The perforated appendix, despite surgical appendectomy with lavage, was associated with polymicrobial peritonitis that subsequently led to abscess formation. Additionally, possible exposure to beta-lactam antibiotics following this procedure might have selected for *C. tertium* as a dominant bloodstream pathogen.

There are no guidelines for the treatment of *C. tertium* infection in humans. Information from case reports and case series has demonstrated that *C. tertium* is commonly susceptible to vancomycin, trimethoprim-sulfamethoxazole, and ciprofloxacin [2]. Resistance is frequently shown to metronidazole, clindamycin, and cephalosporins [1,2]. *C. tertium* is a non-toxin-producing *Clostridium* species. Toxin suppressing antimicrobial therapy is not recommended, unlike with infections due to other *Clostridium* species [1].

Few cases of *C. tertium* bacteremia in non-neutropenic patients have been described. Primary spontaneous bacterial peritonitis accounts for the majority of reported cases of *C. tertium* in non-neutropenic patients with four reported cases to date. One patient was successfully treated with ciprofloxacin, metronidazole, and vancomycin and another with cefoxitin. A case series by Miller et al. reported on two non-neutropenic patients with *C. tertium* infections. One patient had systemic lupus erythematosus treated with high-dose corticosteroids along with a recent placement of a percutaneous gastrostomy tube. Treatment for the *C. tertium* bacteremia was unsuccessful with non-reported antibiotics [10]. The other patient had Crohn's disease, although not immunosuppressed, and was successfully treated with IV ciprofloxacin and clindamycin [2]. A recently reported case described a non-neutropenic patient with *C. tertium* bacteremia and acute

bronchopneumonia following ingestion of glyphosate herbicide. This patient was successfully treated with ertapenem and metronidazole [11]. A pyogenic liver abscess was also recently described in a non-neutropenic patient. This patient's abscess was treated with drainage and metronidazole [12]. Another reported case involved a non-neutropenic patient that initially presented with colitis that was later found to have *C. tertium* bacteremia successfully treated with ampicillin, vancomycin, and imipenem [13].

Conclusion

Similar to these reported cases, our patient was non-neutropenic and had intestinal mucosal damage, in this case with associated peritonitis and peritoneal abscess, as a risk factor. Anaerobic coverage was universal for all the reported cases, although *C. tertium* is an aerotolerant bacterium. Vancomycin was an additional treatment in two of the noted case reports that was not trialed in our patient. There have been few reported cases of *Clostridium tertium* bacteremia in non-neutropenic patients. We report the successful treatment of a patient with primary source control via percutaneous drainage followed by ertapenem to complete the course of therapy in the outpatient setting.

Conflicts of interest

The authors declare no conflicts of interest.

Consent

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

Authors statement

Conceptualization: Dr. Milano, Dr. Biehle, Dr. Patel, and Dr. Hammer

Data curation: Dr. Milano, Dr. Biehle, Dr. Patel, and Dr. Hammer

Investigation: Dr. Milano and Dr. Biehle

Methodology: Dr. Milano, Dr. Biehle, Dr. Patel, and Dr. Hammer

Project administration: Dr. Milano and Dr. Biehle

Resources: Dr. Milano, Dr. Biehle, Dr. Patel, and Dr. Hammer
Roles/Writing – original draft: Dr. Milano, Dr. Biehle, Dr. Patel
Writing – review & editing: Dr. Milano, Dr. Biehle, Dr. Patel, and Dr. Hammer.

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