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Isolation of *Bordetella bronchiseptica* from Blood and a Pancreatic Abscess

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***Bordetella bronchiseptica* is a respiratory pathogen rarely encountered in human hosts. We describe a case of bacteremia and pancreatic abscess caused by this organism. To our knowledge, this is the first reported case of *B. bronchiseptica* causing intra-abdominal infection in the form of an abscess.**

CASE REPORT

A 71-year-old male with a history of extensive alcohol use, fatty liver disease, and chronic pancreatitis presented to hospital with progressive bilateral leg edema and inability to ambulate. At the time, he denied abdominal pain, respiratory symptoms, or changes in his cognitive status. He denied any recent animal contacts.

On admission, he appeared unkempt and uncomfortable. He was afebrile. Cardiorespiratory examination was normal. His abdomen was mildly distended, soft, and tender to deep palpation in the right lower quadrant, and the liver span was 18 cm. There was no appreciable jaundice or asterixis. A bedside ultrasound showed trace ascites.

Initial laboratory investigations revealed a normal white blood cell (WBC) count of 10.1×10^9/liter with a neutrophil count of 8.09×10^9/liter. The hemoglobin level and platelet count were normal. Serum electrolytes and renal function were normal. Notably, liver transaminases were elevated: aspartate aminotransferase was 137 U/liter (normal, 5 to 34 U/liter), and alanine transaminase was 48 U/liter (normal, 7 to 40 U/liter). Similarly, total bilirubin was elevated at 34 μmol/liter (normal, <22 μmol/liter), and alkaline phosphatase was elevated at 643 U/liter (normal, 40 to 150 U/liter). A chest X ray demonstrated bibasilar atelectasis, with no focal areas of consolidation.

He was admitted to hospital for treatment of alcoholic hepatitis and managed with oral corticosteroids, diuretics and lactulose. During the course of his treatment, he developed painful abdominal distension with obstipation. An abdominal X ray at the time showed air-fluid levels in the small bowel, suggestive of a bowel obstruction. The patient was placed on strict bowel rest and empirical intravenous ceftriaxone and metronidazole. A computed tomogram (CT) of the abdomen showed a small bowel ileus. Incidentally, an 8.2- by 5-cm peripancreatic fluid collection with gas bubbles was also seen, consistent with abscess (Fig. 1). There was no evidence of bowel perforation. The patient's WBC count at the time had elevated to 15.4×10^9/liter. He otherwise remained afebrile throughout his course in the hospital.

A percutaneous perihepatic drainage catheter was inserted via CT guidance for diagnostic purposes, as well as to achieve source control. There was immediate drainage of approximately 130 ml of purulent material. Gram staining of the fluid revealed leukocytes but no visible organisms. Predominant growth of two types of colonies was visible after 24 h on aerobic 5% sheep blood, chocolate, and MacConkey agar plates (Oxoid, Nepean, Canada). One of these colonies was identified as *Klebsiella pneumoniae* using the Vitek-2 system by bioMérieux (Hazelwood, MO) and was broadly susceptible to cephalosporins, fluoroquinolones, aminoglycosides, and sulfamethoxazole. The second colony stained as Gram-negative cocco-bacilli and tested oxidase positive. The API-20NE system (bioMérieux) generated identification code 1200067, with 99.3% probability (excellent confidence) for *Bordetella bronchiseptica*. The same isolate was also tested via the Vitek-2 system, which reported *B. bronchiseptica* with 99% probability (excellent confidence). The Vitek-2 system had generated a series of MICs for the *B. bronchiseptica* isolate. Of note, MICs were quite high for nonpseudomonal cephalosporins—in particular, the ceftriaxone MIC was reported as greater than 64 μg/ml. However, these MICs could not be clinically interpreted due to a lack of Clinical and Laboratory Standards Institute (CLSI) interpretation guidelines.

An aerobic blood culture that had been collected shortly after drain insertion also grew Gram-negative cocco-bacilli (BacT/Alert 3D system; bioMérieux). At this time, matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF MS) (Vitek MS Plus, bioMérieux) had been newly introduced to the laboratory and was being performed on blood culture isolates only. This system uses a commercially generated database and initially reported identification as *B. bronchiseptica*/*B. parapertussis* with 50/50% confidence. This disparity was presumed to be due to poor specimen preparation. When MALDI-TOF MS was performed on the isolate a second time, *B. bronchiseptica* was reported with 99.9% confidence. *K. pneumoniae* was never isolated from the blood.

Based on reviews in the recent literature (1, 2), the decision was made to place the patient on a 7-day course of oral doxycycline for

Received 24 January 2015 **Returned for modification** 9 February 2015
Accepted 26 February 2015

Accepted manuscript posted online 4 March 2015

Citation Matic NA, Bunce PE. 2015. Isolation of *Bordetella bronchiseptica* from blood and a pancreatic abscess. J Clin Microbiol 53:1778–1780. doi:10.1128/JCM.00175-15.

Editor: M. J. Loeffelholz

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doi:10.1128/JCM.00175-15

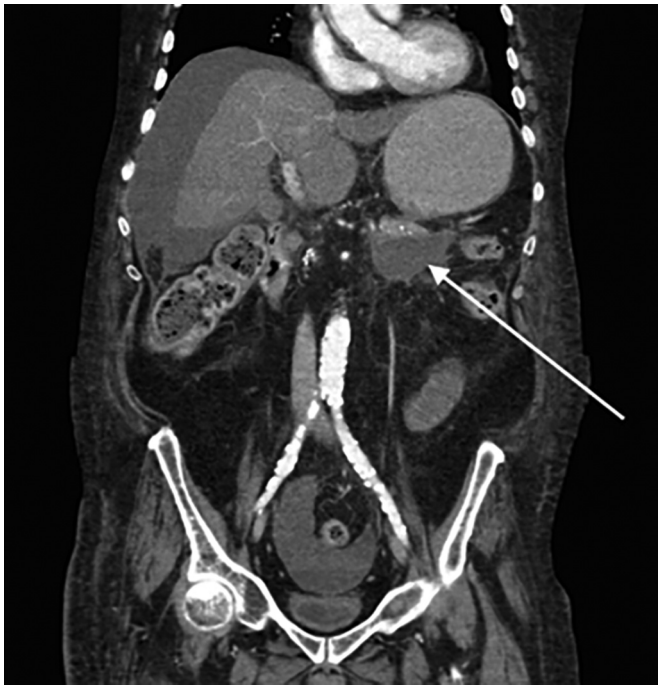

FIG 1 Coronal view from a computed tomogram (CT) of the abdomen, showing an 8.2-cm by 5-cm peripancreatic abscess (arrow).

the bacteremia and intra-abdominal infection. The patient tolerated doxycycline monotherapy without any adverse effects. Repeat blood cultures were sterile, and the ileus resolved. After 21 days, drainage from the perihepatic catheter was scant. Repeat imaging of the abdomen confirmed resolution of the peripancreatic abscess.

Bordetella bronchiseptica is a Gram-negative cocco-bacillary aerobe well known for its role in animal disease, particularly kennel cough in dogs (3) and atrophic rhinitis in swine (4). To date, its pathogenic role in human disease remains poorly understood; it is infrequently encountered, with few published studies available to guide antimicrobial therapy (5, 6). The cases of *B. bronchiseptica* previously reported primarily describe respiratory tract infections in immunocompromised hosts, with or without known animal contacts (5, 7). Other syndromes of *B. bronchiseptica* infection in humans have included meningitis (8, 9), endocarditis (10), and peritonitis in the setting of continuous ambulatory peritoneal dialysis (11–13) or hematogenous spread from a primary pneumonia (14). We herein report, to our knowledge, the first case of *B. bronchiseptica* isolated from an intra-abdominal abscess with associated bacteremia.

This case raises several questions regarding the natural history and pathogenicity of this organism. First, the site of infection is unusual for *B. bronchiseptica*. As a strict aerobe, *B. bronchiseptica* is most commonly associated with respiratory tract infections. The small number of case reports in the literature of abdominal infections describe either a primary pneumonia leading to hematogenous seeding of the peritoneum (14) or direct inoculation from peritoneal dialysis catheters (11–13). This case is the first to describe isolation of *B. bronchiseptica* from an intra-abdominal abscess. Furthermore, the exact pathogenic role of *B. bronchiseptica* in this patient's pancreatic abscess is difficult to ascertain. *K. pneumoniae* was also isolated from the abscess aspirate, which is a well-known organism commonly associated with abscess formation. We cannot comment in this case to what extent *B. bronchiseptica* was the cause of infection or simply a cohabitant, although its presence in blood cultures raises the likelihood of a pathogenic role.

Second, this is an atypical host for *B. bronchiseptica*. It is rarely isolated from humans, but when encountered, *B. bronchiseptica* is typically isolated from immunocompromised human hosts. Of note, literature reviews reveal a small number of case reports describing *B. bronchiseptica* pneumonia or peritonitis in patients with underlying alcoholic liver disease (14, 17), which is applicable to this case. This suggests chronic alcohol use should increasingly be recognized as a cause of immunosuppression and a risk factor for *B. bronchiseptica* infection.

Third, this case demonstrates the extent of the virulence of *B. bronchiseptica*. We isolated *B. bronchiseptica* from blood while the patient was receiving intravenous ceftriaxone and metronidazole. Previous research has suggested *B. bronchiseptica* is resistant to cephalosporins via a narrow-spectrum β-lactamase enzyme and possibly reduced membrane permeability (15). Overall, while studies on the antimicrobial susceptibilities of *B. bronchiseptica* isolates are limited, this organism has typically been reported as susceptible to antipseudomonal cephalosporins, aminoglycosides, carbapenems, and in most cases, tetracyclines. There appears to be only intermediate susceptibility to fluoroquinolones and sulfamethoxazole. Interestingly, *B. bronchiseptica* is the only species in the genus *Bordetella* that is consistently resistant to macrolides (6, 16).

Finally, the transmission of *B. bronchiseptica* remains unclear. Traditionally associated with canines and swine, there have been a number of cases in the literature that are unable to describe a clear point of animal contact in the patient's history. Potentially, *B. bronchiseptica* survives as normal commensal flora of the human respiratory tract, creating opportunistic infections when its host is in an immunocompromised state.

This case highlights our incomplete understanding of *B. bronchiseptica* as a human pathogen. Physicians should be aware of its diverse clinical manifestations and limited treatment options.

ACKNOWLEDGMENTS

There was no funding source for this project.

Neither of the authors has any conflicts of interest to declare. Both authors had access to the data and contributed to the preparation of this article.

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