

CASE REPORT

Bloodstream Infection Caused by *Bacteroides caccae* in a Diabetic Patient: a Case Report and Review of the Literature

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SUMMARY

Background: *Bacteroides caccae* is a ubiquitous, anaerobic bacteria, but it is not a common cause of pathologic bloodstream infection. Diabetic patients are at increased risk of developing anaerobic bacteria infection. Here, we report a repeated fever case caused by *Bacteroides caccae* in a diabetic patient. The aim of this study was to describe the clinical characteristics and manifestations of *Bacteroides caccae*.

Methods: The pathogenic bacteria isolated from patient blood was identified as *Bacteroides caccae*. Identification of the *Bacteroides caccae* was done by 16s rDNA sequencing and matrix-assisted laser desorption/ionization-time of light spectrometry. The infection was cured by one-week combined therapy of intravenous Piperacillin tazobactam and oral Ornidazole tablet.

Results: After treatment had been completed, no episodes of fever occurred during the follow-up to date.

Conclusions: *Bacteroides caccae* is regarded as an intestinal, opportunistic pathogenic bacteria. It can invade the mucosa of the intestine and cause various abdominal suppurative infections. Sequencing and matrix-assisted laser desorption/ionization-time of flight spectrometry could have a role for *Bacteroides caccae* diagnosis. The curative effect of using first generation cephalosporines therapy was unsatisfactory. Using intravenous Piperacillin tazobactam and ornidazole tablet might obtain certain curative effect. Early diagnosis and appropriate anti-infection therapy were necessary to improve the outcome of patients with *Bacteroides caccae* bloodstream infection.

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KEY WORDS

case report, bloodstream infection, *Bacteroides caccae*, anaerobe

LIST OF ABBREVIATIONS

WBC - white blood cell
CRP - C-reactive protein
ALT - alanine aminotransferase
AST - aspartate aminotransferase
ALP - alkaline phosphatase
PCT - procalcitonin
 γ GT - γ -glutamyl transpeptidase
D-D - D-Dimer
GLU - glucose
ESR - erythrocyte sedimentation rate

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INTRODUCTION

Bloodstream infection is a serious infectious disease with high mortality. The diagnosis of bloodstream infection is based on the positive result of blood culture because blood culture can visually reflect the presence of bacteria, fungi or other substances in the blood. *Bacteroides caccae* is a gram-negative, rod-shaped, obtusely rounded, densely stained, capsule-free, spore-free, non-motivated obligate anaerobic bacterium (Figure 1) [1]. It can produce enterotoxin and parenteral enterotoxin [2]. *Bacteroides caccae* is part of the normal flora of the human and animal gut, colonizing and growing in the gastrointestinal tract [3]. With the wide application of antibiotics and the immunodeficiencies related to chronic disease, opportunistic pathogens invade the bloodstream becoming one of the main causes of death for patients with chronic disease [4]. Anaerobic bacteria are an uncommon cause of invasive infections. *Bacteroides caccae* isolates have previously been reported, and clinical sepsis by bloodstream is considered rare [5]. Here, we report an invasive infection case caused by *Bacteroides caccae* in a patient with a history of poorly controlled diabetes. *Bacteroides caccae* was isolated from two anaerobic blood culture bottles 4 days after the onset of fever. After one round of Cefradine treatment, the effect is not obvious. Therefore, appropriate antibiotic stewardship is required in cases of anaerobic bacterial infections.

CASE PRESENTATION

A 64-year old female patient was hospitalized on March 5, 2018, with an abnormal rise in platelets and high fever of 19 days duration. The patient was a known diabetic on treatment for the last 10 years. On March 5, WBC count $10.89 \times 10^9/L$ (82.41% neutrophils, 14.02% lymphocytes), hemoglobin level 98 g/L, and platelet count $538 \times 10^9/L$. CRP was 54.96 mg/L, ALT was 69 μ/L , AST was 55 μ/L , ALP was 321 μ/L , PCT was 18.59 μ/L , γ GT was 199 μ/L , D-D was 1.84 ug/mL, and GLU was 7.6 mmol/L, renal function test results were within normal limits. The patient was given a diagnosis of hyperglycemia and glucosuria. Two days later, CRP increased to 142.5 mg/L. WBC count $12.35 \times 10^9/L$ (78.74% neutrophils, 15.23% lymphocytes), hemoglobin level 108 g/L, and platelet count $539 \times 10^9/L$, PCT was 16.85 μ/L , Ferritin was 575.8 ng/mL, ESR was 93 mm/hour, and glycated hemoglobin was 6.1%. First generation cephalosporine therapy was used to treat the infection by administration of 200 mg/day, but the Cefradine effect was not obvious. On March 7, the fever continued to exist. As the fever did not resolve, a blood culture test was carried out. *Bacteroides caccae* were isolated from blood cultures. *Bacteroides caccae* was identified on the basis of sequencing and matrix-assisted laser desorption/ionization-time of flight spectrometry (MS) analysis. Antimicrobials therapy was changed

to a combination of 4.5 g/day Piperacillin tazobactam and ornidazole tablet. On March 13, blood cultures were negative. PCT decreased to 1.05 pg/mL. On March 15, body temperature of the patient reduced and clinical symptoms improved. All microbiological tests were negative. Blood test showed 108 g/L hemoglobin, $543 \times 10^9/L$ PLT, and WBC count $10.75 \times 10^9/L$. The patient was generally stable and discharged from our hospital. Patient provided informed consent for publication of the case. After 2 weeks, the patient was recalled for follow up and the general condition was stable. The body temperature of the patient was normal.

DISCUSSION

Bacteroides caccae as a conditional pathogen, when the intestinal mucosa of the host is damaged, it may invade the blood, cause bloodstream infection, and may also cause purulent infections in other organs of the body such as the intestines, abdominal cavity, liver, lungs, and brain [6]. In this report, we describe a case of *Bacteroides caccae* infection in a diabetic patient, successfully treated with Piperacillin tazobactam and Okunita. Diabetic patients are at an increased risk of anaerobic bacteremia. The incidence of anaerobic bacteremia and mortality has a potential increase [7]. Clinical symptoms of patients with *Bacteroides caccae* infection are similar to other bloodstream infections [8]. Identification of *Bacteroides caccae* may be difficult [9]. Traditional biochemical tests have been proven to be too insensitive for distinguishing among species of anaerobic bacteria, because they require anaerobic growth environment and need relatively high nutritional conditions, and it is hard to cultivate within 72 hours [10]. If conditions permit, it is recommended to use anaerobic blood culture bottles to increase the positive diagnosis rate. In this study, sequencing and MS analysis was used for rapid identification of *Bacteroides caccae*. These results demonstrated that MS is an excellent diagnostic tool for rare anaerobe identification, such as *Bacteroides caccae* [11]. The world's leading therapeutic drug for anaerobic infections is 5-nitroimidazole, but many anaerobic bacteria develop resistance [12]. Among them, it may be related to the nim gene which is located on the mobile genetic elements [13]. Most reported nim genes are now described in *Bacteroides caccae* group isolates [14]. In this case, the patient had symptoms such as fever and elevated blood platelets. She initially received cefradine monotherapy, which failed to control the infection. A combination of Piperacillin tazobactam and ornidazole tablet effectively controlled *Bacteroides caccae* infection. These results demonstrated that using Piperacillin tazobactam and ornidazole tablet might improve the prognosis of diabetic patients with *Bacteroides caccae* infection [15].

With the rising prevalence of diabetes in China, coupled with poor glucose control, anaerobic bacterium infection should be considered in the differential diagnosis

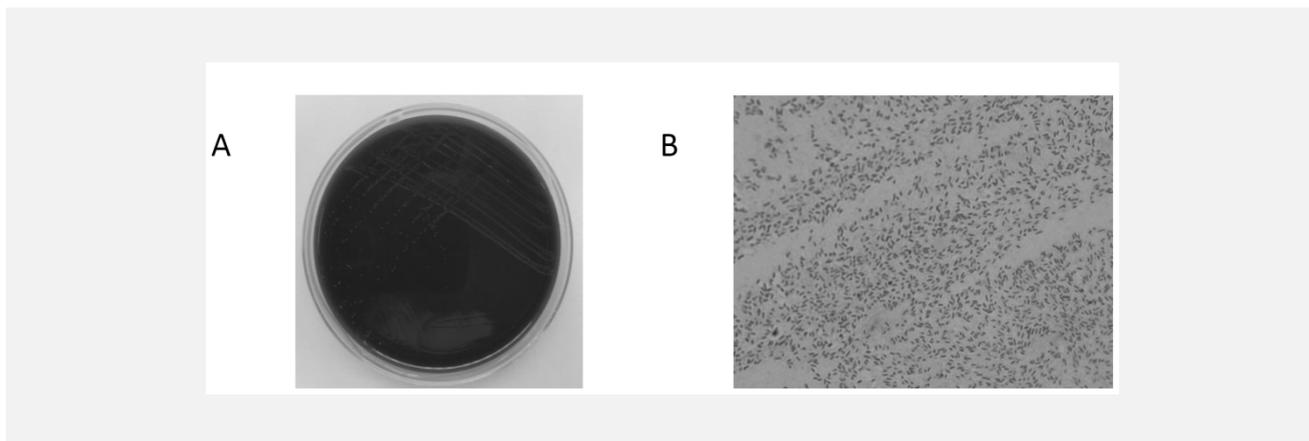


Figure 1. Left - The fourth day *Bacteroides fragilis* grew on blood plate, Right - Optical microscope image of the *Bacteroides fragilis* strain with acid-fast stain, under a 1,000 x magnification.

for diabetic patients presenting with fever. MS has significant advantages for identification of anaerobic bacteria. The prognosis of invasive *Bacteroides caccae* infection is poor in patients who were treated with a single drug such as first generation cephalosporines. Association of Piperacillin tazobactam and ornidazole tablet can be used as empirical antibiotics for *Bacteroides caccae* infections. Initiation of appropriate antimicrobial treatment and adequate glucose control are recommended to guarantee fruitful results.

Declaration of Interest:

None.

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