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Case Report

A rare case of a prostatic abscess, bacteremia and chronic granulomatous disease associated with *Klebsiella pneumoniae*☆

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ABSTRACT

Chronic granulomatous disease (CGD) is a primary immunodeficiency disease characterized by severe recurrent infections such as pneumonia, liver and skin infections. However, prostatic abscesses are rare as only two cases have been reported thus far. We present the case of a 41-year-old patient with CGD who was admitted to the hospital with fever and subsequently, *Klebsiella pneumoniae* was identified on blood culture. Abdominal computed tomography revealed a prostatic abscess. He improved with intravenous antibiotics and drainage of the abscess. After he was taken off the intravenous antibiotics and started on an oral agent, he was discharged from the hospital. We confirmed a reduction in the prostatic abscess size and continued the antibiotic therapy for 52 days. A prostatic abscess is an uncommon disease being diagnosed at a median age of 49 years. Sometimes it is discovered in patients with fever of unknown origin and might be considered as an infection site of CGD patients.

1. Introduction

Chronic granulomatous disease (CGD) is a primary immunodeficiency disease characterized by recurrent life-threatening bacterial and fungal infections [1]. The most common sites of infection are the lungs, skin, lymph nodes, and liver [2]; however, there are only two previous reports of prostatic abscesses associated with CGD. Here we report a case of bacteremia caused by *Klebsiella pneumoniae* with a concomitant prostatic abscess treated by antibiotics and abscess drainage.

2. Case report

The patient was a 41-year-old male with chronic granulomatous disease (CGD) that was diagnosed when he was aged 1 year. He took trimethoprim-sulfamethoxazole prophylaxis (160 mg/day) since childhood. For obstructive and inflammatory disorders of the lung due to recurrent infections, he took 2 L/min of home oxygen therapy and 0.5 mg of dexamethasone. Four days prior to admission, he had an outpatient visit because of a low grade fever (37.7 °C), but no other symptoms were present. He was discharged that day without any medication, but his body temperature remained high and he experienced headache. He then had an outpatient visit again and was admitted for fever workup.

On admission, his blood pressure was 116/52 mmHg, his body temperature was 39.0 °C, his heart rate was 100/min and oxygen saturation was 95% in 2 L/min of nasal flow. Admission laboratory data included the following: white blood cells (WBCs), 12,000 μL; platelets, 122,000/μL; C-reactive protein, 9.21 mg/dL; lactate dehydrogenase (LDH), 421 U/L; aspartate amino transferase (AST), 91 U/L; alanine amino transferase (ALT), 112 U/L; gamma-glutamyltransferase (γ-GTP), 201 U/L; creatinine, 0.69 mg/dL; and WBCs in urine, 1–4 cells/high power field. The plain chest computed tomography (CT) revealed a ground glass appearance within both lung fields. An infectious site could not be detected by plain abdominal CT. Pneumonia or bronchitis could not be ruled out by chest CT, and therefore piperacillin/tazobactam was administered. One day following this treatment, the patient's blood culture revealed *Klebsiella pneumoniae,* but the sputum and urine culture were negative. Antimicrobial susceptibility patterns of this *K. pneumoniae* were pan-sensitive except for trimethoprim-

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Fig. 1. A: Enhanced computed tomography (CT) on day 5 demonstrates a ring enhancing lesion within the prostate. **B:** Follow up CT performed on day 12 reveals reduction of the prostate abscess. **C:** On day 52, the prostate abscess was absent on the follow up CT.

sulfamethoxazole. On day 4, piperacillin/tazobactam was changed to meropenem because the patient's body temperature was high even though piperacillin/tazobactam was administered. To identify the focus of infection, enhanced total body CT was performed on day 5 and it revealed a ring-enhanced site measuring 22 mm in diameter within the prostate (Fig. 1a). On day 7, a prostatic abscess was diagnosed by transrectal ultrasonography, and even though a transperineal drain tube was placed at the enhanced site, very little pus was drained. After removal of drain tube on day12, *K. pneumoniae* was cultured from the drain tip after extraction of the drain tube. Therefore, the patient was diagnosed with bacteremia due to the prostate abscess. The patient's body temperature returned to normal after the pus drainage (Table 1). And a follow up CT was performed on day 12. By this time, the size of the prostate abscess was reduced (Fig. 1b). Meropenem was switched to oral levofloxacin on day 14 and the patient was discharged from the hospital on day 22. Antibiotic treatment for the prostate abscess was then continued for 52 days (Fig. 1c). After treatment, there was no symptoms of recurrence for one year.

3. Discussion

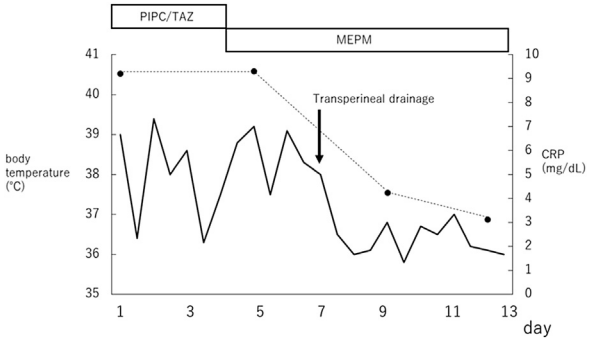
CGD is characterized by a deficiency of nicotinamide adenine dinucleotide phosphate (NAPDH) oxidase (NOX) which plays an important role in antimicrobial host defenses and inflammation [3]. NOX generates reactive oxygen species (ROS) which are fundamental for eliminating pathogens and for regulating inflammatory responses to infection [4]. NOX deficiency in humans results in recurrent and severe bacterial infections, especially those caused by catalase positive bacteria such as *Staphylococcus aureus*, Enterobacteriaceae including *Salmonella* and *Klebsiella* [5]. In addition, *Aspergillus, Nocardia and Mycobacterium tuberculosis* are important pathogens that lead to severe infections [2].

CGD is usually diagnosed early in life due to severe recurrent bacterial fungal infections that develop in childhood. Typical infection sites include the lungs, skin, soft tissues, liver and lymph nodes [2]. As for urological diseases, one review reported that 23/60 patients with CGD demonstrated urological diseases such as bladder granulomas, urethral strictures, recurrent urinary tract infections, and renal dysfunction [6]. However, there are only two published reports regarding prostatic abscesses associated with CGD, one is a case report on a 15 year old patient, the other is a report on a 35 year old patient [7,8]. In both case, patients had persistent fever, but didn't have any urological symptoms. A prostatic abscess itself is a rare disease because it has declined with the widespread use of antibiotics [9]. Prostatic abscess typically develops as a result of urinary tract infections or urinary catheter use, but sometimes bacteremia itself causes prostatic abscess subsequently [10]. This case, we suspect prostatic abscess developed as a result of bacteremia, but etiology of bacteremia was unknown. There is no guideline for treatment of prostatic abscess, but Chou et al. reported larger abscesses more than 1 cm in diameter were better treated by aspiration or continuous drainage [11] . The mean patient age for developing a prostatic abscess is 49.14 ± 15.67 years, which is older than the age group for those with chronic granulomatous disease [9]. However, life expectancy of CGD is getting longer because of new antimicrobial agents and treatment such as hematopoietic stem cell transplantation [12]. A prostatic abscess is an uncommon disease, but sometimes it is discovered in patients with fever of unknown origin and might be considered as an infection site of CGD patients. CGD patients have a high risk of bacteremia, but only two cases of prostatic abscess were reported. We assumed that prostatic abscess was missed and patients take antibiotics without careful investigation. Therefore, image computed tomography or transrectal sonography is important to use for final diagnoses.

K. pneumoniae is gram negative bacteria and one of the Enterobacteriaceae [13]. It causes a wide range of infections, including pneumonias urinary tract infection, bacteremia, and liver abscesses [13]. Jang et al. reports that *K. pneumoniae* is the second most common pathogen associated with prostatic abscesses (17.3%) [10].

Patients with CGD need infection prophylaxis using intracellularly active antimicrobials such as trimethoprim sulfamethoxazole and itraconazole [14]. The patient in this case took trimethoprim sulfamethoxazole for prophylaxis; however, *K. pneumoniae* was cultured but showed resistance to trimethoprim sulfamethoxazole.

Table 1
Body temperature till day 13 after admission. Body temperature returned to normal after transperineal drainage. Body temperature is solid line, and CRP is dotted line.



For patients with CGD, it is often difficult to prevent infections only with oral antibiotics, and breakthrough infections caused by resistant pathogens can occur. In this situation, the appropriate intravenous antibiotics should be administered when an acute infection is suspected.

Conflicts of interest

The authors declare they have no conflict of interest.

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