Case Report

Septic pulmonary embolism complicated by pyogenic spondylitis and psoas abscesses in a patient with methicillin-sensitive Staphylococcus aureus bacteraemia

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Abstract

Septic pulmonary embolism (SPE) is a rare condition, indicating bacteraemia. We report a rare case of Staphylococcus aureus bacteraemia causing SPE and multiple abscesses in a previously healthy patient. A previously healthy 33-year-old man presented to our hospital with fever and back pain for 3 weeks. Chest contrast-enhanced computed tomography image was suggestive of SPE, and the blood culture showed methicillin-susceptible S. aureus. Additional focus identification revealed pyogenic spondylitis and abscesses in the psoas muscles. After the 6-week antimicrobial treatment, his clinical condition and image findings improved, and he was discharged. SPE should be considered as a critical consequence of bacteraemia, and early focus identification is essential for appropriate treatment.

INTRODUCTION

Staphylococcus aureus bacteraemia (SAB) is one of the most common serious bacterial infections with a high risk of metastatic complications and high in-hospital mortality ranging between 20 and 30% [1]. To identify the source of infection is critical in determining appropriate therapy [1]. Septic pulmonary embolism (SPE) is a rare condition with focal lung abscesses due to pathogenic microorganisms; it often develops as a consequence of bacteraemia, such as SAB.

Here, we present an educational case of SAB concomitant with pyogenic spondylitis and psoas abscesses which initially presented as SPE in a previously healthy young subject.

CASE REPORT

A previously healthy 33-year-old man was referred to a community hospital with persistent back pain for 3 weeks. He worked in an information technology company in India and Dubai for the past 7 years. He underwent acupuncture therapy in India for the back pain. Three weeks later, he returned to Japan. At the time of return, he presented with high fever (≥38°C), fatigue, and back pain. On hospitalization, a computed tomography (CT) image showed multiple nodules in both lungs. Pneumonia was suspected, and he was treated empirically with carbapenem. After treatment initiation, his fever persisted for 4 days, and he was transferred to our hospital. Initial laboratory investigations
at our hospital revealed a white blood cell count of 24.8 × 10^3/mm^3 (88% neutrophils), hemoglobin level of 9.3 g/dL, platelet count of 377/mm^3, C-reactive protein level of 13.23 mg/dL, fasting blood glucose level of 93 mg/dL. The patient had normal renal function and negative result of HIV. A chest contrast-enhanced CT image revealed distinct vessels leading to pulmonary nodules (feeding vessel sign), suggestive of SPE (Fig. 1A–D). Concomitantly, gram-positive cocci were confirmed in two sets of blood cultures taken at the previous hospital, and we added vancomycin to the previous antimicrobial therapy. In order to identify the source of infection, we conducted whole body imaging examination. Contrast-enhanced CT and magnetic resonance imaging (MRI) revealed pyogenic spondylitis, left purulent shoulder arthritis, and abscesses in the psoas muscles (Fig. 2A and B). Transthoracic echocardiography was not suggestive of infective endocarditis. Because the gram-positive cocci were identified as methicillin-susceptible Staphylococcus aureus (MSSA), we de-escalated to cefazolin therapy after 5 days of carbapenem therapy. Although we tried drainage of the joint and the abscesses, it was difficult to approach because of the size and location. Furthermore, because we confirmed that follow-up contrast-enhanced CT improved 5 days after treatment, we did not administer drainage. After 6 weeks of cefazolin treatment, his symptoms disappeared and the imaging findings improved, and the treatment was discontinued.

**DISCUSSION**

In the present case, CT revealed multiple nodules before we identified the presence of bacteraemia; SPE is a rare condition in which emboli containing pathogens embolize to the pulmonary artery, leading to focal lung abscesses [2]. SPE is most commonly associated with intravenous drug use, rightsided infective endocarditis, catheter-related infection, septic thrombophlebitis, periodontal abscesses and Lemierre’s syndrome. Moreover, patients with SPE have comorbidities such as diabetes, malignancy, heart disease and chronic kidney disease [3]. Though the symptoms are non-specific, SPE presents unique imaging findings, such as nodules, patchy infiltrates, cavity and feeding vessel sign in both lungs [2]. Blood cultures are commonly positive in SPE, with S. aureus the commonly identified pathogen [2]. Although our patient was unlikely to have bacteraemia, the unique imaging findings of SPE suggested the presence of bacteraemia.

Here, further focus identification revealed pyogenic spondylitis and psas abscesses, which led to persistence of symptoms in spite of empiric treatment for bacteraemia. SAB is a common and serious condition, carrying a high risk of metastatic complications; in-hospital mortality is 20–30% [1]. Patients with SAB often have risk factors such as old age, hemodialysis, host immune defense and diabetes [4]. In SAB, the common primary clinical foci of infection are vascular catheter-related infections, skin and soft tissue infections, pleuropulmonary infections, osteoarticular infections and infective endocarditis, while a focus of infection is not evident in <25% of cases [4]. Persistent fever after 72–96 h of effective antibiotic therapy are predictors of complications, such as endocarditis, septic thrombophlebitis or undrained deep-seated foci [1], are associated with higher rates of mortality [5]. The deep-seated foci in this case might have made the symptoms persistent. When we identified the deep-seated foci, the source control followed by antibiotic therapy will be often necessary. In the present case, we could not administer the source control, but the frequent follow-up imaging studies were helpful in preventing progression of the infection. Acupuncture therapy may be an important factor for progression of the infection in this case, because spinal abscesses...
secondary to burn injury caused by repeated acupuncture has been reported earlier [6].

To conclude, the presence of unique imaging findings compatible with SPE in patients with infectious symptoms should lead the clinician to suspect bacteraemia and attempt early focus identification for accurate treatment, even in the absence of risk factors.

CONFLICT OF INTEREST STATEMENT
None to declare.

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None to declare.

ETHICAL APPROVAL AND CONSENT
Our institution does not require the approval of institutional review board for case report. We obtained written consent form for this report from the patient.

GUARANTOR
Kohei Fujita.

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