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Case report

Acute bacteremic pneumonia due to melioidosis developing in the intensive care setting

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ABSTRACT

In Malaysia, melioidosis is commonly encountered as this infection is known as part of the endemic area for the disease. Managing cases of positive *Burkholderia pseudomallei* infection can involve multidisciplinary unit mainly, microbiologist, infectious disease team and intensive care as it may be quite difficult to distinguish melioidosis from a number of other diseases on the clinical setting alone. Laboratory diagnosis plays a vital role in determining the direction of management. Investigations such as culture, polymerase chain reaction (PCR) and serology should be evaluated once the disease is suspected. In this particular case, the patient is a young adult involved in a road traffic accident. Unlike any other cases with melioidosis, he had no potential risk factors which may have contributed to the severity of the disease and it is likely that the site of the accident was the source of acquisition of this gram negative bacterium.

Introduction

Melioidosis is caused by gram negative bacillus, now referred to as *Burkholderia pseudomallei* and has been recognized as a potential bioterrorism agent. It is an environmental saprophyte which survives within stagnant water and particularly on tropical wet soil in endemic areas. The highest incidence of meliodosis was reported from South East Asia and the Northern Territory of Australia. However, there are cases reported from other locations globally [1].

More than 540 cases over the period of 20 years have been identified in the Darwin prospective melioidosis study, one of notably fundamental epidemiology studies which opened up new insight to the disease spectrum. Among the risks factors identified and highlighted included diabetes, chronic alcohol use, and chronic kidney disease. Additionally, patients who had chronic lung disease, rheumatic heart disease, cardiac failure and malignancies were at increased risk as well as those over the age of 50 [2].

The commonest presentations of patients with melioidosis were pneumonia and septic shock which accounted for 21%. Early diagnosis and the improvement in intensive care management have contributed to the significant decrease in mortality rate to only 9% in the last five years comparing to 30% in the first five years. Therefore, for intensive care providers, recognizing the risks factors and understanding the course of the disease played significant impact to the ICU mortality generally [3].

We describe here a case of a young boy involved in road traffic accident who, after five days of mechanical ventilation, developed pneumonia and the blood, endotracheal tube and bronchoalveolar lavage cultures yielded *Burkholderia pseudomallei.* After reviewed by an Infectious disease physician, he was diagnosed as disseminated melioidosis and thus the appropriate antibacterial regime was promptly initiated.

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Case report

A 15 year-old boy, with mild, infrequent asthma was referred from a district hospital after he was involved in a road traffic accident and was suspected of having intracranial involvement. The boy was riding a motorbike but was not wearing a helmet and collided with a car from the opposite direction. The incident happened on a bright day light, at the hill side but the exact mechanism of injury could not be determined as there was no eye witness. It was not clear whether he had inhaled any water or soil materials during the incident.

He was subsequently brought to the nearby district hospital by a passer-by. Upon arrival, the Glasgow Coma Scale (GCS) was six (6) with Eye 1, Verbal 2 and Motor 3. The Oxygen saturation (SpO2) of only 75%. He was intubated due to the respiratory failure and for an airway protection as he presented with a low GCS. Chest xray (CXR) reveals massive right haemothorax and segmented fracture of the 6th posterior rib. Ipsilateral chest tube inserted and 300 ml of blood drained. He was then transferred to Hospital University Sains Malaysia, a tertiary hospital for further management. A CT of the brain revealed a performed subarachnoid haemorrhage (SAH) with punctate intracerebral haemorrhage. A burr hole was done and intracranial pressure (ICP) monitoring was attached. Once stable, he was transferred to an Intensive Care Unit (ICU).

In the ICU, the patient was put ventilator support and requiring minimal inotropic support of 0.1-0.2 mcg/kg/min of Noradrenaline. After three days, the team involved deliberately decided to extubate him as he showed improvement and was able to follow a simple command, required a minimal inotropic support and a low ventilator setting. Unfortunately, eight hours after that, he was reintubated and put on a moderate ventilator setting as he was not able to sustain with the non invasive ventilation (NIV) and producing significant amount of secretions. At the same period of time, he was febrile with temperature ranging between 38 and 40 °C.

Bronchoscopy was performed revealing purulent secretions and subsequently blood, tracheal secretions and bronchoalveolar lavage fluid cultures grew a gram negative bacillus identified as *Burkholderia pseudomallei.*

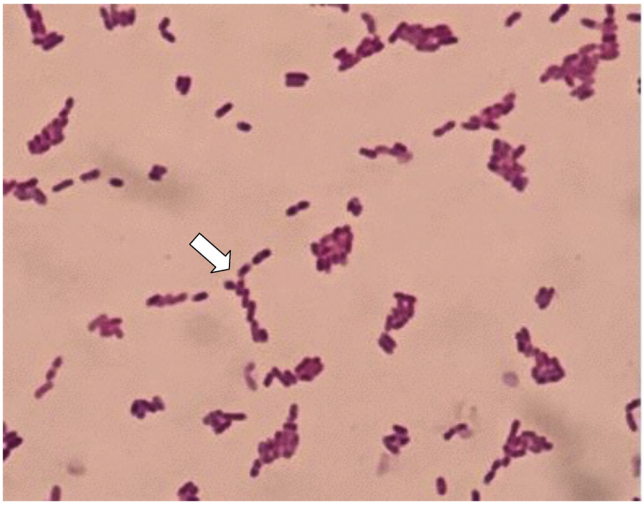

Fig. 2. Gram stain of *B. pseudomallei* showing 'safety-pin' appearance.

The culture grew as white creamy, low convex colonies with metallic shine that became wrinkled and dry after about four days of incubation, in-keeping with *Burkholderia pseudomallei* (Fig. 1).

Gram stain showed gram negative bacilli with safety-pin appearance (Fig. 2). The organism was sensitive to amoxicillin-clavulanate, ceftazidime, doxycycline, imipenem and trimethoprim-sulfamethoxazole. Blood investigations sent for Hepatitis B, Hepatitis C, HIV and syphilis screening were all negative.

On the other hand, CXR showed predominant right hemithorax consolidations. Despite that, he required only a low to moderate ventilator setting and minimal inotropic support throughout his stay in ICU. He was extubated a week later and discharged to the general ward after a total 21 days of ICU stay.The antibacterial he was on included IV Meropenem 1 g 8-hourly which was started after seven days intubated which was then deescalated to IV Ceftazidime 2 g 8-hourly for the duration of four weeks. He was planned for an oral trimenthoprim/sulfamenthoxazole for a total duration of five months for the eradication phase (Fig. 3).

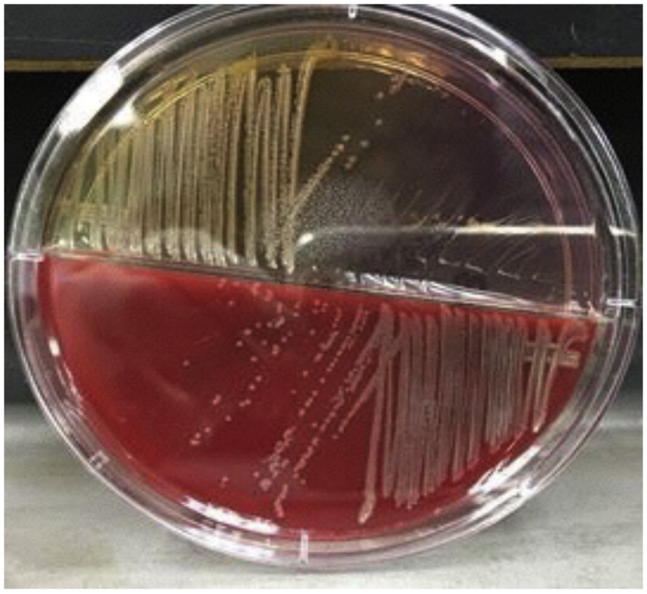

Fig. 1. Blood agar plate of *B. pseudomallei* showed metallic shine colonies.

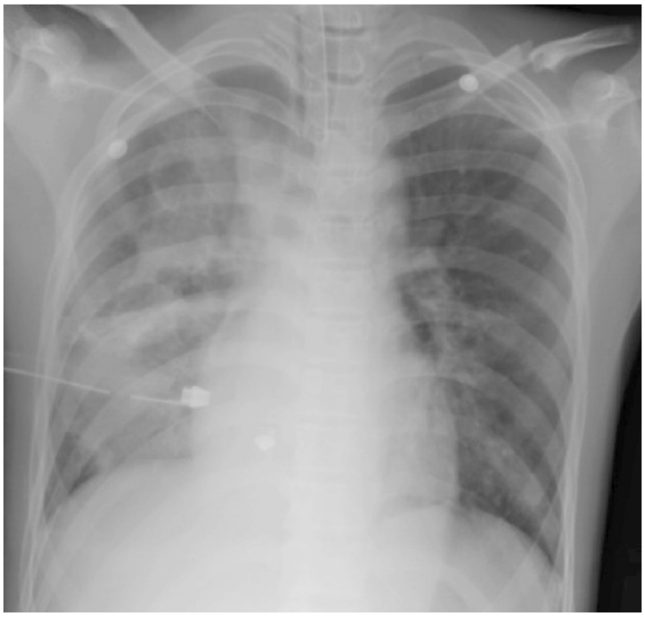

Fig. 3. Right hemithorax consolidation with areas of cavitation on the right upper zone. There is also right sided pleural effusion, presence of fracture right 6th posterior rib and left clavicle.

Discussion

Patients who are diagnosed with melioidosis present significant challenges to the team involved, especially to the intensive care providers, to deliver the best level of care. More often in our setting, melioidosis occurs in the older diabetic patient who is a farmer or construction worker and is exposed to contaminated soil. The highest incidence is during rainy season. There is well established association between the occurrence of melioidosis and wet monsoon or rainfall. Besides pneumonia, other clinical manifestation includes lung abscess, liver abscess, splenic abscess, lymphadenitis, osteomyelitis and other soft tissue infections. Studies have shown that the mean incubation period for acute melioidosis infection averages 9 days [4]. However, the incubation period can be last long as several decades as has been reported in American military personnel, the so called "Vietnamese Time Bomb" [5]. The disease course, clinical presentation and the overall outcome seems to be determined by a number of other associated factors such as the general state of the host, bacterial inoculum, bacterial virulence and mode of infection [6].

In our case, the disseminated melioidosis infection involved a young healthy immunocompetent boy who sustained road traffic accident few days prior to the onset of septicaemia. He had no social history suggesting of involvement in a risky activity which could lead to an immunocompromised state. A number of aspects of this case were unusual for cases of acute bacteraemic melioidosis including the short incubation period, the initial presentation while hospitalized, the lack of risk factors in the host and the occurrence in a non-rainy season.

We could not get detailed history on the site and the exact mechanisms of injury as there were no eligible eye witnesses. Based on the laboratory results that was obtained, where most cultures grew *Burkholderia pseudomallei* in few days of incubation reflects the significant load of organisms the boy may have had inhaled, ingested or inoculated at the wounded area. We believe the most probable source is from the soil at the site of the accident. For melioidosis, human transmission does occur via ingestion or contact of wounded skin with contaminated water or even via inhalation of a water particle or a dust contaminated with the organism. The latter has been seen in Vietnamese war soldiers were thought to have inhaled bacterial-containing dust from helicopter landing areas [7]. Again to date, the association of inhaled melioidosis as compared to percutaneous exposure to the mortality rate is not clearly known [3].

The presentation of acute melioidosis in this patient which occurred while hospitalised after a traumatic injury was identical to any other pneumonia in the intensive care unit. No risk factors for severe *Burkholderia pseudomallei* infection were present and the diagnosis was made microbiologically. It is important that, in endemic areas, to keep this diagnosis in mind.

Conflict of interest

No interest declared on commercial organisation, consultancy, board activity or personal financial gain.

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