Section: Microbiology

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Case Report

TWO CASE REPORTS OF BURKHOLDERIA PSEUDOMALLEI BACTERAEMIA AND PLEURO-PULMONARY INFECTION IN A TERTIARY CARE CENTRE IN NORTH-EAST INDIA

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ABSTRACT

Burkholderia pseudomallei, a soil saprophyte, is the bacterium that causes Melioidosis, a multi-faceted disease that is indigenous to Northern Australia and the tropical region of South-East Asia. In the following case reports, the blood culture samples from two patients who got admitted to the Intensive Care Unit yielded *Burkholderia pseudomallei*. The blood culture showed growth of smooth, creamy, white colonies after 24 hours. It was followed by identification via VITEK 2 system (bioMerieux). Subsequently, the patients were started on antibiotics and they responded to meropenem therapy.

INTRODUCTION

Burkholderia pseudomallei exhibits remarkable resilience and can survive in harsh environmental conditions including highly acidic surroundings, antiseptic and detergent solutions, and a wide temperature range of 24°C-32°C.[1] The organism is increasingly being isolated from clinical specimens, especially in patients with chronic diseases. The most frequently observed manifestation of Melioidosis is pneumonia and it occurs in about half of all the reported cases. Other clinical features include development of abscesses in several organ systems – skin, subcutaneous tissues, liver, spleen etc.[1] We present here two case reports of patients with Melioidosis.

CASE PRESENTATION

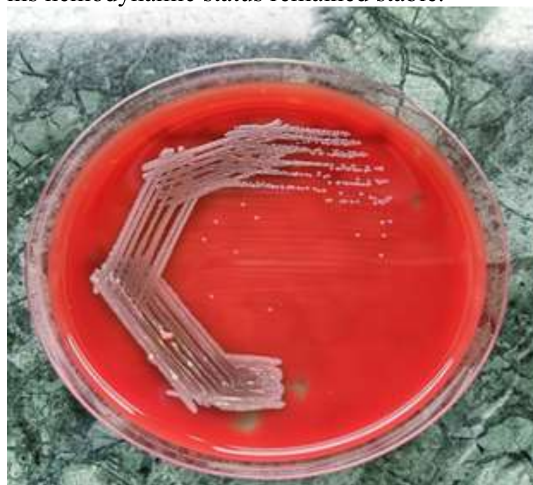
CASE 1: A 43-year-old male arrived at the Emergency Department experiencing loss of consciousness and fever. The patient had a history of binge-drinking. He worked as a farmer and had no known comorbidities. Further, the patient underwent intubation and was put on mechanical ventilation in the Medicine ICU (Intensive Care Unit). MRI (Magnetic Resonance Imaging) brain was suggestive of hypoglycemic encephalopathy. NCCT (Non-Contrast Computed Tomography) thorax showed right-sided pleural effusion with scattered regions of consolidation in the upper lobe of the right lung, left lower lobe and posterobasal segments of the bilateral lower lobes. Multiple clusters of centrilobular nodules were also seen in the bilateral lower lobes. Samples of sputum and blood were sent to the Microbiology Laboratory. Subsequently, the culture after 24 hours showed the growth of smooth, creamy, white colonies of about 0.5-1mm in diameter, on blood agar. The isolate was identified by the automated VITEK 2 system (bioMerieux) as *Burkholderia pseudomallei.*

The antibiotic susceptibility pattern generated by the automated system and interpreted as per CLSI (Clinical and Laboratory Standards Institute) 2024 showed sensitivity to meropenem. The isolate was resistant to trimethoprim-sulfamethoxazole (co-trimoxazole), minocycline and levofloxacin. Based on the blood culture report, meropenem treatment was initiated for the patient. He was apparently alright at follow-up after 1 month.

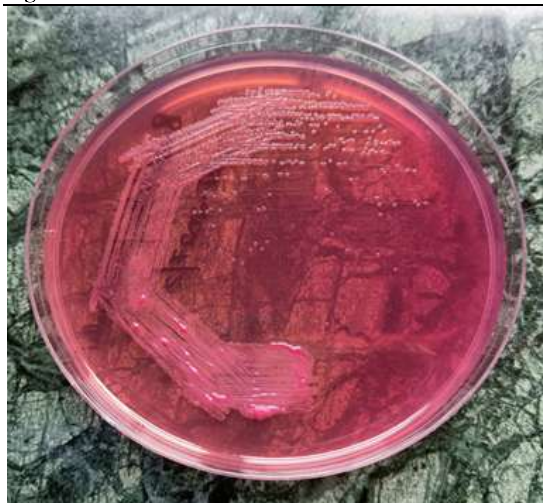
CASE 2: A 38-year-old male presented to the Emergency Department with the complaint of severe shortness of breath and fever for 2 days. He had a history of type 2 Diabetes Mellitus with poorly managed hyperglycemia. Due to significant respiratory distress and altered mental status, the patient was intubated and put on mechanical

ventilation in the Medicine ICU. Radiological investigations such as Ultrasonography WA (Whole Abdomen) and CECT (Contrast-Enhanced Computed Tomography) WA+Thorax showed abscesses in the liver(large multiloculated), spleen, prostate, seminal vesicle along with bilateral pleural effusion and pulmonary wedge-shaped opacities. Sputum and blood samples were collected and sent to the Clinical Microbiology laboratory for investigation. The blood culture after 24 hours showed the growth of smooth, creamy, white colonies, of about 0.5-1mm in diameter, on blood agar, followed by identification via VITEK 2 system as *Burkholderia pseudomallei*. It was susceptible to meropenem, minocycline, trimethoprim-sulfamethoxazole and resistant to levofloxacin. In view of the blood culture report, the patient was initially started on meropenem therapy for 2 weeks.

A repeat blood culture done after the initial therapy showed a sterile culture. Repeat Ultrasonography WA showed minimal free fluid in the pleural cavity with no features of abscesses. Further, the patient responded well to trimethoprim-sulfamethoxazole therapy for 12 weeks of eradication phase. At the time of discharge, his symptoms had improved, and his hemodynamic status remained stable.



A) Colonies of *Burkholderia pseudomallei* on Blood Agar



B) Colonies of *Burkholderia pseudomallei* on MacConkey Agar

DISCUSSION

Melioidosis is an infectious disease which mimics the clinical symptoms of several diseases and it has become a significant public health concern in regions of South-East Asia and Northern Australia.[1] The causative agent is *Burkholderia pseudomallei*. Melioidosis was first identified as a distinct clinical condition in 1911 when a disease resembling glanders was documented by C.S. Krishnaswami (bacteriologist) and Alfred Whitmore (pathologist) in Rangoon, Myanmar.[2]

Burkholderia pseudomallei shows a negative reaction to Gram stain. It is an elongated bacillus which exhibits bipolar staining and vacuolation. It shows positive reaction to oxidase test. *Burkholderia pseudomallei* can also assimilate arabinose, a property which differentiates it from the less virulent *Burkholderia thailandensis*.[1] On culture, the organism initially demonstrates smooth, creamy white colonies and gives rise to dessicated or ridged colonies on prolonged incubation.[1]

The major risk factors for Melioidosis include diabetes, excessive alcohol consumption, soil or water exposure, progressive pulmonary condition, long-standing kidney disorder, thalassaemia, cystic fibrosis, immunosuppressive therapy, cancer.[3] Individuals engaged in occupational activities that involve contact with moist soil or surface water face the highest risk. These include paddy and crop cultivators, farm labourers, infrastructure workers and voyagers.[4] The infection is contracted through direct exposure, whether by inoculation, inhalation, or ingestion of soil or water that has been contaminated.[5] While the symptoms typically manifest within 2-4 weeks following exposure, the incubation period can range from a few days to several years. Most of the cases occur in rainy season.[1,4] The clinical manifestations of *Burkholderia pseudomallei* infection are extremely diverse. Pneumonia is the leading manifestation of the disease.[6,7]

Other clinical features include presence of single or multiple abscesses in the skin and internal organs.[8] Pleural effusion is observed in 15% of long-standing Melioidosis cases.[9] It is present in the above mentioned case reports too. Hence, the clinical spectrum ranges from subclinical cases, focal sores to persistent pulmonary infection and severe sepsis with abscesses in multiple internal organs.[3,4] Another well-recognised manifestation of *Burkholderia pseudomallei* is septic arthritis which mainly affects the knee and shoulder joints.[10] The clinical and the radiologic picture of this infection may mimic those of neurologic TB and arboviral encephalitis.[11] Multiple nodular infiltrates are often seen in both lungs on chest radiograph, that can eventually coalesce and lead to the formation of caseous necrosis and metastatic abscess.[12,13]

Acute sepsis accounts for 60% of the infections and the remaining 40% exhibit focal infections mainly in the lungs (bronchitis, pneumonia) and abscesses such as cutaneous, subcutaneous abscess, lymphadenitis,

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osteomyelitis, liver abscess, splenic abscess etc.[3,6] The likelihood of mortality in Melioidosis is shaped by multiple host-related factors, including underlying health conditions and the length of treatment. In the above case reports, the first patient had no known comorbidities while the second patient had diabetes. Melioidosis cases complicated by sepsis have a high mortality rate, ranging from 50% to 90%, even with appropriate treatment.[14]

Melioidosis treatment comprises of an initial intensive phase of therapy (minimum 2 weeks) with ceftazidime or a carbapenem (plus or minus trimethoprim-sulfamethoxazole) followed by an eradication phase (minimum 3 months) with trimethoprim-sulfamethoxazole (plus or minus doxycycline).[1]

CONCLUSION

Melioidosis is more common than realized. After extensive literature search, these case reports are among the few reported cases of Melioidosis in North-East India. *Burkholderia pseudomallei* remains a significant diagnostic hurdle in regions of endemicity given the fact that Melioidosis mimics the clinical symptoms of many other diseases. Hence, early consideration of the disease in the differential diagnosis, especially in the endemic areas, is a must. A strong clinical insight coupled with stringent efforts from both the microbiologists and the clinicians are essential for a timely detection and an effective treatment, ultimately reducing the fatality of this potentially life-threatening infection.

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