Case Report

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Multi-Systemic Melioidosis

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Abstract

Background: Melioidosis is a severe infectious disease caused by *Burkholderiapseudomallei*, a Gram-negative bacterium endemic to tropical regions. While it most commonly affects the lungs, melioidosis can present as a multisystemic infection, impacting various organ systems, including the liver, spleen, kidneys, skin, and central nervous system. The clinical manifestations of multisystemic melioidosis are diverse and range from localized abscesses and septicemia to more severe presentations such as pneumonia, acute respiratory distress syndrome (ARDS), and disseminated infection with organ failure. Diagnosis is often challenging due to its nonspecific symptoms and requires microbiological culture, PCR, and serological tests. We report a case of a 25-year-old male who presented with fever and headache and diagnosis was made of multisystemicmelioidosis and treated accordingly.

Conclusion: Despite appropriate therapy, the mortality rate remains high, particularly in cases with delayed diagnosis or in immunocompromised patients. Understanding the pathophysiology, risk factors, and optimal management strategies for multisystemic melioidosis is crucial for improving patient outcomes in endemic regions and for travelers to these areas.

Keywords: Melioidosis, *Burkholderiapseudomallei*, Multisystemic infection, Sepsis, Pneumonia, Organ failure, Diagnosis, Treatment, Tropical disease.

INTRODUCTION

Melioidosis is an infectious disease caused by *Burkholderiapseudomallei*, a Gram-negative bacterium predominantly found in soil and water in tropical and subtropical regions, particularly in Southeast Asia, Northern Australia, and parts of Africa. It can affect humans and animals, leading to a broad range of clinical presentations. While it often presents as a localized infection, it can become multisystemic, affecting multiple organs simultaneously, leading to a complex and severe form of the disease known as multisystemic melioidosis.

The primary route of infection is through direct contact with contaminated soil or water, usually through broken skin, inhalation, or ingestion. *Burkholderiapseudomallei* has the ability to invade and survive within host cells, particularly macrophages, and can cause a variety of tissue damage. The bacterium can evade the host immune system, which contributes to the chronic and often difficult-to-treat nature of melioidosis.

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Infected individuals may present with local infections, such as abscesses or pneumonia, but when the infection disseminates, it affects multiple systems, including the respiratory, hepatic, renal, and central nervous systems, making diagnosis and management more challenging.

CASE SUMMARY

A 25-year-old male who is a farmer presented to the Emergency Department with complaints of fever and headache. The patient does not have any comorbidities. Routine blood tests showed an erythrocyte sedimentation rate (ESR) 36 mm, C-reactive protein (CRP) of 42.96 mg/L, and a white blood cell (WBC) count of 11.8×10^3 / mm^3 with 75.8% neutrophils, normal platelets, and creatinine. The patient's fasting plasma glucose level was 125mg/dl. Pulmonary tuberculosis was suspected initially but sputum culture came as negative. Melioidosis is common in our region so systemic melioidosis was suspected. Venous blood was obtained for blood culture and selective media was used for culture. Real-time PCR also confirmed melioidosis. Intravenous Ceftazidime for 4 weeks, followed by oral maintenance therapy with cotrimoxazole for 4 months. Patient was improved after continuous antibiotic therapy.

DISCUSSION

Hainan, a tropical region, provides favorable conditions for the spread of melioidosis. Most reports describe isolated cases without clear patterns. In 1997, around 60 cases were reported from Hainan, but none involved multi-system melioidosis affecting the thorax, CNS, and spleen[1] . The occurrence of this disease is linked to rainfall, as the pathogens reside in the soil. During extreme weather events, such as typhoons, these pathogens can become aerosolized and inhaled. As a result, direct skin inoculation and inhalation are the primary routes of infection.[2]

Clinical Manifestations

Respiratory System: Pneumonia is one of the most common manifestations of melioidosis, with severe respiratory distress being a hallmark of the disease.[3] Patients may develop acute respiratory failure due to septic shock, abscesses in the lungs, or a high burden of infection. Chest X-rays or CT scans may show consolidation, abscesses, or infiltrates.[4]

Hepatic Involvement: The liver is frequently affected in multisystemic melioidosis, presenting as hepatomegaly, liver abscesses, or jaundice. In severe cases, hepatic failure can develop. The bacterium is known to have a propensity for abscess formation, leading to focal necrosis and inflammation within the liver.[5]

Renal System: Renal involvement can present as acute kidney injury (AKI) or chronic renal insufficiency. *B. pseudomallei* may form abscesses in the kidneys, leading to renal dysfunction. This can be particularly problematic in patients with pre-existing renal conditions or those who develop sepsis.

Neurological Involvement: Neurological manifestations can include meningitis, brain abscesses, and encephalitis. Patients may present with altered mental status, headaches, seizures, or focal neurological deficits. Neurologic involvement is particularly concerning because it can lead to long-term disability.[6]

Musculoskeletal System: Soft tissue abscesses, osteomyelitis, and arthritis are not uncommon in melioidosis, with abscesses frequently observed in the bones and joints. Musculoskeletal complications may lead to significant morbidity, particularly in patients with immunocompromised states.[7]

Septic Shock and Disseminated Infections: Severe septicemia with disseminated intravascular coagulation (DIC) can occur, resulting in multi-organ failure. This septic form of melioidosis has a high mortality rate, especially if not recognized early and treated aggressively.

Various radiological patterns of thoracic melioidosis have been identified. Acute disseminated infection typically presents with multiple lung nodules or multilobar consolidation, which can progress to cavity formation and rupture, resulting in pneumothorax or bronchopleural fistula. In CNS melioidosis, radiological features vary depending on the stage of infection, ranging from a normal brain CT during the initial stages of cerebritis to the characteristic formation of macroabscesses. MRI is more sensitive in the early stages.The frontal lobes and brainstem are particularly prone to infection. Other radiological findings may include microabscesses, osteomyelitis, encephalitis, and myelitis. Brain abscesses are a typical imaging finding in CNS melioidosis, though distinguishing them from brain malignancies using conventional imaging alone can be challenging.

Risk Factors for Multisystemic Melioidosis are diabetes mellitus, chronic kidney disease, immunocompromised individuals, heavy alcohol

use, exposure to contaminated environment. Diagnosis of melioidosis can be challenging due to its nonspecific symptoms and varied presentations[8]. The definitive diagnosis is typically made through microbiological culture, where *Burkholderiapseudomallei* is isolated from blood, sputum, urine, or abscess aspirates. PCR and serological tests can also assist in diagnosis, although they may not be widely available in all regions.

Management includes antibiotic therapy, surgical interventions for abscess, and supportive care. The prognosis of multisystemic melioidosis is often poor, especially in severe cases where organ failure occurs[9]. Early diagnosis and appropriate treatment are crucial for improving outcomes. Mortality rates can be high, particularly in patients with diabetes, liver disease, or those who present with septic shock and multiple organ failure.

Preventing melioidosis involves reducing exposure to contaminated environments, especially in endemic areas. This includes wearing protective footwear, avoiding contact with soil or water during floods, and practicing good hygiene. Vaccines are under investigation but are not yet available for human use.[10]

CONCLUSION

Multisystemic melioidosis represents a severe and often life-threatening form of melioidosis, which can affect multiple organs and systems simultaneously. Early recognition and aggressive treatment with appropriate antibiotics are critical to improving patient outcomes. Given the challenging nature of diagnosis and treatment, healthcare providers in endemic regions must maintain a high index of suspicion for this disease, especially in patients with risk factors such as diabetes, renal failure, and immunosuppression.

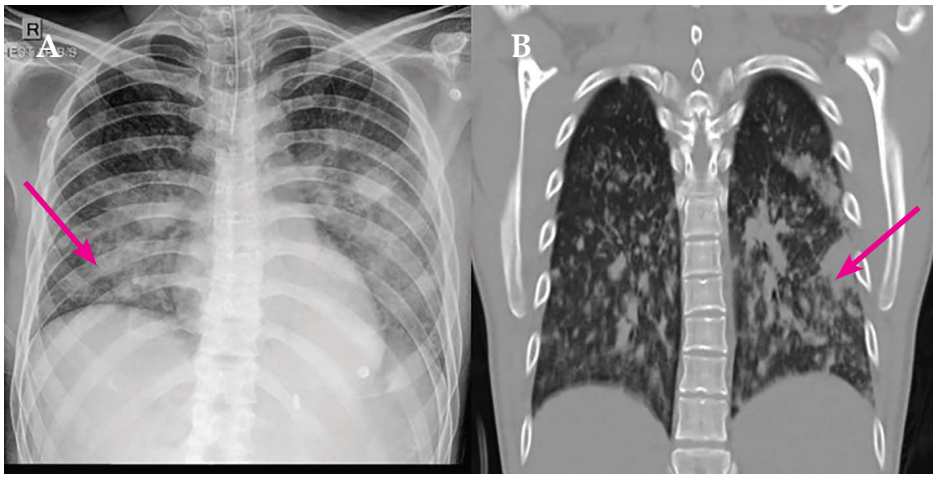

Fig. 1: (A) Chest X-Ray showed multiple radio opacities in bilateral lung fields, **(B)** CT chest showed Patchy subpleural consolidations with nodules in bilateral lungs

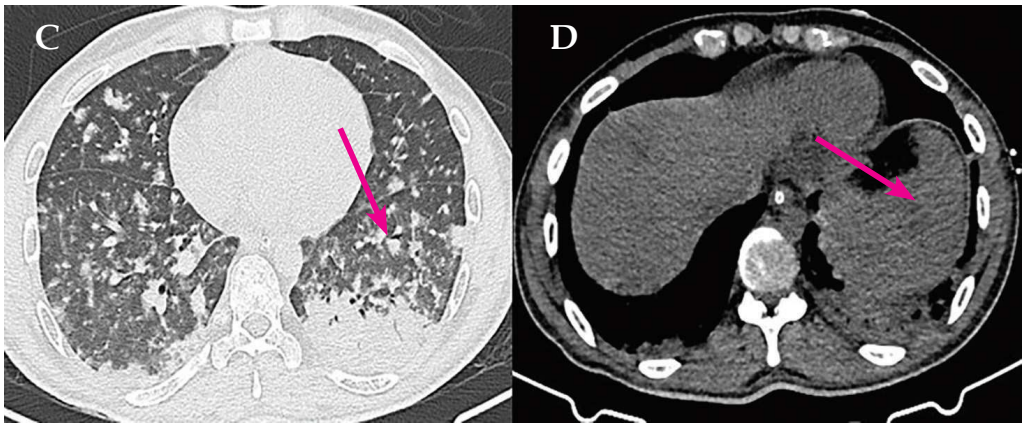

Fig. 2: (C) CT chest showed Patchyperibronchialconsolidations with nodules in bilateral lungs, **(D)** CT abdomen showed few hypodense lesions spleen suggestive of micro-abscesses

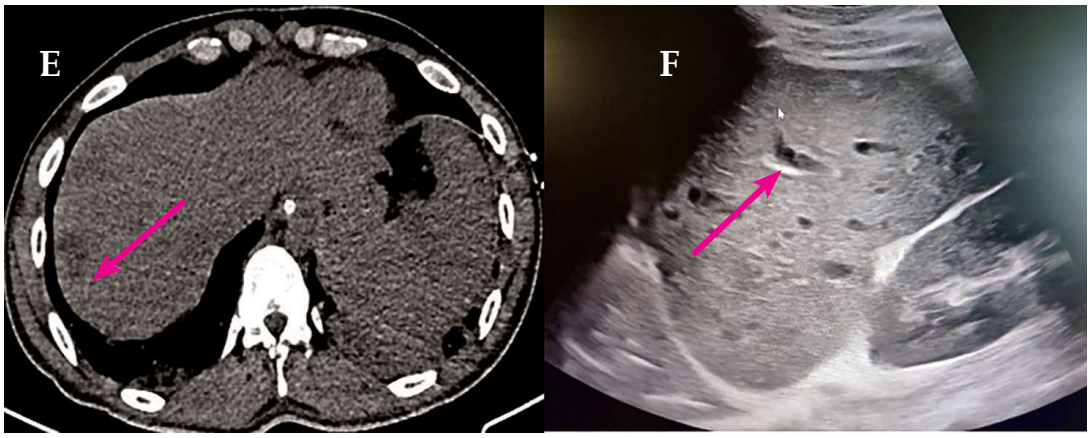

Fig. 3: (E) CT abdomen showed few hypodense lesions in liver suggestive of micro-abscesses, **(F)** Ultrasound abdomen showed few micro-abscesses in spleen

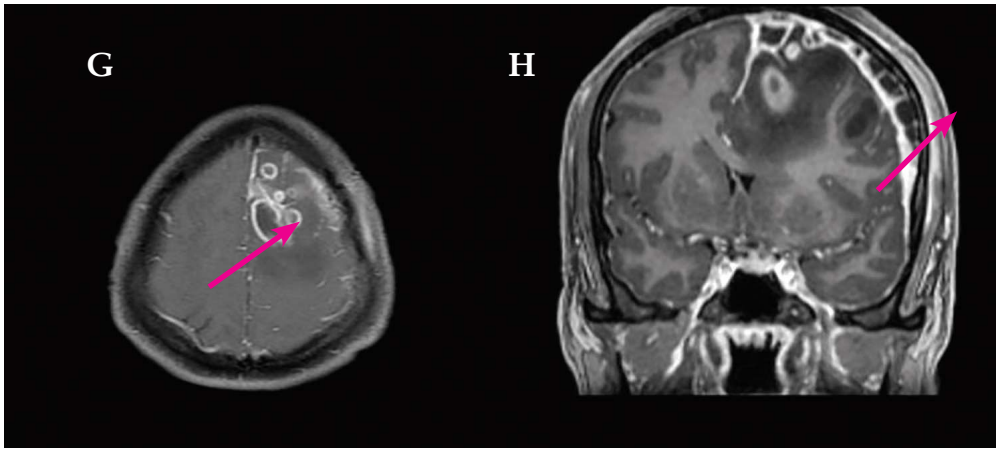

Fig. 9.4: (G) MRI brain with contrast showed Conglomerate peripheral rim enhancing lesions in left frontal lobe, **(H)** Multiloculated extra-axial collection with dural enhancement

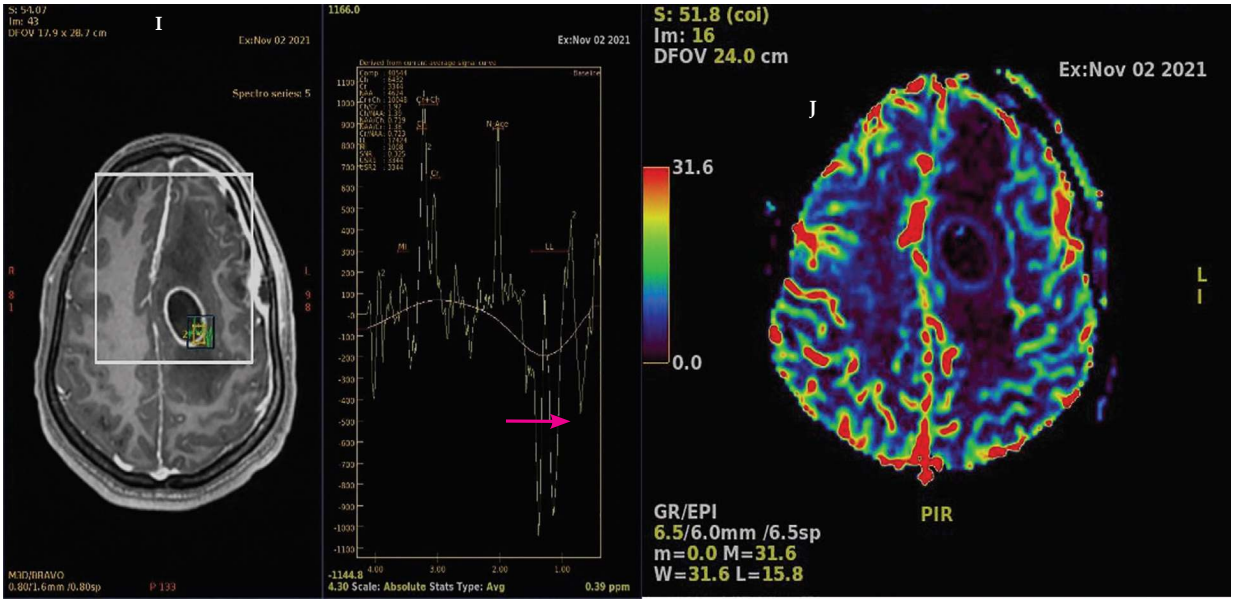

Fig. 5: (I) MR spectroscopy revealed large lipid-lactate peaks within the lesion **(J)** MR perfusion showed no increase in perfusion

Conflicts of interest

No Conflicts of Interest

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Ethics declaration

All the ethics followed to prepare the article

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