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A Case Series of Melioidosis: The great imitator in MAPIMS hospital, Melmaruvathur, Tamil Nadu, India

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Abstract

Background: *Burkholderia pseudomallei* is a saprophytic, aerobic, non-sporing, nonfermenting, facultative intracellular, motile, Gram-negative bacillus found in tropical and subtropical regions. Melioidosis can range from asymptomatic infection to life-threatening disease affecting the internal organs, particularly when host immunity is compromised. Delayed clinical presentation and lack of access to critical care resources in high-prevalence areas contribute significantly to this disease burden. This disease has a high case fatality rate in endemic areas. Written consent was obtained from the patients after the study was explained to them. This case series aimed to increase physicians' awareness of melioidosis in high-risk patients presenting with diverse clinical symptoms, thereby improving diagnostic accuracy and ensuring timely and appropriate treatment.

Case Presentation: Case series: Case 1: a 40-year-old male with septic pulmonary emboli; Case 2: a 72-year-old female with chronic obstructive pulmonary disease and Type II respiratory failure; Case 3: a 25-year-old female with septic arthritis; Case 4: a 69-year-old male with pneumonia and bacteraemia; and Case 5: a 54-year-old male with diabetic nephropathy and chronic kidney disease. Appropriate samples were collected from all cases, and identification of the isolated organisms and antibiotic susceptibility testing were performed using the VITEK 2 automated compact system. The patients were treated with appropriate supportive measures. Among the five cases, three had better outcomes, whereas two cases deteriorated.

Conclusion: This case series emphasizes that clinicians should be aware of the risk of melioidosis, particularly during the rainy season. Diagnostic testing should be improved to ensure timely detection and treatment.

Article Type: Case Series

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Introduction

Melioidosis, commonly known as Whitmore's disease, is an infectious disease that affects humans as well as animals. This disease is caused by *Burkholderia pseudomallei* (*B. pseudomallei*), a Gram-negative bacillus widely found in contaminated water and soil (1). Melioidosis is most commonly recognized as an acute respiratory illness. *B. pseudomallei* infection can cause a wide spectrum of symptoms, ranging from asymptomatic infection to local abscesses, lower respiratory tract infection, and severe disease (2). Melioidosis is a leading cause of life-threatening community-acquired pneumonia and septicaemia in endemic areas, with mortality rates of up to 44%. Pneumonia may be asymptomatic or may present as severe necrotizing disease (3). It has been a less suspected, underdiagnosed, and underreported disease in the Indian subcontinent, with approximately 1,550 of the total 1,700 cases (More than 90%) reported from India in the past 10 years (4). Melioidosis and diabetes mellitus may be correlated because diabetic individuals have impaired innate immunity, which is associated with poor glycaemic control. Acute cases of melioidosis with diabetes mellitus have shown a lower cellular adaptive immune response compared with acute melioidosis cases in non-diabetic patients (5). To our knowledge, this is the first series to describe complete recovery in three of the five cases. Detailed instructions were explained to the patients and attendants regarding this study, and written consent was obtained from the patients. This case series aims to raise physicians' awareness of melioidosis in high-risk patients exhibiting a range of symptoms, thereby improving the likelihood of accurate diagnosis and appropriate treatment.

Case Presentation

Case 1

On 17 September 2024, a 40-year-old male patient presented with complaints of fever and breathlessness for ten days, Grade II to III New York Heart Association dyspnoea, and giddiness for three days. He was on irregular medication for diabetes and hypertension. On examination, the patient was fair, conscious, oriented, febrile, and dyspnoeic. His pulse rate was 110 per minute, blood pressure was 100/60 mmHg, respiratory rate was 24/minute, and temperature was 102°C. On systemic examination, S1 and S2 were heard in the cardiovascular system, with a loud P2, and bilateral air entry was present in the respiratory system. On investigation, the electrocardiogram showed sinus tachycardia, 2D ECHO showed dilated RA and RV, and computed tomography pulmonary angiography showed pulmonary embolism (Figure 1). The case was diagnosed as septic pulmonary emboli. A blood sample was sent for culture and sensitivity, which showed a positive flagged blood culture. Gram staining showed Gram-negative bacilli, and *B. pseudomallei* was identified using the automated VITEK 2 compact system (bioMérieux), with AST (Table 1). Treatment was started with meropenem 1 gm IV TDS, ionotropic support, antithrombotic drugs, and other supportive measures. Despite the above treatment, the patient began to deteriorate and expired on the 7th day of treatment.

Case 2

A 72-year-old female patient was brought to the hospital on 4 October 2023 with complaints of acute-onset breathlessness, Grade II to III New York Heart Association dyspnoea for one week, which was progressive,

fever on and off not associated with chills and rigor, and cough with expectoration of yellowish sputum. She was a known case of chronic obstructive pulmonary disease and diabetes and was on irregular medication. On examination, the patient was conscious, oriented, obese, and tachypnoeic. Her pulse rate was 103 beats/minute, blood pressure was 130/80 mmHg, respiratory rate was 26/minute, and temperature was 100°C. On systemic examination, S1 and S2 were heard in the cardiovascular system; bilateral air entry was present in the respiratory system, bilateral wheeze was present, and scattered crepitations were heard. On investigation, chest X-ray PA showed hyperinflated lung fields and multiple opacities suggestive of consolidation, and HRCT showed features of consolidation (Figure 1). This case was diagnosed as COPD and Type II respiratory failure. A sputum sample was sent for culture and sensitivity. Gram staining showed Gram-negative bacilli, and the isolated organism was identified as *B. pseudomallei* using the automated VITEK 2 compact system (bioMérieux), with AST (Table 1). Treatment was started with meropenem 1 gm IV TDS, non-invasive ventilation support, and other supportive measures. The patient began to improve on the fifth day of treatment, and a maintenance dose of cotrimoxazole was given for two months.

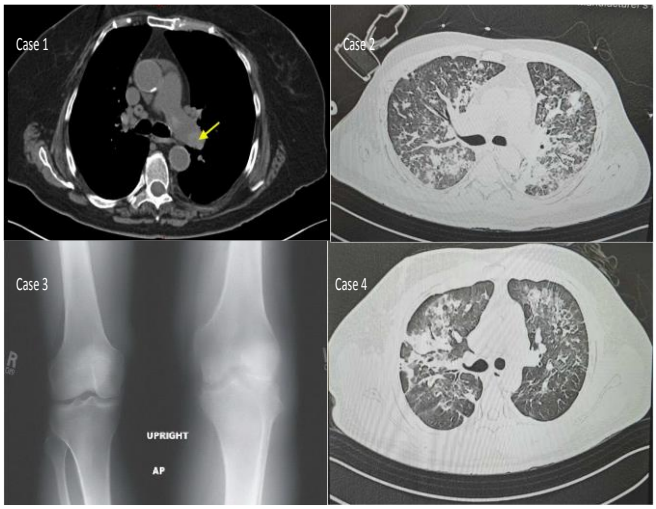


Figure 1. Radiological findings of patients: Case 1: Computed tomography pulmonary angiography showing pulmonary embolism; Case 2: HRCT showing features of consolidation; Case 3: X-ray of the right knee showing soft tissue swelling, edema, and capsular distension; Case 4: HRCT showing ground-glass opacity, consolidation, and interlobar septal thickening.

Case 3

On 19 October 2023, a 25-year-old female patient presented with a history of swelling over the right knee for the past two weeks. She had a history of a road traffic accident two months earlier and had sustained a patellar fracture, which was treated conservatively. She also had native treatment one month earlier. She had no history of comorbid disease. On examination, the patient was conscious, oriented, and febrile. Her pulse rate was 108 bpm, blood pressure was 100/70 mmHg, and temperature was 100°F. On systemic examination, S1 and S2 were heard in the cardiovascular system, and bilateral air entry was present in the respiratory system. On local examination, there was acute local inflammation over the right knee, which was warm and tender. On investigation, the count was elevated, and X-ray of the right knee showed soft tissue swelling, edema, and capsular distension (Figure 1). This case was diagnosed as septic arthritis. An aspirated pus sample was sent for culture and sensitivity, and *B. pseudomallei* was identified using the automated VITEK 2 compact system (bioMérieux), with AST (Table 1). Treatment was started with ceftazidime 2 g IV twice daily for two weeks, and other supportive measures were given. The patient's prognosis began to improve, and a maintenance dose of doxycycline was given for 1 month. The patient recovered from the infection and was discharged.

Case 4

On 25 December 2023, a 69-year-old male patient presented with complaints of cough with expectoration for the past ten days, a history of breathlessness, and fever for five days. He was a known case of diabetes on regular medication. On examination, the patient was conscious, oriented, and febrile. His pulse rate was 110 beats/minute, blood pressure was 100/80 mmHg, respiratory rate was 28/minute, and temperature was 100.6°F. On systemic examination, S1 and S2 were heard in the cardiovascular system. In the respiratory system, bilateral air entry and bronchial breath sounds were present, and right lower crepitations were heard. On investigation, leucocytosis was present; chest X-ray showed right lower lobe pneumonia with consolidation. HRCT showed ground-glass opacity, consolidation, and interlobar septal thickening (Figure 1), and the case was diagnosed as pneumonia and bacteremia. A sputum sample was sent for culture and sensitivity, which showed *B. pseudomallei* using the automated VITEK 2 compact system (bioMérieux), with AST (Table 1). Treatment was started according to sensitivity with meropenem 1 gram IV three times daily, and supportive measures were given. The patient began to improve after seven days, and a maintenance dose of cotrimoxazole was given for two months. The patient recovered from the infection.

Case 5

On 5 January 2024, a 54-year-old male patient presented with fever for the past two weeks, associated with chills and rigors, and decreased urine output for one week. He had been on irregular medication for diabetes and hypertension for 15 years. On examination, the patient was conscious, oriented, and febrile, with mild dehydration. His pulse rate was 113 beats per minute, blood pressure was 130/80 mmHg, and temperature was 103°F. On systemic examination, S1 and S2 were heard in the cardiovascular system, bilateral air entry was present in the respiratory system, and abdominal examination showed colic and suprapubic tenderness. Investigations showed elevated WBC, urine routine protein +++, blood urea of 158 mg/dL, and serum creatinine of 12.1 mg/dL. Ultrasonography showed multiple simple cysts. The case was diagnosed as diabetic nephropathy and chronic renal failure. A urine sample was sent for culture and sensitivity, and *B. pseudomallei* was identified using the automated VITEK 2 compact system (bioMérieux), with AST (Table 1). The patient was treated with meropenem 1 gram IV three times daily, underwent hemodialysis, and received supportive measures. After five days of treatment, the patient collapsed into cardiac arrest and died.

Table 1. Antibiotic sensitivity pattern of isolates

Case	Antibiotic						
	Ceftazidime	Imipenem Meropenem	Clotrimazole	Ciprofloxacin	Gentamicin	Polymyxin B	Tetracycline
1	S	S	R	I	R	R	S
2	S	S	S	R	S	R	S
3	S	S	S	S	S	R	S
4	S	S	R	S	S	R	R
5	S	S	S	R	R	R	R

S, Sensitive; I, Intermediate; R, Resistant.

Discussion

Melioidosis, caused by *B. pseudomallei*, is a potentially severe infectious disease that remains underdiagnosed and underreported in regions outside its endemic areas. This under recognition can be attributed to a combination of factors, including lack of awareness among healthcare professionals, insufficient diagnostic facilities, and clinical overlap with other diseases that present with similar symptoms. As a result, melioidosis is often misidentified, leading to delayed diagnosis and suboptimal patient outcomes.

One of the key reasons melioidosis is underrecognized is its diverse clinical presentation. It can range from asymptomatic infection to localized abscesses, severe respiratory illness, and even disseminated disease affecting multiple organs (2). The varied symptoms make it challenging to diagnose without a high level of suspicion, particularly in areas where the disease is not endemic. Moreover, *B. pseudomallei* shares many clinical features with common bacterial infections, particularly those caused by *Pseudomonas* species, which are often considered environmental contaminants. Consequently, healthcare providers may overlook melioidosis, particularly in cases where the clinical presentation does not immediately indicate the disease. In our case series, participants received this information in a language they could understand, both verbally and in written form. Four cases had diabetic comorbidities. Among these four cases, two cases (Case 2 and Case 4) had controlled glycaemic levels, whereas the other two cases (Case 1 and Case 5) had uncontrolled glycaemic levels. All cases were sensitive to carbapenem; resistance to carbapenem is rare in this organism. Male patients were predominant.

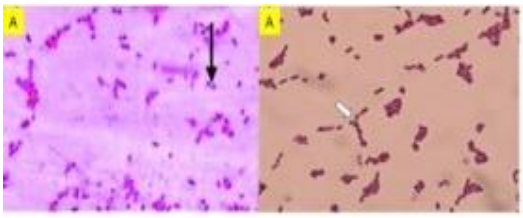
The diagnostic challenges associated with melioidosis are multifaceted. *B. pseudomallei* is a Gram-negative, oxidase-positive bacillus that exhibits a characteristic "safety pin" pattern on Gram staining. However, it is often misidentified as other environmental or commensal bacteria, such as *Pseudomonas cepacia*, *B. thailandensis*, or *P. stutzeri*. The organism grows well on standard culture media. Nutrient agar shows grey, dry, wrinkled colonies; 5% sheep blood agar plates show nonhemolytic colonies; and MacConkey agar shows non-lactose-fermenting colonies. It is catalase-positive, oxidase-positive, urease-negative, indole-negative, and citrate-negative; triple sugar iron shows alkaline/alkaline reactions with no gas and no acid; and PDA is negative. This organism ferments arabinose, arabitol, dulcitol, fructose, galactose, glucose, mannose, sucrose, ribose, and trehalose, and does not ferment lactose, maltose, rhamnose, tartrate, or xylose. In Moller base decarboxylase testing, arginine and ornithine are dehydrolysed (7) (Figure 2 (A-G)).

Despite these distinctive characteristics, *B. pseudomallei* is frequently overlooked, particularly because its colonies are sometimes mistaken for non-pathogenic environmental organisms. Blood and tissue cultures, which are typically used to diagnose melioidosis, have relatively low sensitivity, contributing to the initial misdiagnosis in nearly 40% of cases. The limitations of conventional diagnostic techniques, such as low discriminatory power in automated systems like VITEK 2, further complicate accurate identification, especially in regions with limited resources or technical expertise (6,7). In addition to diagnostic issues, melioidosis is more common among certain populations, particularly individuals with poorly controlled diabetes and those with chronic kidney disease or immunocompromised states. In the Indian subcontinent, where diabetes is highly prevalent, *B. pseudomallei* infects a significant number of patients with underlying chronic conditions. This highlights the need for heightened awareness in areas with a high burden of diabetes and other risk factors. Indeed, in countries such as India, Sri Lanka, and Bangladesh, up to 80% of patients with melioidosis have diabetes. The association between uncontrolled diabetes and melioidosis underscores the importance of maintaining good glycaemic control to reduce the risk of infection, particularly in endemic areas (6,8,9).

Treatment of melioidosis is complicated by the organism's resistance to several antibiotics, including penicillin, ampicillin, and first- and second-generation cephalosporins. However, *B. pseudomallei* is generally susceptible to carbapenems, tetracyclines, trimethoprim-sulfamethoxazole, and third-generation cephalosporins. Carbapenems, in particular, remain a cornerstone in the treatment of severe melioidosis, although resistance to these drugs is rare. The increasing availability of more effective diagnostic tests, including molecular techniques and automated systems, has led to earlier detection and treatment, significantly improving patient outcomes. However, a key challenge remains the underdiagnosis of the disease, especially in non-endemic regions where physicians may not routinely consider it in the differential diagnosis (8-10).

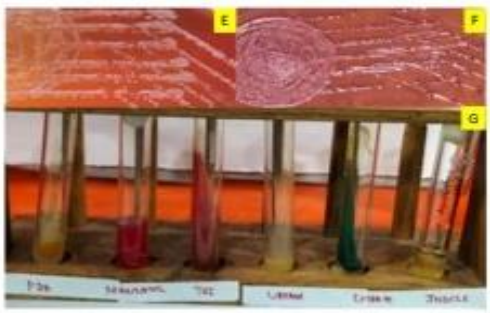
Prevention of melioidosis is an ongoing challenge, particularly because the organism is commonly found in soil and surface water in endemic regions. Individuals with risk factors such as diabetes, skin lesions, or immunocompromised conditions should avoid contact with contaminated soil and stagnant water. In agricultural settings, wearing boots and protective clothing while working in fields can reduce the risk of infection. In healthcare settings, stringent infection control measures are essential to prevent laboratory-acquired infections. Plates should be taped shut during incubation. "Sniffing" of plates should not be performed because they may contain this organism. Healthcare workers handling blood or body fluids should use appropriate personal protective equipment, such as gloves and gowns, and should exercise caution when handling specimens that may contain *B. pseudomallei* (7).

The lack of a vaccine for melioidosis further complicates prevention efforts. As the disease remains endemic in regions with high humidity and rainfall, the focus should be on public health strategies aimed at increasing awareness and improving the diagnostic capacity of healthcare facilities. Early detection and prompt treatment, alongside improved surveillance systems, are critical to reducing the burden of melioidosis in endemic regions (6,10).



A, Gram stain of *Burkholderia pseudomallei*

B, Automated VITEK 2 compact system; **C**, Sputum sample; **D**, Blood sample in blood culture bottle



E, Colonies in 5% sheep blood agar; **F**, MacConkey agar; **G**, Biochemical reactions

Figure 2. (A-G): Microbiological Investigations

Conclusion

This case series highlights that melioidosis is an underrecognized infectious disease that presents significant diagnostic and treatment challenges. The disease's diverse clinical manifestations, coupled with the limitations of current diagnostic methods, contribute to its underdiagnosis, particularly in non-endemic areas. Increased awareness among healthcare professionals, enhanced diagnostic capabilities, and better management of underlying risk factors, such as diabetes, are crucial for improving patient outcomes. Public health efforts must focus on increasing awareness, improving diagnostic infrastructure, and implementing preventive measures to mitigate the impact of melioidosis in endemic regions.

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None.

Ethical Statement

Written informed consent was obtained from the patients.

Conflicts of Interest

None.

Author Contributions

Dr. Arulananthi Venkataraman Arumugam and Dr. Sabarinathan Thiyagarajan conceived the presented idea. Dr. Arulananthi Venkataraman Arumugam and Dr. Sabarinathan Thiyagarajan verified the microbiological methods. Dr. Saleem Mohamed Ali encouraged the investigation and supervised the findings of this work. All authors discussed the results and contributed to the preparation of the final manuscript.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Use of Artificial Intelligence

The authors declare that no AI-assisted technologies were used in the generation of text, data analysis, image creation or manuscript preparation.

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