Unmasking the Lurking Threat: A Rare Case of Melioidosis

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Summary

Melioidosis, caused by Burkholderia pseudomallei, is a rare but life-threatening infectious disease. Neurological involvement is uncommon but presents diagnostic challenges due to non-specific imaging findings and negative cultures. A 10-year-old female from Chennai (Tamil Nadu, India), presented with fever, cough, and bilateral upper extremity paralysis, which later progressed to involve the lower limbs. She had a history of recent treatment with Ceftriaxone following a reactive Widal test. Diagnosis was delayed due to multiple negative cultures from bodily fluids and non-specific radiological findings. Cerebrospinal fluid analysis was suggestive of infection, and gram staining of a brain biopsy specimen revealed gram-negative rods with a characteristic 'safety pin' morphology, confirming B. pseudomallei infection. The patient received targeted antibiotic therapy and intensive medical care. Despite severe complications, she demonstrated clinical improvement and survived. Neurological melioidosis should be considered in cases of unexplained neurological deterioration, particularly in endemic regions or travellers from such areas. Early recognition and appropriate antimicrobial therapy are crucial for improving outcomes.

Key words: Neurological melioidosis, Burkholderia pseudomallei, Safety pin morphology

Melioidosis is an infectious pathology instigated by the bacterium *Burkholderia pseudomallei*, which is commonly located in terrestrial and aquatic environments in Southeast Asia and northern Australia (Raja et al, 2005; Vidyalakshmi et al, 2007). The disease exhibits an extensive spectrum of clinical presentations, thereby complicating the diagnostic process (Jesudason et al, 2003). Presented below is a comprehensive case report that exemplifies the intricacies associated with melioidosis.

Need of the study: Neurological melioidosis is a rare but severe manifestation of infection caused by *Burkholderia pseudomallei*, primarily found in tropical and subtropical regions (Viswaroop et al, 2007). While melioidosis commonly affects adults with underlying conditions like diabetes, its occurrence in previously healthy children is unusual and often misdiagnosed (Noyal et al, 2009). This case report highlights the need for increased clinical suspicion, early diagnosis, and timely intervention to prevent morbidity and mortality in paediatric patients. Documenting such rare presentations helps in guiding clinical practice and raising awareness, especially in endemic regions (Vidyalakshmi et al, 2007).

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Review of Literature

Melioidosis, first described in 1911, is caused by the gram-negative bacterium *Burkholderia pseudomallei* (Raja et al, 2005). It is predominantly found in Southeast Asia and northern Australia but has also been reported in parts of India (Vidyalakshmi et al, 2007). Neurological involvement occurs in approximately 4 percent of all melioidosis cases, presenting as brain abscesses, encephalitis, meningitis, and cranial nerve palsies (Cheng et al, 2004). Children are less frequently affected than adults, and diagnosis is challenging due to its mimicry of conditions such as tuberculosis or viral encephalitis (Noyal et al, 2009). MRI and cultures are key diagnostic tools (Mukhopadhyay et al, 2007), and mortality rates are high if not treated early with appropriate antibiotics such as ceftazidime or meropenem (Sookpranee et al, 1992; Cheng et al, 2004).

Prevalence

Globally, melioidosis is endemic in Southeast Asia (Thailand, Malaysia, Singapore) and northern Australia (Raja et al, 2005). In these regions, protocols for early detection and treatment are better established (Cheng et al, 2004). Studies from Australia indicate a higher rate of central nervous system involvement in children, emphasising the pathogen's neurotropic potential (Cheng et al, 2004). Climate change and increased travel have

contributed to the emergence of melioidosis in non-endemic regions such as the Americas and parts of Africa (Vidyalakshmi et al, 2007).

Indian scenario: In India, melioidosis is considered underreported due to limited diagnostic resources and lack of awareness (Vidyalakshmi et al, 2007). Southern and Eastern regions such as Tamil Nadu, Kerala, and Odisha have reported sporadic outbreaks (Mukhopadhyay et al, 2008). Pediatric neurological melioidosis is rarely documented, and many cases go misdiagnosed as tuberculous meningitis or cerebral malaria (Noyal et al, 2009). Awareness among paediatricians and inclusion of melioidosis in differential diagnosis in encephalitic illnesses is crucial, especially in endemic areas and post-monsoon periods (Cherian et al, 1996).

Epidemiology and risk factors: *B. pseudomallei* is an environmental saprophyte endemic to Southeast Asia and northern Australia (Raja et al, 2005). It thrives in soil and water, primarily infecting individuals through direct contact, inhalation, or ingestion (Mukhopadhyay et al, 2008). While diabetes mellitus, chronic renal disease, and immunosuppression are well-known risk factors for severe melioidosis (Viswaroop et al, 2007), the index patient was previously healthy, emphasising the importance of maintaining a high degree of suspicion even in immunocompetent individuals from non-endemic areas (Noyal et al, 2009).

Clinical Manifestations and Diagnostic Challenges

Melioidosis exhibits a broad clinical spectrum, ranging from asymptomatic colonisation to severe sepsis and fulminant organ involvement (Jesudason et al, 2003). Neurological melioidosis, as seen in this case, is rare and often presents with encephalomyelitis, abscess formation, or brainstem dysfunction (Cheng et al, 2004). The diagnostic complexity was exacerbated by multiple negative cultures and non-specific imaging findings. Advanced microbiological techniques, such as PCR and MALDI-TOF mass spectrometry, may aid in early identification of *B. pseudomallei* (Mukhopadhyay et al, 2008).

Management and Treatment Considerations

Melioidosis requires a prolonged and staged treatment regimen to achieve successful outcomes. The intensive phase consists of intravenous antibiotics, typically ceftazidime, meropenem, or imipenem, followed by an eradication phase using oral trimethoprim-sulfamethoxazole to prevent relapse (Sookpranee et al, 1992; Cheng et al, 2004; Walsh et al, 1995). In severe or CNS cases, carbapenems such as imipenem or meropenem have demonstrated superior CNS penetration and efficacy (Cheng et al, 2004).

Case Report

A 10-year-old female child from Chennai, India, presented with fever, cough and both upper extremities paralysis initially, then lower extremities started paralysis. Two months prior, she was treated for fever with Ceftriaxone after a reactive Widal test. Despite initial treatment, her symptoms persisted and worsened over the past week, leading to his admission for further management.

Examination Findings

Overall appearance: The patient looked dehydrated, toxic, and feverish (102). Vital Signs: heart rate was 128 beats per minute, respiratory rate was 50 beats per minute, and blood pressure was 90/70 mm Hg.

Respiratory system: Bilateral crackles and bronchial breath sounds were detected on the left side.

Abdomen: Free no fluid, mild splenomegaly.

Musculoskeletal system: The right knee was swollen, and both ankles were erythematous and edematous.

Laboratory Investigations (Table 1)

Haematological and biochemical parameters: Multiple parameters were deranged (specific values not provided).

Table 1: Baseline investigations

Haemoglobin	10.7
TLC	9.86
Platelets	155
Urea	40
Creatinine	0.9
PT/INR	11.8/1.25
S. bilirubin	1.5
SGOT	32
SGPT	45
Albumin	1.5
Blood sugar	100
Procalcitonin	0.98

Imaging Results

Chest X-ray showed homogeneous consolidation in the left upper lobe and diffuse alveolar opacities in the remaining lung fields (Fig 1). The ultrasound revealed mild bilateral pleural effusion, mild ascites, and enlarged spleen without focal lesions or organomegaly (Fig 2). Brain biopsy results are depicted in Fig 3.

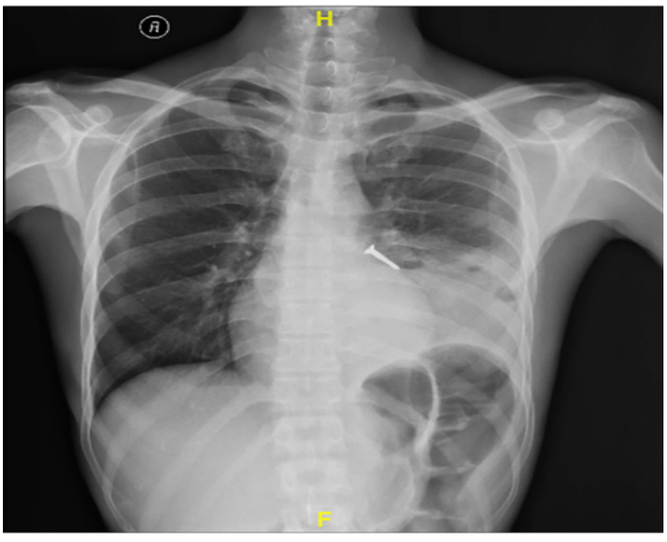

Fig 1: Consolidation is seen in the left upper lobe and diffuse alveolar opacities in other lung regions.

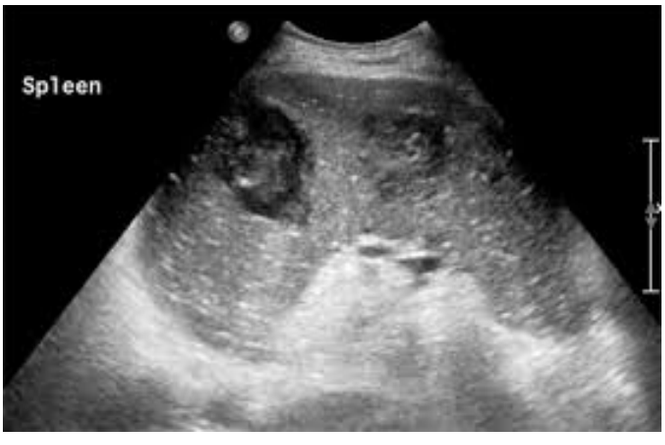

Fig 2: Ultrasound showing mild bilateral pleural effusion, mild ascites, and enlarged spleen without focal lesions or organomegaly.

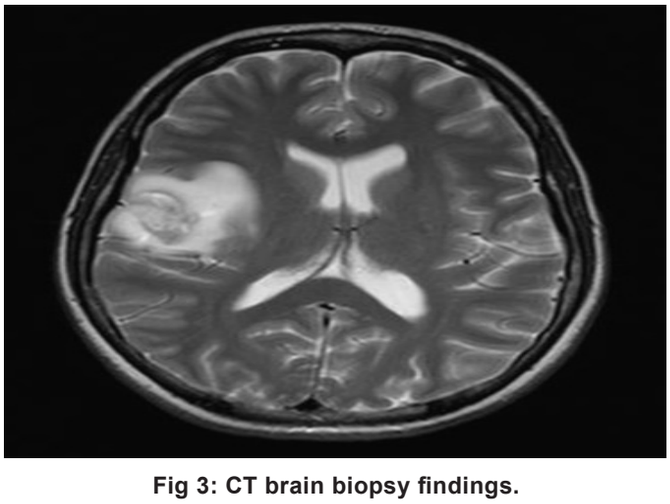

Fig 3: CT brain biopsy findings.

Brain biopsy results: The biopsy of the parietal lesion indicated the presence of brain parenchyma with multiple abscesses, devoid of any mitotic tissue. Cultures yielded no growth. Following several episodes of generalised seizures, Levetiracetam was introduced, and the antitubercular therapy (ATT) was adjusted. After two weeks, the patient began to show signs of improvement; her fever decreased, seizures diminished, and she was able to walk with minimal assistance.

Clinical Course

After admission, the patient's condition worsened, leading to the development of acute respiratory distress syndrome (ARDS), with oxygen saturation levels plummeting to 78 percent. She was subsequently intubated and placed on mechanical ventilation. Empirical antibiotic treatment with Piperacillin/Tazobactam and Clindamycin was commenced.

Microbiological findings: Blood cultures identified Burkholderia pseudomallei, confirming a diagnosis of melioidosis. The organism demonstrated sensitivity to Imipenem.

Treatment and Outcome

The antibiotic regimen was modified to include Imipenem. Over time, the patient exhibited clinical improvement and was successfully weaned off the ventilator. She completed the intensive phase of antibiotic treatment and was discharged with a plan for extended eradication therapy.

Nurses' responsibilities: Nurses play a pivotal role in the management of children with neurological melioidosis. Their responsibilities include:

Early recognition and reporting: Identifying unusual symptoms (e.g., seizures, altered sensorium) and promptly reporting to physicians.

Infection control: Implementing standard precautions to prevent nosocomial infections, especially in ICU settings.

Medication administration: Ensuring timely and correct administration of intravenous antibiotics like ceftazidime, meropenem.

Monitoring and supportive care: Frequent neurological assessments, monitoring for signs of raised intracranial pressure, and managing fever, seizures, or altered consciousness.

Family education and support: Explaining the disease process, treatment plan, and prognosis to caregivers in a compassionate manner.

Documentation: Accurate recording of clinical observations, interventions, and responses to therapy for medico-legal and continuity-of-care purposes.

Stages of nursing process are outlined in Table 2.

Table 2: Stages involved in nursing process

Nursing process step	Findings / assessment	Nursing diagnoses (NANDA)	Evidence-based interventions	Rationale	Evaluation / Outcome
Assessment	Child with fever 102 °F, seizures, paralysis, SpO_2 78%, albumin 1.5 g/dL	—	Continuous neuro, respiratory, and haemodynamic monitoring; fluid balance charting	Early detection of deterioration	Deterioration identified promptly; timely interventions
Diagnosis 1: Ineffective airway clearance r/t ARDS and neurological compromise	RR 50/min, mechanical ventilation	Maintain airway patency and oxygenation	Suction PRN, oral care q4h, ventilator bundle (HOB 30°, subglottic suction), administer prescribed O_2	Reduces VAP risk, improves oxygenation	SpO_2 maintained >92%, no VAP
Diagnosis 2: Risk for infection spread r/t invasive devices and immunocompromise	Central line, ET tube	Prevent nosocomial infection	Strict hand hygiene, aseptic line care, barrier precautions	Prevents secondary infection	No new infection acquired
Diagnosis 3: Impaired physical mobility r/t paralysis of limbs	Weakness in upper & lower limbs	Promote mobility & prevent complications	Passive ROM q4h, splinting, pressure-relieving mattress	Prevent contractures & pressure injury	No pressure ulcers; improved movement
Diagnosis 4: Knowledge deficit in caregivers r/t rare disease & prolonged therapy	Parents are unaware of eradication therapy	Provide education	Explain disease, antibiotic schedule, relapse risk, follow-up plan; give written instructions	Ensures adherence & relapse prevention	Parents verbalise understanding; adhere to follow-up
Diagnosis 5: Risk for nutritional deficit r/t high metabolic demand & low albumin	Albumin 1.5 g/dL, poor oral intake	Support nutritional needs	High-protein diet, enteral feeding if needed, albumin infusion per order	Promotes healing & immune function	Weight stabilised; albumin improved

Learning Points

This case underscores several critical aspects of neurological melioidosis:

1. *Diagnostic vigilance* – Melioidosis should be considered in patients with neurological symptoms and unexplained infectious syndromes, especially in endemic regions. Negative cultures do not rule out the disease, and additional diagnostic modalities should be pursued.
2. *Multisystem involvement* – The presentation of pulmonary, musculoskeletal, and neurological symptoms suggests disseminated infection, requiring comprehensive evaluation and management.
3. *Early antimicrobial optimisation* – The use of carbapenems in severe cases significantly improves outcomes, and treatment must be prolonged to prevent relapse.
4. *Severe disease potential* – The risk of ARDS and multi-organ dysfunction necessitates intensive monitoring and aggressive supportive care in critically ill patients.

Despite the delayed diagnosis and severe disease course, the patient survived due to the timely escalation of therapy, illustrating the importance of recognising and managing neurological melioidosis effectively. Future advancements in rapid diagnostic testing may help in earlier detection and better clinical outcomes.

Conclusion

This case emphasises the need to document the occurrence of melioidosis in India. The diagnosis was likely overlooked due to insufficient clinical awareness and inadequate microbiological identification. A high level of suspicion is essential for diagnosis, given the varied clinical presentations. Additionally, this case underscores the necessity for enhanced microbiology services in patient care management. Successful treatment was achieved through the administration of appropriate antimicrobials based on the identified pathogen.

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