Aquatic to pulmonary: Severe melioidosis following near-drowning from Southern India
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Citation

Abstract
Melioidosis is a known emerging infectious disease in India. Pulmonary melioidosis presents as acute fulminant septicemia, subacute illness, chronic infection, or subclinical disease. Aspiration of water containing bacteria is an unique mode of transmission, which can give rise to pulmonary melioidosis with or without septicaemia. The two unique presentations of pulmonary melioidosis in non-diabetic patients were documented following fresh water drowning and aspiration of water. They had different clinical and radiological presentation, course of illness, and outcome, although the source of infection was similar. One of the patient succumbed to septicemic shock while the other survived with the adequate treatment. Melioidosis was never the differential diagnosis in both the cases. It shows the urgency of the disease to be highlighted in this part of the world, especially among the clinicians and microbiologists, so every similar episode of drowning might be complimented by the work up of melioidosis and managed as critical.

BACKGROUND
Melioidosis is now a known emerging infectious disease in India. Several cases have been reported in last few years and the number seems to be increasing with each passing year (1-6). The disease presentation varies from asymptomatic to acute and fatal manifestations. Pneumonia is the most common presentation in approximately half of all cases, but there is a great clinical diversity, from localized skin ulcers or abscess to fulminated sepsis with multiple abscesses in various organs. The most important risk factors for melioidosis are diabetes, alcohol excess and renal disease, (7-10). Burkholderia pseudomallei, the causative agent is a saprophyte, inhabiting moist soils and pooled surface water. Contact with soil mostly occupational and surface water in the environment is an important factor contributing to the disease development. The modes of acquisition are commonly percutaneous inoculation or inhalational routes (11). Pulmonary melioidosis involving the lungs presents as acute fulminant septicemia, subacute illness, chronic infection, or even as a subclinical disease (12). Most of the cases are either misdiagnosed or underdiagnosed in this part of India due to low index of suspicion. We report the first two non-diabetic cases of severe pulmonary melioidosis following fresh water drowning and subsequent aspiration as the mode of acquisition of this disease from our institution.

CASE PRESENTATIONS
CASE 1: A 55-y-old lady, working as manual laborer, with no pre-morbid illness, slipped accidentally into the riverside pond while washing clothes on a cyclone hit rainy day. She was immediately resuscitated and managed at a local hospital as a case of near drowning. She developed high-grade fever with chills, breathlessness, chest pain with reduced urine output 6 days after the drowning episode. She was admitted as a referral case to our tertiary care hospital with altered mentation, tachycardia, tachyapnoea, cyanosis, and bilateral lung crepitations. She was mechanically ventilated due to poor oxygen saturation and was started on intravenous piperacillin-tazobactum, ciprofloxacin, azithromycin and metronidazole. Investigations revealed platelet count of 83,000/cmm, WBC 5,800/cmm with left shift, toxic granulations and band forms. Renal function tests were normal. Liver parameters were within normal range except raised alkaline phosphatase (211 IU/l) and LDH (282 U/l).

Chest X-ray showed bilateral fluffy infiltrates suggestive of ARDS. Blood culture grew B. pseudomallei after 48 hours in BacT Alert automated system. The isolate was sensitive to amoxicillin-clavulanic acid, cefazidime, co-trimoxazole, imipenam and resistant to ciprofloxacin and gentamicin. However, patient rapidly progressed to septicemic shock and succumbed to illness within 2 days of ICU admission.
Autopsy findings of the lung revealed pneumonia, oedema, venous congestion along with hepatic venous congestion; lung tissue showed numerous Gram-negative bacilli with typical safety-pin appearance. The case was diagnosed as septicemic pulmonary melioidosis with a rapid fulminating course due to near drowning.

CASE 2: Eight months after the presentation of the first case, a 26-y-old manual laborer, with no pre-morbid illness was admitted with cough, white expectoration, left sided chest pain and breathlessness accompanied by high grade fever with chills. There was no history of cardiac involvement, asthma or tuberculosis. Upon interrogation he recollected the episode of nearly five-minutes underwater immersion in a river 20 days ago while carrying out the funeral rituals of his father, which mildly chocked him. Further investigation revealed that this river was the same as encountered by our previous patient. On examination, he was tachypnoic and he had decreased chest movements and breath sounds with coarse crepitations on the left side. Investigations revealed a normal leucocyte count with elevated ESR (83 mm/h). Chest x-ray showed a large hydro pneumothorax. Intercostal drainage of pus grew B. pseudomallei in culture, that was sensitive to amoxicillin-clavulanic acid, cotrimoxazole, ceftazidime, imipenem and resistant to amikacin, ciprofloxacin and gentamicin. Initial empirical therapy of amoxicillin-clavulanic acid was replaced with ceftazidime. USG abdomen also supported left sided pleural effusion with underlying consolidation. He made a remarkable recovery as fever spikes touching base line and drain fluid decreasing in amount over a week. Blood culture remained sterile for 7 days. Other supportive therapy was continued. After hospitalization for 2 weeks he was discharged with oral cotrimoxazole for the next 20 weeks. The final diagnosis was left pyopneumothorax with bilateral pneumonia due to melioidosis.

**DISCUSSION**

Melioidosis is an endemic disease in South east Asia and Northern Australia, and now is increasingly encountered in Indian subcontinent also (1-6). It may present as acute, subacute or chronic form of pulmonary, suppurrative or septicemic disease (12). Infections occurring after near drowning accidents are well recognized. Aspiration of water containing bacteria initiates a rapidly progressive pulmonary disease (13, 14). The route of _B. pseudomallei_ infection is at least one of the factors that influence disease severity and outcome, thus contributing to broad spectrum of clinical disease (15, 16). Similarly extreme weather events like heavy rainfall and monsoon winds have resulted in more severe cases of inhalational melioidosis (17).

In the episodes of drowning, pulmonary infection is an important factor determining prognosis of victims (18). Melioidosis was not a differential diagnosis in both of our cases of lung involvement following near drowning and underwater submersion. First case had typical features of downhill course of sepsis with multiorgan dysfunction, shock, respiratory failure and a fatal outcome. Amount of water aspirated and time spent underwater explains the disease severity and rapid progression to septicemic pneumonia with ARDS. Available information on clinical epidemiology of melioidosis supports high fatality in such presentations (19,20).

However, second patient had minimum aspiration and progressed to non-bacteremic pneumonia with pyopneumothorax. Radiologically isolated pleural effusion or pneumothorax is relatively rare in pulmonary melioidosis (12). This may not be true, however, in all cases as evidenced by studies on melioidosis in Tsunami survivors following drowning episodes that showed pyo or pneumothorax as an usual finding (19).

Interestingly, both the patients hailed from the same district and had aspirated water from the same river, Tunga. Fatal outcome in our former case was during heavy monsoon while latter was in dry season. Striking features in both of these cases is the lack of predisposing factors and any external wound as seen in most of published reports on melioidosis. The disease acquired through aspiration after near drowning has been associated with short incubation period and severe presentation. First case was seen during peak of monsoon in July where the floods and washing of surface water might have increased the bioload in aspirated water directly contributing to disease severity. Successful outcome in the second case could be ascribed to early case detection and antimicrobial management with amoxicillin-clavulanic acid following high suspicion. Appropriate clues of choking while dipped into water with absence of any predisposing factors might also have attributed to right diagnosis.

Increased reporting from several tertiary care centers in India, especially from the southern part, rises an alarm among clinical microbiologists and physicians to suspect melioidosis with varied manifestations. Much needs to be explored about possible environmental sources and modes of acquisition of _B. pseudomallei_ in Indian subcontinent.
CONCLUSION

Pulmonary melioidosis must be considered as one of the differential diagnosis in patients presenting with history of aspiration, choking or accidental immersion in water at places of increasing isolation of B. pseudomallei. Successful outcome depends on appropriate therapy initiated early as melioidosis differs from other Gram-negative infections in terms of antibiotics and treatment duration. High index of suspicion helps to arrive at the accurate diagnosis and management which will bring down the mortality.

LIST OF ABBREVIATIONS:

LDH: lactate dehydrogenase  
ICU: intensive care unit  
ESR: erythrocyte sedimentation rate  
USG: ultrasonogram

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References

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