Paediatric melioidosis with septic shock in a previously-well child

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ABSTRACT

We present a previously-healthy 12-year-old girl from a rural community and who was admitted to a district general hospital in Malaysia with coagulopathy and septic shock. Despite receiving intensive care, she succumbed to her illness. Blood cultures grew *Burkholderia pseudomallei*. Melioidosis is an unusual cause of paediatric Gram-negative sepsis among children in Malaysia.

Keywords: *Burkholderia pseudomallei*, melioidosis, septicaemia, septic shock

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INTRODUCTION

Melioidosis is an uncommon cause of Gram-negative septicaemia in children. Although uncommon in the West, this condition has been well recognised in Australasia. This condition usually occurs as a chronic infection in an immunocompromised patient. We present a case of acute melioidotic septicaemia in a previously-well child, resulting in a serious outcome.

CASE REPORT

A 12-year-old Malay girl was admitted to the intensive care unit with a history of fever for six days. This was associated with abdominal pain, vomiting, diarrhoea and increasing difficulty in breathing. The child was previously well and lived with her parents in a nearby farming community. She had no prior medical illness and had been thriving. Her immunisations were up-to-date. On admission, she was noted to be cyanosed with poor perfusion, confused and afebrile. Her blood pressure was unrecordable and she was tachycardic. Auscultation of the lungs, heart and abdomen were unremarkable. She had severe metabolic acidosis (pH 6.93; pCO_2 32 mmHg; pO_2 29mmHg; HCO_3 6 mmol/L; BE 27 mmol/L), with leukopenia and thrombocytopenia (leukocyte count 4.2 × 10^3/μL; 47% lymphocytes; haemoglobin 10.1 g/dL; platelets 96 × 10^3/μL). Coagulation studies were deranged (prothrombin time > 46 s; control 13 s; international normalised ratio 4.67; activated partial thromboplastin time 39 s; control 26 s) and she also had renal failure (blood urea 22.6 mmol/L; serum sodium 135 mmol/L; potassium 5.7 mmol/L; chloride 100 mmol/L).

She was intubated and ventilated on admission, and then transferred to the intensive care unit. Her blood pressure remained low, despite receiving intravenous dopamine, dobutamine and noradrenaline. A nasogastric tube was inserted, and more than 500 ml of digested blood was drained. She was started on intravenous ceftazidime and penicillin.

Urgent bedside ultrasonography of her abdomen did not reveal a hepatic or splenic abscess. A chest radiograph showed a left pleural effusion and bilateral infiltrates. Despite active resuscitation, she remained hypotensive and succumbed less than 12 hours after admission. Two samples of blood culture, which were taken on admission, and culture of a tracheal aspirate, grew *Burkholderia pseudomallei*, which was sensitive to ceftazidime. A post-mortem lumbar puncture was carried out. The cerebrospinal fluid (CSF) was turbid. CSF glucose level was 2.7 mmol/L, and protein level was high at 0.8 g/L. Microscopical examination of CSF showed 10 red blood cells, but no white blood cells were seen. CSF culture did not grow any organism.

DISCUSSION

Melioidosis is an unusual cause of Gram-negative septicaemia in the paediatric population. It is endemic in Southeast Asia and Northern Territory, Australia.[1,2] It is caused by the Gram-negative bacillus, *B. pseudomallei*. *Burkholderia* species are usually non-pathogenic in immunocompetent human hosts. They are water- and soil-borne organisms, and are mainly reported among adults with underlying chronic illness, such as diabetes mellitus.[1] This condition has various clinical presentations. It can present as an acute illness with pneumonia, septicaemia, coagulopathy and shock. Patients can also develop chronic infection causing soft tissue infection, osteomyelitis and abscess.[3]

Although uncommon, this disease has been reported in children. In a case series from Thailand, among a group of 55 children with melioidosis, 20 patients presented with septicaemia while the rest had localised infection.[4] Nine out of the 20 patients with septicaemia had shock, with a fatality of four cases (44.4%). How et al looked at a group of 14 children with melioidosis from the central Malaysian state of

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Pahang.[5] In this series, eight patients had septicaemia on admission and six had localised infection. Five out of the eight patients with septicaemia had shock, with a case fatality of 80% (four cases). Outbreak of this disease has also been reported in South America, with a high mortality rate.[6]

On the other hand, in a study from Northern Territory, Australia, which reviewed six paediatric patients, two cases had localised melioidosis, two cases had colonisation, and two cases had neurological melioidosis.[2] There was no case fatality in this series.

It appears that a large proportion of children who acquire this condition from developing countries develop septicaemia and shock. Melioidosis with shock appears to have high case fatality rate. The limitation of paediatric intensive care services and the presence of malnutrition in these developing countries could have contributed to a higher mortality rate. This hypothesis remains to be proven because a review of 27 adult patients with melioidosis, admitted to two intensive care units in Singapore, showed an overall mortality of 48.1%. Mortality among patients with septic shock was 60%.[7]

This patient had no prior illness. She has been well since early childhood. There was no past medical or family history to suggest that this child could have an inherited or acquired immunodeficiency. Her anthropometrical measurements were normal for her age, and it is highly unlikely that she had any underlying chronic illness. It is difficult to explain why an apparently-healthy child developed melioidosis with septic shock, although this has been reported in other countries.[6]

It has been suggested that there could be a difference in the immune response to *B. pseudomallei* antigen. Barnes et al showed that following in vitro stimulation with *B. pseudomallei* antigens, significantly higher lymphocyte proliferation and interferon γ production was observed in asymptomatic, seropositive individuals, compared with individuals with a history of clinical melioidosis.[8] This may reflect differences in their antigen-specific memory T-cell populations. This study also provides further evidence of differences in immune responses to *B. pseudomallei* that appear to determine the outcome of natural infection. The results indicate that individuals who fail to mount an adequate cell-mediated immunity (CMI) response may succumb to infection. Alternately, those who develop strong specific CMI response to *B. pseudomallei* may not develop clinical disease. Other studies have shown that there is an increase in mortality rate in melioidosis patients with increased interleukin (ILN)-6 and ILN-10 levels. However, it is unknown if the mortality was due to the elevated levels of the cytokines or the elevated levels are merely a reflection of greater disease severity.[9]

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REFERENCES

1. Leelarasamee A. Recent development in melioidosis. Curr Opin Infect Dis 2004; 17:131-6.
2. Edmond KM, Bauert P, Currie BJ. Paediatric melioidosis in the Northern Territory of Australia: an expanding clinical spectrum. J Paediatr Child Health 2001; 37:337-41.
3. Inglis TJ, Rolim DB, Rodriguez JL. Clinical guidelines for diagnosis and management of melioidosis. Rev Inst Med Trop Sao Paulo 2006; 48:1-4.
4. Lumbiganon P, Viengnondha S. Clinical manifestations of melioidosis in children. Pediatr Infect Dis 1995; 14:136-40.
5. How HS, Ng KH, Yeo HB, Tee HP, Shah A. Pediatric melioidosis in Pahang, Malaysia. J Microbiol Immunol Infect 2005; 38:314-9.
6. Rolim DB, Vilar DC, Sousa AQ, et al. Melioidosis, northeastern Brazil. Emerg Infect Dis 2005; 11:1458-60.
7. Chan KP, Low JG, Raghuram J, Fook-Chong SM, Kurup A. Clinical characteristics and outcome of severe melioidosis requiring intensive care. Chest 2005; 128:3674-8. Comment in: Chest 2006; 130:1282.
8. Barnes JL, Warner J, Melrose W,et al. Adaptive immunity in melioidosis: a possible role for T cells in determining outcome of infection with Burkholderia pseudomallei. Clin Immunol 2004; 113:22-8.
9. Simpson AJH, Smith MD,Weverling GJ, et al. Prognostic value of cytokine concentrations (tumor necrosis factor-alpha, interleukin-6, and interleukin-10) and clinical parameters in severe meliodosis. J Infec Dis 2000; 181:621-5.