Melioidosis Presenting Predominantly as Thoracic Empyema

Ngoc-Huyen Dao-Thi¹, Au Nguyen-Tiet², Lam Nguyen-Ho³ ¹,²,³
¹University Medical Center HCMC, ²Department of Internal Medicine, University of Medicine and Pharmacy at Ho Chi Minh City, ³Respiratory Department, Cho Ray Hospital, Ho Chi Minh City, Vietnam

Abstract

Burkholderia pseudomallei has been rarely mentioned as a causative organism of thoracic empyema in previous literature. Here, we reported two cases (a 66-year-old male farmer and a 57-year-old male security guard) presenting with fever and pleuritic chest pain. Their chest computed tomography scans revealed pleural effusion which was frank pus confirmed through thoracentesis. The result of pus culture isolated B. pseudomallei suitable to diagnose melioidosis. These patients were treated successfully with appropriate antibiotics without chest tube drainage. Although uncommon, melioidosis could present exclusively as thoracic empyema.

Keywords: Burkholderia pseudomallei, empyema, melioidosis

INTRODUCTION

Burkholderia pseudomallei is a negative-gram bacteria resulting in human disease, called melioidosis, via direct contact with contaminated soil or water. Melioidosis is endemic in tropical countries, especially in northern Australia and Southeast Asia, including Vietnam. Melioidosis is a potentially life-threatening infection with high mortality estimated appropriately 19 to 36%.[1,2] Patients with diabetes mellitus have the higher risk for developing melioidosis. The clinical manifestation of melioidosis was diversity such as sepsis, community-acquired pneumonia (CAP), abscess developed at multiple organs, etc., Pneumonia is the most common presentation of melioidosis in contrast to pleural involvement.[3,4] We reported two rare cases presenting predominantly as thoracic empyema.

CASE REPORTS

Case 1

A 66-year-old male farmer was transferred to our hospital with a 1-month history of fever and right pleuritic chest pain. He sometimes coughed up a bit of whitish sputum. His past medical history was unremarkable. Physical examination revealed fever (38.5°C) and dry gangrene of the left second finger, which he did not mind the time point of appearance. His chest X-ray (CXR) showed opacity in the right axillary area [Figure 1a]. Blood testing revealed the level of C-reactive protein (CRP) 385.1 mg/l and the normal white blood cells (6.4 G/L) with neutrophil to lymphocyte ratio (NLR) 10.6. The other laboratory tests, including polymerase chain reaction testing for COVID-19, Widal test, serum leptospira antibody, sputum smear of acid-fast bacillus, the rapid diagnostic tests for human immunodefiency virus and malaria showed negative. He was diagnosed with pneumonia, and the empirical initiation of antibiotics included sulperazone/sulbactam, clindamycin, and moxifloxacin. However, he had still been fever (40°C) after 4 days. Chest computed tomography (CT) scan with contrast media showed right middle-dorsal pleural effusion [Figure 1b]. Then, thoracentesis was undertaken, and 40 ml of yellow pus was removed. The antibiotic treatment was changed to meropenem, levofloxacin, and vancomycin without chest tube drainage. The result of blood culture was no isolated pathogen. However, B. pseudomallei was identified from the culture of pleural pus, and trimethoprim/sulfamethoxazole was added. Then, his fever subsided, and his status improved spectacularly. The combination of intravenous meropenem and oral trimethoprim/sulfamethoxazole treatment was continued...
to the 21st day and after that the eradication therapy with only oral trimethoprim/sulfamethoxazole was sustained.

Case 2
A 57-year-old man presented to the emergency department with fever, left pleuritic chest pain, and dry cough for 1 week. He was a security guard, and his past medical history was hypertension and type 2 diabetes mellitus. His temperature was 39.4°C, heart rate 128 beats/min, blood pressure 110/70 mmHg, respiratory rate 24 breaths/min, and oxygen saturation of pulse oximeter 94% on room air. Physical examination was unremarkable except for diminished breath sounds in the left lower lung field where also showed homogenous opacity on CXR [Figure 1c]. His abdominal ultrasound was normal. Cell blood count revealed leukocytosis (white blood cells 12.79 G/L) with NLR of 12.48. He was diagnosed with CAP, for which he was prescribed piperacillin/tazobactam and levofloxacin. However, chest CT scan with contrast media recorded mainly left pleural effusion with pleural thickening. (c) CXR in second case showed homogenous opacity in the left lower lung field. (d) Chest CT scan in second case showed pleural effusion in the left lower lung field.

Discussion
There are the diversity of bacteria relating to thoracic empyema which varies among countries but B. pseudomallei has been rarely mentioned in previous literature. Our cases emphasized clinical scenario of thoracic empyema induced by B. pseudomallei, especially in countries with endemic melioidosis. Thoracic empyema usually results from pneumonia as an evolving form of parapneumonic pleural effusion. However, the infecting organism could attack directly pleural space through the hematogenous dissemination with clinical manifestation mainly involving to pleura. The latter spreading routine could be more suitable to our empyema cases because they presented predominantly pleuritic chest pain and very few features toward pneumonia (dry cough or cough up a bit of sputum, minimal infiltration on chest CT scan).

Definite diagnosis of melioidosis has still based on the isolation of B. pseudomallei from the culture result of specimens such as sputum, blood, pleural fluid, wound fluid, etc. Our cases identified B. pseudomallei from the culture of pleural pus. This diagnostic approach delays the early identification of melioidosis and the initiation of appropriate antibiotics. The first case was farmer and the possible finger entry of infection and the second case had the past medical history of diabetes mellitus. All these features are associated with the increased risk of B. pseudomallei infection. The evaluation of risk factors (occupation and comorbidities) and improvement of awareness could play an important role in detecting early pulmonary melioidosis.

NLR calculated by dividing the absolute count of neutrophil and lymphocyte from a peripheral venous blood specimen showed a significant correlation to inflammatory markers (CRP and pro-calcitonin) in CAP patients. Moreover, NLR also indicates the disease severity of CAP and can be a diagnostic marker in sepsis particularly NLR ≥ 9 in critically ill patients. Our first case had a high level of CRP but a normal leukocyte count, and the second case had elevated leukocyte count. Both two cases showed high NLRs (>9) which was consistent with a severe bacterial infection. This implies that NLR could be a useful marker for infection with B. pseudomallei (pulmonary melioidosis with or without sepsis). Further research is necessary to provide more evidence.

Two main principles to manage thoracic empyema include controlling infection and removal of pleural pus. Our melioidosis cases were treated successfully with appropriate antibiotics without chest tube drainage (thoracic surgeon declined the chest tube drainage, the patient showed a good improvement of symptoms and CXR).

Although rare, B. pseudomallei could cause the clinical scenario of thoracic empyema exclusively. It is important to maintain a high suspicion among individuals with risk factors of melioidosis to detect and treat it appropriately, especially in endemic countries.

Acknowledgments
We would like to thank Dr. Thuan Nguyen-Minh and Dr. Nam Nguyen-Thanh for their support in the management of two patients.
Research quality and ethics statement
The authors followed applicable EQUATOR Network (http://www.equator-network.org/) guidelines, notably the CARE guideline, during the conduct of this report.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patients have given their consent for images and other clinical information to be reported in the journal. The patients understand that their name and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References
1. Bhengsri S, Baggett HC, Jorakate P, Kaewpan A, Prapasiri P, Naorat S, et al. Incidence of bacteremic melioidosis in eastern and Northeastern Thailand. Am J Trop Med Hyg 2011;85:117-20.
2. Currie BJ, Fisher DA, Howard DM, Burrow JN, Lo D, Selva-Nayagam S, et al. Endemic melioidosis in tropical northern Australia: A 10-year prospective study and review of the literature. Clin Infect Dis 2000;31:981-6.
3. Meumann EM, Cheng AC, Ward L, Currie BJ. Clinical features and epidemiology of melioidosis pneumonia: Results from a 21-year study and review of the literature. Clin Infect Dis 2012;54:362-9.
4. Virk HS, Mukhopadhyay C, Wiersinga WJ. Melioidosis: A neglected cause of community-acquired pneumonia. Semin Respir Crit Care Med 2020;41:496-508.
5. Brims FJ, Lansley SM, Waterer GW, Lee YC. Empyema thoracis: New insights into an old disease. Eur Respir Rev 2010;19:220-8.
6. Tsang TY, Lai ST. A case of thoracic empyema due to suppurative melioidosis. Hong Kong Med J 2001;7:201-4.
7. Karakioulaki M, Stolz D. Biomarkers in pneumonia – Beyond procalcitonin. Int J Mol Sci 2019;20:2004.
8. Pantzaris ND, Plataniotis C, Pierrako C, Karamouzos V, Velissaris D. Neutrophil-to-lymphocyte ratio relation to sepsis severity scores and inflammatory biomarkers in patients with community-acquired pneumonia: A case series. J Transl Int Med 2018;6:43-6.
9. Huang Y, Liu A, Liang L, Jiang J, Luo H, Deng W, et al. Diagnostic value of blood parameters for community-acquired pneumonia. Int Immunopharmacol 2018;64:10-5.
10. Kaushik R, Gupta M, Sharma M, Jash D, Jain N, Sinha N, et al. Diagnostic and prognostic role of neutrophil-to-lymphocyte ratio in early and late phase of sepsis. Indian J Crit Care Med 2018;22:660-3.