

Melioidosis Presenting Predominantly as Thoracic Empyema

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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 immunodeficiency 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

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How to cite this article: Dao-Thi NH, Nguyen-Tiet A, Nguyen-Ho L. Melioidosis presenting predominantly as thoracic empyema. *J Global Infect Dis* 2022;14:87-9.

Received: 15 July 2021

Revised: 25 August 2021

Accepted: 21 September 2021

Published: 21 March 2022

Access this article online

Quick Response Code:



Website:
www.jgid.org

DOI:
10.4103/jgid.jgid_211_21

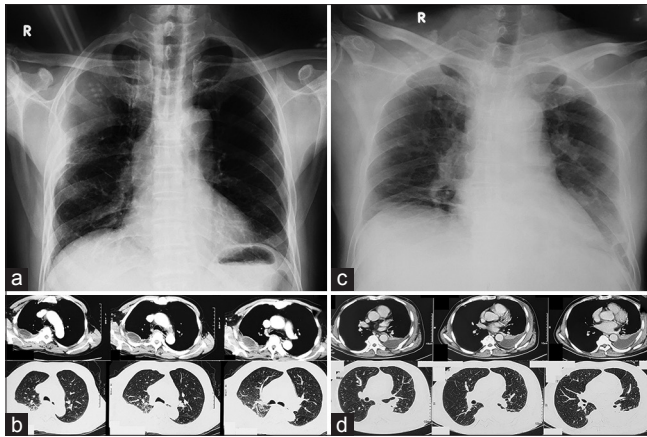


Figure 1: Chest X-ray (CXR) and computed tomography (CT) scan of two patients with thoracic empyema induced by *Burkholderia pseudomallei*. (a) CXR in first case showed opacity in the right axillary area. (b) Chest CT scan with contrast media in first case showed local effusion with pleural thickening. (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

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 scarce parenchymal involvement [Figure 1d]. Therefore, the pleural aspiration was conducted and obtained 3 ml of whitish pus. Diagnosis of thoracic empyema was established with the result of pus culture isolating *B. pseudomallei*. Then, antibiotics were changed to 3 grams of meropenem and 6 gram of ceftazidime intravenously every day. Although the thoracic surgeon declined the chest tube drainage, the patient showed a good improvement of symptoms and CXR.

DISCUSSION

There are the diversity of bacteria relating to thoracic empyema which varies among countries^[5] but *B. pseudomallei* has been rarely mentioned in previous literature.^[6] 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.^[4] 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.^[7,8] Moreover, NLR also indicates the disease severity of CAP^[9] and can be a diagnostic marker in sepsis,^[10] particularly $NLR \geq 9$ 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.^[5] Our melioidosis cases were treated successfully with appropriate antibiotics without chest tube drainage (thoracic surgeon declined because of the small pleural effusion). It did not mean that chest tube drainage was unnecessary to small empyema induced by *B. pseudomallei*. The indication of chest tube drainage should be re-evaluated during the treatment course of small empyema, especially in non-responsive cases.

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.

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