

Legionella Pneumonia in Neutropenic Hairy Cell Leukemia: A Case Report

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Abstract Immunocompromised patients, especially those with cell-mediated immune deficiency are susceptible to legionella infection. We report the case of a hairy cell leukemia patient with legionella pneumonia and neutropenic fever. Patient was diagnosed with legionella pneumonia after two weeks of antimicrobial treatment for non-responding pneumonia and neutropenic fever. This case highlights the importance of high suspicion for legionella in immunocompromised pneumonia patients with neutropenic fever and the need for empiric coverage of atypical microbes in treatment of pneumonia in neutropenic immunocompromised patients.

Keywords: legionella, pneumonia, neutropenic fever, hairy cell leukemia

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1. Introduction

First identified in 1976-1977, legionella, a facultative intracellular parasite, is a common cause of community acquired pneumonia and the pathogen is acquired by inhalation of aerosols containing legionella or by microaspiration of contaminated water. [1,2] Water is the major natural reservoir for legionella and aerosol generating equipment in homes and hospitals, such as air-cooling systems and respiratory-therapy equipment, have been associated with community and hospital acquired infections. Pneumonia is the principal clinical manifestation of legionella and hyponatremia occurs more frequently in legionella pneumonia compared to other types of pneumonia while gastrointestinal symptoms, especially diarrhea, are also common in legionella. [2] Risk factors for legionella include male sex, age over 50 years, cigarette smoking, alcohol abuse, chronic lung disease, hematological malignancies and immunosuppression. [2,3]

Legionella multiply in functionally impaired monocytes and patients with hairy cell leukemia, an uncommon chronic B-cell leukemia characterized by pancytopenia and dysfunctional monocytes, have increased susceptibility to legionella pneumonia. [4,5] Culture isolation from clinical specimens is the gold standard for legionella diagnosis but alternative diagnostic techniques include urine antigen test, seroconversion or nucleic acid amplification test. [3]

We report the case of a hairy cell leukemia patient with legionella pneumonia and neutropenic fever. Patient was diagnosed with legionella pneumonia after two weeks of

antimicrobial treatment for non-responding pneumonia and neutropenic fever. Since the patient presented with neutropenic fever, and the usual first line antibiotics for neutropenic fever does not include coverage for atypical pneumonia, this caused a delay in diagnosing and treating the disease. This case highlights the importance of high suspicion for legionella in immunocompromised pneumonia patients with neutropenic fever and the need for empiric coverage of atypical microbes in treatment of pneumonia in neutropenic immunocompromised patients.

2. Case Report

Patient is a 79-year-old male, with underlying hairy cell leukemia in remission and chronic pancytopenia who presented to the emergency department (ED) due to general weakness, mild cough, chills and altered mental status. On admission, blood pressure was 153/59mmHg, heart rate 108, respiratory rate 22, and temperature 100F. Physical examination revealed a patient that was alert and confused with no other remarkable findings.

Blood count was remarkable for anemia (Hgb 7.9), leukopenia (WBC 1,400), neutropenia (absolute neutrophil count 700), and thrombocytopenia (platelet 68,000). In addition, patient had mildly elevated glucose and mild hyponatremia. Hepatic and renal parameters were normal. Urinalysis was unremarkable. Chest x-ray showed opacity within the left lower lobe, with mildly prominent markings in the left lung (Figure 1). MRI brain showed 1.1 cm cavernous malformation with subacute hemorrhage in the left inferior frontal gyrus.



Figure 1. Chest x-ray of patient on presentation to the hospital

Patient was started on IV cefepime and vancomycin. Infectious Disease (ID) and oncology were consulted and recommended continuation of his IV antibiotics (cefepime and vancomycin) and neupogen administration while continuing to follow his culture samples. Due to the subacute intraparenchymal hemorrhage seen on brain MRI the decision was made to transfer the patient to a tertiary facility that could provide more comprehensive neurosurgical management.

CT chest at the tertiary hospital showed a large consolidative opacity involving the left lower lobe and superior segment of the right lower lobe. All blood culture showed no growth. Bronchoscopy guided lung biopsy was done and bronchoalveolar lavage cultures (respiratory, viral, fungal) were all negative -including aspergillus, histoplasma and cryptococcus. Cefepime and vancomycin were discontinued after 7 days for lack of clinical improvement, and patient was started on amphotericin, voriconazole, imipenem and Linezolid based on the recommendation of ID physician but without clinical improvement. Legionella PCR test done on day 16 of admission was positive. Other antibiotics were discontinued, and patient was started on Levaquin 750 mg daily for 21 days with clinical improvement and transferred back to the referring hospital for continuation of management.

3. Discussion

Immunocompromised patients, especially those with cell-mediated immune deficiency are susceptible to legionella infection. This is because the primary host defense mechanism against legionella is cell-mediated immunity and depression of cell-mediated immunity by corticosteroids, immunosuppressive drugs, acquired immune deficiency syndrome (AIDS), and hairy cell leukemia increases susceptibility to legionella pneumonia. [5] Additionally, hairy cell leukemia causes monocyte deficiency and dysfunction increasing the risk of legionella infection. [6] Legionella pneumonia is considered as “atypical” pneumonia based on its clinical presentation and chest radiographic findings that are neither lobar nor consolidating as seen in “typical” pyogenic pneumonia. [7]

Guidelines for management of severe community acquired pneumonia recommend at least chest x-ray, sputum Gram stain and culture, blood culture, urinary antigen tests for legionella pneumophila and timely administration of antibiotics active against both typical (e.g. *Streptococcus pneumoniae*, *Haemophilus influenzae*) and atypical organisms (e.g. *Legionella* spp., *Mycoplasma pneumoniae*, and *Chlamydia pneumoniae*). [8] Levofloxacin and Azithromycin are currently the preferred antibiotics

for legionnaires disease. Alternative antibiotics include other fluoroquinolones, other macrolides and tetracyclines. [9] The duration of treatment is determined by severity of illness and patient response to therapy. In general, 5 to 10 days of antibiotics is often enough to completely treat patients with legionella infection, but therapy may take longer in immunocompromised patients. [9]

For this patient, he was initially placed on IV cefepime and vancomycin because of his neutropenic fever which was later changed to amphotericin, voriconazole, imipenem and Linezolid due to lack of clinical improvement. Legionella PCR test done on day 16 of admission was positive. Other antibiotics were discontinued, and patient was started on Levaquin 750 mg daily for 21 days with clinical improvement

In summary, this case highlights the importance of high suspicion for legionella in immunocompromised pneumonia patients with neutropenic fever and the need for empiric administration of antibiotics active against atypical pneumonia in the treatment of immunocompromised pneumonia patients with neutropenic fever.

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