SEVERE SEPSIS AND ACUTE RESPIRATORY DISTRESS SYNDROME FROM COMMUNITY-ACQUIRED LEGIONELLA PNEUMONIA: CASE REPORT

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Abstract
A case of a young man with community-acquired pneumonia, severe acute respiratory distress syndrome, and sepsis is reported. Treatment with antibiotics and various modes of mechanical ventilation in the intensive care unit were unsuccessful. A urinary legionella antigen test was positive for Legionella pneumophila. (American Journal of Critical Care. 2007;16:320,317-319)

Since its debut in 1976 at the American Legion convention in Philadelphia, Legionella pneumophila has become a relatively common cause of community-acquired pneumonia. Legionellosis accounts for substantial morbidity, with case fatality rates of 5% to 25% even in immunocompetent patients. Legionellosis refers to 2 clinical syndromes caused by bacteria of the genus Legionella. Legionnaires disease is the more common syndrome of community- and hospital-acquired pneumonia. Pontiac fever, on the other hand, is an acute, febrile, self-limited illness that has been linked to Legionella species.

The incidence of legionnaires disease depends on the degree of contamination of the water reservoir, the intensity of exposure to the contaminated water, and the susceptibility of the host. Microbiological diagnosis requires specialized media (ie, buffered charcoal yeast extract media) and can take several days. The bacteria are aerobic gram-negative bacilli that internalize and proliferate within the phagosomes of alveolar macrophages and blood monocytes. Therefore, antibiotics such as penicillins and cephalosporins that cannot penetrate the host’s cell membrane are relatively ineffective against legionellae. Antibiotics with good intracellular penetration such as macrolides, quinolones, tetracyclines, and rifampin can provide effective treatment. Patients who receive appropriate treatment early usually experience symptomatic relief in 3 to 5 days. Chest radiographs are not useful for monitoring the clinical response, because complete resolution of radiographic findings typically takes several months.

The following is a case report of a young man with severe acute respiratory distress syndrome...
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and sepsis resulting from community-acquired legionella pneumonia.

Case Report

In September 2006, a 38-year-old man in respiratory distress was transferred to our intensive care unit. He reported that he had a persistent cough that had produced brown phlegm for the past 4 days and that he was experiencing dyspnea at rest. He also reported intermittent chills, drenching sweats, and fever. He initially treated himself at home with over-the-counter medications and visited the emergency department of his local hospital when his condition did not improve. Because he was in respiratory distress, he was transferred to our hospital for admission to the intensive care unit.

The patient’s medical history was unremarkable. He took no medications regularly and had no known drug allergies. He had stopped smoking about 2 weeks earlier and reported occasional alcohol and marijuana use. He had not traveled outside the United States or participated in any unusual hobbies. He worked as a truck driver. He had not had contact with any sick people and had no risk factors for HIV infection. He had no chest or abdominal pain and no gastrointestinal or genitourinary signs or symptoms.

On physical examination, the patient had a body temperature of 38.6°C (101.5°F), was tachycardic with a heart rate of 134/min, and was tachypneic with respirations at 30/min. Blood pressure was 143/56 mm Hg and oxygen saturation on room air was 88%. The patient appeared anxious and uncomfortable but was alert, awake, and oriented. He was in moderate respiratory distress, as indicated by his use of accessory muscles of respiration. The mucous membranes were dry and the sclerae and conjunctivae were unremarkable. Jugular venous pressure was normal. The first and second heart sounds were regular in rate and rhythm, and no murmurs were heard. Pulmonary examination revealed dullness to percussion in the bases and increased tactile and vocal fremitus with coarse crackles heard bilaterally in all lung fields. Abdominal examination revealed normoactive bowel sounds. The extremities were warm and well perfused with no edema. Findings on motor, sensory, and neurologic examinations were normal. Examination of the skin revealed no rash or cyanosis.

Laboratory studies done at admission revealed a white blood cell count of 26.9 x 10^9/L with 49% bands, a hematocrit of 48%, and a platelet count of 189 x 10^9/L. Electrolyte levels were within the reference range, except for an elevated phosphorus level of 1.58 mmol/L (4.9 mg/dL). The level of serum urea nitrogen was 23.9 mmol/L (67 mg/dL), and creatinine level was 301 μmol/L (3.4 mg/dL). Results of liver function tests, cardiac enzyme assays, and coagulation studies all were normal. Influenza testing was not performed because the patient was first seen in September, when influenza is uncommon.

Results of urinalysis were unremarkable except for trace amounts of red blood cells and protein. A urine toxicology screen was positive for tetrahydrocannabinoids and opiates but negative for alcohol. Initial arterial blood gas analysis with the patient breathing ambient air showed a pH of 7.38, a Pco_2 of 37 mm Hg, a Po_2 of 36 mm Hg, and an oxygen saturation of 78%. Oxygenation improved minimally after initiation of bilevel positive airway pressure. The patient was intubated, and pressure-control ventilation was started. A chest radiograph showed bilateral diffuse consolidation consistent with acute respiratory distress syndrome (see Figure). The patient had been given intravenous ceftiraxone and azithromycin in the emergency department for empiric treatment of community-acquired pneumonia. Vancomycin was added in the intensive care unit because of the severity of the signs and symptoms. Additional laboratory tests were done, including blood and urine cultures, a urinary legionella antigen test, and HIV and viral antibody testing. Levofloxacin was added to the antibiotic regimen after the urinary legionella antigen test was positive.

During the course of several hours, the patient’s clinical status continued to deteriorate. He was hypotensive and required massive fluid resuscitation as well as norepinephrine, dopamine, and vasopressin infusions for blood pressure support. An infusion of drotrecogin alfa (activated) was begun because the patient met multiple criteria for its use in severe sepsis. He was given intravenous steroids and was tested for adrenal insufficiency. He had an
appropriate cortisol response to stimulation. Atrial fibrillation and supraventricular tachycardia developed, and the patient required cardioversion to revert to normal sinus rhythm.

The patient’s clinical course evolved into multi-system organ dysfunction as he became oliguric with elevated transaminase and troponin levels. He did not experience any bleeding events while the drotrecogin alfa (activated) was being infused. His skin turned mottled and cyanotic with marked livedo reticularis. He also became universally edematous. A second set of arterial blood gas analyses showed a persistent acidemia with pH reaching a nadir of 7.09. The refractory hypoxemia persisted despite use of multiple ventilation modes, including high-frequency oscillation, turning the patient prone, and jet ventilation (see Table).

The patient died approximately 26 hours after admission to the intensive care unit. His family refused permission to perform an autopsy, and the case did not fall under the purview of our state’s medical examiner.

Discussion

The first clinical descriptions of legionnaires disease were of patients with fever, gastrointestinal symptoms, and pneumonia. It is now clear that the clinical features of the disease are more varied and nonspecific. Respiratory signs and symptoms initially are not prominent. Gastrointestinal signs and symptoms are usually common, with diarrhea, nausea, vomiting, and abdominal pain. Patients are usually lethargic, with headache and occasional stupor. Abnormalities in laboratory values are likewise nonspecific and can include indications of hepatic and renal dysfunction, thrombocytopenia, leukocytosis, and hypophosphatemia. Hyponatremia (serum level of sodium <130 mmol/L) occurs more frequently in legionnaires disease than in other types of pneumonia.4

Prompt diagnosis of legionnaires disease and initiation of appropriate therapy can decrease the mortality rate. The single most important test for the disease is isolation of the Legionella organism on specialized media. The availability of the clinical isolate in culture can be critical for subsequent epidemiological investigations. The availability of the rapid urine test for legionella antigen has decreased the time to diagnosis. In fact, the use of the urinary antigen test has resulted in the detection of unrecognized endemic outbreaks of legionnaires disease.5 The urinary antigen test has several advantages over culture. Severely ill patients may not be able to generate an adequate sputum sample for culture. More important, the results of the urine test are usually available within hours, whereas culture of sputum specimens requires days. Finally, the positive result on the urine test can persist for days, even in patients receiving empiric antibiotic therapy.6

The treatment of community-acquired pneumonia without the benefit of diagnostic testing should include empiric treatment for infections caused by several microorganisms, including Legionella species. The American Thoracic Society and Infectious Diseases Society of America consensus committees on community-acquired pneumonia recommend empiric therapy with azithromycin, either as monotherapy or combined with a β-lactam agent. Monotherapy with a respiratory quinolone such as levofloxacin also is acceptable.7

Conclusion

The occurrence of 3 cases of community-acquired pneumonia due to Legionella species at our institution illustrates the varied outcomes of the disease. Two patients sought treatment in a timely manner and were given empiric treatment

Results of a urinary legionella antigen test are available within hours, so the causative agent can be identified and antibiotic therapy started rapidly.
with antibiotics and supportive therapies; these 2 patients did not die, despite their advanced ages and comorbid illnesses. The patient described in this case report had signs and symptoms of pneumonia but did not seek medical attention for several days. The positive result of urinary antigen testing for *Legionella* species was available within several hours of his admission and established his diagnosis. Timely initiation of administration of standard antibiotics for empiric treatment of community-acquired pneumonia might have changed the outcome of this case.

FINANCIAL DISCLOSURES

None reported.

REFERENCES


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