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Legionnaires' Disease: Description of a sporadic case

Louis D. Saravolatz, MD* and Gene Tilchen, MD*

This first case of Legionnaires' disease seen at Henry Ford Hospital is described. A previously healthy 72-year-old man developed progressive pneumonia in September, 1977; it was unresponsive to treatment with cephalothin. However, he rapidly recovered when the treatment was changed to oral erythromycin. Diagnosis was established by serologic studies done at the Center for Disease Control. This pneumonia occurred in a sporadic form with no evidence of secondary cases.

IN July, 1976 a previously unrecognized bacterium was responsible for an epidemic of 182 cases of pneumonia occurring among persons attending an American Legion convention in Philadelphia. During this outbreak, there was no evidence of person-to-person spread. As of December 9, 1977, 130 additional cases of infection due to this same bacterium, hereafter referred to as Legionnaires' bacterium, were confirmed by the Center for Disease Control. It is of interest that these cases were sporadic, which suggested a lack of person-to-person spread.

Analysis of confirmed cases indicates that the incubation period for this disease is 2-10 days. Early symptoms are malaise, myalgias, headache and nonproductive cough. Over the following two or three days the patients develop progressive dyspnea, pleuritic chest pain, gastrointestinal symptoms and fever of 38.9 to 40.6°C. During the initial physical examination, rales without evidence of consolidation are noted, and the remainder of the examination is normal. Laboratory findings show a leukocytosis in only 59% of patients and a left shift in only 50%. Urinalysis shows greater than 3+ proteinuria in 20% of the patients. Chest radiographs show patchy interstitial infiltrates, minimal effusions, cavitation, and areas of consolidation which progress to widespread consolidation.

Diagnosis of this disease is usually considered when the patient's cultures are negative, or the patient fails to respond to conventional treatment for outpatient-acquired pneumonias.
The Legionnaires’ bacterium has not been found in the sputum of patients but has been isolated from pleural fluid and lung tissue. Specimens should be inoculated onto Mueller-Hinton agar containing 1% Isovitalex in 5% carbon dioxide. The organism is a gram-negative rod. The most sensitive stain for this organism is the Dieterle silver-impregnation method, which demonstrated the organism in 18 of 26 cases. However, the specificity of this stain is not known.

Because of this organism’s fastidious growth requirements, diagnosis is generally established by serologic technique which shows a four-fold or greater rise in indirect fluorescent antibody titers to the agent of Legionnaires’ disease, or by a demonstration of this bacterium through direct fluorescent antibody technique in lung tissue.

Serum samples from 16 suspected cases of Legionnaires’ pneumonia at Henry Ford Hospital have been submitted to the Center for Disease Control for serologic studies from September to December, 1977. In only one case was the test considered diagnostic of this infection. The purpose of this paper is to report the fourth sporadic case in Michigan and to describe the first encounter with Legionnaires’ disease at Henry Ford Hospital.

Case Report

A previously well 72-year-old white man arrived in Detroit, Michigan on September 3, 1977 after a 6-day cross-country trip from San Diego, California. During his trip he stopped in Arizona, New Mexico, Missouri, and Illinois. On September 6, 1977 he was seen in the Henry Ford Hospital clinic for a routine physical examination, which was normal. On September 9, 1977 he was admitted to the Hospital complaining of fatigue, fever and chills for one day. He denied cough, chest pain, or dyspnea. His review of systems was essentially negative.

Past medical history included a diagnosis of diabetes mellitus controlled with diet alone and Type II B hyperlipoproteinemia treated with Atromid. He had a 50 pack-year history of cigarette smoking.

On physical examination the patient had a temperature of 39.5°C, a pulse of 96 per minute, a respiratory rate of 24 per minute, and blood pressure of 120/60 mm Hg. The chest showed equal expansion bilaterally with dullness to percussion over the left upper lobe. There were moist inspiratory rales heard diffusely throughout the lung fields. The rest of the physical examination was within normal limits.

Laboratory studies on admission revealed a hemoglobin of 14.5 gms% and a white blood count of 7,400/mm³ with 54% neutrophils, 28% bands, 9% lymphocytes, 7% monocytes, 1% basophils, and 1% metamyelocytes. Sedimentation rate was 103 mm/hr. A fasting blood sugar was 148 mg/dl. Electrolytes, BUN, creatinine, cholesterol, triglyceride, and a serum protein electrophoresis were normal. Urinalysis was normal except for a trace of protein and 1+ ketones. An intermediate PPD was negative with a positive streptokinase-streptodornase control. A gram stain of the sputum showed no leukocytes, moderate gram-positive cocci, and moderate gram-negative rods, but only commensal respiratory flora was cultured.

Complement fixation for Eaton agent was negative. Cold agglutination titer was 1:32 on two occasions. Smear and culture for acid-fast bacteria was negative, as was sputum bacteria for malignant cells. EKG showed sinus tachycardia.

Initial chest x-ray examination on September 9, 1977 (Figure 1) showed a patchy infiltrate in the left upper lobe. Repeat chest x-ray examination three days later revealed that the heart had enlarged slightly with the infiltrate persisting in the left upper lobe. However, small bilateral pleural effusions were noted. On September 19, 1977 (Figure 2) a repeat chest x-ray showed progression of the left upper lobe pneumonia; in addition, there was now a right upper lobe infiltrate with some increase in the left pleural effusion. On September 20, 1977, laminograms of the mediastinum and of the left lung showed no evidence of bronchial obstruction or cavitation within the infiltrates. The infiltrative density had now spread to the right lung and findings were compatible with progressive pneumonia.

During the course of hospitalization the clinical diagnosis was bacterial pneumonia, and the patient was treated with cephalothin, 1 gm intravenously every 6 hours. His temperature was remittant to 39.5°C, and he developed a non-productive cough. Since mycoplasma and Legionnaires’ disease were diagnostic considerations, on the seventh hospital day the patient’s cephalothin was discontinued, and he was started on oral erythromycin 500 mg every 6 hours. Twelve hours after the initial dose, the patient became afebrile.
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Figure 1
Admission chest x-ray showing patchy infiltrates in the left upper lobe.
Figure 2
Chest x-ray 11 days after admission showing patchy infiltrates in the left and right upper lobes.
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and continued so for the remainder of his hospitalization. The infiltrates in the chest x-ray resolved, and the pleural effusions disappeared over the next 14 days. The patient was discharged in good condition after 14 days of hospitalization. Indirect fluorescent antibody serum titers performed at the Center for Disease Control were 1:32 for Broad Street pneumonia and Legionnaires' disease antigens. Repeat samples taken approximately two weeks later after the patient had been discharged revealed titers for both antigens of 1:256. The patient has remained well with no apparent complications due to this illness.

Discussion

The characteristics of the pneumonia seen in this patient were similar to the cases seen during the outbreak of Legionnaires' disease in Philadelphia in the summer of 1976. Since the patient left California 12 days before becoming ill, it appears that he acquired his illness during his cross-country travels or in Michigan. As in other sporadic cases, there were no family members or contacts who had recent respiratory illnesses. No secondary cases were noted among individuals who were exposed to the patient during his illness.

This case illustrates a favorable outcome with erythromycin, which is currently the treatment of choice. All other antibiotics used in treating this disease, with the exception of tetracycline, have been associated with a much higher fatality rate.

It appears that this organism may be responsible for many cases of pneumonia in the sporadic form that previously have been unrecognized. Many sporadic cases are being confirmed every week by the Center for Disease Control. It has also been suggested that this organism may be found with increasing frequency in the immunosuppressed patient.

When patients fail to respond to antibiotic therapy and an etiology is lacking for their pneumonia, Legionnaires' disease should be suspected. Paired serum should be collected for serologic studies, and an attempt should be made to isolate the organism from pleural fluid or biopsy tissue. If other causative agents are excluded, erythromycin should be started empirically since the course of this disease may not permit delay in beginning adequate treatment.

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