

A Novel Case of Legionnaire's Disease after Staying at Home Rentals

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Case of a 44-year-old woman with past medical history of dermatomyositis who had been on Methotrexate therapy who became infected with *Legionella pneumophila* after staying at a home rental, known commercially as an Airbnb. The patient presented to the ER with complaints of general malaise and subsequently developed sepsis with respiratory failure requiring intubation. CT scan confirmed the diagnosis of pneumonia and through extensive research *L. pneumophila* was identified using a pneumonia panel that works by identifying nucleic acids of fastidious organisms that are difficult and take long to grow by culture. As the patient's pneumonia progressed to ARDS and her clinical impression worsened, pronation technique was begun in addition to her course of antibiotics that were already being administered. The patient began showing significant improvement in her clinical picture and was extubated with progressive recovery. [*PR Health Sci J* 2023;42(4):325-327]

Key words: *Legionella*, ARDS, Home rentals

L*egionella sp.* is an atypical Gram-negative bacterium often found in water related tubing. Infection with this pathogen can lead to Legionnaire's disease and Acute Respiratory Distress Syndrome (ARDS) (1). Here, we present a case of an immunocompromised patient who developed ARDS secondary to Legionella infection after staying at a home rental. In 1976 the American Legion Convention marked the discovery of Legionnaires' disease, a syndrome of pneumonia caused by the bacteria *L. pneumophila* after people became sick at the American Legion in Philadelphia (2). There are many species serogroups of this bacterium. Most notably, 1, 3, 4 and 6 have been linked to disease in humans with *L. pneumophila* serogroup 1 being the most serious and responsible for most infections (3). Along with pneumonia, it can also lead to extreme sickness and diarrhea (3).

Case Report

Case of a 44-year-old female with past medical history of dermatomyositis on Methotrexate and 5 pack-year tobacco smoking history presented to ER with 3 days onset of general malaise, headache, and fever. She denied vomiting, diarrhea, cough, respiratory complaints, abdominal pain, skin lesions or rashes. She denied any sick contact but states having stayed at a home rental the previous week. Chest X ray AP was notable for bilateral peribronchial thickening correlating to bronchitis without evidence of consolidations or pleural effusions. CT scan as shown in Figure 1 was remarkable for multifocal pneumonia. CBC at admission showed leukocytosis for which she was started on Ceftriaxone and Azithromycin. After developing confusion, worsening SOB, and hypoxemic respiratory failure she was placed on mechanical ventilation. She had arterial blood

gases obtained showing an acid base disorder with a pH at 7.5. Inflammatory markers were also found to be elevated as shown on Table 1. Her CRP and Procalcitonin levels were elevated at 35mg/dl and 4.21ng/ml a day after admission. Her Procalcitonin decreased to 0.10ng/ml throughout her admission. She also had an elevated lactate level at 17.7, Ferritin was found at 445.7 and D-Dimer at 5.16 mg/L. These values served to showcase the severity of her infection and inflammatory process. Extensive workup for a possible pathogen was positive for *Legionella* by a pneumonia panel that was specific to nucleic acids of common fastidious organisms. The antigen of the bacterium was also present in urine (3). The antibiotic was changed to Levaquin, Fluconazole, Meropenem and Vancomycin to improve coverage of the underlying organism. After 4 days of intensive care unit management, the patient began tolerating spontaneous breathing and then she was extubated. She remained on the nasal cannula demonstrating progressive clinical improvement.

Discussion

Here we present a case and treatment of contamination with *L. pneumophila* in a patient without typical exposure factors. We can draw a conclusion from the data and history of the

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Table 1. Laboratory values upon admission

| | |
|-----------------------------|----------|
| Renal panel | |
| Sodium | 136 |
| Potassium | 3.87 |
| Chloride | 104 |
| Urea | 11 |
| Creatinine | 0.82 |
| Calcium | 8.30 |
| CBC | |
| Hemoglobin | 11.8 |
| Red Blood Cells | 3.88 |
| White Blood Cells | 17.28 |
| RDW | 14.7 |
| Platelets | 266 |
| MCHC | 34.1 |
| MCV | 89.2 |
| Hematocrit | 34.6 |
| Sedimentation rate | |
| Arterial gases | |
| pH | 7.576 |
| pCO2 | 22.8 |
| HCO3 | 21.3 |
| pO2 | <39.1 |
| SaO2 | 79.9 |
| Urinalysis | |
| Protein | 100 |
| Nitrite | Positive |
| Leukocyte | Negative |
| Inflammatory markers | |
| CRP | 35.20 |
| Procalcitonin | 4.21 |
| Lactate | 17.7 |
| Ferritin | 445.7 |
| D-Dimer | 5.16 |

patient that she was exposed during a stay at a home rental. This would be the first reported case of an infection from a home rental with this bacterium. Important to note that the patient had a history of Dermatomyositis diagnosed in 2017 and was on Methotrexate therapy. Dermatomyositis is characterized by muscle infiltration of T cells causing increased inflammation in joints and muscles (4). Methotrexate is an immunosuppressive therapy that works by inhibiting inflammatory markers and increasing susceptibility of cells to apoptosis improving inflammation (4).

The year-round incidence of legionella is about 25,000 people in the United States, many infected individuals present with mild symptoms or no signs of illness (5). Common ways to diagnose *L. pneumophila* include urine antigen and PCR as done in this patient, as growth by culture generally take greater than 5 days and is dependent on very specific parameters (5). Urinary

antigen is a rapid way to confirm the presence of the bacterium, but it serves to only detect serogroup 1 which accounts for 84% of cases (5). The PCR test, performed via nucleosides is also a rapid way to detect species and its other serogroups but often varies by laboratories and commercial availability (5).

The CDC states that around 10-15% of all cases of Legionnaire's disease is from people who have traveled within 10 days of symptom onset (6). Other diseases such as COVID-19 and Influenza H1N1 may also be commonly acquired in hotel venues and such areas but are managed with general disinfection while Legionella is the only disease related to water systems that may pose a greater risk due to shared plumbing (7). There are many regulations, steps for treatment, and inspections hotels and cruise ships must pass to be deemed safe for guests, home rentals however are not held to such standards as these are not regulated (8).

The death rate of infection may be as high as 40–80% in untreated patients and can be reduced to 5–30% through appropriate diagnosis and case management (9). Infected patients are difficult to distinguish from those infected with other bacteria based on clinical symptoms and physical findings (9). Adequate exposure history is needed for prompt diagnosis or suspicion of Legionnaire's disease (9). As inflation soars, and people look for cheaper ways to travel, alternatives such as home rentals and hostels have become increasingly popular options. Without regulations, these may be a new focus for a range of diseases including Legionnaire's disease (10). This is the first case of an immunocompromised patient becoming infected with this bacterium after staying in such a place. It is highly encouraged for health care professionals to act in timely fashion and report to public health official cases such as these so they may stop potential clusters and outbreaks by linking new cases to previously reported ones (11). New regulations may eventually be implemented in home rentals as these become increasingly popular (12). Often, one group of guests arrives as



Figure 1. Contrast CT scan of chest showing small right pleural effusion is seen, in favor of a parapneumonic effusion. Multifocal areas of consolidation are seen scattered throughout both lungs. This is most severe at the level of the right lower lobe where there is almost complete consolidation of the right lung. Findings are most compatible with multifocal pneumonia.

the other leaves without much intermission between them (13). Further scrutiny on proper cleaning and ventilation may help prevent future outbursts of pathogens (13). Interventions by public health officials to evaluate timely and routine evaluation of ventilation systems at home rentals is needed in the growth of popularity of these services (13).

Resumen

Caso de una mujer de 44 años con historial médico pasado de dermatomiositis en tratamiento con Metrotexato quien contrajo *Legionella pneumophila* luego de haber estado en un hogar por paga, conocido comercialmente como AirBnB. La paciente se presentó a sala de emergencias con queja de malestar general y subsiguientemente desarrolló sepsis con empeoramiento respiratorio requiriendo entubación. La imagen del CT confirmó el diagnóstico de neumonía y luego de una búsqueda extensa de patógenos *L. pneumophila* fue identificada utilizando un panel de pneumonia que identifica ácidos nucleicos de organismos fastidiosos. A la neumonía de la paciente progresar a ARDS y su impresión clínica empeorar, se comenzó con la técnica de pronación en adición a los cursos de antibióticos que estaban siendo administrados. La paciente comenzó a demostrar una mejoría significativa clínica y fue extubada con recuperación completa progresivamente.

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