

Legionella Pneumophilia, A Deadly Bacterium, Can Kill a Patient in Days

Khiem Phan *

*Department of Internal Medicine Leonard J. Chabert Medical Center, 1978 Industrial Blvd, Houma, LA 70363, United States.

Received August 2, 2024; Revised September 02, 2024; Accepted September 05, 2024

ABSTRACT

Background: *Legionella pneumophilia* is a type of bacteria that can cause severe pneumonia. It commonly causes one of two lung diseases: Legionnaires' disease (severe lung pneumonia) and Pontiac fever (mild respiratory disease). In rare cases, *Legionella* can cause infections outside of the lungs, such as heart or wound infections. Legionnaires' lung pneumonia is caused by inhaling or aspirating contaminated aerosolized water particles that contain the bacteria. The source can be found in warm water. Here, I present the case of a 41-year-old male with no significant past medical history who presented with severe shortness of breath, fever, and generalized malaise. His symptoms commenced about two weeks before he presented to the hospital, probably from occupational exposure. His labs were significant for lactic acidosis, leukocytosis, thrombocytopenia, elevated BUN and creatinine, transaminitis, electrolyte imbalances, elevated creatinine kinases, and abnormal ECG. Urine *Legionella pneumophilia* serology was positive even though pneumonia respiratory PCR panel, sputum culture, and MRSA screening were all negative. Initially, he was on a heated nasal cannula of 5L oxygen and was started on Levophed, vancomycin, meropenem, and doxycycline. After confirming his urine antigen test culture, he was on cannula 5L oxygen, Levofloxacin, and Rifampin. His acute hypoxic respiratory failure secondary to *Legionella pneumonia* was managed with Extracorporeal Membrane Oxygenation (ECMO), FiO₂ 50% with a positive-end-expiratory pressure (PEEP), and Methylprednisolone (Solu-Medrol). His acute kidney injury (AKI) secondary to acute tubular necrosis (ATN) secondary to septic shock was managed with continuous renal replacement therapy (CRRT). Despite extensive management and measures, the patient deceased on his 7th day in the ICU.

Conclusion: This case is to highlight Legionnaires' disease (LD) can be severe and deadly if diagnosis and treatment are delayed even in previously healthy and young patients.

Keywords: *Legionella pneumophilia*, Legionnaires' disease (LD), Legionellosis, Acute Respiratory Distress Syndrome (ARDS), Waterborne disease

INTRODUCTION

Legionnaires' disease (LD) is a waterborne disease caused by *Legionella pneumophilia*. *Legionellae* are diverse, gram-negative, facultatively intracellular bacilli. More than 60 species have been identified. *Legionella pneumophilia*, serogroup 1, is the most common agent in 80-90% of clinical cases [1-6]. *Legionella* species require three to five days of incubation to be detected [1,5,6].

The bacteria spread through aspiration or inhalation of contaminated aerosolized water particles [1-5]. *Legionella* species can thrive in warm water, such as showers, hot tubs, hot and cold-water systems, humidifiers, ventilators, decorative fountains, swimming pools, birthing pools, and drinking water. Exposure to soil, potting mixes, and other organic materials [2-7]. *Legionella* can live as an intracellular parasite with protozoa, and its growth is optimum in warm temperatures and stagnant water [8].

LD is an atypical pneumonia that is usually community-acquired but can be acquired in healthcare settings. LD can be severe in older populations and immunocompromised patients [5]. About 1 out of 10 patients with LD will die from the complications of the illness, and about 1 out of 4 will die from LD if they acquire LD during their hospital stay [2-6]. Identifying the disease early is essential in treating it successfully and increasing the chance of survival [4]. Therefore, it is necessary to early diagnose and initiate

Corresponding author: Khiem Phan, Department of Internal Medicine Leonard J. Chabert Medical Center, 1978 Industrial Blvd, Houma, LA 70363, United States, Tel: 225-239-0169; E-mail: kvphan10@gmail.com

Citation: Phan K. (2024) *Legionella Pneumophilia*, A Deadly Bacterium, Can Kill a Patient in Days. Int J Surg Invasive Procedures, 7(3): 194-196.

Copyright: ©2024 Phan K. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

therapeutic interventions to avoid detrimental outcomes [5].

LD can be mild or severe, and it requires treatment with antibiotics. The Infectious Diseases Society of America (IDSA) recommends therapy for *Legionella* are quinolones or newer macrolides or a combination of both for severe cases [7-12].

A history of the source of infection is critical for diagnosing pneumonia caused by *Legionella pneumophila*.

CASE PRESENTATION

A previously healthy 41-year-old male presented to the emergency department due to worsening shortness of breath, fever, generalized malaise, and bilateral lower extremity swelling over the past two nights. The patient collapsed and was found near the emergency department by The Rapid Response Team. The patient had shortness of breath and was lethargic.

The patient reported that his symptoms started two weeks ago, but they were getting worse during the past two days and prompted the patient to the hospital. The patient stated that he self-medicated himself with Amoxicillin and brought it with him to the hospital. He thought the medication he took would treat his condition, but it only got worse. He denied any recent fall, past medical, surgical, or hospitalization histories in the past. He denied any coughs, recent travel history, or recent sick contact. He denied taking any other medications, smoking, alcohol, or illicit drug use. He reported that he lived alone in his own house and worked in construction, where he demolished old houses and rebuilt them. He had just demolished one a few days before he presented to the hospital.

On presentation, he displayed hypotensive BP 78/48, tachycardia HR 109, and hypoxic. The ICU Team was contacted immediately and admitted the patient to the unit. He was put on a heated nasal cannula of 5L oxygen and was started on a Levophed drip. His arterial blood gas showed pH 7.26, CO₂ 28, O₂ 62.7, and H₂CO₃ 12.6. A chest computer tomography (CT) showed evidence of extensive bilateral multifocal pneumonia. Pneumonia respiratory PCR panel, sputum culture, and MRSA screening were all negative, but all remained negative. The patient was originally on vancomycin, meropenem, and doxycycline. However, the urine *Legionella* antigen test (UAT) was positive. He was given Levofloxacin and Rifampin. Meropenem was empirically given. During the first 24 h, his labs showed Sodium 135mmol/L (low), BUN 26 mg/dL (high), Creatinine 5 mg/dL (high), glucose 140 mg/dL (high), AST 1214 units/L (high), ALT 532 units/L (high), alk phos 176 units/L (high), total bilirubin 13.3 mg/dL (high), WBC 50.88 X 10³/mcL (high), Hgb 9.3 gm/dL (low), Hct 27.2% (low), Plt 46 x 10³/mcL, Pt 13.4 seconds, aPTT 61 seconds (high), Neu % auto 83.9% (high), Neut # auto 39.37 x10³/mcL (high), Mono # 4.9x 10³/mcL (high), Immature Grans # auto 1.57 x10³/mcL. He was

attempted to be managed medically in the ICU for the first 24 h. Head CT or brain without contrast on the same day showed multiple foci of intra-axial hemorrhage with rightward subfalcine herniation.

On day 4th, his blood culture showed no growth, and the urine culture was a clean catch. After extensive consultations and attempted management from many departments, his condition continuously deteriorated. The patient was put on extracorporeal membrane oxygenation (ECMO), FiO₂ 50% with a positive-end-expiratory pressure (PEEP) of 10 for acute hypoxic respiratory failure secondary to *Legionella pneumonia*, on Solu-Medrol. His new acute kidney injury (AKI) secondary to acute tubular necrosis (ATN) secondary to septic shock was managed by continuous renal replacement therapy (CRRT). His septic shock was managed with antibiotics, Norepi, and Vasopressin. He also developed electrolyte disturbances, especially hypocalcemia secondary from rhabdomyolysis suspected from status post fasciotomy. In addition, his transaminitis and thrombocytopenia were worsening, given he was septic and on multiple medications and elevated heparin due to right upper extremity compartment syndrome status post fasciotomy. He also developed new-onset atrial fibrillation. His fingers and toes showed necrosis and gangrene, along with multiple organ failures. The patient has been unconscious since he was admitted to the ICU. Despite all the management and measures, the patient deceased on his 7th day in the ICU.

DISCUSSION

This patient was a very challenging case in which to manage LD. Despite appropriate treatment and management being provided, the patient's condition continuously declined. The patient presented with hypotensive, tachycardia, hypoxic, shortness of breath, fever, and extremity edema. Although he didn't have shivering chills, hyponatremia, abdominal pain, or immunosuppression, his exposure history and delay of seeking treatment might have been a significant risk factor contributing to the lack of clinical improvement.

According to Center for Disease Control and Prevention (CDC), several major risk factors associated with *Legionella* infections, including Legionnaires' disease, such as adults over the age of 50, underlying medical conditions (diabetes, heart disease, lung disease, cancer, immunocompromised in HIV/AIDS, organ transplants), smoking, exposure to contaminated water sources, certain occupations (plumbers, cooling tower maintenance workers, construction workers), travel history, and certain healthcare settings [4]. Considering this patient's clinical presentation and occupation exposure risks, the patient was possibly exposed to *Legionella* in contaminated aerosolized water particles. His sputum culture and pneumonia respiratory PCR panel were negative and remained negative. Only his urine *Legionella* antigen test was positive. Given the patient's no significant past medical history, pneumonia was suspected at first until his urine *Legionella* came back positive.

The IDSA and the American Thoracic Society (ATS) recommend perform UAT for patients with severe presentation such as septic shock, respiratory failure requiring mechanical ventilation, *Legionella* recent outbreak, or recent travel history. IDSA and ATS also recommended UAT should be used to assess LD in the presence of non-specific criteria commonly associated with LD, such as hyponatremia and diarrhea [12].

Legionella pneumophila can have a variety of clinical manifestations, from coughs, purulent sputum production, headache, GI symptoms, fever, chills, and confusion. *Legionella pneumonia* is associated with bradycardia, hypoxemia, hyponatremia, pleurisy, and transaminitis [9-12]. This patient's clinical manifestations included some of the above and, plus more, worsened after the first 24 h after admission to the ICU until the end of his hospital stay. His presentations were typical for Legionellosis, although the patient's age was 41, and he had no underlying medical conditions.

Treatment of *Legionella pneumonia* is either a fluoroquinolone or a newer macrolide as first-line treatment or a combination of both for severe cases since they have similar effectiveness for reducing mortality [12,13].

CONCLUSION

This case emphasizes *Legionella pneumophila* can be deadly to any healthy and young patient such as this one. The disease can deteriorate and cause death in a matter of days. However, with the most appropriate treatments and monitoring, his condition only got worse. Thus, the importance of early detection and initiation of therapeutic interventions to prevent severe and deadly outcomes cannot be overstated. However, the patient didn't present with cough, abdominal pain, shivering chills, or fatigue in the early stage of his disease, which led to the delay in coming to the hospital to get medical treatment. It is crucial to educate the public about occupation, possible exposure *Legionella pneumophila*, and its early clinical presentations.

CONTRIBUTORS

The author wrote and edited the manuscript. The author approved the final version of this manuscript and is responsible for all aspects of this study.

COMPETING INTERESTS

None stated.

FUNDING

None.

REFERENCES

1. Brady MF, Awosika AO, Nguyen AD, Sundareshan V (2024) Legionnaires Disease. [Updated 2024 Feb 24]. In: Stat Pearls [Internet]. Treasure Island (FL): Stat Pearls Publishing.
2. Cunha BA, Burillo A, Bouza E (2016) Legionnaires' disease. *Lancet* 387(10016): 376-385.
3. Den Boer JW, Nijhof J, Friesema I (2006) Risk factors for sporadic community-acquired Legionnaires' disease. A 3-year national case-control study. *Public Health* 120(6): 566-571.
4. Jasper AS, Musuza JS, Tischendorf JS, Stevens VW, Gamage SD, et al. (2021) Are fluoroquinolones or macrolides better for treating *Legionella Pneumonia*? A systematic review and meta-analysis. *Clin Infect Dis* 72: 1979-1989.
5. Khan MS, Baloch L, Borja JB (2021) Covid-19 Infection and Pneumomediastinum. *Chest* 160(4): A937.
6. Kenagy E, Priest PC, Cameron CM, Smith D, Scott P, et al. (2017) Risk Factors for *Legionella long beachae* Legionnaires' Disease, New Zealand. *Emerg Infect Dis* 23(7): 1148-1154.
7. Metlay JP, Waterer GW, Long AC, Anzueto A, Brozek J, et al. (2019) Diagnosis and treatment of adults with community-acquired pneumonia. An official clinical practice guideline of the American thoracic society and infectious diseases society of America. *Am J Respir Crit Care Med* 200: e45-67.
8. Miyashita N, Horita N, Higa F, Aoki Y, Kikuchi T, et al. (2018) Diagnostic predictors of *Legionella pneumonia* in Japan. *J Infect Chemother* 24(3): 159-163.
9. Nakano Y, Saka K, Yamane F, Sano C, Ohta R (2022) A Case of *Legionella Pneumonia* in an Older Patient without Typical Exposure to a Susceptive Environment. *Cureus* 14(7): e27541.
10. Rello J, Allam C, Ruiz-Spinelli A, Jarraud S (2024) Severe Legionnaires' disease. *Ann Intensive Care* 14(1): 51.
11. Schuetz P, Haubitz S, Christ-Crain M, Albrich WC, Zimmerli W, et al. (2013) Hyponatremia and anti-diuretic hormone in Legionnaires' disease. *BMC Infect Dis* 13: 585.
12. Viasus D, Gaia V, Manzur-Barbur C, Carratalà J (2022) Legionnaires' disease: Update on diagnosis and treatment. *Infect Dis Ther* 11: 973-986.