



DOI: 10.5505/ajfamed.2024.25744

AJFAMED 2024;7(2):77–81

A Case of Legionnaire's Disease

Seval Sarıkaya,¹ Emel Ceylan²¹Clinic of Family Medicine, Oltu State Hospital, Erzurum, Türkiye²Department of Chest Diseases, Aydın Adnan Menderes University, Aydın, Türkiye

ABSTRACT

This case report aims to provide up-to-date information about the conditions requiring hospitalization in primary health-care services in cases of *Legionella* pneumonia. This case was a 66-year-old woman with a history of smoking who admitted to the emergency department with increasing dyspnea and fatigue. On physical examination, he appeared dyspneic and tachypneic, and on auscultation, inspiratory rales and bilateral widespread expiratory rhonchi were detected. C-reactive protein was 324.3 mg/L, leukocytosis was 10980 10³/mm³, and neutrophil-dominated (90.2%). There was a respiratory failure according to the arterial blood gas analysis (PO₂: 57.3 mmHg, HCO₃⁻: 25.7 mEq/L, PCO₂: 33.6 mmHg, SO₂: 91.3%). Moxifloxacin (400 mg 1×1) and oseltamivir (75 mg 2×1) peroral empirically were initiated because of pneumonia, and additionally inhaler steroid and bronchodilator treatments (Salmeterol+flutikazon 50/500 mcg twice daily) for bronchitis. However, on the third day of follow-up, 40 mg methylprednisolone parenterally was added to the treatment because of bronchospasm and dyspnea continued despite bronchodilator therapy, and additionally parenteral ampicillin-sulbactam (4x1 gr.) was started to expand the spectrum of Gram-positive bacteria. *Legionella* was detected as the causative pathogen by viral and bacterial sampling of the airways with PCR. Low awareness about the disease may cause serious mortality and morbidity in patients presenting with a vague clinical picture in the early stages.

Keywords: Infectious diseases, legionnaire's disease, primary healthcare



Please cite this article as:

Sarıkaya S, Ceylan E. A Case of Legionnaire's Disease. AJFAMED 2024;7(2):77–81.

Address for correspondence:

Dr. Seval Sarıkaya. Clinic of Family Medicine, Oltu State Hospital, Erzurum, Türkiye
Phone: +90 530 211 03 50
E-mail: dr-svs@hotmail.com

Received Date: 29.11.2023

Revision Date: 09.12.2023

Accepted Date: 27.08.2024

Published online: 02.09.2024

©Copyright 2024 by Anatolian Journal of Family Medicine - Available online at www.AJFAMED.org

OPEN ACCESS



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

INTRODUCTION

Legionella is a Gram-negative bacterium and caused a major pandemic in 1976.^[1] First identified in 1977, *Legionella* bacteria is a common cause of community-based pneumonia.^[2] It is an intracellular pathogen of freshwater protozoa and uses a similar mechanism when infecting human phagocytic cells.^[3] *Legionella* is becoming increasingly significant as a public health problem all over the world. Although it is a rarely reported disease, its incidence has been documented to be on an increasing trend.^[4] It is one of the most reported waterborne pathogens in industrialized countries. It often colonizes water ecosystems, interacts with many other resident microorganisms, and remains in biofilms.^[5] Cough, fever, gastrointestinal symptoms, hyponatremia, and impaired liver function tests are the most common clinical and laboratory features.^[6] In clinical practice, to confirm the diagnosis, *Legionella* antigen is examined in the urine taken from the patient, and the sputum or bronchial alveolar lavage samples are evaluated by molecular polymerase chain reaction (PCR) methods to investigate the bacterial genetic structure. In the studies conducted, diagnosis is obtained by patient sample cultures such as sputum and bronchial lavage.

This case report aims to provide up-to-date information about the conditions requiring hospitalization in primary health-care services in cases of *Legionella* pneumonia.

CASE REPORT

A 66-year-old female patient living in the Kuşadası district of Aydın province was diagnosed with acute bronchitis and lower respiratory tract infection at a secondary health-care facility when she visited five days ago due to cough and difficulty in breathing. She was started on inhaled salmeterol+fluticasone propionate 50/500 micrograms twice daily for bronchitis and oral cefuroxime axetil 500 mg twice daily for lower respiratory tract infection. The patient applied to the emergency department of our university hospital due to the lack of improvement in her general condition and the increase in difficulty in breathing. The patient, who experienced a fever once at home, had a cough and difficulty in expectoration. Sputum was white in color and the amount of one cup a day. In her medical history, it was revealed that her summer house had a pool, and her complaints started when she went there. She had no lung pathology known in her background. She had pneumonia in her childhood and a history of cerebrovascular disease 6 years ago. She had had prosthetic surgery on both knees. She was using antidepressants (sertraline 100 mg 1×1). She was also an active smoker who had a smoking history of 72 packages/year. In her family history, there was a history of colon cancer in her son and breast cancer in her grandmother.

In the physical examination; her general condition was good, she was oriented-cooperative, had a fever of 38.1°C, pulse of 107/min, arterial blood pressure of 147/115 mmHg, respiratory rate of 22/min, and saturation (without oxygen) of 89%. In her respiratory system examination, tachypneic, dyspneic, inspiratory rales in the right mid-lower zone, and bilateral expiratory rhonchi were revealed. The patient, whose other system examinations were normal, was admitted to the pulmonary diseases department, as 2 points were determined by the CURB-65 pneumonia scoring. Laboratory parameters of the patient at admission are summarized in Table 1. The patient's cardiothoracic ratio was increased, her right hemidiaphragm was elevated, both hiluses were full, and there were interstitial reticular infiltrates in the mid-lower zones in her chest radiograph at the first admission. The chest X-ray of the patient at the time of admission is shown in Figure 1.

Treatment was started empirically, considering atypical pneumonia according to the current radiological and clinical findings. Since the patient did not respond to the oral treatment, intravenous infusion and moxifloxacin were started as of her hospitalization. However, considering the possible risk of influenza infection due to extensive lung infiltration, oral oseltamivir was also started and used for 5 days until the viral PCR result was obtained. Besides, con-

Table 1. Laboratory parameters of the patient at admission

	On first application	Normal range
Hemogram		
Hemoglobin (g/dL)	12.2	11.2-15.7
Hematocrit (%)	35.6	34.1-44.9
Erythrocyte (10 ⁶ /mmv)	4.31	3.93-5.22
Leukocyte (10 ³ /mm ³)	10980	3.98-10.04
Neutrophil (10 ³ /mm ³)	9890	1.56-6.13
Neutrophil (%)	90.2	34-71.1
Lymphocyte (10 ³ /mm ³)	740	1.18-3.74
Lymphocyte (%)	6.7	19.3-51.7
Monocyte (10 ³ /mm ³)	1.80	0.24-0.86
Platelet (10 ³ /mm ³)	207	180-370
Biochemistry		
Blood glucose (mg/dl)	164	70-105
Urea (mg/dl)	60	13-43
Creatine (mg/dl)	0.84	0.57-1.11
Na (mEq/L)	142	136-145
K (mEq/L)	3.2	3.5-5.1
AST (U/L)	24	5-34
ALT (U/L)	25	<55
Indicators		
CRP (mg/L)	324.3	0-5
Pro-BNP (pg/ml)	113.3	0-100
Coagulation		
aPTT	25.7	25.4-38.4
PT (min)	13.3	8-13.5
INR	1.01	0.8-1.2
Urine analysis		
Density	1.022	1.005-1.03
pH	6.0	5-9
Leukocyte esterase	1 Positive	Negative
Protein	2 Positive	Negative
Erythrocyte	1	0-3
Leukocytes	10	0-5
Blood gas		
pH	7.478	6.3-8
PO ₂ (mmHg)	57.3	80-100
HCO ₃ (mEq/L)	25.7	22-26
PCO ₂ (mmHg)	33.6	35-45
SO ₂ (%)	91.3	94-98

sidering the symptoms and physical examination findings and bronchial hyperreactivity, the patient was also given inhaler steroid and bronchodilator nebulizer treatments. During the follow-up process, no fever was detected during the hospitalization of the patient. Since bronchospasm



Figure 1. Chest X-ray of the patient at the time of admission.

and dyspnea continued despite bronchodilator treatment, 40-mg methylprednisolone was started parenterally on the 3rd day of treatment. Considering the fact that the clinical course was severe and other typical pneumonia agents could also play a role in the pneumonia picture, ampicillin-sulbactam (4×1 g) was started parenterally to expand the spectrum of Gram-positive bacteria.

On the 7th day of the treatment, the respiratory tract bacterial PCR evaluation was concluded, and it was reported that *Legionella* was detected. There was no growth in blood and sputum cultures. Laboratory parameters of the patient during treatment are summarized in Table 2. Due to steroid use, leukocytosis was observed to persist, however, improvements were seen in C-reactive protein and other laboratory data including neutrophil, lymphocyte, and monocyte percentages. On the 7th day of the treatment, the patient's radiograph revealed almost complete regression on the right and partial regression on the left. Chest X-ray in 7 days during the treatment of the patient is shown in Figure 2. As a result, at the end of the 8th day, it was determined that

Table 2. Laboratory parameters of the patient during treatment

	On the 7 th Day of Treatment	On the 21 st Day of Treatment	Normal Range
Hemogram			
Hemoglobin (g/dL)	11.4	11.5	11.2–15.7
Hematocrit (%)	34.5	34.3	34.1–44.9
Erythrocyte (10 ⁶ /mm ³)	4.07	4.18	3.93–5.22
Leukocyte (10 ³ /mm ³)	14950	5790	3.98–10.04
Neutrophil (10 ³ /mm ³)	10550	3220	1.56–6.13
Neutrophil (%)	70.7	55.6	34–71.1
Lymphocyte (10 ³ /mm ³)	3710	2000	1.18–3.74
Lymphocyte (%)	24.8	34.2	19.3–51.7
Monocyte (10 ³ /mm ³)	5.80	0.33	0.24–0.86
Platelet (10 ³ /mm ³)	278	396	180–370
Biochemistry			
Blood glucose (mg/dL)	149		70–105
Urea (mg/dL)	58		13–43
Creatine (mg/dL)	0.7		0.57–1.11
Na (mEq/L)	141		136–145
K (mEq/L)	3.3		3.5–5.1
AST (U/L)	25		5–34
ALT (U/L)	19		<55
Indicators			
CRP (mg/L)	160	7.50	0–5
Procalcitonin (µg/L)	0.35		0–0.5

CRP: C-reactive protein.

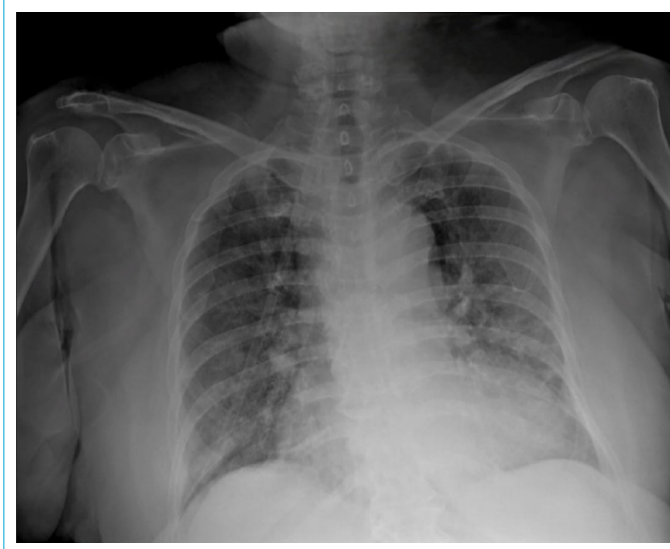


Figure 2. Chest X-ray in 7 days during the treatment of the patient (withdrawn to bed).

the patient could be discharged from the hospital due to the improvement of the clinical picture, the control of the fever, the improvement of the physical examination findings, and the disappearance of the oxygen requirement. Oral moxifloxacin (400 mg 1×1) was prescribed for seven more days to the patient, and she was discharged from the hospital. In the radiograph taken 21 days after the start of the treatment, a complete improvement was observed in the infiltrates. Chest X-ray in 21 days during the treatment of the patient is shown in Figure 3.

DISCUSSION

Legionella has been detected in artificial water ecosystems, including wastewater purifying installations, cooling towers, and drinking water systems. It is found in higher concentrations, especially in drinking water and building installation systems.^[5] *Legionella* is not only found in nature, but also in waterborne biofilms commonly found in medical and dental equipment, and it may even cause epidemics.^[7]

In a 56-year-old male case reported in the literature, due to such symptoms and signs as high fever, dry cough, hypoxia, speech disorder, and difficulty in cooperation and orientation, the patient was hospitalized, examined, and treated.^[8] His lifestyle and history of habits were deepened since he used oral amoxicillin/clavulanate for 4 days because of fever and cough a week before his history and as his complaints did not improve. It was found out that the patient stayed at the hotel for a few days due to travel a week before the start of his complaints, and *Legionella* was detected in the water samples taken from the hotel where he stayed. In this case, just as in our case, *Legionella* was not considered the primary diagnosis, and the patient had to be hospitalized and diag-

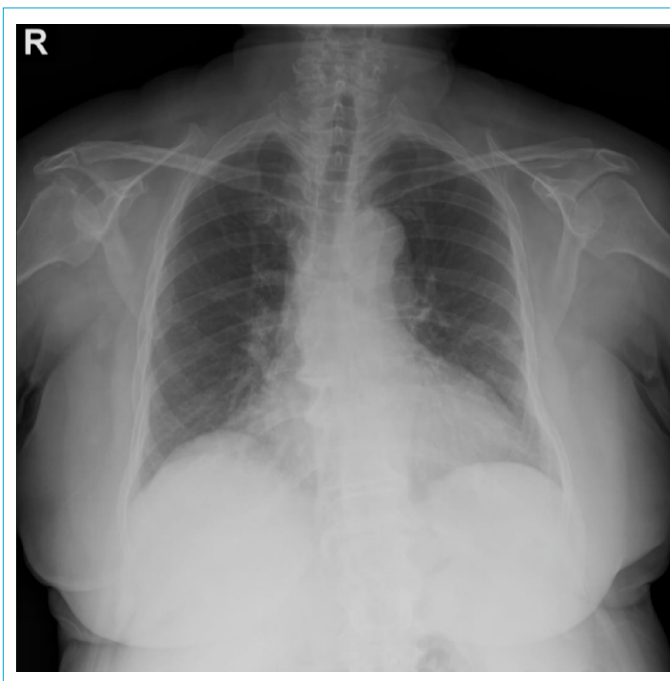


Figure 3. Chest X-ray in 21 days during the treatment of the patient.

nosed as there was no positive response to the treatment. However, upon deeper investigation of the medical history, it was determined that *Legionella*, which lives in stagnant water, originated from the pool.

Legionnaire's disease may present with different clinical courses and result in a poor prognosis.^[9] In the literature, two cases have developed acute respiratory illness syndrome after hospitalization. The first case was a 54-year-old male tourist with diabetes. He applied to the hospital with complaints of high fever and diarrhea. The second case is an 82-year-old female patient with diabetes who had complaints of respiratory distress, high fever, diarrhea, and altered consciousness. In the first case, fever response was obtained on the 11th day and healing was obtained, whereas the second case passed away on the 7th day.

In another case report, as a result of worse cardiac functions, a diagnosis of acute myocarditis was made in an 81-year-old male patient who applied to the emergency with high fever, cough, unsteadiness in walking, and confusion, and *Legionella* antigen test positive was detected in his urine.^[10] The patient, whose complaints regressed with antibiotic treatment, was transferred to his country by air ambulance on the 10th day and was discharged from the hospital in his country with recovery.^[10]

As in these case reports, *Legionella* pneumonia may present in different clinical manifestations such as diarrhea and confusion, the disease may be treated or may progress so severely that it may result in death.^[11] Early diagnosis and

treatment will be lifesaving. Various objective criteria and indices have been defined to minimize diagnosis and treatment difficulties, assess the severity of pneumonia, and determine indications for hospitalization in severe clinical pictures. In our case report, the CURB-65 score was determined as 2 due to high urea level and age criteria, and hospitalization was found appropriate.

CONCLUSION

Legionnaire's disease, which has a false but permanent status as an exotic plague, cannot be diagnosed mostly due to a lack of clinical awareness.^[3] This case report draws clinical attention to *Legionella* pneumonia, which can lead to serious clinical consequences and public health problems. *Legionella* pneumonia, which may also cause regional epidemics due to the increased risk of contact with an infected water source in the spring and summer seasons, is a disease that should be kept in mind in the distinguishing diagnosis of atypical pneumonia. Although it is possible to treat the disease in a primary care institution, in severe clinical cases it is extremely important to refer the patient to secondary or tertiary care institutions and, if possible, to isolate the agent.

Disclosures

Informed Consent: Verbal consent was obtained.

Conflict of Interest: There is no conflict of interest.

Peer-review: Externally peer-reviewed.

Financial Disclosure: There is no financial support.

Funding: None.

Authorship contributions: Concept – S.S., E.C., Design – S.S., E.C., Supervision – S.S., E.C., Materials – S.S., E.C., Data collection and/or processing – S.S., E.C., Analysis and/or interpretation – S.S., E.C., Literature search – S.S., E.C., Writing – S.S., E.C., Critical Review – S.S., E.C.

REFERENCES

1. Wang C, Chuai X, Liang M. Legionella feeleii: Pneumonia or Pontiac fever? Bacterial virulence traits and host immune response. *Med Microbiol Immunol* 2019;208(1):25–32.
2. Cunha BA, Burillo A, Bouza E. Legionnaires' disease. *Lancet* 2016;387(10016):376–85.
3. Fields BS, Benson RF, Besser RE. Legionella and Legionnaires' disease: 25 Years of investigation. *Clin Microbiol Rev* 2002;15(3):506–26.
4. Viasus D, Gaia V, Manzur-Barbur C, Carratalà J. Legionnaires' disease: Update on diagnosis and treatment. *Infect Dis Ther* 2022;11(3):973–86.
5. Cavallaro A, Rhoads WJ, Huwiler SG, Stachler E, Hammes F. Potential probiotic approaches to control Legionella in engineered aquatic ecosystems. *FEMS Microbiol Ecol* 2022;98(8):fiac071.
6. Mercante JW, Winchell JM. Current and emerging legionella diagnostics for laboratory and outbreak investigations. *Clin Microbiol Rev* 2015;28(1):95–133.
7. Atlas RM. Legionella: From environmental habitats to disease pathology, detection and control. *Environ Microbiol* 1999;1(4):283–93.
8. Akinci E, Baran G, Erbay A, Çolpan A, Afacan G, Bodur G. Legionnaires' disease: A case report. *Türkiye Klinikleri J Microbiol-Infec* [Article in Turkish] 2003;2(1):28–31.
9. Erdoğan H, Arslan H. Acute respiratory distress syndrome caused by legionnaires' disease: Two case reports. *Med J Bakırköy* [Article in Turkish] 2018;14(1):146–50.
10. Erdoğan H, Eldem HO. A patient with suspected myocarditis associated with legionnaires' disease: A case report and review of the literature. *Mediterr J Infect Microb Antimicrob* 2017;6:2.
11. İlhan G, Karakaya Z, Akyol PY, Topal FE, Payza U. Evaluation of PSI and CURB-65 scoring systems which patients were diagnosed as community-acquired pneumonia in emergency department. *CMJ* 2017;39(3):586–96.