

An Interesting Case Report of Legionnaires' Disease and Acute Kidney Injury: A Case Report

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ABSTRACT

Background: *Legionella* is a bacterial pathogen well-known for causing atypical pneumonia. However, extrapulmonary manifestations like rhabdomyolysis and acute kidney injury (AKI) are uncommon. There have been <50 case reports to date of extra-pulmonary *Legionella* and AKI.

Case description: We report a 54-year-old patient with Legionnaire's disease who presented with severe rhabdomyolysis and AKI. Patient was managed with hydration, intravenous antibiotics and hemodialysis.

Conclusion: Timely diagnosis and management are essential to improve outcomes in this potentially fatal condition.

Keywords: Acute kidney injury, Atypical pneumonia, Case report, Legionnaire's disease, Rhabdomyolysis.

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INTRODUCTION

There has been a rising incidence of pneumonia caused by atypical infections. *Legionella* is the second most common cause of community-acquired atypical pneumonia.^{1,2} However, it can also have uncommon presentations like rhabdomyolysis. This report highlights the importance of early detection and management of such complicated clinical situations.

CASE DESCRIPTION

A 54-year-old British national, lawyer by occupation, premorbidly obese (body mass index: 44 kg/m²) and hypertensive on amlodipine 10 mg once a day presented with a history of fever and rigors for 3 days, severe bodyache for 2 days and oliguria for 1 day. He had no history of recent travel or exposure to sick contacts. On examination, he had a fever of 39.5°C, sinus tachycardia (heart rate 124/minute), hypotension (blood pressure: 90/60), and respiratory distress with hypoxia (respiratory rate 24/minute, oxygen saturation 91% on room air). Investigations revealed that he had right lower lobe pneumonia with rhabdomyolysis and acute kidney injury (AKI) complicated by hyperkalemia and metabolic acidosis. Detailed investigations are listed in Table 1. He required noninvasive ventilation and inotrope support for fluid-refractory shock. Broad-spectrum antibiotics were started for pneumonia, and the patient required continuous renal replacement therapy (CRRT) for AKI. He gradually improved over the next 3 days and was weaned off CRRT to intermittent hemodialysis thrice a week. Differential diagnoses considered were *Legionella pneumophila*, *Streptococcus pneumoniae*, *Staphylococcus aureus*, severe acute respiratory syndrome coronavirus 2, and influenza. *Legionella* antigen was isolated in urine, and he responded well to a 2-week course of fluoroquinolones. His rhabdomyolysis recovered slowly over 2 weeks, and hemodialysis was stopped after 3 weeks from onset of illness. He regained normal kidney function 3 weeks later.

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DISCUSSION

Legionella is a gram-negative, intracellular bacterium that invades and replicates in alveolar macrophages, causing pneumonia. Outbreaks are associated with inhalation of contaminated aerosolized water droplets from swimming pools, air-conditioners, cooling towers, hot tubs, humidifiers, medication nebulizers, or potting soil.¹ Older adults, smokers, immunocompromised people and those with preexisting lung diseases are particularly susceptible to Legionnaires' disease. *Legionella* causes 2–15% of cases of community-acquired pneumonia and is the second most common cause of pneumonia requiring intensive care treatment.² Albeit rare, it can have extrapulmonary involvement in other organs, including

Table 1: Investigations

Hemoglobin/white blood cell/platelet	14.6/12,300/172,000
Peripheral smear	Leukocytosis+, neutrophilia+, toxic granules+ shift to left
Creatinine (mg/dL)/urea	11.2/230
Sodium/potassium/chloride/ bicarbonate (mEq/L)	130/3.3/94/13
Calcium/phosphorous/uric acid (mg/dL)	6.8/10.1/8.9
Serum glutamic-oxaloacetic transaminase/serum glutamate pyruvate transaminase/bilirubin (IU/L)	659/348/ 0.6
Protein/albumin/globulin (gm/dL)	5.4/3.0/2.4
C-reactive protein/procalcitonin	343/0.93
Creatine phosphokinase (U/L)	> 39,000
T3/T4/TSH (SI)	0.56/4.5/3.9
Anti- <i>Legionella</i> antibody (EIA)	3.14 (0–0.9)
Anti- <i>Mycoplasma</i> antibody: immunoglobulin M	Negative
Urine routine	Protein: 1+, occult blood: 4+, 5–10 red blood cells per high power field, casts+
Urine myoglobin (ng/mL)	54 (0–13)
Urine <i>Legionella</i> antigen (IFA)	Positive

EIA, enzyme immunoassay; IFA, immunofluorescence assay

the integumentary (skin and soft tissue infection), musculoskeletal (septic arthritis, osteomyelitis, or rhabdomyolysis), cardiovascular (myocarditis or pericarditis), gastrointestinal (peritonitis), renal (pyelonephritis), and neurological (meningitis or brain abscess) systems.³ *Legionella*-induced rhabdomyolysis is a rare association, with few published cases in the literature since 1980.⁴ The pathophysiology of *Legionella*-induced rhabdomyolysis remains unclear. One theory postulated a mechanism of a direct bacterial infection into myocytes, similar to that of influenza virus.⁵ Another theory suggested the release of bacterial endotoxin into the bloodstream, causing a vasoconstrictive effect and local ischemic damage to myocytes.^{4,6} Management of the rhabdomyolysis with AKI is aggressive isotonic fluid administration and correction of etiological factors. The first-line treatment of Legionnaires' disease is empiric therapy with fluoroquinolones or macrolide monotherapy or in combination with β -lactams after ruling out *Streptococcus* species by bacterial culture. Antibiotic selection varies with infection severity and involvement of extrapulmonary sites. The minimum duration of therapy is 5–7 days for clinically stable patients, whereas severe infections require 10–14 days of therapy.⁷ Rhabdomyolysis caused by any bacteria is associated with

high mortality and morbidity, with 57% of cases leading to AKI and 38% of cases leading to death.⁸ The mortality rate associated with community-acquired and nosocomial Legionnaire's diseases is 42 and 79%, respectively.⁸

CONCLUSION

A high index of suspicion is needed to initiate early and aggressive management in this potentially fatal condition. It is important for healthcare providers to recognize this clinical triad of *Legionella pneumonia*, rhabdomyolysis, and renal failure, as timely management can reduce disease-associated morbidity and mortality.

Clinical Significance

Legionnaire's disease is associated with fatal complications like myocarditis, rhabdomyolysis, pyelonephritis, and AKI. Early diagnosis in vulnerable populations can help in timely management and improve patient outcomes.

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