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Case Report

Legionnaires' disease following cave diving in Thailand: A case report of travel-associated atypical pneumonia in a young adult

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Abstract

Background: *Legionella pneumophila* is a waterborne pathogen responsible for Legionnaires' disease, a severe atypical pneumonia. Travel to endemic regions and exposure to contaminated water are known risk factors.

Case Summary: A 39-year-old previously healthy male presented with prolonged fever, cough, and dyspnea following cave diving in Thailand. Chest CT showed bilateral patchy opacities suggestive of atypical pneumonia. Urinary antigen testing confirmed *Legionella pneumophila* serogroup 1 infection. The patient responded well to intravenous levofloxacin and was discharged with complete recovery.

Conclusion: Legionnaires' disease should be considered in returning travellers with pneumonia and aquatic exposure. This case highlights the importance of exposure history and targeted diagnostic testing.

Keywords: *Legionella pneumophila*, Legionnaires' disease, Pneumonia, Atypical, Urinary antigen tests, Diving.

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1. Introduction

Legionnaires' disease, caused primarily by *Legionella pneumophila*, is a potentially severe form of community-acquired atypical pneumonia transmitted via inhalation of aerosolized contaminated water.[1] While nosocomial and hotel-associated outbreaks are well-documented, sporadic travel-related infections, particularly in tropical regions with suboptimal water sanitation, are increasingly reported.[2] Timely recognition and early administration of appropriate antibiotics are key to improving outcomes.

We present a case of travel-associated Legionnaires' disease in a healthy young adult following cave diving in Thailand, emphasizing the diagnostic approach, management, and clinical learning points for practicing pulmonologists.

2. Case Presentation

A 39-year-old male with no prior comorbidities presented with a one-month history of high-grade fever, dry cough, dyspnea, and fatigue. He denied chest pain, hemoptysis, or wheezing. Ten days before symptom onset, he had engaged in cave swimming in freshwater pools in Thailand during a two-week trip.

On admission, he was febrile (101°F), tachycardic (110 bpm), tachypnoeic (24 breaths/min), and maintained an oxygen saturation of 92% on room air. Chest auscultation revealed bilateral basal crackles.

Laboratory investigations revealed leucocytosis (WBC 11,800/mm^3 with 84% neutrophils), elevated CRP (158 mg/L), procalcitonin (1.5 ng/mL), hyponatremia (130 mmol/L), mildly elevated transaminases (AST 64 U/L, ALT 70 U/L), and raised LDH. HIV and viral hepatitis serologies were negative.

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High-resolution CT of the chest showed bilateral lower-lobe-predominant ground-glass opacities, patchy consolidation, and centrilobular nodules, with no pleural effusion or lymphadenopathy, suggestive of atypical pneumonia. **(Figure 1)**

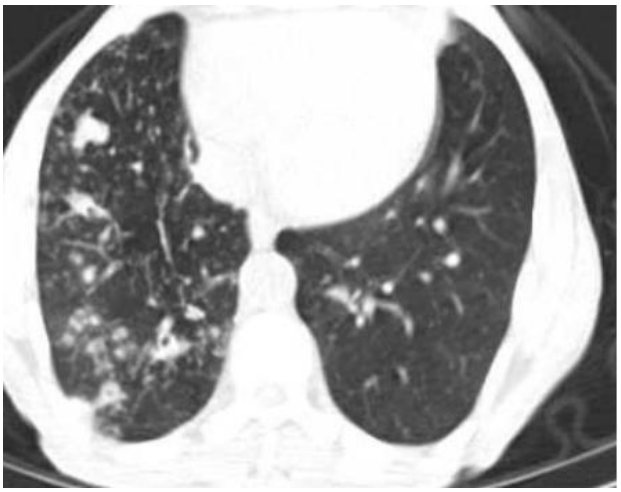

Figure 1: CT thorax showing right lower lobe ground-glass opacities (GGO) with patchy consolidation

Microbiological investigations including blood cultures, sputum Gram stain and culture, respiratory viral PCR, and bronchoalveolar lavage (BAL) were non-contributory. Given his recent freshwater exposure and supportive laboratory abnormalities, a urinary antigen assay for *Legionella pneumophila* was performed at a reference laboratory using a rapid lateral-flow immunochromatographic test that detects the lipopolysaccharide antigen of *L. pneumophila* serogroup 1 in urine, which turned out to be positive.

The patient was started on intravenous levofloxacin 750 mg once daily, along with supportive care. He showed marked improvement within 72 hours, became afebrile, and was discharged on oral levofloxacin to complete a 7-day course. At follow-up, he remained asymptomatic and had fully recovered.

3. Discussion

Legionnaires' disease constitutes 2–15% of hospitalized community-acquired pneumonia (CAP) cases, although this figure is likely underestimated due to limitations in diagnostic testing and clinical recognition.[3] The primary mode of transmission is inhalation of aerosolized water droplets containing *Legionella* organisms, which may originate from both manmade systems (air conditioning units, spas, plumbing) and natural freshwater environments.[4] In tropical countries such as Thailand, the warm, humid climate and prevalence of biofilm-rich aquatic habitats create ideal conditions for Legionella colonization.[5] This highlights the significant risk of infection following activities like cave diving or freshwater swimming in such regions.

Clinical suspicion for *Legionella* infection should be heightened when evaluating patients with atypical pneumonia presenting with extrapulmonary manifestations such as hyponatremia, elevated hepatic transaminases, gastrointestinal symptoms, or neurological features.[6,7] These signs often precede or accompany pulmonary findings and may guide early empiric therapy when microbiological results are pending. In our patient, the constellation of hyponatremia, transaminitis, and persistent fever in the absence of an identifiable pathogen raised suspicion for atypical organisms, leading to targeted testing.

The urinary antigen test is a rapid and highly specific method for detecting *L. pneumophila* serogroup 1, which accounts for over 80% of reported Legionnaires' disease cases.[5,8] However, its inability to detect other serogroups or species necessitates additional testing in high-risk or outbreak scenarios. Culture on buffered charcoal yeast extract (BCYE) agar, though considered the diagnostic gold standard, suffers from low sensitivity and prolonged turnaround time.[9] Newer molecular techniques, including PCR and multiplex respiratory panels, offer improved sensitivity and broader detection capabilities but may be limited by availability and cost, particularly in resource-limited settings.[10,11]

Antimicrobial treatment must account for the intracellular nature of Legionella. Fluoroquinolones, such as levofloxacin or moxifloxacin, achieve high intracellular concentrations and demonstrate superior bactericidal activity compared to macrolides, making them the preferred agents for moderate to severe cases.[7,12] Macrolides, such as azithromycin or clarithromycin, remain effective alternatives in milder cases or where fluoroquinolones are contraindicated.[13] Multiple studies have shown that delays in initiation of appropriate antimicrobial therapy significantly worsen clinical outcomes and increase hospital stay.[6,14] Thus, empiric inclusion of atypical coverage is critical in CAP patients with relevant exposure history or systemic features.

This case underscores the value of comprehensive exposure history and maintaining a high index of suspicion for atypical pathogens in travellers presenting with pneumonia. Clinicians should proactively inquire about recreational water exposure, especially in tropical settings, and consider early urinary antigen testing where *Legionella* is suspected.

4. Conclusion

Legionnaires' disease should be suspected in patients with atypical pneumonia and a history of recent travel or exposure to natural water sources. Early recognition, detailed exposure history, and targeted diagnostic tests such as urinary antigen testing are critical. Empiric antimicrobial therapy with coverage for atypical pathogens, particularly fluoroquinolones, can lead to rapid recovery and prevent complications.

5. Authors Contributions

Aishwarya Alavandar: Writing – original draft;
Jayamol Revendran: Conceptualization;
Ghanshyam Verma: Supervision.

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7. Conflict of Interest

The authors declare that they have no conflicts of interest related to this publication.

8. Patient Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

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