

A Fatal Fulminant Legionella Pneumonia in Which CT Findings Had Been Negative the Previous Day

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Abstract This is a case of fatal fulminant Legionella pneumonia in which the chest computed tomography findings had been negative the previous day. A repeated examination may be necessary to detect new lesions in the lung fields and obtain clues for a correct diagnosis of patients with a compromised status.

Keywords: Legionella; pneumonia, computed tomography, compromised host

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1. Introduction

Legionella spp. are Gram-negative bacteria recognized as a common cause of community-acquired pneumonia. Water is the major natural reservoir for Legionella, and the pathogen is found in many different natural and artificial aquatic environments. [1,2,3] Legionnaires' disease is an atypical pneumonia, and multisystem manifestations mainly affect susceptible patients as a result of an older age, underlying debilitating conditions, or immunosuppression. The incubation period is roughly 2–14 days. [1,2,3]

We herein report a case of fatal fulminant Legionella pneumonia in which the chest computed tomography (CT) findings had been negative the previous day.

2. Case Presentation

A 67-year-old woman fell down and hurt both legs at home after fixed-period medical consultation. The patient had had active rheumatoid arthritis requiring steroids, methotrexate and etanercept, and she was immobile from old thoracolumbar fracture. Two days after the fall, a home visiting nurse found patient's reaction being dull, judged that hospital admission was required. On arrival, she was disorientated, tachycardic and had mild hypertension. Roentgen revealed bilateral leg fractures. A blood examination showed a positive inflammatory response (Table 1). The whole-body CT and culture

studies for sputum, urine and blood were performed to determine the inflammatory focus. However, the CT findings were negative (Figure 1). Urgent external fixation for the right foot joint and infusion of sulfamonomithin for prophylaxis of bacterial infection were performed. On the morning of second hospital day, her response remained dull and at around 10 o'clock, the patient developed tachypnea and required 3 L/minute of oxygen. In the early afternoon, she became unresponsive to verbal stimulation, and emergency physicians were consulted. The patient was in a deep coma with a sinking tongue root. The vital signs were as follows: heart rate, 140 beats per minute; respiratory rate, 40 breaths per minute; body temperature, 38.2°C; blood pressure and percutaneous saturation of oxygen under 10 L/minute, unmeasurable. The electrocardiogram showed sinus tachycardia. Chest CT showed a newly appearing bilateral peripheral patchy ground-glass appearance (Figure 1). A blood examination indicated leukopenia, liver dysfunction and rhabdomyolysis. The patient was diagnosed with atypical pneumonia with acute respiratory distress syndrome and septic shock. The patient underwent infusion of piperacillin/tazobactam, minocycline, gamma globulin, methylprednisolone and noradrenalin. However, the patient ultimately died around 6 o'clock that evening. Rapid assay urinary antigen test for Legionella was positive, and polymerase chain reaction for COVID-19 was negative. The results of both sets of aerobic and anaerobic blood culture bottles later revealed Achromobacter species, which had good sensitivity to piperacillin/tazobactam. Sputum cultures were negative for both Legionella and Achromobacter species.

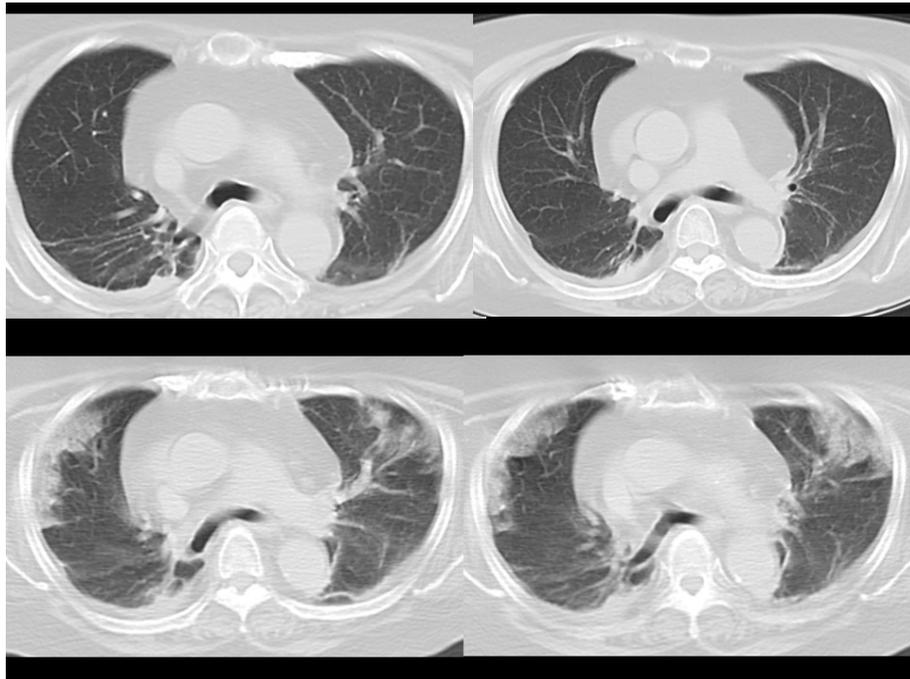


Figure 1. Chest computed tomography (CT) on arrival (upper) and the following day (lower). The CT showed clear lung fields with thin dorsal atelectasis in the supine position on arrival, but the following day, CT showed bilateral peripheral patchy ground-glass appearances

Table 1. Results of the biochemical analysis of the blood

Examination item	-2	1 st	2 nd day	unit
Total protein	6.6	6		g/dL
Albumin	3.3	2.8		g/dL
Total bilirubin	0.7	2.1	2.3	mg/dL
Aspartate aminotransferase	46	37	152	IU/L
Alanine aminotransferase	49	40	84	IU/L
Lactate dehydrogenase	209	281		IU/L
Creatine kinase	18	22	287	IU/L
Blood urea nitrogen	8.2	14.6	18	mg/dL
Creatinine	0.33	0.37	0.94	mg/dL
eGFR (ml/min/1.73 m ²)	144	127		
Sodium	137	131	134	mEq/L
Potassium	4	4.2	4.2	mEq/L
Brain natriuretic peptide	7.5	11.3		pg/mL
C reactive protein	0.08	9.24	13.4	mg/dL
Procalcitonin	0.04			ng/mL
Rheumatoid factor	x 1264			
Krebs von den Lungen-6 (<500)	494			U/mL
Ferritin	889			ng/mL
White blood cell count	10,130	14,600	3,700	/μL
Neutrophil	82	82		%
Lymphocyte	13	9		%
Hemoglobin	18.4	15.1	13.9	g/dL
Platelets	16.6	17.1	6.6	× 10 ⁴ /μL
PT-INR	1.03	1.05	1.5	
APTT	28.3	25.4	27.8	Second
D-dimer	0.9	4.5	18.3	μg/mL
pH	7.39	7.39		
Lactate	2.2	-14.1		mmol/L

PT-INR, Prothrombin time-international normalized ratio
APTT, Activated partial thromboplastin time.

3. Discussion

Although the sputum cultures were negative for *Legionella* species, the clinical manifestations and urinary antigen test (UAT) positivity led to the diagnosis of *Legionella* pneumonia.[4,5] UAT is the most commonly used method and is considered highly accurate in detecting of *Legionella pneumophila* serogroup 1, the most frequent cause of *Legionella* pneumonia. [4] The differentials included *Achromobacter* pneumonia, which grew from blood culture of the patient; however to our knowledge, its clinical manifestation following a fulminant course is rare, and there are no reports of ground glass opacification on CT with this species. [6] In addition, the present case deteriorated rapidly, despite the administration of piperacillin/tazobactam, which *Achromobacter* pneumonia should respond to, making the diagnosis unlikely. [7]

To our knowledge, this is the first case of fatal fulminant *Legionella* pneumonia in which the chest CT findings had been negative the previous day. Typical CT features of *Legionella* pneumonia include multilobar or multisegmental well-circumscribed air-space opacities intermingled with ground-glass opacities. [8] The presence of only consolidation or ground-glass opacities, as in the present case was unusual. The clinical question was when this patient contracted *Legionnaires'* disease. One possibility was, within two days prior to admission, as leukocytosis was recognized on a blood examination on arrival. *Legionnaires'* disease might had been a cause of the fall and the mild consciousness disturbance prior to admission is compatible with symptoms of *Legionella* pneumonia. However, other possibility is that the patient abruptly developed *Legionnaires'* disease due to the surgical stress.

A fulminant course of *Legionnaires'* disease has been reported in patients with a compromised system, such as in the elderly, those on hemodialysis or receiving

immunosuppressive treatments, similar to the present case. [9,10,11] An early, correct diagnosis and proper treatment are key elements for obtaining a survival outcome. [3] However, correctly diagnosing *Legionnaires'* disease in a patient without lung lesions on CT is extremely difficult. [12] Repeated examinations may be necessary to detect new lesions in the lung fields and gathering clues in order to make a correct diagnosis.

4. Conclusion

We encountered a case of fatal fulminant *Legionella* pneumonia in which the chest CT findings had been negative the previous day. A repeated imaging examination maybe necessary to gather clues for *Legionella* pneumonia for patients with a compromised system to avoid under and miss diagnosis.

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