

Lung Involvement in Leptospirosis

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We reviewed a series of 5 cases of leptospirosis treated in our hospital between 1998 and 2004 and found that lung involvement was observed in 3 of the 5 cases. All patients met the criteria for the diagnosis of leptospirosis. Weil syndrome was diagnosed in 4 patients and anicteric leptospirosis in 1 patient. The 3 patients with lung sequelae were admitted into the intensive care unit because of severe respiratory failure. All patients responded to antibiotic treatment; 3 received doxycycline and 2 received doxycycline with penicillin G.

Leptospirosis can lead to severe lung complications often requiring admission to the intensive care unit. The degree of severity is independent of the particular clinical syndrome (the anicteric form or Weil syndrome). Finally, despite the severity of the clinical picture, our patients responded to medical treatment and did not require invasive mechanical ventilation.

Key words: *Leptospirosis. Weil disease. Lung disease.*

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Afectación pulmonar en la leptospirosis

Hemos realizado una revisión retrospectiva de una serie de 5 casos de leptospirosis, en 3 de los cuales se detectó afectación pulmonar, ingresados entre 1998 y 2004 en nuestro hospital. Los 5 pacientes presentaron criterios confirmados de leptospirosis. Cuatro cumplían criterios de síndrome de Weil y el restante, de leptospirosis anictérica. Los 3 pacientes con secuelas pulmonares ingresaron en la unidad de cuidados intensivos por presentar insuficiencia respiratoria grave. Los 5 casos evolucionaron favorablemente con tratamiento antibiótico, 3 con doxiciclina y 2 con doxiciclina asociada a penicilina G.

En conclusión, en la leptospirosis hay complicaciones pulmonares graves que requieren con frecuencia ingreso en la unidad de cuidados intensivos. El estado de gravedad es independiente del síndrome clínico: variante anictérica o síndrome de Weil. Por último, a pesar de la gravedad en su forma de presentación, en nuestra experiencia la evolución es favorable con tratamiento médico, sin necesidad de ventilación mecánica invasiva.

Palabras clave: *Leptospirosis. Enfermedad de Weil. Enfermedad pulmonar.*

TABLE
Clinical Summary of 3 Cases of Leptospirosis With Lung Involvement*

	Sex Age, Years	Epidemiological Features	Clinical Presentation	Laboratory Results	Chest-X-Ray
Case 1	Male 36	Rice-field worker	Mild fever. Progressive jaundice. Biliuria. Mild hemoptysis	Urea, 143 mg/dL; creatinine, 5.76 mg/dL; total bilirubin: 21.42 mg/dL (direct: 12.13 mg/dL); arterial blood gases: pH, 7.37; PaO ₂ , 56 mm Hg; PaCO ₂ , 35 mm Hg	Alveolar interstitial image mainly in the right side of the chest
Case 2	Male 26	Crab fisherman in rice fields	Fever syndrome. Headache. Conjunctival hemorrhage. Mild jaundice. Nose bleed. Cough and feeling of breathlessness	Urea: 35 mg/dL; creatinine: 0.9 mg/dL; total bilirubin: 0.5 mg/dL; blood gases on room air: pH, 7.33; PaO ₂ , 65 mm Hg; PaCO ₂ , 40 mm Hg	Bilateral alveolar interstitial image. Diffuse infiltrates in the left side of the chest
Case 3	Male 48	Plant nursery worker	Fever syndrome and headache	Urea: 130 mg/dL; creatinine: 3.14 mg/dL; blood gases on room air: pH, 7.40; PaO ₂ , 80 mm Hg; PaCO ₂ , 23 mm Hg	

*Ig indicates immunoglobulin; ICU, intensive care unit.

Introduction

Leptospirosis is a zoonosis that affects individuals in contact with infected animals or with contaminated environments. It has a wide variety of manifestations ranging from asymptomatic forms to severe ones with serious complications involving vital organs. There are 2 distinguishable variants: *a*) Weil syndrome, involving the liver and kidneys, and characterized by high fever, jaundice, hemorrhagic diathesis, and kidney and liver failure; and *b*) the anicteric variant, manifested by nonfocal fever syndrome.¹ Pulmonary manifestations have been found in up to 70% of patients in some series although prevalence depends on the population studied (community or hospital) and if it is an endemic or epidemic situation.² The clinical and radiographic pictures of patients at presentation seem to be the result of alveolar bleeding,²⁻⁵ and hemoptysis and severe respiratory failure are associated with high mortality.^{2,4-7}

Case Description

Five cases of leptospirosis were diagnosed in our hospital between 1998 and 2004; of these we report the 3 cases with lung involvement. The diagnoses were confirmed by serology for *Leptospira* organisms through indirect immunofluorescence: immunoglobulin (Ig) M positive, seroconversion (4-fold rise in titer), or increase in IgG titer (greater than 1/512).

Case 1

The patient was a 36-year-old rice-field worker. He was admitted to the hospital for a 5-day history of mild fever, general malaise, and weight loss. Progressive jaundice and biliuria were noted. During his hospital stay he had slight hemoptysis and was tachypneic at rest (28 breaths/min). Auscultation revealed bibasilar crackles, and oxygen saturation was 90% with a fraction of inspired oxygen (FiO₂) of 0.4.



Figure 1. An alveolar-interstitial pattern mainly in the right side of the chest (case 1).

Biochemistry findings were urea, 143 mg/dL; creatinine, 5.7 mg/dL; and bilirubin, 21.4 mg/dL. Arterial blood gas results indicated partial respiratory failure (PaO₂, 56 mm Hg; PaCO₂, 35 mm Hg). A chest x-ray showed an alveolar-interstitial pattern mainly in the right side of the chest (Figure 1).

Given the hemodynamic instability and respiratory failure, the patient was admitted to the intensive care unit (ICU), where he received antibiotic treatment (100 mg/12 h of intravenous doxycycline) in addition to conventional treatment. The patient responded favorably without requiring additional ventilatory support, and he was discharged 10 days later.

Case 2

The patient was a 26-year-old crab fisherman in the rice fields. He was admitted to our hospital because of a 3-week history of fever (40 °C), chills, headache, general deterioration, light sensitivity, joint and muscle pain, and nose bleed. Upon

	Serology		Treatment	Clinical Course
	IgM	IgG		
	Initial: 1/32; convalescence: 1/256	Initial: 1/128; convalescence: 1/2048	Intravenous doxycycline. 100 mg/12 h over 10 days	Admitted to the ICU because of rapid hemodynamic deterioration. Discharged with no sequelae in 10 days
	Initial: positive. Convalescence: positive	Initial: 1/1024. Convalescence: 1/2048	Penicillin G, 20 MIU/6 h over 3 days. Intravenous doxycycline 100 mg/12 h over 10 days	Admitted to the ICU for respiratory failure and responded to treatment without needing noninvasive mechanical ventilation
	Initial: 1/128. Convalescence: 1/128	Initial: 1/1024. Convalescence: 1/512	Intravenous doxycycline 100 mg/12 h over 10 days	Admitted to the ICU for kidney failure and lung involvement (radiographic findings). Favorable outcome



Figure 2. An alveolar-interstitial infiltrate in both lungs (case 2).

admittance conjunctival hemorrhage, mild jaundice, and enlarged liver were noted. He also had a cough and moderate dyspnea.

Leptospirosis was suspected, and treatment was initiated with 20 MIU of intravenous penicillin G every 6 hours. During his stay, he was admitted to the ICU because of hemodynamic instability and respiratory failure. Tachypnea (27 breaths/min), intercostal retractions, and low oxygen saturation (PaO_2 , 65 mm Hg; saturation, 80%; and FiO_2 , 0.4) were observed, and a chest x-ray revealed alveolar-interstitial infiltrates in both lungs (Figure 2).

The patient responded to the treatment without needing noninvasive mechanical ventilation. He received treatment of intravenous doxycycline at a dosage of 100 mg/12 h over 10 days.

Case 3

The patient was a 48-year-old man who worked in wet areas (plant nurseries). He was admitted for a 1-week history of intermittent fever (40°C), severe headache involving the whole head, and joint and muscle pain. Upon arrival he was breathing normally and had good vesicular murmurs; saturation was 100% on oxygen at a flow of 1.5 L/min. Jaundiced skin and mucosa, as well as an enlarged liver were noted. At first, he showed no signs of respiratory involvement. Biochemistry findings indicated acute kidney failure (urea, 130 mg/dL; creatinine, 3.14 mg/dL).

Because of the kidney failure, he was admitted to the ICU, where a chest x-ray revealed infiltrates throughout the left side of the chest (inconsistency between the clinical and radiographic signs).

The patient responded well to treatment with intravenous doxycycline (100 mg/12 h), and he was discharged, asymptomatic, at the end of 15 days.

Discussion

The prevalence of lung involvement in leptospirosis has been reported to range from 20% to 70% in different series.² In our series the prevalence was over 50%.

The pathogenesis is not clearly defined although vascular endothelial involvement has been demonstrated to occur through an immunologic mechanism in which

the toxin acts as an antigen. The disruption of the vascular endothelium would lead to an increase in its permeability, which would in turn give rise to alveolar bleeding (demonstrated by bronchoalveolar lavage)²⁻⁵; this would explain the radiographic findings (alveolar infiltrates) and the most prominent clinical sign (hemoptysis).

The clinical presentation of leptospirosis is very diverse, ranging from asymptomatic forms with radiographic manifestations (inconsistency between clinical and radiographic features) to signs and symptoms of varying intensity, such as cough, pleuritic costal pain, dyspnea, or hemoptysis.^{2,4-7}

Lung involvement, the degree of which is unrelated to the clinical form of leptospirosis, may accompany anicteric leptospirosis or Weil syndrome.²

The typical radiographic pattern is alveolar infiltration mainly in the bases and peripheral fields. Such a pattern was observed in the cases we present. Diffuse infiltrates and alveolar-interstitial, ground glass or miliary patterns are less often observed.^{2,5}

Diagnosis requires a high index of suspicion as the clinical signs, symptoms, and the radiography are nonspecific unless they are accompanied by Weil syndrome. Diagnosis is usually confirmed by serology⁸; in our series, IgM findings were positive in all cases, seroconversion occurred (four-fold rise in titers) in 2 of the cases and an increase in IgG titer in the third. New quantitative polymerase chain reaction techniques in real time demonstrate high levels of leptospiremia, rapidly facilitating a definitive diagnosis.⁷

In patients with risk factors and respiratory signs it is important to consider a diagnosis of pulmonary leptospirosis.

Finally, in those patients admitted to the hospital for leptospirosis, lung involvement implies a worse prognosis, and the associated mortality is high.⁷ Admittance to the ICU for hemodynamic and ventilatory support is therefore necessary,^{4,5} as in the cases we have reported.

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