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An unusual case of hemoptysis: pulmonary hemorrhage in leptospirosis

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ABSTRACT

Leptospirosis is a zoonotic disease with a wide clinical spectrum, including severe cases of leptospiral pulmonary hemorrhage syndrome (LPHS). A 45-year-old male presented with fever, myalgia, headache, and hemoptysis. Physical examination revealed pallor, tachycardia, and bilateral crepitations. Laboratory findings indicated anemia, leukocytosis, thrombocytopenia, renal impairment, and hepatic dysfunction. Chest X-ray and HRCT confirmed diffuse alveolar hemorrhage. Serological testing confirmed leptospirosis. The patient was treated with intravenous ceftriaxone, mechanical ventilation, and methylprednisolone. Gradual clinical improvement was noted with resolution of symptoms. To conclude, early recognition and multidisciplinary management of LPHS are crucial. Awareness of leptospirosis in endemic regions can improve outcomes through timely intervention.

Keywords: leptospirosis, hemoptysis, thrombocytopenia, jaundice, leptospiral pulmonary hemorrhage syndrome, diffuse alveolar hemorrhage

INTRODUCTION

Leptospirosis is a zoonotic bacterial disease caused by spirochetes of the genus *Leptospira.* It is one of the most widespread zoonoses in the world, with a higher prevalence in tropical and subtropical regions due to the favorable environmental conditions for the bacteria's survival and transmission. Humans can contract the disease through direct contact with the urine of infected animals or through indirect contact with contaminated water, soil, or food [1,2].

Leptospirosis has a broad spectrum of clinical manifestations, ranging from a mild flu-like illness to severe and potentially fatal conditions [3]. The disease is often biphasic, starting with an acute septicemic phase characterized by fever, myalgia, and headache, followed by an immune phase where more severe complications can occur. These complications may include jaundice, renal failure, aseptic meningitis, and pulmonary hemorrhage. The severe form of leptospirosis, known as Weil's disease, includes jaundice, renal failure, hemorrhage, and myocarditis [4].

Pulmonary involvement in leptospirosis is not uncommon, and in some regions, it is the predominant clinical presentation. Leptospiral pulmonary hemorrhage syndrome (LPHS) is a severe form of the disease, characterized by massive pulmonary hemorrhage and high mortality rates. This condition is often underdiagnosed due to its nonspecific symptoms and the overlap with other pulmonary diseases [5].

The case reported here involves a patient presenting with bloody sputum, a rare and unusual presentation of leptospirosis. Hemoptysis, or coughing up blood, can result from various underlying conditions, including infections, malignancies, and vascular disorders. In regions where leptospirosis is endemic, it is crucial to consider this disease in the differential diagnosis of hemoptysis, especially when accompanied by systemic symptoms such as fever and myalgia.

This case highlights the importance of early recognition and prompt management of leptospirosis to prevent severe complications and improve patient outcomes. The inclusion of leptospirosis in the

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differential diagnosis of hemoptysis, particularly in endemic areas, can lead to timely treatment and potentially life-saving interventions.

PRESENTING CONCERNS

A 45-year-old male with no known comorbidities presented to the emergency department with a constellation of symptoms that had persisted for five days. Initially, the patient experienced fever, myalgia, and headache—symptoms that are common in many viral and bacterial infections, making the initial diagnosis challenging. As the illness progressed, the patient developed a cough accompanied by expectoration of blood-stained sputum, indicating hemoptysis. Hemoptysis is a concerning symptom as it often signifies a serious underlying pulmonary or systemic condition.

Upon physical examination, the patient exhibited pallor, which could be indicative of anemia or a systemic illness impacting his overall health. The presence of tachycardia suggested an acute response to infection or another form of physiological stress. Auscultation of the chest revealed bilateral crepitations, suggesting fluid or exudate in the alveoli, indicative of potential pulmonary involvement. These findings warranted further investigation due to their serious implications.

Given the severity of his symptoms, the patient was admitted to the intensive care unit for close monitoring and aggressive management. Intravenous ceftriaxone, a broad-spectrum antibiotic, was initiated immediately, targeting a potential severe bacterial infection. The patient's presentation, combined with the endemic nature of leptospirosis in the region, led clinicians to include leptospirosis high on the differential diagnosis list. Confirmatory serological testing using the Microscopic Agglutination Test (MAT) for leptospirosis returned positive, thus confirming the diagnosis.

Despite appropriate antibiotic therapy, the patient's condition did not improve as expected. He continued to exhibit high-grade fever and developed worsening respiratory distress, necessitating further evaluation to assess the extent and nature of pulmonary involvement. An echocardiogram was performed and returned normal results, effectively ruling out cardiac causes for his respiratory symptoms. High-Resolution Computed Tomography (HRCT) of the thorax was conducted next, which revealed diffuse alveolar hemorrhage—a severe and life-threatening complication associated with leptospirosis.

The diagnosis of severe pulmonary hemorrhage secondary to leptospirosis was established. This complication required intensive supportive care. The patient was managed with mechanical ventilation to address respiratory failure and intravenous methylprednisolone to control inflammation. Continued antibiotic therapy was necessary to treat the underlying leptospiral infection. Over the course of treatment, gradual clinical improvement was observed. The patient's fever resolved and his respiratory function stabilized, demonstrating the efficacy of the comprehensive management approach.

Laboratory investigations and diagnosis

The initial laboratory investigations for the patient revealed several significant abnormalities indicative of a severe systemic illness. The hemoglobin level was measured at 9.8 g/dL, which is below the normal range, indicating the presence of anemia. Anemia in this context could be multifactorial, potentially resulting from chronic inflammation, hemolysis, or bone marrow suppression. The total leukocyte count was elevated at 12,400 cells/mm^3, suggesting an ongoing inflammatory response, likely due to infection. This leukocytosis is a common finding in systemic infections and inflammatory conditions.

The platelet count was markedly low at 48,000 cells/mm^3, indicating thrombocytopenia. Thrombocytopenia can be a critical finding, especially in the context of leptospirosis, as it increases the risk of bleeding and can be indicative of disseminated intravascular coagulation (DIC), a severe complication of infections. Renal function was also impaired, as evidenced by a creatinine level of 2.6 mg/dL, which indicates renal dysfunction or acute kidney injury. Renal impairment is a well-documented complication of severe leptospirosis, often referred to as Weil's disease.

Liver function tests revealed elevated levels of total bilirubin (3.1 mg/dL), AST (122 IU/L), and ALT (108 IU/L), suggesting hepatic involvement and injury. Hepatic dysfunction in leptospirosis can manifest as jaundice and is often part of the multi-organ involvement seen in severe cases of the disease.

Radiological imaging supported the laboratory findings. A chest X-ray demonstrated bilateral infiltrates (Figure 1), consistent with pulmonary involvement. This finding aligns with the clinical symptoms of cough and hemoptysis and raises the concern for leptospiral pulmonary hemorrhage syndrome. Blood cultures were sterile, effectively ruling out bacterial sepsis and pointing towards a non-bacterial systemic inflammatory process. Ultrasonography of the abdomen revealed hepatosplenomegaly, which further supported the presence of a systemic inflammatory response and multi-organ involvement.

These combined laboratory and imaging findings were critical in guiding the clinical suspicion towards leptospirosis, particularly given the patient's geographical location and risk factors. The

comprehensive assessment underscored the severity of the condition and the need for urgent and targeted therapeutic interventions.

The chest X-ray demonstrates diffuse bilateral pulmonary infiltrates consistent with a severe and widespread pulmonary process. In the context of the patient's clinical presentation and confirmed diagnosis, these findings are indicative of diffuse alveolar hemorrhage secondary to leptospirosis. The absence of pleural effusion and a normal cardiac silhouette help narrow down the differential diagnosis, supporting the conclusion of a primarily pulmonary pathology rather than a cardiac or pleural one. This imaging result corroborates the clinical and laboratory findings, emphasizing the need for aggressive management of the underlying condition (Figure 1).

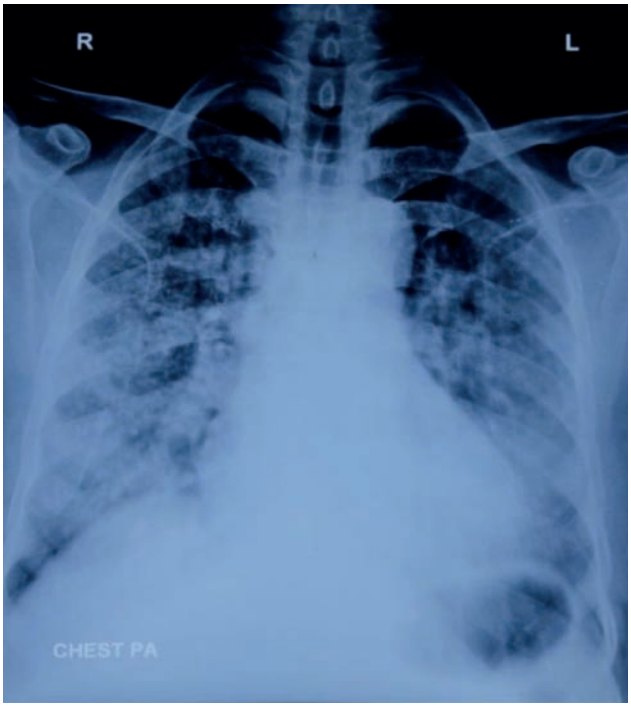

FIGURE 1. Chest X-ray PA view - bilaterally diffuse opacities present

The ECG shows sinus tachycardia, which is consistent with the patient's clinical presentation of fever, infection, and systemic inflammatory response. There are no acute ischemic changes, and the rhythm appears to be of supraventricular origin. This ECG does not show any acute life-threatening abnormalities, but it does reflect the physiological stress the patient is undergoing due to the severe systemic infection (Figure 2).

The HRCT thorax scans reveal diffuse alveolar hemorrhage, characterized by bilateral infiltrates, ground-glass opacities, and areas of consolidation. These findings are indicative of severe pulmonary involvement and corroborate the clinical diagnosis of pulmonary hemorrhage secondary to leptospirosis. The imaging results highlight the need for intensive supportive care and targeted therapeutic interventions to manage the patient's condition effectively (Figure 3).

DISCUSSION

Pulmonary involvement in leptospirosis can vary significantly, ranging from mild respiratory symptoms to the severe and life-threatening condition known as leptospiral pulmonary hemorrhage syndrome (LPHS). LPHS is characterized by massive pulmonary hemorrhage and carries a high mortality rate if not promptly recognized and treated. The pathogenesis of LPHS involves direct damage to the alveolar-capillary membrane by leptospiral antigens, which increases vascular permeability and leads to hemorrhage [6].

In this case, the patient's presentation with bloody sputum, coupled with serological and radiological findings, pointed towards a diagnosis of LPHS. Early recognition of LPHS is critical, as delayed diagnosis and treatment are associated with poor outcomes. The management of LPHS requires a multidisciplinary approach, including infectious disease specialists, pulmonologists, and critical care

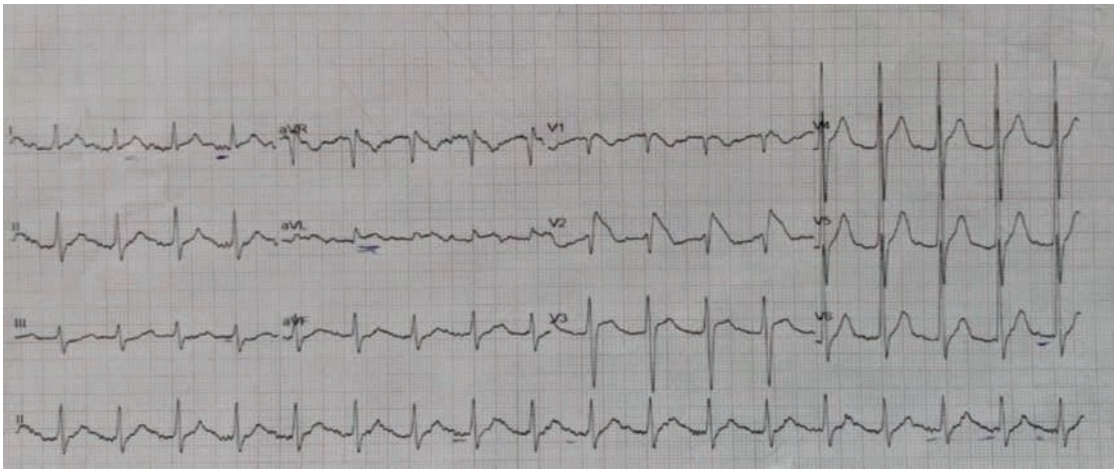

FIGURE 2. ECG - Normal sinus rhythm with ST segment coving in V1-V2 with T wave inversions

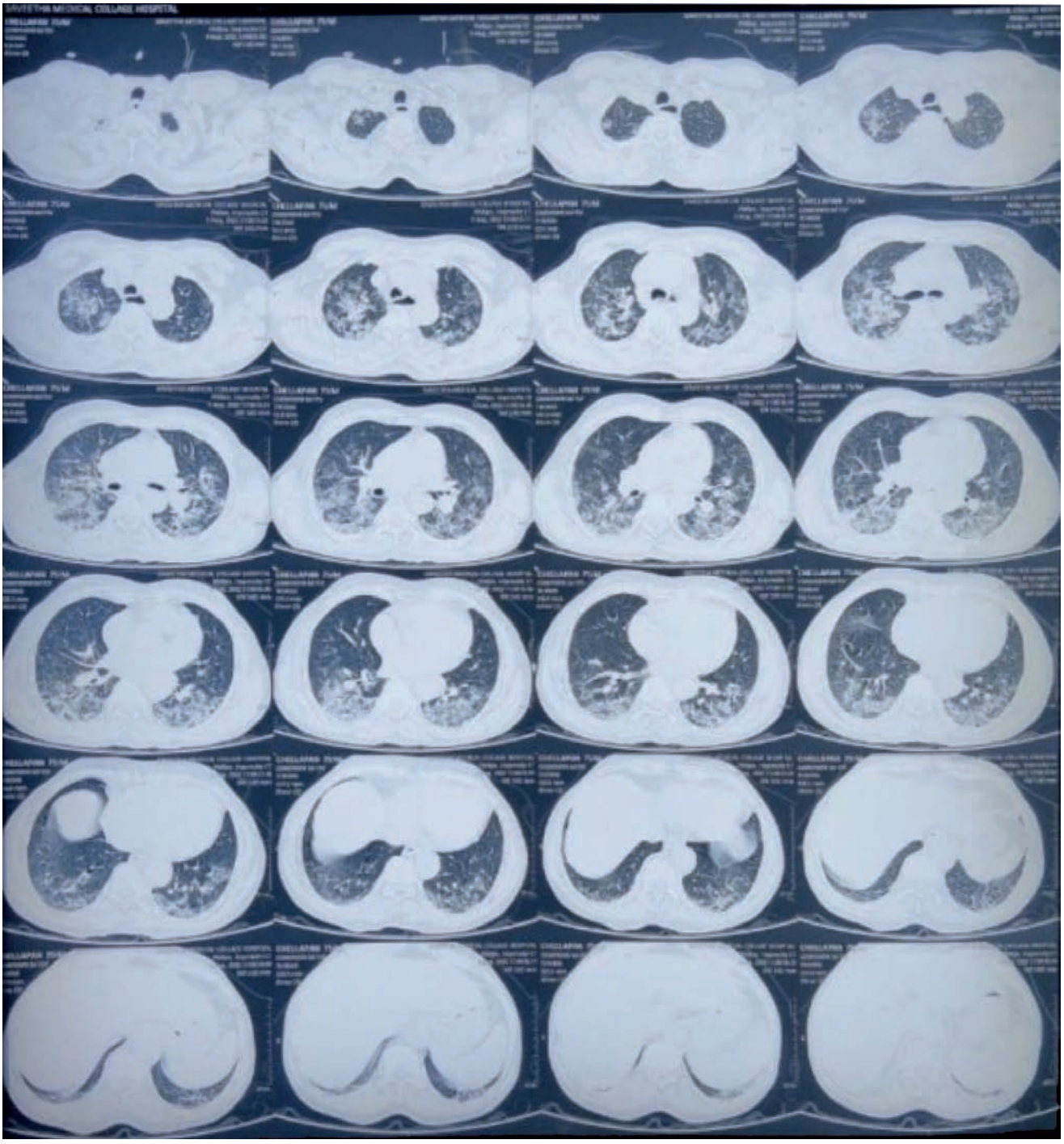

FIGURE 3. HRCT THORAX - Diffuse ground glass opacities with interlobar septal thickening giving crazy paving appearance noted in upper and lower lobes of both lungs

teams. Prompt initiation of appropriate antibiotic therapy, along with supportive measures such as mechanical ventilation and corticosteroids, are crucial for improving patient outcomes.

Several studies have highlighted the importance of early diagnosis and intervention in leptospirosis, particularly in cases with severe pulmonary involvement. A study by Zaki and Shieh (1996) demonstrated that leptospiral infection can cause widespread pulmonary capillary damage, resulting in diffuse alveolar hemorrhage [7]. The study emphasized the need for early recognition of this severe complication to improve patient outcomes. The findings in our case are consistent with this study, where diffuse alveolar hemorrhage was identified through HRCT and managed with intensive supportive care.

In this case, common causes were ruled out through a comprehensive evaluation, including chest radiography, high-resolution computed tomography (HRCT), and sputum analysis, which were negative for tuberculosis and other infections. The diagnosis of leptospirosis was confirmed through serological testing, specifically by detecting leptospi-

ral antibodies using the Microscopic Agglutination Test (MAT). This test remains the gold standard for diagnosing leptospirosis. The combination of clinical presentation, imaging findings suggestive of diffuse alveolar hemorrhage, and positive serology solidified the diagnosis, allowing for timely and targeted treatment

A comparative study by Dolhnikoff et al. (2007) reviewed autopsy findings of patients with severe leptospirosis and highlighted the high prevalence of pulmonary hemorrhage among fatal cases[8]. The study underscored the role of systemic inflammation and immune response in the pathogenesis of pulmonary complications. In our case, the presence of systemic inflammatory markers, such as elevated leukocyte count and thrombocytopenia, supports the findings of Dolhnikoff et al., indicating a severe inflammatory response contributing to pulmonary damage.

A clinical review by Samrot et al. (2021) focused on the clinical manifestations and outcomes of leptospirosis in an urban setting [9]. The study reported that patients with pulmonary hemorrhage had significantly higher mortality rates compared to those with other manifestations. Early administration of antibiotics, particularly penicillin and ceftriaxone, was associated with better outcomes. Our patient's treatment with intravenous ceftriaxone aligns with the recommendations from this study, highlighting the importance of timely antibiotic therapy.

A case series by Nery et al. (1977) analyzed the outcomes of patients with leptospiral pulmonary hemorrhage syndrome treated with mechanical ventilation and corticosteroids [10]. The study found that patients who received early corticosteroid therapy had improved survival rates, suggesting a beneficial role in managing severe inflammation and alveolar damage. In our case, the use of intravenous methylprednisolone was a critical component of the treatment regimen, contributing to the patient's gradual clinical improvement.

The case presented here explains the critical need for heightened clinical suspicion and early diagnosis of leptospirosis, particularly in endemic regions. The patient's initial presentation with fever, myalgia, and headache, followed by hemoptysis, was indicative of a severe systemic infection. The confirmatory serological tests and radiological findings guided the timely initiation of targeted therapy.

CONCLUSION

This case explains the importance of considering leptospirosis in the differential diagnosis of hemoptysis, especially in endemic regions. Awareness and early intervention can significantly reduce morbidity and mortality associated with this potentially fatal condition. Timely diagnosis and comprehensive management, including the use of antibiotics, corticosteroids, and supportive care, are essential for favorable outcomes in patients with severe leptospirosis.

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