International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

Acute Kidney Injury in a Patient with Severe Leptospirosis (*Weils Disease)*: A Case Report

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Abstract: ***Leptospirosis is a zoonotic disease caused by bacteria that can infect both humans and other animals. This disease is caused by an infection of Leptospira bacteria, which can be transmitted through the nose, mouth, eyes, or through open wounds on the skin when a person is exposed to water contaminated with the urine of infected animals. In this case report, a 45-year-old woman came to the emergency department with complaints of shortness of breath, abdominal discomfort, high fever, and generalized body pain, especially in her calves. The patient reported that her urine output had been significantly reduced for three days prior to hospital admission. The patient was hospitalized in the high care unit for 12 days. Following the administration of third-generation cephalosporin antibiotics and two sessions of hemodialysis during the course of treatment, the patient showed clinical improvement, with decreased serum concentrations of urea and creatinine, as well as increased urine output without the use of diuretics. The prognosis of acute kidney injury in patients with severe leptospirosis depends on the clinical condition of the patient, the accuracy of the diagnosis, and the timeliness of initiating treatment. In patients with significantly impaired renal function and declining clinical status, prompt initiation of renal replacement therapy such as hemodialysis is recommended.***

Keywords: leptospirosis, weils disease, acute kidney injury

1. Introduction

Leptospirosis is a zoonotic disease caused by bacteria and can affect both humans and other animals. It is caused by an infection with *Leptospira* bacteria, which can be transmitted through the nose, mouth, eyes, or through open wounds on the skin when an individual is exposed to water contaminated with the urine of infected animals. This disease occurs worldwide, but it is more prevalent in tropical and subtropical regions with high rainfall. [1,2] The risk factors for leptospirosis in Indonesia are diverse and include the frequent occurrence of floods, the presence of stagnant water, and poor waste disposal and sanitation systems in residential areas. The risk increases when humans or animals come into contact with contaminated environments, such as muddy water, rivers, or floodwaters. [1] The global prevalence of leptospirosis remains uncertain; however, current reports estimate the incidence to range from 0.1 to 10 cases per 100,000 population per year. During outbreaks, the incidence can rise to over 50 cases per 100,000 population. [3]

Leptospirosis can progress to a more severe and life-threatening form known as Weil's disease, which is typically characterized by jaundice, acute kidney injury, and multi-organ dysfunction involving the kidneys, liver, lungs, and heart, leading to increased susceptibility to severe pulmonary hemorrhage and other complications. It is estimated that 5–10% of leptospirosis cases progress to Weil's disease. Globally, the prevalence of Weil's disease is estimated to range from 50,000 to 150,000 cases per year, while in Indonesia, the estimated number is between 5,000 and 15,000 cases annually. [4]

Acute kidney injury (AKI) is defined as a sudden decline in kidney function occurring over the course of hours to several days. It is characterized by the accumulation of metabolic waste and disturbances in fluid and electrolyte balance. In certain cases, patients with AKI require dialysis therapy to assist in the removal of excess metabolic waste from the body.[5] Several studies have found that 49.2% of leptospirosis patients develop AKI, with 14.4% of them requiring dialysis. However,[6] other studies have reported that AKI occurs in as many as 88.7% of leptospirosis patients. [7] In general, the incidence of leptospirosis including its advanced form, Weil's disease remains significant, particularly in tropical regions such as Indonesia. However, it is often underdiagnosed. Accurate diagnosis is crucial to ensure that appropriate treatment is administered based on the disease's etiology. [8] Therefore, this case report has been compiled as an educational reference to emphasize the importance of proper diagnosis and management of leptospirosis, particularly Weil's disease, to ensure patient safety. It is hoped that such knowledge will contribute to improving the quality of life of affected patients**.** This report contributes to clinical literature by illustrating the progression and recovery of Weil's disease managed through timely renal support and antibiotic therapy in a tropical setting, thus underscoring the importance of early intervention and multidisciplinary care.

2. Case Report

A 45-year-old female patient presented with complaints of shortness of breath, abdominal bloating, high-grade fever, vertigo, headache, and generalized body pain, especially in her calves, for 7 days prior to hospital admission. For the last 3 days before admission, the patient reported decreased urinary frequency. There was no history of epistaxis or bleeding gums. The patient denied any history of hypertension, diabetes mellitus, kidney disease, or heart disease. She also denied any history of long-term medication use, alcohol consumption, smoking, or engaging in sexual activity with multiple partners. The patient works as a farmer

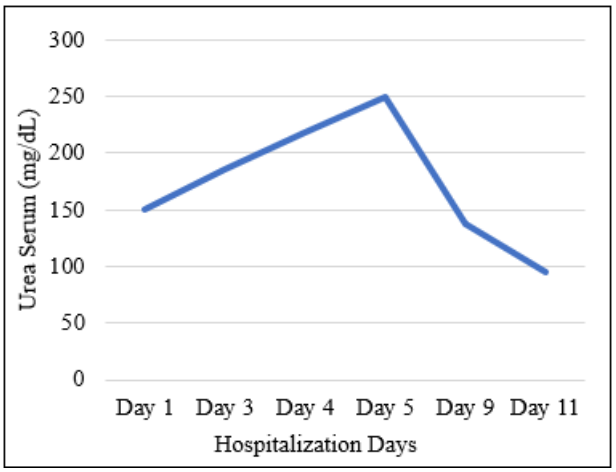
and frequently works barefoot. She had no prior history of chronic illness or regular medication use.

On physical examination, the patient was alert and compos mentis, with a BMI of 28.3 (pre-obese). Vital signs were as follows: blood pressure 91/58 mmHg, pulse rate 90 bpm, temperature 36.6°C, and oxygen saturation of 99% on 3 L/min nasal cannula. Physical examination revealed icteric sclera in both eyes and rhonchi in the lower lung fields bilaterally. Examination of the lower extremities revealed leg edema and tenderness of both calf muscles.

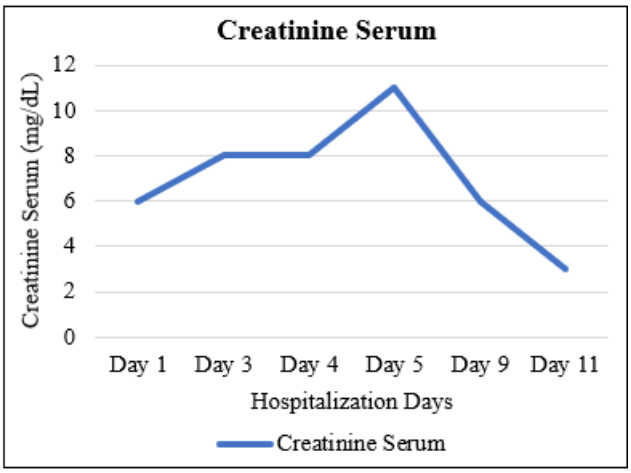
Laboratory findings showed anemia (hemoglobin 10.5 g/dL), thrombocytopenia (49,000/µL), leukocytosis (16,700/µL), elevated serum urea (151 mg/dL) and creatinine (5.7 mg/dL). Urinalysis revealed proteinuria (+++) and hematuria (+++). NS-1 antigen for dengue was negative, and both HIV and HBsAg tests were non-reactive. Serological testing for leptospirosis showed a negative IgG and a positive IgM for Leptospira antibodies. Chest X-ray showed no radiological abnormalities. Abdominal and renal ultrasound revealed no signs of chronic kidney disease or abnormalities in the visualized intra-abdominal organs. Electrocardiography showed sinus rhythm.

The patient was admitted to the high care unit and received adequate fluid therapy. Due to hypotension, norepinephrine was administered at a dose of 0.1 mcg/kg/min during the first 3 days of hospitalization. The patient was treated with ceftriaxone 2 grams every 24 hours. During the first 5 days of treatment, levels of urea and creatinine in serum continued to rise, and the patient experienced worsening dyspnea. Consequently, a central dialysis line (CDL) was inserted into the right jugular vein, and emergency hemodialysis was performed using a heparin-free protocol.

She was discharged on the 12th day of admission. Following administration of third-generation cephalosporin antibiotics and two sessions of hemodialysis during the treatment course, the patient showed clinical improvement, with decreased serum markers of urea and creatinine, as well as increased urine output without the use of diuretics. The patient was subsequently discharged



Graph 1: Urea Serum Levels



Graph 2: Creatinine Serum Levels

Table 1: Complete Blood Count

	Day 1	Day 3	Day 4	Day 5
Haemoglobin (g/dL)	10.5	10.8	11.4	10.5
Hematocrit (%)	31.2	32.1	33.2	31.1
Plateletets (uL)	49.000	40.000	45.000	64.000
Leukocytes (uL)	16.700	13.700	13.200	16.700

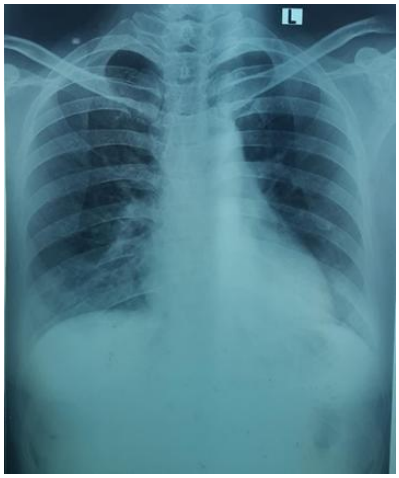


Figure 1: Chest X-ray

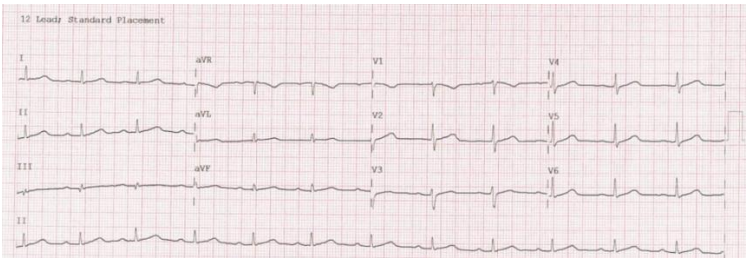


Figure 2: ECG

3. Discussion

In this case report, a 45-year-old female patient who works as a farmer presented with complaints of shortness of breath, abdominal bloating, high-grade fever, vertigo, headache, and generalized body pain, particularly in the arms and both calves, which had been ongoing for 7 days prior to hospital admission and worsened over the last 3 days. This was accompanied by a marked decrease in urine output. Physical examination revealed icteric sclera and tenderness in both calves. Serological testing showed a negative IgG and a positive IgM for *Leptospira* antibodies, indicating an acute leptospiral infection. [9] Laboratory tests revealed elevated serum creatinine and urea levels, along with a decreased glomerular filtration rate. The combination of icterus, acute kidney injury, and a positive leptospira IgM result supports the diagnosis of Weil's disease.[8,] The patient's serum creatinine was measured at 6 mg/dL, which classifies the acute kidney injury as "Failure" according to the RIFLE criteria, and as Stage 3 according to the AKIN classification. [10]

The patient was admitted to the high care unit, received adequate fluid therapy, and was administered norepinephrine at a dose of 0.1 mcg/kg/min during the first three days of hospitalization due to hypotension. Intravenous ceftriaxone at a dose of 2 grams every 24 hours was also administered. During the first five days of treatment, the patient's serum urea and creatinine parameters continued to rise, and her respiratory distress worsened. As a result, a central dialysis line (CDL) was inserted into the right jugular vein, and emergency hemodialysis was performed using a heparin-free protocol.

The patient remained hospitalized for 12 days. After administration of third-generation cephalosporin antibiotics and two sessions of hemodialysis, the patient showed clinical improvement, with decreasing serum urea and creatinine levels, and urine output increased to more than 400 mL over 24 hours without the use of diuretics. The patient was subsequently discharged for outpatient follow-up.

This management approach was in accordance with current clinical guidelines, which recommend the use of vasopressors when the mean arterial pressure remains below 65 mmHg despite adequate fluid resuscitation. Guidelines specifically recommend norepinephrine as the first-line vasopressor in patients with acute kidney injury, as it has been shown to improve creatinine clearance (CrCl) within 6–8 hours after administration, with fewer arrhythmic side effects compared to other vasoactive agents. [10]

During hospitalization, the patient received intravenous ceftriaxone, which aligns with evidence-based recommendations indicating that ceftriaxone or cefotaxime are the antibiotics of choice for severe leptospirosis. [9, 11]

The patient also underwent hemodialysis therapy, as recommended by current guidelines for renal support in cases meeting specific criteria such as oliguria, defined here by a urine output of only 120 cc/24 hours. [10] Hemodialysis was performed twice during hospitalization. Once the patient showed clinical improvement, with urine output increasing to over 400 mL/24 hours without diuretic use, alongside reductions in serum urea and creatinine concentrations and improvement in glomerular filtration rate, hemodialysis was discontinued, and the patient was discharged.

4. Conclusion

Leptospirosis is a disease caused by infection with *Leptospira* bacteria, which can affect humans. Severe leptospirosis may lead to Weil's disease, characterized by jaundice, acute kidney injury, and hemorrhagic manifestations.

The prognosis of acute kidney injury in patients with severe leptospirosis (Weil's disease) depends on the patient's clinical condition, the accuracy of the diagnosis, and the timeliness of therapeutic intervention. In patients with severe renal impairment accompanied by clinical deterioration, renal replacement therapy such as hemodialysis is strongly recommended and should be initiated promptly. Antibiotic treatment should be started as soon as leptospirosis is clinically suspected; therapy should not be delayed pending the results of laboratory tests for *Leptospira* antibodies. This is because serologic tests may only become positive approximately one week after symptom onset, while culture results may take several weeks. In cases of mild leptospirosis, treatment with oral antibiotics is generally sufficient.

This case report is intended to raise awareness and enhance the knowledge of medical professionals, emphasizing the importance of timely and appropriate therapy and encouraging consideration of leptospirosis as a differential diagnosis—even in non-endemic areas.

Disclosure
There is conflict of interest in this case report

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