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Case Report: Multiorgan Leptospirosis (Weil's Disease) in a Young Adult Male with a History of Recurrent Tidal Flood Exposure

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Abstract

Leptospirosis is a bacterial zoonotic disease caused by spirochetes of the genus *Leptospira* and belongs to the group of Neglected Tropical Diseases that often go undiagnosed, particularly in areas with a history of flooding. This case report presents a 20-year-old man who presented with a five-day history of weakness prior to hospital admission, accompanied by persistent fever, nausea, vomiting with every meal, and dizziness, with a history of repeated flood exposure in his residential environment. Physical examination revealed a generally ill appearance, bilateral icteric sclera, anemic conjunctiva, and jaundice of the skin. Laboratory findings showed progressive leukocytosis, thrombocytopenia, mild anemia, hyponatremia, hypokalemia, and elevated urea and creatinine levels that improved during treatment, as well as hyperbilirubinemia with a cholestatic pattern and mild elevations in SGOT/SGPT. Serological testing for *Leptospira* yielded positive results, while HBsAg, Anti-HCV, and HIV tests were negative. Chest radiography demonstrated findings consistent with bronchopneumonia, while abdominal ultrasonography showed increased cortical echogenicity of both kidneys suggestive of a chronic process, accompanied by cystitis and bilateral pleural effusion. The patient was diagnosed with severe leptospirosis (Weil's disease) complicated by acute kidney injury and bronchopneumonia, and received intravenous ceftriaxone antibiotic therapy, hemodialysis, and supportive management, with subsequent clinical and laboratory improvement. This case underscores the importance of maintaining early clinical suspicion for leptospirosis in patients with a history of flood exposure, given that delayed diagnosis and management are closely associated with a worsening prognosis.

INTRODUCTION

Here is the proofread version. This section contained one particularly important terminology error (a geological term substituted for a medical one), along with several grammatical corrections. I've retained all citations and paragraph structure, and italicized genus names:

Leptospirosis is a bacterial zoonotic disease caused by spirochetes of the genus *Leptospira*, transmitted from reservoir animals, especially rats, to humans through contact with

water or soil contaminated with the urine of infected animals (Haake & Levett, 2015). It belongs to a poorly recognized group of Neglected Tropical Diseases, although its burden is estimated to exceed that of many other neglected tropical diseases, with more than one million severe cases and approximately 58,900 deaths estimated annually worldwide.

In Indonesia, leptospirosis exhibits an "iceberg phenomenon," whereby the number of reported cases is substantially lower than the actual incidence due to misdiagnosis and underreporting, particularly following seasonal flooding during the rainy season (Ministry of Health of the Republic of Indonesia, Health Research and Development Agency, 2019). Nine provinces have reported active cases, with an estimated annual morbidity of 39.2 per 100,000 population. Typical environmental risk factors in Indonesia include seasonal flooding, poor sanitation in densely populated settlements with high rat populations, and activities involving direct contact with water or mud (Ministry of Health of the Republic of Indonesia, Directorate General of P2P, 2017).

The clinical manifestations of leptospirosis are widespread, ranging from a self-limited, flu-like illness during the septicemic phase to a severe form known as Weil's disease in approximately 10% of cases, characterized by the classic triad of jaundice, acute renal dysfunction, and hemorrhagic diathesis (Centers for Disease Control and Prevention [CDC], 2026). The nonspecific early symptoms of leptospirosis are often mistaken for other tropical infectious diseases such as dengue hemorrhagic fever, typhoid fever, and acute viral hepatitis, underscoring the need for a high index of clinical suspicion, particularly in patients with a history of flood exposure (Centers for Disease Control and Prevention [CDC], 2018).

The novelty of this case report lies in several aspects. First, it presents a severe manifestation of leptospirosis (Weil's disease) in a young adult without comorbidities, exposed to recurrent tidal flooding in the coastal area of Semarang, distinguishing it from case reports involving elderly patients or those with comorbidities. Second, it comprehensively documents the patient's clinical and laboratory course during treatment, including the response to therapy and improvement in organ function, suggesting a favorable prognosis with early management. Third, it addresses the challenges of early diagnosis in primary and secondary healthcare facilities in Indonesia, and the role of the Modified Faine's Criteria as a presumptive diagnostic tool when access to gold-standard testing is limited. Fourth, it discusses the implications of antibiotic stewardship policy (ASP) on treatment decisions in severe leptospirosis cases with suspected sepsis.

This case report presents a young adult male with severe leptospirosis accompanied by jaundice, impaired renal function, and bronchopneumonia, with a history of repeated flood exposure in his residential environment. This case aims to illustrate the correlation between epidemiological history, clinical manifestations, and laboratory findings in establishing the diagnosis of severe leptospirosis, as well as the importance of initiating early management to prevent further deterioration of organ function.

METHOD

Research Design

This study was a case report with a descriptive-observational design that presents one case of severe leptospirosis (Weil's disease) accompanied by acute kidney injury and bronchopneumonia in a young adult male patient. The design of the case report was chosen

because this case has important educational and clinical value related to the correlation between the epidemiological history of repeated flash flood exposure and the multiorgan manifestation of leptospirosis, which is still often undiagnosed in primary and secondary health services in Indonesia.

Research Subject

The subject of the study was a 20-year-old male patient who was treated at the National Regional Hospital (RSWN) K.R.M.T Wongsonegoro, Semarang, in the period from June 27 to July 1, 2026, with a clinical and laboratory diagnosis of severe leptospirosis. The selection of subjects was carried out purposively based on the completeness of medical record data and the relevance of the case to the epidemiological context of coastal areas that are routinely affected by flash floods.

Data Collection Sources and Techniques

Data was collected retrospectively through a search of the patient's medical records, which included:

Anamnesis data includes main complaints, current disease history, epidemiological history (flash flood exposure), past disease history, family history, and nutritional history.

Physical examination data at the time of hospital admission, including vital signs and systemic examinations per organ.

Serial laboratory supporting examination data during treatment, including routine blood (hemoglobin, hematocrit, leukocytes, platelets), kidney function (urea, creatinine), electrolytes (sodium, potassium, calcium), liver function (SGOT, SGPT, total/direct/indirek), blood sugar, and serological examinations (Leptospira, HBsAg, Anti-HCV, HIV).

Imaging examination data, in the form of AP thoracic photos and abdominal ultrasound.

Pharmacological and non-pharmacological management data provided during treatment, including antibiotic therapy, fluid resuscitation, and hemodialysis.

Clinical journey and patient outcomes data up to discharge, including follow-up therapy provided.

Diagnostic Instruments

The enforcement of the diagnosis of leptospirosis in this case is supported by the Modified Faine's Criteria approach, which assesses three main components, namely clinical picture, epidemiological history, and laboratory findings, as a presumptive diagnostic aid in health facilities with limited access to gold standards such as Microscopic Agglutination Test (MAT) (Bandara et al., 2016).

Data Analysis

The data that has been collected is analyzed in a descriptive-narrative manner by correlating epidemiological history, clinical manifestations, laboratory results, and imaging findings to support diagnosis enforcement and explain the patient's clinical journey. The interpretation of the case is then discussed based on a review of the latest literature on the pathogenesis, diagnostic criteria, and management of severe leptospirosis, in order to provide a scientific context for the clinical findings in this case.

RESULTS AND DISCUSSION

Case Report

A 20-year-old man, living in the coastal area of Semarang which is routinely affected by flash floods, came to the National Regional Hospital (RSWN) KRMT Wongsonegoro with the main complaint of feeling weak since about five days before entering the hospital (SMRS). Complaints are accompanied by fever that is felt continuously, nausea and vomiting with every meal until appetite decreases, as well as dizziness. The patient denied having diarrhea, liquid bowel movements, and complaints of itching. From the anamnesis, it was obtained that there was a history of frequent exposure to floods in the neighborhood where he lived, which was about five times a year, including in mid-June 2026, a few days before the onset of symptoms. A history of allergies, past illnesses, medications, and family history of illnesses are denied. Nutritional history shows a three-meal diet with varied side dishes.

At the physical examination on June 28, 2026, it was found that he appeared to be seriously ill with composing awareness (GCS E4V5M6). Vital signs show blood pressure of 100/59 mmHg, pulse rate of 90 times/minute, breathing rate of 21 times/minute, temperature of 36°C, and oxygen saturation of 100% in the room air. An examination of the eye showed an isochoral spherical pupil with a good light reflex, a bilateral icteric sclera, and a bilateral anemic conjunctiva. The oral mucosa appears dry, without lymphadenopathy of the neck. Lung examination within normal limits without ronking or wheezing. The heart examination is within normal limits without murmurs or gallops. An abdominal examination showed a flat abdomen, increased intestinal noise, hypertympanic percussion, and a suppressed abdomen without pressure pain, signs of free fluid, and splenomegaly. On skin examination, jaundice was shown without rash or cyanosis, while the limbs were warm with a capillary refill time of less than two seconds without edema.

Serial laboratory examination during treatment showed progressive leukocytosis from 18.1 $\times 10^3/\mu L$ to a peak of 25.1 $\times 10^3/\mu L$, accompanied by thrombocytopenia with a nadir of 69 $\times 10^3/\mu L$ that gradually improved to 140 $\times 10^3/\mu L$. Hemoglobin levels ranged from 9.5–11.7 g/dL which described mild anemia. Electrolyte examination showed hyponatremia (128–135 mmol/L) and hypokalemia (2.70–4.20 mmol/L) that varied during treatment. Early renal function showed a significant improvement with urea of 171.2 mg/dL and creatinine of 3.29 mg/dL, which then improved significantly to 33.5 mg/dL and 0.96 mg/dL at the end of treatment. Liver function showed hyperbilirubinemia with total bilirubin of 10.48 mg/dL, rectus bilirubin of 7.62 mg/dL (dominant), and indilineal bilirubin of 2.86 mg/dL, accompanied by a mild increase in SGOT 79 U/L and SGPT 64 U/L. Serological examination of Leptospira gave positive results, while Anti-HCV, HBsAg, and HIV gave negative results. The full laboratory results are presented in Table 1.

Table 1. Trends in Patient Laboratory Examination Results During Treatment

Parameter	Normal Values	27/06/2026	28/06/2026	29/06/2026	30/06/2026	01/07/2026
Sodium (mmol/L)	135–147	128 / 131	-	134	135	134
Kalium (mmol/L)	3,50–5,00	4,20 / 3,10	-	2,70	3,90	3,10
Calcium (mmol/L)	1,00–1,15	1,11 / 1,19	-	1,05	1,10	1,13
Ureum (mg/dL)	17–43	171,2	-	77,3	-	33,5
Creatinine (mg/dL)	0,6–1,1	3,29	-	1,23	-	0,96
Hemoglobin (g/dL)	13,2–17,3	10,8	11,7	11,1	-	9,5
Hematocrit (%)	40–52	29,4	32,2	30,6	-	26,3
Erythrocytes (million/µL)	4,7–6,1	3,80	4,06	3,95	-	3,36
Leucositol ($\times 10^3$/µL)	3,8–10,6	18,1	23,3	25,1	-	23,9
Trombosit ($\times 10^3$/µL)	150–400	69	106	114	-	140
SGOT (U/L)	0–50	-	79	-	-	-
SGPT (U/L)	0–50	-	64	-	-	-
Bilirubin Total (mg/dL)	0,00–1,00	10,48	-	-	-	-
Bilirubin Direk (mg/dL)	0,00–0,35	7,62	-	-	-	-
Bilirubin Indirect (mg/dL)	0,00–0,65	2,86	-	-	-	-
Current Blood Glucose (mg/dL)	70–140	82	-	-	-	-
Glukosa POCT (mg/dL)	70–110	96	87 / 105	-	-	114 / 82 / 126
Serology Leptospira	Negatives	-	Positive	-	-	-
Anti-HCV (COI)	<1.00 (Negative)	0,05	-	-	-	-
HBsAg	Negatives	Negatives	-	-	-	-
HIV I	Non-reactive	Non-reactive	-	-	-	-
HIV II	Non-reactive	Non-reactive	-	-	-	-
HIV III	Non-reactive	Non-reactive	-	-	-	-

A thoracic examination of the AP showed a normal shape and location of the heart, with an increased pulmonary vascular pattern and patches on both perihilaries, giving the impression of bronchopneumonia. Abdominal ultrasound examination did not show abnormalities in the

liver, but it was found that an increase in echogenicity of the cortex in both kidneys (Brenbridge grade 1) led to chronic kidney processes, accompanied by a picture of cystitis and bilateral pleural effusion.

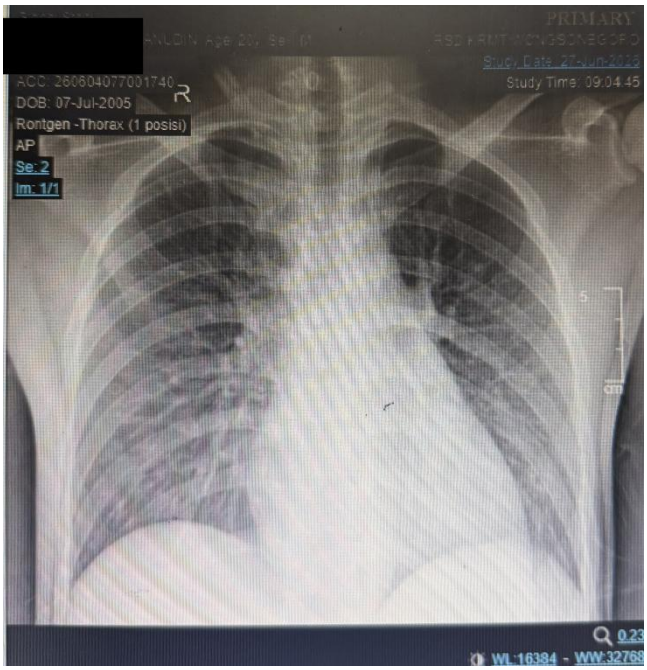

Figure 1. AP Thoracic X-ray Photos Show Increased Pulmonary Vascular Patterns and Bilateral Perihilar Infiltrates Leading to Bronchopneumonia (patient identity has been disguised)

Based on the overall clinical, laboratory, and imaging findings, the patient was established with a diagnosis of leptospirosis, chronic kidney disease, and bronchopneumonia. Patients received pharmacological management in the form of intravenous 2×2 grams of ceftriaxone, metronidazole injection, 8 mg injection ondancentron, and continuous vasopressor (SP Vascon). Non-pharmacological management included intravenous fluid resuscitation of Ringer Lactate followed by NaCl 0.9%, as well as hemodialysis three times during treatment. Upon discharge, patients received follow-up therapy in the form of cefixime 2×200 mg, nocid, ursodeoxycholic acid 3×250 mg, and cavicur. The patient's prognosis was assessed dubia ad malam for ad vitam and ad functionam, as well as dubia ad bonam for ad sanationam, given the involvement of three organs (renal, hepatic, and pulmonary) that occur simultaneously despite the patient's young age being a protective factor.

This case describes a young adult male with the classic triassic of immunological phase leptospirosis, namely jaundice, renal dysfunction, and hemorrhagic tendency, accompanied by pulmonary involvement in the form of bronchopneumonia. This picture is consistent with Weil's disease, which is a classic form of severe leptospirosis that occurs in about 10% of cases and is characterized by a combination of liver failure and acute kidney failure (World Health Organization Indonesia, 2020).

The patient's epidemiological history, i.e. repeated exposure to tidal flooding approximately five times per year including in mid-June 2026, a few days before symptom onset, met the epidemiological criteria in the Modified Faine's Criteria which require contact with contaminated water or soil or a history of flooding (Bandara et al., 2016). The incubation

period of leptospirosis ranges from two days to four weeks with an average of 7–14 days, which corresponds to the time interval between flood exposure and symptom onset in these patients. Early symptoms in the form of weakness, persistent fever, nausea, vomiting, and dizziness also correspond to the manifestations of the septicemic phase (leptospiremia) that lasts from the first to the seventh day, while the absence of diarrhea or itching helps to rule out some of the comparative diagnosis of gastroenteritis.

Pathogenesisically, Leptospira penetrates abrasive skin or mucosa upon contact with contaminated water or soil, then spreads hematogenously to all organs in the acute leptospiremia phase (Gonçalves-de-Albuquerque et al., 2023). The bacteria further attach to the endothelial cells and epithelium of the renal tubules through surface proteins such as LipL32, causing endothelial dysfunction and Na/K-ATPase disorders that lead to diffuse capillary leakage (StatPearls, 2026). This process explains the findings of hyponatremia and hypokalemia in patients, which are classic descriptions of acute kidney injury due to leptospirosis due to impaired ion transport in the renal tubules, in contrast to the pattern of hyperkalemia commonly found in acute kidney failure due to other causes (StatPearls, 2026). Significant improvement in urea and creatinine during treatment (from 171.2 to 33.5 mg/dL and from 3.29 to 0.96 mg/dL) also supports the generally reversible nature of acute interstitial nephritis with adequate management.

The findings of jaundice with a dominant directory bilirubin pattern, accompanied by only mild increases in SGOT and SGPT and normal liver ultrasound images, were consistent with the cholestatic pattern typical of leptospirosis, in contrast to the severe hepatocellular pattern that is more commonly found in acute viral hepatitis. Positive Serological results of Leptospira, accompanied by negative HBsAg and Anti-HCV, confirm the diagnosis and rule out viral hepatitis as the cause of jaundice. The progressive leukocytosis and thrombocytopenia found reflect a systemic inflammatory response to bacteremia as well as diffuse microvascular damage due to endothelial dysfunction, which is an important stage in the pathogenesis of severe leptospirosis.

The Modified Faine's Criteria estimate in this case showed that all three components, namely the clinical picture (fever, jaundice, renal symptoms), epidemiological history (repeated flood exposure), and laboratory results (positive Leptospira serology), had been met, supporting the probable diagnosis of leptospirosis even before serological confirmation was available. This principle is clinically important because antibiotics should not be delayed until waiting for serological results, given that IgM can only be detected 3–10 days after symptom onset, whereas early initiation of antibiotics has been shown to be a major determinant of the prognosis of severe leptospirosis patients (Kiya et al., 2024).

One diagnostic issue that needs to be looked at in this case is the ultrasound findings in the form of an increase in the echogenicity of the cortex of both kidneys that leads to chronic processes, raising the question of whether the picture purely reflects acute kidney injury due to leptospirosis, or acute kidney injury on chronic kidney disease. The young age of the patient with no previous history of kidney disease, accompanied by significant improvement in urea and creatinine during treatment, further favors a reversible acute process. However, a history of repeated flood exposure has the potential to indicate a previous subclinical episode of leptospirosis, and the literature by Chou LF, et al. (2023) mentions the potential evolution of

leptospirosis kidney disease from acute to chronic, so the ultrasound picture in the acute phase needs to be interpreted carefully and ideally confirmed by follow-up evaluation.

The management given to this patient is in the form of intravenous ceftriaxone as a mainline parenteral antibiotic and hemodialysis as a kidney replacement therapy in acute kidney injury, in accordance with the recommendations for severe leptospirosis management (Ministry of Health of the Republic of Indonesia, 2015). Nonetheless, the dose of ceftriaxone administered in this case exceeded the standard dose for leptospirosis alone, which likely took into account the suspicion of sepsis and accompanying bronchopneumonia. Pulmonary involvement in the form of bronchopneumonia also aggravates the assessment of patient prognosis, considering that the combination of involvement of three organs, namely kidney, liver, and lung, is a poor prognosis factor that has been described in various literatures, although the patient's young age remains a mitigating protective factor (Ministry of Health of the Republic of Indonesia, 2015).

It should be noted that in the case of severe Weil's disease with suspicion of sepsis, follow-up management in some guidelines also considers the escalation of broad-spectrum antibiotics, for example to the carbapenem group such as meropenem, especially if there is no clinical improvement with first-line therapy or coinfection of resistant gram-negative bacteria is suspected. In this case, the administration given is only in the form of an increase in the dose of ceftriaxone without escalation to meropenem. This is in line with the policy of the Antimicrobial Resistance Control Program (PPRA) that applies at the KRMT Wongsonegoro Hospital in accordance with the mandate of the Minister of Health Regulation Number 8 of 2015, where meropenem is classified as a third-line restriction antibiotic. (13) Based on the provisions of the National Formulary, the use of restriction antibiotics of the carbapenem group can only be proposed and approved through the PPRA Committee/Team and the Hospital Pharmacy and Therapy Committee, and can only be covered by BPJS if the patient has met the criteria for sepsis that are objectively proven, either through an increase in procalcitonin levels or microbiological culture results that confirm the presence of bacteria that cause infection (Luhulima et al., 2022; Marwasyifa et al., 2025). This administrative procedure aims to control antimicrobial resistance while maintaining financing efficiency, as shown in studies that report an increase in the rationality of the use of meropenem after the implementation of antibiotic restriction policies in hospitals (Derin et al., 2022; García-Rodríguez et al., 2019). However, this procedure can practically be an obstacle in clinical conditions that actually require rapid escalation of therapy, considering that procalcitonin and blood culture tests have limitations in the form of relatively long turnaround times and culture sensitivity that is not always high to identify the causative pathogen. In this case, because the patient did not undergo procalcitonin or microbiological culture examinations and the objective sepsis criteria required for meropenem submission could not be met, the clinician maintained high-dose ceftriaxone therapy while closely monitoring the clinical response. This strategy has ultimately been shown to provide adequate clinical and laboratory improvement without the need for further escalation of antibiotics, although ideally biomarker testing such as procalcitonin should be pursued as early as possible in patients with suspected sepsis to speed up the process of submitting advanced therapy if needed.

This case report has limitations, including the absence of a Microscopic Agglutination Test as the gold standard for serological confirmation or a reimaging examination to evaluate

the status of kidney chronicity definitively. Images of abdominal ultrasound results alone cannot be included in this report because the image file is missing; Only descriptive findings from radiologists were successfully obtained and reported. In addition, no long-term follow-up data were obtained to assess the resolution of post-discharge kidney and liver function, so the interpretation of the relationship between the history of repeated flood exposure and the possibility of chronic kidney processes still requires further confirmation.

Beyond individual patient management, leptospirosis control in tidal flood endemic areas requires a complementary two-way approach. From the medical side, increasing the awareness of primary health workers on the early signs and symptoms of leptospirosis, the application of Modified Faine's Criteria as a rapid screening tool in primary services, and expanding access to rapid diagnostic tests such as rapid diagnostic tests (RDT) based on IgM lateral flow assay and procalcitonin tests in secondary health facilities, have the potential to accelerate the enforcement of antibiotic diagnosis and initiation before multiorgan deterioration occurs, At the same time, accelerate the administrative process of applying for next-line antibiotics if needed. From an environmental perspective, public education in coastal areas that are routinely affected by flash floods regarding clean and healthy living behaviors (PHBS) after flooding, such as the use of closed footwear when in contact with standing water, washing hands and bodies after exposure to floodwater, and household waste management to reduce the rat population as the main reservoir of Leptospira, needs to be promoted in a sustainable manner by local health centers and health cadres. The active role of stakeholders, including local governments, health agencies, and public works agencies, in improving drainage systems, normalizing waterways, and long-term tidal flood control programs, is the key to reducing leptospirosis incidences in a sustainable manner (long-term wellness), rather than just dealing with cases reactively after an outbreak occurs.

CONCLUSION

Severe leptospirosis (Weil's disease) needs to be clinically suspected in patients with symptoms of fever, jaundice, and impaired renal function with a history of exposure to water or flooded environments, although serological confirmation results are not yet available. Modified Faine's Criteria can help enforce presumptive diagnoses in facilities with limited resources. Early initiation of antibiotics and supportive management per organ, including renal replacement therapy in cases with severe acute kidney injury, play an important role in improving clinical outcomes and preventing the progression of multi-organ damage.

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