Case Report

Leptospirosis Onboard Afloat Unit: Case Report of an Underreported Infectious Disease

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Abstract

Rat-borne diseases including leptospirosis have been of historical importance in the military. With the risk of human–rat encounters onboard ships and vessels, encountering such an illness at sea is not rare for a primary care physician. Thus, it becomes important for those at the front, to be aware of its presentation and management. Leptospirosis must always be considered as a differential diagnosis of febrile patients, in an environment with positive risk factors. We present the case of a 30-year-old sailor managed and evacuated at sea, who presented with fever and abdominal pain. Our patient was found to have hypotension with oliguria and was administered fluid resuscitation along with broad-spectrum antibiotics while at sea, with a provisional diagnosis of acute pyelonephritis and differential diagnosis of leptospirosis. He was evacuated to a tertiary care center where he was evaluated and managed as anicteric leptospirosis. Our patient had an uneventful recovery. It is essential for primary health-care workers to have a high level of suspicion, to ensure the successful management of such atypical infections. Earliest initiation of empirical antibiotic therapy and symptomatic management along with fastest means of evacuation is suggested to ensure best outcome. The availability of rapid diagnostic tests at primary care centers is a must, to ensure early diagnosis and treatment. Although curable, prevention by rodent control and hygiene maintenance continues to be the most effective and economical methods to minimize the loss of workforce, morbidity, and mortality due to leptospirosis.

Keywords: Leptospirosis, rodents, ship, zoonosis

INTRODUCTION

Leptospirosis is a globally significant zoonotic disease with a broad clinical presentation and worldwide distribution. The reservoir of the disease includes rodents and other domestic and wild animals. Transmission occurs either by direct contact with infected fluids such as urine, blood, and tissues or by exposure to environmental contamination.[1] Humans are accidental hosts. Leptospirosis is endemic to the Indian subcontinent due to favorable climate and poor hygiene conditions.[2] Rat menace is a known problem onboard ships globally, which when coupled with limited space often poses a threat to seafarers, against rat-borne diseases including leptospirosis.[3] Seafarers are at risk population for developing leptospirosis globally, view space constraints on board, and infestation of rodent population in most ships and vessels. Diagnosis is mainly based on a history of exposure and a good clinical examination. Rarely, cases present with complications such as renal failure, hepatic failure, and pulmonary hemorrhage.[4] With limited diagnostic modalities at sea, a high index of suspicion of leptospirosis in a febrile patient is likely to significantly limit the morbidity and the end result complications in a possible case, being managed on board.

CASE REPORT

A 30-year-old healthy male presented with a chief complaint of abdominal and flank pain that had worsened over 2 days which were associated with anorexia, nausea, cough, and high-grade fever. He reported oliguria and dysuria 24–48 h before the presentation. Our patient’s past medical history was not significant, with no known

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Discussion

Our patient was a case of anicteric leptospirosis with underlying acute renal failure. With the initial presentation and examination findings, a diagnosis of urinary tract infection/acute pyelonephritis was formed. Other differential diagnoses such as dengue fever and malaria were ruled out by RDTs which were available on board. Typhoid fever was also considered apart from leptospirosis. In our case, the transmission of the disease in the absence of any water logging could be explained by contact of infected urine while cleaning the floor, where the patient often removed his footwear. Similar transmission has been reported in a study conducted in South India, where walking barefoot over infected urine has been documented as a contaminated environment.[9] With an incubation period of 7–10 days and no travel history in the past 3 months, it was ascertained that our patient was a local case of leptospirosis. It is a challenge for the primary physician to be suspicious of a disease presenting as viral fever, with a potential to develop organ failure. A thorough history and complete physical examination are the only tools available to the primary physician, in the absence of diagnostic modalities and communication in an at-sea environment. As the diagnosis is majorly clinical, an early diagnosis/suspicion and prompt treatment is essential. Modified Faine’s criteria is an objective tool to diagnose leptospirosis with clinical and epidemiological criteria’s useful to arrive at a probable diagnosis of leptospirosis as shown in Table 1.[6] Due to varied presentations, leptospirosis is likely to be misdiagnosed and consequently under managed, though seldom it takes a fulminant course which can lead to morbidity and mortality. Various other rodent-borne diseases including rat-bite fever may be considered, which present with fever, joint pains, and rash and are often benign with no complications.[7] In primary health centers and field areas with limited diagnostic modalities, Indian Council of Medical Research and World Health Organization regional office Southeast Asia guidelines can be referred to as mentioned in Table 2.[8] Empirical antibiotics and supportive care with earliest referral to a higher medical echelon remain the standard protocol for a primary physician.

Records for such cases are limited in military and in the navy globally. A similar presentation with viral-like prodrome in a 23-year-old American seaman who also had renal failure, shock, and diffuse alveolar hemorrhage and was managed with ceftriaxone and doxycycline along with Extracorporeal membrane oxygenation has been documented. The patient was discharged after 13 days of care.[9] Several surveillance programs were conducted by the US Navy from 2011 to 2015 among the US Marines posted in Japan, where 81 among

Allergies, past medication, or travel history. Our patient is a serving sailor who is working as a cook on board. There was no water logging near his place of work or bunking areas, however occasional rat sightings were reported. On physical examination, our patient was alert but had a toxic look. The patient was febrile with temperature 103.5°F. Blood pressure of 88/42 mmHg, pulse rate of 110 beats/min, and a respiratory rate of 16 breaths/min were recorded. Examination of the head and neck revealed anicteric sclera, bilateral anterior cervical lymphadenopathy, and congested oropharyngeal mucosa with no petechiae or any skin rash. Bilateral pitting pedal edema was noted. The patient had normal heart sounds and lung fields. Mild tenderness was elicited in the epigastric, left hypochondriac, and lumbar region, with no guarding or rigidity. Left costovertebral angle tenderness was also elicited. Neurological examination was normal. Dengue (NS1, immunoglobulin M [IgM]/IgG), and malaria rapid diagnostic tests (RDTs) were done on board, came negative. On suspicion of acute pyelonephritis and differential diagnosis of leptospirosis with acute renal failure, the patient was started on oral ciprofloxacin and doxycycline. He was administered 2.5 L fluid resuscitation with 0.9% saline. Post therapy, the hypotension resolved, and the patient passed 100 mL of high-colored urine.

Our patient was managed on board for 36 h and was evacuated by boat to the nearest port where he was admitted. Hospital laboratory investigations revealed a white blood cells (WBCs) count of 8700/mm³ with 60% segmented neutrophils, 31% lymphocytes, and 6% monocytes. The hematocrit was 38.4%, and platelets were 60,000/mL. The renal function test revealed creatinine valued at 1.9 mg/dL, whereas urinalysis gave a specific gravity of 1.030. Gram’s stain and subsequent culture of the urine were negative. Serum bilirubin was 2.3 mg/dL with all liver enzymes within the normal limits. Serum potassium was 4.1 mg/dL, and other electrolytes were within the normal limits. The chest X-ray was normal.

Within 24 h of admission, the patient developed conjunctival hemorrhages and suffusion. However, the clinical picture improved. The complete blood count revealed 7400 WBCs/mm³, hematocrit of 43.9%, and a platelet count of 1.2 lakh/mL. The total bilirubin reduced to 1.3 mg/dL (unconjugated bilirubin was 0.6 mg/dL), ALT 113 IU/L, AST 122 IU/L, and LDH 278 IU/L. Dengue (NS1, IgM/IgG) and malaria RDTs were redone, along with typhidot test, which all came negative. On the recommendation of an internal medicine specialist, intravenous penicillin was added for all came negative. On suspicion of acute pyelonephritis and malaria rapid diagnostic tests (RDTs) were done on board. Typhoid fever was also considered apart from leptospirosis. In our case, the transmission of the disease in the absence of any water logging could be explained by contact of infected urine while cleaning the floor, where the patient often removed his footwear. Similar transmission has been reported in a study conducted in South India, where walking barefoot over infected urine has been documented as a contaminated environment.[9] With an incubation period of 7–10 days and no travel history in the past 3 months, it was ascertained that our patient was a local case of leptospirosis. It is a challenge for the primary physician to be suspicious of a disease presenting as viral fever, with a potential to develop organ failure. A thorough history and complete physical examination are the only tools available to the primary physician, in the absence of diagnostic modalities and communication in an at-sea environment. As the diagnosis is majorly clinical, an early diagnosis/suspicion and prompt treatment is essential. Modified Faine’s criteria is an objective tool to diagnose leptospirosis with clinical and epidemiological criteria’s useful to arrive at a probable diagnosis of leptospirosis as shown in Table 1.[6] Due to varied presentations, leptospirosis is likely to be misdiagnosed and consequently under managed, though seldom it takes a fulminant course which can lead to morbidity and mortality. Various other rodent-borne diseases including rat-bite fever may be considered, which present with fever, joint pains, and rash and are often benign with no complications.[7] In primary health centers and field areas with limited diagnostic modalities, Indian Council of Medical Research and World Health Organization regional office Southeast Asia guidelines can be referred to as mentioned in Table 2.[8] Empirical antibiotics and supportive care with earliest referral to a higher medical echelon remain the standard protocol for a primary physician.

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239 personnel were found positive for leptospirosis and were treated with doxycycline. Similar outbreaks were also reported in Guam. Despite being endemic, no such case has been reported from ships of the Indian subcontinent.

The disease affects major organ systems including kidneys (invariably involved in leptospirosis) as in our patient, also liver and lungs. Conjunctival hemorrhage and oliguria in this case further pointed toward a complicated case of suspected
leptospirosis. Laboratory results usually show leukocytosis with a left shift and elevated inflammatory markers. Thrombocytopenia is common and is associated with bleeding and renal failure, which was also seen in our patient. Serum bilirubin levels may be high, whereas rises in aminotransferase and alkaline phosphatase levels are usually moderate. A definitive diagnosis of leptospirosis is based on isolation of the organism from the patient, on a positive result in the polymerase chain reaction, or on seroconversion (microscopic agglutination test) or a rise in antibody titer. Our case was not subjected to further confirmatory/quantitative analysis view complete remission. In mild cases, oral treatment with azithromycin, doxycycline, amoxicillin, or ampicillin is recommended. Aggressive supportive care for leptospirosis is essential and can be life-saving. Patients with nonoliguric renal dysfunction require aggressive fluid and electrolyte resuscitation to prevent dehydration and precipitation of oliguric renal failure. Prognosis is largely good with complete recovery. The case is a unique presentation which reiterates the importance of history taking and physical examination toward managing cases at sea or field areas.

**Conclusion**

It is essential to have a high degree of suspicion towards atypical infections and possibly carry rapid diagnostic kits helpful in excluding diseases, cueing toward a definitive diagnosis, and better management during prolonged sailing. The availability of simple tests, such as lateral flow assay (Leptocheck) and latex agglutination test (Lepto Dri Dot), augments the overall approach to a case of fever on board, predictability depends on the type of test, and duration of illness as shown in Table 3. Peripheral medical centers/afloat units should, though, have these rapid diagnostic bedside test kits, for timely diagnosis and early treatment of such neglected tropical diseases like leptospirosis.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

**Conflicts of interest**

There are no conflicts of interest.

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**Table 3: Statistics of various rapid diagnostic tests with stage of illness**

| Tests and duration of illness | Sensitivity (%) | Specificity (%) | PPV (%) | NPV (%) |
|------------------------------|-----------------|-----------------|---------|---------|
| Leptospirosis dipstick (days) |                 |                 |         |         |
| <7                           | 48.6            | 85.1            | 82.9    | 52.6    |
| >7                           | 87.7            | 85.1            | 87.7    | 85.1    |
| Leptospirosis lateral flow (days) |             |                 |         |         |
| <7                           | 52.9            | 93.6            | 92.5    | 57.1    |
| >7                           | 86.0            | 89.4            | 90.7    | 84.0    |
| IgM ELISA                    |                 |                 |         |         |
| <7                           | 50.0            | 78.7            | 77.8    | 51.4    |
| >7                           | 87.7            | 87.2            | 89.3    | 85.4    |
| Leptospirosis Dri Dot        |                 |                 |         |         |
| <7                           | 67.6            | 66.0            | 74.6    | 57.9    |
| >7                           | 85.5            | 80.0            | 82.5    | 83.3    |

PPV: Positive predictive value, NPV: Negative predictive value, ELISA: Enzyme-linked immunosorbent assay
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