



Case report

Sporadic leptospirosis case in Florida presenting as Weil's disease

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ABSTRACT

Leptospirosis has been rarely reported in the United States and has been historically related to occupational exposure to infected animals, and contaminated environments. Over the past decade, there are indications that at-risk populations may be changing in the United States, to also include participants in freshwater sports and occasionally individuals living in economically disadvantaged urban inner-city environments. We present a case of Weil's disease in a 39-year-old homeless man who had been released from prison two weeks prior and denied direct contact with infected animals or contaminated fresh water. Prison inmates and homeless patients are potentially at high risk of rat exposure and infection with *Leptospira*. A high index of suspicion is needed for diagnosis of leptospirosis in the absence of traditional risk factors. To our knowledge, this is the first case of leptospirosis associated with homelessness and incarceration in the United States. A literature review on leptospirosis cases in Florida over the past 60 years was performed.

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Introduction

Leptospirosis is a bacterial zoonotic infection caused by pathogenic serovars in the genus *Leptospira* [1]. A wide variety of domestic (dogs), peri domestic (rats, horses, cows, pigs), and wild animals (bats, coyotes, sea lions, frogs) can act as reservoirs by maintaining chronic infection and shedding leptospire in their urine [2]. Human infection occurs when the pathogen in contaminated water or soil enters micro abrasions on the skin, or via intact mucous membranes and the conjunctivae [3]. The incubation period is approximately 15 days (range 6–29 days) [4,5].

Historically, workers in direct contact with animal reservoirs—especially cattle and pig farmers, slaughterhouse workers, veterinarians, and dairy farmers—were at increased risk. However, the literature is replete with examples of human leptospirosis cases without clear evidence of direct contact with animals but indirectly through contaminated soil or water [2]. In the United States, new groups at risk for leptospirosis have emerged, including residents in urban areas [6] and participants in freshwater sports [5,7].

The spectrum of human disease caused by leptospirosis is wide, ranging from subclinical infection to multiorgan involvement associated with a high mortality. Up to 90 % of leptospiral

infections are subclinical or of mild severity, whereas approximately 10 % of infected persons present with abrupt onset of fever, headache, muscle aches, and gastrointestinal symptoms. Biphasic illness may occur, in which more severe symptoms begin after a short recovery period. The most severe form of icteric leptospirosis can occur as Weil's syndrome with hepatic and renal failure, massive pulmonary hemorrhage and cardiac arrhythmias. Even with early diagnosis and aggressive therapy Weil's syndrome has a case fatality rate of 5 %–15 % [3].

Case report

A 39-year-old homeless and previously healthy male presented in August 2018 after one week of generalized weakness, diffuse arthralgia, myalgia, subjective fever and chills. He also reported non-bloody, watery diarrhea, emesis, dark tea-colored urine and yellowing of his eyes. He was born in Puerto Rico and moved to Miami, Florida, ten years prior, and denied history of traveling outside the state of Florida or outside the United States since then. He had been released from prison two weeks prior, after three years of incarceration. He denied intravenous drug use, swimming in freshwater, and exposure to rodents or sick contacts. He admitted to recreational cocaine, marijuana and alcohol use four days prior to admission.

Physical examination revealed fever, mild tachycardia, scleral icterus and left lower quadrant abdominal pain. There was no conjunctival suffusion, lymphadenopathy, hepatosplenomegaly, or skin rash. Laboratory results showed leukocytosis (12.730/mcl)

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Table 1
Leptospirosis cases in Florida between 1958 and 2019.

REF	Number of cases	Diagnosis date	Age (y)	Sex	Risk Factors	Clinical symptoms	Diagnosis	Treatment	Outcome
[13]	86	Between 1958 and 1967	6–29	M/F	Unknown	Fever, nausea, vomiting, myalgia, abdominal pain, headache, nuchal rigidity	MAT	Unknown	Unknown
[14]	11	Between June 15 and August 28, 1978	6–24	M	Dairy workers	Malaise, fever, nausea, vomiting, diarrhea, myalgia, coryza, chills, adenopathy, pharyngitis and anorexia, stiff neck, photophobia, arthralgias.	MAT	Penicillin	Cure
[7]	14	November 2005	19–66	Unknown	Adventure Race	Fever, headache, chills, sweats, muscle of joint pain, eye pain, photophobia.	MAT	Unknown	Cure
[15]	1	July 2009	40	M	Rat infestation control, farmer (raised horses, goat, and chickens)	Fever, myalgia, calf pain, malaise, and headache.	Leptospira specific IgM antibodies by dot blot on the second of paired consecutive blood specimens	Doxycycline	Cure
[15]	1	September 2009	59	M	Rat infestation control, farmer (raised chickens, pigs and goats).	Fever, myalgia, malaise, nausea, abdominal pain, and dyspnea.	Post- mortem histology and immunohistochemistry	Unknown	Death

Ref, reference; M, male; F, female; MAT, Microscopic agglutination test.

with neutrophil predominance (91 %), anemia (10.9 g/dl), thrombocytopenia (115,000/mcl), acute kidney failure (creatinine of 4.31 mg/dl and blood urea nitrogen of 51 mg/dl), hyponatremia (132 mmol/L), hypokalemia (2.9 mmol/L). Total creatine kinase was elevated (1,750 U/L), alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were also elevated (74 U/L and 150 U/L, respectively), and there was significant hyperbilirubinaemia (total 5.2 mg/dl, direct 3.6 mg/dl). Coagulation studies showed no abnormalities. Chest x-ray was normal. Computed tomography scan of the abdomen did not reveal gallbladder inflammation, common bile duct dilation, cholelithiasis or pancreas abnormalities. Blood cultures and stool studies remained negative. Serologic tests for infectious hepatitis A, B and C were negative. Leptospirosis was suspected and empirical treatment with ceftriaxone was started before subsequent confirmation by urine PCR. Patient had complete clinical recovery after 5 days of ceftriaxone followed by 2 days of doxycycline. Patient was discharged in stable condition after nine days of hospitalization.

Discussion

Leptospirosis has a global distribution with a higher incidence in the tropics and subtropics ranging from 10 to 100 human cases per 100,000 individuals [8]. In the United States, 100–200 human cases of leptospirosis were reported annually through 1994, when it ceased to be a nationally notifiable disease [9]. However, leptospirosis remained reportable in 36 states and territories, of which Hawaii and Puerto Rico had the highest reported incidence [10]. During the period 1998–2009, the average annual rate of leptospirosis-associated hospitalizations in the United States was 0.6 hospitalizations/1,000,000 population [11], which likely represents an underestimation of the problem due to underdiagnosis and underreporting. Leptospirosis has been recently reinstated as a nationally notifiable disease in the United States as of January 2013 [12].

Human infections have been historically associated with occupational exposure to infected animals, and contaminated environments. However, there are indications that at-risk populations may be changing in the United States. Recent outbreaks have been associated with participation in adventure races and triathlons involving fresh-water events [5,7]. Additionally, individuals living in economically disadvantaged urban inner-city environments, characterized by inadequate sanitation and poor

housing, are at high risk of rat exposure and infection with *Leptospira* [6].

Serologic evidence of leptospirosis infection in human beings and domestic animals has existed in Florida since the 1950s. [13]. During the period 1958–2018, only 113 cases of leptospirosis human infection has been reported in Florida state (Table 1). A shift from traditional leptospirosis risk factors to recreational exposure to contaminated freshwater is apparent over the past decade, following the recent trend in the United States.

We present a case of Weil's Disease in a young homeless male who dwelled briefly in Miami Beach, Florida, after being released from prison. He denied direct contact with infected animals or contaminated fresh water. We suspect that this patient might have been exposed to rodents' excrements in prison or on the streets in within two weeks of freedom. Leptospirosis cases in homeless patients and in individuals living in economically disadvantaged urban inner-city environments have been reported elsewhere [6,16]. A case series of leptospirosis in a prison in South America has also been reported [17], however no literature is available on occurrence of leptospirosis in prison inmates in the United States. Incarceration and homelessness are potential risk factors for of rat exposure and infection with *Leptospira*. A high index of suspicion is needed for diagnosis of leptospirosis in the absence of traditional risk factors.

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Ethical approval

All authors agree upon standards of expected ethical behavior.

Declaration of Competing Interest

We have no conflict of interest.

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