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# Leptospirosis and an animal bite

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## ABSTRACT

In October 2013, leptospirosis was identified in a 20-year-old male. The male was bitten on his hand by either his canine or a skunk while breaking up a fight between the two animals. Eight days after the bite, the male developed fever, headache, drowsiness, neck pain, nausea, vomiting, diarrhea, malaise and erythematous rash. Diagnosis was confirmed by amplification of *Leptospira* by DNA from a urine specimen. Veterinarian serology testing of the canine for *Leptospira* was negative. *Leptospira* in a human, acquired from an animal bite is a rare occurrence.

**Key words** Animal bite, leptospirosis, public health, real-time polymerase chain reaction

## Introduction

Leptospirosis is a zoonotic bacterial infection that is seen worldwide, but is more commonly seen in tropical and subtropical regions.<sup>[1]</sup> *Leptospira spc* has not been a nationally notifiable condition in the United States since 1994.<sup>[2]</sup> Consequently, it is challenging, to get a true case count.<sup>[2]</sup> In addition to underreporting, this infection is probably underdiagnosed by physicians.<sup>[3]</sup> A person acquires the infection by direct or indirect contact with the urine of an infected wild or domestic animal. The bacterium enters the body by penetrating intact mucous membranes or abraded skin.<sup>[4]</sup> Once in the blood, it is transported to all parts of the body. The incubation period for the infection has a range of a few days to 4 weeks, but, usually, occurs from 5 to 14 days.<sup>[1,5]</sup> The infection has generally two phases. The initial febrile stage, generally lasts 5-7 days followed by the convalescent or the second stage that typically lasts 3-30 days.<sup>[1,4]</sup> The early phase may consist of fever, chills, rigors, headache, myalgia, abdominal pain, vomiting, diarrhea, conjunctival suffusion, and skin rash.<sup>[1-5]</sup> The convalescent phase may consist of jaundice, renal failure, aseptic meningitis, myocarditis, hemorrhage, or

hemodynamic collapse.<sup>[1-5]</sup> Oral doxycycline and penicillin G have been shown to reduce morbidity of the illness.<sup>[1-5]</sup> Cephalosporins (ceftriaxone and cefotaxime) can be used as an alternative to penicillin.<sup>[1,4]</sup> Ampicillin or amoxicillin can also be used for treatment of mild infection.<sup>[1-4]</sup>

## Case Report

In September 2013, a 20-year-old male college student was walking his canine one evening in a suburb of Rochester, New York. During their walk, they came upon a skunk. The canine fought with the skunk and the male intervened in a fight. The male was bitten on his right fourth finger while trying to get the canine's mouth off the skunk. He was unsure if he was bitten by the canine or the skunk due to the fact it was dark. The skunk was killed by the canine. The male did not seek out medical treatment after the bite. Eight days after the incident he had a sudden onset of headaches, drowsiness, dizziness, neck pain, blurred vision and nausea after football practice. He believed he was struck in the head during practice. The male went to the emergency department (ED) and a fever was identified. A lumbar puncture (LP) and head computerized tomography (CT) were performed. The LP and CT were normal, and the male was sent home with a discharge diagnosis of viral syndrome. His symptoms persisted for the next couple of days, and he then was seen by his primary care provider (PCP) who obtained lab work. The PCP reviewed the lab results which showed the male's creatinine level to be 3.37 mg/dL. He was promptly referred to another ED for follow-up, 4 days after his previous ED visit.

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When he presented to the second ED, he had a fever of 38.9°C, headache, malaise, dizziness, abdominal pain, diarrhea, nausea, vomiting, photophobia and an erythematous blotchy rash. Laboratory results showed blood urea nitrogen 30 mg/dL, creatinine 2.97 mg/dL, aspartate aminotransferase 122 U/L, alanine aminotransferase 124 U/L, alkaline phosphatase 102 U/L, total bilirubin 0.7 mg/dL and white blood cell count 4,900. He had acute kidney failure and transaminitis and anemia. Testing for hepatitis ABC, HIV, influenza and mononucleosis were negative. The patient told the hospital staff about the bite that had occurred 2 weeks prior to admission. Based on the patient's declaration of an unknown animal bite, the provider collected samples for the zoonosis diseases of brucellosis, leptospirosis and parvovirus. A urine specimen was collected for polymerase chain reaction (PCR) analysis which has been shown to be more successful in identifying early leptospirosis than a PCR serum specimen.<sup>[6]</sup> The Monroe County Department of Public Health (MCDPH) was contacted to report an animal bite, and rabies prophylaxis was recommended. The patient was administered the rabies vaccine and rabies immunoglobulin. The differential diagnosis based on the laboratory data to date was unrevealing of any infection.

During his hospital stay, he was treated supportively with intravenous fluids and analgesics. His rash quickly abated, and his renal function improved over several days. His fever resolved and he was feeling improved although mild transaminitis persisted. A nondescript viral syndrome was the discharge diagnosis based on common etiologies having been ruled out.

Seven days after the male was discharged from the hospital, the urine specimen came back positive, by a real-time PCR for *Leptospira* species DNA, from the New York State Department of Health Wadsworth Laboratory. All routine and zoonosis cultures revealed no growth. The male followed up after discharge with his PCP and was treated with Amoxicillin 500 mg three times a day for 7 days. Follow-up blood work was ordered to monitor liver and kidney functions. The transaminases showed a normal level for aspartate aminotransferase and minimally elevated alanine aminotransferase 78 U/L.

Based on the positive PCR results and clinical case definition, the MCDPH contacted the male and interviewed him with a standard questionnaire. No recent travel history or other animal or recreational water exposure was identified during the incubation period for this illness. The male said that while his canine and the skunk were fighting, his clothing and

hands were sprayed by a skunk in addition to being bitten. MCDPH recommended that he contacted his canine's veterinarian to discuss testing for *Leptospira*. Veterinarian serology testing of the canine for *Leptospira* was negative.

## Discussion

This zoonotic disease tends to infect humans through recreational water activities or through occupational exposures such as pig and cattle farmers, veterinarians and lab workers. Very rarely, an acquired infection results from an animal bite. In the literature, it has been previously reported bites from rats, canine and a mouse have led to *Leptospira* infection.<sup>[7]</sup> It is unknown if the canine or the skunk infected the male with *Leptospira* by the bite, or urine from the skunk infiltrated the bite wound during the close encounter. Physicians should consider *Leptospira* if a patient develops a fever after having an animal bite. In such instances, medical providers should immediately report any bites of unknown origin to their local department of health for epidemiologic exposure and risk assessment. The local health department will then guide the medical personnel to start rabies postexposure prophylaxis. Reference laboratory support could also be utilized if the hospital laboratory cannot identify the organism. Through consultation with the local health department, a specimen could be forwarded to the state public health laboratory for PCR testing.

It is important for people to seek medical attention for all unknown animal bites. With this case the male was unsure if his canine or the skunk bit his finger. This uncertainly led to the administration of rabies treatment along with the fact that the skunk was unobtainable for rabies testing. Prompt medical attention by this male after the animal bite possibly could have prevented infection if empirically treated with antibiotics.<sup>[8]</sup>

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