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Case Report

Tularemia Hand Infection From a Cat Bite—A Case Report

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Tularemia is an uncommon infection caused by the bacterium *Francisella tularensis*. The nonspecific presentation and infrequency with which it is encountered make it a diagnostic challenge. A rare and scarcely reported mode of tularemia inoculation is a cat bite to the hand. We report a cat bite hand infection with tularemia in a 66-year-old woman. She underwent treatment for presumed polymicrobial cellulitis. Over the next 5 days, the symptoms progressed to fever, malaise, and fluctuant lymphadenitis with nodules along draining lymphatics. Cultures grew *F tularensis* and antibiotics were switched to doxycycline, which resolved the infection. The patient remained symptom-free after the doxycycline was discontinued. The purpose of this case study is to alert treating providers to consider tularemia infection when a hand infection persists, particularly in the context of an animal bite.

Tularemia is a potentially deadly multisystem infection caused by the pleomorphic gram-negative bacillus *Francisella tularensis*.[1] Tularemia is a highly infectious disease most commonly transmitted to humans by insect or animal bites. Signs and symptoms vary depending on the mode of transmission.[2] There are 6 common clinical forms: ulceroglandular, oculoglandular, oropharyngeal, pneumonic, typhoidal, and intestinal.[1] This is a report of an ulceroglandular soft tissue hand infection in a human subject caused by a cat bite.

Case Report

A 66-year-old woman presented for evaluation of a cat bite on the left index finger and second web space by an unvaccinated farm cat. Initial presentation showed small puncture wounds to the dorsal surface of the second web space with a small area of swelling. Treatment with amoxicillin and clavulanic acid was started for *Pasteurella multocida* prophylaxis. Four days after the initial presentation, the patient returned to the clinic for worsening pain, swelling, and erythema of the injured area. Physical examination showed no discharge or fluctuance to the area. Left-hand x-ray films and white blood cell count were normal. The patient's amoxicillin and clavulanic acid was continued, and topical bacitracin was added.

The patient's symptoms progressed to include fever, malaise, and decreased appetite. Clinically, she then had axillary lymphadenopathy and a fluctuant area on the dorsum of the left hand near the base of the second metacarpal and second web space (Fig. 1). A left hand x-ray image showed soft tissue gas between the index and middle fingers. She was referred to a hand surgeon.

The next day, the patient was brought to the operating room for left hand irrigation and debridement. A 2 × 3-cm abscess in the second web space was incised. Dissection into the subcutaneous tissues noted necrotic subcutaneous tissue and purulence. There was no violation of the tendon and the joint capsule was intact. The wound was irrigated with normal saline and the skin was loosely reapproximated with 4-0 nylon sutures. The patient received 2 doses of intravenous piperacillin–tazobactam and was discharged home with azithromycin because cultures were pending. On the 13th postoperative day, the patient presented with mild drainage and erythema from the incision and reported painful nodular lesions on the left upper extremity. Physical examination showed a 1-cm nodule present on the dorsal hand (Fig. 2), a 5-mm nodule on the midventral forearm, and a 5-mm nodule on the medial arm (Fig. 2). In addition, enlarged, tender left axillary and epitrochlear lymph nodes were palpated. Wound cultures from surgery were positive for *F tularensis* the following day. The patient's antibiotics were changed to oral doxycycline, which resulted in rapid

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Figure 1. Erythematous and fluculant cat bite wound in the second web space.

improvement of the hand infection and nodular lymphangitis. Antibiotics were continued for 30 days. The hand wounds healed completely and the patient was otherwise asymptomatic.

Discussion

Tularemia, also known as rabbit fever, is a zoonotic disease caused by *F tularensis. Francisella* is an aerobic, highly infectious, gram-negative coccobacillus. Although distributed worldwide, most cases of tularemia are reported in the Northern Hemisphere. Tularemia has been reported in every state except Hawaii.[3] From 2007 to 2017, 1,958 cases were reported to the Centers for Disease Control and Prevention. Kansas, Missouri, Oklahoma, Arkansas, and South Dakota accounted for 55% of all cases during that period. The patient in this case report contracted the infection and presented in South Dakota.

Few intracellular bacterial pathogens have as broad a host range as *Francisella*. Tularemia has been reported in over 250 different species.[3] Despite its broad host range, transmission is limited by geographic region. In cases of known exposure, 63% of tularemic patients reported tick bites and 23% had exposure to rabbits.[4] Tularemia from cat scratches or bites, as described in this patient, is rare and accounts for less than 2% of all tularemia cases.[4]

Clinical presentation of tularemia may be diverse and depend on patient characteristics and transmission route. Transmission may occur through a break in the skin, inhalation, or contact with mucus membranes. The most common type of presentation is ulceroglandular tularemia, which accounts for approximately 80% of cases.[1] Patients with ulceroglandular disease typically report recent tick or animal exposure. Initially, an erythematous papule or localized ulcer occurs at the site of inoculation, and the location of the ulcer depends on the route of transmission. Fever and malaise are common. Tender lymphadenopathy is also common, especially in axillary and epitrochlear nodes,[1] as seen in the patient in this report. Lymphadenopathy may be profound, ranging from 0.5 to 10 cm, and may persist up to 3 years.[3] Subcutaneous nodules along draining lymphatics are usually not seen and may suggest bacterial superinfection of the ulcer.[5] The current patient had 3 tender nodules located proximal to the wound along draining lymphatics. Pulmonary or pneumonic tularemia refers to a clinical presentation with predominately pulmonary symptoms. It develops from inhalation of aerosolized particles of *Francisella* or by hematogenous spread to the lung. Ulceroglandular tularemia may also progress to septicemia and pulmonary tularemia, although this was not apparent in the patient in this report.

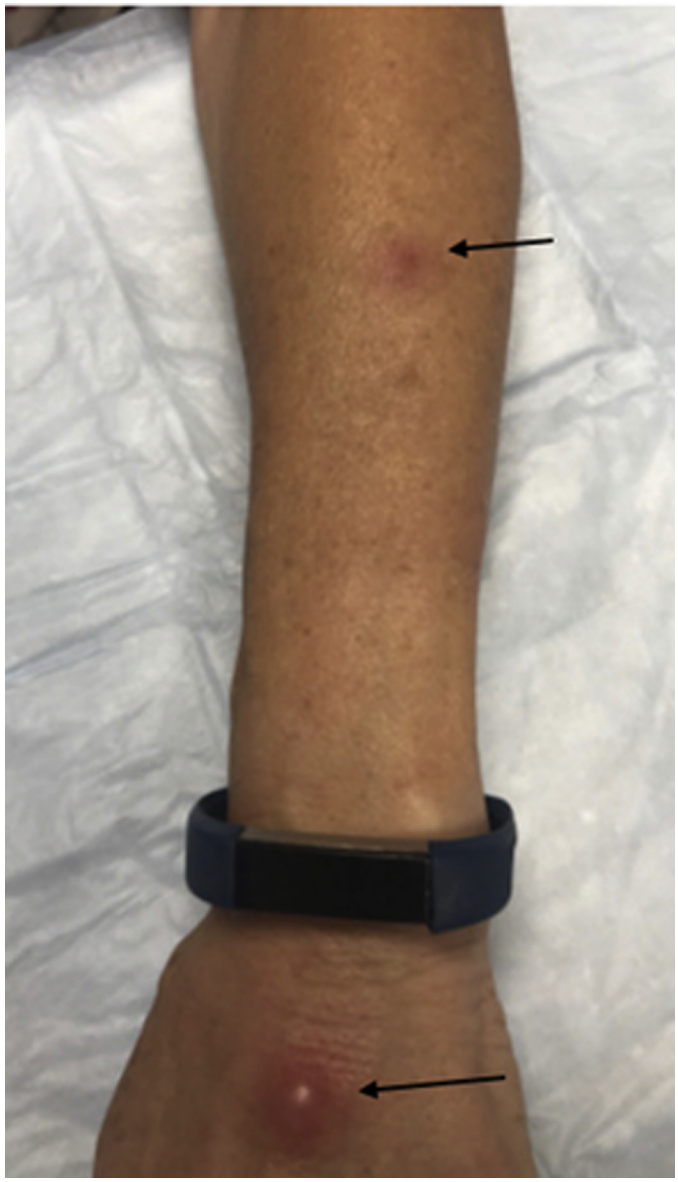

Figure 2. Subcutaneous nodules along draining lymphatics (black arrows).

Cat bites commonly are polymicrobial, and 30% to 60% of bites contain aerobic and anaerobic bacteria.[6] *Pasteurella* spp. and *Streptococcus* spp. are the most common aerobic microbes transmitted from cat bites, and *Fusobacterium* spp. are the most common anaerobes.[6] Multiple treatment options cover these common aerobic and anerobic infections but are ineffective against tularemia. Diagnosis can be difficult owing to the infrequency of infection and the clinical symptomology that overlaps with more common infections. High clinical suspicion, early diagnosis, and appropriate antimicrobial therapy greatly improve the morbidity of tularemia infections. Antibiotics should be administered without delay in suspected or confirmed cases of tularemia. *Francisella tularensis* is generally susceptible to a wide variety of antibiotics. Aminoglycosides, specifically streptomycin and gentamycin, are well-established first-line treatments with a low likelihood of relapse. Fluoroquinolones and tetracyclines are acceptable alternatives. Relapses have been shown with tetracycline and chloramphenicol

owing to their bacteriostatic mechanism. Therefore, to prevent relapse adequately, a 2-week minimum course is recommended when using bacteriostatic agents.[1,4] Antibiotic treatment and supportive therapy are often sufficient in cases of known tularemia infection.[1] However, in cases of unknown infection or draining wounds, surgical debridement is often indicated.

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