Legionella maceachernii Soft Tissue Infection

CHENG E. CHEE, MD; LARRY M. BADDOUR, MD

ABSTRACT: Soft tissue infection caused by *Legionella* spp. is rare. Infection due to *Legionella maceachernii* has only been described in 5 cases and none of them had soft tissue infection; they were immunocompromised hosts who presented with pneumonia. To our knowledge, this is the first case report of *L. maceachernii* soft tissue infection. **KEY INDEXING TERMS:** *Legionella maceachernii;* Soft tissue infection; Cellulitis; Abscess. **[Am J Med Sci 2007;334(5):410–413.]**

Infection due to *Legionella maceachernii* is rare, with pneumonia described in only 5 cases among immunocompromised hosts in the literature.[1,2] To our knowledge, the following description represents the first case report of *L. maceachernii* soft tissue infection.

Case Report

A 68-year-old woman receiving prednisone and methotrexate for treatment of polymyalgia rheumatica was admitted to our institution for pain, swelling, and redness of her right hand for 4 weeks. She reported generalized myalgia and stiffness but no fever or chills. Before hospitalization, she was diagnosed with cellulitis and was treated with 2 weeks of oral clindamycin followed by 2 weeks of oral linezolid with no improvement. Over the first 4 days of hospitalization, the swelling, erythema, and tenderness of her right fifth finger progressed, and several erythematous nodules developed on her dorsal right forearm. She reported no trauma, bites, pets, or water exposure but had pulled weeds and spread mulch in her garden bare-handed and had traveled to the Caribbean, with both exposures occurring several months before presentation. She lived in a city and had never smoked or drank alcohol.

On physical examination, she had normal vital signs and no fever. There were several tender, fluctuant, erythematous nodules on her right dorsal forearm (Figure 1) and a single nodule on her face. Her right fifth finger was swollen and tender from the metacarpophalangeal joint to the distal phalanx (Figure 2).

MRI of the right upper extremity showed a small crescentic subcutaneous fluid collection overlying the posterior aspect of the proximal ulna. A skin nodule was aspirated and yielded frank pus that was culture negative. Biopsies of the nodules showed dermal suppurative neutrophilic and granulomatous inflammation. The erythema, swelling, and pain in the small finger worsened, and operative debridement was done and copious pus was seen. This, in combination with subsequent high fevers and tachycardia prompted empiric broad-spectrum antibacterial and antifungal therapy.

With a broad differential diagnosis, we contacted the microbiology laboratory to request extended cultures of the biopsy material, including culture on buffered-charcoal yeast extract (BCYE) because *Francisella tularensis* was a pathogen that was considered. Two weeks later, after multiple negative conventional cultures of fluid and blood, growth was seen on the BCYE plate from the biopsy material; this organism was confirmed by direct fluorescence antibody (DFA) testing to be a *Legionella* species that was not *L. pneumophila*. Further species identification was difficult because there was too much homology in the DNA (16s) region, and the sample was forwarded to the State of Minnesota Public Health Department laboratory for species identification. This was subsequently identified as *L. maceachernii*. The patient was treated with levofloxacin. After 2 weeks, the erythema and swelling of her right fifth finger had improved but 2 new small nodules had appeared on the ulnar aspect of her right forearm. Her fever and chills had resolved. The dose of levofloxacin was increased due to improvement of her renal function. On subsequent follow-up visit 3 weeks later, 3 new small nodules were present at the periphery of the previously identified nodules. The patient remained afebrile, and there were no significant episodes of spreading erythema around the nodules. Due to the presence of new nodules, levofloxacin was continued for a further 6 weeks.

Discussion

There are 41 species of *Legionella*, with 63 serogroups. *L. maceachernii* was first described by Brenner and colleagues[3] and has phenotypic properties similar to other *Legionella* spp.[1] This case report focuses on soft tissue infections caused by *Legionella* species and include *L. pneumophila*,[4,5] *L. dumoffii*,[5] *L. micdadei*,[6–8] and *L. cincinnatiensis*.[9] To our knowledge, this is the first description of *L. maceachernii* soft tissue infection. All prior infections due to *L. maceachernii* have been pneumonia in immunocompromised patients. Of the 5 patients reported with pneumonitis, 4 died[1,10–12] and one was successfully treated with ciprofloxacin.[2] *L. maceachernii* infections have been identified in the United States,[1,10] Australia,[11] Canada,[12] and the Dominican Republic.[2]

Table 1 summarizes the clinical features of reported cases of *Legionella* soft tissue infection. Criteria for a case definition included the presence of clinical findings of soft tissue infection (cellulitis, abscess formation or both) and *Legionella* species

From the Department of Medicine (CEC, LMB), Division of Infectious Diseases (LMB), Mayo Clinic College of Medicine, Rochester, Minnesota.

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Correspondence: Cheng E. Chee, MD, Department of Medicine, Mayo Clinic College of Medicine, 200 First Street SW, 55905 Rochester MN (E-mail: chee.chengean@mayo.edu).

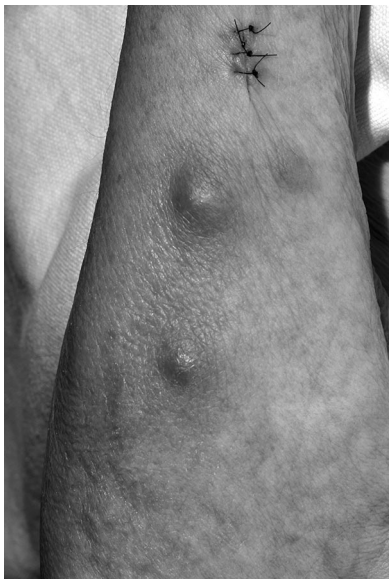

Figure 1. Several tender, fluctuant, erythematous nodules on the patient's right dorsal forearm.

recovered from a clinical specimen. These cases did not have other concomitant endogenous sources for infection such as pulmonary or central nervous system or exogenous sources such as contaminated water exposure. There have been other cases of *Legionella* soft tissue infection including perirectal abscess[13] and cellulitis[14] that have been described but they had concurrent *Legionella* pneumonia. In other cases, hip[4] and sternal[5] wound infections were described, but contaminated water exposure was confirmed as the source of infection. Most patients were immunocompromised (Table 1), either from their underlying medical condition or from exogenous immunosuppressive therapy.[6,7,9] The only exception was a case that involved an otherwise healthy 9-year-old girl.[8]

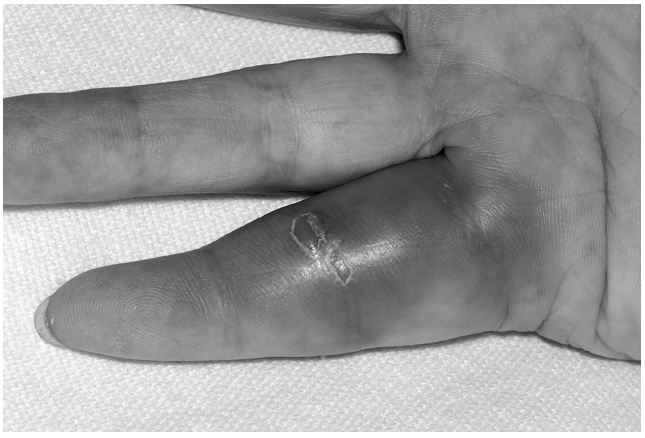

Figure 2. The patient's right fifth finger was swollen and tender from the metacarpophalangeal joint to the distal phalanx.

Establishing a microbiologic diagnosis was challenging in all cases cited in this review. *Legionella* are fastidious, aerobic bacilli that do not grow on ordinary blood agar.[15]

Conventional bacterial cultures of drainage material or tissue specimens failed to grow in all cases. Both DFA staining and BCYE agar were used to establish an etiologic diagnosis in the 2 *L. micdadei* cases.[6,7] Bacterial broad-spectrum polymerase chain reaction (PCR) and sequencing methods were used to identify *Legionella* in two other cases.[8,9] All 3 techniques (culture on BCYE agar, DFA staining and PCR) were used to identify the organism in the current case report. Currently, the medium most often used is the BCYE agar, which supports primary growth from clinical specimens suspicious for *Legionella*.[15] Tiny colonies, with a cut-glass appearance by oblique light microscopy, usually appear in 3 to 5 days.[15] Culture is more sensitive than DFA staining[16] (80% vs. 33% to 70%) and has a specificity of virtually 100%. The major limitation with this technique, however, is a prolonged length of time required before growth is noted for some *Legionella* species. In the case described by van Dam et al[2] and in our case, growth of *L. maceachernii* was not detected for 2 weeks, which indicates that some *Legionella* species are more fastidious than others. DFA testing is a rapid technique that involves the staining of clinical material with fluorescein-labeled antibody directed against various *Legionella* species.[17] This technique has limitations, including low sensitivity, requirement for experienced laboratory personnel to interpret the smears because it is a subjective test, and limited species and serogroups that can be detected.[16] Although PCR-based assays for detection of *Legionella* in clinical samples are highly specific, they are not more sensitive than culture.[16] The primary advantage of PCR is the ability to detect *Legionella* rapidly and to detect species other than *L. pneumophila*. The urinary antigen test is very insensitive for the detection of nonserogroup 1, *L. pneumophila* serogroup isolates, and other *Legionella* spp.[18–20] Therefore, it has a greater chance of being falsely negative in immunocompromised patients because this group of patients is most likely to be infected by those *Legionella* spp. not detected by the urine antigen test.[19]

The cases described highlight the critical role of immunofluorescence and bacterial broad-spectrum PCR and sequencing methodologies in establishing a *Legionella* diagnosis in otherwise culture-negative cases. Recognizing that immunofluorescence and PCR are not routinely used to further evaluate culture negative bacterial samples, we may be underdiagnosing cases of *Legionella* soft tissue infection. The optimal antimicrobial therapy for these infections are unknown, but macrolides,[6–9] fluoroquinolones (our case), tetracycline, and rifampin[7,9] have