

BRIEF ARTICLES

Persistent Cutaneous Infection Due to *Mycobacterium immunogenum*, a Relatively Novel Species

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ABSTRACT

Mycobacterium immunogenum is a species of nontuberculous mycobacteria (NTM) that has been recently identified as the cause of cutaneous infections.¹⁻³ Historically, the majority of NTM infections were attributed to contamination of municipal water systems due to inadequate equipment sterilization. Many of these organisms have been found to grow in distilled water and display resistance to chlorine, formaldehyde, mercury, and standard disinfectants.⁴ In the environment, *M. immunogenum* has been isolated in swimming pools and adjacent showers.⁵ A limited number of cutaneous infections with *Mycobacterium immunogenum* have been reported, and an even smaller number of cases have been reported in immunocompetent individuals. We report a case of a persistent cutaneous infection with *M. immunogenum* in a previously healthy patient successfully treated with clarithromycin 250 mg twice daily for eight weeks. After treatment, the patient remained free of infection and only a minimal scar remained.

CASE REPORT

A 30-year-old female presented to the dermatology clinic for an evaluation of a tender lesion on her right leg that was increasing in size. The lesion was first noted two months ago during a vacation in Hawaii. The patient denied any trauma to the area, but stated she swam in the ocean and swimming pools while on vacation. No pruritus, drainage, or bleeding was noted. On physical exam, the patient had a violaceous, indurated nodule on the right anterior distal leg with poorly defined borders, overlying fine white scale, and

surrounding erythema (Figure 1). The lesion was initially diagnosed as a staphylococcal abscess, but did not improve after taking amoxicillin/clavulanic acid (875 mg /125mg twice daily for 3 days) and applying warm compresses. Amoxicillin/clavulanic acid was discontinued, doxycycline (100 mg twice daily for 10 days) was initiated, and the patient was instructed to take twice-weekly dilute bleach baths.

Twenty-four hours later, the patient returned after developing purulent drainage. On

physical exam, the lesion has developed a necrotic base. A biopsy for tissue culture was obtained. Doxycycline therapy was continued and mupirocin 2% ointment twice a day for 7 days was added. Tissue culture rapidly grew a mycobacterium species, and Matrix Assisted Laser Desorption Ionization Time-of-Flight (MALDI-TOF) method identified the organism as *Mycobacterium immunogenum*. It was found to be susceptible to amikacin and clarithromycin, resistant to cefozitin, ciprofloxacin, imipenem, minocycline, and trimethoprim/sulfamethoxazole, with intermediate susceptibility for linezolid.

Subsequently, doxycycline and mupirocin ointment were discontinued and oral clarithromycin (250 mg twice daily) was initiated. The patient was also instructed to apply warm compresses (30 minutes nightly) as the lesion was still not healing after biopsy. After eight weeks of treatment, the patient's symptoms fully resolved. Antibiotics and warm compresses were discontinued after resolution of the lesion (Figure 2). Eighteen months after initial presentation, the patient denied recurrence of the lesion and only a minimal scar remained.



Figure 1. A violaceous, indurated nodule on the right anterior distal leg with ill-defined borders. Overlying fine white scale and surrounding erythema on initial presentation to the dermatology clinic.



Figure 2. Six weeks after tissue biopsy and one month of treatment with clarithromycin, a level scar with red pigment and slight scale remains.

DISCUSSION

Mycobacterium immunogenum (formerly *M. immunogen*) was first characterized in 2001 as belonging to the *Mycobacterium chelonae-Mycobacterium abscessus* group of nontuberculous mycobacteria. It is a rapidly growing aerobic gram-positive, acid- and alcohol-fast, non-pigmented bacillus.¹ Identification of new NTM species has been possible due to genetic methods. PCR-restriction enzyme analysis patterns of a 439 bp fragment of the hsp65 gene distinguished *M. immunogenum* from other mycobacterium species.^{1,6} Although 16S ribosomal DNA sequencing shows only an 8 bp difference from *M. abscessus* and a

10 bp difference from *M. chelonae*.⁶ The MALDI-TOF spectrometry method used to identify *M. immunogenum* in this case, utilizes protein fingerprint analysis to identify bacteria and yeast.⁷

M. immunogenum has been implicated as the causative agent in several reported skin infections (Table 1). These cases were observed after penetrating trauma like tattoo needles, medication injections, and intravenous catheters.^{2,4,8} Similar to other NTM, *M. immunogenum* is capable of contaminating hospital water and equipment due to its resistance to a variety of

disinfectants, biocides, and its ability to form biofilms.⁷ In a one study, *M. immunogenum* was the second most common NTM isolated from swimming pools. Unlike other NTM species, *M. immunogenum* was not isolated in spas or whirlpools.⁵ Disseminated

infections have also been observed in solid organ and bone marrow transplant patients. The disseminated disease often presents cutaneously with multiple painful skin nodules or draining abscesses.^{3,6}

Table 1. Case reports of *Mycobacterium Immunogenum* Cutaneous Infection

Case Reports of <i>Mycobacterium Immunogenum</i> Cutaneous Infection			
Year Published	Number of Cases	Patient Presentation	Treatment
2001	1	Disseminated cutaneous infection in a patient with SCID ¹	-
2001	1	Disseminated cutaneous infection in a patient after liver transplant ¹	-
2005	1	Immunocompetent patient with chronic ulcer on shin	Heat compresses; resistant to antibiotics ⁵
2009	3	Cutaneous infections following mesotherapy at the injection site	Combination of clarithromycin with either ciprofloxacin or levofloxacin for 6-8 months ⁹
2010	1	Healthy patient with non-healing leg lesion, no prior exposure	Clarithrimycin and Levofloxacin for 9 months ⁷
2010	1	Incision site infection in patient with multiple myeloma on dexamethasone and IL-6 inhibitor	Azithromycin for 5 months ⁷
2011	1	Cutaneous infection in a healthy patient at site of tattoo	Clarithromycin for 7 months with advice to continue for 9-12 months ²
2017	1	Cutaneous infection of lower leg in a healthy patient	Clarithromycin for 8 weeks with heat compresses

Cases of cutaneous infections in immunocompetent patients with no known exposure are limited but are similar to the case presented. In 2005, the first reported case of *M. immunogenum* in an immunocompetent patient was described as a chronic ulcer on the shin. Initially, the ulcer

was resistant to antibiotic treatment and eventually resolved with heat compresses by the time the causative agent was identified.⁹ In 2010, another case of *M. immunogenum* causing a nonhealing leg lesion in a healthy individual was reported. The patient had no history of exposure, and

required extensive treatment with clarithromycin and levofloxacin for 9 months.¹⁰

The best treatment for cutaneous *M. immunogenum* infection is still not known, and has been based on the susceptibility testing of the tissue culture. Clarithromycin has been effective in disseminated and localized infections, however, additional agents are recommended to avoid the development of resistance.³ Although an additional agent should have been considered for this patient, the lesion still reached resolution with monotherapy.

The recommended treatment duration for disseminated infection is still unclear, but may last up to 6 months with clarithromycin and up to 4 months with an additional drug.³ Application of mild heat by the use of a warm compress was used in addition to antibiotics in our patient. It is unclear if the application of heat is of benefit in the treatment of *M. immunogenum*, but it has been shown to be of benefit in the treatment of other NTM infections, such as *Mycobacterium marinum*.¹¹ The patient presentation demonstrates similarities to the previous cases of *M. immunogenum* cutaneous infections in immunocompetent hosts. NTM should be considered in cases of non-healing lesions, classically on the extremities, resistant to antibiotics used for treating staphylococcal species. As *M. immunogenum* displays multi-drug resistance, a tissue culture with species identification should be performed with susceptibility testing to determine appropriate treatment.

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