



## Case report

Necrotizing osteomyelitis in a man with disseminated *Mycobacterium chelonae* infectionGarrett M. Harp<sup>a,\*</sup>, Rosane Duarte Achcar<sup>b</sup>, Wendi K. Drummond<sup>c,\*\*</sup><sup>a</sup> Department of Pulmonary Medicine, Naval Medical Center San Diego, San Diego, CA, USA<sup>b</sup> Division of Pathology, Department of Medicine, National Jewish Health, Denver, CO, USA<sup>c</sup> Division of Mycobacterial and Infectious Diseases, Department of Medicine, National Jewish Health, Denver, CO, USA

## ARTICLE INFO

## Keywords:

Skin nodules

Necrotizing osteomyelitis

Nontuberculous mycobacteria

*Mycobacterium chelonae*

Disseminated infection

## ABSTRACT

Cases of disseminated nontuberculous mycobacterial (NTM) infection are difficult to treat. We encountered an elderly man with disseminated *Mycobacterium chelonae* infection. The clinical evaluation and treatment of patients with this type of systemic infection pose unique challenges. Disseminated NTM infection with bone involvement often requires surgical intervention in addition to antimicrobial therapy.

## Introduction

The most common clinical manifestation encountered with *Mycobacterium chelonae* is localized soft tissue infections in immunocompetent hosts [1]. These infections typically are sporadic and tend to occur at sites of trauma such as penetrating injury or surgical incision [1]. Less commonly, disseminated infections may occur on a background of immunosuppression caused by medications (anti-tumor necrosis factor therapy, corticosteroids, and methotrexate) or diseases (AIDS, malignancy) [2–4].

We present a case of an elderly man with *Mycobacterium chelonae* infection that disseminated to bone. We also discuss the challenges associated with treating patients with this type of disseminated infection.

## Case

A previously healthy 83-year-old Caucasian man with a 12-month history of tender skin nodules presented to infectious diseases clinic. Eighteen months prior to presentation, he underwent sinus surgery for removal of nasal polyps as well as repair of his deviated nasal septum. Shortly after the sinus surgery, he was referred for a follow-up exam and was found to be hypoxemic. Computed tomography (CT) scan of the chest was obtained and showed interstitial fibrosis, which was thought to be amiodarone-induced. Amiodarone was discontinued, and the patient was started on high-dose oral prednisone at 60 mg daily as well as supplemental oxygen. A CT angiogram was completed to screen

for pulmonary emboli and was negative. About 1 month later, he was able to wean off supplemental oxygen. He remained on oral prednisone at a lower dose of 20 mg daily.

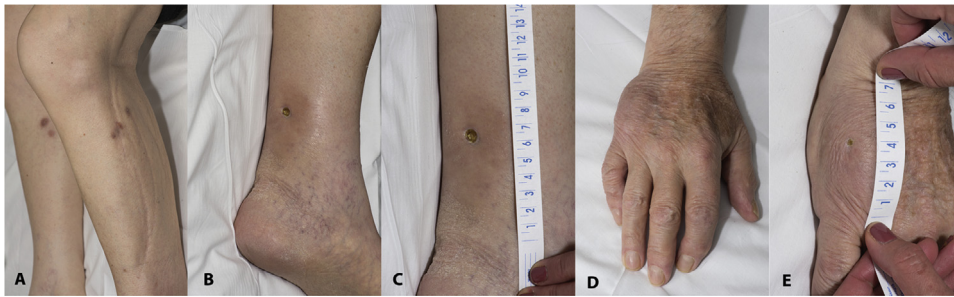
Two months after the initial CT of the chest, the patient developed hypoxemia again requiring the use of supplemental oxygen, and his prednisone dose was increased to 60 mg daily. He developed epistaxis and was evaluated by otolaryngology for cauterization. The otolaryngologist noted a shallow ulcerated lesion within the nares. Tissue was obtained from the ulcer and was smear positive for acid fast bacilli (AFB) with subsequent AFB culture growing *Mycobacterium chelonae* which was sensitive to aminoglycosides, macrolides, and carbapenems. The isolate was resistant to cephalosporins, fluoroquinolones, and trimethoprim-sulfamethoxazole (TMP-SMX). Six months following the initial chest CT, the nasal ulcer healed. However, skin nodules were noted on his elbows, left lower extremity (Fig. 1A–C), and right hand (Fig. 1D–E). The nodule on the medial aspect of his left lower extremity drained purulent fluid, and the patient was admitted to the hospital. A fluid pocket was identified in the left lower extremity superior to the Achilles tendon. Culture was obtained from the left lower extremity nodule fluid and was smear positive. After the initial I&D, he continued to have intermittent drainage of clear and occasionally purulent fluid from his left leg and right hand. Additional purple nodules developed on his left arm and left olecranon process.

Laboratory evaluation yielded a normal white blood cell count with mild eosinophilia at 3.3%. He had mild normocytic anemia with hemoglobin at 10.1 g/dL (normal range for men: 13.5–17.5 g/dL). C-reactive protein (CRP) was elevated at 4.87 mg/dL (normal level for CRP:

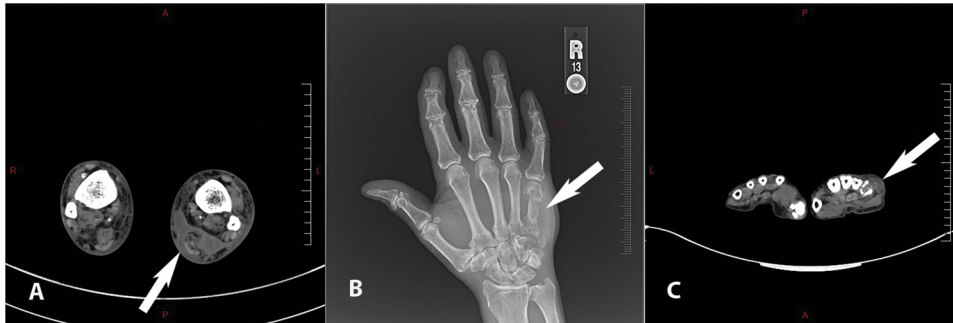
\* Corresponding author at: Naval Medical Center San Diego, Departments of Pulmonary and Critical Care Medicine, 34800 Bob Wilson Drive, San Diego, CA, 92134, USA.

\*\* Corresponding author at: National Jewish Health, Division of Mycobacterial and Infectious Diseases, Department of Medicine, Jackson Street, Denver, CO, 80206-2761, USA.

E-mail addresses: [garrett.m.harp@mail.mil](mailto:garrett.m.harp@mail.mil) (G.M. Harp), [DrummondW@NJHealth.org](mailto:DrummondW@NJHealth.org) (W.K. Drummond).



**Fig. 1.** Lateral left leg and medial right leg with several cutaneous nodules (A). Medial aspect of left leg with nodule and crust overlying sinus tract (B–C). Right fifth metacarpal with overlying soft tissue edema and crust over prior drainage tract (D–E).



**Fig. 2.** Axial computed tomography (CT) image showing fluid pocket in left leg (A). Radiograph of right hand showing cortical loss and sclerotic changes in right fifth metacarpal (B). Axial CT image of metacarpals showing destruction of the right fifth metacarpal, which suggests osteomyelitis (C).

less than 3.0 mg/dL). Autoimmune workup included antinuclear antibody (ANA), rheumatoid factor, anti-SSA antibody, and anti-SSB antibody, which was negative. Immunoglobulin E (IgE), immunoglobulin M (IgM), immunoglobulin G (IgG), and immunoglobulin A (IgA) levels were all normal. Hepatitis C antibody was negative. Alkaline phosphatase was mildly elevated at 117 U/L.

CT images were obtained of his upper and lower extremities (Fig. 2A, C). CT images of the left lower extremity showed a fluid collection along the posteromedial aspect of the left calf (Fig. 2A). CT images of the right upper extremity showed evidence of chronic destruction of the right 5th metacarpal bone with an associated 2-cm soft tissue mass (Fig. 2C). No signs of bone destruction or soft tissue deep infection in the left upper extremity were noted. A biopsy of the right extensor digitorum profundus synovium demonstrated necrotizing granulomatous inflammation with extensive necrosis (Fig. 3A).

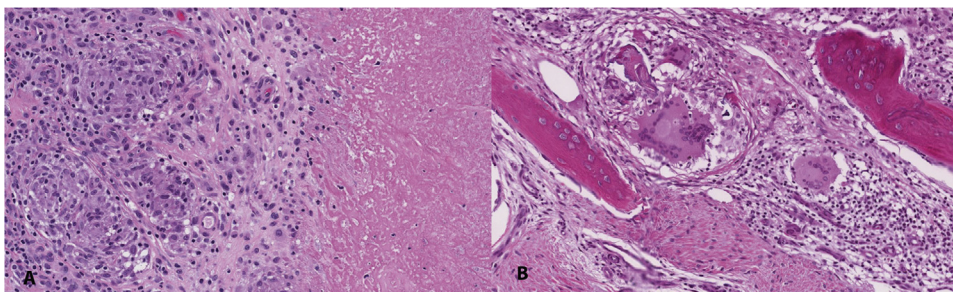
Following his initial laboratory and radiology studies, he was referred for orthopedic surgery consultation. Based on the CT scan of his hand, a right ray amputation of the right fifth metacarpal was recommended. He agreed to undergo the amputation. Hematoxylin and eosin (H&E) staining of the right fifth finger amputation showed necrotizing granulomatous osteomyelitis with extensive necrosis (Fig. 3B). Further excisions of his soft tissue lesions were also recommended. He was started on antimicrobial therapy with azithromycin 500 mg Monday, Wednesday and Friday, imipenem 500 mg every 12 h, and

clofazamine 100 mg daily. He did not suffer any complications related to the amputation and tolerated the medication regimen well.

## Discussion

Four clinical syndromes account for most infections with non-tuberculous mycobacteria (NTM): pulmonary infection, lymphadenitis, disseminated disease, and skin & soft tissue infections (SSTIs) [5]. Usually, disseminated disease presents with disseminated cutaneous lesions [5]. SSTIs in patients with *Mycobacterium chelonae* specifically vary in terms of their clinical presentation [5]. In patients infected with *Mycobacterium chelonae*, the classic cutaneous presentation is disseminated disease with multiple lesions in the form of tender, erythematous nodules that often have a purpuric appearance [5]. Some of these patients present with a chronic, non-healing cellulitis or skin ulcers that are usually painful and spread slowly [5]. Infections associated with surgical procedures may present as wound infections, draining sinus tracts, or dysfunctional prosthetic devices [5,6]. Rhinosinusitis may be caused by disseminated *M. chelonae* but is rare [7]. Although this patient had sinus ulceration, he did not appear to have sinusitis clinically or radiographically.

CT scans of bones in patients with disseminated NTM infection and multifocal bone involvement demonstrate abnormal thickening of the affected cortical bone with sclerotic changes, encroachment of the



**Fig. 3.** Right hand tenosynovium biopsy showing necrotizing granulomatous inflammation with extensive necrosis (magnification 20X) (A). Right fifth finger amputation revealed necrotizing granulomatous osteomyelitis with extensive necrosis. There are extensive areas of necrosis (pink acellular material) intermixed with areas showing granulomatous inflammation with well-formed granulomas composed of epithelioid histiocytes and multinucleated giant cells (magnification 20X) (B).

medullary cavity, and can show chronic draining sinus tracts [8]. Plain radiographs do not demonstrate the aforementioned changes as early as a CT scan [8]. CT is less desirable than MRI because of decreased soft tissue contrast but is particularly helpful for cases of chronic osteomyelitis as it detects necrotic bone more readily than conventional radiography. In this case, CT of the upper extremities showed chronic appearing expansion and destruction of the right-sided fifth metacarpal bone, which was compatible with osteomyelitis.

There are no specific guidelines for medical treatment of disseminated *M. chelonae* infection and no randomized controlled trials comparing different treatment regimens [5]. Antimicrobial susceptibility testing with cultures is crucial. The use of macrolide monotherapy is not recommended due to cases of acquired resistance to macrolides. Surgical treatment is also indicated in instances like this case [5]. In complex cases, extrapulmonary NTM infections due to rapid-growing mycobacteria often require aggressive surgical debridement as part of the management strategy. This is due to several factors including the intractable nature of the pathogen, the propensity to form fistulas, limited activity of antimicrobials, and difficulties related to medical therapy including the need to use multiple antimicrobial agents.

#### Conflict of interest

None. The views expressed in this case report are those of the

authors and do not necessarily reflect the official policy or position of the United States (U.S.) Department of the Navy, U.S. Department of Defense or the U.S. Government.

#### References

- [1] Oelberg DA, Mendelson J, Miller MA, Dascal A. Disseminated *Mycobacterium chelonae* infection presenting as progressive multifocal osteomyelitis: report of two cases and a review of the literature. *Can J Infect Dis* 1994;5(1):28–32.
- [2] Lage R, Biccigo DG, Santos FB, Chimara E, Pereira ES, Costa A. *Mycobacterium chelonae* cutaneous infection in a patient with mixed connective tissue disease. *An Bras Dermatol* 2015;90(1):104–7.
- [3] Ichihara A, Jinnin M, Fukushima S, Inoue Y, Ihn H. Case of disseminated cutaneous *Mycobacterium chelonae* infection mimicking cutaneous vasculitis. *J Dermatol* 2014;41(5):414–7.
- [4] Van der Wekken L, Herbrink J, Snijders D, Chamuleau M, Griffioen A. Disseminated *Mycobacterium chelonae* in a patient with T-cell lymphoma. *Hematol Oncol Stem Cell Ther* 2017;10(2):89–92.
- [5] Gonzalez-Santiago TM, Drage LA. Nontuberculous mycobacteria: skin soft tissue infections. *Dermatol Clin* 2015;33(3):563–77.
- [6] Eid AJ, Berbari EF, Sia IG, Wengenack NL, Osmon DR, Razonable RR. Prosthetic joint infection due to rapidly growing mycobacteria: report of 8 cases and review of the literature. *Clin Infect Dis* 2007;45(6):687–94.
- [7] Enomoto Y, Oba M, Ishii N, et al. Rhinosinusitis and disseminated cutaneous infection caused by *Mycobacterium chelonae* in an immunocompromised patient. *J Infect Chemother* 2015;21(9):691–4.
- [8] Pineda C, Espinosa R, Pena A. Radiographic imaging in osteomyelitis: the role of plain radiography, computed tomography, ultrasonography, magnetic resonance imaging, and scintigraphy. *Semin Plast Surg* 2009;23(2):80–9.