Atypical Mycobacterium Abscessus Cutaneous Infection in the Immunosuppressed: A Case report on an emerging pathogen

Jigar Patel, B.S., AZCPM[1], Dylan Mariano, B.S. MBA-HCM, AZCPM[1], Caden Carver, B.S., AZCOM[2], Mattie Krause, B.S., AZCPM[1], & Evelyn Heigh-Rosen, DPM, AZCPM[1],
1: Arizona College of Podiatric Medicine 2: Arizona College of Osteopathic Medicine
Midwestern University, Glendale, AZ, USA

Introduction:

This report describes a patient with longstanding diabetes mellitus with systemic complications, severe comorbidities, and a non-healing wound infected with Mycobacterium Abscessus Complex. The patient in this case unfortunately died shortly after diagnosis and before treatment could eradicate the infection. This case report will discuss the natural history, etiology, and clinical presentation of a skin and soft tissue infection with this challenging pathogen.

Background:

Mycobacterium abscessus complex (MAbc) is a globally emerging nontuberculosis mycobacteria (NTM) group organism that has led to an increased incidence of opportunistic pulmonary, skin and soft tissue infections (SSTIs). Although heightened physician awareness and improved diagnostic capabilities have contributed to the increased identification of MAbc cases in the past decade, there are gaps in the medical literature regarding the clinical characteristics and diverse presentations of the pathogen.

MAbc is ubiquitous in soil and water. MAbc has a tight multilayer outer lipid membrane making the species highly resistant to disinfectants and allowing it to persist on both surgical equipment and medical devices. Since Moore and Frerichs' initial description in 1953, SSTIs caused by MAbc have been associated with post-tattoo, post-injection, post-surgical, nosocomial, and post-environmental exposure. Furthermore, even secondary skin involvement during disseminated disease is reported [1]. While NTM SSTIs have been noted in immunocompetent patients, a greater number of documented cases exist in immunocompromised patients, including those with decreased CD4+ T lymphocyte counts [2]. Patients with immunocompromised status have a higher risk of disseminated infections, clinical exacerbations, and overall mortality [2]. Estimating the disease burden of MAbc is difficult given that NTM infections are prevalent globally and many countries do not specifically report NTM infections.

MAbc is described as one of the most pathogenic and drug-resistant species within the NTM group, making treatment challenging. Recent studies on resistance rates and drug susceptibility demonstrate resistance profiles that vary geographically, highlighting the importance of early local susceptibility testing [3]. The problematic drug resistance is facilitated by an array of proposed mechanisms, including modified enzymes, efflux pumps, and selective permeability [4]. Of note, it has been shown that MAbc isolates exposed to macrolides can induce the erm(41) gene, conferring resistance to macrolides days after starting initial treatment [5]. Current literature suggests that MAbc SSTI infections are treated with a long course of multi-drug regimens that often include a macrolide in combination with amikacin, cefoxitin, or imipenem in conjunction with aggressive surgical debridement [6]. Due to the difficulty of successful treatment, clinicians must rely on susceptibility testing and good clinical judgement to develop a treatment plan.

Case Presentation:

A 69-year-old female presented with a four-month history of a solitary, nonhealing ulcer on her right lower extremity following a reported insect bite. The patient had a past medical history of longstanding poorly controlled diabetes mellitus type II (DM), diabetic peripheral neuropathy, hyperlipidemia, essential hypertension, osteopenia, steatosis of the liver, dementia, and a 50-pack-year history of smoking. On initial exam, an ulceration on the right lower extremity was noted [Figure 1]. Periwound erythema was present initially, with mild calor. After a two-week trial of oral amoxicillin/clavulanic acid and topical mupirocin, the wound was unchanged. Wound biopsy was then obtained and sent for culture and pathologic analysis. Microscopic exam revealed reactive epidermal inflammation without evidence of malignancy. Wound tissue culture showed growth of M. abscessus complex and a diagnosis of cutaneous M. abscessus infection was made. Empiric clarithromycin and doxycycline were initiated while awaiting susceptibility testing results. Final culture showed Mycobacterium abscessus group sensitive to amikacin, cefoxitin and clarithromycin and indeterminant to imipenem. Susceptibility testing showed resistance to the following: ciprofloxacin, doxycycline, linezolid, moxifloxacin, tobramycin, and trimethoprim/sulfamethoxazole. Unfortunately, one week later, before antibiotics could be adjusted, the patient developed a large left basal ganglia intracranial bleed with ventricular extension complicated by multiorgan system failure and succumbed to the hemorrhage 20 days after the antibiotics were begun.

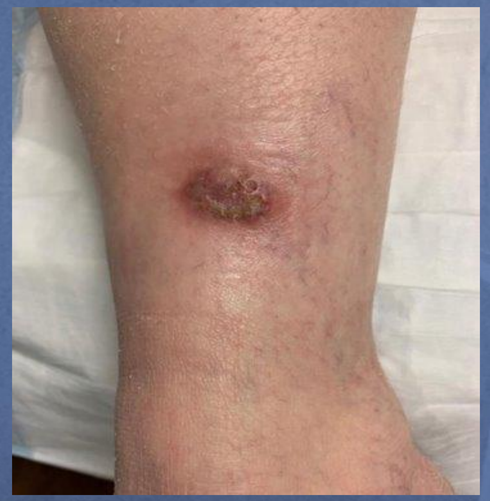

Figure 1:
Dermatologic exam of lesion: right lower leg ulceration 2.2 cm x 1.4 cm x 0.3 cm with fibro-granular central aspect and hypertrophic perimeter. Mild periwound erythema present without acute cellulitis or malodor.

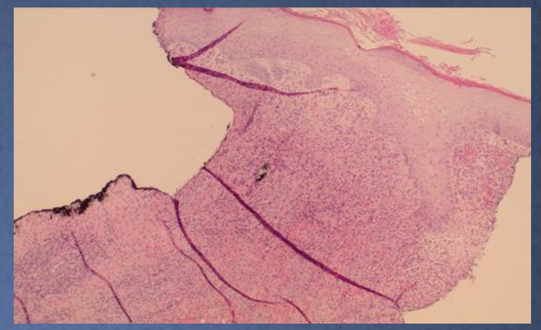

Figure 2:
Skin punch biopsy specimen: right central lower leg showed reactive epidermal changes with moderate chronic and mild acute inflammation involving dermis and subcutaneous tissue.

Discussion:

Chronic, non-healing cutaneous lesions in the immunocompromised require a high degree of suspicion for atypical pathogens such as MAbc, so that timely diagnosis and effective treatment can be initiated. Given the challenging nature of MAbc SSTIs, a thorough history and physical exam is the initial step in correctly diagnosing these infections. Early clinical suspicion of an atypical infection, including MAbc should prompt wound culture and biopsy followed by antimicrobial susceptibility testing.

The patient presented here reported an insect bite precipitating her non-healing lower extremity wound. She denied history of tattoo, self-injection, surgical procedure, or mechanical instrumentation to the site, all of which are commonly associated with MAbc SSTIs cases. MAbc SSTIs have been reported associated with psoriasis treated with methotrexate, and several other types of immunosuppression [7]. The underlying etiology in many of these scenarios appears to be a compromised epithelial barrier due to diverse factors. The reported patient probably had a break in skin due to the insect bite followed by exposure to contaminated water or soil. A high level of clinical suspicion for atypical pathogens, including MAbc, is aided by being cognizant of compromised skin barrier and underlying comorbidities.

In the reported case, biopsy of a solitary ulceration on the right lower extremity demonstrated a fibro granular center with hypertrophic perimeter [Figure 1]. Other cases of MAbc present with cutaneous nodules, papular abscesses, and erythematous pustules [6] with underlying granulomatous inflammation and positive acid-fast staining. Biopsy of the lesion in this case demonstrated reactive epidermal changes with chronic and acute inflammation of the dermis and subcutaneous tissue [Figure 2]. The stain was negative for AFB, and no granulomas were seen on the biopsy of this patient. The deep inflammation is not specific but is a characteristic of MAbc and other mycobacterial SSI. [8]. Others have reported granulomas in 85% of NMT skin infections in the immunocompetent, but only in 65% of those immunocompromised [8]. Acid fact staining of wound tissues only finds organisms in 11-27% when culture positive [8]. The deep dermal and subcutaneous inflammation seen in our patient is an important clue to infection with NMT organisms [8]. Pathologic aids to diagnosis can be very helpful when positive, but a high index of suspicion for atypical infection is necessary when nonspecific but suggestive findings are present.

Current literature suggests that MAbc SSTI infections are most effectively treated with a lengthy course of multi-drug regimen including a macrolide and amikacin, cefoxitin, or imipenem in conjunction with aggressive surgical debridement [6]. Most patients show response to treatment with resolution of skin lesions in 4-6 months [3]. The patient described here completed only 20 days of clarithromycin and doxycycline before succumbing to complications of her numerous comorbid conditions. Although unfortunate, this outcome raises the question of what role, if any, her MAbc infection played in her response to treatment and overall adverse health outcome. In addition, this case demonstrates the poor physiologic reserve of patients who acquire MAbc SSTIs, and how wound healing may be affected in the presence of other comorbid conditions. This case highlights the need for a high clinical suspicion for atypical infection in patients with non-healing wounds, particularly where the epithelial layer has been breached, and in those who are immune compromised.

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