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A Rare Case of *Mycobacterium chelonae* Septic Joint

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Abstract

Background
Nontuberculous mycobacteria (NTM) are abundant in soil and water. They can cause infection by direct inoculation via even minimal trauma. Chronic soft tissue infection may extend to involve joints and underlying bone by direct extension. Septic joint infections due to NTM are rare and much of what is known about their management is either taken from case reports or extrapolated from the tuberculosis literature.
Methods
Here we describe a case of septic ankle due to *M. chelonae,* a rapidly growing NTM. We also review the literature of mycobacterial infection, prognosis, and the treatment pharmacology of these difficult to treat infections.
Results
An 86-year-old man presented to our hospital with complaints of a painful, swollen, left ankle. Three months earlier he had seen a pimple on his left foot after tripping over a lawn mower. The lesion evolved into erythema and swelling of the left ankle which was so painful that he could not bear weight on his left lower extremity (LLE). MRI of the LLE revealed a comminuted nondisplaced fracture of the distal tibial metaphysis. Turbid joint fluid was aspirated, and cell studies showed 211,450 k/uL white blood cells with 97% neutrophils. Patient underwent partial removal of the left tibia with insertion of a drug implant device. Tissue culture grew acid fast bacilli. Histopathology also showed acid-fast bacilli, confirming an atypical mycobacterial infection. Meropenem, linezolid, and azithromycin were initiated until the organism was identified as *Mycobacterium chelonae*. Based on susceptibility report, meropenem was discontinued, and ciprofloxacin was initiated. After discharge, a repeat MRI showed possible osteomyelitis and small abscesses about the left ankle. This prompted a repeat debridement. Tobramycin was started and ciprofloxacin was discontinued. The patient was re-admitted shortly after discharge with acute renal failure and lactic acidosis; he ultimately passed away on comfort care per patient and family wishes.
Conclusion
NTM are more resistant to antimycobacterial therapy compared with mycobacteria tuberculosis (MTb) and repeat surgical debridement is often necessary for cure. Because these cases are rare, it is important to approach treatment as a team including ID physicians, ID pharmacists, and surgeons to improve outcomes.

Background

- NTM are ubiquitous within soil and water.
- *M. chelonae* has been associated with water or other liquid-borne infections in a variety of medical procedures.
- Infections caused by nontuberculous mycobacteria do not require public health reporting, so their exact incidence is not known.
- NTM may cause a subacute to chronic ulceronodular soft tissue infection that manifests slowly over many months.
- Rapidly growing NTM may be identified in days but the isolation and identification of MTb and slow-growing NTM may take up to 8 weeks or longer.
- NTM are intrinsically more resistant to antimycobacterial therapy compared with MTb, and thorough surgical debridement is often necessary for clinical cure.
- Much of what is known about the management of osteoarticular infections caused by NTM is either derived from case reports and case series or extrapolated from the tuberculosis literature.

Case Description

86-year-old man presented with complaints of a painful, swollen, left ankle for three months. He had first noticed a pimple on his left foot after tripping over a lawn mower while working outside on his lawn. The lesion evolved into erythema and swelling of the left ankle which was so painful that he could not bear weight on his left lower extremity. Initial laboratory work was significant for a sedimentation rate of 122 mm/HR, C-reactive protein 13.83 mg/dL, WBC 10.2 K/uL, and platelet count of 495 K/uL. Arthrocentesis revealed turbid fluid with total WBC of 211,450 K/uL with 97% neutrophils. Patient underwent partial removal of the left tibia. Tissue culture showed growth of acid-fast bacilli on Day 4. Histopathology also showed AFB positive acid-fast bacilli, confirming an atypical mycobacterial infection (Figure 2).

Initial empiric therapy included meropenem 2 grams every 8 hours, linezolid 600 mg daily, and azithromycin 250 mg daily until the organism was identified as *M. chelonae* and a sensitivity profile was reported. Based on susceptibilities (Table 1), meropenem was discontinued, and ciprofloxacin was added. The patient did well for 8 weeks with near normalization of his inflammatory markers and improvement of strength.

After this initial period of progress, the patient developed pain, generalized weakness, and malaise. A repeat MRI showed possible osteomyelitis and small abscesses about the left ankle. (Figure 3). This prompted a repeat debridement. IV tobramycin was added, and ciprofloxacin was discontinued. Linezolid and azithromycin were continued. He was re-admitted shortly after with acute renal failure and lactic acidosis; the patient was ultimately placed on comfort care per his wishes and passed away.

Antibiotic	MIC/ Interpretation
Tobramycin	2 Susceptible
Ciprofloxacin	4 Resistant
Clarithromycin	2 Susceptible
Doxycycline	> 16 Resistant
Linezolid	16 Intermediate
Imipenem	32 Resistant

Table 1. *M. chelonae* Susceptibility testing results

Discussion

- Susceptibilities in NTM and data correlating outcomes between *in vitro* susceptibility testing and clinical response is mixed.
- For *M. chelonae* specifically, tobramycin is the preferred aminoglycoside due to it being the most active and imipenem is the preferred beta-lactam due to resistance noted with cefoxitin and lower MICs.
- Ciprofloxacin was chosen in a salvage approach to spare aminoglycoside usage initially given the patient's risk factors for complications if on therapy, along with evidence that *in vitro* susceptibilities may not correlate with clinical response.
- In the setting of NTM osteomyelitis, pharmacokinetics of agents is a factor to consider so ID pharmacists are fundamental in the treatment of this infection.
- Treatment approach to managing rapid growing mycobacterium such as *M. chelonae* will largely depend on macrolide sensitivities (Chart 1)

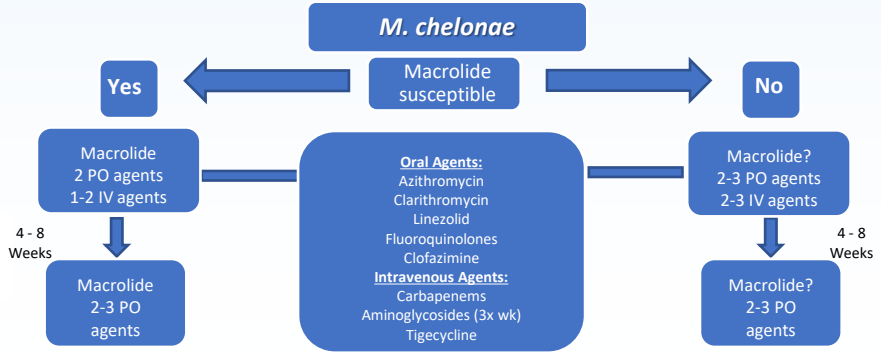


Chart 1. Approach to treatment based on susceptibilities

Imaging and Pathology

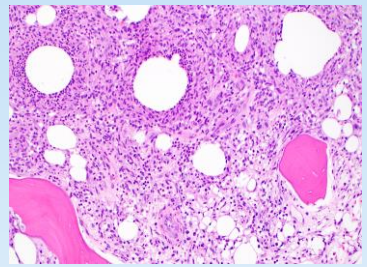
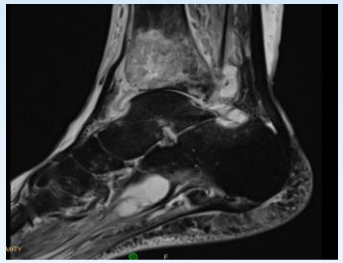


Fig 1. There are cleared spaces surrounded by neutrophils and granulomatous inflammation. Within many of these cleared spaces are acid-fast bacilli



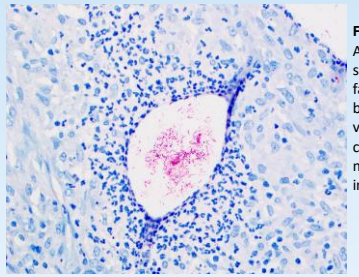


Fig 2. AFB Stain shows acid fast positive bacilli in the vacuoles, confirming a mycobacterial infection

Fig 3. Comminuted nondisplaced fracture of the distal tibial metaphysis extending into the epiphysis with significant associated T2 hyperintense bone marrow edema and associated moderate tibiotalar joint effusion.

Conclusions

- Treatment of these infections is costly, prolonged, and antimicrobial resistance poses a significant challenge to successful outcomes.
- Treatment approach to managing rapid growing mycobacterium such as *M. chelonae* will largely depend on macrolide sensitivities.
- Susceptibilities in NTM can be variable and data correlating outcomes between *in vitro* susceptibility testing and clinical response is mixed.
- In the setting of NTM osteomyelitis, the pharmacokinetics of agents is a factor to consider.
- A multidisciplinary approach is fundamental in the treatment of *M. chelonae* infections.

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