Mycobacterium mucogenicum is a nontuberculous mycobacterium (NTM) recently noted as the etiologic agent of infections in various organ systems, including the skin. Infection by NTM is associated with AIDS and has been encountered with increasing frequency in the population without AIDS. Found ubiquitously in water and soil, NTM easily colonize the respiratory tract, with cutaneous infections occurring less frequently. Individuals with NTM colonization typically do not develop disease. However, when M mucogenicum infiltrates other tissues, it causes infection in the blood, liver, lungs, peritoneum, skin and soft tissue, and central nervous system. Cutaneous infections have been described in immunocompromised patients who are taking tumor necrosis factor (TNF) inhibitors and in otherwise healthy patients following a break in the skin and subsequent exposure to pond or salon water. We report a case of nosocomially derived cutaneous infection.

Reports of a Case

A woman in her 70s presented with a 1-month history of a tender swollen papule on her right superomedial malar cheek near the medial canthus. She had a history of hypothyroidism, hyperlipidemia, basal cell carcinoma of the right temple and left lower eyelid, and lacrimal atresia with blockage for which she recently had undergone a right-sided dacryocystorhinostomy with Crawford tube placement. This procedure was performed 6 weeks before presentation in an outpatient setting. She was taking levothyroxine sodium, simvastatin, aspirin, and estradiol. Her other medical conditions were well controlled. She denied any fevers, chills, or night sweats at initial presentation.

Physical examination revealed an erythematous, tender papule on her right superomedial malar cheek near the medial canthus (Figure 1). Evaluation included a 4-mm punch biopsy specimen from the lesion, tissue culture, complete blood cell count, and comprehensive metabolic panel. The complete blood cell count and comprehensive metabolic panel did not reveal any abnormalities. Histopathologic
findings of the lesion demonstrated a mononuclear and multinuclear histiocytic infiltrate with focal granulomatous inflammation. There were areas of dermal edema and granulation tissue. A small number of lymphocytes, eosinophils, plasma cells, and neutrophils was noted (Figure 2). Fite stain highlighted numerous acid-fast forms (Figure 3). Results of periodic acid-Schiff staining for fungal organisms were negative. Tissue culture identified *M. mucogenicum*.

The patient initially received 100 mg of oral minocycline hydrochloride twice daily. She was unable to tolerate the drug therapy because of nausea, dizziness, and fatigue, and was subsequently given 500 mg of clarithromycin twice daily with temporary discontinuation of simvastatin to avoid a possible drug interaction. Treatment with clarithromycin was continued for 6 months, with complete resolution of disease. She remains free of infection.

Follow-up with the physician's office that placed the device revealed that no investigation was undertaken after discovery of the infection. The surgical procedure had been performed in a sterile setting.

**Discussion**

*M. mucogenicum* was first identified within the group of rapidly growing NTM in 1982 and was given its current classification in 1995.12 *M. mucogenicum* is taxonomically similar to both *Mycobacterium fortuitum* and *Mycobacterium chelonae-abscessus*.12 It is found ubiquitously in water and soil.1,12 The organism is particularly hardy and able to survive within biofilms, amoebae, and disinfected water sources.13 While most infections are owing to organism exposures outside of the hospital, the first reported cases of *M. mucogenicum* infections were in dialysis patients who developed septicemia via their dialysis catheters. The mycobacteria discovered had survived in the water used to wash the catheters, despite disinfection with formaldehyde, per the manufacturer’s recommendations.4 Others report *M. mucogenicum* growth in hospital water systems, on catheter-based equipment, and in food sources. These reports have emphasized the organism's resistance to low levels of chloride, formaldehyde and glutaraldehyde disinfectants, and acidity.12-14 The mechanism of this resistance is thought to be related to a thick, waxy outer membrane surface as well as the bacterium's ability to form biofilms and reproduce within protozoa.2,13

The respiratory tracts of many people are colonized with *M. mucogenicum*, yet symptomatic disease is most commonly associated with positive cultures in skin, wound tissue, or blood.2,13 Disease caused by NTM occurs in both immunocompetent and immunocompromised patients.2,6-8,11,12 Skin and soft-tissue infections caused by *M. mucogenicum* typically occur in one of two settings: immunocompromised patients or patients with posttraumatic injury in which the organism is introduced via a break in the skin.2,8 Once mycobacteria have infiltrated human tissue, the body responds via a granulomatous immune reaction within the infection site. Individuals...
who lack immunologic components of granuloma formation are at higher risk for a serious mycobacterial infection. A relationship between anti-TNF therapy, especially infliximab, and NTM infections has been shown. An article by Shehan and Sarma documented recurring erythematous papules with occasional ulceration in a patient with history of trauma but who was receiving a regimen of low-dose prednisone and etanercept for rheumatoid arthritis.

Our article describes M mucogenicum infection of the skin and subcutaneous tissue following trauma. Postinjury infection has been described in the setting of NTM exposure in unsterilized water sources. Gómez-Moyano et al reported infection with M mucogenicum in a young boy who developed suppurative nodules in the popliteal fossae and systemic symptoms after exposure to pond water. Gira et al documented an outbreak of Mycobacterium mageritense infections in the lower calves of multiple women who received pedicures at the same salon. The women reported shaving before the pedicure, presumably causing small breaks in the skin. Several atypical mycobacterial species, including M mucogenicum, were isolated from various water sources in the salon. Our case is unique in that the initial trauma occurred in a medical setting during placement of a surgically introduced device. Although previous nosocomial infections resulted in peritonitis and septicemia, this is the first report, to our knowledge, of a dermatologic manifestation of nosocomially derived M mucogenicum following a medical device placement. The case highlights the need to consider NTM when faced with persistent erythema or other signs of infection at the site of surgical intervention.

Many NTM infections are difficult to treat, showing resistance to a variety of antibiotic classes. Despite its resistance to environmental disinfectants, M mucogenicum is unique in that it is susceptible to numerous antibiotics, including fluoroquinolones, certain cephalosporins, macrolides, and aminoglycosides. Because of the differences in antibiotic susceptibility, proper identification of the mycobacterial species is important. The criterion standard for species identification is 16S rRNA sequencing. In addition, antibiotic sensitivity testing for the particular infecting organism is recommended. Several studies recommend dual-antibiotic therapy for immunocompromised patients or patients with bacteremia. Treatment periods vary in length from 1 to 6 months. Our patient’s infection was treated successfully with a regimen of 500 mg of oral clarithromycin twice daily for 6 months.

Conclusions

This case highlights cutaneous infection with a rarely described NTM, M mucogenicum. To our knowledge, it is the first reported case of nosocomial cutaneous infection following a medical device placement. Owing to their ubiquity, resistance to therapy, and potential complications if left untreated, physicians should consider M mucogenicum when faced with a cutaneous mycobacterial infection following surgical intervention. Organism identification is key, as appropriate treatment is highly effective.

REFERENCES

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