

Amputation of a finger in a patient with multidrug-resistant *Mycobacterium marinum* skin infection

Stefano Veraldi
Paolo Pontini
Gianluca Nazzaro

Department of Pathophysiology and Transplantation, Università degli Studi di Milano, I.R.C.C.S. Foundation, Cà Granda Ospedale Maggiore Policlinico, Milan, Italy

Abstract: *Mycobacterium marinum* is the etiologic agent of fish tank granuloma. The clinical course is usually benign: spontaneous healing is possible within weeks or months. However, fish tank granuloma is sometimes resistant to several antibiotics. We report a case of *M. marinum* infection of a finger in a 73-year-old cook. The disease was resistant to a number of antibiotics and required the amputation. The history of this patient testifies that *M. marinum* can be resistant to several antibiotics and that skin infections can be sometimes so severe as to require the amputation of a finger.

Keywords: cook, *Mycobacterium marinum*, clarithromycin, amputation

Introduction

Mycobacterium marinum is an acid-fast, aerobic, nonmotile, non-sporulating, photochromogen bacterium. It possesses a thick cell wall made up of wax (40%–70%) and lipids (25%–30%). *M. marinum* growth is usually slow: 2–6 weeks on Löwenstein–Jensen medium, at the temperature of 25°C–33°C. In culture, with a light source, the color changes from white to yellow because of the accumulation of β -carotene crystals.^{1,2} *M. marinum* has a worldwide diffusion, mainly in temperate and hot-humid climates. Its natural habitat is fresh and salt water. Penetration of *M. marinum* in the skin occurs through abrasions or excoriations. Incubation period is usually 3 weeks; however, 35% of patients has an incubation period ≥ 30 days.³ *M. marinum* is the etiologic agent of fish tank granuloma. Hands (fingers and dorsum), wrists and forearms are most frequently involved.^{3–9} Fish tank granuloma is characterized by four clinical presentations: type I: single erosive or ulcerative or crusted or verrucous papules, nodules and plaques; type II: more or less numerous and widespread lesions, often with a sporotrichoid distribution (multiple nodules along superficial lymphatics; regional lymphadenopathy is possible); type III: deep infections (bursitis, tenosynovitis, arthritis, osteomyelitis), with or without skin involvement; and type IV: widespread or disseminated lesions, systemic involvement and bacteremia, almost exclusively in immunocompromised patients.^{5,8,10–14} In types I and II, the clinical course is benign: spontaneous healing is possible within weeks or months;^{8,11,13} however, scar formation and reinfection, because of no permanent immunity, are possible. We report a case of type I *M. marinum* infection of a finger which was resistant to a number of antibiotics and required the amputation.

Case report

A 73-year-old Caucasian cook was admitted because of painful swelling, ulcers and crusts located at the left index finger. The patient stated that she was in good general

Correspondence: Stefano Veraldi
Dermatology Unit, University of Milan,
Via Pace 9, 20122 Milan, Italy
Tel +39 2 5503 5109
Fax +39 2 5032 0779
Email stefano.veraldi@unimi.it

health, except for mild essential arterial hypertension. Furthermore, the patient stated that the swelling had appeared 2 years earlier, followed, 6 months later, by the appearance of the ulcers. She was subjected to a biopsy at a dermatological center, with diagnosis of mycobacteriosis, although cultural examinations were negative for mycobacteria. The patient was treated with minocycline (100 mg/day for 3 months). However, this therapy was stopped because of both clinical failure and appearance of headache, dizziness and tinnitus. The patient was unsuccessfully treated at a second center with doxycycline (100 mg/day for 3 months) and nonsteroidal anti-inflammatory drugs. She subsequently went to a third center, where it was decided to use rifampicin (600 mg/day) and ethambutol (400 mg/day) for 4 months; however, no clinical remission was observed. When the patient was admitted at our hospital, dermatological examination revealed a severe erythematous swelling involving the left index finger. A roundish ulcer, of 0.8 cm diameter, with fibrinous bed and well-defined borders, and a round crust, of 0.7 cm diameter, were also visible at the medial and medial-lower surface of the finger, respectively (Figure 1). The patient complained of severe pain. General physical examination did not show anything pathological: in particular, no axillary lymphadenopathy was recorded. Laboratory examinations revealed leukocytosis (10,800 leukocytes/mm³), and increase in erythrocyte sedimentation rate (49 mm at the first hour), C-reactive protein (9 mg/dL) and α 1-acid glycoprotein (4.1 mg/mL). All the other laboratory tests, including immunological tests, were within normal ranges or negative. X-rays showed a mild involvement of the periosteum of the second phalanx. Ultrasonography showed a dermal and subcutaneous swelling. Neurological examination, which was necessary in order to understand the nature of the severe pain reported by the patient, was negative. We performed a new



Figure 1 Erythematous swelling, ulcer and crust located at the left index finger.

biopsy. Histopathologic examination showed tubercular-like granulomas, with some Langhans cells and an inflammatory infiltrate with lymphocytes and neutrophils. Two out of three cultures were positive for *M. marinum*. PCR confirmed that the causative agent was *M. marinum*. Mycological examinations were negative. In vitro drug susceptibility testing was not performed. This was decided because, in our experience, based on ~60 patients with *M. marinum* skin infections, in vitro sensitivity was rarely correlated to in vivo sensitivity. The patient was treated with clarithromycin, according to a regimen we recently proposed (500 mg/day for 10 consecutive days/month for 5 months);¹⁵ oral diclofenac (100 mg/day) was added. This therapy induced only a slight improvement of the clinical picture; in particular, the patient complained of severe pain. She was therefore sent to a plastic surgery unit, where it was decided to perform the amputation of the finger. No additional antibiotic therapy was prescribed. We did not examine the patient anymore, but her surgeons stated that the follow-up (36 months) was negative.

Written informed consent has been provided by the patient to have the case details and the accompanying image published.

Discussion

M. marinum skin infections can sometimes be considered as occupational diseases. However, they have been exceptionally reported in cooks.^{16–18} The patient we have described showed to be resistant to a number of antibiotics, including clarithromycin, which is, in our personal experience, the most effective antibiotic for the treatment of fish tank granuloma.¹⁵ However, according to literature data, *M. marinum* is often resistant, both in vitro and in vivo, to several antibiotics.¹³ In addition, in vitro sensitivity is not always correlated to in vivo sensitivity.¹³ In conclusion, no established therapy of choice does exist, and no therapeutic studies based on large groups of patients have been published.¹³ As previously mentioned, in this patient it was necessary to perform the amputation of the involved finger. This was also decided because of the severe pain reported by the patient. To our knowledge, six cases of amputation of a finger because of *M. marinum* infection were reported in the literature.^{9,19–23} In all cases, the infection was resistant to several antibiotics: isoniazid, rifampicin and ethambutol;¹⁹ rifampicin, ethambutol, clarithromycin and doxycycline;²¹ clarithromycin;²² and clarithromycin, moxifloxacin and ceftaroline.²³ In addition, in one patient, destruction of the metacarpophalangeal joint capsule, flexor and extensor tenosynovitis, metacarpal and proximal phalanx bone destruction and abscess were recorded.¹⁹ In other two

patients, amputation was considered as necessary because of osteomyelitis followed by fractures²⁰ and flexor tenosynovitis,²² respectively. Finally, an amputation was performed because of methicillin-resistant *Staphylococcus aureus* superinfection.⁹ In our patient, bursitis, tenosynovitis, arthritis and osteomyelitis were not detected. The history of this patient testifies that *M. marinum* can be resistant to several antibiotics and that skin infections can be sometimes so severe as to require the amputation of a finger.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Gluckman SJ, Marinum M. *Mycobacterium marinum*. *Clin Dermatol*. 1995;13(3):273–276.
2. Palenque E. Skin disease and nontuberculous atypical mycobacteria. *Int J Dermatol*. 2000;39(9):659–666.
3. Jernigan JA, Farr BM. Incubation period and sources of exposure for cutaneous *Mycobacterium marinum* infection: case report and review of the literature. *Clin Infect Dis*. 2000;31(2):439–443.
4. Edelstein H. *Mycobacterium marinum* skin infections. Report of 31 cases and review of the literature. *Arch Intern Med*. 1994;154(12):1359–1364.
5. Bhatta MA, Turner DP, Chamberlain ST. *Mycobacterium marinum* hand infection: case reports and review of literature. *Br J Plast Surg*. 2000;53(2):161–165.
6. Aubry A, Chosidow O, Caumes E, Robert J, Cambau E. Sixty-three cases of *Mycobacterium marinum* infection: clinical features, treatment, and antibiotic susceptibility of causative isolates. *Arch Intern Med*. 2002;162(15):1746–1752.
7. Bhambri S, Bhambri A, del Rosso JQ. Atypical mycobacterial cutaneous infections. *Dermatol Clin*. 2009;27(1):63–73.
8. Bonamonte D, de Vito D, Vestita M, et al. Aquarium-borne *Mycobacterium marinum* skin infection. Report of 15 cases and review of the literature. *Eur J Dermatol*. 2013;23(4):510–516.
9. Johnson MG, Stout JE. Twenty-eight cases of *Mycobacterium marinum* infection: retrospective case series and literature review. *Infection*. 2015;43(6):655–662.
10. Piersimoni C, Scarparo C. Extrapulmonary infections associated with nontuberculous mycobacteria in immunocompetent persons. *Emerg Infect Dis*. 2009;15(9):1351–1358.
11. Petrini B. *Mycobacterium marinum*: ubiquitous agent of waterborne granulomatous skin infections. *Eur J Clin Microbiol Infect Dis*. 2006;25(10):609–613.
12. Pandian TK, Deziel PJ, Otley CC, Eid AJ, Razonable RR. *Mycobacterium marinum* infections in transplant recipients: case report and review of the literature. *Transpl Infect Dis*. 2008;10(5):358–363.
13. Rallis E, Koumantaki-Mathioudaki E. Treatment of *Mycobacterium marinum* cutaneous infections. *Expert Opin Pharmacother*. 2007;8(17):2965–2978.
14. Gonzalez-Santiago TM, Drage LA. Nontuberculous Mycobacteria: Skin and Soft Tissue Infections. *Dermatol Clin*. 2015;33(3):563–577.
15. Veraldi S, Çuka E, Nazzaro G. Treatment of sporotrichoid fish tank granuloma with pulsed clarithromycin. *Dermatology*. 2014;229(2):83–87.
16. Arai H, Nakajima H, Nagai R. *Mycobacterium marinum* infection of the skin in Japan. *J Dermatol*. 1984;11(1):37–42.
17. Cennimo DJ, Agag R, Flegler E, et al. *Mycobacterium marinum* hand infection in a “sushi chef”. *Eplasty*. 2009;9:400–406.
18. Veraldi S, Çuka E, Vaira F, Nazzaro G. *Mycobacterium marinum* skin infection in a sushi cook. *G Ital Dermatol Venereol*. 2016;151(5):569–570.
19. Wendt JR, Lamm RC, Altman DI, Cruz HG, Achauer BM. An unusually aggressive *Mycobacterium marinum* hand infection. *J Hand Surg Am*. 1986;11(5):753–755.
20. Vazquez JA, Sobel JD. A case of disseminated *Mycobacterium marinum* infection in an immunocompetent patient. *Eur J Clin Microbiol Infect Dis*. 1992;11(10):908–911.
21. Rajesh G, Ip WY, Chow SP, Fung BK. Treating deep-seated *mycobacterium marinum* infection in the hand: a report of three cases. *Hand Surg*. 2006;11(1-2):83–88.
22. Pang HN, Lee JY, Puhaindran ME, Tan SH, Tan AB, Yong FC, Jyl L, Abh T. *Mycobacterium marinum* as a cause of chronic granulomatous tenosynovitis in the hand. *J Infect*. 2007;54(6):584–588.
23. Patel SS, Tavana ML, Boger MS, Win SS, Rimawi BH. Necrotizing soft tissue infection occurring after exposure to *Mycobacterium marinum*. *Case Rep Infect Dis*. 2014;2014:702613.

Infection and Drug Resistance

Publish your work in this journal

Infection and Drug Resistance is an international, peer-reviewed open-access journal that focuses on the optimal treatment of infection (bacterial, fungal and viral) and the development and institution of preventive strategies to minimize the development and spread of resistance. The journal is specifically concerned with the epidemiology of antibiotic

Submit your manuscript here: <https://www.dovepress.com/infection-and-drug-resistance-journal>

resistance and the mechanisms of resistance development and diffusion in both hospitals and the community. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Dovepress