Clinical Medicine Insights: Dermatology

CASE REPORT

Sporotrichoid Cases of *Mycobacterium Marinum* Skin Infection

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Abstract: *Mycobacterium marinum* belongs to the slow growth photochromogenous mycobacteria group. It is pathogenic for fish and human beings in which it can cause cutaneous nodular and ulcerative lesions, sometimes with sporotrichoid arrangement.
We report three cases of sporotrichoid *Mycobacterium marinum* infections successfully treated with prolonged antibiotic therapy. Tropical fish aquaria and, more in general, the water environment were identified as the source of infection.

Keywords: *Mycobacterium marinum*, sporotrichoid mycobacteriosis, swimming pool granuloma

Clinical Medicine Insights: Dermatology 2010:3 25–29

This article is available from http://www.la-press.com.

Introduction

Since the Fifties, when *Mycobacterium marinum* was recognized as the causative pathogen of a cutaneous disease called "swimming pool granuloma",[1,2] several human cases have been reported over the world.[3–7]

In 1962 the first case of *M. marinum* skin infection acquired from a tropical aquarium was reported,[8] and since then this disease has been also defined.

"Fish tank granuloma". Afterwards, several descriptions of human infection linked to the aquarium environment were published,[9–11] confirming the potential role of the infected fish tanks as a hazard in the transmission of the disease.

Other species of atypical (or nontuberculous) mycobacteria that are saprophytes in the aquatic environments, such as *M. fortuitum* and *M. chelonae,*[12] have been reported as aetiological agents of human skin infection over the world.[13–17]

Furthermore, aquatic animals such as fresh-or saltwater fish, snails, shellfish, dolphins, shrimps and water fleas can be considered as vectors of human skin infection.[5,18] Risk factors include skin injuries and water/fish related hobbies or occupations.

We report three cases of sporotrichoid skin infection due to *Mycobacterium marinum*, observed in Sicily. Tropical fish aquaria and, more in general, the water environment were identified as the source of infection.

Case Reports

Case 1

A 32 year-old man, farmer, was a fish fancier and had the hobby of cleaning his "beautiful" home tropical freshwater fish aquarium without gloves periodically.

One day he injured himself with the fish spines so that, in a few weeks, two nodules developed on his dorsal left hand. The nodular skin lesions, mobile and painless, 2–3 cm in diameter, had a soft consistency and a reddish, slighty hyperkeratotic, ulcerative surface (Fig. 1). Regional lymphadenopaty was absent. The patient's general health was good.

Case 2

A 30-year-old aircraftman observed, 4-weeks after the injury while he was cleaning a private freshwater aquarium, a soft, reddish lesion, 3 mm. In diameter, without scaling, crusting, and ulceration on the left hand. After some days a erythematous and ulcerative nodular lesion of 1–2 cm in diameter was observed proximally the first lesion. After 10-days new lesions appeared along the lymphatic vessels in the typical sporotrichoid arrangement (Fig. 2).

Case 3

A 58-year-old man, farmer in a little town of Sicily, showed some lesions on the back of the right hand. Detailed questioning of the patient revealed that 3 weeks before he underwent a trauma on the same hand, during irrigation activities. Early a violaceous papula, 2–3 mm in diameter, appeared on the back of the hand; then some ulcerative nodules could be seen along the course of the lymphatics of the involved extremity in a sporotrichoid pattern. Moreover, the second finger of the right hand showed swelling, erythema, pain and slight functional impairment (Fig. 3). No radiopaque spines were revealed by X-ray examination of the involved tissues.

In all three cases the pulmonary findings and the complete blood screening and biochemical tests were within normal limits. The tuberculin skin test was negative. Skin biopsies were taken for histological and mycobacterial examination. The histopathology suggested a granulomatous inflammation in the two third of derma (Fig. 4), a tuberculoid structure with central basophilic necrosis surrounded by several epithelioid cells and Langhans giant cells (Fig. 5), lymphocytes and monocytes. No acid-fast bacilli were detectable by Ziehl-Neelsen staining (data not shown).

The skin lesions were cultured for mycobacteria on Löwenstein-Jensen media at 30 and 37 °C. Growth occurred after 10–14 days at 30 °C. The results of the biochemical tests[19] were indicative of *M. marinum* in all three cases.

The patients were successfully treated with Rifampicina (600 mg per day) and Ethambutol (20 mg/kg body daily) for two months.

Discussion

Atypical mycobacteria are saprophytic nontuberculous mycobacteria showing a world-wide distribution in aquatic environments,[5] both fresh and marine water. Infection can be acquired from sources as diverse as fish-tanks and swimming pool, mainly via inoculation into the skin.

M. marinum was first isolated in 1926 by Aronson[20] from saltwater fish that died in the Philadelphia aquarium. In 1951 it was recognized as a cause of human

Figure 1. Mobile and painless nodules on the dorsal left hand.

disease by Norden and Linell[1] that isolated this organism from skin lesions in swimmers of a contaminated swimming pool in a Swedish town: Orebro.[2] In 1962 Swift and Cohen reported the first case of *M. marinum* skin infection acquired from an aquarium.[8]

The clinical manifestations, restricted principally to the extremities, range from a solitary granulomatous verrucous papule that may occasionally ulcerate to ascending lymphatic sporotricoid lesions. Rare cutaneous disseminated lesions have been described both in immunologically competent and in immunosuppressed patients. Lesions are most common on the elbows, knees and feet of swimmers, and on the hands and fingers of fish fanciers. They are painful in less than one-half of cases.

Even if similar skin lesions have been recently referred to other species of atypical mycobacteria, such as *M. abscessus*, *M. fortuitum* e *M. chelonae*,[14,16,17,21]

Figure 2. Nodular lesions developed along the line of lymphatic drainage.

M. marinum is the most common non-tuberculous mycobacterium to produce, along the lymphatic channels, cutaneous nodules resembling those of sporotrichosis.[22,23]

The clinical picture of the haematogenous and lymphatic dissemination of this bacterium consists of multiple erythematous papules and nodular-ulcerative lesions with sporotrichoid arrangement in the lower legs and forearms.

Two main types of skin lesions can be found: multiple lesions in a sporotrichoid pattern along the course of lymphatic vessels or a single nodular lesion, at points of trauma, sometimes verrucous or psoriasiform, that breaks down to form a crusted ulcer or a suppurating abscess; sometimes it may remain warty. In immunosuppressed patients the lesions can occur multiple and disseminated

Figure 3. Some nodules in a sporotrichoid pattern on the back of right hand.

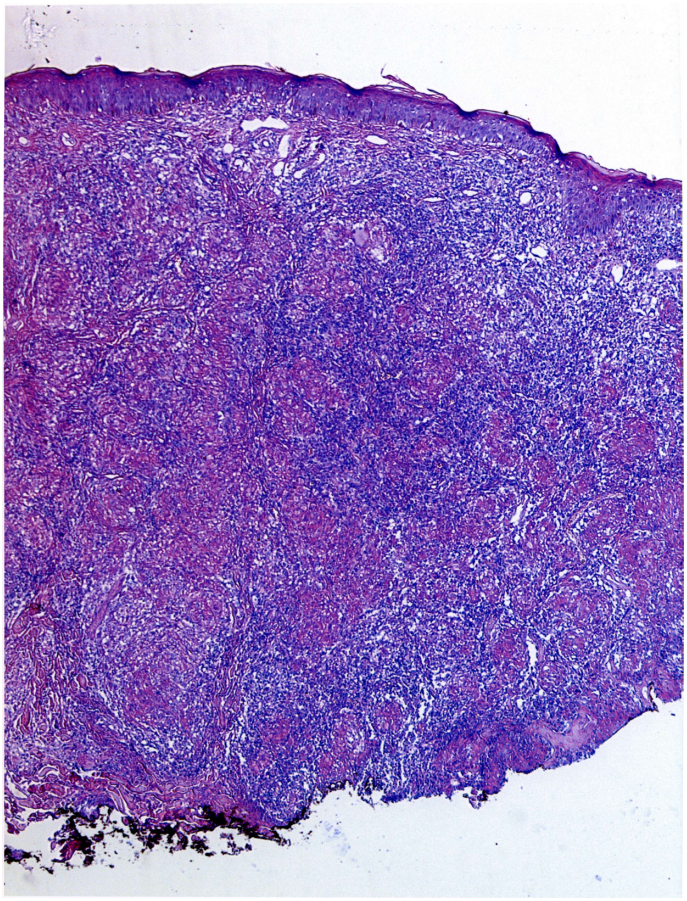

Figure 4. Granulomatous inflammation in the two third of derma. E.E. 10X.

on the trunk and limbs.[24] Sometimes penetration to underlying structures may occur and, in endemic areas, skin lesions resembling those of cutaneous leishmaniasis may develop. While the single nodular lesion generally resolves spontaneously with residual scarring in a period that ranges from three months to three years, the sporotrichoid form presents poor inclination to healing. Most lesions are asymptomatic and only occasionally do hurt when bumped. Lymphangitis and lymphadenophaty are absent regionally.[3]

Atypical mycobacteria seem to be pathogenic mainly on abraded skin and the terms 'leisure-time pathogen' and 'hobby hazard' indicate the association with fishing, swimming and keeping tropical fish. The incubation period ranges from one week to two months but it is usually two to three weeks long.

Early histological lesions show epidermal hyperkeratosis and acanthosis and an inflammatory type reaction within the dermis with an infiltrate of lymphocytes, polymorphonuclear cells and histiocytes. In older lesions a more typical tuberculoid architecture is

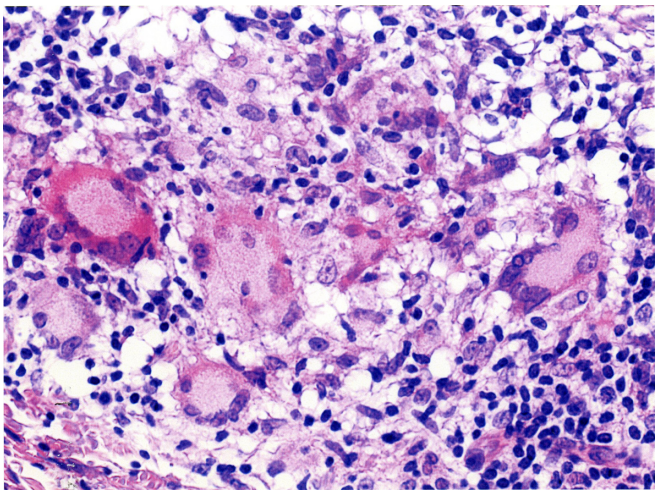

Figure 5. Conspicuous Langhans giant cells are present. E.E. 40X.

developed with epithelioid cells and Langhans giant cells.[3] The granulomatous reaction may invade through the depth of the dermis and subcutaneous tissues. Our histopathological findings were consistent with the classical histological descriptions, and the absence of acid-fast bacilli in the lesions has already been reported in literature, given that only in about 10% of cases can the histopathology reveal acid-fast bacilli, which are usually located within histiocytes.[25,26]

As to the diagnosis, an accurate history taking, the appropriate cultural identification, the finding of a tuberculoid granuloma at histology are very important elements. Skin testing with PPD did not prove to be helpful.

Mycobacterium marinum is poorly susceptible to antituberculous drugs. A standardized therapy regimen for *Mycobacterium* spp. does not exist and spontaneous regression of the lesions does occur in some cases. The surgical excision or the destruction by cryosurgery or electrodessication and irradiation are useful in the single lesions.[6,27] Rifampicin (600 mg per day) with Ethambutol (20 mg per kg body daily) or in association with Trimethoprim and Sulfamethoxazole (800 mg per day) for two-to-four months resulted in healing of the lesions. Recently, Tetracycline (2 g per day), Minocycline (200 mg per day) for one-to-three months have been reported to be effective. With antibiotic therapy, excision is usually unnecessary.[28]

The public health authorities should be alerted when a public source of infection is identified. Maximum chlorination of swimming pools is generally effective. Fish fanciers should know the

risk of mycobacterial infection related to their hobby. The use of gloves and the covering of skin lesions could reduce the incidence of infections, as the two major risk factors for *M. marinum* infection are represented by exposure to *M. marinum* infected waters and presence of superficial cuts or abrasions.

Three cases reported in this paper confirm both the diffusion of atypical mycobacteria in the water environment and the risk of infection associated with the aquarium hobby and with jobs involving frequent contact with contaminated waters.

Disclosure

This manuscript has been read and approved by all authors. This paper is unique and is not under consideration by any other publication and has not been published elsewhere. The authors and peer reviewers of this paper report no conflicts of interest. The authors confirm that they have permission to reproduce any copyrighted material. Written consent was obtained from the patients for publication of this study.

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