Mycobacterium marinum Infection in Connecticut: Report of Four Cases

YAW AMOATENG-ADJEPONG, MD, ANAN SALLOUM, MD, DACELIN ST. MARTIN, MD, AND MAXIME J-M COLES, MD

ABSTRACT—*Mycobacterium marinum* is emerging as an important human pathogen in the United States. We report four cases incidentally diagnosed from culture of biopsy specimens of wrist lesions at a Connecticut inner city hospital between 1996 and 1999. There was no clear association with aquatic exposure and only one patient recalled prior trauma. All were successfully treated with ethambutol and rifampicin. The current literature on the epidemiology, clinical characteristics and management of *Mycobacterium marinum* infections is reviewed.

Introduction

ALTHOUTH *Mycobacterium marinum (M. marinum)* was first isolated in 1926, it was not recognized as a cause of human disease until 1959.[1,2] In retrospect, clusters of human cases occurred between 1930 and 1970.[1] It is steadily "emerging" as a significant human infection in the United States (US) and in other industrialized countries.[1,3] We present a series of four cases diagnosed at Bridgeport Hospital, a coastal, inner city community teaching hospital in Bridgeport, Connecticut. The literature on the epidemiology, clinical presentations and management of *M. marinum* infection is briefly reviewed.

Case 1.—An 85-year old, previously healthy, gentleman presented with right wrist swelling of uncertain duration. He did not recall any prior trauma, fever, night sweats or chronic cough. He had no fish tank at home and did not engage in any aquatic sports. Physical examination was remarkable for a palpable, cystic lesion on the dorsum of the right wrist, about 2 cm in the widest diameter, tender to deep palpation, with no erythema, differential warmth or visible puncture site. A provisional diagnosis of "*ganglion*" was made and the cystic lesion was excised. It contained thick, yellowish, non-foul smelling material. The pathology was consistent with chronic synovitis with non-caseating granuloma. Culture yielded *M. marinum*.

Case 2.—A 41-year old woman with a history of sarcoidosis presented with a painful, right wrist swelling of four weeks duration. She denied any recent trauma, hiking or insect bite. She did not participate in any recreational aquatic sports and had not been to the beach for months. Physical examination revealed a warm, tender, fluctuant mass at the dorsum of the right wrist, measuring 3 cm at the widest diameter. A clinical diagnosis of abscess was made. The lesion was incised and debrided. Purulent, foul-smelling liquid was obtained. The smear was positive for acid-fast bacilli (AFB). The culture grew *M. marinum*. Pathology of the lesion was described as "organizing abscess with granulomatous tissue and marked inflammation."

Case 3.—A 33-year old gentleman, with no significant past medical history, presented with recurrent distal left hand and wrist swellings. He worked as a window installer and recalled being stuck by a wood splinter prior to the onset of the lesions. He had no recreational aquatic habits. He had been treated with two courses of antibiot-

YAW AMOATENG-ADJEPONG, MD, MPH, PhD, FAAP, Assistant Clinical professor, Yale University School of Medicine, Associate Program Director, Combined Medicine-Pediatrics Residency Program, Bridgeport Hospital, Yale-New Haven Health, Bridgeport, E-mail: Pyamoa@bpthosp.org; ANAN SALLOUM, MD, DACELIN ST. MARTIN, MD, AND MAXIME J-M COLES, MD

Table 1.—List of antibiotics used successfully in the management of *M. marinum* infections (or suggested by favorable susceptibility testings*).

Antibiotic	Dosage (adults)
Amikacin	15 mg/kg/day IM/IV q8–24 h
Amoxicillin-Clavulanate	875 mg PO q12h
Ciprofloxacin	500 mg PO q12h
Clarithromycin	500 mg PO q12h
Doxycycline	100 mg PO q12h
Ethambutol	15–25 mg/kg PO qd (Max 1g/day)
Isoniazid	15 mg/kg PO qd (Max 300 mg/day)
Levofloxacin	500–750 mg PO qd
Linezolid*	600 mg PO q12h
Minocycline	100 mg PO q12h
Ofloxacin	200–400 mg PO q12h
Pristinamycin	2–4 g/day (50–100 mg/kg/day)
Pyrazinamide	15–30 mg/kg PO qd (Max 3g/day)
Rifabutin	300 mg PO qd
Rifampicin	10–20 mg/kg PO qd (max 600mg)
Sparfloxacin**	200 mg qd
Tetracycline	500 mg PO qid
Trimethoprim/sulfamethoxazole	160/800 mg PO bid

** Drug discontinued in the US

ics in the preceding month. The lesions temporally decreased in size with each course of antibiotic therapy. Bacterial cultures on two previous occasions had been negative. Physical examination revealed multiple, tender, cystic lesions (measuring 0.5-3 cm in diameter) at the distal left forearm and wrist. Two of the lesions were excised. Purulent fluid was recovered from both lesions. The smears from both lesions were positive for AFB. Cultures grew *M. marinum*. No granuloma was identified in the pathology of the lesions.

Case 4.—A 44-year-old woman known to have *Human immunodeficiency virus* infection, presented with a one month history of a tender mass on the dorsum of the left hand. She denied any intravenous drug use, skin popping, or trauma to the site. She denied any associated constitutional symptoms. Physical examination was remarkable for an erythematous, tender, cystic mass at the dorsum of the left hand. There was no differential warmth. The lesion was presumed to be an abscess. Open drainage yielded copious, purulent fluid. The smear was positive for AFB and the culture grew *M. marinum*.

Comment

M. marinum infection is an "emerging," necrotizing, cutaneous disease. It has been variously called "Mariner's tuberculosis," "aquarium granuloma" and "swimming pool granuloma" because of its high association with aquatic milieu. Its "natural" habitat is contaminated water. It thrives in both fresh and salt water. It is a common fish pathogen. Human infections typically occur after exposure to a contaminated aquatic environment (including household fish tanks) usually following mild trauma or skin abrasions. No known aquatic exposure or trauma has been found in about half of the reported cases.[1,3] Person-to-person transmission has not been recorded. The median incubation period is 16–21 days but can be as long as nine months.[3,4]

The incidence of *M. marinum* infection in Connecticut is unknown. In the US about 150 cases per year were diagnosed between 1993 and 1996, based on a survey of 46 states.[1] This represented nearly a four-fold increase from the 40 cases per year observed in 1981–1983.[5] These rates likely represent an underestimation of the true incidence. As the above cases illustrate, diagnosis is often missed or delayed. The upper extremities are most often involved. The distal aspects of the upper extremities, usually the hand, forearm and wrist, are involved in over 90% of the reported cases.[1-5] Infections of unusual sites, including the face, chest wall and the buccal cavity, rarely have been reported.[6-8] People of all ages, gender and race have been infected. It is not typically a disease of the immunocompromised.

M. marinum presents commonly as a cutaneous infection. The lesions usually begin as painless (or minimally painful) papules at the inoculation site. They progress into nodules and, if left untreated, will ulcerate or progress to abscesses. The abscesses are clinically indistinguishable from pyogenic bacterial infections. Deeper structures may be involved leading to tenosynovitis, osteomyelitis and septic arthritis. Localized lymphangitic spread may occur with associated sporotrichoid lesions and lymphadenitis. Scarring is not uncommon. Disseminated infections are rare but have been noted among some immunosuppressed patients.[9,10] Untreated chronic infections may result in scarring and lymphedema.[11]

The definitive diagnosis is made by culture. *M. marinum* grows on *Lowenstein Jenson* medium and is readily identified with the *Ziehl-Nielson* stain. Histopathology may reveal nonspecific inflammation with or without granuloma, depending on the stage of the lesion. Typically few acid-

fast bacillis are observed within the granulomas.[1] They are, nonetheless, readily cultured from the necrotic, cutaneous lesions.

There is no consensus on the optimum treatment of *M. marinum* infection. Various antibiotics (Table 1) have been used, alone or in combination. The specific antibiotic choice appears to be based on personal experience and/or preference. Table 1 lists antibiotics that have been used in reported case series to date. Treatment successes and failures have been observed with almost all of them. All of our patients were successfully treated with ethambutol and rifampicin. No true antibiotic-resistance has emerged. Duration of therapy has varied among patients and ranges from six weeks to 1-1/2 years. The deep-seated infections usually require longer durations of therapy. Surgical treatment (including excision, drainage and debridement) are necessary in many cases, in addition to the antibiotic therapy. Surgery alone appears to be inadequate in effecting a cure. Spontaneous resolution has been occasionally noted after one to two years of mild superficial skin infections.[1]

In conclusion, we have presented four cases of *M. marinum* infection treated at a hospital in Bridgeport, Connecticut. To avoid diagnostic delays, clinicians need to have a high index of suspicion for *M. marinum* infection in the differential diagnosis of wrist nodular lesions, cysts and abscesses. Many of the patients may not recall a history of trauma or aquatic exposure.

REFERENCES

1. Dobos KM, Quinn FD, Ashford DA, et al: Emergence of unique group of necrotizing mycobacterial diseases. *Emerg Infect Dis* 1999; 5(3):367–78.
2. Linnell F, Norden A: *Mycobacterium balnei*: A new acid-fast bacillus occurring in swimming pools and capable of skin lesions in humans. *Acta Tuberc Scand* 1959; Suppl 33:1–84.
3. Aubry A, Chosidow O, Caumes E, et al: Sixty-three cases of *M. marinum* infection: Clinical features, treatment, and antibiotic susceptibility of causative isolates. *Arch Int Med* 2002; 162(15):1746–52.
4. Huminer D, Pitlik SD, Block C, et al: Aquarium-borne *M. marinum* skin infection. Report of a case and review of the literature. *Arch Dermatol* 1986; 122:698–703.
5. O'Brien RJ, Geiter LJ, Snider DE: The epidemiology of nontuberculous mycobacterial diseases in the United States. *Am Rev Resp Dis* 1987; 135:1007–14.
6. Kuhn SM, Rosen W, Wong A, Jadavji T: Treatment of *M. marinum* facial abscess using clarithromycin, *Pediatr Infect Dis J* 1995; 14(7):631–2.
7. Saito H, Hironaka T, Nishikawa K, Fukuhara T: A case of *M. marinum* infection of buccal cacity – with special reference to the bacteriological investigations. *Kekkaku* 1972; 47(9):309–13.
8. Smith AG, Jiji RM: Cutaneous infection due to a rough variant of *M. marinum*. *Am J Clin Pathol* 1975; 64(2):263–70.
9. Parent LJ, Salam MM, Appelbaum PC, Dosset JH: Disseminated *M. marinum* infection and bacteremia in a child with severe combined immunodeficiency. *Clin Infect Dis* 1995; 21:1325–7.
10. Tchornobay AM, Claudy A, Perrot JL, et al: Fatal disseminated *M. marinum* infection. *Int J Dermatol* 1992; 31:286–7.
11. Lee MW, Brenan J: *Mycobacterium marinum*: Chronic and extensive infections of the lower limbs in South Pacific Islanders. *Australas J Dermatol* 1998; 39(3):173–6.

Connecticut Medicine

VOLUME 67 JUNE/JULY 2003 NUMBER 6

REEVES MEMORIAL HEALTH SCIENCES LIBRARY BRIDGEPORT HOSPITAL

Health Scien
BRIDGEPORT HOSPITAL
PO BOX 5000
BRIDGEPORT CT 06610-0120

Owned, Published, and Copyrighted, ©2003 by the Connecticut State Medical Society

CONNECTICUT MEDICINE (ISSN 0010-6178), published monthly except June/July and November/December at 160 St. Ronan Street, New Haven, CT 06511. Subscription rate included in membership dues. Nonmembers: $25.00 per year. Periodicals postage paid at New Haven, CT and at additional mailing offices. POSTMASTER: Send address changes to Connecticut Medicine, 160 St. Ronan Street, New Haven, CT 06511-2312.