DERMOSCOPY OF THE MONTH

Clinical, Dermatoscopic and Laboratory Essentials of Fish Tank Granuloma

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Abstract

In immunocompetent individuals *Mycobacterium marinum* (*M. marinum*) infection usually presents with localized skin lesions, better known as “swimming pool granuloma” or “fish tank granuloma” (FTG). When establishing the diagnosis of FTG, doctors encounter several problems in the clinical practice: granulomas are detected in less than two thirds of biopsies and acid-fast bacilli are identified only in a minority of cases. Majority of disseminated and aggressive FTG forms are unrecognized at the beginning, and occur in immunosuppressed patients, including organ transplant patients. Functional impairment or even amputation of the extremity, visceral involvement and lethal outcome have been reported. Although more than one thousand cases of FTG have been reported worldwide, dermatoscopy of FTG, as a diagnostic aid, has not been reported yet. Presenting the case of FTG of recent onset where, guided by dermatoscopy, microorganisms were isolated and identified from the biopsy material, we summarize the essentials of clinical and laboratory diagnostics of *M. marinum* infection.

Key words: Granuloma; Diagnosis; *Mycobacterium marinum*; Skin Diseases, Bacterial; Dermoscopy; Immuno-compromised Host

Introduction

In immunocompetent individuals *Mycobacterium marinum* (*M. marinum*) infection usually presents with localized skin lesions, better known as “swimming pool granuloma” or “fish tank granuloma” (FTG), due to fish-keeping hobby (1, 2). Several problems may occur during establishing the diagnosis of FTG. Granulomas are detected in less than two thirds of biopsies (3). With conventional Ziehl-Nielsen (ZN) staining, acid-fast bacilli are identified only in a minority of cases (4,5). In the absence of *M. marinum* identification, the patients are treated empirically. Majority of disseminated and aggressive FTG forms are unrecognized at the beginning, and occur in immunosuppressed patients (4-7), including organ transplant patients (8). Although more than one thousand cases of FTG have been reported worldwide, dermatoscopy of FTG, as a diagnostic aid, has not been re-

ported yet. Presenting the case of FTG of recent onset where, guided by dermatoscopy, microorganisms were isolated and identified

Figure 1. The clinical presentation. The livid nodule with annular scale was biopsied and histology of the excised lesion is presented in Figure 3.

Figure 2. Multiple lesions on the upper arm. The biggest lesion on the upper arm with dermatoscopy images presented in Figure 4. It was biopsied and *M. marinum* isolated from the tissue (colonies/microorganisms are presented in Figure 5 and 6).

from the biopsy material, we summarize the essentials of clinical and laboratory diagnostics of *M. marinum* infection.

Case report

A 68-year-old woman, an aquarium owner, presented with sporotrichoid painless livid nod-

Figure 3. Microscopic analysis revealed mixed inflammatory infiltrate with proliferation of small blood vessels, and scattered epithelioid granulomas (arrows) (hematoxylin&eosin stain, original magnification 100x).

ules of the skin and subcutaneous tissue on the right arm, ranging from 0.5 to 2 cm, present for 3 weeks (**Figures 1 and 2**). The largest distal nodule on the forearm with annular scaling was excised. Dermal non-caseating epithelioid granulomas surrounded by mixed inflammatory infiltrate, with the proliferation of small blood vessels were present (**Figure 3**). ZN

Figure 4. (4a) Dermatoscopy of the lesion that was subsequently biopsied and samples sent to laboratory for mycobacteria identification. Telangiectatic vessels on an erythematous base are present. (equipment: DermLite Hybrid M dermatoscope (3 GEN, San Juan Capistrano, CA, USA) in a polarized mode coupled with Nikon J1 camera (Nikon corporation, Tokyo, Japan)) (4b) With increasing the pressure, erythema completely disappeared, leaving yellow background indicating a granulomatous disease. (4c) At the maximum pressure of the device, the yellow background color disappeared completely into a white color, depicting telangiectatic vessels in the center.

Figure 5. Tissue samples were decontaminated with N-acetyl-L-cysteine and cultured in parallel in liquid Mycobacteria growth indicator tube (MGIT) and solid Lowenstein-Jensen (LJ) media. One set was incubated at 30°C and another at 37°C up to 8 weeks. Yellow pigmented photochromogen *M. marinum* colonies growth on LJ at 30°C.

staining was negative for acid-fast bacilli. Subsequently, dermatoscopy of the remaining, clinically similar lesions, was performed. The lesions were depicted as telangiectatic vessels on an erythematous base. Only the largest nodule on the upper arm presented the persistence of the central vascular pattern at the maximum pressure (**Figure 4 a, b, c**) and was biopsied using two punch biopsies. Both Mycobacteria growth indicator tube (MGIT) and Lowenstein-Jensen (LJ) incubated at 37°C remained negative after 8 weeks, but, incubated at 30°C, yielded colonies on MGIT and LJ after 15 and 20 days, respectively. Colonies on LJ turned yellow upon the light exposure (**Figure 5**). ZN stain confirmed the cultured organism

Figure 6. Acid-fast bacilli identified from the *M. marinum* colonies (Ziehl-Nielsen stain, light microscopy, immersion 1000x)

as acid-fast bacillus (**Figure 6**). Isolated colonies were identified as *M. marinum* with a GenoType Mycobacterium CM culture identification kit (Hain Lifescience, Nehren, Germany). The patient had positive Quanti FERON®-TB Gold test (interferon-gamma release assay).

All the lesions disappeared after 3 months of clarithromycin monotherapy and no recurrence was observed after 20 months of follow-up.

Discussion

Incubation period for cutaneous *M. marinum* infection ranges from 5 to 270 days (the median period being 21 days) (9). *M. marinum* low replication temperature and inhibition of growth at 37°C limits infection to the skin and subcutaneous tissue in the peripheral, cooler parts of the body. Skin lesions can be papular or plaque-like, eczema-like or can progress forming ulcers (1, 2, 7, 9). Locally invasive disease, including tenosynovitis, arthritis, and osteomyelitis is usually associated with delayed diagnosis or initially mistaken for rheumatoid arthritis, leading to prescription of tumor necrosis factor- α inhibitors or local steroid injections which aggravate the disease resulting in varying degrees of functional impairment or even amputation (5, 6). Polymorphous clinical presentation makes correct

diagnosis difficult, sometimes leading to visceral involvement (4), or lethal outcome (7). Tuberculin skin test and interferon-gamma release assay are often positive due to exposure to *M. marinum*, and can support the presumptive diagnosis of FTG (4, 5).

Tissue specimens should be incubated at 30 - 32°C, that being the temperature that promotes optimal growth of *M. marinum*, instead of standard 37°C, used for *Mycobacterium tuberculosis* and most other nontuberculous mycobacteria [4, 6-9]. The long-acting bacterial cultures can be identified either by conventional biochemical testing [6, 7], nucleic acid amplification techniques (4, 8), or gas-liquid chromatographic analysis of cellular fatty acids (7).

The most important differential diagnosis of FTG are sporotrichosis, cutaneous leishmaniasis and deep mycoses. Dermatoscopically, in sporotrichosis, in the only reported case, generalized erythema, yellowish structureless areas with clustered pustules at the periphery, arborizing telangiectasia and white scar-like areas are present (10). In cutaneous leishmaniasis, there is generalized erythema, yellow tears, white starburst-like pattern and increased vascularity. Dermatoscopy of deep mycoses is limited to single case reports (11). Dermatoscopy of FTG, however, reveals different features comparing to the mentioned diagnoses and needs unique terminology (10, 12). Telangiectatic vessels on an erythematous base, and test with different pressure with the dermatoscope causing background colour change into yellow with persistence of the central vessel architecture at the maximum pressure have not been reported so far. According to our opinion, this pressure test might be important in order to find the best lesion for biopsy because the persistence of vessels at the highest pressure might point to well developed structures that are needed for histological and microbiological confirmation of the disease.

Conclusion

Further investigations of FTG dermatoscopy and the application of descriptive rather than metaphorical terminology will help to compare the reports and make more definitive conclusions. Collaboration with microbiologist is necessary for *M. marinum* successful cultivation, timely FTG diagnosis and treatment.

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Kliničke, dermatoskopske i laboratorijske karakteristike akvarijumskog granuloma

Sažetak

Kod imunokompetentnih osoba *Mycobacterium marinum* (*M. marinum*) infekcija se obično prezentuje lokalizovanim kožnim lezijama, poznatijim kao "bazenski granulom" ili "akvarijumski granulom" (engl. *Fish tank granuloma* (FTG)). U kliničkoj praksi, pri postavljanju dijagnoze FTG lekar se susreće sa nekoliko problema. Granulomi se mogu naći u manje od dve trećine biopsija, *acid-fast* bacili se identifikuju samo u manjem broju slučajeva. Većina diseminovanih i agresivnih formi FTG se ne prepoznaju na početku i javljaju se kod imunosuprimiranih, uključujući i pacijente kojima je transplantiran

neki organ. Zabeleženi su funkcionalni ispadi ili čak amputacije ekstremiteta, visceralna diseminacija i smrtni ishod. Iako je objavljeno više od hiljadu slučajeva FTG širom sveta, dermatoskopija FTG, kao pomoć u dijagnostici, nije do sada publikovana. Prikazujući slučaj FTG sa skorašnjim početkom gde su, zahvaljujući dermatoskopiji, mikroorganizmi izolovani i identifikovani iz biopsijskog materijala, prezentujemo osnove kliničke i laboratorijske dijagnostike *M. marinum* infekcije.

Ključne reči: Granulom; Dijagnoza; *Mycobacterium marinum*; Bakterijske kožne bolesti; Dermoskopija; Imunokompromitovani domaćin

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