Polish Annals of Medicine

Journal homepage: https://www.paom.pl

Case report

Difficulties in the diagnosis of fish tank granuloma: Case report

Ewelina Woźniak, Agnieszka Owczarczyk-Saczonek, Waldemar Placek

Department of Dermatology, Sexually Transmitted Diseases and Clinical Immunology, School of Medicine, Collegium Medicum, University of Warmia and Mazury in Olsztyn, Poland

Article info

Article history
Received 30 April 2020
Accepted 31 August 2020
Available online 6 November 2020

Keywords
Mycobacterium marinum
Swimming pool granuloma
Fish tank granuloma

Doi
https://doi.org/10.29089/2020.20.00132

Abstract

Introduction: Fish tank granuloma is a rare dermatitis caused by *Mycobacterium marinum*. Infection occurs through contact of damaged skin with water or aquatic animals infected with these bacteria.

Aim: It is likely that skin infection caused by *M. marinum* transmitted from *Clarias gariepinus* has as yet not been reported in literature. Our case report is presumably the first publication. Dermatoscopy as a useful method in the diagnosis of skin infections caused by atypical mycobacteria. Our article presents new dermatoscopic features of fish tank granuloma.

Case study: The case report applies to a 30-year old, white, Caucasian man referred because of a single, well-demarcated plaque measuring 2 × 4 cm, localized on third finger on left hand above proximal phalanx, without subjective symptoms. The diagnosis was confirmed by medical history, dermoscopy and histopathological examination. Patient was successfully treated with sulfamethoxazole and trimethoprim.

Results and discussion: Due to the fact that *M. marinum* infection is uncommon, in case of clinical suspicion it is necessary to perform skin biopsy, culture and tissue PCR analysis. Knowledge about the opportunities and limitations of theses laboratory tests is pivotal to reasonable clinical decision-making.

Conclusions: Dermoscopy is useful to make a diagnosis, but there are still too few accounts in literature. The correct diagnosis determines the effective treatment.

Corresponding author: Ewelina Woźniak, Department of Dermatology, Sexually Transmitted Diseases and Clinical Immunology, School of Medicine, Collegium Medicum, University of Warmia and Mazury Al. Wojska Polskiego 30 10-229 Olsztyn, Poland. Tel.: +4889 678 66 70, fax +4889 678 66 41. E-mail address: dermatologia.wozniak@gmail.com.

1. INTRODUCTION

Fish tank granuloma is a rare dermatitis caused by *Mycobacterium marinum*. The incidence of this infection is 0.05–0.27 cases per 100 000 adults.[1] *Mycobacterium marinum* infections are classified clinically into four types:

(1) type I – limited 1–3 lesions marked by superficial cutaneous infection,
(2) type II – more than 3 skin lesions (often with sporotrichoid spreading pattern),
(3) type III – deep infection that may be affected skin, joints, tendons, bursae or bones,
(4) type IV – disseminated infection with lung disease and other systemic manifestations.[2–4]

The most characteristic skin lesions are red-purplish plaque or nodule, sometimes with ulceration, most frequently located on upper limbs, especially on hands.[5,6] A severe course occurs in people with impaired immune function, e.g. in transplant recipients, HIV positive or patients treated with biologic drugs, mainly anti-TNF-α.[7]

Infection occurs through contact of damaged skin (sometimes a small, unnoticed injury) with water or aquatic animals infected with these bacteria. *Mycobacterium marinum* is a slowly growing non-tuberculosis bacillus belonging to the Runyon I – photochromogenic, i.e. producing yellow dye only in the light. At 30°C–33°C, its growth usually requires 7–10 days.[5] It occurs all over the world, primarily in non-chlorinated water, both in saltwater and freshwater reservoirs, often infecting fish, amphibians, crustaceans and water mammals.[7] This pathogenic organism replication inside the host macrophages, forming a granuloma during chronic infection.[8] Non-specific inflammatory infiltration occurs during the first months of infection. Weakly formed granulomas consisting of histiocytes, leukocytes with several giant cells, resulting in the formation of numerous giant cells, appear in the next stages of inflammation, but that is not a common picture. The presence of granulomas in the biopsy suggests mycobacterial infection but does not differentiate the pathological factor. The epidermis can be characterized by papillomatosis, hyperkeratosis and inflammatory cell infiltration, sometimes an ulceration is present on the surface.[6,9,10]

Dermoscopy is non-invasive skin or mucosae membrane examination mainly used to evaluate pigmented skin lesions. However, it is a method that is increasingly used to differentiate non pigmented lesions like granulomatosis disease.[11,12]

Treatment of *M. marinum* infection is based on several months of antibiotic therapy. Clarithromycin, trimethoprim-sulfamethoxazole or ciprofloxacin are most commonly used as a monotherapy.[13] In more advanced cases, contained sporotrichoid spreading form, a combination of ethambutol and rifampicin is recommended.[14] Streptomycin, isoniazid and doxycycline should not be used due to the frequent resistance of *M. marinum*.[2,15] The average duration of treatment is 3 months or 6 weeks after remission of the skin lesions, while in more severe cases it can reach up to 12 months.[5,16] Alternative treatments include electrodissection, X-ray, cryotherapy and photodynamic therapy.[5]

The prevention of mycobacteriosis in fish consists in pasteurization of food. This is particularly important if the fish are fed with other fish or with processed fish waste. Before admission to trading, aquarium fish should be tested for mycobacteria carrier, and fish breeding should take place under optimal conditions for a given species.[13]

2. AIM

It is likely that skin infection caused by *M. marinum* transmitted from *Clarias gariepinus* has as yet not been reported in literature. Our case report is presumably the first publication.

Dermatoscopy as a useful method in the diagnosis of skin infections caused by atypical mycobacteria. Our article presents new dermatoscopic features of fish tank granuloma.

3. CASE STUDY

A 30-year old, white, Caucasian man was referred because of a single, well-demarcated plaque measuring 2 × 4 cm, localized on third finger on left hand above proximal phalanx, without subjective symptoms (Figure 1). He did not suffer from any chronic diseases and did not take any medications. He was neither a smoker nor an alcoholic. The first lesions appeared about 3 years earlier in the form of several papules, which evolved into one gradually expanding plaque. He was treated with topical glucocorticoids and oral antibiotics (ciprofloxacin, doxycycline) for several months without any improvements. Particularly noteworthy in the interview is the fact that the patient was an ichthyologist, who was work-

Figure 1. Skin lesion before treatment.

Figure 2. Dermoscopy: erythematous background with dotted vessels and orange areas (arrows).

Figure 3. Dermoscopy: hyperkeratosis globules (arrows).

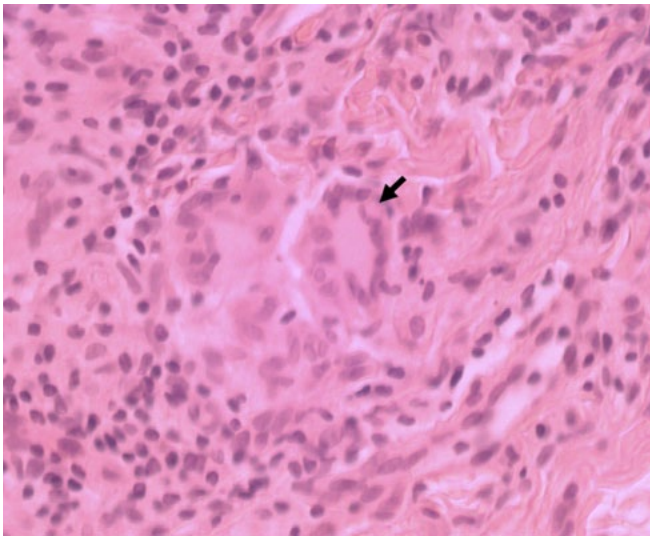

Figure 4. Histopathology (HE stain, 40×): inflammatory infiltration in the dermis; Langhans giant cell (arrow).

Figure 5. Skin lesion after 14 weeks treatment with sulfamethoxazole and trimethoprim.

ing mainly with a fish species called African sharptooth catfish (*C. gariepinus*). Laboratory tests revealed more than 2-fold increased alanine aminotransaminase (ALT) concentration (ALT 89 U/L; norm 5.0–40.0 U/L), aspartate aminotransaminase (ASP) within the norm (AST 30 U/L; norm 5.0–40.0 U/L). Viral hepatitis (anti-HCV, HbsAg negative) was excluded. The studies did not reveal any deviations in blood smear and in concentration of inflammatory markers – erythrocyte sedimentation rate (ESR), C-reactive protein (CRP). Quantiferon-TB Gold Plus was negative. Chest X-ray and abdomen ultrasound were correct. Dermoscopy of granuloma shows erythematous background with dotted vessels, orange areas and orangish hyperkeratosis globules which are not related to hair follicles (Figures 2 and 3). Ultrasound of the skin lesion confirmed that the inflammatory process was limited to the skin and subcutaneous tissue. Histopathological examination revealed abundant inflammatory infiltrates composed of lymphocytes, plasma cells, histiocytes, epithelial cells, giant multinucleated cells with formation of epithelium-histiocytic granulomas with the presence of Langhans giant cells without necrosis caseosa, suggestive of tuberculosis-like granuloma (Figure 4). The inflammatory infiltrate contained a lot of neutrophilic multinucleated granulocytes, which penetrated the epidermis and the skin appendages. Ziehl-Neelsen staining for mycobacterium species was negative. On the basis of occupational exposure to fish, the clinical picture and the results of the histopathological and dermoscopic examination, we diagnosed the fish tank granuloma. Due to the clinical picture and the lack of any symptoms of disseminated *M. marinum* infection – the infection is classified as type I. Patient was treated with sulfamethoxazole and trimethoprim twice daily in dose of 960 mg for 14 weeks with clinical improvement (Figure 5), which confirmed the infectious nature of

the skin lesion. Moreover, the patient received timonacic at dose of 3 × 200 mg due to an elevated ALT. The patient was referred to a Hepatological Outpatient Clinic because of persistently elevated concentration of ALT.

4. RESULTS AND DISCUSSION

It is likely that skin infection caused by *M. marinum* transmitted from *Clarias gariepinus* has as yet not been reported in literature. Our case report is presumably the first publication.

Dermoscopy is a very useful examination also in dermatitis. Conforti et al. was first to determine the dermatoscopic features of swimming pool granuloma by describing the clinical case of a 66-year-old man with 2 purplish nodules on the dorsal part of hand and the thumb for 2 months. This examination of first lesion evinced a whitish area surrounded an erythematous background with fine scaling and dotted vessels and orange-whitish central areas with looped concentric monomorphic vessels, while the thumb lesion had a purplish background with multiple structured rounded areas with orangish appearance surrounded by looped vessels arranged in a crown-like shape.[11] In dermoscopy of cutaneous granulomatous disorders orangish or yellowish-orange areas are strictly related to the presence of the dense and compact granulomatous infiltrate in the dermis, vessels are frequently seen more common in early or active phases, whitish areas are more typical of long-standing lesions with dermal fibrosis.[17] Our picture of dermoscopy showed new characteristic features for tuberculosis granuloma – orangish hyperkeratosis globules which are not related to hair follicles. The described features may be different because our patient's skin lesion was present for 3 years. Moreover probably because of long time of the disease orangish hyperkeratosis globules are more common or prominent in more infiltrated areas (due to the higher density of granulomas in the dermis).

The result of our patient's histopathological examination had to be differentiated from sarcoidosis. Against the diagnosis of sarcoidosis was the clinical picture and response to antibiotics. The mainstay of treatment of sarcoidosis are topical or systemic glucocorticoids.[18]

Due to the fact that *M. marinum* infection is uncommon, in case of clinical suspicion it is necessary to perform skin biopsy, culture and tissue PCR analysis. The result of the histopathological examination confirms the presence of granulomatous inflammation in about 50% of cases and depends mainly on the duration of the disease.[9] Histopathological examination describes positive staining of Ziehl-Neelsen in about 30% of cases, but nevertheless it does not distinguish infection with other mycobacteria.[9] Cultures from biopsy or aspirate of purulent content are reported as positive in 70%–80% of cases. Molecular methods are also useful in the diagnosis of mycobacterial infection, including PCR, which is a quick method of species identification.[9] However, errors of identification have been reported when using PCR.[19,20] In our case report, the diagnostic suspicion was based on occupational exposure to fish, the clinical picture, the result of dermoscopic and histopathological examination confirming granulomatous dermatitis. Efficacy of the applied treatment was finally confirmed by the diagnosis of swimming pool granuloma.

Chronic skin lesions are often a difficult challenge for the clinician, especially uncommon diseases. To make an appropriate diagnosis, not only adequate additional tests, but above all a detailed interview and physical examination are required. Answers to questions about occupational exposure, forms of leisure activities, including trips and hobbies (aquarium), can sometimes be a clue to reduce the differential diagnosis leading to the proper diagnosis. Skin lesions in the course of infection with this mycobacterium may be incorrectly diagnosed as contact eczema or fungal infection. Empirical treatment increases the time it takes to properly diagnose and administer appropriate medication, which can lead to spreading of the disease.

5. CONCLUSIONS

Knowledge about the opportunities and limitations of laboratory tests in diagnosis mycobacterium skin infections is pivotal to reasonable clinical decision-making.

The search for dermatoscopic features characteristic of aypical mycobacterial infections, in combination with clinical data from the history with a high probability may indicate a mycobacterium skin infection.

Our picture of dermoscopy showed new characteristic features for tuberculosis granuloma – orangish hyperkeratosis globules. There are still few studies showing the dermatoscopic features in fish tank granuloma, therefore more similar studies are needed.

The correct diagnosis determines the effective treatment.

Conflict of interest

None declared.

Funding

None declared.

Ethics

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

References

1 Iredell J, Whitby M, Blacklock Z. Mycobacterium marinum infection: epidemiology and presentation in Queensland 1971–1990. *Med J Aust*. 1992;157(9):596–598.

2 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. https://doi.org/10.1001/archinte.162.15.1746.

3 Bartralot R, Garcia-Patos V, Sitjas D, et al. Clinical patterns of cutaneous nontuberculous mycobacterial infections. *Br J Dermatol*. 2005;152(4):727–734. https://doi.org/10.1111/j.1365-2133.2005.06519.x.

4 Bhatty MA, Turner DPJ, Chamberlain ST. Mycobacterium marinum hand infection: Case reports and review of literature. *Br J Plast Surg*. 2000;53(2):161–165. https://doi.org/10.1054/bjps.1999.3245.

5 Rallis E, Koumantaki-Mathioudaki E. Treatment of Mycobacterium marinum cutaneous infections. *Expert Opin Pharmacother*. 2007;8(17):2965–2978. https://doi.org/10.1517/14656566.8.17.2965.

6 Johnson MG, Stout JE. Twenty-eight cases of Mycobacterium marinum infection: retrospective case series and literature review. *Infection*. 2015;43(6):655–662. https://dx.doi.org/10.1007%2Fs15010-015-0776-8.

7 Petrini B. Mycobacterium marinum: Ubiquitous agent of waterborne granulomatous skin infections. *Eur J Clin Microbiol Infect Dis*. 2006;25(10):609–613. https://doi.org/10.1007/s10096-006-0201-4.

8 Barker LP, George KM, Falkow S, Small PL. Differential trafficking of live and dead Mycobacterium marinum organisms in macrophages. *Infect Immun*. 1997;65(4):1497–1504.

9 Aubry A, Mougari F, Reibel F, Cambau E. Mycobacterium marinum. *Microbiol. Spectr*. 2017;5(2). https://doi.org/10.1128/microbiolspec.tnmi7-0038-2016.

10 Travis WD, Travis LB, Roberts GD, Su DW, Weiland LW. The histopathologic spectrum in Mycobacterium marinum infection. *Arch Pathol Lab Med*. 1985;109(12):1109–1113.

11 Conforti C, Zalaudek I, Vichi S, Di Meo N. Dermoscopy of Mycobacterium marinum skin infection: A challenging diagnosis. *Acta Dermatovenerol Croat*. 2019;27(4):278–279.

12 Errichetti E, Stinco G. Dermoscopy in general dermatology: A practical overview. *Dermatol Ther (Heidelb)*. 2016;6(4):471–507. https://doi.org/10.1007/s13555-016-0141-6.

13 Hashish E, Merwad A, Elgaml S, et al. Mycobacterium marinum infection in fish and man: Epidemiology, pathophysiology and management; A review. *Vet Q*. 2018;38(1):35–46. https://dx.doi.org/10.1080%2F01652176.2018.1447171.

14 Koushk-Jalali B, Freitag AP, Tigges C, Oellig F, Hillemann D, Kreuter A. Sporotrichoid fish tank granuloma. *QJM*. 2019;112(2):147–147. https://doi.org/10.1093/qjmed/hcy203.

15 Parrish N, Luethke R, Dionne K, Carroll K, Riedel S. Case of Mycobacterium marinum infection with unusual patterns of susceptibility to commonly used antibiotics. *J Clin Microbiol*. 2011;49(5):2056–2058. https://dx.doi.org/10.1128%2FJCM.02022-10.

16 Jacobs S, George A, Papanicolaou GA, et al. Disseminated Mycobacterium marinum infection in a hematopoietic stem cell transplant recipient. *Transpl Infect Dis*. 2012;14(4):410–414. https://doi.org/10.1111/j.1399-3062.2011.00681.x.

17 Errichetti E, Stinco G. Dermatoscopy of Granulomatous disorders. *Dermatol Clin*. 2018;36(4):369–375. https://doi.org/10.1016/j.det.2018.05.004.

18 Błaszczyk M. Cutaneous sarcoidosis: Clinical presentation and diagnostic difficulties. *Przegl Dermatol*. 2012;99(3):185–194 [in Polish].

19 Nolte O, Haag H, Häfner B. A mutation in the 65,000 Dalton heat shock protein gene, commonly used for molecular identification of non-tuberculous mycobacteria, leads to the misidentification of Mycobacterium malmoense as Mycobacterium marinum. *Mol Cell Probes*. 2005;19(4):275–277. https://doi.org/10.1016/j.mcp.2005.04.006.

20 Ho M, Ho C, Chong L. Atypical mycobacterial cutaneous infections in Hong Kong: 10-year retrospective study. *Hong Kong Med J*. 2006;12(1):21–26.