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Case Report

The Madura Foot: A Case of Eumycotic Mycetoma on Histopathology

Shweta Rana[1], Shivani Kalhan[2], Sonia Hasija[3], Puja Sharma[4], Shilpa Garg[5]
[1]Demonstrator, [2]Professor and Head, [3,5]Assistant Professor, [4]Associate Professor, Department of Pathology, SHKM, GMC, Nalhar, Mewat, Haryana, India

***Corresponding author**
Dr. Shweta Rana
Email: drshwetarana15@gmail.com

Abstract: Madura foot or mycetoma is a chronic granulomatous disease characterized by chronic infection of skin and subcutaneous tissues, caused by true fungi (eumycetoma) or by filamentous bacteria (actinomycetoma). It is endemic in tropical and subtropical regions where it is a real public health issue. The recurrence rate for the disease if treated inadequately is very high. Treatment modalities for both the etiologies are far different, hence a definite diagnosis after histopathological and microbiological examination is mandatory. A case of eumycotic mycetoma in a young agricultural worker from rural part of Northern India who had swelling, induration and minimal discharge from sinuses over the foot is presented herewith.
Keywords: Mycetoma, Eumycetoma, Madura Foot, Actinomycetoma.

INTRODUCTION

Mycetoma is a chronic granulomatous disease of skin, subcutaneous tissue and bones that is present worldwide and is endemic in tropical and subtropical regions. This infection occurs commonly in the foot and was described by Gill in the Indian Madura district in 1842, hence the name Madura Foot [1, 2]. It is a slow growing infection presenting with characteristic symptomatic triad of swelling, draining sinuses and extrusion of colonial grains in the exudates. As the disease has slow and relatively pain free progression, it is usually diagnosed at an advanced stage [2, 3]. The most common site of occurrence is the foot (70% cases), explaining the synonym 'Madura foot' [4]. Mycetoma is commonly seen in agricultural workers and in barefoot walkers in dry and dusty areas. Repeated trauma or implantation by thorns and splinters provide a portal of entry for the organism. Infection can be caused by true fungi (eumycetoma) in 40% cases and by filamentous bacteria (actinomycetes) in 60% cases [5]. Since the treatment of these two etiologies is entirely different, a definite diagnosis after histopathological and microbiological examination is mandatory [2]. We present a case of Madura foot, diagnosed on histopathology.

CASE REPORT

A 30 years old male, farmer by occupation presented with swelling of the dorsum of right foot since 2 years. The swelling was progressively enlarging and associated with pain while walking. Clinical examination revealed a tumefaction, draining sinus discharging purulent exudates (Fig. 1a). Complete hemogram, Erythrocyte sedimentation rate, C- reactive protein were within normal limits. Tests for Syphilis, HIV infection, Hepatitis B and C virus infection were negative. Foot radiograph showed localized area of bone destruction (Fig. 1b). Clinical diagnosis was chronic osteomyelitis 5th metatarsal bone.

Curretted material from bone and excised soft tissue containing blackish granules was sent for culture and histopathological examination. Fungal cultures were negative. Histopathological examination showed fibromuscular and bony tissue with interlacing, septate, branching hyphae embedded in interstitial brownish matrix with numerous spores associated with a dense inflammatory cell infiltrate comprising of lymphocytes, few polymorphs, aggregates of epithelioid cells with giant cell reaction (Fig. 2a & 2b).

Gomori methenamine silver (GMS) and Periodic acid Schiff (PAS) stains provided excellent contrast and delineated 4-5µm thick septate hyphae of eumycetoma (Fig. 3a & 3b). Gram stain was negative (Fig. 3c). A diagnosis of Eumycotic mycetoma was made and the patient was treated with antifungals. There was a good clinical response.

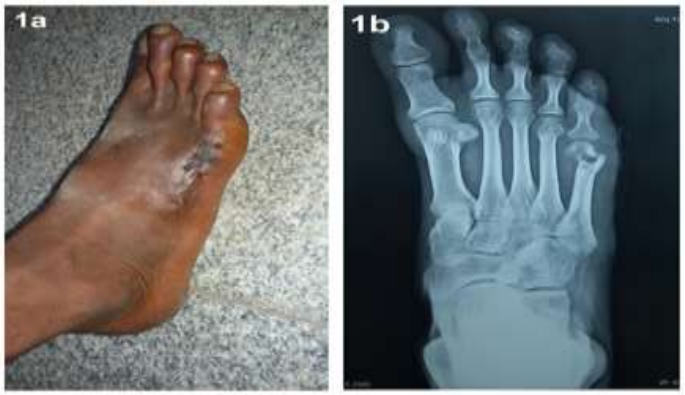

Fig. 1a: An area of tumefaction with discharding sinuses on dorsum of right foot; 1b: Foot radiograph showing localized area of 5th metatarsal bone destruction

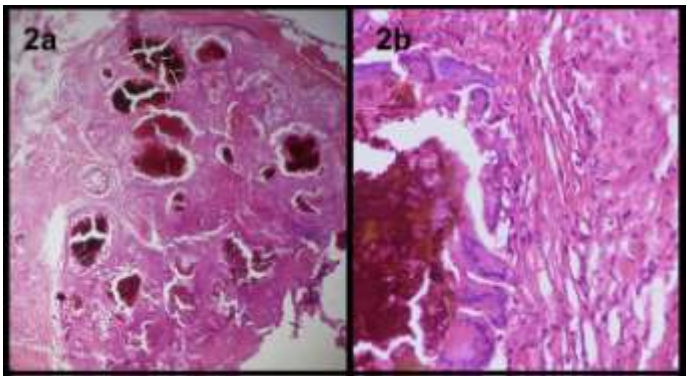

Fig. 2a: Microphotograph showing fibromuscular and bony tissue with interlacing, septate, branching hyphae embedded in interstitial brownish matrix (H& E; 200x); 2b: Microphotograph showing interlacing, septate, branching hyphae embedded in interstitial brownish matrix with aggregates of epithelioid cells with giant cell reaction (H&E; 400X)

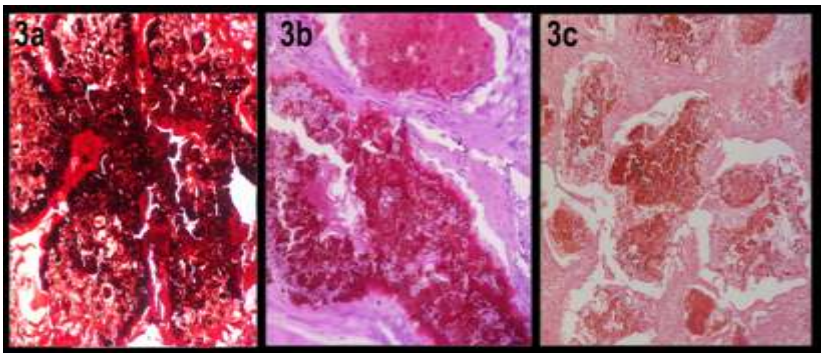

Fig. 3a: Microphotograph showing 4-5µm thick delineated septate hyphae of eumycetoma (GMS; 400X); 3b: Microphotograph showing 4-5µm thick delineated septate hyphae of eumycetoma (PAS; 400X); 3c: Microphotograph showing Gram negative interlacing, septate, branching hyphae (Gram's stain; 200X)

DISCUSSION

Mycetoma is mainly found in dry tropics and affects agricultural workers and people who walk barefooted [6]. Fungi are found as saprophytes in the soil and are introduced through skin wounds. Infection begins in the skin and subcutaneous tissue causing local papular or nodular swelling which grows and ruptures forming discharging sinus tracts exuding characteristic coloured grains [7]. The granules vary in size, colour and consistency depending on the etiological species. These grains are the hallmark of mycetoma [6]. Some sinuses heal with scarring with simultaneous appearance of fresh sinuses in the proximal areas. Subsequently bone destruction occurs [7]. The causative agents have been identified as: the actinomycetes group of bacteria and true mycetes i.e. eumycetes [1]. Over 30 species have been identified to cause mycetoma [5, 8]. Actinomycotic mycetoma is caused by aerobic species of actinomycetes belonging to the genera Nocardia, Streptomyces and Actinomadura. Eumycotic mycetoma is associated with a variety of fungi, the most common being Madurella mycetomatis, Pseudoallescheria boydii and Acremonium species [6]. The grains discharged from

the sinuses vary in size, colour and consistency. The characteristic features of the grains in combination with the clinical picture (indurated swelling of the foot with multiple discharging sinuses) can be used for rapid provisional identification of the etiological agent [5]. The size of the grains varies from microscopic to 1-2mm in diameter. Large grains are seen with madurellae, Actinomadura madurae and A. palletieri whereas granules of N. brasiliences, N. cavae and N. asteroids are small [9]. Dark (black) grains are found only among the eumycotic mycetoma [10]. The incubation period varies from several weeks to months [5]. Sinuses develop after 6-12 months and extension to involve the underlying fascia, muscle and bone is common. In eumycotic mycetoma, there may be multiple punched out lytic lesions in bones. Actinomycotic mycetoma is characterized by both osteolytic and osteosclerotic lesions [6]. Thin filaments of actinomycetoma and thick filaments of eumycetoma can also be differentiated on discharged granules crushed on a slide and stained with lactophenol blue stain [2]. Histopathological examination proves useful in differentiating actinomycetoma from eumycetoma. In cases of Madura foot, biopsy material stained with Haematoxylin and Eosin shows grains or colonies with or without surrounding granulomatous reaction. Eumycotic colonies are frequently surrounded by fibrotic tissue [11]. A Gram stain is of considerable value in distinguishing between actinomycetoma and eumycetoma. The granules of actinomycetoma consisting of fine, branching filaments, only about 1um thick are gram positive whereas the grains of eumycetoma are gram negative [9]. Eumycotic grains are better identified by PAS and GMS stains and are composed of 4-5µm thick septate hyphae [12]. In cases of PAS- positive eumycotic colonies showing hyphae, one should look for amorphous matrix highlighted by Gram's stain or PAS stain. The presence of an amorphous matrix narrows the diagnosis to three eumycotic agents, Madurella mycetomatis, Madurella grisea and Leptosphaeria. If this amorphous matrix is present throughout the colony imparting a grainy appearance, a provisional diagnosis of M. mycetomatis can be considered [11]. Confirmation of diagnosis and exact identification of the species requires culture. Culture, however, is difficult practically and may be false negative many a times [7]. Serodiagnosis with ELISA also is not always diagnostic because there are variable levels of humoral response to infection [4]. In addition, ancillary investigations such as PCR are not readily available at all centres [11]. Thus histology has a beneficial role and remains the only option in culture negative cases. Imaging studies are useful in defining the extent of disease [5]. Besides Mycetoma, the clinical differential diagnoses in patients presenting with chronic discharging sinuses in extremities include Tuberculous osteomyelitis, Blastomycosis, Coccidioidomycosis, Sporotrichosis, Botryomycosis, Syphilis, Yaws and Neoplastic pathologies [5]. The choice of treatment for mycetoma depends on the causative agent which has been identified on the basis of morphology of grain in histopathology sections. Actinomycetoma can be treated with surgical debridement including prolonged antibiotic treatment for several months. However, resistant cases can be treated with a combination of Trimethoprim-sulphomethoxazole, dapsone and streptomycin along with rifampicin. Eumycetomas are only partially responsive to anti- fungal therapy but can be treated by surgery due to their normally well circumscribed nature. Surgery in combination with azole treatment is the recommended regime for small eumycetoma lesions in extremities [2]. Amputation is indicated in advanced mycetoma with severe secondary bacterial infections [4, 13], not responding to medical treatment; emphasizing the importance of early and definite diagnosis [14].

CONCLUSION

As mycetoma is a relatively painless condition and also because it is mostly found in areas with low living standards, the disease is often neglected in the initial stage. Due to this, there is a high incidence of secondary bacterial infection, deformities and recurrences which subsequently necessitate amputation of the affected foot. So, increased awareness and emphasis on early and definite diagnosis after meticulous clinical examination assisted by histological and microbiological studies is required.

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