

CHARACTERIZATION OF MYCETOMA USING ULTRASOUND

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Abstract

The objective of this study is to characterize mycetoma using ultrasonography and to describe the incidence of mycetoma. This study carried out in soba university hospital in Khartoum state during the period extended from November 2012 to 18 March-2013, using high quality ultrasound machine type, Aloka SSD 3500 with high frequency transducer (7.5 MHz). A total of 100 patients, their ages ranging between 10 to 50 years, suffering from the foot mycetoma. Most of the patients used in this study had undergone routine plain x-ray before coming for ultrasound examination.

The main findings of this study show the foot mycetoma more common in males (76%), Most common affected age intervals (21-30) years, 32 cases, and (31-40) years (32%), the most common area from Aljazeera state (57%) and the fungal type (78%) is more than bacterial type (22%). The study revealed that the major of the patients were workers 61 (61%). The types of Mycetoma were, 22 (22%) actinomycetoma and 78 (78%) were Eumycetoma. Ultrasound appearance of Mycetoma with Grain 51(51%) .It was found that 67 (67%) with intact, and verified that the ultrasound examination of foot mycetoma is simple, reproducible, and low cost.

The study concluded that ultrasound and Doppler has high efficiency in diagnosing mycetoma with high accuracy in diagnosis of mycetoma and even in differential diagnosis of its types. It must be used as first diagnostic tool.

Keywords: Mycetoma, Actinomycetoma, Eumycetoma Sudan, ultrasound, granuloma.

Introduction:

Mycetoma is a chronic, specific, granulomatous, progressive inflammatory disease. It involves, usually the subcutaneous tissue, most probably after traumatic inoculation of the causative organism, most often affect the foot or the hand. Infection normally start in the foot or the hand and travel up the leg or arm. Foot is most commonly affected. (López et al , 2008)Mycetoma may be casued by true fungi (eumycetoma). OR by higher bacteria (actinomycetoma) and hence it is usually classified into eumycetoma and actinomycetoma respectively. Distinction between eumycetoma and actinomycetoma is very important for the treatment.(Palma-Ramos ,2007) Mycetoma commonly affect adults aged 20 to 40 years predominantly males, especially agricultural workers, with minor skin injuries. Also are common in pare footed persons (Salinas-Carmona,2004) Mycetoma is a common health problem in many tropical and subtropical regions. Yet and despite its devastating deformities, disability, high morbidity and negative socioeconomic impacts, it is one of the most neglected diseases worldwide and it is even neglected by "the neglected diseases initiatives across the globe" (Fahal et al ,1992, Fahal , 2004, Fahal ,2004, Fahal ,2012). To date the disease incidence, prevalence and route of infection are not well characterized, likewise, its susceptibility, resistance and response to medical treatment (Fahal et al ,2011, Zein HAM et al ,2012)Diagnosis of mycetoma requires a detailed clinical history and physical examination. Particular attention should be given to the duration of the disease, the presence of sinuses, discharge of grains, and color of the grains, the presence or absence of pain, and involvement of the regional lymph nodes. X-ray and laboratory tests help confirm the diagnosis. Cultures are the gold standard in the diagnosis and management of mycetoma. Rarely, when cultures are falsely negative, actinomycetoma can be diagnosed on clinical and histopathological grounds.(Bonifaz et al,2007,Meis et al .2000,Palit et al ,2011,Tilak et al,2009)

The differential diagnosis of mycetoma is made with diverse pathologies. In early lesions, they can be confused with foreign body granulomas, various benign and malignant soft tissue neoplasias, and cystic lesions(Salamon et al ,2006). Nonfistular lesions should be differentiated from sporotrichosis, chromomycosis, or conidiobolomycosis. Other diagnoses to consider are leishmaniasis, cutaneous tuberculosis, and cellulitis. (Campos et al ,2010)Although the clinical characteristics are critical, laboratory studies are needed to establish the etiologic diagnosis. The various imaging methods help determine the extent of disease and bone involvement. (Czechowski et al ,2001)

An increase in volume of the soft tissues (93%), bone sclerosis (56%), bone cavities-geodes (32%), periosteal reaction (27%), and osteoporosis (19%) are frequently observed(Abd El-Bagi & Fahal ,2009)

Ultrasound imaging is useful in eumycetoma with thick-walled cavities without acoustic resonance(Fahal & Sheik ,1997)This method is inexpensive and relatively simple. The image known as the —dot in circle is considered a radiographic sign that

is diagnostic of mycetoma and can be identified by ultrasound and magnetic resonance imaging. (Parker et al ,2009) The computed tomography scan has proved to be more sensitive for detecting early bone changes compared with magnetic resonance imaging(Sharif et al,1991) Ultrasonic Imaging of Mycetoma Characteristic features include numerous, isolated sharp hyperechoic echoes corresponding to the grains in the lesion in eumycetoma. In actinomycetoma, the grains are less distinct because of their smaller size and consistency. The technique is safe, simple, accurate, and useful in planning surgical treatment. Ultrasonography is simple, non-invasive, quick, reproducible and acceptable to patients. Mycetoma has characteristic ultrasonographic features, Furthermore, ultrasonography delineates the extent of mycetoma more.(Palma et al ,2008)

The purpose of this study is to diagnose foot mycetoma using ultrasound.

Methodology:

This study carried out in soba university hospital in Khartoum state in the period from 18 March-13 November 2012 using equipped by high quality ultrasound machine type Aloka SSD 3500 with high frequency transducer 7.5 MHz. A total of 100 patients were recruited for this study all of them suffer from the foot mycetoma.

Scanning Technique of foot

Hind Foot

Plantar fascia: Patient prone on bed, foot flexed with toes on the bed for support. Place the probe over the midline of the heel on the plantar aspect. The toe of the probe towards the heel. Scan in longitudinal and transverse over the plantar aspect of the metatarso-phalangeal joints. Scan the plantar fascia distal longitudinal and transverse Flexor hallucis longus tendon transverse and longitudinal. The plantar fascia appear as a fibrillar structure inserting onto the calcaneum. It should be flat and homogenous.

Mid foot:

Follow the plantar fascia into the arch and look for fusiform, nodular thickenings.

Forefoot

Each metatarso-phalangeal joint scan in different position to Assess the extensor then flexor

Plantar plates:

Scan in longitudinal over the plantar aspect of the metatarso-phalangeal joints. The plantar plate is readily seen as a homogeneous elongated wedge arising from the base of the proximal phalanx extending under the head of the metatarsal. Data analysis was performed with statistical package for social science (SPSS) version 12.0 software.

Result

A total of 100 patients their ages between (10-50) years and most of them had undergone routine plain x-ray were used for this study. All of them were suffering of the foot mycetoma. The main findings of this study showed that the foot mycetoma is more common in males (76%) than in females. Most common affected age intervals are (21-30) years, 32 case, and (31-40) years (32%). The most common endemic area from Aljazeera state (57%). The fungal type (78%), which is more than bacterial type (22%). The study revealed that the major of patients were workers 61(61%). The type of Mycetoma, 22 (22%) were actinomycetoma, and 78 (78%) were Euomycetoma, Mycetoma with Grain 51(51%), Figure(1), with fluid collection 48, and 67 (67%) with intact, and verified that the ultrasound examination of foot mycetoma is simple, reproducible, and low cost. Ultrasound findings of mycetoma are shown in (Figures 2,3,4)

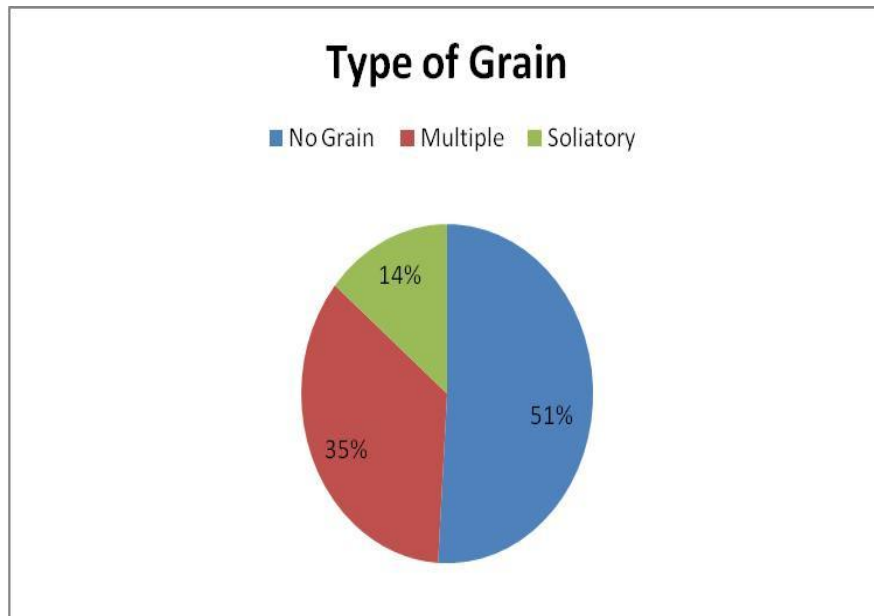


Figure1 shows types of mycetoma



Figure2 shows Doppler ultrasound image of foot euomycetoma with multiple grains and Pocket of fluid

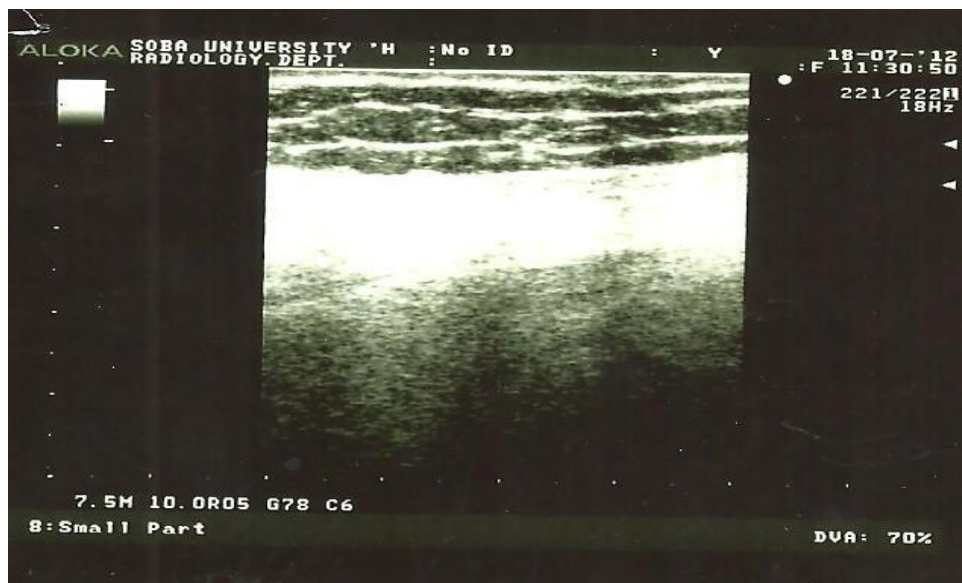


Figure3 shows ultrasound image of foot actinomycetoma



Figure4 shows ultrasound image of foot euomycetoma with solitary grain and Pocket of fluid

Discussion:

Madura foot is defined as mycetoma of the foot that is a chronic granulomatous pseudotumor due to fungi (eumycetoma) or actinomycotic bacteria (actinomycetoma), soil saprophytes that produce mycelial filaments. Mycetoma is endemic in dry tropical and subtropical regions (Mrad et al ,2008,Gueguen et al,1998,Daoud et al,2005,Al-Heidous & Munk,2007,Abd El Bagi ,2003,Sharif et al,1991,Kumar et al ,2007). .

Imaging guides the positive diagnosis when clinical and other investigations are not determinative. It is especially important for staging the disease. Ultrasound is especially interesting in countries where the disease is endemic. It shows multiple cavities, with thickened walls and without posterior reinforcement, with multiple hyper-reflective echoes corresponding to the mycetoma grains. The examination is more precise in the case of lesions without sinus tracts, because fibrosis of these tracts can make interpretation difficult (Mrad et al ,2008).This study shows the foot mycetoma affected males more than females especially agriculture workers who had suffered minor skin injuries. The common affected groups age ranged between 31-40 years and 21-30 years, as found by Sandhya et al in 2012).Most of the cases were found to be from Aljazeera state (52%). We feel that it is important to distinguish between eumycetoma and actinomycetoma, because appropriate treatment is dependent upon an accurate

diagnosis of the causative organism and the literature supports this sentiment (Ahmed et al ,2004). So this study showed the eumycetoma in 78% and actinomycetoma 22%. However, our patient's scans ultrasound images (Figure2-10), depicted the mycetoma. The ultrasound revealed well-defined hyper-reflective grains, previously reported to be more apparent with black-grain eumycetoma than with smaller, less distinct bacterial grains (30). The present study showed that appearance of grains (49%) multiple (35%, solitary (14%) due to persistence of disease or recurrent mycetoma. Some patients came with collection of fluid in the affected foot or no pocket of fluid, no fluid (52%) may be due to surgery treatment. accumulation of fluid (48%) may be due to recurrent mycetoma. The effect of bone vary, bone can be intact (67%) mainly in the beginning of the disease or non intact (33%) may be due to long period of mycetoma.

Conclusion:

Ultrasound with high frequency transducer is very effective and accurate; it must be used as the first tool, Doppler u/s is important for accurate diagnosis of mycetoma.

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