



'DOT IN CIRCLE SIGN' – A SONOGRAPHIC CLUE TO MUSCULOSKELETAL MYCETOMA

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ABSTRACT Mycetoma is a chronic granulomatous disease, most commonly affecting the foot. A diagnosis of mycetoma should be considered in a patient with a swelling that is present for a longer duration. This case report highlights the importance of ultrasound in diagnosing musculoskeletal mycetoma with the knowledge of the characteristic 'Dot in Circle' sign on ultrasound, as an MRI is not always available and is expensive for a common man, thus helping the radiologist and the clinician to arrive at a diagnosis at an early stage, thereby avoiding misdiagnosis or neglect and thus avoiding the consequence of subjecting the patient to the progression of the disease, leading to disability.

KEYWORDS : Mycetoma, Ultrasound

1. Clinical History:

A 39-year-old male presented with a diffuse swelling and dull pain associated with chronic sinuses over the dorsomedial aspect of his left foot of two years duration as shown in figure 1. It started after a trivial trauma while he was playing barefoot.



Figure 1: Diffuse swelling over the dorsomedial aspect of left foot with chronic sinuses

2. Imaging Findings:

Frontal radiograph of the left foot revealed soft tissue thickening along the medial aspect of the left foot with no obvious underlying osseous involvement as shown in figure 2.



Figure 2: Soft tissue thickening over the medial aspect of the left foot. There is no underlying osseous involvement

Ultrasound of the left foot revealed multiple discrete heterogeneously

hypoechoic lesions with central hyperechoic foci ('Dot in Circle' sign) in the subcutaneous plane of the dorsomedial aspect of the left foot as depicted in figures 3a, 3b and 3c. There was significant surrounding soft tissue thickening and edema. Based on these findings, a provisional diagnosis of mycetoma of the left foot was made.

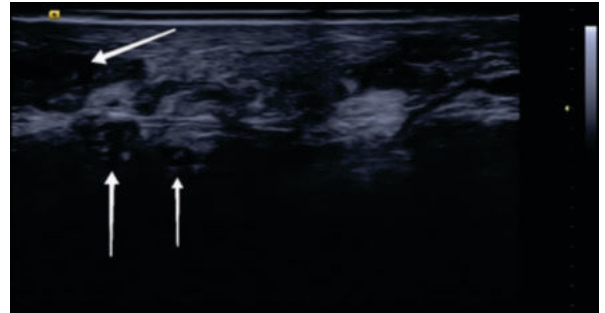


Figure 3a

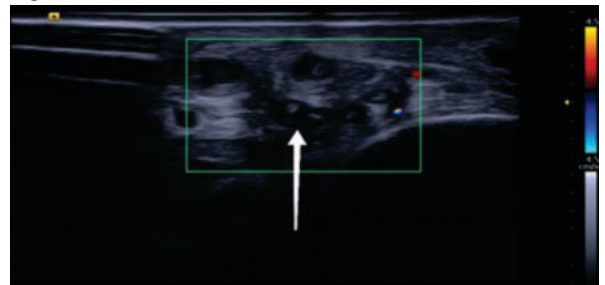


Figure 3b

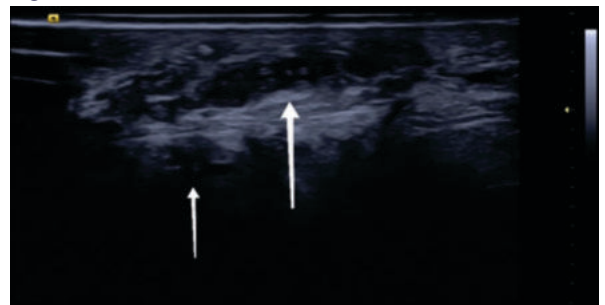


Figure 3c

Figure 3a, 3b, 3c: USG of the left foot: Multiple discrete heterogeneously hypoechoic lesions with central hyperechoic foci ('Dot in Circle' sign) and surrounding soft tissue edema over the dorsomedial aspect of the left foot.

3. Laboratory findings:

KOH mount from a 24-hour saline dressing showed slender, hyaline septate hyphae. The patient underwent wound debridement of the affected site and the tissue biopsy revealed microabscesses with small colonies of pigmented filamentous fungi with brown spores as seen in figure 4. These findings were consistent with mycetoma of the left foot, although, tests to establish the specific type of fungus was not done.

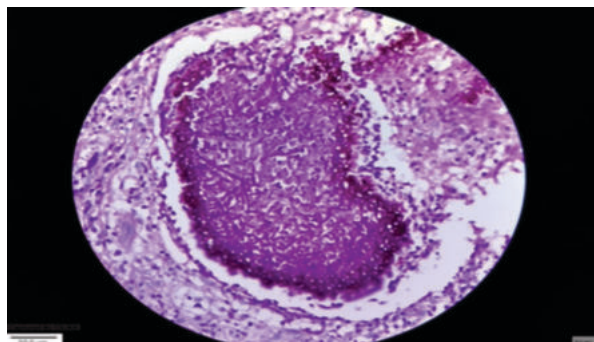


Figure 4: Fungal colony with hyphae and peripheral pigmentation in high power - PAS stain

4. DISCUSSION:

Mycetoma is a chronic granulomatous infection that affects the skin, soft tissues, bones, and rarely the viscera. It is more common in the tropical and subtropical regions(1). The first description of mycetoma was made in Madura, India in the 19th century, from which the disease gets its eponym 'Madura foot' (2). Young males between the age group of 20 to 40 are predominately affected at a ratio of 3.5:1 (3)

Based on the causative organisms it is classified as eumycetoma and actinomycetoma, where the former is caused by true fungi and the latter is caused by bacteria belonging to actinomycetes species (4). These organisms are usually soil or plant saprophytes and become incidental human pathogens. The infection tends to occur after a trivial penetrating injury such as a thorn prick, and in endemic areas where barefoot travel is common, patients usually have no history of trauma at the site of infection (3)

The disease shows slow and gradual progression. Affected individuals present with painless subcutaneous mass, draining sinuses and exuding grains which constitute the classic clinical triad of mycetoma (5). In the presence of discharge, the color of the grains can suggest the type of mycetoma (6). In the absence of typical clinical features, mycetoma clinically mimics a soft tissue neoplasm or a chronic bacterial/ tuberculous infection (7)

Plain radiographs may appear normal or may demonstrate soft tissue enlargement, bone sclerosis, bone cavities, periosteal reaction, bone expansion, extrinsic cortical scalloping, fanning of the rays or osteoporosis (8). The 'melting snow' appearance resulting from intraarticular osseous fusion can be seen occasionally (9). CT scan provides better delineation of the osseous involvement than radiographs (10)

The 'Dot in Circle' sign is a characteristic and highly specific sign to diagnose musculoskeletal mycetoma on ultrasound and magnetic resonance imaging (MRI).

'Dot in Circle' sign on ultrasound appears as numerous isolated or conglomerated (11) hypoechoic lesions with sharp hyperechoic central foci within which represents the grain cement substance, in eumycotic lesions. Single or multiple thick-walled cavities with no acoustic enhancement were identified in some lesions with few of them showing debris within (5). Few studies have shown increased Doppler signals within the lesion (11)(12). In Actinomycetoma, the ultrasound findings were similar to that of eumycetoma, except that the central hyperechoic foci were hazy, closely aggregated and settled at the bottom of the cavities (5)

On MRI, the 'Dot in Circle' sign can be appreciated on T2-weighted,

STIR and T1-weighted fat-saturated gadolinium-enhanced images as multiple, well defined, tiny spherical hyperintense foci (representing inflammatory granulation tissue), surrounded by a hypointense rim (representing the intervening fibrous septa) with a central hypointensity seen within the spherical mass (due to susceptibility effects of the fungal grain) (13)(14)(15). However, MRI is not readily available in the areas endemic for mycetoma, which mostly involve the developing and underdeveloped countries.

The definite causative organism can be established by microbiological culture or by histopathological examination. Polymerase chain reaction (PCR) may also provide an accurate diagnosis.

Treatment depends on the causative agent and the disease progression. Eumycetoma requires long-term antifungal medications and surgical intervention. Most cases of actinomycetoma can be treated with long-term antimicrobial combination therapy alone. The main goals of therapy are to clear infection, reduce morbidity and prevent further complications (16)

5. CONCLUSION:

In conclusion, this case report highlights that ultrasound is a simple, rapid, sensitive, cheap and non-invasive modality which can be effectively used as the primary modality to establish an accurate diagnosis of musculoskeletal mycetoma with knowledge of the characteristic 'Dot in Circle' sign as MRI is not widely available in the endemic areas and is expensive for a common man. Also, this sign is an important imaging clue to differentiate mycetoma from other lesions. However, ultrasound can never replace an MRI to rule out complications such as ligamentous and osseous involvement.

Understanding the distinctive ultrasound characteristics of mycetoma can aid in arriving at an early diagnosis, thus preventing delay in the patient's treatment and further complications. Written informed patient consent for publication has been obtained

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