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Medical Imagery

Madura foot in a developed tropical country



A 45-year-old unemployed and destitute Malay male with mild intellectual disability presented with increasing pain over the right base of his foot associated with a smelly discharge and a fever of 1 day. He had a long history of walking barefoot in soil and reported skin lesions, swelling and discharge that have been present for more than 8 years. His recent presentation is due to the progressively increasing pain, size and volume of discharge impacting his mobility. Physical examination revealed a right leg displaying multiple verrucous nodules covering the entire right foot dorsal surface extending to mid-shin with a foul-smelling yellowish exudate discharging from between the nodule crevices as seen in Figure 1. His left leg had a hyperpigmented lichenified plaque extending from distal shin to dorsum of the left foot. No inguinal lymphadenopathy, abdominal masses and scrotal swellings were noted.

Blood tests did not show elevated inflammatory markers, filariasis IgG or parasites. Right leg vascular scans did not show deep vein thrombosis but revealed complete venous incompetency. The right leg scintigraphy showed partial lymphatic obstruction. MRI of the right foot showed multiple extensive superficial nodules with mild peripheral enhancement over the foot dorsum and retrocalcaneal regions. A dot in circle sign was apparent as shown in Figure 2. Subsequent deep tissue biopsy cultures and histopathology identified *Actinomadura madurae*, which was further confirmed with molecular testing.

Madura foot mycetoma is an uncommon chronic tropical infective disease of the skin and subcutaneous tissues characterized by the triad of tumefaction, draining sinuses and presence of colonial grains in the exudates (Alam et al.,

2009). The infection is associated with walking barefoot and is caused by repeated minor trauma allowing for infection by eumycetoma in 40% of cases and by filamentous bacteria actinomycetes in 60% of cases (Alam et al., 2009). The dot in circle sign is recognized as a radiological sign as a non-invasive diagnostic aid for Madura foot (Sen and Pillay, 2011; Laohawiriyakamol et al., 2014; Guerra-Leal et al., 2019). It is described as a small rounded hyperintensity (representing granulation tissue), surrounded by a low signal intensity rim (representing fibrous septa) with a hypointense dot (representing susceptibility loss due to fungi) in the center (Sen and Pillay, 2011; Laohawiriyakamol et al., 2014; Guerra-Leal et al., 2019).

Management of these cases is often complex and requires involvement of orthopedic surgeons and infectious disease physicians. For antimicrobial treatment, this patient was started on amikacin sulfate (15 mg/kg) in combination with co-trimoxazole (14 mg/kg twice daily) as the first line for actinomycetoma treatment (Relhan et al., 2017). Surgical debulking was subsequently planned for the patient; unfortunately the patient was lost to follow up during the Covid-19 pandemic. Due to actinomycetoma possessing ill-defined borders, a margin of healthy tissue was planned to be excised with the skin lesions. Simple bone curettage and soft tissue excision was also planned for any localized bony lesions.

This publication aims to raise awareness of uncommon neglected tropical disease in the setting of impoverished communities within developed countries. Hopefully this would lead to timely antimicrobial treatment and more physician-led public health measures to address such social inequities.



Figure 1. Multiple verrucous nodules covering entire surface of dorsum of right foot extending to mid shin. Diff tag not allowed inside this tag

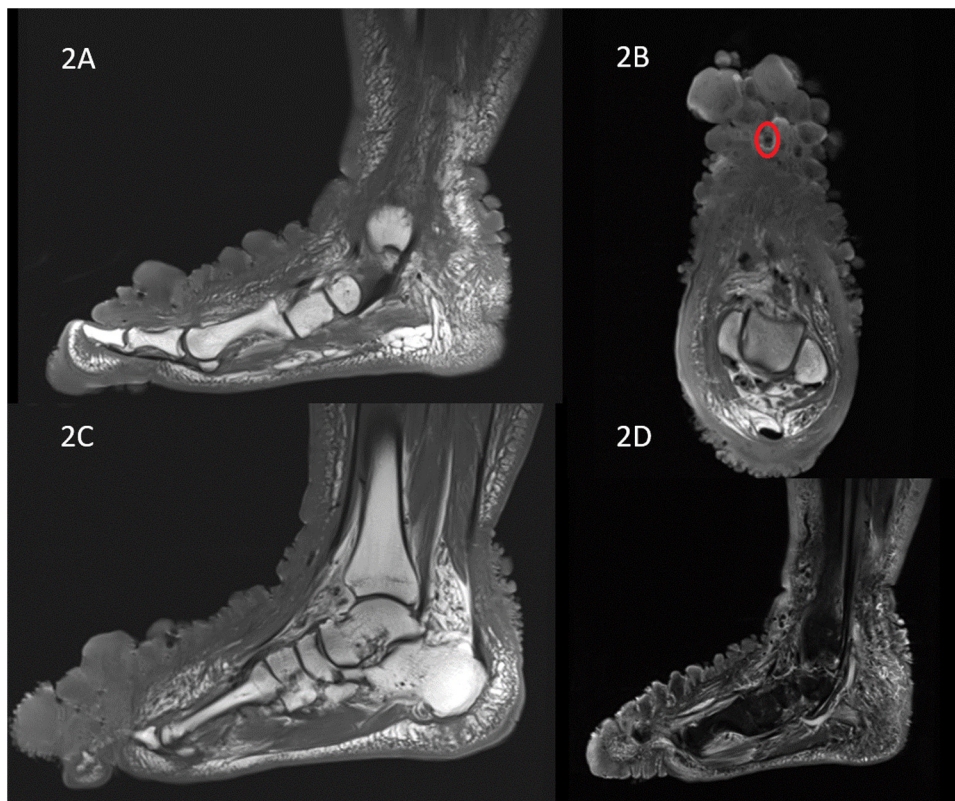


Figure 2. Pre-contrast and post-contrast multiplanar MRI sequences of the right foot showed extensive, multiple superficial nodular lesions of various sizes with mild peripheral enhancement seen over the dorsal and retrocalcaneal aspect of the foot. Diffuse mild subcutaneous and epifascial edema was noted over the dorsal and plantar aspect of the right foot and ankle areas. Mild soft tissue edema involving the flexor/abductor hallucis and the abductor digiti minimi muscles was noted. A “dot in circle” sign was noted, highlighted by the red oval in (B). The joint spaces were maintained. No muscle extension, bone destruction, drainable collection, sinus tract formation or nerve hypertrophy was seen.

Conflict of interest

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Ethics

Ethical approval was not necessary for this study.

Informed consent

Informed consent for publication of this paper was given by the patient.

References

Alam K, Maheshwari V, Bhargava S, Jain A, Fatima U, Haq EU. Histological diagnosis of madura foot (mycetoma): a must for definitive treatment. *J Glob Infect Dis* 2009;1(1):64–7.

Guerra-Leal JD, Medrano-Danés LA, Montemayor-Martinez A, Pérez-Rodríguez E, Luna-Gurrola CE, Arenas-Guzman R, et al. The importance of diagnostic imaging of mycetoma in the foot. *Int J Dermatol* 2019;58(5):600–4.
 Laohawiriyakamol T, Tanutit P, Kanjanapradit K, Hongsakul K, Ehara S. The “dot-in-circle” sign in musculoskeletal mycetoma on magnetic resonance imaging and ultrasonography. *Springerplus* 2014;3:671.
 Relhan V, Mahajan K, Agarwal P, Garg VK. Mycetoma: an update. *Indian J Dermatol* 2017;62(4):332–40.
 Sen A, Pillay RS. Case report: dot-in-circle sign – an MRI and USG sign for “Madura foot”. *Indian J Radiol Imaging* 2011;21(4):264–6.

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