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Madura foot masquerading as a hemangioma

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Mycetoma, also known as Madura foot, is a rare soft-tissue granulomatous infection caused by Actinomyces or true fungi. The MRI "dot-in-circle" sign has been described as a characteristic finding of mycetoma. This sign represents spherical T2 bright masses containing central and intervening low-signal-intensity foci. However, other soft-tissue masses can have similar appearances. We present a case of a Madura foot that was erroneously given the imaging diagnosis of soft-tissue hemangioma due to the presence of serpiginous enhancing masses with the "dot-in-circle" sign (believed to be due to phleboliths).

Case report

A 30-year-old male farmer presented with an eight-year history of a growing painless soft-tissue mass on the lateral aspect of his right ankle. The patient reported noticing lumps on his ankle after a tractor injury in an apple field. Workup first occurred at another facility, where the initial diagnosis of fungal infection was made from punch biopsy. However, no treatment was provided. The patient was then referred to our institution for infectious disease consultation and possible surgical management due to increasing discomfort and work debilitation. He was initially placed on itraconazole. However, the mass continued to grow slowly, and surgery was deemed the best treatment option.

MRI for pre-operative evaluation showed a 6-cm area composed of homogeneously enhancing round and serpiginous masses in the soft tissues inferior to the lateral malleolus, extending to the plantar subcutaneous tissues of the midfoot. The masses displayed low signal intensity on T1 and high signal intensity on T2 and STIR sequences, with some intervening and central foci of low T1-, T2-, and STIR-signal intensity (Figs. 1-4). No tendinous or osseous involvement was present. Unfortunately, biopsy results, outside institution radiographs, and clinical history were not

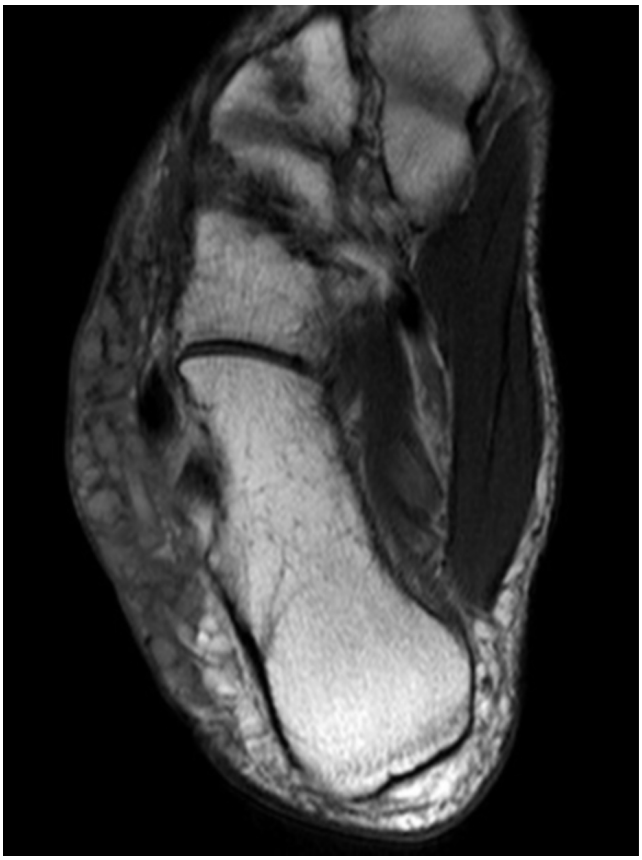

Figure 1. Axial T1 image of the foot demonstrating round and serpiginous intermediate-signal-intensity masses in the lateral subcutaneous tissues, Some of the masses have internal areas of low T1 signal.

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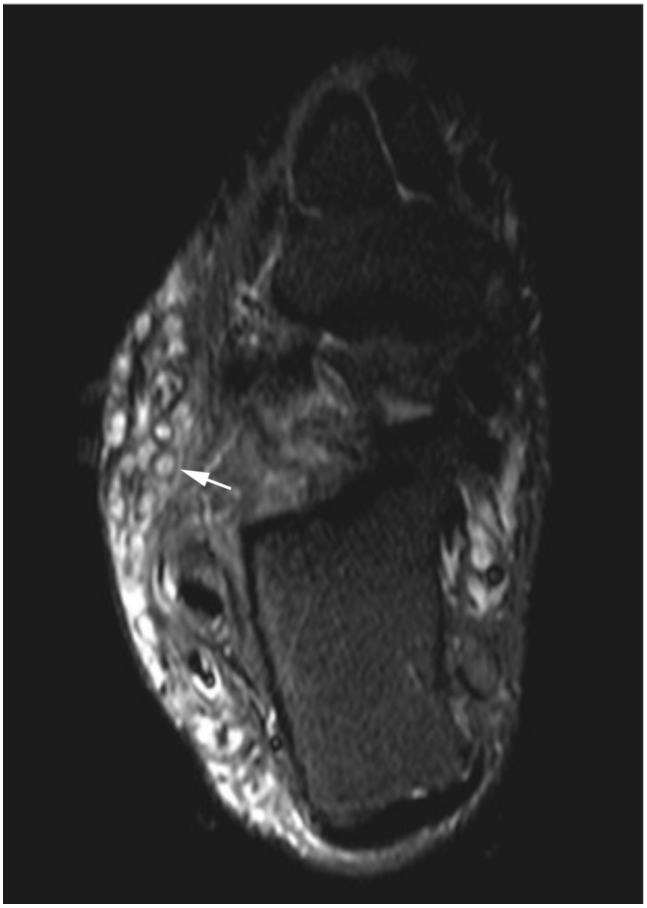

Figure 2. Axial STIR image demonstrates the "dot-in-circle" sign described in mycetoma (arrow).

provided to the radiologists, and thus MRI diagnosis of a hemangioma, not mycetoma, was reported. Surgical excision was performed by plastic and orthopedic surgery for the possibility of mycetoma superimposed on an underlying soft-tissue hemangioma. Histology showed multiple subcutaneous abscesses with brown fungal hyphae of relatively uniform parallel walls and septations consistent with fungal mycetoma. There was no pathological evidence of a soft-tissue hemangioma. Postoperative course was uneventful, and the patient eventually was able to return to work. There has been no evidence of disease recurrence.

Discussion

Mycetoma, or Madura foot, is a chronic granulomatous infection of the dermis and epidermis caused by the bacteria Actinomyces or true fungi (eumycetoma) (1). Histologically, the lesion is composed of "grains" of fungal hyphae or bacteria in microabscesses within a granulomatous fibrous-tissue reaction (2). The infection is initially introduced from direct inoculation by a sharp object (3-5). The process is usually indolent but with potential for abscess, draining sinus tract, osteomyelitis, and fistula formation if treatment is not provided (6). Although antifungal medication is successful in almost 90% of cases, lesions not arising in the foot or due to fungus tend to have a worse prognosis and require surgery (4), as occurred with our patient.

Radiographs may be normal, demonstrate a soft-tissue mass, or show signs of osteomyelitis. Initial reports of the MRI findings of mycetoma described low T1- and T2-signal lesions likely due to susceptibility from metabolic products of the "grains" (7). A characteristic MRI sign called the "dot-in-circle" sign was later described by Sarris et al. in 2003 (8) and recently by Cherian et al (9). The "dot-in-circle" sign represents discrete T2 bright spherical masses with central low-signal-intensity foci and low-signal-intensity areas between the spheres. Ultrasound findings are similar to the MRI sign, with multiple round hypoechoic lesions containing hyperechoic foci (10). Our case did exhibit some "dot-in-circle" signs on MRI. However, the serpiginous rather than round appearance of the masses was atypical. Thus, the diagnosis of hemangioma was favored in our case.

Soft-tissue hemangiomas are common benign neoplasms with capillary, cavernous, arteriovenous, venous, and mixed variations (11, 12). They may be cutaneous, subcutaneous, or intramuscular. Radiographs may show a soft-tissue mass,

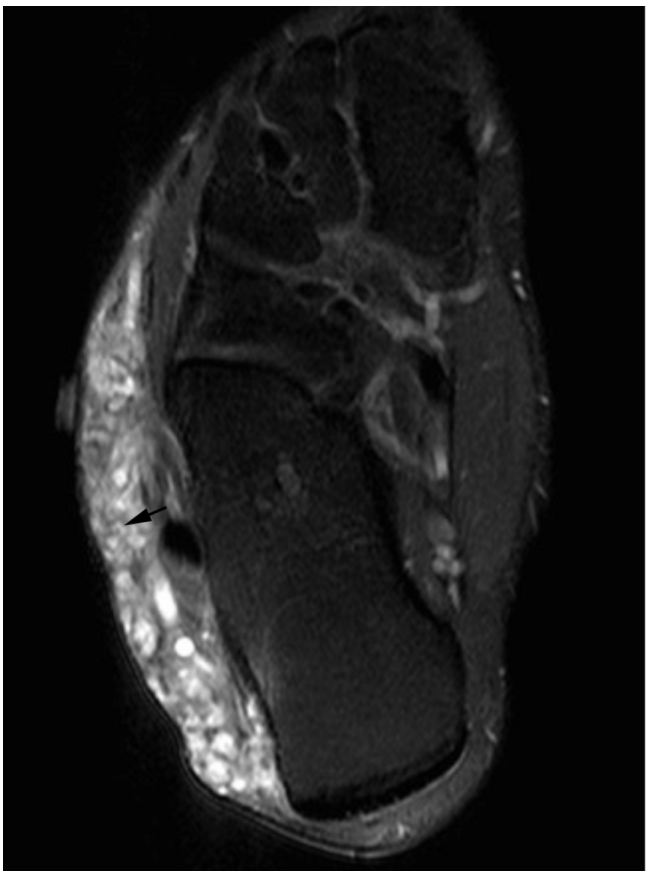

Figure 3. Axial T1 fat-suppressed image, post contrast, demonstrates enhancement of the mass involving the lateral soft tissues of the foot and "dot-in-circle" sign (arrow).

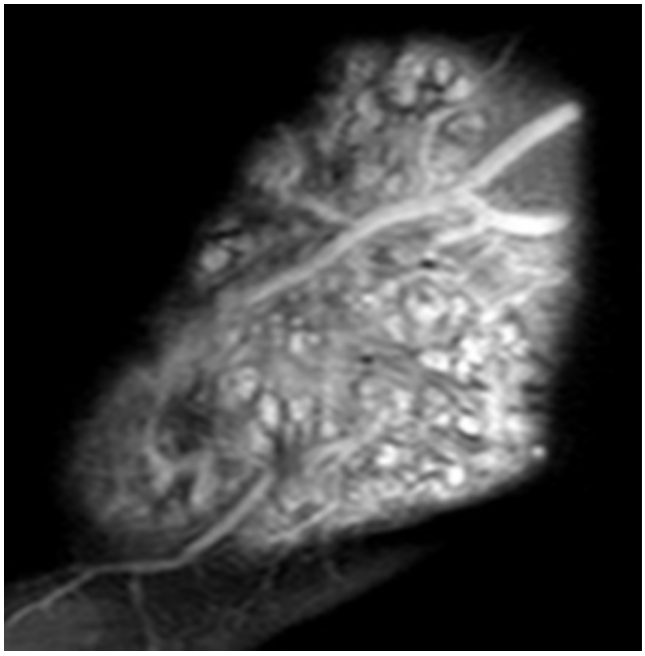

Figure 4. Sagittal T1 fat-suppressed postgadolinium image at the lateral aspect of the ankle and foot demonstrates a large enhancing mass containing spherical and serpiginous components that contain both central and intervening areas of low signal.

phleboliths, or osseous changes of periostitis and cortical thickening. CT features include ill-defined masses that enhance avidly and contain serpiginous structures and phleboliths. On ultrasound, hemangiomas may look similar to the "dot-in-circle" sign, with hypoechoic masses containing phleboliths that appear as central hyperechoic shadowing foci (11). MRI features of soft-tissue hemangiomas include serpiginous, heterogeneous T1- and T2-signal-intensity soft-tissue elements that prominently enhance post gadolinium (13). The lesions are often extremely bright on T2, possibly from increased free water pooled in larger vessels (14). Areas of high T1 signal consistent with fat may be present due to muscle atrophy (believed to develop secondary to chronic vascular insufficiency) (15). Due to the presence of ossification, fast flow within blood vessels, hyalized vascular channels, or phelboliths, focal areas of low T1 and T2 signal may be seen. Thus, in our case, the areas of low T1 and T2 signal were believed to represent phleboliths in a hemangioma. Additionally, hemangioma is a much more common soft-tissue lesion then a mycetoma.

In our case, conventional, CT, or MR angiography could have been useful for pre-operative differentiation. Typical findings include pooling of contrast material with arteriovenous shunting and multiple enlarged feeding vessels. Additionally, correlation with physical exam, secondary signs of vascular shunt phenomenon, and presence of phleboliths on plain radiographs, if they had been available, might have aided in diagnostic differentiation. Ultimately, our case illustrates that both soft-tissue hemangiomas and mycetomas may have the "dot-in-circle" sign on MRI, that mycetoma can have a serpiginous nature, and that differentiation may be difficult without clinical history. Recognition of the similarities between these two entities and their imaging features is important when facing soft-tissue masses of the feet.

References

1. Sharif HS, et al. Mycetoma: comparison of MR imaging with CT. *Radiology* 1991. 178:865–70. [PubMed]
2. Magana M. Mycetoma, some clinical and histopathological features. *Turk J Dermatopathol* 1994; 3:94.
3. Magana M. Mycetoma. *Int J Dermatol* 1984;23:221-236. [PubMed]
4. McGinnis MR. Fader RC. Mycetoma: a contemporary concept. *Infect Dis Clin North Am* 1988; 2:939-954. [PubMed]
5. Bendl BJ, Mackey D, Al-Saati F, Sheth Ky, Ofole SN, Baily TM. Mycetoma in Saudi Arabia. *J Trop Med Hyg* 1987; 90:51-59. [PubMed]
6. Lewall DB, Ofole S, Bendl B. Mycetoma. *Skeletal Radiol* 1985; 14:257-262. [PubMed]
7. Czechowski J, Nork M, Haas D, Lestringant G, Ekelund L. MR and other imaging methods in the investigation of mycetomas. *Acta Radiol* 2001; 42:24-6. [PubMed]
8. Sarris I, Berendt AR, Athanasous N, Ostlere SJ. MRI of mycetoma of the foot: two cases demonstrating the dot-in-circle sign. *Skeletal Radiol* 2003;32:179–83. [PubMed]
9. Cherian RS, etal. The "dot-in-circle" sign-a characteristic MRI finding in mycetoma foot: a report of three cases. *British Journal of Radiology* 2009; 82:662-665 [PubMed]
10. Fahal AH, Skeik HE, Homeida MMA,Arabi Y, Mahgoub ES. Ultrasonographic imaging of mycetoma. *Br J Surg* 1997; 84:1120–1122. [PubMed]
11. Greenspan A, McGahan JP, Vogelsang P, Szabo RM. Imaging strategies in the evaluation of soft-tissue hemangiomas of the extremities: correlation of the findings of plain radiography, angiography, CT, MRI, and ultrasonography in 12 histologically proven cases. *Skeletal Radiol* 1992; 21:11-18. [PubMed]
12. Resnick D. Vascular and lymphatic tumors. In: Draud LA, Fix CF, eds. *Diagnosis of bone and joint disorders*. 4th ed. Philadelphia, Pa: Saunders, 2002; 4186-4195.
13. Murphey MD, Fairbairn KJ, Parman LM, Kirkman GB, Parsa MB, Smith WS. Musculoskeletal angiomatous lesions: radiologic-pathologic correlation. *RadioGraphics* 1995; 15:893-917. [PubMed]
14. Buetow PC, Kransdorf M J, Moser RP, Jelinek JS, Berrey BH (1990) Radiologic appearance of intramuscular hemangioma with emphasis on MR imaging. *AJR* 1990 Mar;154(3):563-7 [PubMed]
15. Olsen KI, Stacy GS, Montag A. Soft-tissue cavernous hemangioma. *Radiographics*. 2004 May-Jun;24(3):849-54. [PubMed]