Fibula Stress Fracture Mimicking a Malignancy

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Abstract

Stress fractures may be easily misdiagnosed as another entity, especially tumors, which may prompt very severe surgical treatment and sometimes amputation. The appropriate use of modern radiography may make the difference in proper diagnosis of stress fractures.

In this article, we present the case of a man in his early 30s whose right ankle pain was initially misdiagnosed as a malignancy (Ewing sarcoma) on the basis of radiographic and magnetic resonance imaging (MRI) findings. Scintigraphy and computed tomography (CT) with 3-dimensional (3-D) reconstruction confirmed the diagnosis as a stress fracture of the distal fibula. This fracture was treated conservatively, and it healed successfully.

The authors have obtained the patient's written informed consent for print and electronic publication of the case report.

Case Report

We present the case of an active male construction worker in his early 30s known to be previously healthy. He presented to our orthopedic surgery clinic for right ankle pain of 1 month's duration. The pain increased during walking and jumping and was more confined to the distal fibula. The patient denied any history of trauma. He also reported night pain. On physical examination, there was no ankle stiffness or effusion but painful range of motion. There was a trigger tender point on the distal fibula about 3 cm proximal to the joint line just on the upper level of the shoe. No skin changes were observed, and the examination was otherwise normal. Anteroposterior and lateral radiographs of the ankle showed a very small cortical lesion on the lateral aspect of the distal fibula (Figure 1), but the radiology report was interpreted as normal. Complete blood cell count with differential, chemistry, erythrocyte sedimentation rate, C-reactive protein, alkaline phosphatase, and lactate dehydrogenase—all part of the blood workup—were in the normal ranges.

The patient was given nonsteroidal anti-inflammatory drugs for pain relief and was scheduled for another appointment. Two weeks later, he had increased pain and could no longer bear weight on the foot. MRI showed an abnormal segmental signal of the distal fibula at the junction between the diaphysis and the metaphysis (Figure 2) and a cortical defect surrounded by soft-tissue swelling that enhanced after contrast injection. The MRI report was in favor of a malignancy (Ewing sarcoma). Our team discussed performing a biopsy of the cortical lesion to rule out malignancy, as the MRI findings for cortex and soft-tissue swelling were in favor of this diagnosis. We decided to continue the investigational studies. CT with 3-D reconstruction and scintigraphy were performed. CT showed a homogenous thickening associated with a

"A retrospective study... found that, when MRI failed to provide the proper diagnosis, CT and scintigraphy proved to be the best diagnostic tests.[7]"

Figure 1. Anteroposterior (A) and lateral (B) radiographs of left ankle show small cortical defect of distal fibula.

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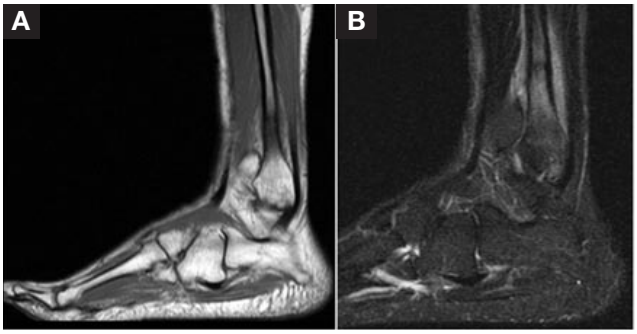

Figure 2. (A) Sagittal T_1-weighted magnetic resonance imaging of ankle shows cortical defect surrounded by swelling. (B) Sagittal short tau inversion recovery image of same ankle shows diffuse soft-tissue reaction.

Figure 3. (A) Frontal and axial computed tomography shows cortical thickening and minimal periosteal reaction. (B) Three-dimensional reconstruction of ankle shows linear fracture line of anterolateral cortex of distal fibula.

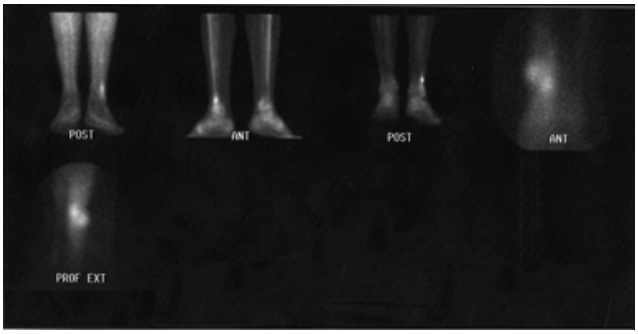

Figure 4. Scintigraphy shows distal fibula positive uptake compatible with diagnosis of stress fracture.

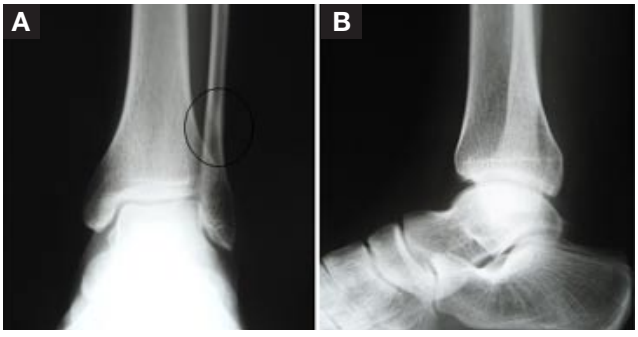

Figure 5. Six months after onset of symptoms, anteroposterior (A) and lateral (B) radiographs of left ankle show complete healing of stress fracture with evident callus formation.

minimal solid periosteal reaction (Figure 3). A linear fracture line involving the anterolateral cortex was also identified. There was no evidence of an intramedullary or a perifibular mass. These findings were consistent with a stress fracture. Scintigraphy also showed a linear rather than a round or oval configuration to the focus of intense uptake shown by pinhole imaging and absence of focally increased tracer localization on the angiographic and tissue phases (Figure 4). A diagnosis of a stress fracture of the distal fibula was established. After a 2-month rest, the patient's symptoms were completely resolved. At 6-month follow-up, he was feeling fine, an ankle radiograph showed a completely healed fracture, and there was evidence of callus formation (Figure 5).

Discussion

Stress fracture is a bone failure caused by multiple repetitive strain cycle loading that exceeds the mechanical capacity of the bone. Stress fractures are usually classified as *fatigue fractures,* which occur in normal bone, or *insufficiency fractures,* which occur in bone that has reduced mechanical properties and is subjected to repetitive normal loading.[1,2]

Stress fractures occur mainly in military recruits and athletes, particularly when overload persists during bone weakening.[3] Incidence peaks 10 to 12 days after intense training begins.[4] Our patient was not involved in the military or in sports, but the physical demands of his job as a construction worker may have contributed to his stress fracture. Also important is that he started feeling pain 3 weeks after starting his job.

Approximately 95% of all stress fractures occur in the lower extremities, with the tibia being the most commonly affected bone. Only 10% of stress fractures occur in the fibula,[5] particularly in the distal third, where the stress created by the upper level of our patient's shoe was concentrated. Similar facts were reported with respect to athletes.[6]

The major clinical symptom is progressive mechanical pain in the absence of trauma. Usually on clinical examination a specific tender point can be found, but a high index of suspicion must always be present.

Stress fractures may present as tumors. A retrospective study of 22 stress fractures that were referred to an oncology clinic for evaluation of tumors found that, when MRI failed to provide the proper diagnosis, CT and scintigraphy proved to be the best diagnostic tests.[7] The same fact was evident in our patient's case, in which MRI findings favored a tumor. We diagnosed his stress fracture only after performing CT, scintigraphy in particular.

Conclusions

Stress fractures may mimic malignant bone tumors. Plain radiographs are a good starting point. MRI may offer additional information but often is not confirmatory. In these cases, CT, particularly with 3-D reconstruction and scintigraphy showing linear uptake, is essential for diagnosis.

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This paper will be judged for the Resident Writer's Award.