Anterior Tibial Stress Fracture: Case Report

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CASE REPORT

A 52-yr-old world class female masters runner presented with increasing pain in the left tibia midshaft, which initially occurred only during exercise, but now persisted at rest. She stated that the pain had been gradually escalating for almost four years. The patient had observed a palpable enlargement over the anterior aspect of the tibia for the past year. The athlete had sought curbside consultations from multiple physicians at road races in the past. The physicians had attributed her pain to "shin splints and a calcium deposit" according to the patient.

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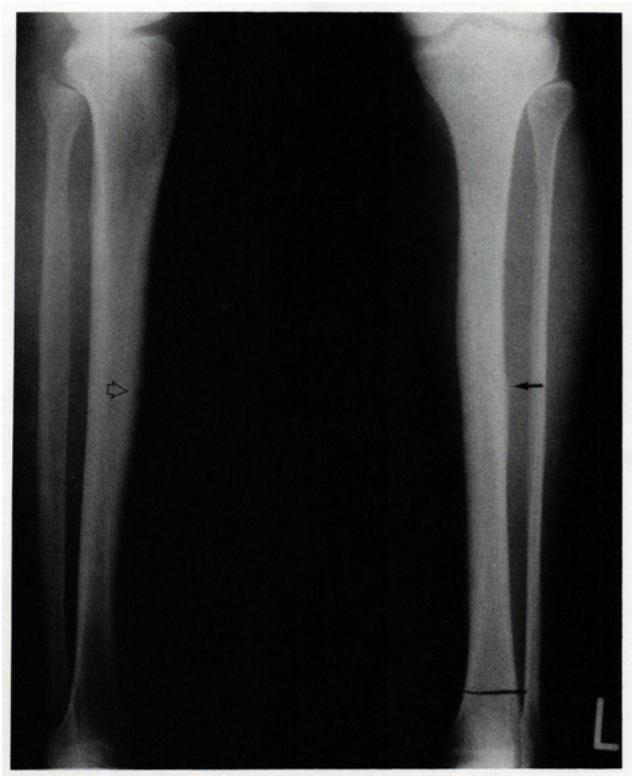

FIG. 1. Lateral roentgenogram of the tibia, showing the transverse fracture line involving the anterior midtibia (arrow). Anteroposterior radiograph depicting anterolateral cortical thickening (open arrow).

Radiography demonstrated a 7-mm thin, transverse stress fracture of the anterior cortex of the left midtibia with cortical thickening above and below (Fig. 1). The patient's physician (JR) consulted an orthopedic surgeon, who requested triple-phase bone scintigraphy to determine if active healing was present and to exclude osteomalacia.

The skeletal radionuclide angiogram, using technetium-99m-methylene diphosphonate (^{99m}Tc-MDP), showed increased perfusion to the left leg (Fig. 2A). The blood-pool images and delayed scintiscans showed an intense, focal abnormality corresponding to the radiographic abnormality, representing a healing anterior tibial stress fracture (Figs. 2B-C). Delayed images also showed an area of nonspecific stress or remodeling in the left foot. Whole-body skeletal images were otherwise normal.

The patient was informed that anterior midtibial stress fractures were prolonged, and even casting with cessation of activity might result in nonunion. She opted for surgical treatment even though the bone scan appearance was consistent with active healing. A Russell-Taylor tibial nail was inserted in the medullary cavity, the fracture excised, and the area grafted with cancellous bone taken from the tibia at the site of the nail insertion. The patient is making an uneventful recovery.

DISCUSSION

Exercise-related stress fractures of the tibia usually involve the posteromedial cortex of the tibia, heal with rest from activity and are almost invariably detected by radionuclide bone scanning (*1–3*). Fatigue fractures involving the anterior cortex of the midtibial shaft are much less common than those involving the posterior tibial cortex (*4–5*). Though unusual, anterior tibial stress fractures have received considerable attention in the sports medicine literature, because they are prone to completion and nonunion if not diagnosed correctly and treated aggressively (*5–8*).

To our knowledge, only three athletes with anterior midtibial shaft stress fractures and bone scans have been reported (*7,8*). Rettig et al. (*7*) reported a positive bone scan but did not describe its appearance. Blank (*8*) described two cases with three-phase bone scintigraphy that showed normal skeletal angiograms, normal tissue-phase images, and "late non-intense activity at the fracture site." One athlete's scan was

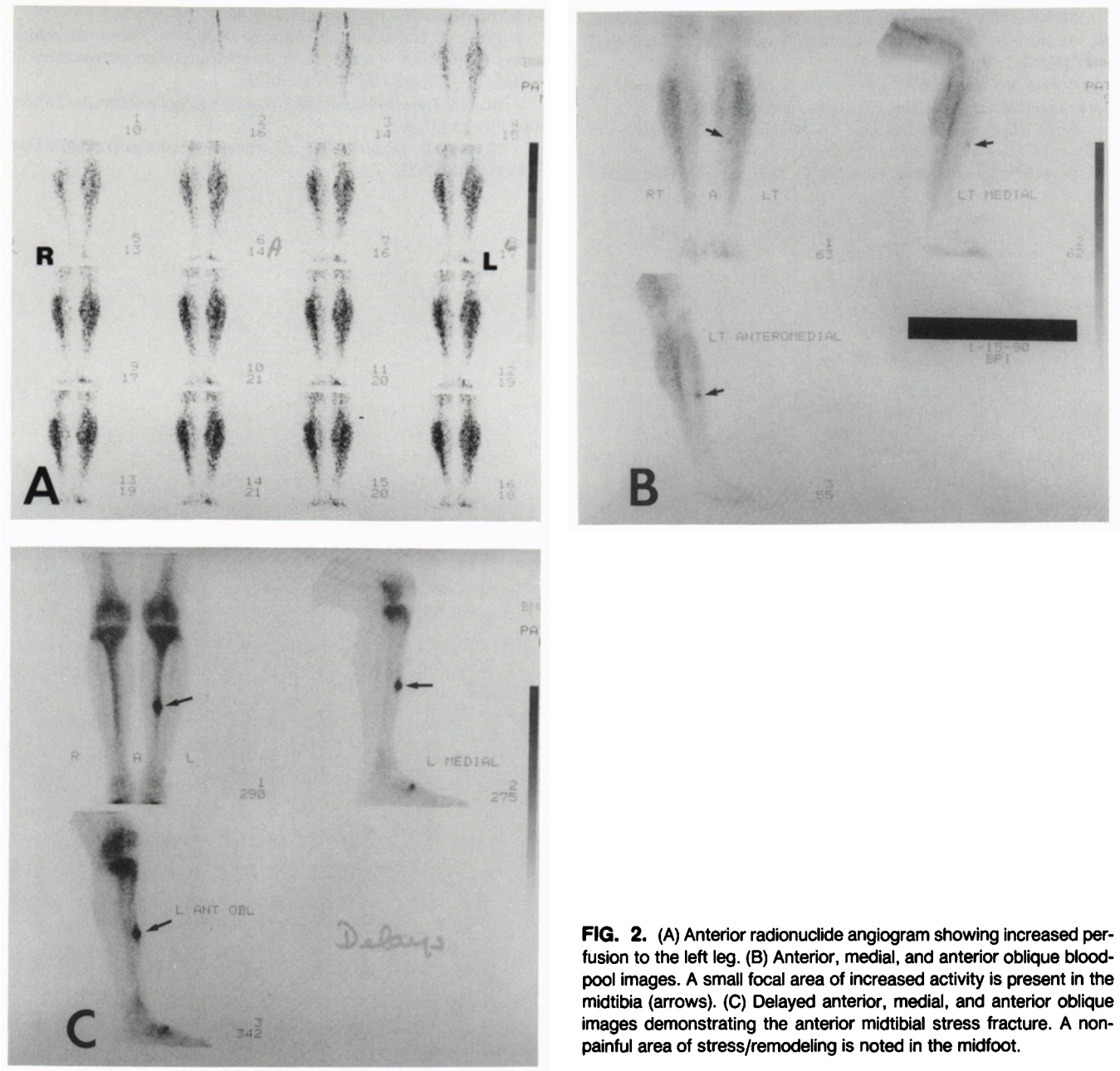

FIG. 2. (A) Anterior radionuclide angiogram showing increased perfusion to the left leg. (B) Anterior, medial, and anterior oblique bloodpool images. A small focal area of increased activity is present in the midtibia (arrows). (C) Delayed anterior, medial, and anterior oblique images demonstrating the anterior midtibial stress fracture. A nonpainful area of stress/remodeling is noted in the midfoot.

initially interpreted as negative, but on review termed questionably positive.

Our patient's three-phase bone scan yielded a different result than those reported by Blank (*8*). The current case had abnormalities present in all phases of skeletal scintigraphy. Both the blood-pool and delayed images showed focal abnormalities in the painful tibia. The delayed scan revealed an intense, diamond-shaped area of increased activity involving the anterior cortex of the midtibia. Increased activity was also present in the asymptomatic left midfoot on delayed scintiscans. Increased activity in nonpainful bones of athletes does not represent stress fracture (*2,3,9*).

Anterior midtibial stress fractures have been mistaken for rickets, osteoid osteoma, tenosynovitis, and anterior compartment syndrome by clinicians (*6,7*). The bone scan can confirm the correct diagnosis and may be helpful in determining if active healing is present (*8*). An intensely abnormal study, such as our case, may suggest active healing while minimal activity at the fracture site can indicate poor bone reparation and nonunion.

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