

Stress Fracture of the Medial Cuneiform Bone in a Runner

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Abstract: Stress fracture of the medial cuneiform bone in an athlete has not been reported previously, to our knowledge. This article documents the clinical features and investigation findings in this rare stress fracture. The injured athlete returned to running after 12 weeks of weight-bearing rest. Clinical features were used to monitor return to activity. **Key Words:** Medial cuneiform stress fracture—MRI—CT. *Clin J Sport Med* 1993;3(4):262-4.

Stress fracture of the cuneiform bone is a rare condition. A small number of cases have been reported in military subjects (1,3,6,10). Stress fracture of the intermediate (or second) cuneiform bone in a triathlete has been documented (2). We present a case of medial (or first) cuneiform stress fracture in a recreational runner. The injury has been demonstrated on radioisotopic bone scan, computed tomography (CT), and magnetic resonance imaging (MRI).

CASE REPORT

A 41-year-old man, a recreational runner (25 km/week), had intense medial midfoot pain during a run. The severity of the pain caused him to stop running and limp home. There had been no sudden change in his training. The pain persisted despite rest from running (weight-bearing rest) and physical therapy treatment (electrotherapy) for 6 weeks. He was referred to a sports physician.

Examination revealed tenderness over the medial aspect of the medial cuneiform bone, the navicular-cuneiform joint, and the navicular bone distally. Observation of the patient walking revealed mildly excessive pronation.

Differential diagnosis included midfoot joint sprain, navicular stress fracture, osteoid osteoma, medial cuneiform stress fracture, and tarsal tunnel syndrome.

Plain radiographs of the foot were normal. Radio-

isotopic bone scan showed intense focal uptake in the region of the medial cuneiform and the navicular bones (Fig. 1). Computerized tomography in the axial plane revealed a zone of sclerosis on the lateral border of the medial cuneiform bone (Fig. 2).

Magnetic resonance imaging showed an abnormal signal on the short tau inversion recovery (STIR) image corresponding with the area of sclerosis on the CT scan as well as extending further medially (Fig. 3). Together with the clinical features, the radioisotopic bone scan and the CT findings allow the diagnosis of stress fracture of the medial cuneiform bone to be made (12).

When the diagnosis was made the patient was provided with crutches but elected to use them for 24 h only. After a total of 12 weeks of weight-bearing rest the patient became pain free on walking. He then gradually returned to running over 4 weeks and subsequently increased his running distance to greater than the preinjury level. As bone scan and CT evidence of healing of stress fracture lags well behind clinical union (4,5,12,13), these investigations were not repeated. To document the natural history of this unusual stress fracture, however, we obtained the patient's permission for a repeat MRI scan 10 weeks after the initial test and this showed absence of all signs of bone stress (Fig. 4).

DISCUSSION

Significant stress on bone results in a continuum of bone response from remodelling through microfracture to completed fracture that has been labelled "bone stress" (12) or "bone strain" (8). Thus, bone can reach a similar state to a stress fracture before radiographic changes can be detected

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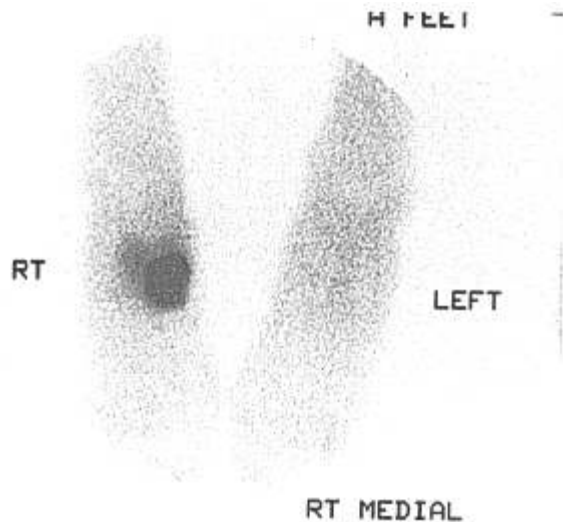


FIG. 1. Bone scan at the time of initial medical assessment (4 weeks after onset of pain) showing markedly increased uptake in the region of the medial cuneiform bone.

(7,12). In the appropriate clinical setting, the radio-nuclide appearance justifies a diagnosis of stress fracture and institution of therapy regardless of whether radiographic abnormalities are evident (7,12).

In this case of medial cuneiform stress fracture there were no abnormalities detected in the plain radiographs taken of the medial cuneiform bone after 4 weeks of symptoms. A CT scan did not reveal cortical fracture, but a zone of sclerosis was present on the lateral border of the medial cuneiform. When a stress fracture occurs in a cancellous bone such as the medial cuneiform bone (15), sclerosis can appear (3,12,14,17). This results from trabecular condensation within cancellous bone and formation of endosteal callus (14).

In this runner the MRI was very sensitive in producing a high signal intensity consistent with bony

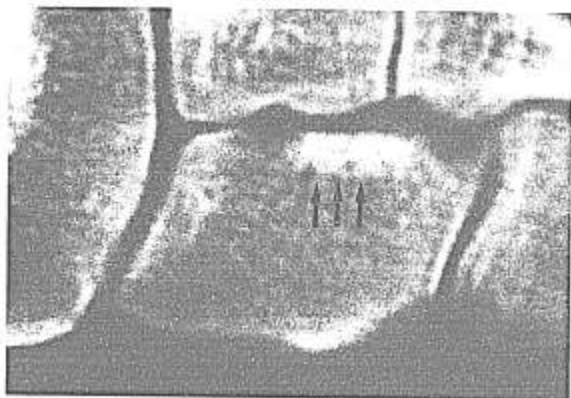


FIG. 2. Computed tomography scan of the medial cuneiform bone performed on the same day as the bone scan in Fig. 1. No cortical fracture is seen. A zone of sclerosis (arrow) on the lateral border of the medial cuneiform bone represents endosteal callus formation.



FIG. 3. Magnetic resonance imaging scan 4 weeks after the scans shown in Figs. 1 and 2 were obtained. High signal intensity on the STIR image confirms bone abnormality.

abnormality. Abnormalities detected on MRI resolved at the same time as the symptoms and signs resolved, much earlier than would be expected with either bone scan (12) or CT (5). Further investigation is required to determine whether MRI will have a role in monitoring a patient's response to injury.

Different tarsal stress fractures require different management (2,4,7,9,11,16). An article describing stress fracture of the intermediate cuneiform bone in a triathlete reported the failure of 7 months of "a host of conservative means" (2). Two cases of medial cuneiform stress fracture are reported in the military literature. In one case the soldier responded to 4 months of conservative treatment, including a period of no weight bearing (6); in the other case, two months of weight-bearing rest was successful (10). Our case of medial cuneiform stress fracture responded to simple limitation of running without a significant period of no weight bearing. Follow-up observation of this case showed that clinical assessment of tenderness of the affected bone was a useful method of monitoring healing.



FIG. 4. Magnetic resonance image scan 10 weeks after the preceding examinations. The STIR image is now normal.

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Clinical Comments

This case report (1) emphasizes four important points: plain x-rays are not sensitive to the earliest changes associated with disturbed bone remodeling. Bone scans still appear to be the most sensitive screening technique when searching for clues leading to a firm diagnosis of bony microtrauma. Computed tomography (CT) scans, although more sensitive than plain x-ray films, do not exclude stress injury to bone when the bone scan shows increased uptake. Magnetic resonance imaging scans appear to be more sensitive than CT scans when attempting to demonstrate objective proof of disturbed remodelling secondary to microtrauma.

It is of great interest to understand that the medial

cuneiform bone is vulnerable to stress injury, as are the adjacent tarsal bones.

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