

Stress fracture in the medial femoral condyle

A case report

Pierre Lafforgue and Pierre-Claude Acquaviva

An 88-year-old woman complained of pain in the medial part of her knee for 5 weeks. Plain radiography was normal. Clinical and scintigraphic findings were suggestive of spontaneous osteonecrosis of the

medial femoral condyle. Magnetic resonance imaging showed a stress fracture of the medial femoral condyle. In 3 weeks pain had disappeared, confirming this diagnosis.

Service de Rhumatologie, Centre Hospitalier, Universitaire de la Timone, Boulevard Jean Moulin, F-13005 Marseille, France
Tel + 33-91 38 65 75. Fax -91 38 60 27
Submitted 92-02-06. Accepted 92-04-11

Although it is not specific, the association of suggestive clinical symptoms and a medial condylar scintigraphic hot spot is usually considered to be sufficient for a diagnosis of osteonecrosis when radiographic changes are lacking (Ahlbäck et al. 1968, Lotke et al. 1977, Haupt et al. 1983, Lotke and Ecker 1988). More recently, magnetic resonance imaging (MRI) has proven useful in the diagnosis of knee osteonecrosis (Pollack et al. 1987, Björkengren et al. 1990) and occult intraosseous fractures (Lee and Yao 1988, Yao and Lee 1988, Deutsch et al. 1989, Mink and Deutsch 1989, Vellet et al. 1991).

We report a case of stress fracture of the medial femoral condyle which could be recognized only by MRI.

an horizontal, sharply defined linear band within the medial condyle, connecting with the medial cortex and surrounded by a patchy ill-defined area. Signals of both these lesions were low on T1- and high on T2-weighted sequences. This was considered typical of a stress fracture whereas no lesion suggestive of osteonecrosis was present.

Spine radiographs showed no vertebral compression fracture. Absorptiometry showed that the spinal bone mineral density was within normal range versus sex/age matched controls.

Pain resolved entirely within 3 weeks with bed rest and salmon-calcitonin medication. Radiographs taken 4 weeks after diagnosis were unchanged. The patient died suddenly 2 months later.

Case report

An 88-year-old woman had rapid onset of pain in the medial aspect of her right knee. There was no history of trauma or unusual effort. The medial femoral condyle was tender and passive flexion was painful but there was no effusion. Bilateral genu varum was clinically evident. Her past medical history was unremarkable.

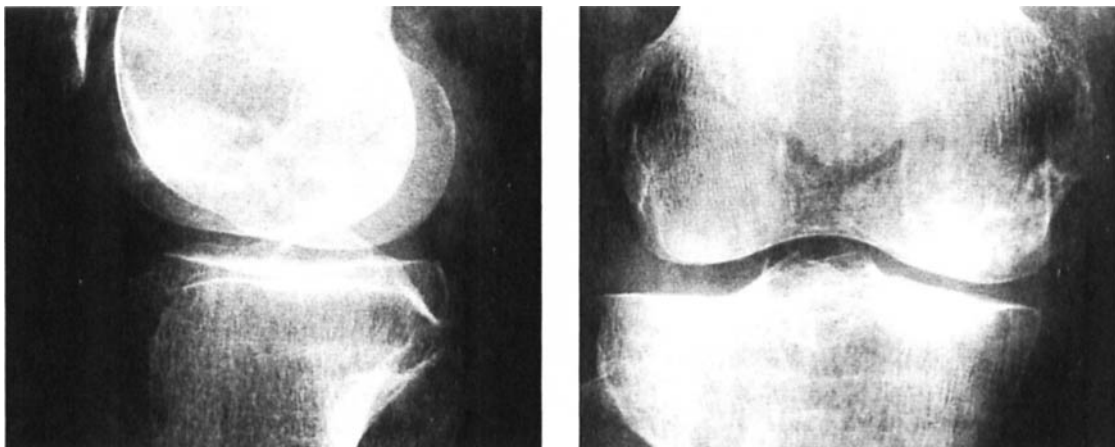
Routine laboratory tests were normal, except for a moderate increase of serum creatinine. Plain radiographs taken 2 weeks after onset of symptoms were normal. After 5 weeks they showed very slight mottled sclerotic changes in the right medial femoral condyle which were considered not to be diagnostic (Figure 1). An intense hot spot located in the right medial femoral condyle was seen on radionuclide bone scans.

A provisional diagnosis of osteonecrosis was made and MRI was performed for confirmation. It showed

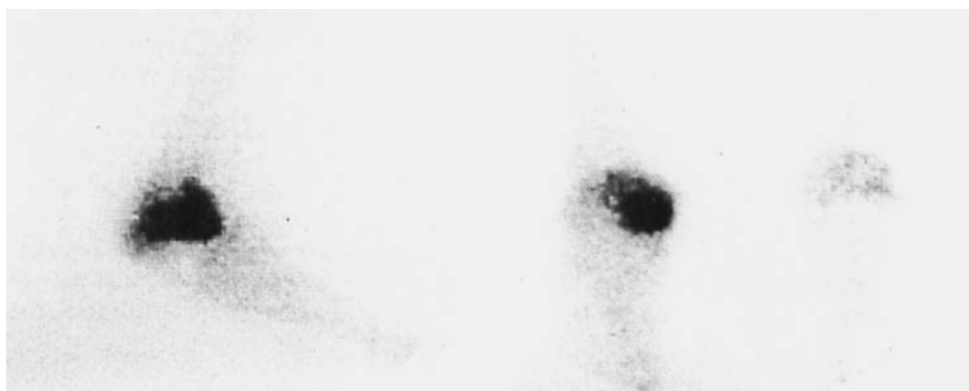
Discussion

This patient presented with clinical and radionuclide signs highly suggestive of spontaneous osteonecrosis of the knee. However, MRI allowed the diagnosis of a medial femoral condyle intraosseous fracture. The ill-defined halo of low/high signal seen on T1/T2 sequences was not specific, but together with the horizontal thin margin within the femoral condyle, this was a pattern similar to those described in stress fractures (Lee and Yao 1988, Deutsch et al. 1989, Mink and Deutsch 1989) and in occult post-traumatic intraosseous fractures (Yao and Lee 1988, Mink and Deutsch 1989, Vellet et al. 1991). Though osteonecrosis may appear on MRI as a variable signal lesion surrounded by a well-defined margin within a more diffuse area of altered signal (Pollack et al. 1987, Björkengren et al. 1991), this is quite different from images found in our patient.

Figure 1. An 88-year-old woman with a stress fracture of the medial femoral condyle.



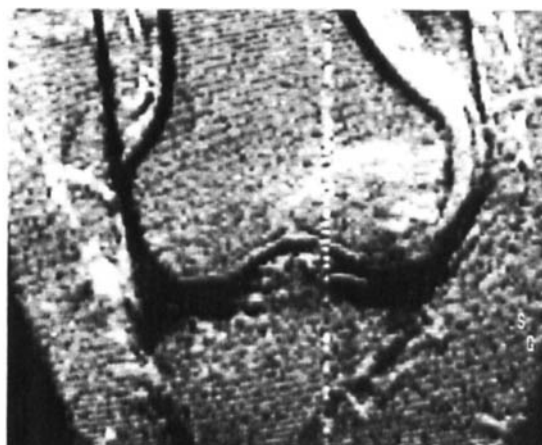
Radiographs 5 weeks after pain onset show moderate and nonspecific mottled sclerotic changes in the medial femoral condyle.



Radionuclide bone scan shows intense hot spot in the medial femoral condyle.



MRI: T1 sequences (TR 450ms/TE 28ms) show a low-signal horizontal sharply-defined line surrounded by a more diffuse area of low signal.



Both T1 lesions have a high signal on T2 examination (TR 1800ms/TE 120ms).

The medial femoral condyle and other epiphyses are not usual sites for a stress fracture (Daffner 1978), unlike osteonecrosis or posttraumatic intraosseous fractures. We found only 2 such cases in the literature. One was associated with a tibial condyle involvement in a series of 8 stress fractures of tibial condyles in old people (Bauer et al. 1981), and the second was included in a series of 18 knee stress fractures in elderly patients (Satku et al. 1990), with no details about presentation and means of diagnosis in each case.

The incidence of stress fracture in the medial femoral condyle may be underestimated. The most difficult differential diagnosis is early-stage spontaneous osteonecrosis of the knee when typical radiographic changes are still lacking. Lotke et al. (1977) reported some cases with clinical and scintigraphic signs similar to those of osteonecrosis in whom radiographic changes never developed, and stated that they represented self-resolving osteonecrosis. Since then, such patients have been considered as having probable osteonecrosis by most authors. They have often been included in series of osteonecrosis despite the absence of proof, and constitute about 20 percent in reported series (Rozing et al. 1980, Greyson et al. 1982, Houpt et al. 1983, al Rowaih et al. 1990). In all these cases the clinical outcome was excellent and the radionuclide bone scan normalized within a few months. This spontaneous recovery favors the diagnosis of a stress fracture and with MRI we have a new diagnostic tool for differentiating the two conditions. It should be helpful in determining how many "self-resolving" spontaneous osteonecroses of the knee in fact are stress fractures.

References

- Ahlbäck S, Bauer G C, Böhne W H. Spontaneous osteonecrosis of the knee. *Arthritis Rheum* 1968; 11 (6): 705-33.
- al Rowaih A, Wingstrand H, Lindstrand A, Björkengren A, Thorngren K G, Gustafson T. Three-phase scintimetry in osteonecrosis of the knee. *Acta Orthop Scand* 1990; 61 (2): 120-7.
- Bauer G, Gustafsson M, Mortensson W, Norman O. Insufficiency fractures in the tibial condyles in elderly individuals. *Acta Radiol (Diagn)* (Stockh) 1981; 22 (5): 619-22.
- Björkengren A G, al Rowaih A, Lindstrand A, Wingstrand H, Thorngren K G, Pettersson H. Spontaneous osteonecrosis of the knee: value of MR imaging in determining prognosis. *AJR Am J Roentgenol* 1990; 154 (2): 331-6.
- Daffner R H. Stress fractures: current concepts. *Skeletal Radiol* 1978; 2: 221-9.
- Deutsch A L, Mink J H, Waxman A D. Occult fractures of the proximal femur: MR imaging. *Radiology* 1989; 170 (1 Pt 1): 113-6.
- Greyson N D, Lotem M M, Gross A E, Houpt J B. Radionuclide evaluation of spontaneous femoral osteonecrosis. *Radiology* 1982; 142 (3): 729-35.
- Houpt J B, Pritzker K P, Alpert B, Greyson N D, Gross A E. Natural history of spontaneous osteonecrosis of the knee (SONK): a review. *Semin Arthritis Rheum* 1983; 13 (2): 212-27.
- Lee J K, Yao L. Stress fractures: MR imaging. *Radiology* 1988; 169 (1): 217-20.
- Lotke P A, Ecker M L, Alavi A. Painful knees in older patients: radionuclide diagnosis of possible osteonecrosis with spontaneous resolution. *J Bone Joint Surg (Am)* 1977; 59 (5): 617-21.
- Lotke P A, Ecker M L. Osteonecrosis of the knee. *J Bone Joint Surg (Am)* 1988; 70 (3): 470-3.
- Mink J H, Deutsch A L. Occult cartilage and bone injuries of the knee: detection, classification, and assessment with MR imaging. *Radiology* 1989; 170 (3 Pt 1): 823-9.
- Pollack M S, Dalinka M K, Kressel H Y, Lotke P A, Spritzer C E. Magnetic resonance imaging in the evaluation of suspected osteonecrosis of the knee. *Skeletal Radiol* 1987; 16 (2): 121-7.
- Rozing P M, Insall J, Böhne W H. Spontaneous osteonecrosis of the knee. *J Bone Joint Surg (Am)* 1980; 62 (1): 2-7.
- Satku K, Kumar V P, Chacha P B. Stress fractures around the knee in elderly patients. A cause of acute pain in the knee. *J Bone Joint Surg (Am)* 1990; 72 (6): 918-22.
- Vellet A D, Marks P H, Fowler P J, Munro T G. Occult post-traumatic osteochondral lesions of the knee: prevalence, classification, and short-term sequelae evaluated with MR imaging. *Radiology* 1991; 178 (1): 271-6.
- Yao L, Lee J K. Occult intraosseous fracture: detection with MR imaging. *Radiology* 1988; 167 (3): 749-51.