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Subchondral cysts of the tibia secondary to osteoarthritis of the knee

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Abstract. Subchondral cysts of the tibia secondary to osteoarthritis of the knee are not usually seen on radiographs. When present, they are typically small and present no diagnostic difficulty. Two cases of unusually large subchondral lesions of the medial tibial plateau are presented. The lesions were well defined and lay adjacent to the medial tibial cortex with their long axes in the sagittal plane. Both were associated with moderate medial compartment osteoarthritis. Additional information obtained from computed tomography indicated that these lesions were subchondral cysts secondary to osteoarthritis rather than tumors or other tumor-like conditions.

Key words: Computed tomography – Subchondral cysts – Osteoarthritis

Subchondral cysts of the tibia secondary to osteoarthritis of the knee are an infrequent radiographic finding. When present, these cysts are usually small, are situated within sclerotic bone, and are associated with marked narrowing of the adjacent joint space. When these typical features are seen the diagnosis is rarely difficult. Larger cysts are, however, uncommon, and differentiation from tumors may be difficult. Two cases of a large, apparently solitary, subchondral lytic lesion situated in the medial aspect of the proximal tibia are presented in this report. Both cases were referred to our institution because tumor was suspected. The value of the plain film and computed tomography (CT) findings in the differentiation of this unusual entity from tumor or other tumor-like conditions of the proximal tibial epiphysis is discussed.

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Case reports

Case 1

A 59-year-old male presented with an exacerbation of right knee pain which he had experienced intermittently over the preceding 5 years. Weight-bearing radiographs revealed a 3 cm × 2 cm cystic lesion in the medial aspect of the proximal tibial epiphysis (Fig. 1A). The medial joint space was narrowed and contained a small amount of gas. The bone scan demonstrated intense uptake of isotope in the region of the lesion. Because the differential diagnosis included tumor, CT was performed for further assessment and demonstrated that the lesion extended from the joint surface into the metaphysis, and abutted the endosteal surface of the medial tibial cortex (Fig. 1B). The additional findings of surrounding sclerosis with multiple smaller subchondral defects, osteophyte formation, and gas within both the medial joint space and the lesion supported the diagnosis of a subchondral cyst secondary to osteoarthritis.

Case 2

An 82-year-old man presented with pain in the right knee, which had recurred intermittently over the preceding 10 years. Three years previously the diagnosis of polymyalgia rheumatica had been made, at which time the rheumatoid factor was negative. Physical examination of the knee revealed that the only abnormality was mild tenderness over the medial joint margin. Radiographs demonstrated a 3 cm × 1.5 cm subchondral lytic lesion with a well-defined sclerotic margin lying medially in the proximal tibia (Fig. 2A). The lesion was visible, although smaller, on radiographs obtained 7 years previously. On CT, the lesion appeared well defined and was surrounded by sclerotic bone containing several smaller subchondral defects (Fig. 2 B and C).

Discussion

The etiology of subchondral cysts associated with osteoarthritis is disputed. Landells [3] suggested that they form when synovial fluid is pumped through defects in the attenuated cartilage and subarticular cortical plate, causing a gradually expanding lesion in the underlying

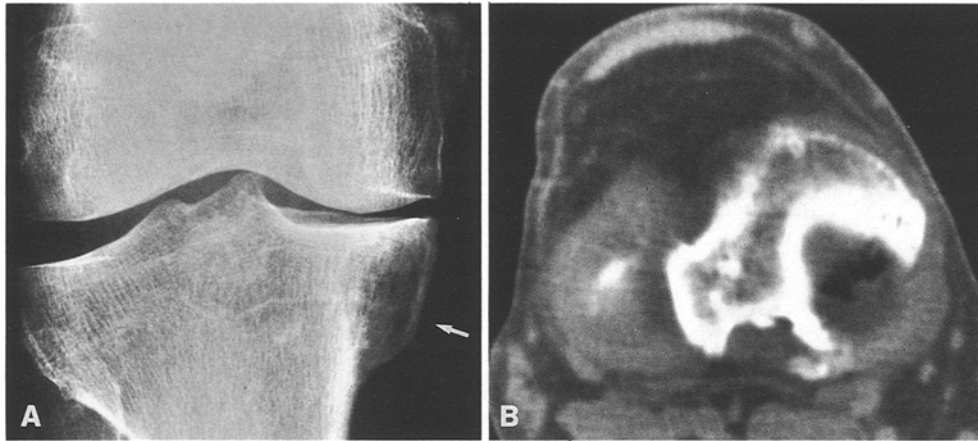


Fig. 1A, B. Case 1. **A** Weight-bearing anteroposterior radiograph of the right knee demonstrating a subchondral lesion of the tibia (*arrow*). The medial joint space is narrowed. **B** Axial CT through the proximal tibia. The lesion is surrounded by sclerosis and contains gas



Fig. 2A–C. Case 2. **A** Radiograph of right knee demonstrating a subchondral lesion of the tibia (*arrow*). The medial compartment is narrowed and contains gas. **B** Axial CT through the proximal

tibia. The lesion is well defined and surrounded by sclerotic bone. **C** Multiple smaller lesions are present in the immediate subarticular region

trabecular bone. Rhaney and Lamb [6] proposed that necrosis of trabecular bone precedes fracture of the subchondral bony plate and results from the increase in transmitted pressure through articular surface that is devoid of cartilage. This theory receives support from experiments performed by Ondrouch [4], in which lines of stress were observed in a photoelastic material subjected to varying loads.

Subchondral cysts are a common feature of osteoarthritis of the hips, but are relatively rare in the knees. In Ahlback's [1] series of 234 knees with tibio-femoral osteoarthritis, subchondral cysts were observed on only 9% of radiographs. All cysts were associated with marked joint space narrowing and subchondral sclerosis.

Large subchondral cysts secondary to osteoarthritis have been reported infrequently. Resnick [5] illustrated a case with strikingly similar radiological features to those presented here. Glass et al. [2] reported a huge multiloculated, expanding subchondral cyst involving most of the medial tibial plateau in a patient with osteoarthritis following medial meniscectomy. In this case, CT demonstrated posterolateral extension of the lesion and disruption of the expanded posterior cortex.

Large cysts are a well-recognized feature of other disorders. In rheumatoid arthritis subchondral cysts may

attain a considerable size, especially if physical activity is maintained. Calcium pyrophosphate deposition disease may produce large cysts that are histologically identical to those associated with primary osteoarthritis. Pigmented villonodular synovitis of the knee occasionally results in bony erosions, which may be extensive. Subchondral intraosseous ganglia have some similar radiological features to degenerative cysts. However, they are not associated with osteoarthritis, rarely communicate with the joint space, and tend to occur adjacent to non-weight-bearing surfaces of the joint.

In the two cases presented in this report, the diagnosis of a degenerative subchondral cyst was considered the most likely plain radiographic diagnosis in view of the presence of significant osteoarthritis. However, if a non-weight-bearing film had been obtained in case 1, the changes of osteoarthritis might have been seen as minimal, as subchondral sclerosis and osteophyte formation were not major features. Similarly, in case 2, if there had been no intra-articular gas, the severity of the medial joint space disease might have been underestimated. In both cases, CT strongly supported the diagnosis of degenerative subchondral cyst. On both scans, the lesions extended to the joint surface and were surrounded by sclerosis. In case 1, gas within the cyst confirmed communication with the joint. CT examination of case 2

confirmed intra-articular gas and revealed additional smaller lesions not apparent on the radiographs.

Our cases and those reported by Resnick [5] and Glass et al. [2] share certain radiologic features: (1) The lesions were lytic, well defined, and adjacent to the medial tibial cortex; (2) other changes indicating moderate osteoarthritis of the medial tibiofemoral joint were present; and (3) the lesions were elliptical with the long axis in the sagittal plane. Recognition of these features may be important in distinguishing large degenerative cysts from tumor. If further imaging assessment is needed, CT may provide valuable information that is not available in radiographs.

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