

Intracapsular and Paraarticular Chondroma of the Knee: Case Report¹

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We report here on a case of intracapsular and paraarticular chondroma of the left knee in a patient with a 6-month history of knee pain and swelling. Magnetic resonance image (MRI) revealed a well-defined solid mass with central hemorrhagic necrosis in the infrapatellar area of the knee.

Index words : Chondroma

Knee

Magnetic resonance (MR)

Chondromas of the soft tissue are rare benign tumors that usually arise in the hands and feet. On rare occasions, this tumor arises from the capsule or paraarticular soft tissue of large joints, such as the knee (1). These lesions should be differentiated from synovial chondromatosis, localized pigmented villonodular synovitis and other calcified lesions occurring about the joints. We report here on a case of intracapsular and paraarticular chondroma of the knee joint in 38-year-old man, and we also include a review of the previous literature.

Case Report

A 36-year-old man visited our hospital and he had a 6-month history of pain and swelling of the left knee. There was no history of trauma. Plain radiographs revealed ill defined soft tissue opacity with joint effusion (Fig. 1). MRI (Philips Gyroscan T5-NT) was then per-

formed, and it demonstrated a $3 \times 2 \times 1$ cm sized well defined ovoid-shaped solid mass in the infrapatellar area. The T1 weighted sagittal image (TR/TE 625/20, spin echo) showed iso-signal intensity muscle with a subtle high signal intensity area in its central portion (Fig. 2A). The sagittal T2 weighted image (TR/TE 1800/



Fig. 1. Lateral radiograph of the knee shows ill-defined soft tissue opacity in the infrapatellar area (white arrows) and bulging of the suprapatellar bursa due to joint effusion (black arrows).

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80, spin echo) demonstrated peripheral high signal intensity with a central low signal intensity area (Fig. 2B). The area of low signal intensity on the long TR images corresponded to hemorrhagic necrosis. Arthroscopy reveals that the mass was in an intracapsular location and partially attached to the synovial membrane adjacent to the anterior cruciate ligament. Arthroscopic removal was done. The removed mass measured 3 × 2 × 1 cm in size and the surface was white and glistening. Central necrosis was seen on the cut section. On histologic examination, the tumor consisted of hyaline cartilage and central hemorrhagic necrosis, and this was surrounded by a thin synovial membrane (Fig. 3). The mass was diagnosed as an intracapsular and paraarticular chondroma.

Discussion

There are three known variants of extraskeletal chondromas: synovial chondromatosis, para-articular chondromas, and soft tissue chondromas. These last two variants are very rare and may show atypical features (2). Intracapsular and paraarticular chondromas have been variously named capsular osteomas, osteochondromas or chondromas depending on the relative proportion of bone and cartilage. The terms "intracapsular and paraarticular chondroma" was firstly used by Jaffe in 1958. This rare, benign cartilaginous tumor arises from the capsule or the paraarticular connective tissue of the large joints, and the knee is the most frequently



Fig. 2. A well-defined ovoid mass in the infrapatellar area on MRI.
A. Sagittal T1 weighted image shows intermediate to low signal intensity with centrally subtle high signal intensity (arrow heads).
B. Sagittal T2 weighted image shows central low signal intensity (arrows), correspond to the high signal portion on T1 weighted images owing to the hemorrhagic necrosis and surrounding high signal cartilage portion.

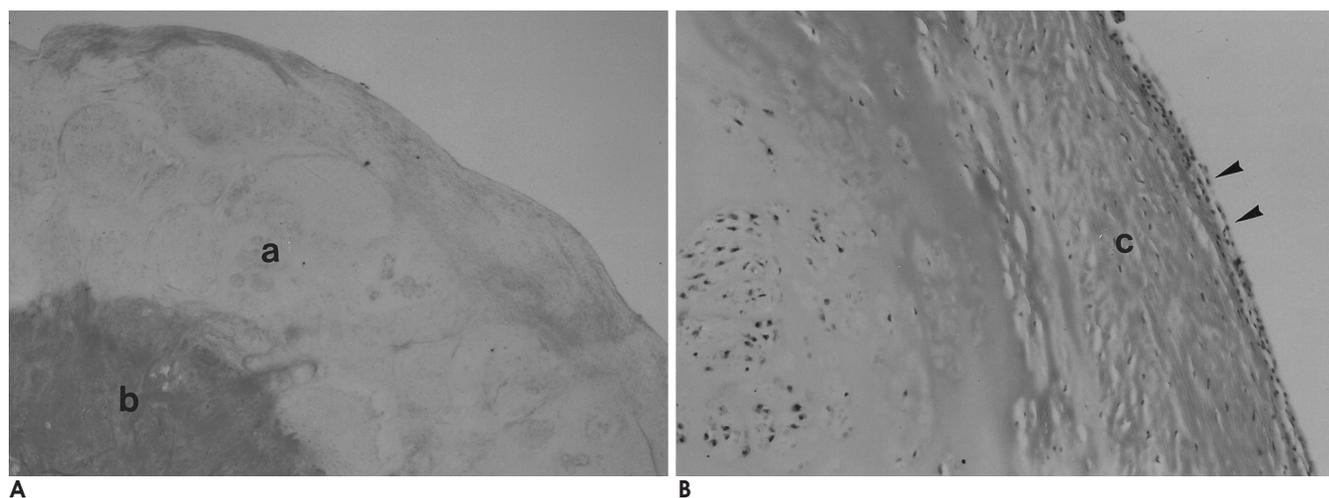


Fig. 3. Photomicrograph of specimen.
A. Low power field (Hematoxylin-eosin stain, × 40) reveals hyaline cartilage (a) and hemorrhagic necrosis (b).
B. High power field (Hematoxylin-eosin stain, × 200) reveals peripheral thin synovial membrane (arrow heads) and fibrous tissue (c).

involved joint (3). The precise pathogenetic mechanism of these tumors is still controversial. It has been proposed that they originate due to cartilaginous metaplasia of the connective tissue following ossification (4). These tumors are found in wide age range of patients and there is no preponderance for either gender. Clinically, these tumors present as slowly growing masses that occasionally cause pain or tenderness of the involved joints. The characteristic plain radiographic appearance of this lesion is the presence of a well defined mass about the knee, usually at the infrapatellar area, which contains variable amounts of chondroid matrix calcification or ossifications. In some instances, the tumors are essentially radiolucent (1, 5, 6), and our case is included in this instance. In our case, there was no chondroid calcification or ossified area in the tumor; therefore, it was difficult to detect on plain radiograph (Fig. 1). The MR findings vary according to the degree of ossification or calcification. The cartilagenous portion of the tumor shows low signal intensity on T1 weighted images and bright signal intensity on T2 weighted images. The central ossified area shows the radiologic features of fatty tissue due to the high proportion of fatty bone marrow among the bone trabeculae (6). In our case, the central portion showed high signal intensity on T1 weighted images and low signal intensity on T2 weighted images; this suggested hemorrhagic necrosis that may have been due to repeated minor trauma (Fig. 2A, B).

Radiologically, intracapsular and paraarticular chondroma should be differentiated from calcified soft tissue lesions about the joints such as calcifying bursitis, old hematoma, tumoral calcinosis, periosteal chondroma, calcified synovial sarcoma, primary synovial chondromatosis and synovial chondrosarcoma. In our case, localized pigmented villonodular synovitis (PVNS) and synovial chondromatosis were considered in the differential diagnosis. PVNS shows the characteristic hemosiderin deposition, and this shows as dark signal intensity on the T1 and T2 weighted MR images. Hence PVNS can be differentiated by the signal intensity from intracapsular and paraarticular chondroma. Synovial chondromatosis presents as intra- or extra-articular multiple osteocartilagenous nodules arising from the synovium. Conversely, intracapsular and paraarticular chondromas are solitary masses that originate from the capsular and the paraarticular connective tissue. However, synovial

chondromatosis can present as a single giant intracapsular nodule on rare occasion. Histologically, synovial chondromatosis differs from intracapsular and para-articular chondroma because synovial chondromatosis is composed of small hyaline nodules that are arranged in characteristic chondrocyte clusters with slight atypia and focal endochondral ossification. In contrast, intracapsular chondroma shows large masses of cartilage with prominent endochondral ossification (5 - 7).

Soft tissue chondromas are subdivided into two broad categories. Two thirds of these lesions are composed predominantly of mature viable hyaline cartilage. They may contain focal area of fibrosis, hemorrhage, necrosis, calcifications, ossifications or granuloma formation. One third of soft tissue chondromas are characterized by the presence of immature chondroblasts (8). Malignant transformation has not been reported. The treatment of choice is excision or marginal resection. Recurrence is infrequent and this may result from the inadequacy of excision (1, 5, 6).

In conclusion intracapsular and paraarticular chondroma of the knee should be radiographically differentiated from other tumors and non-tumorous conditions such as those mentioned above. MRI is useful to detect this tumor and to radiologically diagnose it.

References

- Steiner GC, Meushar N, Norman A, Present D. Intracapsular and paraarticular chondromas. *Clin Orthop* 1994;303:231-236
- Marcial-Seone RA, Marcial-Seone MA, Ramos E, Marcial-Rojas RA. Extraskeletal chondromas. *Bol Assoc Med PR* 1990;82:394-402
- Jaff HL. *Tumors and tumorous conditions of the bones and joints*. Philadelphia: Lea & Febiger, 1958:567-569
- Rodriguez-Peralto JL, Lopez-Barea F, Gonzalez-Lopez J. Intracapsular chondroma of the knee: an unusual neoplasm. *Int J Surg Pathol* 1997;5:49-54
- Nuovo MA, Desai P, Shankman S, Present D. Intracapsular and paraarticular chondroma of the knee. *Bull Hosp Jt Dis Orthop Inst* 1990;50:189-95
- Gonzalez-Lois C, Garcia-de-la-Terre JP, SantosBriz-Terron A, Vila J, Manrique-Chico J, Martinez-Tello FJ. Intracapsular and para-articular chondroma adjacent to large joints: report of three cases and review of the literature. *Skeletal Radiol* 2001;30:672-676
- Edeiken J, Edeiken BS, Ayala AG, Raymond AK, Murray JA, Guo SQ. Giant solitary synovial chondromatosis. *Skeletal Radiol* 1994; 23:23-9
- Bansal M, Goldman AB, DiCarlo EF, McCormack R. Soft tissue chondromas: diagnosis and differential diagnosis. *Skeletal Radiol* 1993;22:309-15

