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Case Report

Giant-cell Tumor of the Patella

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We report a 38-year old man with a giant-cell tumor in a rare site, the patella. Primary patellar neoplasms are highly unusual. According to a survey by the Bone and Soft Tissue Tumor Committee of the Japanese Orthopaedic Association, of more than 2,126 giant-cell tumors of bone reported since 1972, only 22 were primary patellar neoplasms. We present a case of this rare entity along with its clinical and radiographic features. The first clinical symptom was anterior knee pain. Though anterior knee pain has numerous and varied causes, it is necessary to consider patellar bone tumors in the differential diagnosis.

Key words: giant-cell tumor, patella, knee pain

Giant-cell tumors are generally considered to be benign. These tumors develop at the ends of the long bones of the upper and lower extremities. Although giant-cell tumors are most frequently located in the region of the knee, primary patellar involvement is unusual. Herein, we report our experience with a case of giant-cell tumor in the patella.

Case Report

The patient was a 39-year-old man presenting with a chief complaint of left knee pain. His past and family histories were unremarkable. Although he was a police officer, his present job involved mainly desk work. He was not in the habit of exercising regularly or vigorously. Two weeks prior, he had developed left knee pain not attributable to any known or specific trigger; the pain was localized in the anterior peripatellar area and was more severe at rest than while walking. He visited a neighborhood clinic and was referred to our department in mid-May. Imaging examinations were performed, including plain radiography and magnetic resonance imaging (MRI). Based on the suspicion of a patellar bone tumor, he was admitted to our hospital for further examination and treatment in mid -June. At the time of admission, the range of motion of the left knee joint was nearly normal, and no findings, such as joint effusion, were observed. There was neither tenderness nor arthritis over the patellar area. Plain radiographs revealed an ill-defined bone translucency over the medial-to-lateral patellar area; however, no findings suggestive of a pathologic fracture were observed (Fig. 1).

MRI revealed a multilocular cystoid lesion measuring approximately 2 cm in diameter at the lateral upper part of the patella, and a fluid-fluid level was observed within the lesion (Fig. 2). The possible differential diagnoses on MRI included giant-cell tumor and aneurysmal bone cyst. At the end of June, curettage of the lesion and artificial bone grafting were performed

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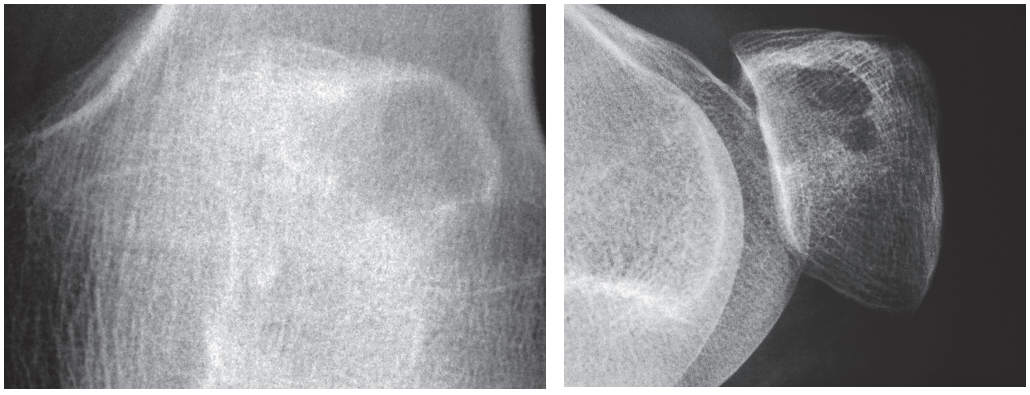
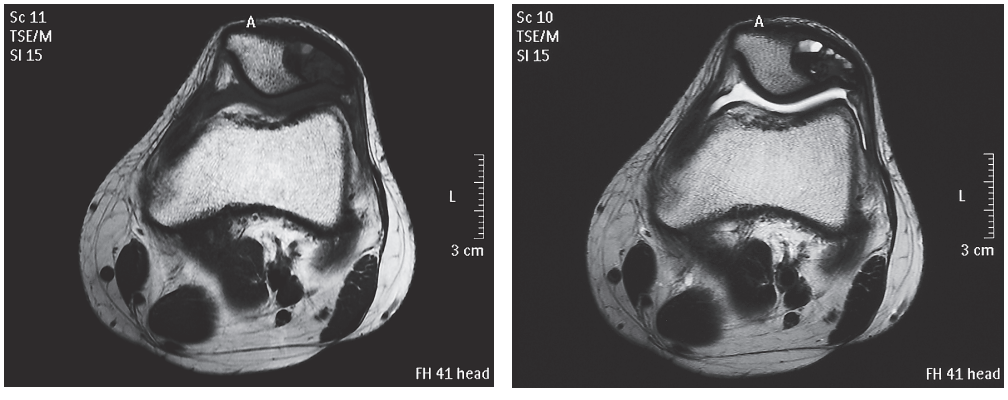


A-P view Lateral view

Fig. 1 Preoperative plain radiograph. This radiograph is an enlargement of the cystic lesion in the patella. A bone translucency with peripheral sclerotic change can be seen at the lateral upper part of the patella.



T1-weigted T2-weighted

Fig. 2 MRI image. A multilocular cystoid lesion measuring approximately 2 cm in diameter can be seen at the lateral upper part of the patella, and a fluid-fluid level is seen within the lesion. Possible differential diagnoses based on the MRI findings include giant-cell tumor and aneurysmal bone cyst.

under general anesthesia. These procedures were performed through an approximately 5-cm longitudinal incision directly above the area slightly lateral to the patella. The periosteum was detached from the surface of the patella with a raspatory to make an oval incision. The main part of the tumor was solid and yellow-brown with partial retention of blood. Macroscopically, it appeared to be a giant -cell tumor. The benign nature of this bone tumor was confirmed by rapid histopathological examination. We carefully removed the contents with a curette, filled the defect with approximately 5 g of granulated interconnected porous calcium hydroxyapatite ceramic (IP-CHA: NEBONE), and closed the incision in a routine manner. The final histopathological diagnosis was a giant-cell tumor, based on histopathological findings (Fig. 3). The affected part was immobilized with a splint for approximately 2 weeks after the operation. After suture removal, weight-bearing and range of motion exercises were initiated. Weight-bearing was gradually increased, and full weight-bearing was allowed by approximately 4 weeks. At present, 5 months after the operation, the patient has no arthralgia, and plain radiography shows almost complete bone union. Using the criteria of Myoui et al, we assessed our patient's condition as grade 3 based on the radiographic finding (Fig. 4). The International Symposium on Limb Salvage (ISOLS) functional score was 90%.

Discussion

Bone tumors arising in the patella are comparatively rare. According to a survey by the Bone and Soft Tissue Tumor Committee of the Japanese Orthopaedic Association, of the 27, 403 primary bone tumor cases reported during the 32 years from 1972 to 2003, tumors involved the lower extremities in 70.5% or 13,860 of these cases [1]. However, tumors arising in the patella were encountered in only 75 cases, accounting for 0.5% of all cases. Of these 75, 4 were osteosarcomas, *i.e.*, malignant bone tumors, and 71 were benign bone tumors. The benign tumors included chondroblastoma (n = 24), giant cell tumor (n = 22), and solitary exostosis (n = 14). According to the breakdown by disease, the number of registered cases of giant-cell tumor cases was 2,126, of which 1,487 had tumors in their lower extremities. Involvement of the patella occurred in only 22 of these cases (1.47%). Patients with an aneurysmal bone cyst, which was considered in the differential diagnosis of our case, numbered 7 (1.15%) among 604 cases. While "Dahlin's Bone Tumors" states that a giant-cell tumor arose from the patella in one of these 671 cases, this classic text on the subject also points out that there have been some aimilar cases among the, consultations at the Mayo Clinic [2]. Balke, *et al.* reported in 2008 that involvement of the patella accounted for only 2 of their 214 giant-cell tumor cases (0.9%) [3]. Singh *et al.* reported in 2009 that giant-cell tumors were seen in 11 of 59 cases of patellar bone tumor [4]. Primary bone tumors of the patella are clearly rare; moreover, giant-cell tumors arising in the patella are even more rare. At present, 5 months after the operation, the state of bone formation with a granular contour of the implanted IP-CHA appears good on radiograph, with no evidence of recurrence. The patient enjoys an active daily life without knee pain or other problems.

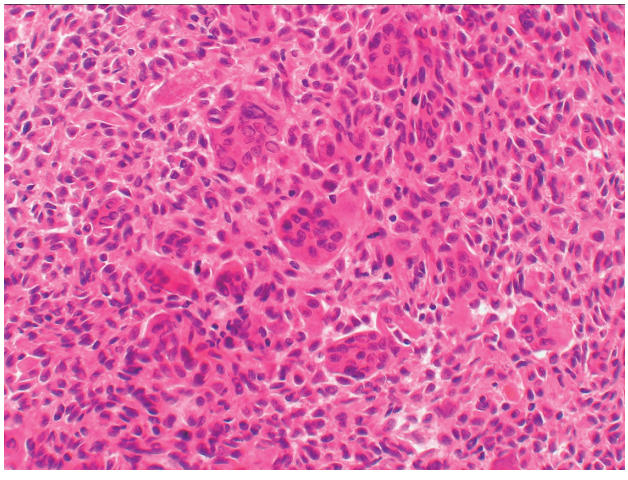
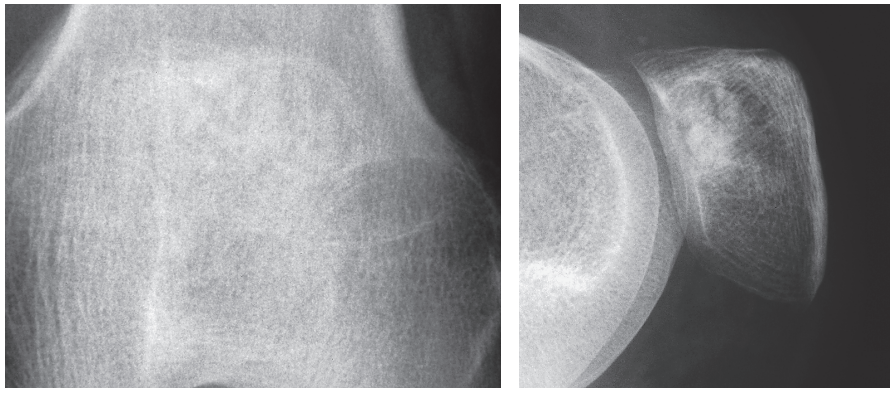


Fig. 3 Histopathological features. The lesion was composed mainly of numerous giant cells, short spindle-shaped cells, bone tissues, and calcification. No cellular atypia and few mitotic figures were observed. On the basis of these findings, the lesion was diagnosed a giant-cell tumor rather than as an aneurysmal bone cyst or chondroblastoma.

Giant-cell tumor is a locally aggressive neoplasm with a tendency for local recurrence [11, 12]. Because



A-P view Lateral view

Fig. 4 Postoperative plain radiograph. Moderate bone formation with a granular contour of the implanted IP-CHA was confirmed at 5 months after surgery. The International Symposium on Limb Salvage (ISOLS) functional score was 90%.

the duration of follow-up in this case has been short, continued careful follow-up is mandatory.

Conclusion. Bone tumors of the patella are considered in cases with knee pain of uncertain cause. Giant-cell tumors, chondroblastoma, and aneurysmal bone cyst can be differentially diagnosed based on imaging studies of bone tumors of the patella. In our case, a benign tumor was suspected from MRI and plain radiograph findings and giant cell tumor was ultimately confirmed. These diagnostic imaging studies showed thinning of the bone cortex to be neither particularly severe nor expansive. Thus, we performed radical curettage of the lesion followed by implantation of artificial bone.

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