Clinical Case Report

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Chondrosarcoma of the patella

A case report

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Abstract

Rationale: Chondrosarcoma, characterized by the production of cartilage matrix, is a common bone tumor, accounting for 20% to 27% of all malignant bone tumors. It often occurs in the cartilage of the pelvis, femur, tibia, and humerus. However, chondrosarcoma of the patella is extremely rare.

Patient concerns: The present study describes a case of chondrosarcoma affecting the right patella in a 68-year-old woman. The chief complaints were painful swelling and limitation of motion of the right knee for about half a year. The pain was a kind of dull ache. The skin around the right knee was red and hot. Moreover, she had a claudication gait due to the symptoms.

Diagnoses: Irregular lytic lesions with ill-defined margins in the patella were determined through computed tomography and magnetic resonance imaging. The diagnosis of primary grade II chondrosarcoma was finally confirmed on the basis of postoperative pathological examination.

Interventions: The patient underwent an open surgery named extensive resection of patellar tumor to remove the tumor tissue completely.

Outcomes: The patient was discharged without any complications 1 week after the surgery. At the 3-month follow-up, the patient was completely free from pain during daily activities, and normal range of motion of the right knee was achieved. Her gait was normal. There was no evidence of recurrence.

Lessons: We believe that an extensive resection is suitable for treating chondrosarcoma to avoid as far as possible local recurrence. An awareness of the potential for chondrosarcoma to present in the patella is crucial for both orthopedic surgeons and radiologists when confronted with similar cases. Besides, as reports of chondrosarcoma of the patella are rare, this study adds a better understanding of this rare condition to the medical literature.

Abbreviations: CT = computed tomography, MRI = magnetic resonance imaging.

Keywords: chondrosarcoma, diagnosis, patella, surgery, symptom

1. Introduction

Chondrosarcoma, a mesenchymal tissue neoplasm that can produce cartilage matrix, is a common bone and soft tissue tumor. It accounts for 20% to 27% of primary malignant bone tumors, with an incidence of 0.79/(million year).[1,2] Besides, it is more common in the long bones, pelvis, and rib. The biological behavior of chondrosarcoma varies widely depending on its grade and location.[3–6] Most chondrosarcomas are primary tumors, but some cases of secondary tumors have been reported.[7] The main symptoms of chondrosarcoma are pain and swelling. Surgical

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The authors declare that they have no competing interests.

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resection is the most common treatment because radiotherapy and chemotherapy are usually ineffective. Low-grade tumors confined to the bone, in certain cases, can be managed by extensive intralesional curettage to minimize functional disability, whereas high-grade tumors require wide, en-bloc local excision with negative margins.[8]

As the largest sesamoid bone in the body, the patella is an uncommon site for primary and metastatic bone tumors. Primary bone tumors in the patella are quite rare. The most common primary osteolytic lesions in the patella include giant cell tumors, chondroblastomas, and aneurysmal bone cysts.[9] As patellar tumors are such a rare etiology of anterior knee pain, their diagnosis is often delayed.[10] Chondrosarcoma in the patella is extremely rare; a literature review revealed only a few previous cases.[11–14] Therefore, an awareness of the potential for chondrosarcoma to present in the patella is crucial for both orthopedic surgeons and radiologists when confronted with similar cases.

In the present study, we describe a rare case of chondrosarcoma of the right patella in a 68-year-old woman.

2. Presenting concerns

A 68-year-old woman presented to our clinic with the chief complaints of painful swelling and limitation of motion of the right knee. The patient stated that the pain and swelling appeared about half a year ago. The pain was a kind of dull ache. The pain aggravated when she walked and went up the stairs, whereas relieved when she rested, especially when she rested in bed. No obvious nocturnal pain was experienced. Subsequently, she was diagnosed with patellofemoral arthritis in a local hospital. She felt a little better after the treatment with glucosamine according to the doctor there. However, the symptoms aggravated in the last month.

3. Clinical findings

She had no related history of injury, past medical illness, family history, or allergy history. She had no comorbidities. Her age of menarche and menopause was 14 and 45 years, respectively. The menstruation was regular and usually lasted for about 5 days. Besides, the menstrual cycle was about 28 days. She gave birth to a son and a daughter both through natural birth. In the general physical examination, the range of motion of the right knee was reduced to 0° to 100°, with no radiation pain in the right lower extremity. The skin around the right knee was red and hot. No bony prominences or soft tissue masses were found in the right knee, and the test for instability of the knee joint was negative. Moreover, she had a claudication gait due to the symptoms.

4. Diagnostic focus and assessment

Further physical examination showed no palpable head, neck, supraclavicular, axillary, or epitrochlear lymph nodes. The erythrocyte sedimentation rate (35 mm/h), serum alkaline phosphatase level (152 U/L), and carcinoembryonic antigen level (7.14 ng/mL) exceeded the normal range (normal ranges: 0–20 mm/h, 50–135 U/L, and 0–6.5 ng/mL, respectively). The lateral radiograph showed multiple osteolytic lesions in the patella (Fig. 1). Computed tomography (CT) revealed irregular lytic lesions on the patella. Furthermore, the tumor had ill-defined margins, and the bone cortex was discontinuous. Three-dimensional CT reconstruction revealed a few lytic lesions on the patella, which resulted in rugged surface and edges (Fig. 2). Sagittal T1- and T2-weighted magnetic resonance imaging (MRI) with fat saturation demonstrated a diffusely abnormal marrow signal throughout the patella (Fig. 3). Chest radiograph from the local hospital was normal. On the basis of the above information, chondrosarcoma was suspected and was considered in the differential diagnosis.

Figure 1. Lateral radiograph: multiple osteolytic lesions in the patella.

5. Therapeutic focus and assessment

After excluding any surgical contraindications, experienced bone tumor surgeons performed the operation to remove the tumor. The patient was placed in a supine position, and following epidural anesthesia, the right knee was covered with disinfecting and paving sterile drapes and positioned to expose the surgical field. A fusiform incision of 15 cm that centered the tumor was made. Subsequently, separation of the tissue layers, including subcutaneous tissue, superficial fascia, and deep fascia, was performed until a thin, but unbroken, periosteal shell was identified. Expansive invasion of the surrounding soft tissues and a fuzzy margin was observed. The cortical structure had become attenuated enough to deform with slight pressure from a finger. The type of surgery we performed was an open operation named extensive resection of patellar tumor. We cut off the patellar ligament and separated the patella using blunt and sharp separation. We conducted complete resection of the tumor by an extended resection method beyond the margin of the tumor, after which the specimen was sent for pathological examination. Sterilized distilled water was used to immerse the incision to inactivate the remaining tumor cells. The patellar and surrounding ligaments were reestablished with a flat piece and some Ethibond wires. A wound drainage tube was

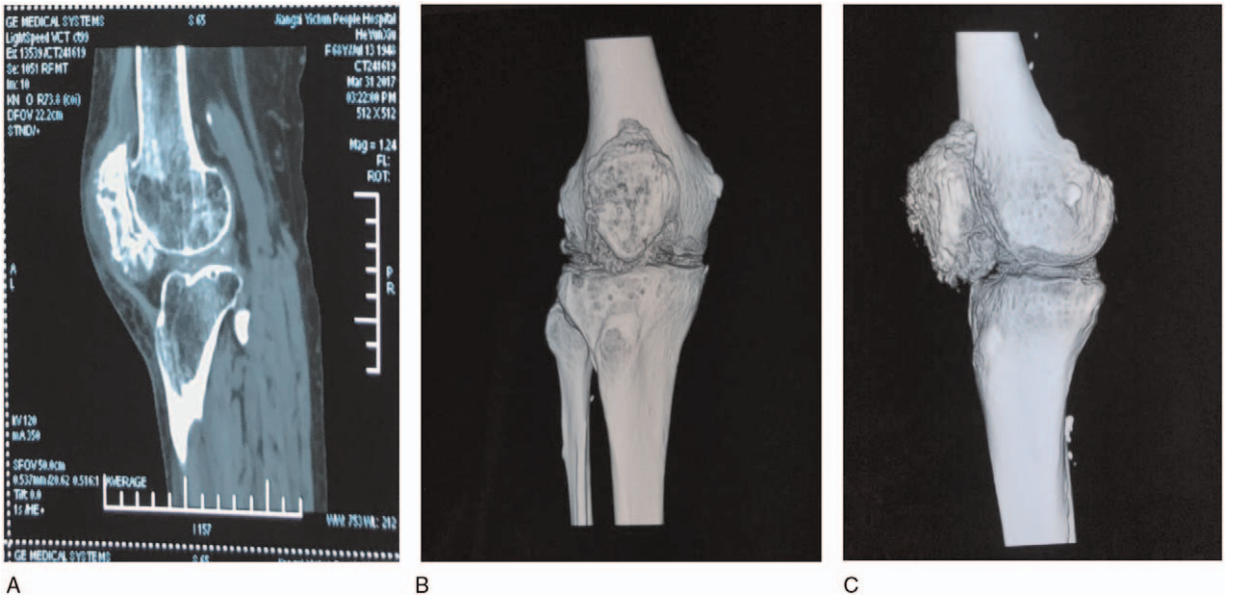

Figure 2. (A) CT: irregular lytic lesions on the patella. (B, C) Three-dimensional CT reconstruction: a few lytic lesions on the patella, resulting in rugged surface and edges.

inserted, and each layer of tissue was sutured to achieve complete hemostasis. The estimated total loss of blood was 300 mL, and no blood transfusion was required during the treatment process. There was no any extensor lag after the surgery.

6. Follow-up and outcomes

Postoperatively, the digital photograph showed the removed tumor. In addition, microscopic examination revealed nodular cartilaginous tissue hyperplasia. Furthermore, a small number of cells with 2 nuclei or cells with a single irregular nucleus were found to infiltrate and destroy the surrounding bone tissue (Fig. 4). The diagnosis of primary grade II chondrosarcoma was confirmed on the basis of these findings.

The patient was discharged without any complications or adverse events 2 weeks after the surgery. At the 3-month follow-up by telephone survey, the patient was completely free from pain during daily activities, and normal range of motion of the right knee was achieved. Her gait was normal. There was no evidence of recurrence. Table 1 summarizes the timeline of the patient.

7. Discussion

A low incidence of tumors, most of which are giant cell tumors and chondroblastomas, is found in the patella.[9] The diagnosis

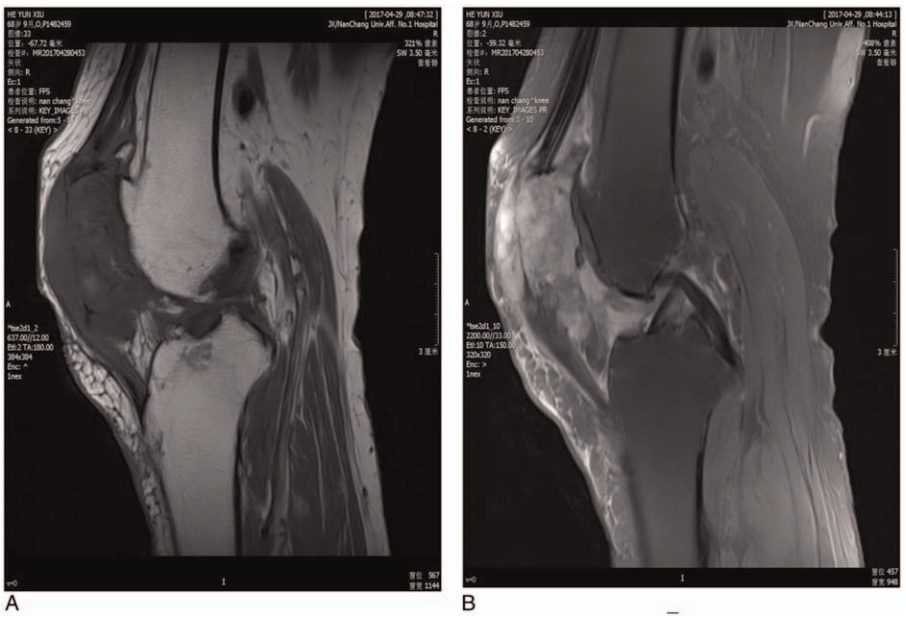

Figure 3. Sagittal MRI with T1-weighting (A) and T2-weighting with fat saturation (B) diffusely abnormal marrow signal throughout the patella.

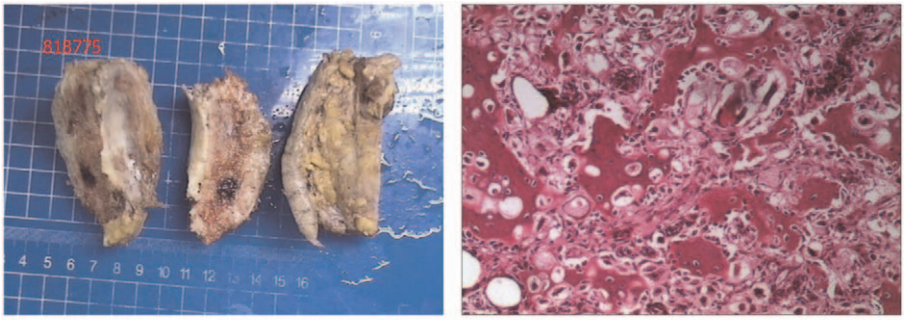

Figure 4. (A) A photograph: the removed tumor. (B) Hematoxylin and eosin stain: chondrosarcoma.

Table 1

Case report timeline.

Complaint/investigations	Details
Presenting symptoms	Painful swelling and limitation of motion of the right knee for half a year; Aggravation of symptoms in the last month; Diagnosed with patellofemoral arthritis in a local hospital
First investigations	Limited motion in the right knee; No bony prominences or soft tissue masses in the patella
Plain radiographs	Multiple osteolytic lesions in the patella
CT	Irregular lytic lesions on the patella; Ill-defined margins; Discontinuous bone cortex
Three-dimensional CT reconstruction	A few lytic lesions on the patella; Rugged surface and edges of the patella
MRI of left shoulder	Diffusely abnormal marrow signal throughout the patella
Surgical intervention	Complete resection; Postoperative pathology: primary grade II chondrosarcoma
Postoperative follow-up	Three-month follow-up: completely free from pain during daily activities; normal range of motion of the right knee; No evidence of recurrence; Consecutive follow-up needed

CT = computed tomography, MRI = magnetic resonance imaging.

and treatment of these benign tumors are typically straightforward. However, some other uncommon histological types, which do not conform to these conventional patellar tumor types, can easily cause both diagnostic and treatment dilemmas. Herein, we report a rare case of a chondrosarcoma of the right patella.

Chondrosarcoma, following osteosarcoma, is the second most frequent primary malignant tumor of the bone, accounting for 20% to 27% of primary malignant bone neoplasms.[1,2] Chondrosarcomas develop mainly at the axial skeleton level, including the bones of the pelvis, femur, proximal humerus, and ribs.[15] The patella, however, is a comparatively unusual location for a chondrosarcoma.

As conventional chemotherapy and radiation are ineffective, surgical resection remains the only curative treatment for chondrosarcoma. The 10-year survival rate for low-grade chondrosarcoma is 80% to 90%.[16,17] However, high-grade chondrosarcoma has a 10-year survival rate of approximately 40% to 70% and is normally treated with radical resection.[18–20] While low-grade chondrosarcomas confined to the bone in selected cases can be handled by extensive intralesional curettage, with the goal of minimizing functional disability,[21,22] high-grade chondrosarcomas require wide en-bloc local excision with negative margins.[18] The optimal surgical margin for low-grade intracompartmental chondrosarcomas is controversial. Some surgeons advocate wide resection, while others propose that intralesional resection, followed by local adjuvant treatment such as liquid nitrogen, phenol, cryotherapy, electrocautery, or argon-beam laser, is better.[23] In this study, the patient was diagnosed with grade II chondrosarcoma. She underwent extensive resection to completely remove the tumor, aiming to reduce the risk of a relapse.

In most reported cases, the patella was partly replaced by the chondrosarcoma; moreover, there were areas of yellowish necrosis in the portions of the circumambient bones and soft tissues.[12,13] Most lesions were composed of a mix of fragmented gel-like tissue and needle-like bones.[13] In some cases, the yellowish necrotic tissue could be discharged from the affected knee joint.[14] Observed under a microscope, the trabecular bone could be partially substituted with hyperplastic cartilage-like tissue.[13] Notably, it was reported that the lesions usually contained cells with 2 nuclei and cells with only one larger or smaller nucleus than nuclei with average size.[12] In this case, microscopic examination revealed nodular cartilaginous tissue hyperplasia. Cells with 2 nuclei or cells with a single irregular nucleus were found to infiltrate and destroy the surrounding bone tissue, which consisted with the previous literature.

In conclusion, primary tumors originating in the patella as a possible etiology of pain in the knee should not be ignored. Given the rarity, primary patellar tumors should be carefully diagnosed. The use of CT and MRI is necessary, and biopsy is very helpful in confirming the diagnosis. Even though a complete macroscopic excision is suitable for treating chondrosarcomas, the patients should be routinely monitored in case of local recurrences. Any analysis based on a single factor or incomplete information can result in an arbitrary diagnosis. As reports of chondrosarcoma of the patella are rare, further studies of more cases are needed for a better understanding of this rare condition. Moreover, we learned the take-away lesson that an awareness of the potential for chondrosarcoma

to present in the patella is crucial for both orthopedic surgeons and radiologists when confronted with similar cases.

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