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CASE REPORT

H. Sakai · K. Tamai · A. Iwamoto · K. Saotome

Para-articular chondroma and osteochondroma of the infrapatellar fat pad: a report of three cases

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Abstract We report three cases of para-articular chondroma and osteochondroma in the region of infrapatellar fat pad. All three lesions were resected and examined histologically. Two of them were primarily cartilaginous with a lobular pattern internally, and one uniformly osseous with peripheral cartilage. We conclude that these lesions are not the same. The former should be designated para-articular chondroma after Jaffe and the latter, osteochondroma.

Résumé Nous rapportons trois cas de chondrome para-articulaire et d'ostéochondrome situés dans le corps adipeux infrapatellaire. Ces trois lésions ont été réséquées et examinées histologiquement. Deux d'entre elles étaient au départ cartilagineuses et avaient une forme lobulaire interne, et l'autre était uniformement osseuse avec un cartilage périphérique. Nous en concluons que ces lésions ne sont pas les mêmes histopathologiquement. Les premières devraient être appelées, à la suite de Jaffe, chondrome para-articulaire et la troisième, ostéochondrome, de façon à l'opposer aux dénominations équivoques utilisées dans les présentations précédentes.

Introduction

Cartilaginous and/or osseous mass lesions in the region of infrapatellar fat pad are not so common. Reith et al. [11] reported 1 case and found only 16 additional cases reported previously in English literature. In those articles many pathological denominations were confusingly given to these lesions, including „chondroma" [1, 3, 6, 8–10, 13, 15], „ossification of infrapatellar bursae and fat pad" [12], „osteoma" [5], and „osteochondroma" [7, 8, 11]. The purposes of this article are to document 3 lesions located in the region of the infrapatellar fat pad and to suggest the important clinical, radiological, and pathological features to differentiate these lesions.

H. Sakai (✉) · K. Tamai · A Iwamoto · K Saotome
Department of Orthopaedic Surgery,
Dokkyo University School of Medicine, 880 Kitakobayashi,
Mibu-machi, Shimotsuga-gun, Tochigi, 321–0293, Japan,
e-mail: hsakai@dokkyomed.ac.jp
Tel: +81-282-87-2161, Fax: +81-282-86-5422

Case reports

Case 1

A 64-year-old woman complained of a slow-growing mass and mild pain on the anterior aspect of her left knee for 1 year. There was no history of trauma. On physical examination, the range of the knee was normal and there was no effusion. A hard, nontender infrapatellar mass was palpable. Radiographs showed an ovoid calcified soft-tissue mass in the infrapatellar area (Fig. 1A). Magnetic resonance imaging (MRI) demonstrated a well-demarcated inhomogeneous lesion of which the major component was hypointense on both T1-weighted and T2-weighted images.

A diagnostic arthroscopy did not reveal a loose body in the knee joint, and a marginal excision was performed. The mass was intracapsular but extrasynovial, and almost completely replaced the infrapatellar fat pad; it measured 6×4.5×3 cm and its cut surface showed yellowish white lobular tissue (Fig. 1B). On microscopic examination, the lobules were composed mainly of cartilage with areas of ossification (Fig. 1C). Fibrous connective tissue surrounded the lesion and separated the lobules. At 2-year follow-up evaluation no evidence of recurrence was found.

Case 2

A 47-year-old man had a 6-year history of restriction of motion and a 2-year history of pain and a palpable mass on his right knee. No history of trauma was elicited. Physical examination disclosed a

Fig. 1A–C *Case 1.* **A** Radiograph showing calcified soft-tissue mass in the infrapatellar area. **B** Cut surface of the lesion showing lobular tissue. **C** Photomicrograph showing that the lobules were composed mainly of cartilage with areas of ossification. Decalcified, hematoxylin and eosin stain, ×200. *Bar* is 10 μm ▶

Fig. 2A–C *Case 2.* **A** Radiograph showing a calcified mass inferior to the patella. The mass erodes the anterior cortex of the proximal end of the tibia. **B** Cut surface of the lesion demonstrating lobular tissue surrounded by fibrous connective tissue. **C** Photomicrograph showing that part of the lobular cartilaginous tissue demonstrates enchondral ossification. Decalcified, hematoxylin and eosin stain, ×200. *Bar* is 10 μm

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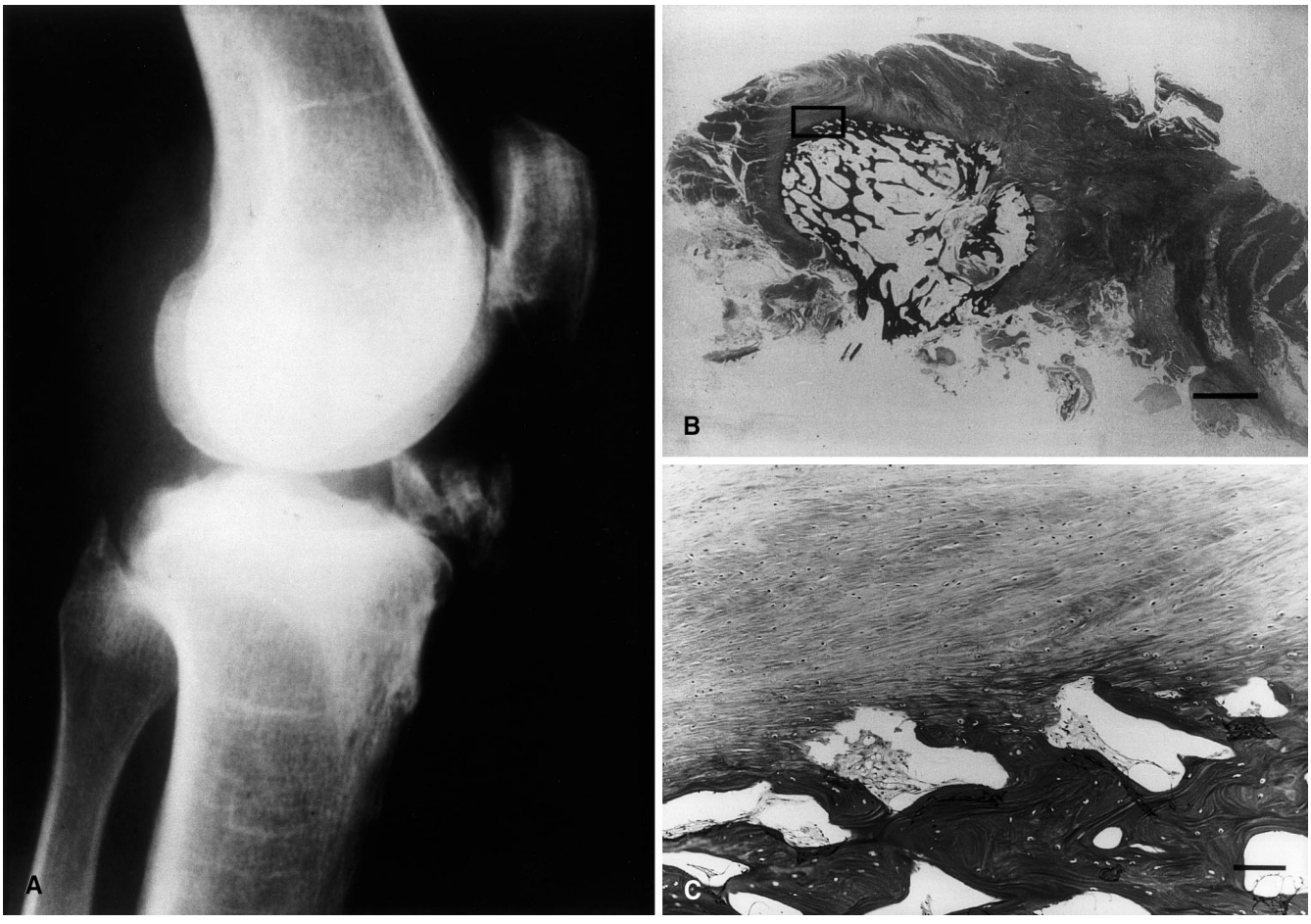

Fig. 3A–C *Case 3.* **A** Radiograph showing an osseous mass in the region of infrapatellar fat pad. **B** Low-power photomicrograph showing well differentiated bone tissue surrounded by connective tissue. Decalcified, hematoxylin and eosin stain, ×7. *Bar* is 400 µm. **C** Higher power view of the area outlined by the rectangle in **B** reveals the area of cartilage between bone tissue and connective tissue. Decalcified, hematoxylin and eosin stain, ×100. *Bar* is 20 µm

hard, nontender mass behind the patellar tendon, which was also palpable on both the medial and lateral side of the patellar tendon. The patient had full extension and flexion to 145°. Radiographs showed a calcified and partly ossified mass inferior to the patella (Fig. 2A). The mass eroded the anterior cortex of the proximal end of the tibia. MRI showed a well-demarcated inhomogeneous lesion which had low signal intensity mostly on T1-weighted images and mixed high and low signal intensity on T2-weighted images.

The patient underwent a diagnostic arthroscopy, followed by a marginal excision of the mass. No loose body was found arthroscopically. The mass was found to be intracapsular and its fibrous capsule was firmly adherent to the extraarticular surface of synovial membrane. The infrapatellar fat pad was almost completely replaced by the mass, which measured 7×5×3 cm. Its cut surface demonstrated yellowish white lobular tissue (Fig. 2B). On histologic examination, the lobules were cartilaginous tissue, part of which showed enchondral ossification (Fig. 2C), and were surrounded by fibrous connective tissue. The patient has no sign of recurrence at 2 years.

Case 3

A 56-year-old man injured his left knee in an automobile accident. The abnormal radiographic shadow was pointed out in another hospital, where the surgical procedure had been done. He did not report any symptoms in his left knee before the accident. We were consulted about the radiographs and the pathological findings of the excised tissue located in the infrapatellar fat pad. Radiographs before surgery showed a well delineated bony mass in the region of the infrapatellar fat pad (Fig. 3A). On microscopic examination, the mass consisted mainly of well differentiated bone tissue surrounded by cartilage and fibrous connective tissue (Fig. 3B, C).

Discussion

A variety of nomenclature has been assigned to osseous or cartilaginous masses occupying the infrapatellar space [1, 3, 5–13, 15].

In our cases, each of the three lesions consisted of cartilaginous and osseous tissue, but there seemed to be differences between cases 1 and 2 and case 3. The patients in cases 1 and 2 had pain or restriction of motion as well as a palpable mass on the affected knee, while the patient in case 3 did not have any symptoms before the abnormal radiographic shadow was noted incidentally. Secondly, the radiographs from cases 1 and 2 demonstrated calcified soft tissue mass, whereas the radiographs from case 3 showed an entirely osseous mass in the infrapatellar region.

Finally, histopathological examinations revealed that the lesions in cases 1 and 2 consisted primarily of cartilage with the area of ossification, but that in case 3 was mainly bony tissue with a relatively small amount of car-

tilaginous tissue. There were also differences in the internal structure of the lesions in addition to their composition. The lesions in cases 1 and 2 mostly contained cartilaginous lobular tissue, and the lobules were separated by connective tissue. On the other hand, the lesion in case 3 did not have a lobular pattern, but showed a mass that was uniformly osseous and surrounded by cartilage and connective tissue.

Because of these differences, we concluded that the lesion in case 3 was pathologically different from those in cases 1 and 2. Lesions in our cases 1 and 2, which were primarily cartilaginous with a lobular pattern internally, were consistent with the lesions described by Jaffe [3] and two of the three lesions reported by Mosher et al. [9], and should be denominated „para-articular chondroma“. Chung and Enzinger [2] examined the pathological features of 104 cases of chondroma of soft tissue and pointed out that nearly all of the chondromas were lobulated histologically. Therefore, the lesion in our case 3, which was mainly osseous without a lobular pattern, was not likely to be a chondroma. Our third lesion was consistent with the lesions described by Robillard [12] or Kautz [5] and the third lesion of Mosher et al. [9], and should be termed „osteochondroma“.

Extra-articular synovial chondromatosis is another disease that should be differentiated from para-articular chondroma or osteochondroma of the infrapatellar fat pad [4, 14]. Karlin et al. [4] showed that the lesion should be diagnosed as extra-articular synovial chondromatosis only when it is identified as definitely synovial in origin. Para-articular chondroma usually appears as a single, large calcified mass adjacent to the joint space without histologic evidence of synovial origin [4].

The etiology of para-articular chondroma and osteochondroma is not known. Metaplasia from extra-synovial mesenchymal cells can be the origin of soft tissue chondroma or osteochondroma [7]. Repeated trauma could be the cause of this metaplasia [5, 6]. Marginal excision or resection should be chosen for the treatment of these lesions [9, 15]; local recurrence is rare [2, 11, 15].

References

1. Böstman O, Karaharju E, Heikkonen L, Holmström T (1985) Extraskeletal ossifying chondroma in the knee. A case report. Acta Orthop Scand 56:87–89
2. Chung EB, Enzinger FM (1978) Chondroma of soft parts. Cancer 41:1414–1424
3. Jaffe HL (1958) Tumor and tumorous conditions of the bones and joints. Lea and Febiger, Philadelphia
4. Karlin CA, De Smet AA, Neff J, Lin F, Horton W, Wertzberger JJ (1981) The variable manifestations of extraarticular synovial chondromatosis. AJR 137:731–735
5. Kautz FG (1945) Capsular osteoma of the knee joint. Report of four cases. Radiology 45:162–167
6. Krebs VE, Parker RD (1994) Arthroscopic resection of an extrasynovial ossifying chondroma of the infrapatellar fat pad. End-stage Hoffa's disease? Arthroscopy 10:301–304
7. Li C, Arger PH, Dalinka MK (1989) Soft tissue osteochondroma. A report of three cases. Skeletal Radiol 18:435–437
8. Milgram JW, Dunn EJ (1980) Para-articular chondromas and osteochondromas. A report of three cases. Clin Orthop 148:147–151
9. Mosher JF, Kettelkamp DB, Campbell CJ (1966) Intracapsular or para-articular chondroma. A report of three cases. J Bone Joint Surg [Am] 48:1561–1569
10. Nuovo MA, Desai P, Shankman S, Present D (1990) Intracapsular paraarticular chondroma of the knee. Bull Hosp Joint Dis 50:189–195
11. Reith JD, Bauer TW, Joyce MJ (1997) Paraarticular osteochondroma of the knee. Report of 2 cases and review of the literature. Clin Orthop 334:225–232
12. Robillard GL (1941) Ossification of infrapatellar bursae and fat pad. Am J Surg 51:442–444
13. Roth PB (1944) Ossifying chondroma replacing the infrapatellar pad of fat. Proc Royal Soc Med 37:279–280
14. Sim FH, Dahlin DC, Ivins JC (1977) Extra-articular synovial chondromatosis. J Bone Joint Surg [Am] 50:492–495
15. Steiner GC, Meushar N, Norman A, Present D (1994) Intracapsular and paraarticular chondromas. Clin Orthop 303:231–236