



## Secondary aneurysmal bone cyst of the patella

Fırat OZAN, Gökhan TOKER

*Department of Orthopedics and Traumatology, İzmir Bozyaka Training and Research Hospital, İzmir*

Aneurysmal bone cyst accounts for 1% of primary bone tumors and is one of the benign tumor-like lesions. Patellar involvement is quite rare. Its development on the basis of any previous lesion such as chondroblastoma is called secondary aneurysmal bone cyst. A 26-year-old male patient presented with right knee pain of three-year history. Physical examination showed a firm, immobile swelling at the anterior aspect of the right knee, without increase in temperature or redness of the skin. There was no pain on palpation and joint range of motion was normal. Radiological studies were suggestive of an aneurysmal bone cyst. At surgery, the cystic lesion was removed via curettage and the residual cavity was filled with an autogenous bone graft taken from the iliac wing. The histopathologic diagnosis was secondary aneurysmal bone cyst in association with chondroblastoma. During a 1.5-year follow-up, the patient had no complaint and no recurrence was observed.

**Key words:** Bone cysts, aneurysmal/surgery; bone neoplasms; chondroblastoma/surgery; patella/pathology.

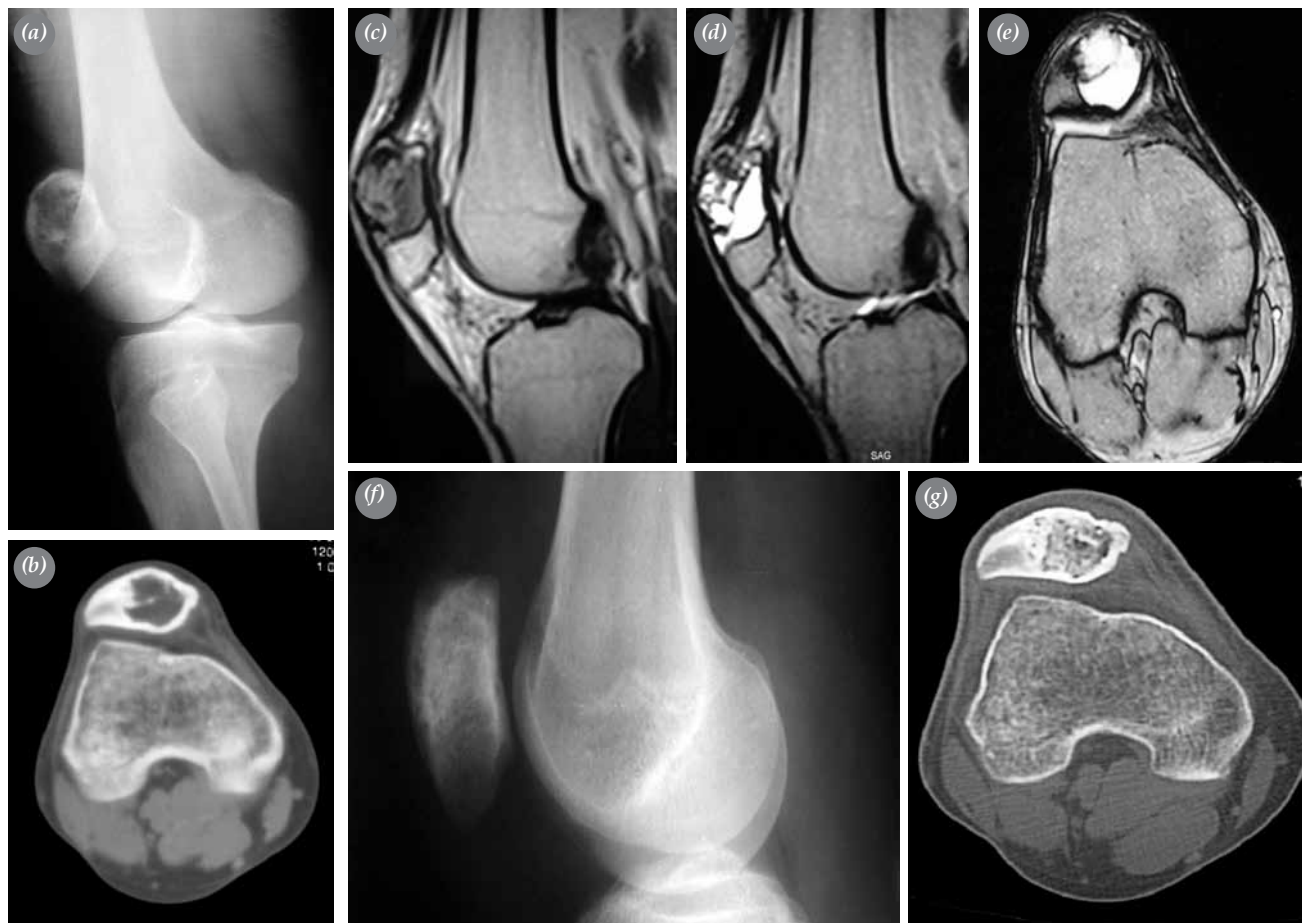
The patella is a rare location for the development of primary tumors and tumor-like lesions and benign tumors are seen more frequently than malignant tumors. The most frequently encountered benign patella tumor is giant cell tumor (33%), followed by chondroblastoma (16%).<sup>[1]</sup> Malignant patella tumors include hemangioendothelioma (4%), lymphoma (4%), osteosarcoma (3%), and metastatic tumors (3%).<sup>[2]</sup> Aneurysmal bone cyst (ABC) accounts for 1% among primary bone lesions, and its occurrence in the patella is rare. Its incidence is 4% among all benign patellar tumors. Chondroblastoma, on the other hand, is a good-natured cartilaginous tumor seen in 10-15% of patients with a secondary ABC and accounts for 1-3% of primary bone tumors.<sup>[1,3-5]</sup>

We reported on a case of ABC that developed secondary to chondroblastoma.

### Case report

A 26-year-old male patient presented with a complaint of right knee pain of a three-year history, that

increased in severity with activities and improved with rest. Physical examination showed a firm, immobile swelling at the anterior aspect of the right knee. The patient had no pain on palpation and there was no increase in temperature nor redness of the skin. Joint mobility was within normal ranges and there was no joint effusion. Routine biochemistry and blood profile were normal. Radiographic examination of the right knee showed multiple cystic lesions causing expansion of the patella (Fig. 1a). Computed tomography showed a lytic lesion, 2.7 x 3.3 cm in size, localized in the medial of the patella in an eccentric position, causing sporadic slimming in the cortex and involving densities of the trabecular pattern (Fig. 1b). T1- and T2-weighted magnetic resonance imaging demonstrated a smooth-contoured cystic mass with internal septa containing spicules of bone, occupying half of the patella with a slight expansion anteriorly, and causing cortical thinning. Patelofemoral joint alignment and cartilage structures were normal (Fig. 1c-e). A preliminary diagnosis of ABC was made.



**Fig. 1.** (a) The radiograph of the right knee shows a lesion involving 1/2 of the upper patella, having sclerotic borders, causing slight widening, and containing central radiolucent areas. (b) Computed tomography scan showing an expansile lytic lesion of soft tissue density, 2.7x3.3 cm in size, localized in the medial of the patella in an eccentric position, and involving intralesional septa. (c) Sagittal T1-weighted magnetic resonance scan shows a hypointense area covering half of the patella with expansion. (d) Sagittal and (e) axial T2-weighted sections show lobular areas of hyperintensity. (f) Radiograph and (g) computed tomography scan of the patellar lesion one week after curettage and bone grafting. (h, i) Radiographs of the knee 1.5 years after surgery.

At surgery, the patellar cystic lesion displayed a septal pattern. There was an anterior cavity containing a sero-hemorrhagic fluid and a dark-colored soft tissue component. Another smaller cavity lying behind was full of a sero-hemorrhagic fluid and both cavities were separated with a thin septum. The cystic structures in the patella were removed via curettage

and submitted to histopathological analysis. The cavity occurring after the curettage was filled with a corticospongyous autogenous bone graft taken from the iliac wing (Fig. 1f, g). In the light of clinical, radiological, and histopathological findings, the case was assessed as a secondary ABC with chondroblastoma. The patient returned to his daily activities in the post-

operative two months. He had no complaints at the end of 1.5 years, nor any recurrences on radiographic examination (Fig. 1h, i).

## Discussion

Aneurysmal bone cyst accounts for 1% of primary bone tumors and is one of the benign tumor-like lesions presenting with enlargement. It mostly occurs in the vertebrae and the metaphysis of long bones. Although its precise pathogenesis is still unknown, it may occur in association with posttraumatic bone fractures, subperiosteal hematoma, or previous bone lesions, or as a result of circulation failure such as venous occlusion or arteriovenous malformation.<sup>[3,6,7]</sup>

Aneurysmal bone cysts are generally seen at the ages of 10 to 20 years without a gender predilection.<sup>[3]</sup> The most important clinical findings are pain and swelling, as seen in our case. Motor or sensory loss due to spinal cord compression may be seen in vertebral involvement. Rarely, a pathological fracture may be observed as the first symptom.<sup>[6,7]</sup>

The typical radiographic appearance of an ABC is an expansile and sporadically osteolytic bone lesion with eccentric location. On computed tomography and magnetic resonance scans, internal septa with a honeycomb pattern and fluid-fluid levels are observed within the lesion.<sup>[3,6]</sup> In our case, fluid-fluid levels were not observed in radiological studies.

Microscopically, there are cystic cavities filled with erythrocytes and having no endothelial lining. Fibroblasts, osteoclast-like giant cells, and hemosiderin-laden macrophages surround the non-anastomosing walls of the cystic cavities.<sup>[3,6]</sup>

Aneurysmal bone cyst may develop in the normal bone as well as in association with a predisposing previous lesion with an incidence of 29-35%, such as giant cell tumor, chondroblastoma, chondromyxoid fibroma, osteosarcoma, fibrous dysplasia, or eosinophilic granuloma, in which case it is called secondary ABC.<sup>[6]</sup>

Chondroblastoma, which is a benign cartilaginous tumor, is seen together with a secondary ABC in 10-15% of patients.<sup>[4]</sup> It accounts for less than 1% of all bone tumors. Chondroblastoma is more common in males than in females and is frequently seen in the second or third decades of life. It almost always develops in the epiphyses of long bones and rarely in the apophyseal region. The most frequent epiphyseal

locations for chondroblastoma are proximal humeral, distal femoral, and proximal tibial epiphyses. The patella is a very rare location for chondroblastoma. Other less frequent regions are the scapula, acetabulum, vertebrae, clavicle, and craniofacial bones.<sup>[4,8,9]</sup> Due to its proximity to the joint, chondroblastoma may cause symptomatic joint effusions and limitation of joint range of motion.<sup>[10]</sup> We did not observe these clinical symptoms in our case.

Radiologically, chondroblastoma appears in the epiphyseal centers of long bones as well-circumscribed areas with thin sclerotic borders and consisting of intralesional calcifications. Soft tissue invasion is very rare.<sup>[11]</sup> Histologically, it presents as an epiphyseal lesion with regular contours, eccentric location, exhibiting round or polygonal cell layers, and sometimes surrounded by the hyaline cartilage. Calcifications are observed around the cell membranes in a chicken-wire pattern.<sup>[9]</sup> Malignant transformation of chondroblastoma is very rare. A significant number of malignant cases were reported after radiotherapy.<sup>[11]</sup>

The standard surgical treatment of both ABC and chondroblastoma involves local resection and curettage of the lesion followed by filling of the cavity with a bone graft or polymethyl methacrylate.<sup>[4,12]</sup> Better results can be obtained with the use of bone grafting for cavity filling. Although chondroblastoma is a good-natured tumor, it can easily recur after incomplete curettage because of fear for damage to the growth plate. After surgical treatment, local recurrence rates are 8-20% and 20-30% for chondroblastoma and ABC, respectively.<sup>[3,4,13]</sup> Other risk factors for recurrence of chondroblastoma involve increased lesion size exceeding 3.7 cm, involvement of the proximal femur and pelvis, and the presence of a secondary ABC.<sup>[12]</sup> No recurrence was observed in our case during a 1.5-year follow-up period.

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