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Chondroblastoma of the distal femur
A case report

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The authors report a case of chondroblastoma which was localised in the distal femoral epiphysis in a 16-year-old boy. The lesion was large, rapidly expanding and extended into the knee joint. After diagnostic evaluation including tru-cut biopsy, the lesion was treated surgically with curettage and grafting with coralline hydroxyapatite.

Four months after surgery the patient had no pain and had nearly full range of motion of the left knee. He was followed up for thirty-five months with routine radiographs and physical examination. He had no recurrence, no pain, and regained full range of motion of his knee.

Most chondroblastomas involve the medullary cavity ; they may rarely involve the cortex but to the best of our knowledge, no cases with soft tissue involvement have been reported in the literature.

INTRODUCTION

Chondroblastoma is a rare primary benign tumour of bone with a relatively high incidence in older children (10). The knee, hip and shoulder are most often affected (3). The tumour usually involves the epiphysis before physeal closure (2). Ninety percent of patients are between the ages of 5 and 25 years ; males predominate with a ratio of 3 to 2. Since the tumour is usually localised near a joint or growth plate, functional impairment and growth disturbances may be expected. Recurrences also are a major concern. Metastasis of a histologically benign chondroblastoma is rare (9). The suggested treatment for aggressive chondroblastoma ranges from simple curettage to resection with a margin of surrounding normal tissue and structural reconstruction (10).

In this report, our aim was to present a chondroblastoma which was localised in the distal femoral epiphysis and extended into the soft tissues.

CASE REPORT

A 16-year-old boy consulted a physician with a 7-month history of blunt pain in his left knee, which began spontaneously. Swelling and discomfort increased over the ensuing months (fig 1). He reported severe pain in his knee and some mild pain in his thigh. Given the rapid enlargement of the left knee, the patient was referred to the authors' institution for definitive care. On physical examination, he had a large mass involving the anterior and lateral aspects of his left knee. Palpation revealed the mass to be firm and non-mobile, with fluctuation. Active range of motion of the knee allowed flexion to 95°, extension to -10°. Radiographs at that time showed an osteolytic lesion in the distal epiphysis of the femur (fig 2).

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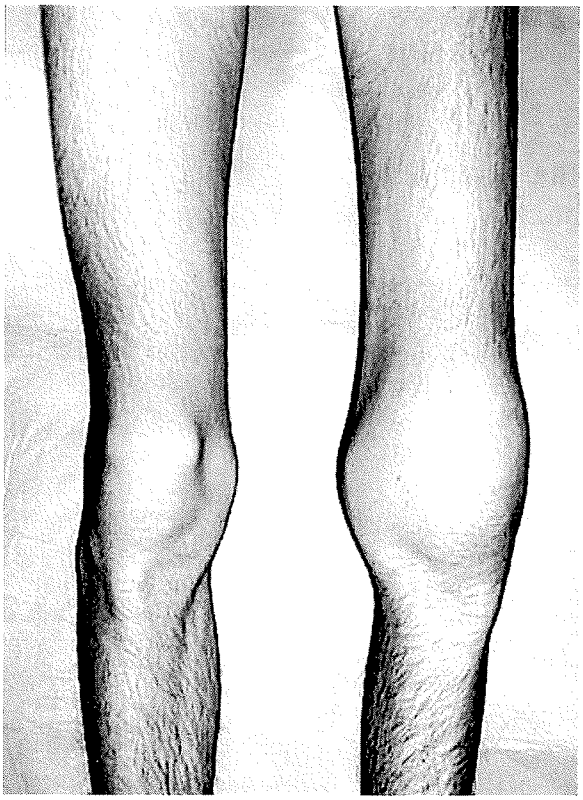


Fig. 1. — Clinical appearance of the patient. There is marked swelling and muscle atrophy around the distal femur

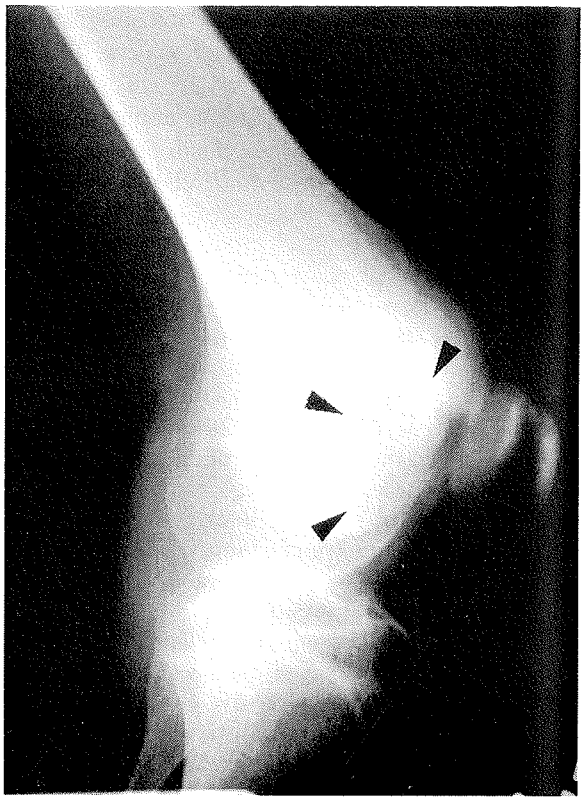


Fig. 2. — Preoperative lateral radiograph showing a cytic area in the distal femoral epiphysis.

Computerised tomography (CT) findings were consistent with a well-delineated lytic lesion in the lateral condyle of the right femur (fig 3). There was a fluid collection inside the left knee joint, together with muscle atrophy around it. A matrix with slight hyperdensity levels was noticeable inside the heterogeneous lytic area. Cortical irregularity was observed at the margin of the lateral condylar area proximal to the lytic lesion.

Magnetic resonance imaging (MRI) findings were as follows : the tumoral lesion had septa with hypointense lobules in T1 weighted sequences which showed hyperintense appearance with proton density and T2 weighted sequences when compared to the bone marrow. After IV injection of Gadolinium-DTPA, the walls showed rim style precipitation and the septa held the contrast material. The dimensions of the lesion were 30 × 40 × 40 mm. The inferior and posterior femoral cortex was slightly eroded with thinning of the walls and there was expansion into the soft tissue toward the popliteal area. Fluid levels were seen inside the tumour, suggesting a possible diagnosis of aneurismal bone cyst. The presence of fluid was noted inside the knee joint (fig 4a,b).

Subsequently a tru-cut biopsy was performed and pathological analysis showed a Grade 3 benign aggressive chondroblastoma.

Intralesional curettage and grafting with bone substitute (coralline hydroxyapatite) was chosen. A 10-cm skin incision, including the previous biopsy scar, was performed on the lateral side of the left knee. We noted that the expanding tumour had slightly distorted the anatomy of the lateral femoral condyle.

Abundant cystic fluid and friable haematoma were found. Specimens were obtained for frozen section analysis which later confirmed the diagno-

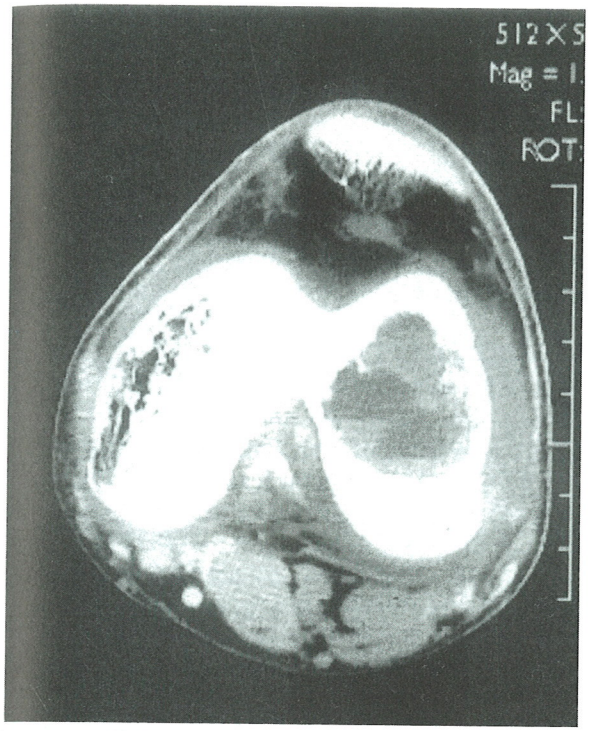
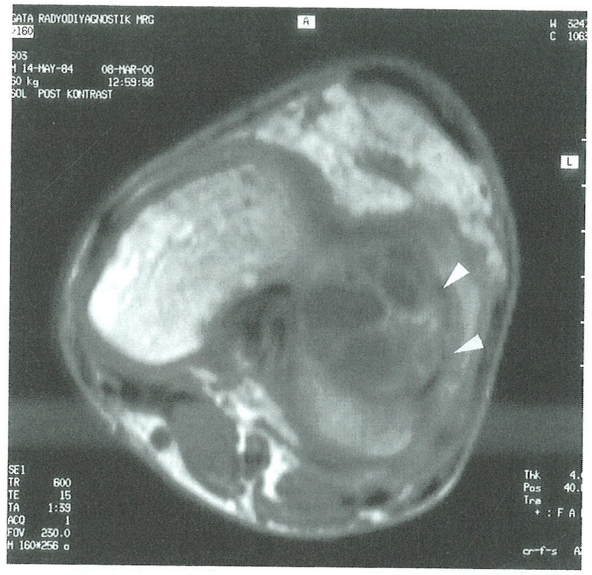


Fig. 3. — Preoperative axial CT scan revealed marked epiphyseal destruction.

sis of chondroblastoma. Intralesional resection of the cyst contents was performed. This procedure involved saucerisation of the cystic cavity with curettage and burring. A shell of attenuated and expanded cortex was used as the peripheral margin of curettage. Given this marked lack of cortical integrity, cancellous coralline hydroxyapatite was used for reconstruction. The patient's leg was immobilised in a long leg cast following wound closure.

Isometric quadriceps muscle and straight leg raising exercises were initiated on the second postoperative day. The cast was removed two weeks after the surgery. Active and active assisted range of motion exercises of the lower extremity were initiated at that time.

No complications were observed in the postoperative period. Four months after the surgery, the patient had no pain and had nearly full range of motion of his left knee. He was followed up for thirty-five months with radiographs and physical



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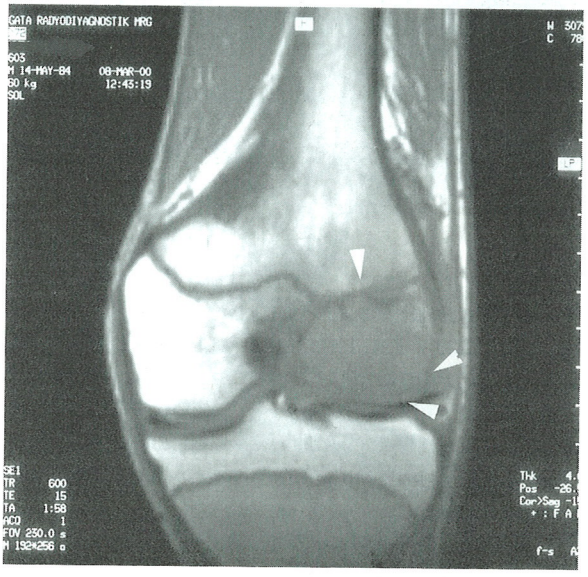

b

Fig. 4a, b. — Preoperative MR images : a. Axial postcontrast T1 weighted image. b. Coronal T1 weighted image.

examination (fig 5,6) Follow-up radiographs showed excellent incorporation and remodeling of the graft. Some resorption of the graft was observed (fig 7 a,b). Newly formed trabecular bone filled the interspaces between grafts.

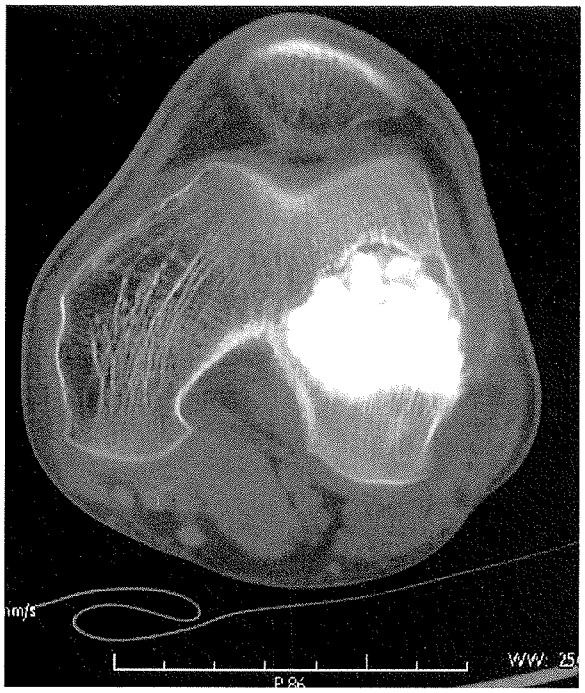

Fig. 5. — Postperative CT scan at twelve months

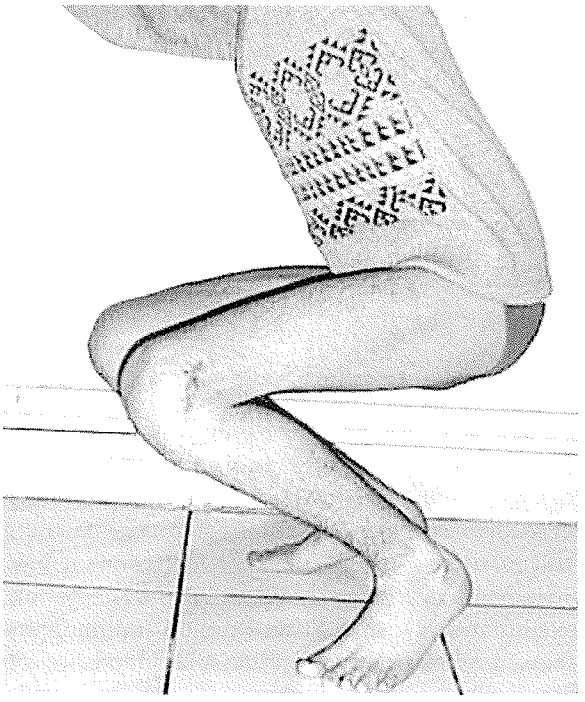

Fig. 6. — Postoperative clinical appearance of the patient sixteen months later with full range of motion.

The overall functional result was excellent according to the MSTS (Musculoskeletal Tumor Society) scoring system.

DISCUSSION

Chondroblastoma constitutes a very rare bone tumour entity (4, 10). Chondroblastomas are generally well-circumscribed lesions involving the medullary cavity. The radiographic appearance is usually suggestive of the diagnosis. The lesion is usually seen as an oval intramedullary tumour with distinct margins. A key diagnostic feature is its almost invariable location within an epiphysis or an apophysis. Other common features are expansion, sclerotic rim, and matrix calcification. Penetration through the cortex into the soft tissues is seen only in a small percentage of cases (6). The adjacent cortex is normal in only 15% of tumors (advanced and stage III lesions) (6). Three fourths of the tumours result in erosion and thinning of the involved cortical bone. Cortical destruction is unusual, occurring in 10% of cases (8, 10). The subchondral articular cortex is thinned to less than 5 mm in slightly more than half of the cases. The cortex is normal in 41% and completely destroyed in at least one region in up to 5% of cases (6, 8, 10). Our case presented with destruction of the lateral femoral cortex and expansion into the adjacent soft tissue. Regional epiphyseal plate expansion has also been observed.

In the case reported here, the aggressiveness of the lesion caused marked destruction of the bony wall in the posterolateral cortex and inferior subchondral bone. Therefore, the tumour extended into the soft tissues via these defects. Thinning of subchondral bone and close proximity to the articular cartilage caused excessive fluid collection in the knee. Chondroblastoma in soft tissues tends to be well circumscribed and has a shell of ossification (10). Hence complete resection of the lesion is not difficult. We performed marginal resection for the soft tissue extention of the lesion including the reactive zone.

Predominant secondary aneurysmal bone cyst-like changes have been noted in up to 15% of chondroblastoma cases (7). Some authors have suggested that recurrences are more common when

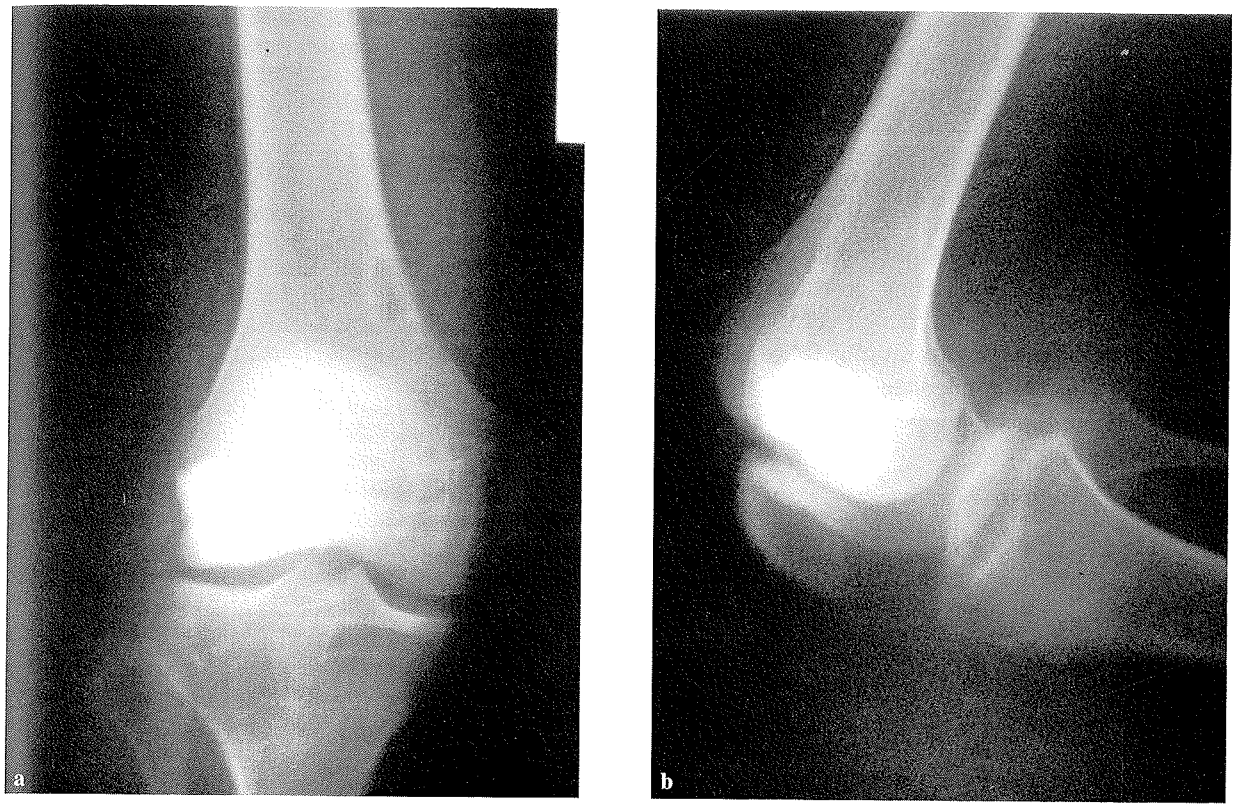

Fig. 7a, b. — Anteroposterior (a) and lateral (b) radiographs at 35 months. Incorporation of coralline hydroxyapatite was found to be satisfactory on latest radiological examination.

aneurysmal bone cyst changes are present (10). In our patient, the aneurysmal component of the lesionwas detected with CT and MRI, particulary in the epiphysis. Therefore, aneurysmal bone cyst was the first diagnosis considered in the differential diagnosis in our patient.

Treatment for chondroblastoma consists of simple curettage, bone grafting, and possible cementation using similar techniques as for giant cell tumour surgery (7, 8). After intralesional resection, reconstruction can be accomplished with autogenous or allogeneic bone graft or both. Since the physis of the patient was open, we performed intralesional curettage and reconstruction with coralline hydroxyapatite even though the lesion was grade III. When treated with curettage these tumors seem to have a higher rate of recurrence (5). Unni's recommendation for treatment of aggressive lesions with cortical erosion or cortical breakthrough was wide cortical saucerisation with curettage and cryotherapy or phenol (10). Vascularised or cancellous autogenous grafts show maximum bone incorporation but donor site morbidity limits their use. Limb length discrepancy and deformity have been reported after curettage of physeal chondroblastomas in children (2, 6). In our patient, we noted no limb length discrepancy or deformity during the thirty-five month follow-up period.

Aneurysmal bone cyst was the first diagnosis considered in the differential diagnosis in our patient. Secondary aneurysmal bone cyst-like changes were seen indeed in more than one-third of all lesions reported. The term chondroblastoma suggests a benign cartilage-forming tumour, but in fact this epiphyseal lesion of childhood has a histologic appearance that is more typical of the benign metaphyseal-epiphyseal giant cell tumour seen in young adults (10).

Even though chondroblastoma is considered benign, on rare occasions it can metastasize to the lung (9). Local recurrences after curettage range from 10% to 38%. In our case, there is excellent graft incorporation, remodeling and excellent function of the knee after a thirty-five month follow-up period with no recurrence.

As a summary, chondroblastoma is a benign bone tumour seldom causing cortex destruction. Curettage and grafting is an effective treatment modality and these patients must be followed-up on a regular basis for immediate diagnosis of recurrence.

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