Case 14513  
**Chondroblastoma of the proximal tibia**

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Section: Musculoskeletal System  
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Patient: 13 year(s), male

**Clinical History**

A 13-year-old boy was referred to the department of radiology for a Magnetic Resonance Imaging (MRI) of the right knee because of posteromedial knee pain for three months. Further clinical history was unremarkable.

**Imaging Findings**

MRI showed a well-delineated lesion in the posteromedial tibial epiphysis of the right knee. The lesion was isointense to muscle on T1-weighted image (WI) and hyperintense on T2-WI. The lesion had a multilobular contour and there was surrounding bone marrow oedema. The margins of the
lesion showed an intimate relationship with the posteromedial and articular cortex of the proximal tibia (Fig. 1). After comparison with the MRI images, plain radiography showed a barely visible osteolytic lesion in the posterior tibial epiphysis of the right knee (Fig. 2). Subsequent computed tomography (CT) was performed for more precise evaluation of the lesion extent towards the growth plate, the posterior cortex and the articular surface. CT showed an osteolytic lesion with a partial sclerotic rim and cortical breakthrough of the articular and posterior cortex. The lesion was confined to the tibial epiphysis. There were subtle intralesional calcifications (Fig. 3).

**Discussion**

Based on the imaging findings, the diagnosis of chondroblastoma was suggested, which was confirmed after histopathological examination of a surgical bone biopsy.

Chondroblastoma is a rare benign cartilaginous tumour with a prevalence of 1-2% of primary bone tumours [1]. It affects young patients, usually under the age of 20 years and prior to the closure of the growth plate. Histologically, chondroblastoma consists of highly cellular and relatively undifferentiated chondroblast-like cells and chondroid matrix [2].

Symptoms are usually insidious and non-specific and include joint pain, muscle wasting, decreased joint mobility and swelling [3].

The tumour is typically located at the epiphysis or more rarely the apophysis. The most commonly affected site is the femur, followed by the humerus and tibia [3]. Approximately 10% are found in hand and feet [1].

Plain radiography shows a well-defined lucent lesion with a sclerotic rim, typically confined to the epiphysis.

CT may be used to evaluate the local extent of the lesion particularly towards the adjacent joint and cortex. Furthermore, CT may be useful to evaluate potential intralesional chondroid calcifications. Because of radiation concerns CT is not routinely performed in paediatric patients.

MRI is the image modality of choice for preoperative characterisation of the lesion. It typically shows a well-delineated, multilobular lesion, which is hyperintense on T2-WI with surrounding bone marrow oedema.

The differential diagnosis includes other epiphyseal lytic lesions such as giant cell tumour, intraosseous ganglion cysts and clear cell chondrosarcoma, which are seen in adulthood after closure of the growth plate. Moreover, giant cell tumours are often located at the metaphysis with epiphyseal extension [4]. A Brodie's abscess is typically located in the metaphysis.

The standard of care is curettage and bone grafting. Chondroblastoma is a benign tumour but can behave locally aggressive and recurrence after surgery is not uncommon [5].
Final Diagnosis

Chondroblastoma

Differential Diagnosis List

Clear cell chondrosarcoma, Giant cell tumour, Clear cell chondrosarcoma

Figures

Figure 1 MRI of the right knee

Sagittal T1-WI. On T1-WI the lesion is isointense to muscle and is partially surrounded by a hypointense border (red arrow), corresponding with a sclerotic rim on CT.

Area of Interest: Musculoskeletal bone;  
Imaging Technique: MR;  
Procedure: Imaging sequences;  
Special Focus: Neoplasia;
Sagittal fat-suppressed (FS) T2-WI. On T2-WI the lesion is inhomogeneous, hyperintense with interspersed areas of low signal intensity. The lesion is relatively well-demarcated and has a hypointense rim (red arrows).

Area of Interest: Musculoskeletal bone;
Imaging Technique: MR;
Procedure: Imaging sequences;
Special Focus: Neoplasia;

Coronal FS T2-WI. There was suspicion of breakthrough of the articular cortex (Fig. 1c) and the posterior cortex of the proximal tibia (Fig. 1b) (white arrows).

Area of Interest: Musculoskeletal bone;
Imaging Technique: MR;
Procedure: Imaging sequences;
Special Focus: Neoplasia;
Axial FS T2-WI. Note the marked surrounding bone marrow oedema (white asterisks). There is an overall lobular structure of the lesion.

Figure 2 Plain radiography of the right knee

The PA view showed a subtle translucent area within the proximal tibial epiphysis which was only visible after careful correlation with MRI.
Lateral view. A barely visible osteolytic lesion in the posterior tibial epiphysis can be suspected. Note also subtle loss of cortical outline of the dorsal and articular cortex (white arrows).

Area of Interest: Musculoskeletal bone;
Imaging Technique: Plain radiographic studies;
Procedure: Screening;
Special Focus: Neoplasia;

Figure 3 CT of the right knee

Sagittal reformatted CT image. The lesion is well-demarcated by a partial sclerotic rim (red arrow). There is however marked thinning of the articular and the posterior cortex with
subtle cortical breakthrough (white arrows).

Area of Interest: Musculoskeletal bone; 
Imaging Technique: MR; 
Procedure: Imaging sequences; 
Special Focus: Neoplasia;

Coronal reformatted CT image. Note breakthrough at the articular cortex.

Area of Interest: Musculoskeletal bone; 
Imaging Technique: MR; 
Procedure: Imaging sequences; 
Special Focus: Neoplasia;

Axial CT image. Note subtle intralesional calcifications (red arrows), in keeping with chondroid matrix.
References


Citation

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