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European Journal of Radiology Extra 62 (2007) 89–93

EUROPEAN JOURNAL OF RADIOLOGY eEXTRA

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Primary malignant transformation of giant cell tumor of bone

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Received 18 December 2006; received in revised form 24 March 2007; accepted 28 March 2007

Abstract

The malignant transformation of giant cell tumor (GCT) of bone is a relatively rare event. Most cases are 'secondary' tumors, usually arising in lesions that have been treated previously with radiotherapy. Less commonly, secondary malignancy occurs in GCTs that have been treated surgically. The growth of 'primary' malignant GCTs has also been reported, but with much lower frequency. In both primary and secondary malignant GCTs, osteosarcomatous transformation is the most frequent histological type seen however malignant fibrous histiocytoma and fibrosarcoma may also develop.

Currently, there are no proven radiological or pathological features that can reliably be used to predict malignant transformation in GCT of bone. We discuss the case of a primary malignant GCT with intratumoral calcification. This radiographic finding may herald the presence of osteosarcoma.

Keywords: Giant cell tumor of bone; Cell transformation; Neoplastic; Osteosarcoma; Magnetic resonance imaging; Tomography; X-ray computed

1. Introduction

The malignant transformation of giant cell tumor (GCT) of bone is a relatively rare phenomenon. The diagnosis in most cases is unexpected and is usually discovered incidentally upon pathological analysis of the resected specimen.

Malignant GCTs are divided into primary and secondary forms. Primary malignant GCTs are those with malignant sarcomatous components that are present de novo in conjunction with a giant cell tumor of bone [1–3] and are exceedingly rare. The term 'dedifferentiated GCT' is also used to describe these tumors [2]. Secondary malignant GCTs are high-grade sarcomas occurring at the sites of previously treated GCT of bone. Most malignancies in GCTs fall into this latter category and occur several years after radiation therapy or, much less frequently, after surgery [2,4–6].

There are no recognized radiological appearances that can be used to reliably differentiate benign from malignant GCT. We report a case of primary malignant GCT of bone in which subtle radiographic findings of intratumoral calcification may have provided an indication of the presence of malignancy.

2. Case report

A 36-year-old female presented with a history of slowly increasing pain in the left knee over a 6-month period. There was no recent history of trauma; the patient had no constitutional symptoms and no significant past surgical or medical history.

Plain radiographs of the knee were performed and demonstrated a lytic lesion, measuring 5 cm in maximum axial diameter, in the proximal tibial metaphysis extending eccentrically into the medial tibial condyle (Fig. 1A). The lesion was causing minimal expansion and thinning of the medial

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doi:10.1016/j.ejrex.2007.03.006

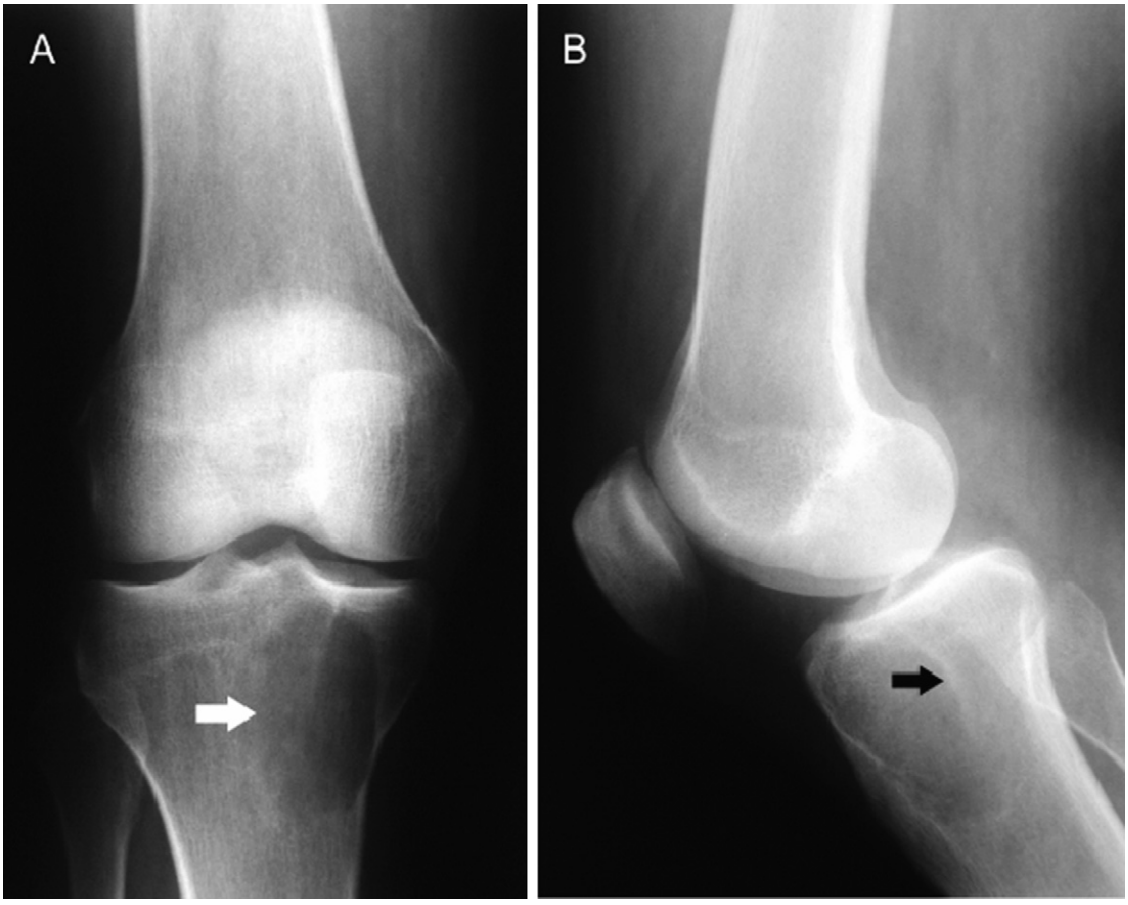

Fig. 1. (A) The AP radiograph shows a 5 cm, eccentric lytic lesion (white arrow) in the proximal tibia, centered in the lateral aspect of the metaphysis but extending into the epiphysis, close to the articular surface. (B) The lateral view shows a curvilinear area of calcification projected over the posterior aspect of the lesion (black arrow) representing pseudotrabeculation due to endosteal scalloping.

metaphyseal cortex. A vertical, curvilinear focus of calcification was projected over the posterolateral part of the lesion representing pseudotrabeculation (Fig. 1B). Computed tomography (CT) confirmed the presence of a lytic lesion replacing the medial two-thirds of the proximal tibia, involving both metaphysis and epiphysis (Fig. 2). While the adjacent cortex was expanded and thinned, there was no definite cortical disruption. No associated soft tissue mass was identified. An area of amorphous calcification was identified in the posterior aspect of the lesion. Magnetic resonance imaging (MRI) demonstrated a well-defined, predominantly low-signal lesion on T1-weighted imaging (Fig. 3A). There was a moderate degree of enhancement of the tumor following the administration of gadolinium (Fig. 3B). $T2^{*}$ imaging showed a heterogenous tumor with a fluid–fluid level at its center (Fig. 3C).

Core biopsies of the lesion were obtained using CT guidance. Histological analysis of the biopsy samples was consistent with giant cell tumor (Fig. 4), and excisional curettage of the lesion was subsequently performed. Analysis of the curetted specimen showed that it contained not only giant cell tumor but also an additional component of high-grade osteosarcoma (Fig. 5). As a result, the patient underwent a

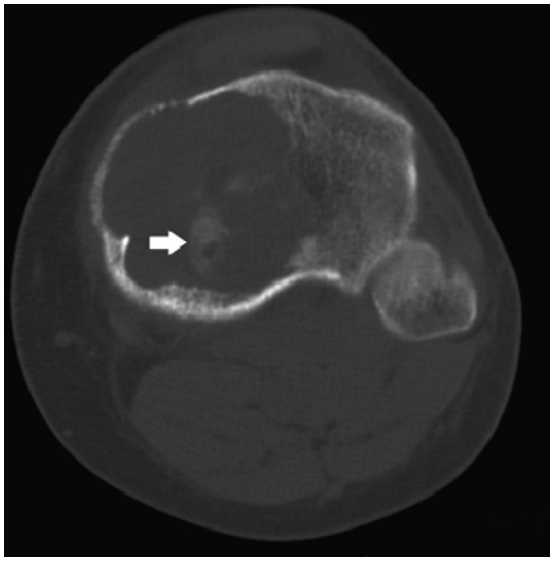

Fig. 2. Axial computed tomography shows that the lesion is causing endosteal scalloping, with incipient disruption of the cortex, and is slightly expansile. In addition there is faint, amorphous calcification within the tumor (arrow). There is no associated soft tissue mass.