

CASE REPORT

An unusual huge distal femoral giant cell tumour of bone (GCTB) in an adult male patient in a low resource setting: A case report



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Abstract

The Giant cell tumour of bone (GCTB) is a benign but locally aggressive bone lesion, it accounts for 4-10% of all primary bone tumours. We present the case of a giant cell tumour of a 35-year-old male with a 3-year history of progressive left knee joint swelling. The swelling was progressive and initially painless but later became painful with walking. The Plain Anterior-posterior and lateral radiographs of the left knee showed an expansile osteolytic lesion involving the distal third of the femur with some sclerosis of the distal femoral segment and thinning of the cortex. Aspiration biopsy of the mass showed large numbers of osteoclast giant cells with spindle-shaped stromal cells. On account of these, a diagnosis of GCT of the left knee was confirmed. The patient had a wide excision of the tumour mass. The tumour grossly consisted of brown cheesy material and involved all the soft tissue around it. The patient had total knee replacement and did very well on follow-up.

Keywords: Giant cell tumour of bone, Radiographic findings, Diagnosis, Benign, Adult male patient

Introduction

Giant cell tumour of bone (GCTB) is an uncommon, benign but locally aggressive bone lesion of unknown origin, with the capacity to metastasize, although it is rarely lethal.¹ However, the 2020 World Health Organization classification redefined GCTB as an intermediate malignant tumour.² It accounts for 4 – 10% of all primary bone tumours and 15 – 25% of benign tumours.³ The majority of cases occur in patients between 20 and 40 years of age, with females affected slightly more frequently than males, at a ratio ranging from 1.1:1 to 1.5:1.^{3,4} Benign metastatic GCTB represents 1 – 3% of all cases of GCTB and 6% of recurrences.⁵

Giant cell tumours are multifocal in about 0.5% of cases, often involving the hands. The solitary lesion shows a predilection for long bones adjacent to the knee and the distal end of the radius.¹ The tumour predominates in the long bones in 75-90% of cases with the femur (30% cases), tibia (25% cases) and radius (10% cases).¹ The spine and innominate bone are involved occasionally.⁶

Radiographically, GCTB usually presents as a lucent lesion without matrix calcifications growing often, however not exclusively, eccentrically in the epi-metaphyseal region of the bone on radiographs, and in a mature patient.³ In inactive and static tumours, the margins of the lesion are well-defined, without sclerosis changes. However, in aggressive cases, margins are poorly demarcated, and the cortex may be thinned, distended, or destroyed with soft tissue extension, but lacking periosteal reaction generally.⁵

The initial presentation is localized pain and swelling of the affected limb, some presenting following trauma or an incidental finding.⁷ This present case describes an unusually huge GCTB involving the lower third of the left femur and highlights the role of radiological investigation in evaluating the condition.

Case Report

M.S. is a 35-year-old male farmer who presented to the outpatient clinic of National Orthopaedic Hospital Dala-

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Kano with a 3-year history of left knee joint swelling. The swelling was progressive and initially painless but later became painful with walking. There was an associated history of weight loss but no fever, cough, chest or back pain. On examination, he was slightly emaciated, not pale, and anicteric.

There was a huge mass (25cm x 19cm x 16cm) of variable consistency involving the lower third of the left thigh. The mass was non-tender and non-pulsatile but fixed to the underlying structures. The overlying skin was free. No regional lymphadenopathy was noted. The chest, abdomen and central nervous system were normal.

The Plain Anterior-posterior and lateral radiographs of the left knee (Figs.1 and 2) showed an expansile osteolytic lesion involving the distal third of the femur with some sclerosis of the distal femoral segment and thinning of the cortex with loss of normal knee anatomical distinction of structures

There is also a marked increase in trabeculation giving the so-called “soap bubble” appearance. A huge soft-tissue extra cortical extension with a well-defined margin was noted. Based on the above radiographic findings a diagnosis of femoral Giant cell tumour was considered. The chest radiograph and abdominopelvic ultrasound of the patient were normal. However, the patient could not afford the CT and MRI investigations because of financial constraints.

The patient's full blood count, serum urea, electrolytes and creatinine were all within normal limits. Due to financial constrain the patient could not do cross-sectional imaging such as Computed tomography and Magnetic resonant imaging to further characterise the lesion. Rather fine needle aspiration biopsy of the mass was done and this showed large numbers of osteoclast giant cells with spindle-shaped stromal cells. On account of these, a diagnosis of GCT of the left distal femur was confirmed. The patient had a wide excision of the tumour mass. The tumour grossly consisted of brown cheesy material and involved all the soft tissue around it.



Fig. 1. A plain AP view radiograph of the left knee showing an expansile osteolytic lesion involving the distal third of the femur with some sclerosis of the distal femoral segment and thinning of the cortex with loss of normal knee anatomical distinction of structures

Histopathological examination showed a well-vascularized, highly cellular tissue consisting of stromal mononuclear cells and multinucleated giant cells present in close association with each other. Reactive bone formation with osteoblastic rimming was seen in some areas. A prosthetic knee replacement was done but the patient was lost to follow-up.

Discussion

The typical radiographic features of GCTB include a zone of radiolucency situated immediately beneath the articular cortex at the end of a long bone.³ This conforms to this case in terms of location and typical radiographic features. GCTB does not contain calcification or ossification unless complicated by a fracture.⁵ However, as this case demonstrated, an extensive “soap bubble” pattern of trabeculation may be seen, in about 40% of cases.¹ Other radiographic features are purely osteolytic or rarely sclerotic bone margin which is typically demonstrated in the present case. A more aggressive lesion as in the present case is associated with the widening of the zone of transition, well-defined extension of the tumour into the adjacent soft tissue thereby producing a huge soft tissue mass overlying the knee joint. Other possible differential diagnoses of an expansile “soap bubble” bony lesion include aneurysmal bone cyst, chondrosarcoma, enchondroma etc. These differentials were ruled out with fine needle aspiration biopsy.

The predominant age of presentation of GCT is between 20-40 years.⁴ And it affects females at a ratio ranging from 1:1.1 to 1:1.5 times as often as males.³ The age of the patient in this report corresponds with that of the literature, however, the patient in the present case is male. GCT typically occurs at the meta-epiphyseal site of the long bones (75–90%), with approximately 84–99% of the lesions extending to about 1cm of sub-articular bone. Most tumours occur in the bones around the knee (50–65% of all cases); the most common site is the distal femur (23–30%).^{2,3} This present case agrees with what was reported in the literature.

A rating system based on the radiographic aspect of the GCT



Fig. 2. A plain lateral view of the left knee showing a marked increase in trabeculation involving the distal third of the femur giving the so-called “soap bubble” appearance. A huge soft-tissue extra cortical extension with well-defined margins was also noted.

was developed by Campanacci et al.⁸ The grade I tumour presents with well-defined margins and a thin “halo” of mature bone. The grade II tumour has well-defined margins but does not present with a sclerotic halo. The grade III lesion has ill-defined borders, suggesting aggressiveness. However, this rating does not seem to have a clinical correlation. This present case falls into the grade III category given the radiographic findings obtained.

Computed tomography (CT) for diagnosing solitary bone lesions is typically used to outline the cortical alterations more accurately.⁵ In the GCT, the CT scan demonstrates more clearly the cortical expansion, pseudo-trabeculations; absence of mineralizing matrix and eventual pathological fractures.³ CT was not done in this case due to the financial constraints of the patient. Other diagnostic imaging methods play a significant role in lesion characterization. The bone scintigraphy demonstrates an increased concentration of radiotracer in the lesion and, in up to 57% of cases, both the “donut sign” and central photopenia are present. However, this imaging modality is not specific, and it is only helpful in evaluating patients with multi-centric or metastatic GCTB.⁵ Facilities were not available for such an investigation to be carried out in this case.

On magnetic resonance imaging (MRI), the GCT presents more commonly as a well-defined lesion, which may be surrounded by a low-intensity signal halo, representing both reactive sclerosis and fibrous capsule.^{5,9} Most lesions present with low-intensity signals both on T₁ and T₂ weighted images, due to the presence of hemosiderin deposits and/or high content of collagen.⁵ This finding may be useful for the exclusion of other cysts such as aneurysmal bone cysts, non-ossifying fibroma, brown tumours of hyperparathyroidism, chondroblastomas and clear cell chondrosarcomas.⁹ In this case, as a result of the financial constraint of the patient, MRI was not performed at the time of this report. What was used in ruling out the above differentials was mainly their location and histology. Brown tumours of hyperparathyroidism are diaphyseal while aneurysmal bone cysts are epiphyseal, although very few cases of GCT were reported in these sites. The presence of periosteal reaction and calcification in addition to osteolytic destruction of the distal femur will favour the diagnosis of osteogenic sarcoma. These findings were not seen in this case, thereby making GCT more likely. Tumours with malignant stroma tend to behave in a malignant fashion; lesions that appear benign may metastasize. Five per cent of patients will have pulmonary metastasis.² This does not however apply to this case as there was no evidence of metastasis to the lungs on the chest radiograph.

The standard treatment ranges from a simple curettage to an extensive resection with different results in several studies.^{2,9} The lesion curettage combined with marginal cauterization and/or use of liquid nitrogen, has shown itself as a reliable treatment method, but large lesions require extensive resection and reconstruction with prosthesis or autologous bone tissue.^{2,10} In this present case patient had a wide excision of the tumour mass with Prosthetic knee replacement.

GCTB local recurrence is more frequently observed in the first three years after treatment. The recurrence rate ranges from about 12-65 % after curettage and osteoplasty as reported by Mavrogenis et al.³ This cannot be ascertained in this case as the patient was lost to follow-up.

Conclusion

A case of unusually huge giant cell tumour in a 35-year-old male farmer was presented. Literature has reviewed the role of radiography especially in low resource settings, in the characterization and evaluation of bone tumours was highlighted and the diagnosis was confirmed on histology. The availability and accessibility of cross-sectional images in low-resource settings will undoubtedly improve the assessment of bone tumours and proffer better outcomes.

Availability of data and materials

All data relating to this study are presented within the manuscript. Other materials are available from the corresponding author upon reasonable request.

Ethics approval and consent to participate

Written informed consent for publication was obtained from the relative of the patient.

Consent for publication

Written informed consent for publication of their clinical details was obtained from the relative of the patient.

Competing interests

All authors of this manuscript declare no competing interests..

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