Egyptian Journal of Radiology and Nuclear Medicine

CASE REPORT Open Access

A case report on aggressive giant cell tumor of greater trochanter: a divergent site

Rohan Kumar Singh, PratapSingh Hanuman Parihar, Gaurav Vedprakash Mishra, Rajasbala Pradeep Dhande and Prerna Anup Patwa*

Abstract

Background: Giant cell tumor is a tumor of benign nature which usually arises in the long bone, but it can also be seen at unusual sites. Only few cases have been reported so far regarding involvement of greater trochanter of the femur as it is a very divergent site for giant cell tumors; our case is one of them. Giant cell tumors are seen in 20–40 years of age in the metaepiphyseal regions of the long bones. If femur has to be involved, it is in the distal end usually.

Case presentation: We present a case of a 45-year-old female with chief complains of swelling and left hip pain since over a month. Magnetic resonance imaging was done where the location and extent of the tumor was found. What makes this case interesting is that on fine needle aspiration cytology the lesion showed multinucleated giant osteoclasts in the background of osseous matrix of spindle cells suggesting Giant cell tumor.

Conclusion: It is sometimes tricky to make a diagnosis of these lesions on imaging as the typical features may not be present, and hence, in such circumstances helping the clinicians with additional information like location, extent, margins is of utmost importance.

Keywords: Aggressive giant cell tumor, MR imaging, Osteoclastoma, X-ray, Fine needle aspiration cytology (FNAC)

Background

Giant cell tumor is a benign lesion which usually arises in long bone, but it can also be seen at various unusual sites. It is mainly made up of stromal cells which have osteoclastic activity. Giant cell tumor has a characteristic appearance, and they are well defined and lytic in nature. These tumors are usually eccentric in location, and because of its aggressive nature, they do not have sclerotic margins. They usually occur in matured skeleton in which physis is closed and can also extend into adjacent articular surface [1]. Giant cell tumors are mainly seen in age group of 20–40 years in the long bones and mostly located in the epiphysis. These tumors have a tendency to metastasize. Giant cell tumors can also involve small bone of fingers and vertebral bodies [2]. Only few cases have been reported so far regarding involvement of greater trochanter of the femur [3]. We present a case of giant cell tumor arising from its unusual site that is from the greater trochanter of left femur, and this was diagnosed on fine needle aspiration cytology.

Case presentation

A case of a 45-year-old female visited the outpatient department of our hospital with chief complains of swelling and pain over left hip since one and a half months. Patient also complained of jerk over her left hip joint and feeling that her lower limb getting stuck while walking. On clinical examination, she complained of pain over the left hip and patient was not able to move her leg. Her pain was aggravated on movements and relieved on taking rest. There was mild swelling and tenderness over anterior joint line, there was no discoloration over the swelling and no local rise of temperature, and the swelling was hard and firm in consistency. Range of movement

*Correspondence: drprernapatwa@gmail.com
Department of Radiodiagnosis, Jawaharlal Nehru Medical College, DMIMS (DU), Sawangi (Meghe), Wardha, Maharashtra 442001, India

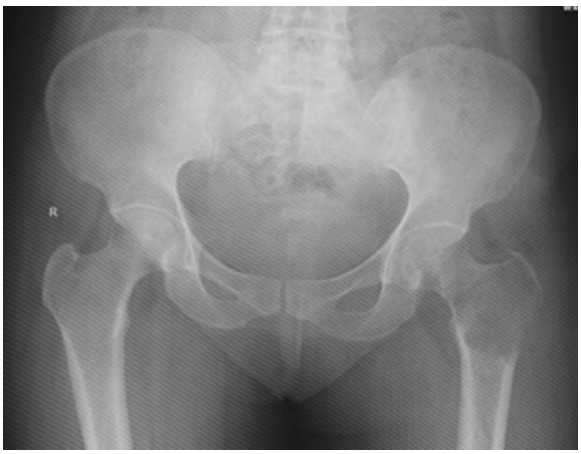

Fig. 1 X-ray: Adult skeleton showing an eccentric expansile lytic lesion in epiphysis of proximal left femur showing wide zone of transition, margins-IB/IC, no periosteal reaction, thinned out cortex. Pathological fracture of the neck of femur

mass into adjacent muscle and displacing them. There is no matrix calcification, and transverse pathological fracture of the neck of femur was seen at the basi-cervical part seen. The patient came from a low-socioeconomic background and could not afford two cross-sectional imaging, so CT scan was not formed.

On MR imaging, lesion was irregular, expansile and lytic with a heterogeneously enhancing soft tissue component showing altered signal intensity in the greater trochanter of femur involving the metaphysis and neck of the femur and extending into the subtrochanteric region. Lesion measured $7.4 \times 7.4 \times 7$ cm and appeared heterogeneously iso-hypointense on T2WI and PD FAT SAT, hypointense on T1 and heterogeneously hyperintense on STIR. The lesion showed wide a zone of transition. Lesion was causing break in cortex with the presence of a soft tissue component. Lesion was seen displacing gluteus minimus, gamellus inferior, vastus lateralis, intermedius muscles along with ischio-femoral and ilio-femoral ligaments of left side. STIR hyperintensity was noted in

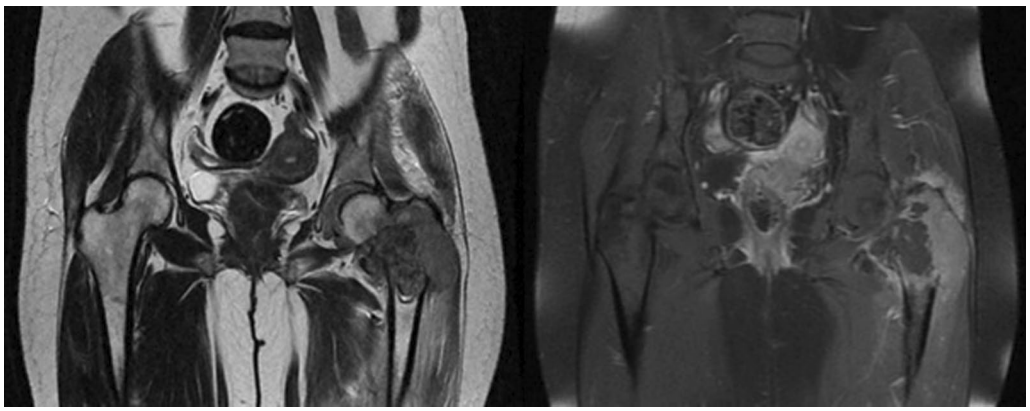

Fig. 2 Coronal T2WI showing heterogeneously hypointense lesion in metaphyseal and diaphyseal region of proximal end of left femur. Cortical break noted. Few hypointense calcific foci seen. T1 + contrast shows heterogeneous enhancement

of left hip could not be assessed due to pain, and range of movement of knee was full and painless. There were toe movements with intact distal circulation. There was no previous history of any trauma or fall neither loss of weight or decreased appetite and no local signs of inflammation.

On X-ray (Fig. 1), there was an eccentric expansile lytic lesion in the greater trochanter of femur involving the metaphysis, neck of the femur and extending into the subtrochanteric region showing wide zone of transition which suggests aggressive nature of the lesion with non-sclerotic margins type IB/IC. There was thinned out cortex with few areas of nearly deficient cortex with no periosteal reaction. There was extension of soft tissue the muscles of all the compartments except posterior compartment of the left thigh suggestive of myofascial edema. STIR hyperintensity was noted in left acetabular fossa suggestive of reactive synovial thickening (Figs. 2 and 3).

Fine needle aspiration cytology of the lesion arising from the greater trochanter of left femur was done, it turned out to be giant cell tumor, and this is very unusual site for giant cell tumor.

Discussion

Giant cell tumor of bone has a wide spectrum ranging from benign to malignant potential. Giant cell tumor is very common in long bones and generally aggressive

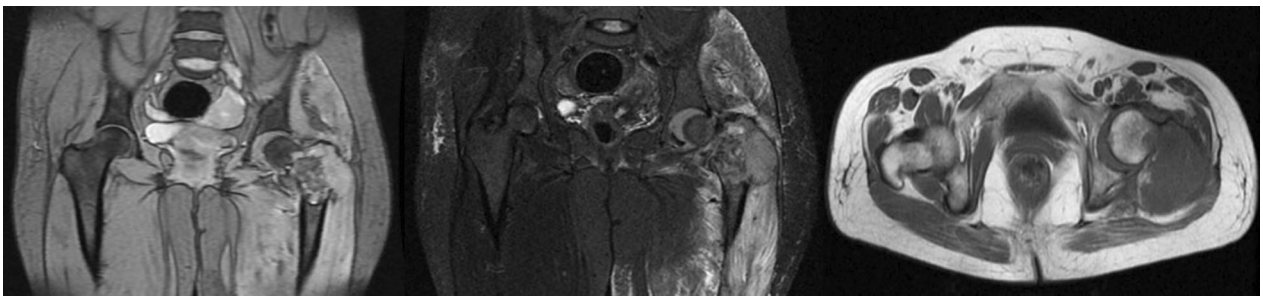

Fig. 3 Coronal GRE/T2* images showing blooming signals due to bone destruction. Coronal STIR images showing hyperintensity in the muscle suggesting myofascial edema. Axial T2WI showing hypointense lesion extending in the neck of femur

locally. Giant cell tumor is mostly seen in young adults; its usual location is knee, and then the second most common site is distal radius and sacrum [4]. Giant cell tumors are mesenchymal in origin, and they are usually benign in nature but have aggressiveness in the form of local infiltration. These tumors have numerous numbers of giant cells with typical appearance of multinuclear giant cells and have mononuclear stromal cells. These giant cells are dispersed in the lesion. The metaphyseal region is main site of giant cell tumor origin, and sometimes subchondral extension can be seen in long bone like proximal part of tibia and distal end of femur. If an epiphyseal lesion is found, it is usually an extension from the metaphysis. Chakarun et al. also stated that till date no cases have been reported in the literature regarding the extension of GCT into an unfused epiphysis from the metaphysis [1]**.** Sacrum is the most common axial skeleton affected by this tumor. In comparison with men, female have more chances of developing giant cell tumor. People of age group of 20 to 40 years are generally affected. There is very rare incidence that children or adolescents are being affected by giant cell tumor. Even though giant cell tumors are benign in nature, still there are incidences that these tumors metastasize to lungs or can even involve multiple bones or same bone but at multiple locations. If these tumors are only treated with curettage, then there are maximum chances of its recurrence. If these tumors are not treated in time, then because of its locally aggressive nature these can destroy bones [5]. On magnetic resonance imaging, these tumors show altered signal intensity appearing low to intermediate signal intensity on T1-weighted imaging and hyperintense signal on T2-weighted imaging. The tumors' intramedullary component will be best assessed on T1- weighted imaging, and its component outside the osseous is properly assessed on T2-weighted imaging. On post contrast study, after administration of gadolinium the tumor shows heterogenous enhancement. Some reports says that if there is haemorrhage within the giant tumor, then because of haemosiderin blooming can be seen on gradient recalled echo [6]**.** Magnetic resonance imaging is very useful in assessing the sub-chondral tumor extension [7]. Generally, cement placement with curettage is done for giant cell tumor and then proper follow-up should be taken in order to find new lytic areas at cement–bone interfaces. Computed tomography and magnetic resonance imaging help in better analysis of lytic areas and in detecting the residual of any soft-tissue mass. Treatment approach should be immediately changed in case one finds any recurrence of tumor on imaging, and computed tomography-guided biopsy should be taken. If there is recurrence of tumor, then this denotes poorer outcome. Sometimes pathological fractures can be seen in the case of giant cell [8].

Conclusions

Neck of femur being an unusual site of giant cell tumor, it is sometimes tricky to make the diagnosis. It is also not necessary that the patient may present with typical features. The literature says that there should be complete and wide excision of tumor following all principles and criteria of oncology surgery. Complete removal of tumor with safety margin is necessary as there is good chance of recurrence, and a close follow-up is needed even after operation. Imaging helps the clinicians to know the location, extensions and margins of the lesion.

Abbreviations

T1WI: T1-weighted image; T2WI: T2-weighted image; PD FAT SAT: Protein density fat saturation; STIR: Short tau inversion recovery; GCT: Giant cell tumor.

Acknowledgements

Not applicable.

Authors' contributions

RKS was involved in manuscript preparation. PHP was involved in designing and concept. GVM was involved in designing, concept and editing & reviewing. RPD was involved in designing and concept. PAP was involved in manuscript corrections, editing and reviewing. All authors have read and approved the manuscript.

Funding
None.

Availability of data and materials
The data are collected from the hospital system with the permission of the competent authority. The identity of the patient is not compromised at any place.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Informed consent was taken from participant(s) prior to their inclusion in this study.

Competing interests
The authors declare that they have no competinginterests.

Received: 27 April 2021 Accepted: 30 August 2021
Published online: 15 September 2021

References

1. Chakarun CJ, Forrester DM, Gottsegen CJ, Patel DB, White EA, Matcuk GR Jr (2013) Giant cell tumor of bone: review, mimics, and new developments in treatment. Radiographics 33(1):197–211
2. Manjunatha HK, Ramaswamy AS, Kumar BS (2012) Aggressive giant cell tumor of the anterior arc of the rib. J Cytol Indian Acad Cytol 29(1):51
3. Stewart MJ, James JROE (1950) Giant-cell tumor confined to the greater trochanter: a case report. JBJS 32(2):439–442
4. Shin JS, Lee IS, Kim A, Kim BH (2002) Giant cell tumor originating from the anterior arc of the rib. J Korean Med Sci 17(6):849
5. Turcotte RE (2006) Giant cell tumor of bone. Orthop Clin 37(1):35–51
6. Aoki J, Tanikawa H, Ishii K, Seo GS, Karakida O, Sone S, Ichikawa T, Kachi K (1996) MR findings indicative of hemosiderin in giant-cell tumor of bone: frequency, cause, and diagnostic significance. AJR Am J Roentgenol 166(1):145–148
7. Herman SD, Mesgarzadeh M, Bonakdarpour A, Dalinka MK (1987) The role of magnetic resonance imaging in giant cell tumor of bone. Skeletal Radiol 16(8):635–643
8. Deheshi BM, Jaffer SN, Griffin AM, Ferguson PC, Bell RS, Wunder JS (2007) Joint salvage for pathologic fracture of giant cell tumor of the lower extremity. Clin Orthop Relat Res 459:96–104

Publisher's Note