

Bilateral Distal Femoral Cortical Irregularity In A 12-Year Old Boy: A Case Report.

M. Islam¹, T. D. Bhattacharyya², R. Roy³, B. Agarwal⁴, S. Dey⁵, Z. P. Islam⁶.
^{1,2,3,4,5,6.} (Department of Orthopaedics, Gauhati Medical College and Hospital, Guwahati, India)

Abstract: Distal femoral cortical irregularity (DFCI) is a benign bony condition presenting with either an irregular appearance or a focal lysis within the posterior cortex of the distal femur. Many cases are confused with malignant lesions. Most of the lesions are found at the attachment of the head of the medial gastrocnemius muscle which can be visualized using different imaging techniques. We report a case of a DFCI in a 12-year old boy. The diagnosis was based on MRI. Patient is being followed up for 1 year.

Keywords: benign fibrous lesions, cortical desmoids, distal femoral cortical defect, fibrous cortical defects, gastrocnemius.

I. Introduction

Distal femoral cortical irregularity (DFCI) is a benign entity presenting with either an irregular appearance or a focal radiolucency within the posterior cortex of the distal femur. These lesions have been reported to occur in 11.5% of male and 3.6% of female children between the ages of 3 and 17(1). They are bilateral in up to 35% of cases (1, 2).

Benign fibrous lesions such as nonossifying fibromas, fibrous cortical defects, and cortical desmoids are rare skeletal lesions that are discovered incidentally on radiographs of children and young adults [3-8]. Nonossifying fibromas and fibrous cortical defects are most often located in the metaphysis or diaphyseal junction of the distal femur or proximal tibia. The rarity of this condition and the dearth of sufficient literature has prompted us to report this case.

II. Case Report

A 12-year old boy was admitted through our out patient department with a complaint of continuous pain over lower thigh for seven days which aggravated while running and playing. On clinical examination there was tenderness over the posterior aspect of distal femur. Initially it was suspected to be of some form of malignancy or infection. All routine work up were done to rule out malignancy and infection. The rest of the physical examination was within normal limits and laboratory data were entirely normal. The patient reported no previous history of trauma, pain or discomfort in the involved extremity. Swelling, fever, chills or night sweats were absent.



Fig. 1: radiographic image anteroposterior and lateral views showing posteromedial cortical defect

Plain lateral radiographs (Fig. 1) revealed a focal lysis on the posterior surface of the distal femoral metaphysis. The lesion was located immediately proximal to the growth plate, originating from the cortex, and was somewhat spiculated. No evidence of cortical disruption, periosteal reaction, or fracture was present. These radiographic findings have led us to the differential diagnosis of surface osteosarcoma, non-ossifying fibroma or distal femoral cortical irregularity (DFCI).



Fig 2: MRI sagittal section showing bilateral distal femoral cortical irregularity

Because of cortical erosion, MRI (Fig. 2,3) was performed and it showed focal cortical irregularity along the posteromedial cortex of the distal right femoral epiphysis with mild periosteal reaction. A small cystic focus is also seen near this irregularity. There was neither medullary involvement nor soft tissue edema. A similar small cystic focus is also seen in the opposite distal femoral metaphysis. So MRI reported it to be bilateral cortical desmoid.

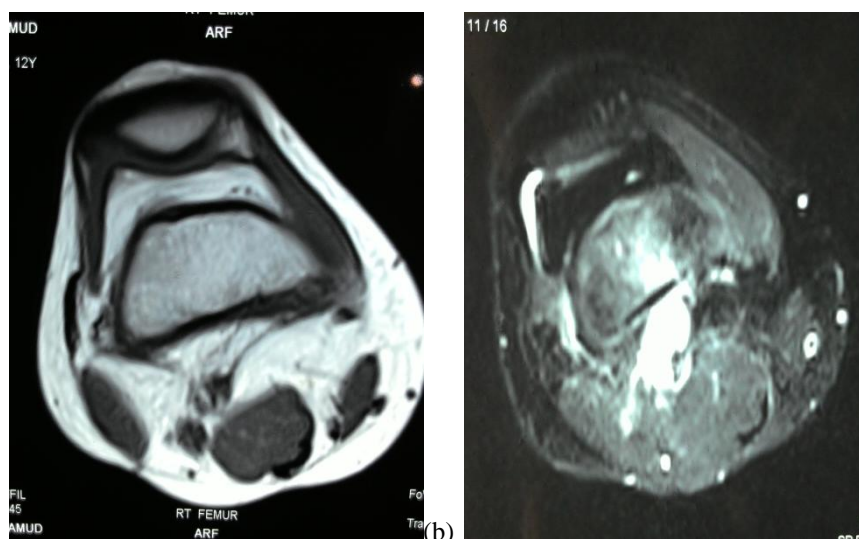


Fig 3: cross sectional views in MRI, (a) T1 image, (b) T2 image

III. Discussion

Distal femoral cortical irregularity (DFCI) are most prevalent among boys 10–15 years old and are believed to be tug lesions secondary to traction injury at the insertion of the adductor magnus aponeurosis or at the origin of the medial head of the gastrocnemius tendon. Although it has been considered a chronic and repetitive injury, this process also may be related to an episode of acute knee trauma, not well recalled by physically active children. Perhaps the most widely accepted cause is a mechanically induced lesion related to an excessive avulsive stress at a site of attachment of a strong muscle [9,10]. These repeated microavulsions elicit a hypervascular and fibroblastic response, which in turn stimulates added osteoclastic activity and bone resorption [9].

Resnick and Greenway were the first to classify this disease condition into excavations and proliferative cortical irregularities based on the observations made on dry femurs (11). But the authors could not show any tendinous structures attached to the excavations or irregularities in their cadaveric dissection study. But after this report there were no further reporting of such cases done until Pennes et al[12], Suh et al[13] and Skylar et al[14] published documents using either CT [12] or MRI [13,14] in the diagnostic work-up of DFCI. From all these studies it was concluded by Verdonk et al[15] that all DFCIs were located at the attachment of the medial gastrocnemius muscle.

The diagnosis of DFCI is based on the history and a highly characteristic location and imaging features. On true lateral plain radiographs, the lesion usually appears as a shallow concave irregular osteolytic area originating on the surface of the cortex. The lesion is best seen in the slightly oblique position and appears as a round or oval eccentric well-circumscribed osteolytic area. The lesion may be surrounded by a sclerotic margin that indicates the healing phase in the evolution [9]. Radiographs also can show bony spiculation associated with compact mature periosteal proliferation that mimics malignancy[2,9]. Other imaging investigations like ultrasonography and CT scan has been done but the utility has become meagre after the advent of MRI in present day. MRI shows a juxtacortical lesion with low signal on T1-weighted images and increased signal on T2-weighted images with moderate enhancement after intravenous gadolinium administration [10]. Nuclear bone scintigraphy if done is occasionally normal or may show increased tracer uptake along the lesion site[16]. In cases with a typical appearance, biopsy is not required [17]. Histologically, the lesion has been described as containing fibrous tissue with irregular spicules of bone, along with osteocytes, a few fibrocytes and fibroblasts, with a mild lymphocytic infiltrate indicating inflammation [2].

The clinical symptoms usually completely resolve with symptomatic management [17].

IV. Conclusion

Because the imaging characteristics of our patient's lesion suggested DFCI, we did not consider a biopsy necessary. The patient's symptoms resolved completely with nonoperative treatment (analgesics) and rest within 2 weeks of onset. He remained asymptomatic with 1 year of follow up.

References

- [1]. Simon H. Medial distal metaphyseal femoral irregularity in children. *Radiology* 1968 ; 90 : 258.
- [2]. Dunham WK, Marcus NW et al. Developmental defects of the distal femoral metaphysis. *J Bone Joint Surg* 1980 ; 62-A, 801-806.
- [3]. Caffey J. On fibrous defects in cortical walls of growing tubular bones: their radiologic appearance, structure, prevalence, natural course, and diagnostic significance. *Adv Pediatr* 1955; 7:13-51
- [4]. Brant WE, Helms CA. *Fundamentals of diagnostic radiology*, 2nd ed. Philadelphia, PA: Lippincott Williams & Wilkins, 1999:969-971
- [5]. Betsy M, Kupersmith LM, Springfield DS. Metaphyseal fibrous defects. *J Am Acad Orthop Surg* 2004; 12:89-95
- [6]. Smith SE, Kransdorf MJ. Primary musculoskeletal tumors of fibrous origin. *Semin Musculoskelet Radiol* 2000; 4:73-88
- [7]. Jee WH, Choe BY, Kang HS, et al. Nonossifying fibroma: characteristics at MR imaging with pathologic correlation. *Radiology* 1998; 209:197-202
- [8]. Greyson ND, Pang S. The variable bone scan appearances of nonosteogenic fibroma of bone. *Clin Nucl Med* 1981; 6:242-245.
- [9]. Bufkin WJ. The avulsive cortical irregularity. *Am J Roentgenol Radium Ther Nucl Med.* 1971;112:487-492.
- [10]. Hyman AA, Heiser WJ, Kim SE, Norfray JF. An excavation of the distal femoral metaphysis: a magnetic resonance imaging study. A case report. *J Bone Joint Surg Am.* 1995;77:1897-1901.
- [11]. Resnick D, Greenway G. Distal femoral cortical defects, irregularities and excavations. *Radiology* 1982 ; 143 : 345- 354.
- [12]. Pennes DR, Braunstein EM. Computed tomography of cortical desmoid. *Skel Radiol* 1984 ; 12, 40-42.
- [13]. Suh JS, Cho JH, Shin KH et al. MR appearance of distal femoral cortical irregularity (Cortical Desmoid). *J Computer Assisted Tomography* 1996 ; 20 : 328-332.
- [14]. Sklar D, Phillips JJ, Lachman RS. Case report 683. *Skel Radiol* 1991 ; 20 : 394-396
- [15]. Verdonk pcm,Verstratte K. distal femoral cortical irregularity in a 13-year old boy. A case report. *Acta Orthopædica Belgica*, Vol. 69 - 4 - 2003.
- [16]. Connolly SA, Davies KJ, Connolly LP. Avulsive cortical irregularity and F-18 FDG PET. *Clin Nucl Med.* 2006;31:87-89..
- [17]. Chaabane S, Merghani A, Drissi C. Knee Pain in a 17-year-old Girl. *Clin Orthop Relat Res* (2010) 468:2003-2006.