

Chondroblastoma of Calcaneum- A Rare Case Diagnosed on Fine Needle Aspiration Cytology (FNAC)

Dr. Prem Singh¹, Dr. Shefali Setia^{2*}, Dr. SP Khanna³, Dr. Maitrayee Roy⁴

¹Professor, ²Senior Resident, ³Professor, ⁴Assistant Professor, Department of Pathology, MMIMSR, Mullana, Ambala, India

DOI: [10.36348/sjpm.2022.v07i02.009](https://doi.org/10.36348/sjpm.2022.v07i02.009)

| Received: 13.01.2022 | Accepted: 20.02.2022 | Published: 26.02.2022

*Corresponding author: Dr. Shefali Setia

Senior Resident, Department of Pathology, MMIMSR, Mullana, Ambala, India

Abstract

Chondroblastoma is a rare, giant cell -rich benign neoplasm of bone. Fine needle aspiration cytology (FNAC) is gaining acceptance as a convenient and reliable method in preoperative diagnosis of chondroblastoma. Differential diagnosis of chondroblastoma on FNAC include giant cell-rich tumors and tumor like lesions such as aneurysmal bone cyst, giant cell tumor, chondromyxoid fibroma. Preoperative diagnosis of chondroblastoma is mandatory for treatment protocol and prognosis. We describe a case of 18 year old female patient who presented with painful swelling over right heel of one year duration. FNAC smears of swelling stained with Leishman and Giemsa stain showed neoplastic mononuclear chondroblasts showing round to oval nuclei, nuclear indentation, grooving and intranuclear inclusions with abundant vacuolated glassy cytoplasm, chicken wire calcification, multinucleated osteoclast like giant cells and chondromyxoid matrix. Histopathological examination of excised specimen revealed focal areas of mature cartilage with proliferating chondroblasts showing nuclear grooves and numerous giant cells. Thus confirming the diagnosis of chondroblastoma.

Keywords: Chondroblastoma, Calcaneum, Chicken wire calcification, Giant cells.

Copyright © 2022 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Chondroblastoma is a benign cartilaginous neoplasm and accounts for less than 1% of all primary bone tumor[1]. In 1927 chondroblastoma was described by Kolodny as a cartilage containing giant cell tumor [2]. Dr James Ewing in 1928 described it as a calcifying giant cell tumor[3]. Ernest Amory Codman in 1931 named it as an epiphyseal chondromatous giant cell tumor[4]. The histogenesis of chondroblastoma is debatable, although cartilage stem cells or epiphyseal cartilage cells are supposed to be cells of origin. It commonly arises in the epiphysis of long bones of upper and lower limbs. Other bones like pelvis, calcaneum, patella, talus are the unusual sites of involvement [5]. The neoplasm commonly occurs in the age group of 10-20 years with painful swelling at the site of presentation and radiologically presents as osteolytic lesion with sclerotic borders [6]. Here we report a case of chondroblastoma of calcaneum which

was diagnosed by fine needle aspiration cytology (FNAC) and was confirmed by histopathology.

CASE REPORT

18 year old female patient presented to our institute with complaints of pain and swelling of right foot in region of calcaneum of one year duration which progressively increased in size and she also had difficulty in walking. Clinical examination revealed diffuse tender swelling in the region of calcaneum right foot.

Plain X-ray of right ankle showed a well-defined lytic lesion with a sclerotic rim on posterior inferior aspect of right calcaneum[Figure 1A]. MRI of right ankle revealed well circumscribed focal mass lesion on the posterior inferior aspect of calcaneum measuring 2.7x3.6x2.6 cm with cortical breach inferiorly [Figure1B].

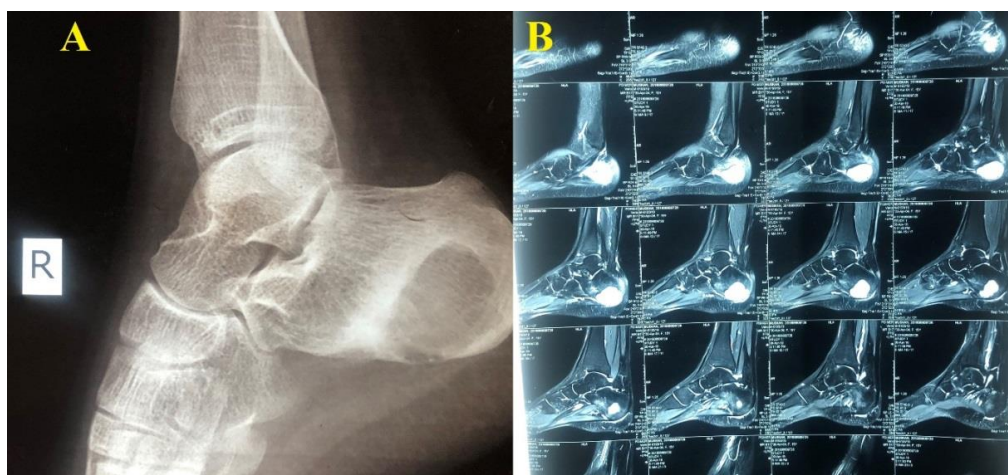


Fig-1A : Xray of right ankle shows osteolytic lesion with sclerotic borders on posterior- inferior aspect of right calcaneum. **1B :** MRI right ankle shows well- circumscribed lytic lesion seen in posterior-inferior aspect of right calcaneum.

Biochemical parameters including serum calcium and phosphorus levels were normal. FNAC from the calcaneal swelling was performed with 22 gauge needle under all aseptic precautions. Two sets of smears were prepared, air dried as well as alcohol fixed and were subjected to further staining. Conventional Leishman - Giemsa (L&G) and Hematoxylin & Eosin (H &E) stains were used. Cellular smears revealed fragments of chondroid matrix admixed with

mononuclear cells having distinct cell borders, round to oval nuclei, moderate amount of glassy vacuolated cytoplasm (chondroblasts). Chicken wire calcification and numerous multinucleated osteoclast like giant cells were noted. Nuclei of some of the cells reveal indentations, few revealing focal grooving and intra-nuclear inclusions. Many binucleated forms were also seen [Figure 2A-D].

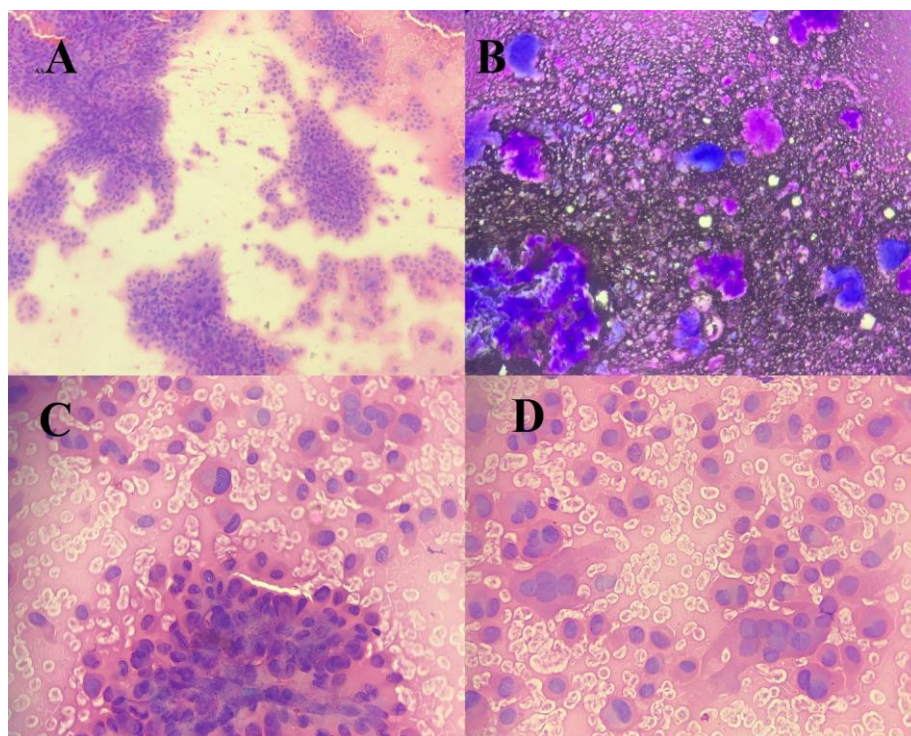


Fig-2A: FNAC smear shows chondroblast arranged in clusters, sheets. [L & G, X 100] **2B :** Fragments of chondroid matrix [L & G, X 100] **2C :** Chondroblasts revealing indentation and nuclear grooving [L & G, X 400] **2D :** Numerous multinucleated giant cells [L & G, X 400]

An excision biopsy with curettage followed by bone grafting was performed. Curettings consisted of red brown friable soft tissue masses with gritty feeling [Fig 3A]. Microscopically the lesion consisted of sheets

of round to polygonal mononuclear cells admixed with scattered osteoclast like giant cells. The mononuclear cells revealed vacuolated to eosinophilic cytoplasm with occasional nuclear grooves and were separated by

abundant interstitial chondroid matrix with foci of calcification [Figure 3B-C]. Thus the cytological

diagnosis of chondroblastoma was confirmed on histopathological examination.

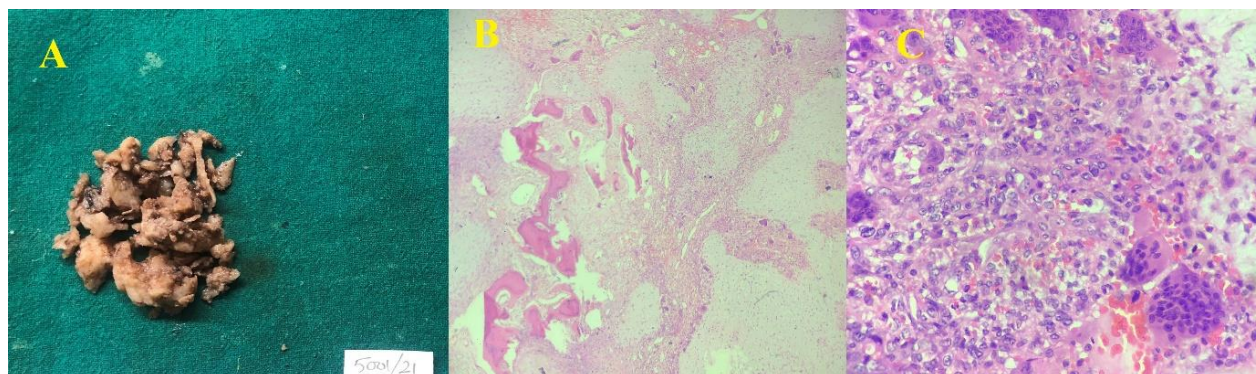


Fig-3A: Curettage specimen showing multiple fragments of red brown friable soft tissue pieces. **B :** Section showing sheets of fairly rounded to polygonal mononuclear cells (chondroblasts) embedded within benign immature cartilaginous matrix along with few bony spicules. **C :** Numerous multinucleated osteoclast like giant cells are seen and mononuclear cells revealing nuclear grooves.

DISCUSSION

Chondroblastoma was first described by Kolodny in 1927 as cartilage containing giant cell tumor [2]. WHO subsequently described it as a benign cartilage-producing neoplasm [1]. It commonly arises in epiphyseal plate or epimetaphyseal region of long bones such as proximal humerus, tibia, and distal femur. Unusual sites of involvement include calcaneum, patella, pelvis and talus [5]. Our case presentation is chondroblastoma of calcaneum which is extremely rare. Recently FNAC has been found to be a simple, safe and reliable non operative tool for evaluation of bone tumors[7]. The tumor most commonly occurs in second decade of life and is more common in men [1, 8]. Our case is that of 18 year old female patient. On radiograph typically chondroblastoma is seen as a osteolytic lesion with lobulated and smooth margins with sclerotic rim involving epiphysis [9]. Cortical breach may be present as seen in our case [10]. FNAC is fast gaining acceptance as an accurate and precise technique for diagnosis of osseous tumors [11]. Diagnostic cytological features on FNAC of chondroblastoma are sheets and clusters of mononuclear cells arranged in dispersed pattern like pebbles. The cells have well defined cell margins, glassy cytoplasm with reniform nucleus showing indentation and grooving [12]. Other cells include giant cells in a background of chondroid matrix.

Histopathological characteristic features are proliferation of chondroblasts along with mature cartilage, giant cells, and calcification. It may present with focal areas of hemosiderin deposition and numerous giant cells [13]. Our findings on histopathology showed round to oval tumor cells (chondroblasts) with lobulated nuclei, moderate eosinophilic cytoplasm with nuclear grooves. Scattered osteoclastic giant cells chondroid matrix and foci of hemosiderin deposition noted. Our histopathological

findings revealed similar features, thus confirming our cytological diagnosis. In the diagnosis of this rare tumor errors in FNAC are known to occur, especially with aneurysmal bone cyst and other giant cell- rich lesions which lead to major limitations. The possibility of giant cell tumor like areas in chondroblastoma are on record and needs to be differentiated from other giant cell rich lesions [14]. The association of Aneurysmal Bone Cyst (ABC) leads to non-representative aspirates in some cases. Aspirates of ABC are usually haemorrhagic with scanty cellularity and are composed of osteoclastic giant cells, histiocytes, osteoblasts and spindle cells. Hence for correct diagnosis multiple aspirations from different sites and radiological correlation are mandatory [7].

CONCLUSION

Chondroblastoma is a rare cartilagenous bone tumor which involves predominantly children and adolescents. FNAC is a simple, safe, reliable and non-invasive preoperative method in the diagnosis of chondroblastoma and can be used as an alternative to surgical biopsy. The cytological features of the chondroblasts and chondroid matrix are the diagnostic hallmarks of chondroblastoma.

REFERENCES

1. Fletcher, C. D., Unni, K. K., & Mertens, F. (Eds.). (2002). *Pathology and genetics of tumours of soft tissue and bone* (Vol. 4). Iarc.
2. Kolodny, A. (1927). Bone sarcoma, in *The Primary Malignant Tumors of Bone and the Giant Cell Tumor. Surg Gynecol Obstet*, 44; 172-214.
3. Ewing, J. (1928). The classification and treatment of bone sarcoma. In *Report of the international conference on cancer* (pp. 365-376). Bristol: J. Wright & Sons.

4. Codman, E.A. (1931). Epiphyseal chondromatous giant cell tumors of the upper end of the humerus. *Surg Gynecol Obstet*, 52; 543-548.
5. Dahlin, D. C., & Ivins, J. C. (1972). Benign chondroblastoma. A study of 125 cases. *Cancer*, 30(2), 401-413.
6. Jaffe, H. L., & Lichtenstein, L. (1942). Benign chondroblastoma of bone: a reinterpretation of the so-called calcifying or chondromatous giant cell tumor. *The American journal of pathology*, 18(6), 969.
7. Krishnappa, A., Shobha, S. N., Shankar, S. V., & Aradhya, S. (2016). Fine needle aspiration cytology of chondroblastoma: A report of two cases with brief review of pitfalls. *Journal of Cytology/Indian Academy of Cytologists*, 33(1), 40.
8. Kudo, T., Okada, K., Hirano, Y., & Sageshima, M. (2001). Chondroblastoma of a metacarpal bone mimicking an aneurysmal bone cyst: a case report and a review of the literature. *The Tohoku journal of experimental medicine*, 194(4), 251-257.
9. Monda, L., & Wick, M. R. (1985). S-100 protein immunostaining in the differential diagnosis of chondroblastoma. *Human pathology*, 16(3), 287-292.
10. Sehajowicz, F., & Gallardo, H. (1970). Epiphyseal chondroblastoma of bone: a clinico-pathological study of 69 cases. *J Bone Joint Surg Br*, 52, 205-226.
11. Akhtar, K., Qadri, S., Ray, P. S., & Sherwani, R. K. (2014). Cytological diagnosis of chondroblastoma: diagnostic challenge for the cytopathologist. *Case Reports*, 2014, bcr2014204178.
12. Fanning, C. V., Sneige, N. S., Carrasco, C. H., Ayala, A. G., Murray, J. A., & Raymond, A. K. (1990). Fine needle aspiration cytology of chondroblastoma of bone. *Cancer*, 65(8), 1847-1863.
13. Chen, W., & DiFrancesco, L. M. (2017). Chondroblastoma: an update. *Archives of Pathology and Laboratory Medicine*, 141(6), 867-871.
14. Spjut, H. J. (1971). *Tumors of bone and cartilage*. US Department of Defense, Armed Forces Institute of Pathology.