Fine needle aspiration cytology of chondroblastoma: A report of two cases with brief review of pitfalls

ABSTRACT
Chondroblastoma is a rare, giant cell-rich, benign neoplasm of bone. Since the past few decades fine needle aspiration cytology (FNAC) has gained momentum in preoperative diagnosis of bone lesions. At cytology, other giant cell-rich tumors and tumorlike lesions such as aneurysmal bone cyst (ABC), giant cell tumor, and chondromyxoid fibroma fall under the differential diagnosis of chondroblastoma. Due to the difference in the treatment protocol and prognosis, preoperative diagnosis is mandatory. We describe the cytomorphology in two cases of chondroblastoma diagnosed at FNAC and confirmed by histopathology. At cytology, the presence of giant cells, chondroid matrix, mononuclear cells with nuclear indentation, and grooving along with glassy, vacuolated cytoplasm are characteristic of chondroblastoma. In addition to this, the presence of chicken wire calcification is a useful clue to the accurate diagnosis of chondroblastoma at FNAC.

Key words: Calcification; chondroblastoma; fine needle aspiration cytology (FNAC); giant cells

Introduction
Chondroblastoma accounts for <1% of all primary bone tumors.[1] Usually occurring in young adolescents, it involves distal ends of long bones. However, unusual sites of presentation such as patella, talocalcaneal, and temporomandibular joint has been reported.[2,3] Since last decade, fine needle aspiration cytology (FNAC) has evolved as a simple, safe, and noninvasive preoperative tool in the diagnosis of bone tumors. It is necessary to differentiate chondroblastoma from other giant cell-rich lesions, as chondroblastoma exhibits predominantly benign behavior, though recurrences and metastasis are on record. Simple curettage with bone grafting is the mode of treatment. Here, we report cytomorphology in two cases of chondroblastoma confirmed by histopathology with a brief review of literature.

Case Report

Case 1
A 16-year-old male presented with pain and diffuse swelling on the knee joint since 2 months. There was no history of trauma. On examination, swelling was noted in the upper end of tibia measuring 3 cm × 3 cm, and was tender on palpation. The overlying skin was unremarkable. X ray showed typically lytic, centrally placed, sharply demarcated lesion with sclerotic border in the epiphysis.

Case 2
A 10-year-old male presented with diffuse swelling on the shoulder joint of 1-month duration. Local examination revealed swelling at the upper end of humerus measuring...
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4 cm × 4 cm. The overlying skin was unremarkable. X ray showed typically lytic, centered in the epiphysis.

FNAC was performed by the nonaspiration technique in the first patient using a 24 gauge needle while for the second case, ultrasound-guided aspiration was done because the lesion was deep-seated.

Cytology smears in both the cases showed similar findings. Smears were highly cellular, polyhedral cells arranged in sheets and small clusters, giving a pebble stone pattern appearance. The individual cells were monomorphous with a well-defined cell membrane, glassy cytoplasm at places showing microvacuolation. Nucleus showed indentation with nuclear grooving. Additionally seen was cartilaginous matrix, plenty of scattered osteoclast-type multinucleated giant cells, and bluish granular calcification surrounding individual cells — chicken wire calcification [Figure 1a-c].

At surgery, curettage and bone grafting was performed. Grossly, the specimen consisted of multiple irregular grey-brown tissue bits with areas of hemorrhage.

Histopathology in both the cases showed sheets of polygonal cells with thick cell membranes and fine pale vacuolated cytoplasm. The nucleus showed fine chromatin and occasional nuclear grooving. Additionally seen were osteoclast-type giant cells seen scattered throughout the tumor. Areas of cartilage formation and chicken wire calcification were noted [Figure 1d].

Discussion

Chondroblastoma is a chondroid tumor accounting for <1% of primary bone neoplasm.\[1\] It involves epiphyseal plate of long bones in young individuals. Unusual sites of location include pelvis, patella, talus, calcaneum, and temporomandibular joint.\[2,3\] Most of the chondroblastomas are benign in nature requiring simple curettage and bone grafting. However, recurrence is known to occur in 10-38% of the cases. Metastases are unusual but occur in the lungs at the time of recurrence.\[4\] As in most of the cases of bone tumors, clinical findings are disappointingly nonspecific and do not provide much insight into the pathology. This, compounded with nonconforming radiological features, leads to the tragic delay in diagnosis. Though the age of the patient and location of the lesion in the given bone are key pieces of information, accurate and early diagnosis is a must for planning appropriate treatment.

The past decade has witnessed the impressive use of FNAC in the diagnosis of bone tumors. Despite this, we have a limited case series describing FNAC findings in chondroblastoma.\[5\] FNA aspirates of chondroblastoma show mononuclear cells arranged in a dispersed pattern like pebbles. These cells have well-defined cell margins, glassy cytoplasm, and nucleus with indentation and grooving.\[5\] Apart from associated giant cells and chondroid matrix, the chicken wire calcification that has been described in histopathology sections can be readily appreciated in FNAC smears and can be a clue to diagnosis. However, errors in the FNAC diagnosis of this rare tumor are known to occur, with the major pitfalls being its association with aneurysmal bone cyst (ABC) leading to a nonrepresentative aspirate and the occurrence of a plethora of giant cell-rich lesions in the differentials.

In one large series of 12 cases of chondroblastoma, the authors described the cytomorphology of this tumor in detail. Radiology was not supportive in most of the cases. In eight cases, diagnosis was rendered preoperatively. In three cases, the diagnosis was missed on FNAC, among which, one was associated with ABC and in another case an erroneous diagnosis of a giant cell tumor was made.\[5\] The possibility of giant cell tumorlike areas in chondroblastoma
are on record. Cabrera et al. described pitfalls in the FNAC diagnosis of chondroblastoma in the temporomandibular joint. The cause of misdiagnosis in one case was due to its association with ABC, leading to nonrepresentative aspirate. In the second case, due to the location of the tumor in preauricular region, cartilaginous stroma aspirated was misinterpreted as chondroid stroma of pleomorphic adenoma in the salivary gland. Sherwani et al., in a study of 110 cases of bone lesions attributed the missed diagnosis in two cases of chondroblastoma at FNAC to inadequate sampling and misinterpretation as giant cell tumor.

All the giant cell containing lesions fall under the differential diagnosis of chondroblastoma. Most common of these are giant cell tumor, ABC, and chondromyxoid fibroma. In giant cell tumor, the mononuclear cells are spindle-shaped and occur in clusters. In chondromyxoid fibroma, the smears are sparsely cellular and lack the mononuclear cell component. Instead, stellate cells with pleomorphism are noted. Aspirates in ABC are usually hemorrhagic, scantily cellular, composed of osteoclast giant cells, histiocytes, osteoblasts, and spindle cells. Differentiation of chondroblastoma from solid ABC is a challenge as well. In addition to chondroblastoma, ABC can occur secondarily in giant cell tumor and osteosarcoma. Hence, multiple aspirations from different sites and awareness of the associations are important.

Conclusion

Chondroblastoma is a rare bone tumor, the cytomorphology of which is very characteristic. This report reiterates the cytomorphic findings in chondroblastoma and its differential diagnosis from other giant cell containing lesions of bone. The collective application of the knowledge of the cytomorphic features of this rare bone tumor would aid in accurate preoperative diagnosis even in the absence of typical clinical and radiologic presentations.

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Conflicts of interest
There are no conflicts of interest.

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