

Cytopathological Diagnosis of Giant Cell Tumor of First Metacarpal: A Rare Site for a Common Tumor

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ABSTRACT

Giant cell tumor (GCT) or osteoclastoma is a common benign tumor which is locally aggressive and is of unknown etiology. They usually occur in young adults (commonly between 20-50 years) at the epiphysis region of long bones. Small bones of hand are very rare sites of these tumors. Here, we present the case of a 18-year-old male who presented with a swelling in the right thenar region. The X-ray revealed an osteolytic lesion in the first metacarpal bone of right hand with soft tissue swelling. Fine-needle aspiration cytology (FNAC) and subsequent histopathology revealed a giant cell tumor. The case is presented because of the unusual site of the tumor and the characteristic radio-cytopathological findings.

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Introduction

Giant cell tumor (GCT) of the bone is a benign, aggressive tumor with frequent local recurrences and potential for metastasis and malignant transformation.^[1] It usually occurs in young adults (commonly between 20- 40 years) with peak incidence in the 3rd decade. The male: female ratio is 3:4. Nearly 85-90 % occur in the epiphyses of long bones of which 46.2% occur around knee joint.^[2] Other frequent sites are distal radius, proximal humerus and fibula. 4% occur in pelvic bone. The small bones of the hand and feet are very rarely involved.^[3] Giant cell tumors of hand represent as low as 2% cases.^[2,4] Here we are presenting a case of giant cell tumor of first metacarpal bone of right hand diagnosed by FNAC, which is a very rare site for such tumor.

Case Report(S)

An 18 year-old male, presented to the Surgical Out-patient Department with the chief complaints of swelling and pain over the right thenar region for 6 months and 4 months respectively. The swelling was insidious in onset and gradually increasing in size. Pain was mild to moderate in intensity and was dull aching in nature. It was relieved on medication but aggravated by activity. There was no history of trauma or any constitutional symptoms.

On physical examination, there was a localized ovoid swelling 4 X 3 cm over the right thenar region opposing the first metacarpal with well- defined margins and stretching of overlying skin but the overlying skin was free. (Figure 1a) The swelling was hard in consistency and tender on deep palpation.

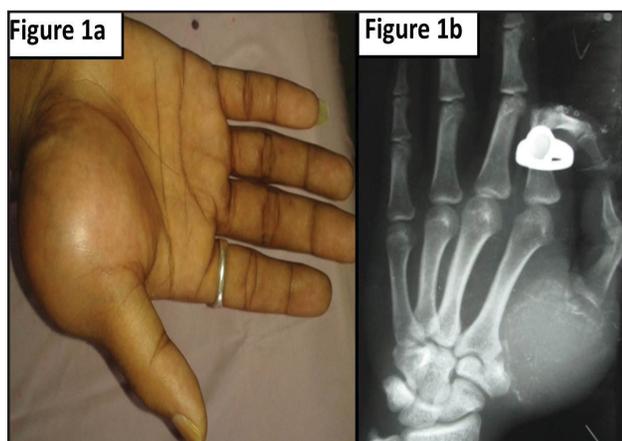


Fig. 1: (a) Photograph showing the swelling in the right thenar region; (b) X-Ray showing an expansile osteolytic lesion involving the whole of first metacarpal bone with soap bubble appearance.

Radiographs revealed an expansile osteolytic lesion involving the whole of first metacarpal bone and with soap bubble appearance, cortical break and soft tissue swelling (Figure 1b)

The complete blood counts and thyroid function tests were within normal limits.

Fine needle aspiration was subsequently performed which revealed cellular smears comprising of a dual population of mono-nuclear spindle cells in cohesive clusters as well as arranged in singles along with osteoclastic giant cells containing numerous uniform nuclei. The spindle cells had ovoid nuclei, bland chromatin, small nucleoli, moderate amount of cytoplasm and were devoid of nuclear pleomorphism. (Figure 2)

Ray's amputation was performed which involved excision of the entire finger with the corresponding first metacarpal.

The cytological diagnosis was confirmed by histopathological examination of the excised tumor which comprised of two main components, stromal cells and osteoclastic giant cells. The giant cells were large, uniformly distributed throughout the lesion, have 20 -30 nuclei mostly arranged toward the center. The mono nuclear cells were round to oval and nuclei resembled those of giant cells. No atypical mitosis or necrosis was noted. Presence of giant cells and stromal cells were noted in lymphovascular spaces at the periphery of the tumor. (Figure 3)

After surgery the patient recovered in 2 months and after 6 months of follow up, there were no signs of recurrence both clinically and radiologically.

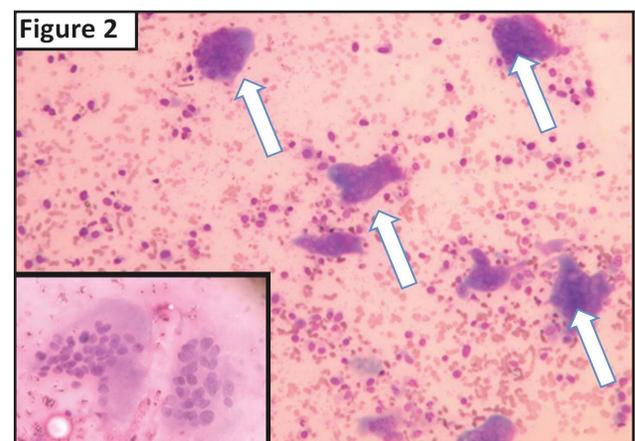


Fig. 2: Microphotograph showing the osteoclast-like giant cells with scattered stromal cells in a hemorrhagic background. (MGG stain; X100); Inset shows two such giant cells. (H&E; X 400)

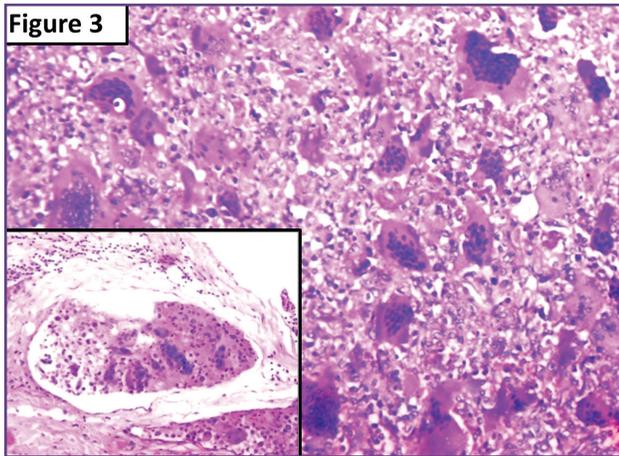


Fig. 3: Microphotograph showing the characteristic histopathological features of uniformly distributed giant cells among the benign looking stromal cells. Inset shows tumor emboli in lymphovascular spaces. (H&E; X 100)

Discussion

Giant cell tumor of the bone is a benign, locally aggressive lesion having potential of metastasis and malignant transformation. It is a tumor composed of connective tissue stromal cells having the capacity to recruit and interact with multinucleated giant cells that exhibits phenotypic features of osteoclasts.^{[1],[5]}

Giant cell tumors predominate in epiphyseal region of long bones (75-90%). Spine and innominate bones are involved occasionally. Giant cell tumors of the bones of the hand are very rare accounting for only 2% of cases. Overall they appear in a younger age group and have shorter duration of symptoms averaging 6 months or less before diagnosis is made.^{[2],[4]}

Radiological features reveal expansile, lytic lesion with soap bubble appearance^[6] as was seen in our case.

Cytological features comprise of a cellular smear consisting of a double population of mononuclear spindle cells and giant cells of osteoclastic type.^[7]

Differential diagnosis includes giant cell tumor of tendon sheath, aneurysmal bone cyst, osteoblastoma, chondroblastoma, brown tumor of hyper-parathyroidism, reparative granuloma of jaw, chondromyxoid fibroma, non-ossifying fibroma, foreign body giant cell reaction and osteosarcoma.^[6,7]

Giant cell tumor of tendon sheath is a soft tissue lesion of the hands and feet which appears on plain radiograph as a fairly circumscribed soft tissue mass with few cases showing cortical erosion. While a giant cell tumor of bone show a dual population of stromal cells and multinucleated

giant cells, in giant cell tumor of tendon sheath there is presence of mono nuclear histiocyte-like polygonal to spindle cells, foamy macrophages, hemosiderin laden macrophages and few multinucleated giant cells.^[8]

Aneurysmal bone cysts have radiological features same as giant cell tumor. Most characteristic findings are large amount of blood obtained during aspiration, paucicellular smears, scattered osteoclastic giant cells, spindle shaped fibroblastic cells and hemosiderin laden macrophages.

Osteoblastoma occurs mainly in the vertebral column in the third decade with male predominance. Cytology reveals cells of osteoblastic type, clusters of spindle cells mixed with osteoclastic giant cells.

Chondroblastomas are rare tumors arising mostly in the epiphysis of long bones during the second decade with a male preponderance. Cytology shows mononuclear cells with well-formed cytoplasm, rounded nuclei, osteoclast like giant cells and fragments of chondroid matrix.

Giant cell reparative granuloma and brown tumor of hyperparathyroidism contain areas of aggregated giant cells having less nuclei than giant cell tumor and more fibrotic stroma and hemorrhage and hemosiderin deposit than giant cell tumor.

Chondromyxoid fibroma is a very rare tumor occurring in the metaphyseal region of long bones in second or third decade and comprises of myxoid background matrix, cartilage fragments, dispersed spindle shaped fibroblastic cells and osteoclastic giant cells.

Nonossifying fibroma is very rare on fine needle aspiration cytology. Only one case was reported which comprised of fibroblast like cells, histiocytic cells with foamy or vacuolated cytoplasm and osteoclastic giant cells. A foreign body giant cell reaction contains only giant cells but not mononuclear cell stroma.

Osteosarcoma may contain giant cells but there will be pleomorphism and nuclear atypia in osteosarcoma.^[9]

Due to the presence of multiple giant cell containing lesions, diagnosing giant cell tumor on cytology is quite difficult. Clinicoradiological correlation as well as histopathological confirmation is necessary for diagnosis. In our case, there were both stromal cells and osteoclast like giant cells but features of other giant cell containing lesions like giant cell tumor of tendon sheath, aneurysmal bone cyst, osteoblastoma, chondroblastoma, brown tumor of hyper parathyroidism, reparative granuloma of jaw, foreign body giant cell reaction were absent. The X- ray finding coupled with the cytological features guided the diagnosis of giant cell tumor although the location was not

a common one. However the subsequent histopathological examination confirmed the cytological diagnosis.

The treatment of giant cell tumor should be surgical when feasible. It consists of curettage with bone grafting or en bloc excision with replacement by allograft.^[6]

Conclusion

Giant cell tumor involving the base of metacarpal bone and is a very rare site for giant cell tumor. Giant cell tumor in the small bones of the hand can present a challenge both in radiological diagnosis due to rarity and in pathologic diagnosis due to similarities with other reactive, benign or malignant giant cell containing lesions. This case is presented because of the unusual site of the tumor and characteristic radio-cytomorphological features which helped to arrive at a confirmatory diagnosis.

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Competing Interests

None declared

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