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Cytological Diagnosis of Giant Cell Tumour In Foot Bone: A Case Report

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ABSTRACT ***Introduction:*** *Giant cell tumour of bone occurs infrequently, comprising 5% of all bone tumours, both benign and malignant. Giant cell tumour is usually seen in patients over 20-40 years of age, following skeletal maturity. GCTs are observed predominantly at ends of long bones, most commonly located in and around the knee (distal femur, proximal tibia) and wrist (distal radius). FNAC smears in context of clinical data and radiological findings are fairly characteristic to suggest the diagnosis of GCT bone, comprising of closely intermixed, 2 cell population of mononuclear spindle and giant cells of osteoclastic type. Here we present a case of 35 year old female with swelling in right foot medial aspect since 2 year. Through combined evaluation of its clinical, radiological, and cytological finding it was diagnosed as giant cell tumour of foot bone.*

KEYWORDS : Giant cell tumour of bone, Histopathology, Incidence, Survival, Osteosarcoma

Introduction:

Giant cell tumours of bone also known as osteoclastoma occur most commonly in third decade of life. The classic location is epiphysis of a long bone and the most commonly affected sites are the lower end of femur, the upper end of tibia and the upper end of radius1. A female predominance exists with F:M ratio of 1.3-1.5: 1[2]. GCTs of bone have been described as the most challenging benign bone tumours. Although benign, GCTs show a tendency for significant bone destruction, local recurrence, and occasionally metastasis. Most commonly, GCTs are solitary lesions: less than 1% is multicentric[3]. These typically benign tumours can interestingly metastasize to lung and are seen in approx. 3% of cases4. In 1-3% of GCTs cases, spontaneous transformations to high grade malignancy can occur5. Malignancies in GCT of bone are typically classified as primary or secondary. A primary malignant GCT of bone will most often arise concurrently and closely with benign tumour, however, spontaneous neoplasm may occur in absence of benign growth. Secondary malignant GCT are more common than primary and arise after treatment of previously benign tumour and more often in patients undergoing radiation therapy with or without currettage6..In malignant transformation, sarcomatous features are presents within stromal components including cells with "hyperchromatic nuclei with variably prominent nucleoli".

Case Report:

A 35-year-old female presented to orthopaedics department of RIMS, Ranchi with complaint of swelling in right foot medial aspect since 2 year. The swelling was progressively increasing since last 6 month and also had history of gradual increase in pain .There was no history of fever, weight loss or other constitutional symptoms. On examination, the swelling was 5x5 cm, circumscribed, firm-hard, tender, fixed to bone.

The surgeon advised routine blood investigation, X-ray right foot AP and Lateral view, FNAC of swelling. The test results including complete blood count, ESR, renal function and liver function are within normal limit. X-ray foot both AP and Lat. shows an osteolytic lesion in 1stmetatarsal bone with cortical destruction of bone and extension to soft tissue (Fig.1) in which typical soap bubble appearance can be appreciated.

FNAC smear are richly cellular, consisting of mixture of cell clusters and dissociated cell. The majority of tumour cells are elongated and mononuclear with moderate to abundant cytoplasm and sharp cytoplasmic borders. A double cell population is seen in which multinucleated osteoclastic giant cell attached to periphery of mononuclear cell(Fig.2).

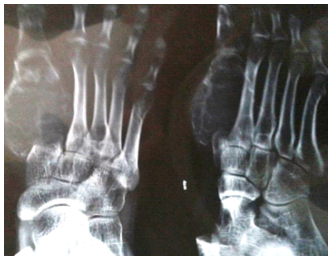

Fig.1 X-ray AP view of foot shows an osteolytic lesion with soap bubble appearance in 1st metatarsal.

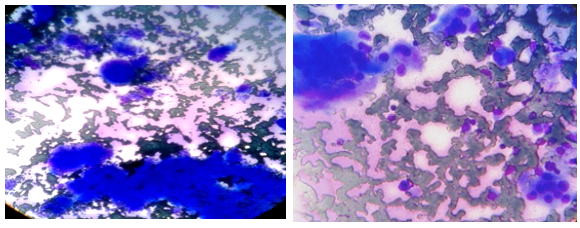

Fig.2 Left LGxLP Cohesive plump spindle cells, multinucleated giant cells located peripherally.

Right LGxHP Dispersed mononuclear cells with Osteoclastic giant cells.

Discussion:

Giant cell tumour of bone is a relatively uncommon tumour of the bone of unknown etiology. It is characterized by the presence of multinucleated giant cells (osteoclast-like). GCTs are generally benign but aggressive and destructive tumour of bone that typically affect females slightly more common than males within the age of 20-40 years old, following skeletal maturity. They usually originate from the epiphysis of long bones. Less common sites are

fibula, sacrum, proximal humerus, distal tibia, foot bones and spine in vertebral body. Most commonly, GCTs are solitary lesions: fewer than 1% are multicentric. Multicentric involvement tends to be more clinically aggressive, and unlike the solitary lesions, multicentric GCT has a propensity for the small bones of the hands and feet7. Patients with multicentric lesions tend to be younger than those with lesions elsewhere. Patients usually present with pain and limited range of motion caused by tumour's proximity to the joint space. Swelling may occur, as well, if the tumour has been growing for a long time. Some patients may be asymptomatic until they develop a pathologic fracture at the site of the tumour. Radiographically, giant cell tumours (GCTs) are lucent and eccentrically located within the bone. These lesions can appear aggressive and are often characterized by extensive local bony destruction, cortical breakthrough, and soft-tissue expansion. Radiologically the tumours may show characteristic 'soap bubble' appearance.

GCTs are categorized according to the Enneking staging system , where the pathologic spectrum ranges from static and confined to bone(stage 1) to aggressive, extending to soft tissue(stage 3)[8]. A radiographic grading system developed by Campanacci et al. grades lesions from 1 to 3 with grade 1 lesions having well defined margins and intact cortex, and grade 3 having irregular margin and cortical destruction[9].

While GCTs account for approximately 20% of all benign bone tumours, malignancies in GCT of bone are much rarer, occurs in about 2% of all cases and are classified as primary or secondary as described above. In both primary and secondary malignant GCTs, osteosarcomatous transformation is the most frequent histological type seen however malignant fibrous histiocytoma and fibrosarcoma may also develop.

Cytologically in GCTs, there are mononucleated and multinucleated cells. The former often in clusters or, less often, are dispersed. They have spindle or plump cell bodies with moderate amounts of cytoplasm and well-defined cytoplasmic membranes. The oval nuclei demonstrated fine, evenly distributed chromatin and small 1-2 nucleoli. The multinucleated cells are osteoclast like and are attached to periphery of spindle cell clusters or lying freely. They have a well-demarcated cytoplasm and contained from a few to several dozen monomorphic nuclei with morphology of nuclei of mononuclear cells. This characteristic arrangement of stromal cell and osteoclastic giant cell cytologically differentiate it from other giant cell containing lesion. The differential diagnosis include Aneurysmal bone cyst, Chondroblastoma, Chondromyxoid fibroma, Giant cell granuloma, Brown tumour of hyperthyroidism, Metaphyseal fibrous defect/non-ossifying fibroma, osteoblastoma, osteosarcoma, Pigmented villonodular synovitis in which osteoclastic giant cells are only focal.

Giant cell tumour is extremely rare in foot bones as per 25 year experience in a tertiary care hospital(Minhas MS, et al. J Pak Med Assoc. 2015) where out of 240 cases of giant cell tumour only 13 related to foot bones. All presented with radiologically stage 2 or 3. The GCTs in foot bones shows early involvement of entire bones, more aggressive behaviour with recurrence potential. The preferred treatment options are resection with reconstruction, curettage and filling cavity with bone graft/cement, resection athrodesis and resection arthroplasty10. In general, the presence of tumour is the indication for surgery. Radiation therapy and embolization generally are reserved for cases in which surgical treatment is not feasible. Radiation therapy has been proposed for patients who are not surgical candidates.

When FNAC smears are amply cellular and of good technical quality the combined evaluation of clinical, radiological and cytological findings may suggest a definitive diagnosis of giant cell tumour[11].

Conclusion:

GCTs of bone are benign but locally aggressive primary bone tumour. Giant cell tumour in foot bones is a rare tumour and shows specific clinical and radiographic features with early involvement of entire bones, more aggressive behaviour with recurrence potential. The case is being reported for its rarity and cytological diagnosis along with clinicoradiological finding in GCT is as reliable as histopathological diagnosis for treatment and management purpose.

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