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# Giant Cell Tumor of Distal End of Femur with Pathological Fracture Treated by Resection and Megaprosthesis: A Case Report

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**Abstract:- Giant cell tumor (GCT) is usually a benign tumor of the bone which arises from the metaphysis area and may typically extends into the epiphysis of the long bones. These are neoplasms arising from mesenchymal stromal cells and shows varied manifestations. GCT is considered to be of benign nature but 3% of giant cell tumors of bone are primarily malignant in nature or will undergo malignant transformation and metastasize to lung and other areas. Pathological fracture rates range from 9% to 30% among patients with GCTs of the bone at the time of initial presentation. Due to the lack of definite clinical, radiological, or histological parameters that can accurately predict the progression of the disease, treating this tumour remains a difficult problem. Patients who present with a pathological fracture are frequently thought to have a more aggressive form of disease, which increases their chance of local recurrence and worsens their prognosis. We consider it essential to share a case of a distal femoral GCT with a pathological fracture that was treated by enbloc excision and reconstruction with megaprosthesis with good functional outcome.**

***Keywords:-*** *GCT, Distal femur, Pathological fracture, Megaprosthesis.*

## I. INTRODUCTION

Giant cell tumour (GCT) is a benign neoplasm of bone which arises primarily from bone and typically involves the epiphysis of long bones. It is one of the commonest tumor that is presented to Orthopaedic surgeon. It accounts for 20% of all benign bone tumours and about 5% of primary bone tumours.[1] It is more prevalent in southern part of India and China, where GCT accounts for 20% of all primary bone tumors [2]. They typically affect patients between the ages of 20 and 40, with a slight female predominance.

The progression of GCT can have a wide range of natural histories, including localised bone destruction, local metastasis, pulmonary metastasis in 3% of patients, metastasis to lymph nodes (rarely), and malignant transformation (rare) [3-7].

GCT generally has a benign course, but it is known for local recurrence, which has been found to occur between 10% and 50% in various studies. Only 10% of cases have been known to have undergone malignant transformation.[8]

The most common locations of GCT are the distal femur, proximal tibia, and distal radius, respectively.[9, 10.] Paget disease may be associated with GCT, which most frequently affects the skull, facial bones, pelvis, and spine. [11].

Majority of the patients with GCT have progressive pain that often is related to activity in initial days and then becomes evident at rest. Unless there has been a pathological fracture, the pain is rarely severe. Pathological fractures range from 9% to 30% among patients with GCTs of the bone at the time of initial presentation. [12, 13]

Patients who present with a pathological fracture are usually considered to have more aggressive form of disease. [14] Plain radiograph usually shows eccentric radiolucent lytic lesion of epiphysis with thinned out cortex. Magnetic resonance imaging (MRI) is helpful in determining the extent of the lesion within the bone and in the soft tissue. On MRI, the lesion usually appears dark on T1-weighted images and bright on T2-weighted images. MRI also may reveal fluid-fluid levels which is typical of a secondary aneurismal bone cyst, that occurs in 20% of patients. Diagnosis is confirmed by histopathogical examination. Grossly, these lesions are chocolate brown, soft, spongy, and friable with blood filled cavities. Microscopically, multinucleated giant cell is seen with background network of stromal mononuclear cells. [15]

## II. CASE REPORT

This is a case of 26 year old female who presented to opd with pain and swelling of left knee since 1 year which are gradual in onset. Pain was dull aching, non radiating associated with weight bearing on left lower limb without any constitutional symptoms. Patient sustained trivial trauma due to accidental fall after which she was unable to walk and weight bear on that limb. There were no similar complaints in other joints. on examination, patient was conscious, coherent, oriented to time, place and person and vitals are stable. There was 10*8cm solid mass with hard consistency over left distal femur without local rise of temperature .Tenderness and crepitus was present, knee movement restricted and there was no distal neurovascular defecit. Overlying skin was freely mobile without any scar, sinus or dilated veins. Plain radiograph shows expansile lytic lesion involving distal femoral epiphysis and

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metaphysis with fracture of distal femur. There was no periosteal reaction. . Patient had her previous xrays of knee which shows initial small, eccentric, radiolucent lytic lesion on lateral aspect of distal femur without any periosteal reaction and without any fracture, which progressed gradually to involve whole distal femur (predominantly on lateral aspect) with thinned out cortex and surrounding soft tissue involvement which lead to pathological fracture.

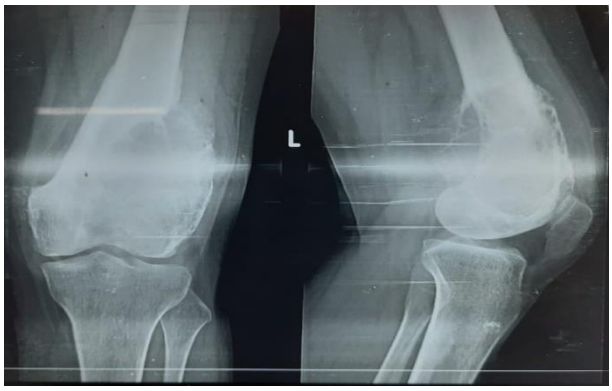

Fig. 1: xray showing GCT Left knee

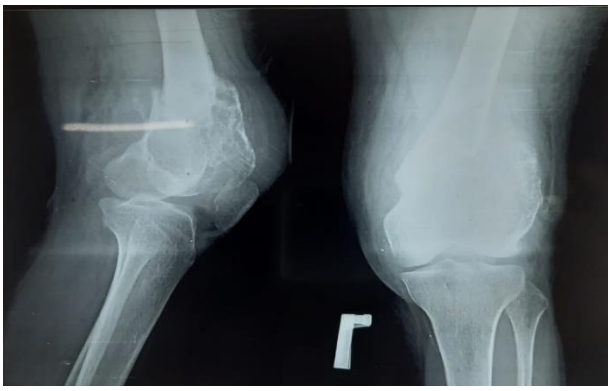
Fig. 2: Xray of GCT with fracture

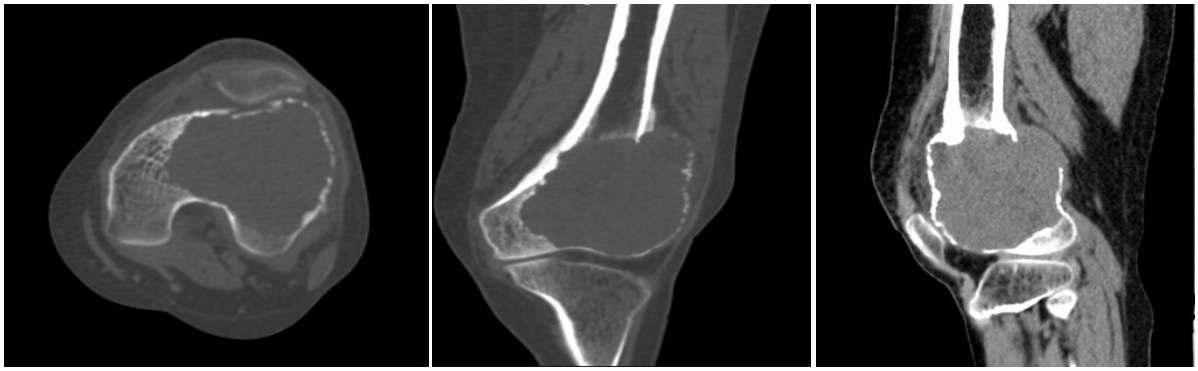
Fig. 3: CT images –axial, coronal and sagittal cuts

MRI of left knee shows lobulated expansile heterogenous enhancing lesion in metadiaphyseal region and extending to epiphysis of distal end of left femur upto the articular surface without breech in the articular cortex of distal femur. There is associated thinning and break at posterior and lateral aspect of left lateral femoral condyle.

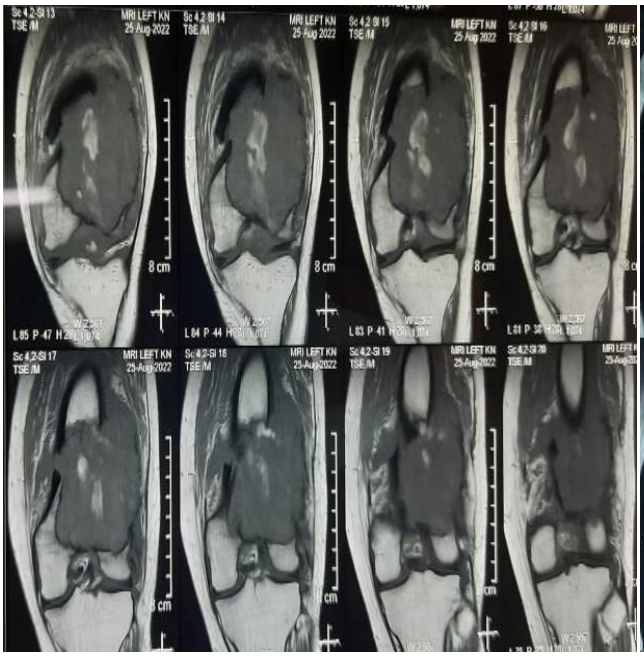
Fig. 4: MRI CORONAL

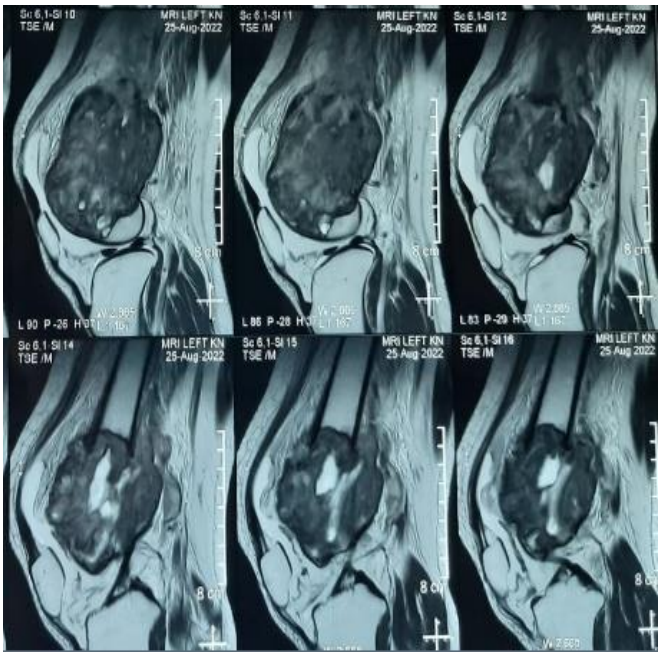
Fig 5: MRI SAGITTAL

FNAC was done to confirm the diagnosis which showed very few osteoclast type of giant cells with occasional spindle cells in a haemorrhagic background. Computed tomography of the chest, ultrasonography of the abdomen and pelvis were done for

screening of metastasis and there was no evidence of any secondaries. Patient was planned for resection of tumor and insertion of custom made megaprosthesis.

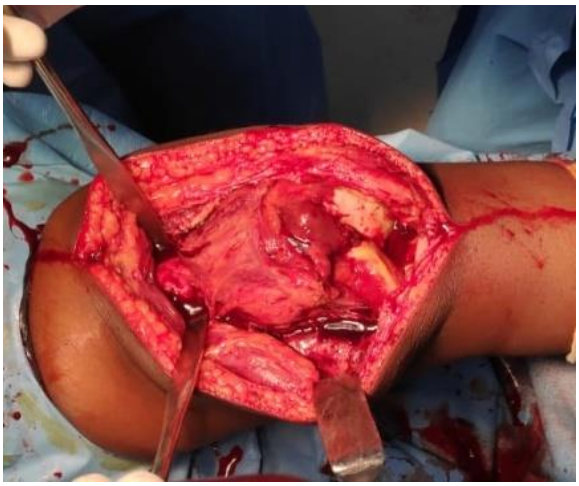
Fig. 6: GCT after dissection

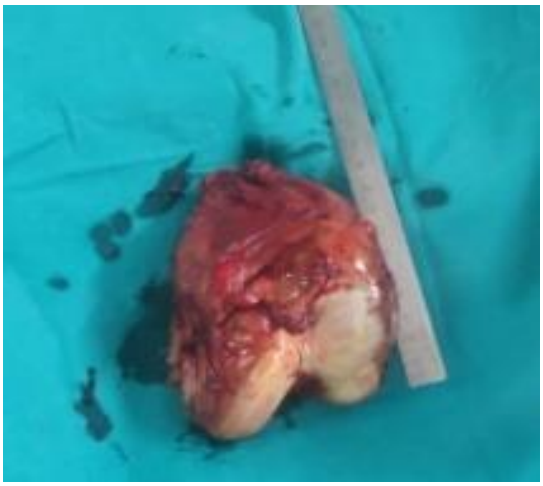
Fig. 7: GCT after resection

Extended medial parapatellar approach was used which helps in vascular dissection and tumor dissection was carried out. The technique of sleeve resection of quadriceps musculature was used which helps in retaining the functioning rectus femoris tendon.

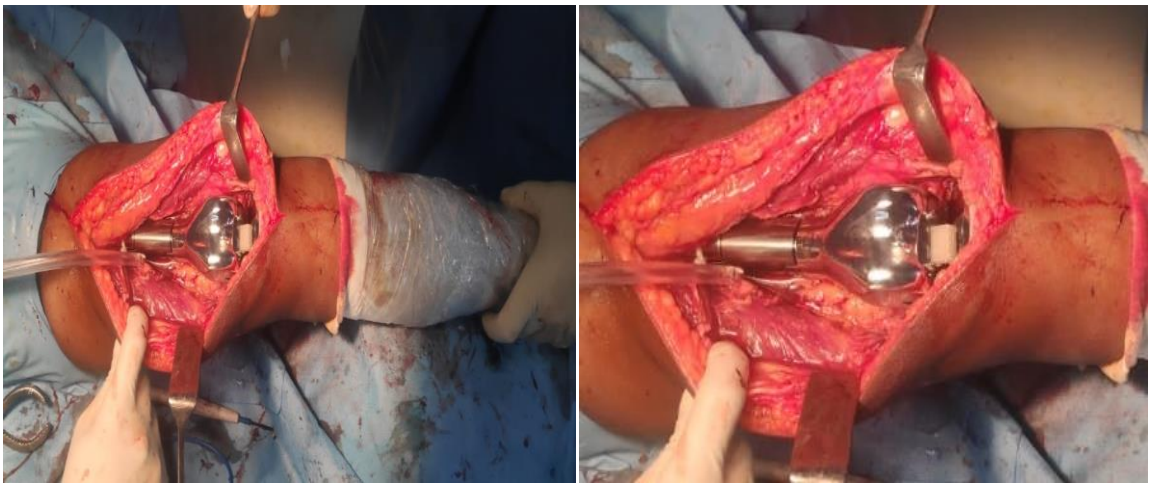
Fig. 8: custom prosthesis after insertion


Fig. 9: MEGAPROSTHESIS

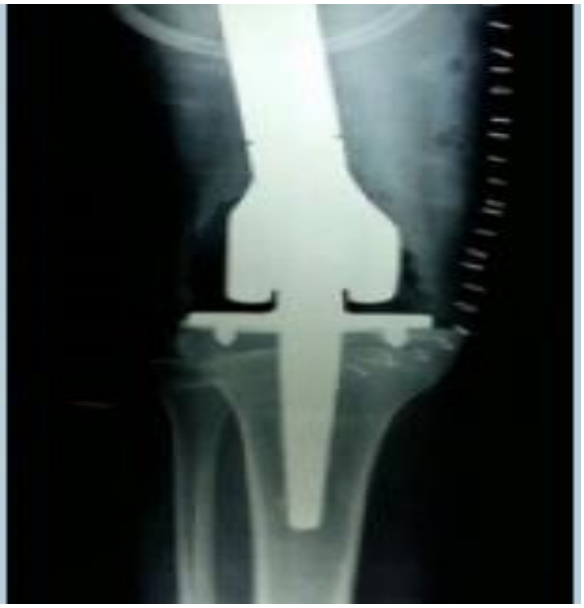
Fig 10: POST OP XRAY

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The custom mega prosthesis contains a femoral component, a pivot pin, a thrust-bearing pad which is made up of high molecular weight polyethylene and a tibial component. Proximally, the prosthesis is given 6° lateral angulation to resemble the valgus angulation of the lower limb. The thrust-bearing pad's function is to provide a flexion of 150° between the tibial and femoral components. 3° of rotation is imparted between the femoral and tibial component by the rotating axis mechanism.

Physiotherapy by Quadriceps strengthening exercises was started on 2nd post op day. Weight bearing was allowed with the help of walker on 3rd post op day. On 15th postop day, sutures were removed. Knee bending was started after 3 weeks. At the time of follow-up after 2 months, patient was able to walk without any support with a good range of flexion. There was no evidence of any complication like peri prosthetic infection, flap necrosis or prosthetic failure.

## III. DISCUSSION

The management of juxta-articular giant cell tumors around the knee occurring in young patients continues to be one of the most challenging areas in orthopedic oncology[16]. Enneking's and Campanacci's radiographic classifications and surgical staging are useful in planning the initial surgical treatment of GCT. Many active (Stage 2) lesions and most of the aggressive (Stage 3) lesions have a higher incidence of local recurrence (20-50%) when treated by curettage with or without bone grafting [17, 18]. The use of methyl methacrylate cement has equivalent recurrence rates[19]. Because of the local aggressive behaviour of GCT and risk of local recurrence, some authors recommend en bloc resection and reconstruction for these Grade III lesions to prevent local recurrence and to preserve the joint[20]. Although en bloc resection is the treatment of choice for these tumors, wide resection creates a problem for the reconstruction of large bone gaps. The reconstructive procedure has to be based on several considerations, such as durability of the surgical procedure, the oncological prognosis, restoration of the anatomy and function, and the needs of the patient[21]. Rotationplasty gives excellent functional results but the cosmetic outcome after this procedure is a serious disadvantage[22]. Resection arthrodesis of knee achieves excellent stability but has the major drawback of lack of knee motion[23]. After resection of the bone tumor, the use of custom mega prosthesis has become the treatment of choice[24]. It has become the primary modality of choice for the management of malignant bone tumors in lower limb[25]. When disease progression has led to clinical situations that prevent skeletal reconstruction following intralesional curettage and in benign aggressive lesions with pathological fractures, custom mega prosthesis has proven to be a simple, technically superior method of replacing the lost segment of bone[26]. The benefits of a custom mega prosthetic arthroplasty are low recurrence rates, early recovery of knee function, cost effectiveness and unassisted ambulation. The various complications of mega prosthesis include flap necrosis, secondary infection, aseptic loosening and periprosthetic fracture[27, 28]. Bone resection is not the usual method fo choice because of its significant morbidity. It is only indicated in GCT of proximal radius and distal ulna and fibula, tubular bones of hand and foot, coccyx, sacrum and pelvic bones[29, 30]. Due to concerns about the therapy's effectiveness and reports mentioning sarcomatous transformation following radiotherapy, radiation therapy is not commonly employed as an adjuvant treatment. [31]. When surgery is not an option or if surgery results in severe disfigurement , radiotherapy might be used as a substitute. [32]. We did not use any radiotherapy in the treatment of our patients.

## IV. CONCLUSION

Distal femur endoprosthetic reconstruction with custom made megaprosthesis was shown to be a safe and reliable technique of reconstructing a large bony defect, created after resection of locally aggressive juxtaarticular tumor with pathological fracture, providing good functional and oncologic outcomes.

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