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A case report of giant cell tumour of right sided distal end femur treated by intralesional curettage and bone grafting with cementing

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Abstract
Giant cell tumour of the bone (GCT) or osteoclastoma is a relatively uncommon, generally benign and locally aggressive tumour. It comprises around 5% of primary bone tumours and 20% of benign bone tumours. Around 55% of the giant cell tumours occur adjacent to the knee joint either in the distal end of femur or the tibia. We present a case of 58 year old female with a giant cell tumour of the right sided distal end of femur with inability to mobilize the limb. The patient was managed operatively by right sided intralesional curettage and bone grafting with cementing of the distal femur. The patient has improved symptomatically with no joint stiffness, no pain and near normal range of motion.

Keywords: Giant cell tumour, GCT, distal end of femur, intralesional curettage, bone grafting, cementing

Introduction
Giant cell tumour of the bone (GCT) or osteoclastoma is a relatively uncommon tumour comprises only 5% of primary bone tumours and 20% of benign bone tumours. 74% are in the age group of 15 to 40 and the peak incidence is the latter half of third decade. There is a gradual decrease in incidence after the fifth decade with only 13% reported after the age of 50. GCT occurs in approximately one person per million per year. The usual site of GCT is at the long bone metaphysis, especially the distal end of femur or tibia, distal end radius, upper end of humerus and lower end of tibia [1]. Current case reports GCT of right sided distal end femur for which excision and curettage-intralesional curettage with bone grafting and cementing was done.

Case report
We present a case of 58 year old female with pain in the right knee since 5 years with preceding history of trauma. She took painkillers on and off for one year to relieve the pain. She had persistent pain with intermittent discomfort since 4 years with difficulty in walking. She took painkillers for the same during this time period, but the pain was persistent. The patient came to DY Patil Hospital OPD with swelling and pain in right knee and inability to walk and mobilize the right lower limb since one month. On examination, the distal neurovascular status was intact, swelling was warm and smooth with variable consistency and tenderness present on firm palpation. Range of motion was severely restricted and painful. The following were her x-rays:
MRI of the right knee showed a well-defined lobulated lesion at the distal end of the right femur involving the epimetaphyseal region extending into the shaft and to the subarticular region of the trochlear fossa measuring 5.3 x 3.4 x 3.8 cm with marrow oedema in the femoral condyles and no overt extra-osseous soft tissue or extension to the joint. A biopsy of the right distal femoral lesion was done which revealed giant cell tumour of the right distal end of femur bone. Routine investigations were done and fitness for surgery taken. We did an excision and curettage (Intralesional curettage) followed by bone grafting and antibiotic cementing for the GCT.

The right lower limb was scrubbed, painted and drapped including bone graft site of right iliac crest. Tourniquet was applied. Approximately 10cm parapatellar median incision was taken and dissection done in layers. Capsulotomy was done and window flap was created over medial cortex of medial condyle. The medial cortex of medial condyle was found to be thin. The soft tissue found beneath cortex was excised completely and sent for histopathology. The inner cortex of cavity was freshened up with help of burr and wash given with betadine and H2O2. An incision was taken over iliac crest 2cm posterior to ASIS and cancellous bone graft taken from iliac bone. The bone graft was then applied over the inferior lateral wall, anterior and superior wall with help of gel foam. Then the antibiotic cementing was done and the cement was put in the empty cavity. The position of bone graft and antibiotic cement was confirmed under C-arm guidance in AP and lat found satisfactory.

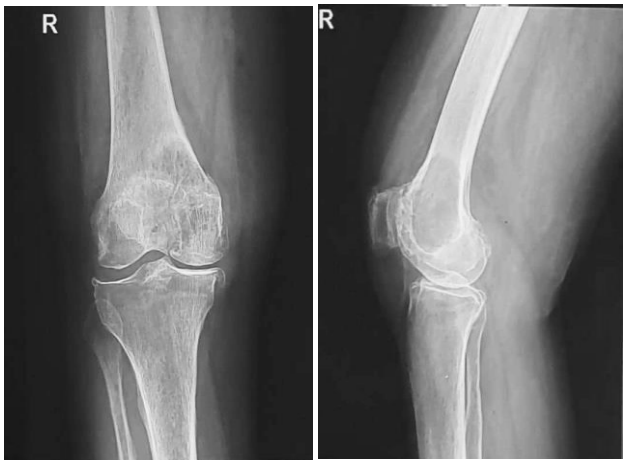

Fig 1: Preoperative x-rays of the patient showing AP and lateral radiographs of the right knee.

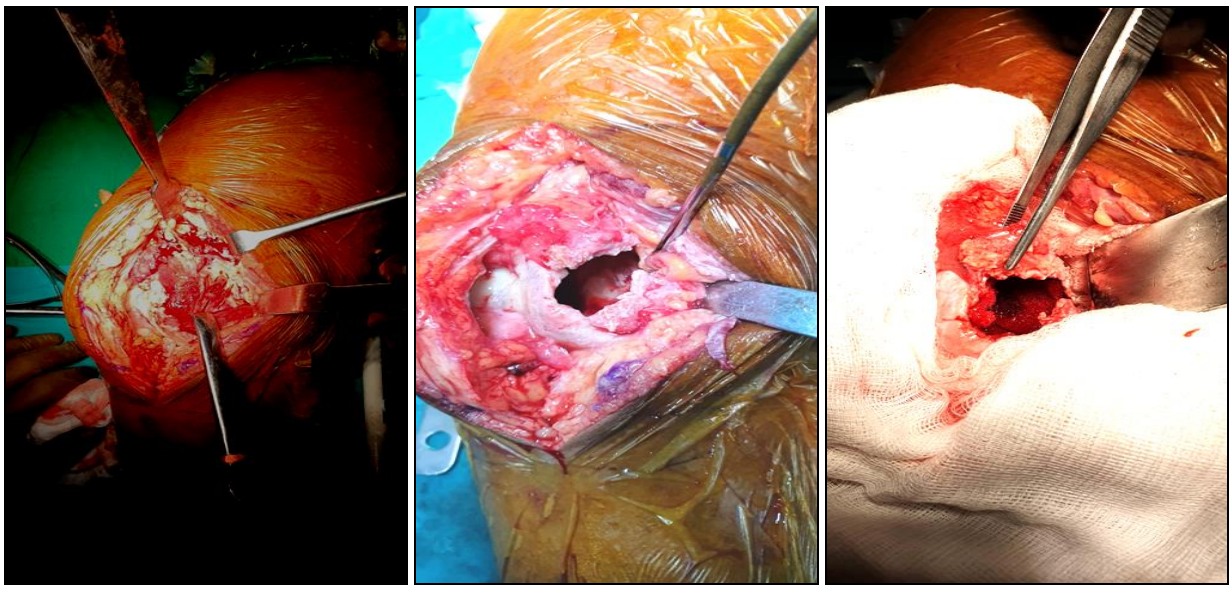

Fig 2 **Fig 3** **Fig 4**

Fig 2, 3 and 4: Are the intraoperative pictures showing the incision taken and the excision with curettage (intralesional curettage) of the giant cell tumour from the right distal end femur. Later it was filled by bone graft and cement

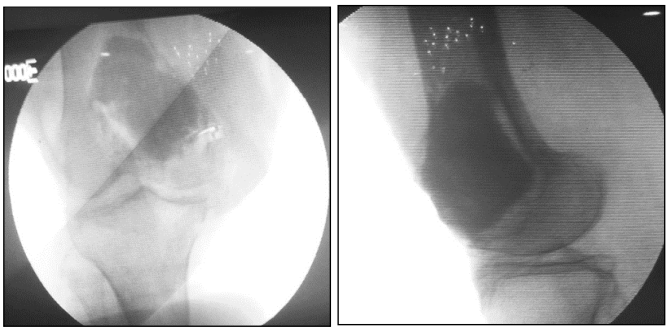

Fig 5 **Fig 6**

Fig 5, 6: Show the intraoperative images of the right knee AP and lat taken under C-arm during the procedure. The filling and position of the bone graft with antibiotic cement was checked under C-arm guidance and found satisfactory

Then thorough wash was given with normal saline and closure was done in layers on both the surgery parapatellar median incision site and also the bone graft site. Sterile dressing was done and a long knee brace was applied. The whole procedure was uneventful and patient was shifted to recovery. Immediate postoperative x-rays were satisfactory.

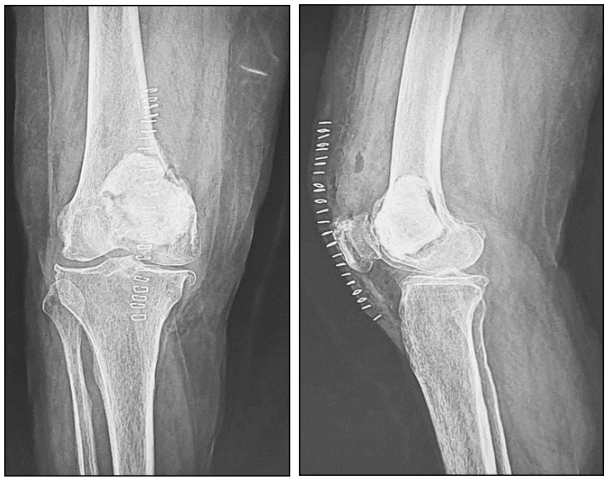

Fig 7 **Fig 8**

Fig 7, 8: Show the Postoperative x-rays taken immediately after the surgery.

Histopathology report confirmed the diagnosis of giant cell tumour of right distal end femur with multinucleated scattered giant cells seen on microscopic examination. Postoperatively

physiotherapy was advised. The patient has no joint stiffness and no pain with near normal range of motion. Patient is walking partial weight bearing.

Discussion

The Giant cell tumour (GCT) of the bone is a relatively uncommon benign bone tumour. In most cases, it has a benign course, but local recurrence can be seen in as many as 50% of cases [2]. In 1940, GCT was defined more strictly to distinguish it from other tumours by Jaffe and Lichtenstein. Incidence is increased in patients with Paget disease of the bone, in which GCT is rare [3]. Natural history of the GCTs varies widely ranging from local bony destruction to local metastasis, metastasis to the lungs, lymph nodes or malignant transformation which is rare [4]. In 16-25% of reported cases, pulmonary metastases have been cited as the cause of death [5]. It is slightly more common in females [6] with Female: Male ratio of 1.3: 1. GCT is much less common in children; with the rate being 5.7% in skeletally immature patient [7]. Approximately 50% of GCTs are located around the knee. Most common location is within the epiphyses of long bones, but often extending into the metaphysis. Pain is the most common presenting complaint, with swelling and deformity being associated with larger lesions. Soft-tissue extension can be found commonly. 11-37% is the incidence of pathological fracture at presentation [8].

On gross inspection, these lesions characteristically are chocolate brown, spongy, soft and friable. Yellowish-to-orange discoloration may be present due to hemosiderin. Cystic cavities within the tumour are commonly seen which are often blood-filled. GCTs are lucent and eccentrically located within the bone radio logically. A grading system for GCTs based on the radiographic appearance of the tumours was proposed by Campanacci *et al.* [9].

The following various treatment options have been advocated, which include:

- Curettage
- Curettage and bone grafting
- Curettage and insertion of polymethylmethacrylate (PMMA)
- En bloc resection
- Radiation therapy
- Embolisation of the feeding vessels.

The key to ensuring an adequate curettage with complete removal of tumour is obtaining adequate exposure of the lesion. This is achieved by making a large cortical window to access the tumour so as to avoid having to curette under overhanging shelves or ridges of bone around the corner adjacent to the near-side cortex. Use of a head lamp and dental mirror combined with multiple angled curettes helps to identify and access small pockets of residual disease which may otherwise result in recurrence. A high speed burr breaks the bony ridges, helps extend the curettage and enlarge the cavity 1 to 2 cm in all directions. A pulsatile jet lavage system used at the end of the curettage helps to bare raw cancellous bone and physically wash out tumour cells.

Bone graft has the theoretical advantage of restoring normal biomechanics to the joint surface. It undergoes remodeling along stress lines to prevent future degenerative joint disease and also restores bone stock, which may help if future procedures are necessary. Once incorporated, reconstruction is permanent. The advantages of cementing include preservation of joint and avoidance of resection, ease of application, and immediate structural support with rapid weight bearing ambulation and hence quicker rehabilitation. In addition it has thermal effect-hyperthermia may help extend the boundary of tumour kill through the heat of polymerization. Methacrylate monomer is cytotoxic, which may kill residual tumour cells. Contrast/radiolucency between the cement and bone make radiographic detection of local recurrence easier. If recurrence occurs-other modalities like resection, amputation are available. Cytotoxic agents like methotrexate and Adriamycin have been incorporated in bone cement to reduce recurrence.

In June 2013, the Food and Drug Association (FDA) has approved Denosumab for the treatment of unresectable GCT of bone in adults and skeletally mature adolescents.

Conclusion

The main primary treatment of GCT is surgical, the type of which depends on preoperative evaluation-it includes clinical evaluation which involves the site and size of the tumour in relation to surrounding structures, together with plain X-ray, CT scan and/or MRI as indicated and tissue biopsy to define tumour grade. A curettage alone results in high rate of local recurrence. On the other hand, there is a low rate of local recurrence with curettage and adjuvant cryosurgery using bone cement or bone grafts.

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