*Indian Journal of Medical Case Reports ISSN: 2319–3832(Online)*
*An Open Access, Online International Journal Available at http://www.cibtech.org/jcr.htm*
*2016 Vol.5 (4) October-December, pp. 18-22/Pawar et al.*
***Case Report***

# MANAGEMENT OF GIANT CELL TUMOR OF PROXIMAL TIBIA WITH CURETTAGE AND RECONSTRUCTION BY CEMENTATION AND LOCKING PLATE: A CASE REPORT

**Eknath Pawar, *Ujwal Ramteke, Ayush Singh, Hitesh Mangukiya and Nikhil Palange**
*Department of Orthopaedics, JJ Group of Hospitals, Mumbai*
**Author for Correspondence*

## ABSTRACT
Giant cell tumor of bone is the commonest benign bone tumor encountered by an orthopedic surgeon. It is characterized radiographically as a lytic lesion occurring in the ends of bones and has a well-known propensity for local recurrence after surgical treatment (Campanacci *et al.,* 1987). GCT generally occurs in skeletally mature individuals with its peak incidence in third decade of life. Distal femur and proximal tibia are the commonest sites followed by distal radius. Current treatment modalities include a meticulous curettage using high speed burrs and adjuvant therapy along with addition of bone graft or cement to pack the defect has significantly lowered the recurrence rates to less than 10% from 60% reported in the past with curettage alone (Canale *et al.,* 2007). 21 year male presented with pain over right knee since last two years which was insidious in onset and gradually progressive. Biopsy was suggestive of Giant Cell Tumor of Proximal Tibia. We decided to manage the case with intralesional curettage using phenol as an adjuvant and reconstruction of defect by cementation along with locking plate. In cases of GCT, the management depends upon the various factors such as site, age, involvement of the bone, extent of bone involvement and whether there is articular involvement or not. Extra-articular proximal tibia GCT can be managed with intralesional curettage and phenol as an adjuvant. Bone cement plays a dual role as an adjuvant as well as an agent for reconstruction of the defect.

***Keywords:*** *Giant Cell Tumor*

## INTRODUCTION
Giant cell tumor (GCT) of bone is a rare, generally benign and locally destructive tumor that occurs predominantly in long bones of post-pubertal adolescents and young adults, where it occurs in the epiphysis.

It is common bone tumor accounting for approximately 20% of benign osseous neoplasms, approximately 10% of primary osseous neoplasms, and 5% of all bone tumors. It generally occurs in adults between the ages of 20 and 40 years. GCT of bone is very rarely seen in children or in adults older than 65 years of age (Rooney *et al.,* 1993). GCT tumors occur in approximately one person per million per year. Usually, the tumor site is at the long bone meta-epiphysis, especially the distal radius and femur, proximal humerus and tibia.

World Health Organization (WHO) classifies giant cell tumor of bone (GCTB) as a benign, locally aggressive tumor. There is slight female gender predominance in its benign form. The lesion is usually solitary. Clinically, affected patients often present with pain secondary to underlying bone destruction, which can predispose to pathologic fractures. Multifocal GCTB is rare, accounting for less than 1% of all cases.

Histologically, giant cell tumor of bone classically shows many large multi nucleated giant cells with interspersed haphazardly arranged mononuclear cells, and the nuclear features of both elements are described as similar (McDonald *et al.,* 1986). Some tumors also have areas with a fascicular or storiform pattern devoid of giant cells resembling a benign fibrous histiocytoma. Vascular invasion outside the boundary of the tumor can be seen (Yip *et al.,* 1996).

Conventional radiographs often have classic findings and can be highly suggestive of the diagnosis of GCBT. These findings include eccentric, lytic lesion centered in the meta-epiphysis extending up to the subchondral bone plate without internal mineralization in a patient with closed physis (Yip *et al.,* 1996).

The margin of the lesion is typically nonsclerotic. MRI features suggesting giant cell tumor typically shows low T2 signal due to the fibrous component along with the deposition of hemosiderin within the tumor (Capanna *et al.,* 1990). Following the administration of intravenous contrast, typically there is heterogeneous enhancement pattern.

Imaging differential diagnosis includes primary aneurysmal bone cyst (ABC) and chondroblastoma. Intravenous contrast administration on MRI is helpful in distinguishing GCTB with secondary ABC from primary ABC as the presence of enhancing soft tissue component is typically present in GCTB but not in primary ABC (Zhen *et al.,* 2004). Presence of extensive surrounding reactive edema within the marrow and soft tissues, sclerotic margin, and presence of chondroid matrix are helpful features distinguishing chondroblastoma from GCT. Additional differential diagnoses include metastasis, plasmacytoma, or multiple myeloma, which should be included based on patient's age, multifocality, and clinical history of known primary neoplasm (Tse *et al.,* 2008).

The rate of local recurrence is varied and is influenced by the completeness of surgical treatment, with high speed burring, adjuvants, and bone cement adding to the effectiveness of curettage treatment. On occasion giant cell tumors of bone undergo frank malignant transformation to undifferentiated sarcomas.

**CASES**

21year male presented to us chief complaints of pain over right knee since last two years (figure 1). It was insidious in onset and slowly progressive. Clinical examination revealed full knee range of motion without any ligament laxity. X-ray of right knee with leg in anteroposterior and lateral views were done, which showed a well-defined osteolytic lesion in the epiphysis involving the metaphysical bone of proximal tibia without intra-articular extension (figure 2 and 3).

Magnetic resonance imaging was performed shows low intensity on T1 and heterogeneous high intensity on T2 weighted images.

MRI findings were confirmed with biopsy. Which showed osteoclast-like multinucleated giant cells in a vascularized network of proliferating round, oval or spindle-shaped stromal cells. Ossification and osteoid production were noted in small foci at the periphery of the lesions, particularly in soft tissue extensions.

We planned for intralesional excision of GCT. Antero medial skin incision was taken large cortical window to access the tumor was created. intralesional curettage was done with the help of multiple angled curettes A high power burr was used to break the bony ridges which helped in extending the curettage (figure 4). A pulsatile jet wash given to wash out tumor cells. Phenol was used as adjuvant. Reconstruction of the defect was done with the help of Cementation using methyl methacrylate. To give additional stability to construct we fixed it with proximal tibia medial locking plate (figure 5). Knee range of motion along with static quadriceps was started on post op day 2. Patient was followed up at six weeks, three months, six months and 1 year after surgery. Series of x rays were done at 6 weeks, three months, six months and 1 year (figure 9 and figure 10).

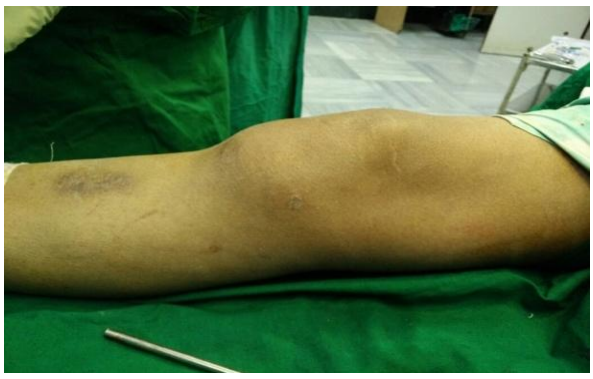

**Figure 1: Clinical Picture**

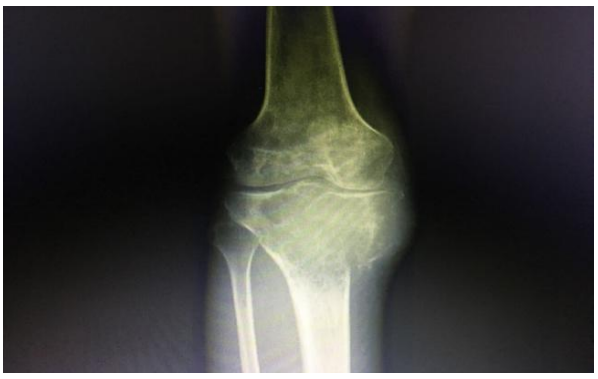

**Figure 2: Pre-Operative AP View**

***Case Report***

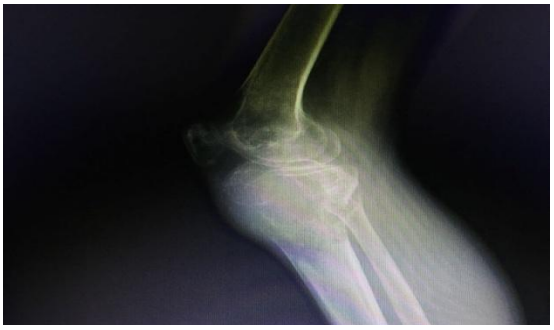
**Figure 3: Pre-Operative Lateral View**

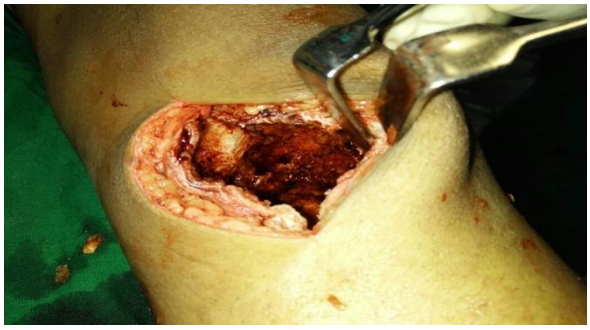
**Figure 4: Intra-Operative Picture 1**

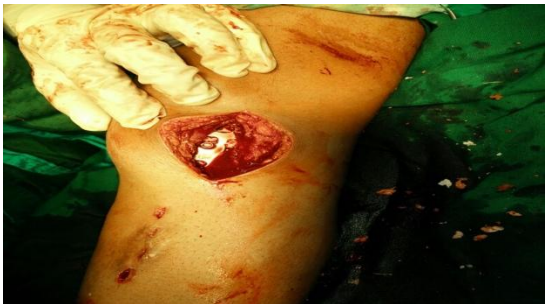
**Figure 5: Intra-Operative Picture 2**

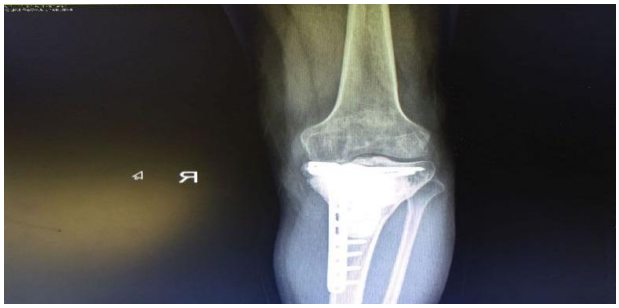
**Figure 6: Post-Operative AP View**

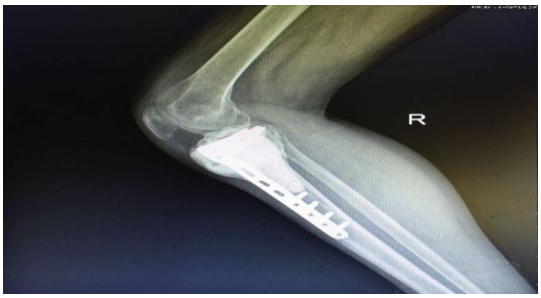
**Figure 7: Post-Operative Lateral View**

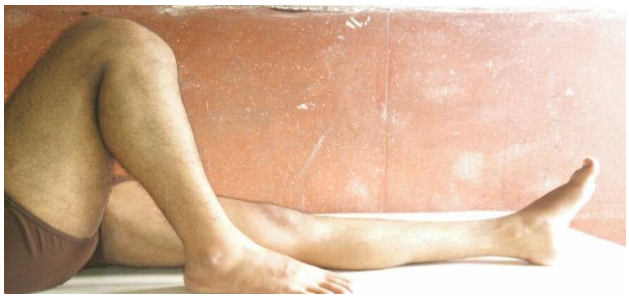
**Figure 8: Post-Operative after 1 Year Clinical Picture**

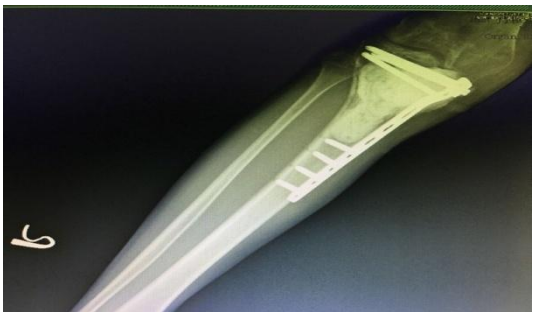
**Figure 9: Follow Up X Ray after 1 Year AP**

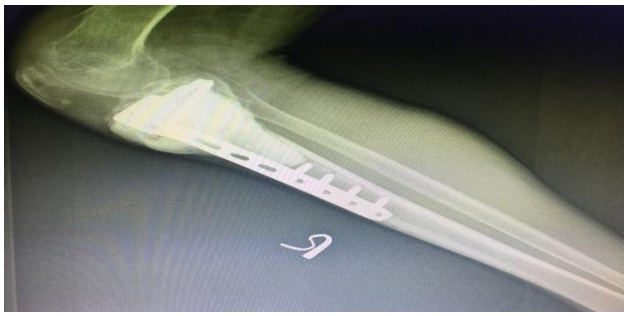
**Figure 10: Follow Up X Ray after 1 Year Lateral**

## DISCUSSION

Giant cell tumor represents 5% of all bone tumors of bone. Tumor is primarily benign but has tendency to turn malignant. Tumor is notorious for recurrences. Microscopically it consists of multinucleated giant cells scattered in vascularized network of proliferating round, oval or spindle shaped cells surrounding by

indistinct cytoplasm. The treatment of GCT is directed towards local control without sacrificing joint function. This has traditionally been achieved by intralesional curettage with reconstruction by packing the cavity of excised tumor with either bone graft or bone cement. Regardless of how thoroughly performed, intralesional excision leaves microscopic disease in the bone and hence, a reported recurrence rate as high as 60% (Dahlin, 1985). Hence, Adequate removal of tumor seems to be a more important predictive factor for the outcome of surgery. Various modalities available which use as adjuvant therapies like phenol cauterization, cryotherapy, intralesional chemotherapeutic agents like Adriamycin or methotrexate (Dahlin *et al.,* 1970).

Resultant defect that is formed is treated based on location and size of tumor. In case distal ulna, proximal radius, proximal fibula, coccyx, sacrum resection of involved bone is performed (Tunn and Schlag, 2003). For distal femur, proximal tibia, distal radius bon cement or bone graft or combination is used. Adjuvant therapies used to reduce recurrences (Doita *et al.,* 2003). Phenol cautery and cryotherapy kills tumor cells at the margin of tumor (Doita *et al.,* 2003).

Bone cement by exothermic reaction exerts a cytotoxic effect on tumor cells (Doita *et al.,* 2003). Cavity can be filled by bone cement or bone graft. Both methods have its own advantages and drawbacks. Advantages of bone cement are cement exerts thermal effect which kills cells, makes detection of recurrence easier and gives structural support and allows early weight bearing. Drawbacks are damage to articular cartilage when used in subchondral lesions and cement though strong in compression is weak when subjected to shear.

Advantages of bone graft are that it undergoes remodeling along stress lines and once incorporated reconstruction is permanent. Drawbacks are autograft quantity is limited, donor site morbidity, allograft is expensive and recurrence is difficult to identify.

***Conclusion***

Surgery remains mainstay treatment for GCT.

Type of surgery depends on preoperative evaluation of patient clinically and radiologically for tumor site, size and involvement of surrounding tissue.

Biopsy needed for confirming diagnosis and staging. The essential factor in the treatment of giant cell tumor is meticulous curettage of the affected bone.

Curettage alone results in high rate of local recurrence. It is generally accepted that intralesional curettage with high-speed drill burr and adjuvant procedure like phenol cauterization, cryosurgery, intralesional chemotherapeutic agents like Adriamycin or methotrexate results in decrease rate of recurrence.

Reconstructing the defect after curettage can be quite challenging. If defect is small and does not jeopardize the structural integrity of the bone it can be left alone and the cavities fill up with blood clot which then gets ossified to form bone. For larger defects reconstruction can be done by cementation or using bone graft.

***Abbreviations***

GCT: giant cell tumor.
GCTB: giant cell tumor of bone
ABC: aneurysmal bone cyst

***Consent***

For this case report to be published patient satisfactorily given informed consent for history, physical examination and publishing clinical photos and other relevant details.

***Authors' Contributions***

UR taken detailed history of patient. Analyzed and interpreted the patient data. And kept regular follow up of the patient. HM, NP and AS done all workup of the patient including blood investigations, MRI and biopsy. EP operated this patient including resection and bone graft with plating.

**ACKNOWLEDGEMENTS**

We would like to acknowledge residents of histopathology for contributing for this case report. Also, lab and x-ray technicians whose sincere effort made this case report possible.

**REFERENCES**

**Campanacci M, Baldini N, Boriani S and Sudanese A (1987).** Giant cell tumor of bone. *The American Journal of Bone & Joint Surgery* **69** 106-14.

**Canale ST and Beaty JH (2007).** Benign/Aggressive tumors of bone. In *Campbell's Operative Orthopaedics* 11th edition, (USA, Philadelphia: Mosby) 883-886.

**Capanna R, Fabbri N and Bettelli G (1990).** Curettage of giant cell tumor of bone. The effect of surgical technique and adjuvants on local recurrence rate. *La Chirurgia degli Organi di Movimento* **75**(1 Suppl) 206.

**Dahlin DC (1985).** Caldwell Lecture. Giant cell tumor of bone: Highlights of 407 cases. *AJR American Journal of Roentgenology* **144** 955-60.

**Dahlin DC, Cupps RE and Johnson EWJr (1970).** Giant cell tumor: A study of 195 cases. *Cancer* **25** 1061-70.

**Doita M, Harada T, Iguchi T, Sumi M, Sha H, Yoshiya S and Kurosaka M (2003).** Total sacrectomy and reconstruction for sacral tumors. *Spine* **28**(15): 296-301.

**Lackman RD, Hosalkar HS, Ogilive CM, Torbert JT and Fox EJ (2005).** Intralesional curettage for grades II and III giant cell tumors of bone. *Clinical Orthopaedics and Related Research* **438** 123–7.

**McDonald DJ, Sim FH, McLeod RA and Dahlin DC (1986).** Giant-cell tumor of bone. *The American Journal of Bone & Joint Surgery* **68** 235–42.

**Rooney RJ, Asirvatham R, Lifeso RM, Ali MA and Parikh S (1993).** Giant cell tumour of bone. A surgical approach to grade III tumours. *International Orthopaedics* **17** 87–92.

**Tse LF, Wong KC, Kumta SM, Huang L, Chow TC and Griffith JF (2008).** Bisphosphonates reduce local recurrence in extremity giant cell tumor of bone: a case-control study. *Bone* **42** 68–73.

**Tunn PU and Schlag PM (2003).** Giant cell tumor of bone. An evaluation of 87 patients. *Z Orthop Ihre Grenzgeb* **141**(6) 690-8.

**Yip KM, Leung PC and Kumta SM (1996).** Giant cell tumor of bone. *Clinical Orthopaedics and Related Research* **323** 60–4.

**Zhen W, Yaotian H, Songjian L, Ge L and Qingliang W (2004).** Giant-cell tumour of bone. The long-term results of treatment by curettage and bone graft. *British Journal of Bone and Joint Surgery* **86** 212–6.