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Original Research Article

Treatment of giant cell tumours of bone by radical curettage and bone cement

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ABSTRACT

Background: Giant cell tumour of bone remains a difficult and challenging management problems because there are no absolute clinical radiographic or histologic parameters that accurately predict the tendency of any single lesion to recur or metastasize.
Methods: We performed surgery on 12 patients of GCT with radical curettage and bone cement over a period of 5.8 years. Results were evaluated using the musculoskeletal skeletal grading system.
Results: The present series consists of 12 case of GCT age ranging from 16-45 years. Painful swelling was the commonest presentation, limitation of motion was seen in 9 cases and pathological fracture was seen in 1 case. 9 of the tumour occurred around knee joint. Rare involvement of talus was seen in 1 case. Overall 9 patients had a perfect functional score of 30 points and 1 patient scored less than 20 points.
Conclusions: Acrylic cement reconstruction is safe and effective procedure that provides local adjuvant therapy, the cement field defect is mechanically stable. Patient can bear weight immediately and rehabilitate quickly.

Keywords: Bone cement, Functional outcome, Giant cell tumour, Radical curettage

INTRODUCTION

Giant cell tumour of bone remains a difficult and challenging management problems because there are no absolute clinical radiographic or histologic parameters that accurately predict the tendency of any single lesion to recur or metastasize. In designing the approach to the treatment of the patient with a giant cell tumour, several goals must be balanced. The ideal goal would be the complete eradication of the tumour while preserving normal bony architecture and joint function.[1] The ideal aim in the management of Giant cell tumour is to eradicate the tumour and still save the joint.

The optimum treatment of giant cell tumour of a bone is a matter of controversy. Recurrence rate between 27% and 55% have been reported after simple curettage with or without bone grafting.[2,3] Several authors have used local adjuvants in the form of cytotoxic chemicals, cryotherapy and polymethylmethaacrylate to obtain better local control without restoring to more aggressive surgery, such as wide resection.[4-6] the advantages of curettage and cementing are the achievement of immediate stability and early mobilization, early detection of local recurrence in addition to its association with the increased rate of local control.[7]

METHODS

The present study was carried out in the department Orthopaedics, Mahatma Gandhi Institute of Medical Sciences, Sewagram, Wardha. The study comprises both

prospective and retrospective patients of giant cell tumor of bone treated using the technique of Curettage and cementing. The criteria for inclusion in this study were histologically proved giant cell tumours and radiographically according to the stage of Campanacci grading system.[2] All the cases of study underwent complete history taking, physical examination and the details were recorded in a predesigned proforma. All the cases were investigated for preoperative assessment before assessment.

Surgical procedure

The surgical technique was uniform in all cases, Curettage and acrylic cementation were performed in a blood less filed when possible. After soft tissue dissection, a large cortical window, size large than the lesion when possible was created to allow inside inspection and to permit digital palpation to allow complete access to all areas of tumor cavity. The tumour tissue was meticulously and thoroughly curetted and scrapped out of its cavity. Entire zone was best washed with high pressure normal saline and Hydrogen peroxide, dried and the resulted cavity was completely obliterated by careful hand packing with standard polymethyl metha acrylate bone cement. Digital pressure was used so that filling would reach all corners of the cavity. Wound closed in layers.

Post operatively antibiotics were given for 10-12 days parenterally. Suture were removed on 10^{th}/12^{th} day postoperatively. Patient remained non-weight bearing for 6weeks. Then gradual weight bearing commenced towards 2 to 3months.

Follow-up was obtained on patients both clinically and radiologically. Functional results were evaluated according to the system of Ennerking et al.[8] at the most recent follow-up visit. This system comprises 6 criteria, pain, function of the extremity, emotional acceptance of any residual deficit, use of mechanical supports, walking ability and gait when a lower extremity is involved. For each of 6 factors values of 0-5 are assigned based on established criteria. For each factor, specific values (0, 1, 3, or 5) are equated with certain levels of achievements or performance. Intermediate vales of 2 or 4 are assigned based on examiner judgement.

RESULTS

The present study consists of 12 cases of histopathologically proved giant cell tumours. All the cases were primarily treated by curettage and bone cementing. Second operation was carried out in two cases in the form of open reduction and internal fixation of fracture. All the cases were followed-up postoperatively and follow-up was done for all cases.

In the group of 12 patients there were 7 (58.4%) male and 5 (41.7%) were females. The mean age at the presentation was 25.2 years, ranging from 16 to 45 years. Maximum number of cases, 5 (41.7%) were seen in the age group of 10-19 years and minimum 1 (8.3 %) in 42-49 years. Painful swelling was the commonest (83.3%) clinical presentation. Pathological fracture was seen in 1 (8.3%) cases. In all the cases, the involvement were in the lower extremity. Maximum cases 6(50%) were in the proximal tibia. The involvement of femur at various site was observed in 5 cases. The rare involvement, 1 (8.3) was seen in talus (Table 1).

Table 1: Skeletal distribution of giant cell tumours.

Skeletal involvement	Number	%
Femur		
Proximal	3	25
Mid-shaft	-	-
Distal	2	16.7
Tibia		
Proximal	6	50
Distal	-	-
Talus	1	8.3

All lesions were epiphysiometaphyseal in origin. Maximum cases 11(91.7%) were in grade 2, 1(8.3%) in grade 3 and none in grade 1 radiologically. Various complications were observed in 3(25%) cases. 2 patients presented with a fracture postoperatively on follow-up. In 1 case fracture occurred through cement after 7months of surgery.

Another case presented with a fracture below cement after 5months of operation and developed ankyloses of the hip joint after 3.5 years of last operation. Another case had secondary osteoarthritis with Varus deformity of the knee joint after 2.5 years of surgery. Minimum follow-up was 3months and maximum was 5.8 years (Table 2).

Table 2: Follow-up.

Duration	No. of cases	%
3-6 months	2	16.7
6-12 months	-	-
1-2 years	1	8.3
2-3 years	2	16.7
3-4 years	4	33.3
4-5 years	2	16.7
5-6 years	1	8.3

Table 3: Evaluation of results.

Score	Number	Percentage
0-9	-	-
10-19	1	8.3
20-29	2	16.7
30	9	75

Around 9 (75%) cases had a perfect functional score, 30 points. 2 (16.7%) had a score of 20 points or more and 1 (8.3%) had a less than 20 points. All patients were rehabilitated quickly (Table 3).

DISCUSSION

Giant cell tumours are considered benign but locally aggressive neoplasm. Frequent recur if no adjuvant treatment is given. By virtue of their biologic behavior and typically juxta-articular location, giant cell tumours require specific surgical management. Various treatment have been utilized and reported by several authors. Therapeutic complications such as infection, recurrence and loss of support of the articular surface have continued to plague the treatment of giant cell tumours.

Simple curettage yields recurrence rate between 37-60 % regardless of whether or not bone graft is used to fill the defect.[1,3,9,10] Patients treated with bone grafts often requires prolonged weight bearing until graft incorporation. There is a difficulty in differentiating the radiographic changes seen with incorporation of the graft versus recurrence of the tumour.[11] Local adjuvant therapy with cytotoxic agents have been used intra-lesionally to improve local margins by lysing microscopic tumor debris. Phenol was reported by McDonalds et al, to reduce recurrence rate from 50% to 35%.[3] Cryotherapy has been used to advance margins by inducing limited osteonecrosis.[5] Recurrence rate between 11% and 36% were reported after cryotherapy where the lesion subsequently was filled with bone graft.[4,5] Polymethylmethaacrylate cement also has been used as an adjuvants to advance the tumour margin. Mjoberg et al and Prsson et al showed that polymethylmethaacrylate enhances the margin of tumour cavity by 1.5 to 2mm in cancellous bone and 0.5mm in cortical bone.[12,6] Many reasons for this effect have been implicated, including heat dispersion during polymerization, monomer diffusion and hypoxemia. Because the cement filled defect is mechanically stable, patient can bear weight immediately and rehabilitate quickly.[11] Several other authors have since documented recurrence rate between 8%-15% using this procedure.[6,11]

The danger of infection in connection with cementation is considerable. Early or late infection is a complication which could be a real disadvantage with this method. **(13)** Several authors documented that no infection has observed in their studies.[6,11,13] Persson and Wouters suggested the future addition of an antibiotic to the cement, prophylactic use of an antibiotic in cement will reduce the risk further and in future, tumour directed chemical agents might become available as additive. Like other studies in this present study also no infection has been observed. Alkalay et al, agree with Dreinhoffer et al that curettage and cementation could give results as good as en-bloc resection and reconstruction.[14,15] Rare involvement of talus in 1 case was seen in our series. Also, as seen by Bini et al, in our series there were no symptoms or recurrence of the disease even 5.8 years of surgery in these patients.[11]

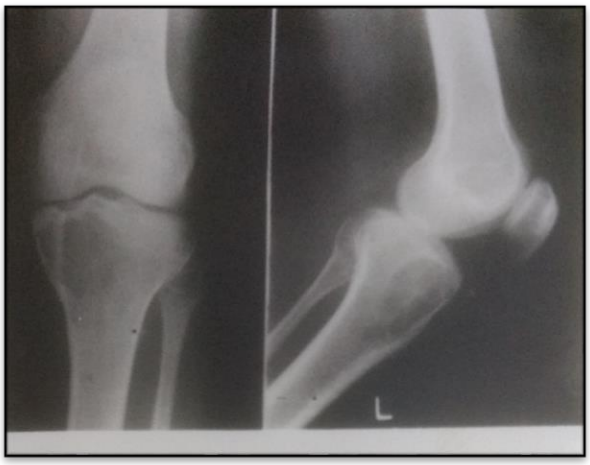

Figure 1: Preoperative radiograph.

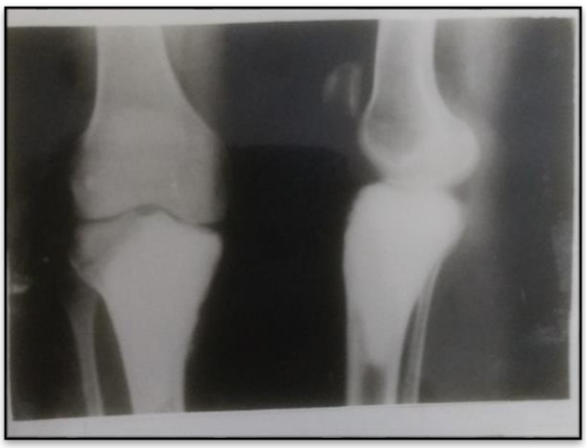

Figure 2: Immediate postoperative radiograph.

In the present study 2 patients presented with a fracture postoperatively on follow-up. This is at odds with reported experience polymethylmethaacrylate bone cement.[11] Because polymethylmethaacrylate support the bone where it has weakened. In our study 9 (75%) cases had a perfect functional score 30 points and only 1 score less than 20 points. While in the study of Gitelis et al, 50% (n=10) had a perfect score 30 points.[16] In Bini et al, series overall functional results were gratified with an 84% or excellent results in our study one of our patients of large subchondral lesion of the femoral condyle reported pain on weight bearing 2.8 years after surgery because of arthritis 10^0 Varus deformity of the knee.[11]

The effect of subchondral cement on articular degeneration at 20 or 30 years follow up remains to be documented. Following figures shows a case of giant cell tumour at proximal tibia left side preoperative radiograph (Figure 1) and immediate postop radiograph (Figure 2) with its follow-up radiograph (Figure 3) and clinical photograph at 3.2 years (Figure 4).

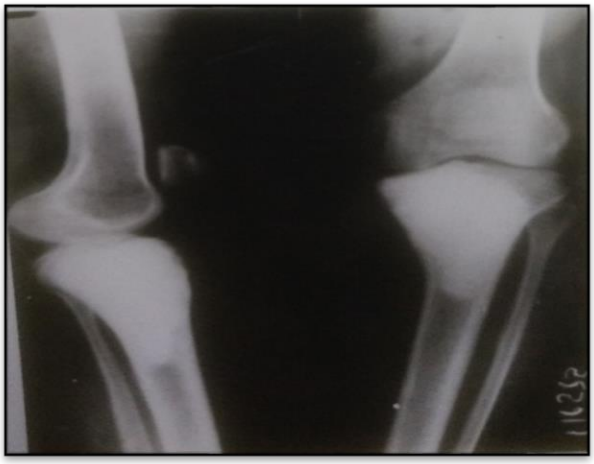

Figure 3: Follow-up radiograph at 3.2 years.

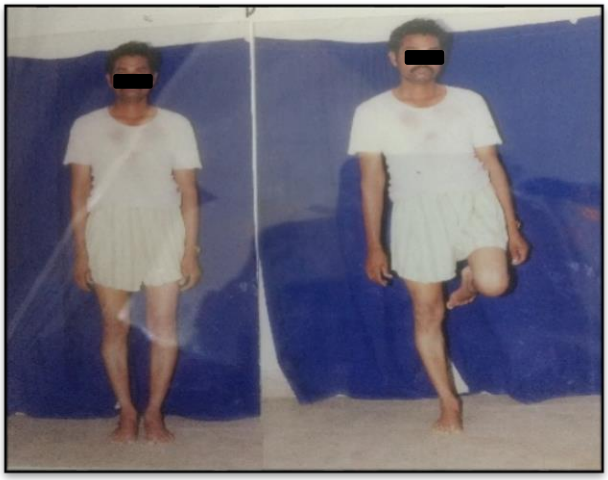

Figure 4: Clinical photograph.

CONCLUSION

Present series comprising 12 patients followed over a period of maximum 5.8 years and minimum 3 months. However, result so far with excellent function, no local recurrence and no infection encourage us to believe that curettage and cementing should be used for giant cell tumour of the bone, even when complicated by pathological fracture. Acrylic cement reconstruction is safe and effective procedure that provides local adjuvant therapy, the cement filled defect is mechanically stable, Patients can bear weight immediately and rehabilitate quickly. This present study recommended curettage and cement packing for giant cell tumour of the bone whenever technically feasible, because this method gives a minimum of a recurrence and a maximum of function.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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