

Giant Cell Tumors (GCT) Around Knee- Curettage and Reconstruction by Ilizarov Technique

Abstract

Purpose: To evaluate outcomes of 17 patients who underwent curettage, use of phenol and reconstruction using the Ilizarov technique for giant cell tumors (GCT) of bone around the knee.

Methods: 12 men and 5 women aged 18 to 45 (mean 26) years underwent intralesional curettage, use of phenol, and reconstruction using the Ilizarov technique for GCT of the proximal tibia (n=14) or distal femur (n=3), 5 of the cases were recurrence. 3, 12 and 2 tumors were classified as grade-I, grade-II and grade-III, respectively. One of the grade-III tumors was associated with an extra-articular pathological fracture. Patients underwent intralesional curettage, use of phenol and reconstruction by Ilizarov technique [1,2]. Functional outcome was evaluated using the Musculo skeletal tumor society (MSTS) score.

Results: The mean follow up period was 6 (2.5-10) years. The mean MSTS score was 28.5 out of 30 (Standard deviation, 3; range, 15-30. No patient had malignant transformation.

Conclusion: Intralesional curettage use of phenol and reconstruction with Ilizarov for GCT of bone achieved good functional outcome and no recurrence rate.

Keywords: Curettage; GCT of bone; Phenol; Ilizarov

Research Article

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Abbreviations: GCT: Giant Cell Tumors; MSTS: Musculo Skeletal Tumor Society; NITOR: National Institute of Traumatology and Orthopaedic Rehabilitation

Introduction

GCT of bone is one of the most common benign bone tumors occurring around the knee in those aged 30 to 45 years. It is locally aggressive and prone to recurrence and malignant transformation [3]. Treatment by curettage, alone has a high risk of recurrence [4,5]. Use of adjuvants (phenol, cement, cryosurgery or a combination of these) is recommended, followed by reconstruction with allograft, autograft, cement or hydroxyapatite. In NITOR (National Institute of Traumatology and Orthopaedic Rehabilitation, Dhaka) and Bari-Ilizarov Orthopaedic Centre, the treatment of GCT of bone has been intralesional curettage followed by the use of phenol and reconstruction using Ilizarov technique [6]. This study evaluated outcome of 17 patients who underwent curettage, use of phenol and reconstruction using the Ilizarov technique for GCT of bone around the knee.

Materials and Methods

Between January 2005 and January 2013, 12 men and 5 women aged 18 to 45 (mean 26) years underwent intralesional curettage, use of phenol and reconstruction using the Ilizarov technique for GCT of the proximal tibia (n=14) or distal femur (n=3), 5 of the cases were recurrences.

According to Capanacci grading systems [6] 3 tumors were classified as grade-I (with a well-defined margin and intact cortex), 12 were graded-II (with a relatively well defined margin, but no radio opaque rim and the thinned and moderately expanded cortex) and 2 were grade-III (with indistinct borders with cortical destruction). One of the grade-III tumors were associated with an extra articular pathological fracture of the femur (n=1).

Through a large cortical window, the tumors were curetted until normal appearing bone was seen. The cavity was cleaned with pulsatile lavage of 5% phenol and phenol soaked gauze was placed inside the cavity for 3 minutes. Care was taken not to spill the phenol to the surrounding tissues. Phenol was not used in cases with a pathological fracture. The damaged bone was then removed. The gap that is created was filled up with compression distraction method by Ilizarov technique [1,2].

Postoperatively, partial weight bearing crutch walking was started immediately. After 3 days weight bearing was allowed as tolerated and after few days gradual full weight bearing was started. Intravenous Zoledronate (4mg) once monthly was given for 6 months, along with oral supplementation of vitamin D3 (800 I.U) and calcium (1-2 gm) once daily for 6 months.

Functional outcomes were evaluated using the Musculo Skeletal Tumor Society (MSTS) score [7] which involves 6 parameters (pain, function, emotional acceptance, use of walking aids, walking ability, and gait). Scores for each parameter range from 0-5, higher scores indicate better outcome.

Results

The mean follow up period was 6 (2.5-10) years. The mean MSTS score was 28.5 out of 30 (standard deviation, 3; range 15-30). No patient had malignant transformation.

Case illustrations

(Figures 1-10)

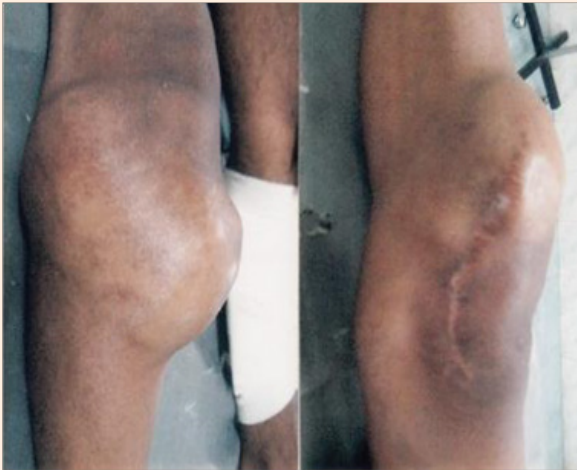


Figure 1: Recurrence of right knee GCT, huge swelling is seen.



Figure 3: Radiographic view of right upper tibia with bone cement soft tissue involvement is seen



Figure 2: 35 years old male recurrence of GCT of tight knee.



Figure 4: Bone cement and intralesional tissue are seen.

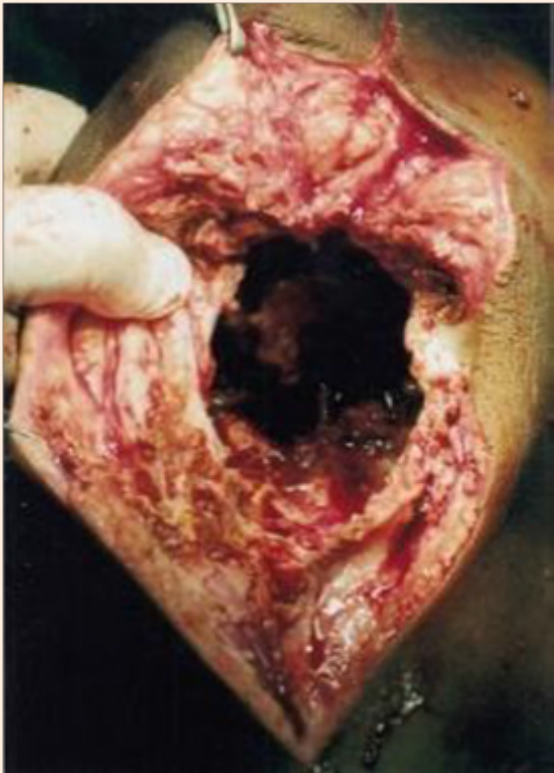


Figure 5: After removal the tissues a big cavity is seen in OR.



Figure 6: After 15 days of follow up a defect is seen



Figure 7: 2 rings (above and below) with 4 telescopic rods applied for segmental transportation by 2 olive wires.

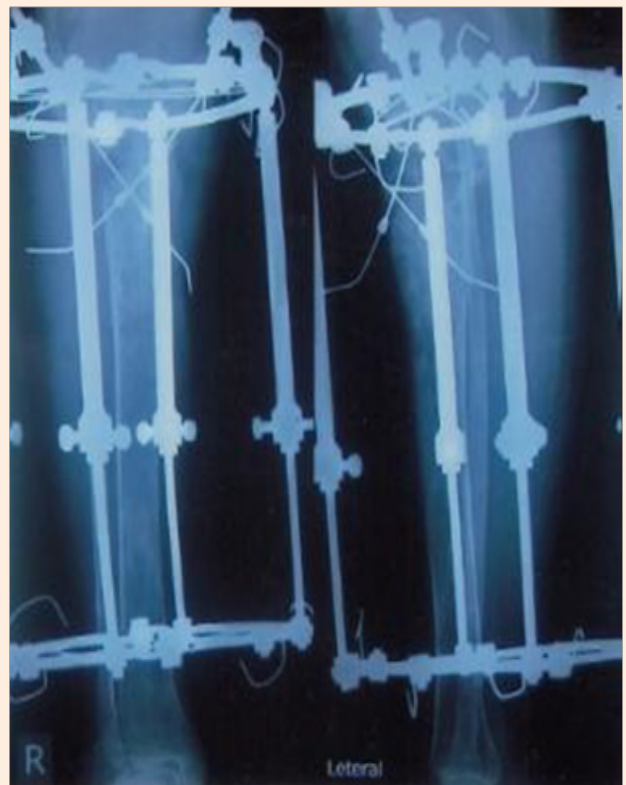


Figure 8: Radiographic view after 3 months follow up.



Figure 9: Final radiographic view of upper tibia with full consolidation after 6 months



Figure 10: Clinical result and appearance of the patient after 6 months.

Discussion

Treatment of giant cell tumors around the knee include curettage alone, curettage with adjuvant therapy (liquid Nitrogen, hydrogen peroxide, phenol, bone cement or bone graft) and marginal or wide resection, followed by reconstruction with Ilizarov technique, arthrodesis or mega-prosthetic joint replacement. Intralesional curettage alone has a high recurrence rate of 60% [8], whereas marginal or wide resection is associated with functional disability. Preservation of joint function is an advantage of intralesional curettage compared to wide resection. In our series intralesional curettage and reconstruction with Ilizarov technique achieved a low recurrence rate (2%) and good functional outcome (95.5%). The use of 5% phenol decreases recurrence [9] as phenol causes protein coagulation and necrosis and damages DNA [10].

The risk of neurovascular injury by phenol increases if the posterior periosteum is deficient. The cavity can be reconstructed by new regenerate bone with distraction compression method of Ilizarov technique. The advantage of Ilizarov technique is bone transportation and that reconstruction is permanent. In our series in all the cases bone transportation was done and bone defect was replaced by new regenerate bone.

Conventionally, grade-III lesions are treated with wide resection to prevent local recurrence [10]. The recurrence rates for grade-III lesions after intralesional curettage are reported to range from 4.5% to 52% [11,12].

In our series, only one of the 2 patients with grade-III GCT of bone had a recurrence. The Ilizarov technique appears to be a viable alternative to wide resection. The use of intravenous Zoledronate as an adjuvant specifically targets the osteoclasts and the GCT cells. Biophosphonates reduces tumor size and recurrence rate in GCT of bone [13]. Biophosphonates bind to bone and inhibit bone resorption by osteoclasts [14]. Biophosphonates not only induce apoptosis of osteoclasts and neoplastic stromal cells, but also possess a direct anti-tumor and anti-angiogenesis activity [15]. Biophosphonates do not have any adverse effect on osteoblasts or reparative mechanisms of bone [16].

Conclusion

Well intralesional curettage, use of phenol and reconstruction by Ilizarov for GCT of bone achieved good functional outcome and a low recurrence rate. Preservation and bone degeneration by means of distraction osteogenesis constitutes a highly conservative limb saving surgery. Patient with good defects of less than 10 cm, a great deal of preserve healthy tissue and good prognosis are good candidates for these methods.

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