

**How to Cite:**

Rajamanickom, A., Moitra, S., Subramanian, P. M., & Reddy, S. (2022). Treatment and recurrence in giant cell tumour locally advanced around the knee: A hospital based follow up study. *International Journal of Health Sciences*, 6(S6), 6150–6156.  
<https://doi.org/10.53730/ijhs.v6nS6.10947>

## **Treatment and recurrence in giant cell tumour locally advanced around the knee: A hospital based follow up study**

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**Abstract**--Background-Giant cell tumour (GCT) is a benign bone tumour with aggressive characteristics. They are more prevalent in the third decade of life and demonstrate a preference for locating in the epiphyseal region of long bones. They have a high local recurrence rate, which depends on the type of treatment and initial tumour presentation. Objective- To evaluate the results of the treatment with regard to relapse. Methods- It was a hospital based follow up study done for periods of 7 months. Fifty patients of GCT were recruited in the study through purposive sampling technique. Study being conducted on patients with followup for 12 months. Demographic profile and all the necessary investigation were done. SPSS (Version 22.0) was used for analysis. Chi-Square test was used as test of significance. Results-There was a predominance of males (80%). The most common location was the distal femur. All patients presented with pathologic fracture at diagnosis, recurrence seen after 9months of followup.the most common location for GCT was distal femur seen in 84% of patients, while curettage with cement was the most common treatment done in 89% which was statistically significant ( $p<0.05$ ). Endoprosthesis was done in 11% patient. All the patients were having fracture. Conclusion- Patients should be aware and well informed about the possible complications and functional losses that may occur as a result of the surgical treatment chosen and the need for further surgery in the medium and long term.

**Keywords**--Giant cell tumour (GCT), resection, endoprosthesis, fracture, non-union, expansile cyst, benign.

## Introduction

Giant cell tumour (GCT) is a benign bone tumour with aggressive characteristics. It represents approximately 5% of primary bone tumours and about 15% of benign bone tumours. It consists of giant osteoclast-like cells interspersed with a hypercellular and vascularized stroma, which differentiates it from other tumour or pseudotumoral lesions, such as chondroblastoma, brown tumour of hyperparathyroidism, and aneurysmal bone cyst. It is more prevalent within the third and fourth decades of life, and is most commonly located in the epiphyseal region of the long bones.<sup>1,2</sup> The most affected areas are the distal femur, proximal tibia, and distal radius. Campanacci et al. classified GCTs into three types according to their biological behavior, radiographic appearance, and degree of bone destruction (figure 1).<sup>4,5</sup> Type I are considered latent and are represented by small, intraosseous lesions. Type II are active and radiographically larger, but with intact periosteum. Type III are aggressive, extending throughout the periosteum and surrounding tissues.<sup>6,7,8</sup> Surgery aims for complete tumour resection, preserving bone architecture and joint function, correction of the defect created with techniques such as autograft, homograft, arthrodesis, non-conventional endoprostheses, and filling with bone cement. Intralesional resection is usually the treatment of choice for Campanacci I and II tumors. This should be accompanied by one or more local adjuvant methods (electrocautery, phenol, liquid nitrogen, argon plasma coagulation, etc.) in an attempt to decrease the chance of recurrence. This study assessed patients diagnosed with locally advanced GCT at the knee level and the outcome one year after surgery. This study aimed to evaluate the results of the treatment of these patients, especially in relation to relapse.

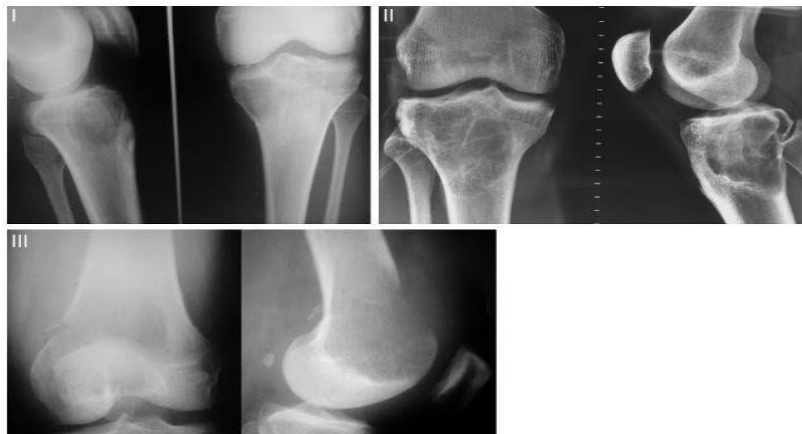


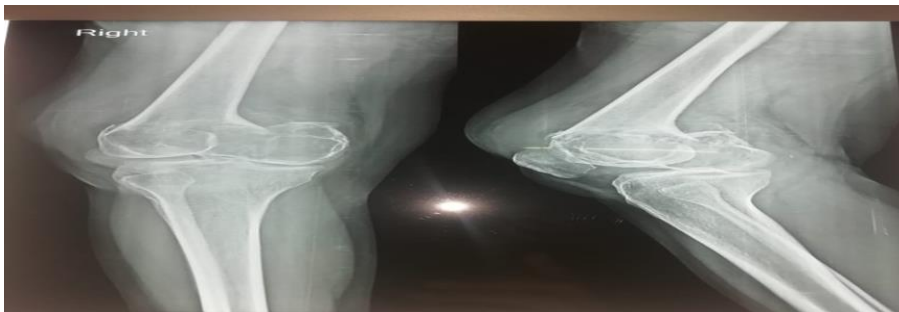
Figure 1. Types of Campanacci Tumours

## Materials and Methods

It was a hospital based follow up study done for periods of 7 months between January 2021 and August 2021, fifty patients diagnosed with locally advanced GCT at the knee (distal femur and proximal tibia) underwent surgical treatment in our tertiary medical centre through purposive sampling technique. The diagnosis of the lesions without fracture was confirmed by percutaneous biopsy using a Jamshidi needle. In cases with pathological fracture, after local staging and surgery, the diagnosis was confirmed by histologic study. The inclusion criteria were: patients diagnosed with Cam-panacci III GCT at the knee or who presented pathological fracture as a diagnosis. Predominant location being distal femur or proximal tibia. Patients were divided according to sex, age, tumour location, presence of pathological fracture, and type of treatment. The most commonly used treatment method was curettage of the lesion, followed by an adjuvant method with electro cauterization and bone cement, in patients.

No patient underwent en bloc resection of the lesion and joint replacement using non-conventional endoprosthesis as there was no significant bone destruction or tumour extension to the neighbouring soft tissues was observed, which made more conservative method like locking condylar plate stabilization more feasible. In cases of pathological fracture of the distal femur, the author chose to approach the tumour, performing curettage of the lesion with electro cauterization of the tumour core, reduction of the deviated fragments with anatomical reduction of the articular surface, fixation with a special plate with locking screws, and lesion cementation. For patients with giant cell tumour of the proximal tibia, without pathological fracture extended curettage done followed by fracture reduction and bone cement for occupying space and stabilization with plate and screw. Evaluation of bone destruction through radiographs and magnetic resonance imaging or computed tomography was paramount to define surgical strategy. In patients whose lesion did not allow anatomical bone reconstruction, resection and replacement with endoprosthesis were best suited, regardless of the presence of a pathological fracture. Patients were evaluated every 15 days in the first month, with monthly follow-up appointments up to the third month, and follow-up appointments every three months until one year of surgery. Patients who did not present relapse in the first two years after surgery were considered cured.

### **Pre op x-ray showing pathological fracture of right distal femur with GCT of right distal femur**



The pre op CT study of right knee joint shows expansile lytic destructive lesion involving distal part of distal femoral metaphysis, both femoral condyles (lateral more than medial) associated with thinning of cortices and pathological fracture through distal femoral metaphysis. Patient received definitive treatment in form of extended intralesional curettage. Following curettage cryotherapy was done with liquid nitrogen. The bone defect that was created following curettage was filled by bone cement spacer and the reduction was maintained by locking condylar plate.

### Statistical Analysis

The statistical software namely statistical package for social sciences (SPSS) 22.0 was used for the analysis of the data. Categorical data represented in frequencies and proportions. Chi-square test has been used to find the significant association.  $P < 0.05$  is considered as statistically significant value.

### Results

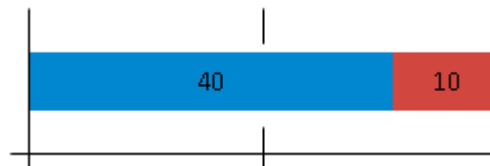


Figure 2. Gender wise distribution

The figure 2 shows that the study was male preponderance while females. Predominance of males was observed. Out of fifty patients evaluated, 40 were male (80%) and ten female (10%) Patient age ranged from 24 to 43 years.

Table 1

Association between Location and Treatment of GCT in study participants

Location	Treatment		p-value
	Curettage	Endoprosthesis	
Distal femur	38	4	0.001*
Proximal tibia	5	3	

As per table 1 the most common location for GCT was distal femur seen in 84% of patients, while curettage with cement was the most common treatment done in 89% which was statistically significant ( $p < 0.05$ ). Endoprosthesis was done in 11% patient. All the patients were having fracture.



Figure 3. Clinical picture and Post Op-X-ray

Figure 3 shows the post operative ray without recurrence after 1 year. And the clinical picture suggest the technique to deduce the symptoms persist after successful procedure.

Table 2  
Recurrences after One year with treatment suggested

Location	Number (%)	Relapse month	Treatment	p-value
Distal femur	20 (40%)	7	endoprosthesis	0.11
Proximal Tibia	6 (12%)	9	endoprosthesis	

As per table 2 the relapse of recurrence was more common in GCT of distal femur could be because of more sample size seen in 7 months while that of recurrence in proximal tibia seen in 9 months. But this was not significant.

### Discussion

GCT is considered to be a benign lesion, despite its potential for local aggression, recurrence, and occasional lung metastases.<sup>7</sup>The frequency of these is approximately 1%–3%, which can be higher in cases with local recurrence, especially when located in the soft tissue.<sup>8</sup>This tumor does not remain latent. A small lesion tends to evolve and lead to the progressive destruction of the affected bone.<sup>9</sup>Therefore; surgical treatment should be indicated and performed as early as possible. Curettage associated with an adjuvant method has been defined as the preferred treatment for most cases of GCT.<sup>1,10,11</sup>This option presents a better functional outcome, but is associated with a higher chance of relapse, as

evidenced in some studies.<sup>9,10</sup> Wide resection has the advantage of lower chance of relapse, as it removes the tumor entirely. It is usually reserved for cases of extensive bone destruction, in which joint reconstruction is not feasible.<sup>12,13</sup> Several studies have advocated the use of this technique in Campanacci III tumors, aiming to reduce the risk of recurrence and biomechanical failure.<sup>5,6</sup> Complete bone resection can also be performed in some cases without marked functional impairment, such as in the ulna, fibula, and small bones of the hand and foot.<sup>1,2,9</sup>

In the present study the patients were young to get this; joint replacement by non-conventional endoprosthesis brings some disadvantages, such as the need for revision and the risk of successive revisions. The use of bone cement is a well-established method that presents good long-term oncological and functional results. Regarding the possibility of arthrosis secondary to the use of bone cement, Baptista et al. published a retrospective study of 46 cases of GCT undergoing curettage and cementation, concluding that the distance from cement to subchondral bone has a prognostic relationship to the development of osteoarthritis, but not to final functional outcome of the patient.<sup>4</sup> The incidence of GCT recurrence varies in the literature. Dahlin et al. published a study with 60% of local recurrence in GCT patients who underwent curettage and grafting, and recommended a more aggressive resection for local control. The use of methylmethacrylate associated with cauterization of the cavity as local adjuvants in the treatment of GCT significantly decreased the rate of recurrence.<sup>14</sup> Klenke et al. observed recurrence rates ranging from 0% to 65%, depending on surgical method. In the present study, 44% of recurrences occurred in the first postoperative year, a period in which the frequency of relapse is greater.<sup>13</sup>

## **Conclusion**

GCT treatment is challenging especially in young patients and it was done by locally advanced knee GCT is extensive resection with reconstruction of the bone defect using non-conventional endoprosthesis which has risk of relapse. Due to the complexity of the treatment and its consequences, patient should be aware and well informed about the possible complications and functional losses that may occur as a result of the treatment chosen, as well as the need for new surgical interventions in the medium and long term.

**Source of Funding-** None

**Conflict of Interest-** None declared

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