

# Examine the Outcomes of Surgical Procedures in Patients with Giant Cell Tumors

Muhammad Ishaq<sup>1</sup>, Karim Bakhsh<sup>2</sup> and Attiq-ur-Rehman<sup>2</sup>

## ABSTRACT

**Objective:** To examine the outcomes of different surgical procedures in patients with giant cell tumor also determine the frequency of involved bone required surgical treatment.

**Study Design:** Retrospective study.

**Place and Duration of Study:** This study was conducted at the Department of Orthopedic & Traumatology, Qazi Hussain Ahmad Medical Complex Nowshera from January 2018 to March 2020.

**Materials and Methods:** Sixteen patients of both genders presented with biopsy proven giant cell tumor were analyzed in this study. Patients detailed demographic including age, sex and residence were recorded after written consent. Types of bones and different surgical procedures for the treatment were examined. Outcomes of surgical treatment were examined by Musculo Skeletal Tumor Society score (MSTS). Follow-up was taken at 1 year after surgery.

**Results:** Ten (62.5%) patients were males and 6 (37.5%) were females. 3 (18.75%) patients were ages less than 20 years, 11 (68.75%) patients were ages 20 to 40 years and 2 (12.5%) patients had ages above 40 years. Pain and swelling was commonly found symptom in 8 (50%) patients. Distal femur was the commonest site in 5(31.25%) patients followed by proximal tibia in 4 (25%) patients. Curettage and bone cementation was the commonly performed surgical procedure in 5 (31.25%), followed by wide excision of bone and cementation and implant in 4 (25%) patients, 3 (18.75%) patients received curettage and bone grafting, 2 (12.5%) had received disarticulation, 1 (6.25%) patient were received arthroplasty and amputation was done in 1 (6.25%) patient. Recurrence was found in 1 patient with curettage and bone grafting and 2 with curettage and bone cementation. The mean MSTS score was 26.2 out of 30.

**Conclusion:** Giant cell tumor is commonly found in patients with 3<sup>rd</sup> and 4<sup>th</sup> decade of life. Distal femur and proximal tibia were the most common site of bones involved and curettage and cementation was the commonly performed surgical procedure. Patients with giant cell tumor were on high risk of recurrence after surgical treatment.

**Key Words:** Giant cell tumor, Site of bones, Surgical techniques, Outcomes.

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## INTRODUCTION

Cooper in 1818 first described Giant cell tumors (GCT) of the bone. Later Nelaton showed their local aggressiveness, and Virchow revealed their malignant potential.<sup>1</sup> The term “giant cell tumor” implies that the multinucleated giant cells are responsible for the proliferative capacity of this tumor, there is evidence that the stromal cells, the major components of the mononuclear cell population, represent the true

neoplastic components of giant cell tumor of the bone (GCTB).<sup>2</sup>

It accounts for 5% of primary skeletal tumors and 21% of all benign bone tumors.<sup>3</sup> The disease is more common in China and India, where it constitutes approximately 20% of all primary bone tumours. Most lesions develop in the long bones (75-90%), with most cases (50–65%) occurring near the knee.<sup>4</sup> Approximately 1% of cases present as multiple synchronous or metachronous lesions.<sup>5</sup>

It primarily occurs in young adults between the ages of 20 and 40 years and paediatric cases of GCT are even less frequent and are believed to comprise only 1.7% of all cases of GCTB. Although usually benign tumors, GCTB frequently recurs locally after surgical resection.<sup>6</sup> Muramatsu et al<sup>7</sup> reported a recurrence rate of 34% after intra-lesional excision, 7% after marginal excision, and none after wide excision.

Secondary transformation, which follows radiation therapy or less commonly surgical intervention, accounts for approximately 70% of malignant GCT. Primary malignant GCT, which arise de novo alongside typical GCT, make up the remainder of malignant

<sup>1</sup>. Department of Orthopaedic & Traumatology, Qazi Hussain Ahmad Medical Complex Nowshera, KPK.

<sup>2</sup>. Department of Orthopaedic, Bolan Medical College Hospital, Quetta.

Correspondence: Dr. Muhammad Ishaq, Head of Department, Orthopaedic & Traumatology, Qazi Hussain Ahmad Medical Complex Nowshera, KPK.

Contact No: 0300-5924169

Email: wamiqishaq@yahoo.com

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cases.<sup>8</sup> The incidence of metastases is estimated to be from 1-6%. The metastatic lesions are histologically identical to the primary lesions, showing no tendency to differentiate. The majority of metastatic lesions are to the lung. Solitary metastasis to regional lymph nodes, the mediastinum and the pelvis have been reported, as has involvement of the scalp, bone and para-aortic nodes. The mean interval between the onset of the tumor and the detection of lung metastases is about four to five years.<sup>9</sup>

Treatment often involves curettage, with or without bone filler or adjuvants such as polymethylmethacrylate (PMMA) or phenol.<sup>8</sup> Early treatment methods of GCT involved simple curettage with or without a bone graft and the consequent recurrence rate was approximately 40%. In 1969, Vidal et al<sup>10</sup> introduced reconstruction with bone cement after thorough intralesional curettage.

## MATERIALS AND METHODS

This retrospective case series study was conducted at Department of Orthopaedic & Traumatology, Qazi Hussain Ahmad Medical Complex Nowshera from 1<sup>st</sup> January 2018 to 31<sup>st</sup> March 2020. A total of 16 patients of both genders presented with biopsy proven giant cell tumor were analyzed in this study. Patients detailed demographic including age, sex and symptoms were recorded. Patients with recurrence, patients with lost their follow-up and those with no consent were excluded. All the patients were received biopsy and the lesions were staged according to the grading system by Campanacci et al<sup>11</sup>, Grade I, II and III. Different sites of involved bones and different surgical procedures for the treatment were examined. Functional outcomes of surgical treatment were examined by Musculo-Skeletal Tumor Society score (MSTS) including pain, function, walking ability, walking aids, emotional acceptance and gait. Recurrence rate was also examined. Follow-up was taken at 1 year after surgery. All the data was analyzed by SPSS 24.0. P-value <0.05 was considered as significant.

## RESULTS

Out of 16 patients, 10 (62.5%) patients were males and 6 (37.5%) were females. 3 (18.75%) patients were ages less than 20 years, 11 (68.75%) patients were ages 20 to 40 years and 2 (12.5%) patients had ages above 40 years. Pain and swelling was commonly found symptom in 8 (50%) patients followed by only pain 4 (25%), only swelling in 2 (12.5%) patients and 2 patients were with fracture. 4 (25%) patients had Grade I tumor, 9 (56.25%) patients had Grade II and 3 (18.75%) patients had Grade III tumor (Table 1). Distal

femur was the commonest site in 6(37.5%) patients followed by proximal tibia in 5 (31.25%) patients, 2 (12.5%) had proximal humerus and 3 (18.75%) patients had other bones involved (Table 2).

Curettage and bone cementation was the commonly performed surgical procedure in 5 (31.25%), followed by wide excision of bone and cementation and implant in 4 (25%) patients, 3 (18.75%) patients received curettage and bone grafting, 2 (12.5%) had received disarticulation, 1 (6.25%) patient were received arthroplasty and amputation was done in 1 (6.25%) patient (Table 3). Recurrence was found in 1 patient with curettage and bone grafting and 2 with curettage and bone cementation. The mean MSTS score was 26.2 out of 30 (Table 4).

**Table No.1: Demographical details of all the patients**

Variable	No.	%
<b>Gender</b>		
Male	10	62.5
Female	6	37.5
<b>Age (years)</b>		
< 20	3	18.75
20 -40	11	68.75
> 40	2	12.5
<b>Clinical presentation</b>		
Pain and Swelling	8	50
Pain	4	25
Swelling	2	12.5
Fracture	2	12.5
<b>Tumor grade</b>		
Grade I	4	25
Grade II	9	56.25
Grade III	3	18.75

**Table No.2: Site of bones involved**

Site	No.	%
Distal femur	6	37.5
Proximal tibia	5	31.25
Proximal humerus	2	12.5
Other	3	18.75

**Table No.3: Different surgical procedure performed**

Procedure	No.	%
Curettage and bone cementation	5	31.5
Wide excision of bone, cementation and implant	4	25
Curettage and bone grafting	3	18.75
Disarticulation	2	12.5
Arthroplasty	1	6.25
Amputation	1	6.25

**Table No.4: Outcomes of different surgical procedures**

Variables	Curettage and bone cementation (n=5)	Wide excision of bone, cementation and implant (n=4)	Curettage and bone grafting (n=3)	Disarticulation (n=2)	Arthroplasty (n=1)	Amputation (n=1)
Yes	2	0	1	0	0	0
No	3	0	2	0	0	0
MSTS score	Mean value					
0-30	26.2					

## DISCUSSION

Giant cell tumor is one of the common life's threatening malignant disorder with high rate of morbidity. Patients received surgical treatment reported poor quality of life, it is due to delay in visiting hospital, inaccurate diagnoses, self-medication and unawareness of the disease.<sup>12-14</sup> Many of studies have been conducted regarding surgical outcomes of giant cell tumor. Present study was also conducted to determine the surgical outcomes of different surgical procedures for the treatment of giant cell tumor of bones. In present study 10 (62.5%) patients were males and 6 (37.5%) were females. 3 (18.75%) patients were ages less than 20 years, 11 (68.75%) patients were ages 20 to 40 years and 2 (12.5%) patients had ages above 40 years. These results showed similarity to some previous studies in which male patients were high in number as compared to females.<sup>15,16</sup> Some of other studies reported that female patients had high incidence rate of giant cell tumors 60 to 80% [9-15]. Several previous studies regarding giant cell tumor demonstrated that the incidence rate of giant cell tumor was high in patients with ages 3<sup>rd</sup> or 4<sup>th</sup> decades of their lives.<sup>18,19</sup>

In this study we found that pain and swelling was commonly found symptom in 8 (50%) patients followed by only pain 4 (25%), only swelling in 2 (12.5%) patients and 2 patients were with fracture. Distal femur was the commonest site in 6(37.5%) patients followed by proximal tibia in 5 (31.25%) patients, 2 (12.5%) had proximal humerus and 3 (18.75%) patients had other bones involved. A study conducted by Ahmad et al<sup>20</sup> regarding outcomes of different surgical procedures in patients with giant cell tumor, in which they reported pain and swelling combine was the most common presented symptom 42.6% followed by only pain. But in contrast to our study Ahmad et al<sup>20</sup> also reported proximal tibia was the commonest site of bone 29.63% followed by distal femur 18.52%.

In the present study, we found recurrence in 3 patients in which 1 patient was treated with curettage and bone grafting and 2 patients were received curettage and bone cementation. The mean MSTS score was 26.2 out of 30. These results showed similarity to some previous studies in which recurrence rate was high in patients treated with bone grafting and cementation.<sup>21,22</sup>

## CONCLUSION

Giant cell tumor is one of the common life's threatening malignant disorder. Early diagnosis and better treatment modality may help to reduce the mortality and morbidity rate. It is concluded that giant cell tumor is commonly found in patients with 3<sup>rd</sup> and 4<sup>th</sup> decade of life. Distal femur and proximal tibia were the most common site of bones involved and curettage and cementation was the commonly performed surgical procedure. Patients with giant cell tumor were on high risk of recurrence after surgical treatment.

### Author's Contribution:

Concept & Design of Study: Muhammad Ishaq  
 Drafting: Karim Bakhsh  
 Data Analysis: Attiq-ur-Rehman  
 Revisiting Critically: Muhammad Ishaq, Karim Bakhsh  
 Final Approval of version: Muhammad Ishaq

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

## REFERENCES

- Sobti A, Agrawal P, Agarwala S, Agarwal M. Giant cell tumor: Rev Arch Bone Joint Surg 2016;4(1): 2-9.
- Cheng D, Hu T, Zhang H., Huang J, Yang Q. Factors affecting the recurrence of giant cell tumor of bone after surgery: a clinicopathological study of 80 cases from a single center. Cell Physiol Biochem 2015;36: 1961-70
- Muheremu A, Niu X. Pulmonary metastasis of giant cell tumor of bones. World J Surg Oncol 2014; 12: 61.
- Xu SF, Adams B, Yu XC, Xu M. Denosumab and giant cell tumour of bone - a review and future management considerations. Curr Oncol 013; 20(5): E442-7.
- Hoch B, Inwards C, Sundaram M, Rosenberg AE. Multicentric giant cell tumor of bone. clinicopathologic analysis of thirty cases. J Bone Joint Surg Am 2006; 88(9): 1998-2008.
- Karras NA, Polgreen LE, Ogilvie C, Manivel JC, Skubitz KM, Lipsitz E. Denosumab treatment of metastatic giant-cell tumor of bone in a 10-year old girl. JCO 2013;31:12e200-2.

7. Muramatsu K, Ihara K, Taguchi T. Treatment of giant cell tumor of long bones: clinical outcome and reconstructive strategy for lower and upper limbs. *Orthopedics* 2009;32(7): 491.
8. Broehm CJ, Garbrecht EL, Bocklage WT. Two cases of sarcoma arising in giant cell tumor of bone treated with denosumab, case reports in medicine, *Cae Rep Med* 2015; 2015: 767198.
9. Puri A, Agarwal M. Treatment of giant cell tumor of bone: current concepts. *Indian J Orthop* 2007; 41(2):101-8.
10. Vidal J, Mimran R, Allieu Y, et al. Plastique de comblement par metacrylate de methyle traitement de certaines tumeurs osseuses benignes. *Montpellier Chir* 1969;15:389-97.
11. Campanacci M, Capanna R, Fabbri N, Bettelli G. Curettage of giant cell tumor of bone: reconstruction with subchondral grafts and cement. *Chir Organi Mov* 1990;75(1 Suppl):212-3.
12. Ayerza MA, Aponte-Tinao LA, Farfalli GL, Restrepo CA, Muscolo DL. Joint preservation after extensive curettage of knee giant cell tumors. *Clin Orthop Relat Res* 2009; 467: 2845-51.
13. van der Heijden L, van de Sande MA, Heineken AC, Fiocco M, Nelissen RG, Dijkstra PD. Mid-term outcome after curettage with polymethylmethacrylate for giant cell tumor around the knee: higher risk of radiographic osteoarthritis? *J Bone Joint Surg Am* 2013; 95:e159.
14. Niu X, Xu H, Inwards CY, Li Y, Ding Y, Letson DG. Primary Bone Tumors: Epidemiologic Comparison of 9200 Patients Treated at Beijing Ji Shui Tan Hospital, Beijing, China, With 10165 Patients at Mayo Clinic, Rochester, Minnesota. *Arch Pathol Lab Med* 2015; 139(9): 1149-55.
15. Niu X, Zhang Q, Hao L, Ding Y, Li Y, Xu H, et al. Giant cell tumor of the extremity: retrospective analysis of 621 Chinese patients from one institution. *J Bone Joint Surg Am* 2012; 94:461-7.
16. Hu P, Zhao L, Zhang H, Yu X, Wang Z, Ye Z, et al. Recurrence rates and risk factors for primary giant cell tumors around the knee: a multicentre retrospective study in China. *Sci Rep* 2016; 6: 36332.
17. Amanatullah DF, Clark TR, Lopez MJ, Borys D, Tamurian RM, Giant cell tumor of bone, *Orthopedics* 2014; 37(2): 112-20.
18. Cheng D, Hu T, Zhang H, Huang J, Yang Q. Factors affecting the recurrence of giant cell tumor of bone after surgery: a clinicopathological study of 80 cases from a single center cell. *Physiol Biochem* 2015; 36:1961-1970.
19. Osman W, Alaya Z, Haggui A, Rejeb MB, Jemni S, Naouar N, et al. Les tumeurs à cellules géantes des gaines synoviales de la main: à propos de 50 cases. *Pan Afr Med J* 2017;26(128):8.
20. Ahmad A, Saeed R, Akram R, Amad I, Ahmad N, Javed S, Amer A. Overview of giant cell tumour, outcomes of different surgical procedures; *Pak J Surg* 2017; 33(4):285-291.
21. Deveci MA, Paydas S, Gonlusen G, Ozkan C, Bicer OS, TekinM. Clinical and pathological results of denosumab treatment for giant cell tumors of bone: prospective study of 14 cases. *Acta Orthop Traumatol Turc* 2017; 51(1): 1-6.
22. Jamshidi K, Gharehdaghi M, Hajialiloo SS, Mirkazemi M, Ghaffarzadehgan K, Izanloo A. Denosumab in patients with giant cell tumor and its recurrence: a systematic review. *Arch Bone Joint Surg* 2018; 6(4): 260-68.