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Management of Campanacci type III giant cell tumor

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Abstract

Objective: Giant cell tumor is an aggressive benign tumor of the bone, involving long bone. They are commonly present around knee joint. There are different treatment options and we assessed the treatment outcomes of various procedures.

Methods: This case series was conducted using probability consecutive sampling technique in the Department Orthopedics Surgery, Combined Military Hospital, Lahore from December 2011 to March 2016 in a duration of five years four months. Our sample size was fifteen patients between 32 to 60 years of age with giant cell tumor. We included all patients with giant cell tumors newly diagnose on history, clinical examination, radiographs, magnetic resonance image (MRI) and bone biopsy. We excluded all patient with history of previous surgery, uncontrolled diabetes, chronic liver failure, chronic kidney disease and congestive heart failure. We managed all patients with various treatment option included resection arthrodesis with vascular fibular graft, mega prosthesis, and wide margin excision with bi-focal segment transport with external fixator device. We observed treatment effectiveness, limb length discrepancy, and post treatment complications. Our follow up period was four years. We followed all patients six monthly for one year and subsequently at one year.

Results: There were 13 (86.7%) male and two (13.3%) females. Majority seven (46.67%) patients were present between 41 to 50 years of age with their mean \pm SD (30.66 \pm 13.87). Amongst three (20%) patients with involvement of proximal humerus, resection arthrodesis with vascular fibular graft was done, three (20%) patients with distal radius, two (66.66%) had resection arthrodesis with vascular fibular graft and one (33.34%) had mega prosthesis. Two (13.3%) had resection arthrodesis (50%) and mega prosthesis (50%). Majority five (33.3%) had proximal tibia involvement were treated with three (60%) resection arthrodesis and two (40%) with mega prosthesis. Among Two (13.3%) patients who had distal tibia involved were managed with wide margin excision, and bi focal segment transport with external fixator device. Out of the total 15 cases, nine (60%) had lower limb involvement and there was only one (11.11%) leg length discrepancy.

Conclusion: We concluded from the study that management of giant cell tumors with mega prosthesis, segment trans port and resection with free fibular graft was equally good, but patient satisfaction was better in patients who had resection with mega prosthesis.

Keywords: Giant cell tumor, patient satisfaction, mega prosthesis

1. Introduction

Giant cell tumors of bone (GCTB) was first recognized in 1818 by Cooper. It is a relatively rare, benign, locally aggressive osteolytic neoplasm of young adult ^[1]. Before 1940, It was not formally distinguished from other bone tumors included aneurysmal bone cyst, chondroblastoma and non-ossifying fibroma ^[2]. Amongst primary benign tumors, it accounts for approximately 3 to 5 percent and 15 to 20 percent of all benign tumors ^[3, 4].

During 3rd and 4th decade, these lesions can occur in more than 50 percent of patients ^[5]. GCTB has aggressive behaviors and they can metastasize. They may be associated with serious damage to the local bone anatomy and can be troublesome in periarticular lesions. It has high re-occurrence rate with metastasis occur in 1 to 9 percent patients with giant cell tumor. Studies correlated, giant cell tumors with aggressive growth and local re-occurrence has high incidence of metastasis ^[6, 7].

There is no consensus about ideal treatment of Campanacci type III giant cell tumors of bone. it can be treated with different surgical technique included intra-lesional curettage to wide margin excision.

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In our study, we treated all patients with different treatment ranging from resection arthrodesis with vascular fibular graft, mega prosthesis, and wide margin excision with bi-focal segment transport with external fixator device. We observed treatment effectiveness, limb length discrepancy, and post treatment complications of various advocated treatments.

2. Methodology

This case series was conducted using probability consecutive sampling technique in the Department Orthopedics Surgery, Combined Military Hospital, Lahore from December 2011 to March 2016 in a duration of five years four months. Our sample size was fifteen patients between 32 to 60 years of age with giant cell tumor. We included all patients with giant cell tumors newly diagnose on history, clinical examination, radiographs, magnetic resonance image (MRI) and bone biopsy. We admitted all patients from out-patient department (OPD) of the hospital. All patients before admission had their baseline, digital radiographs, and magnetic resonance image (MRI). Later, patients were admitted and bone biopsy was done on elective list. Tumor were staged and all patients with Campanacci III were included. Campanacci grade I is intra-compartmental tumor with intact, well marinated border of thin rim of bone, grade II has well defined margins but no radio-opaque rim and grade III are extra compartmental tumor [8]. We excluded all patient with history of previous surgery, uncontrolled diabetes, chronic liver failure, chronic kidney disease and congestive heart failure. We managed all patients with various treatment option included resection arthrodesis with vascular fibular graft, mega prosthesis, and wide margin excision with bi-focal segment transport with external fixator device. We observed treatment effectiveness, limb length discrepancy, and post treatment complications. Our follow up period was four years. We followed all patients six monthly for one year and subsequently at one year.

We used SPSS version 20.0 for data entry and analysis. The variables i.e. age, sex, limb side were tabulated and presented as proportion mean and standard deviation. As the outcome of my study was quantitative 't' test was applied as test of significance.

3. Results

There were 13 (86.7%) male and two (13.3%) females. Majority seven (46.67%) patients were present between 41 to 50 years of age with their mean \pm SD (30.66 \pm 13.87). only 2 (13.3%) patients presented with Pathological fracture while majority 13 (86.67%) has pain at time of presentation. Regarding their site of involvement, there were three (20%) patients who had proximal humerus, three (20%) distal radius, two (13.3%) distal femur, five (33.3%) proximal tibia and two (13.3%) had distal tibia involved. Amongst three (20%) patients with involvement of proximal humerus, resection arthrodesis with vascular fibular graft was done, three (20%) patients with distal radius, two (66.66%) had resection arthrodesis with vascular fibular graft and one (33.34%) had mega prosthesis. Two (13.3%) had resection arthrodesis (50%) and mega prosthesis (50%). Majority five (33.3%) had proximal tibia involvement were treated with three (60%) resection arthrodesis and two (40%) with mega prosthesis. Among Two (13.3%) patients who had distal tibia involved were managed with wide margin excision, and bi-focal segment transport with external fixator device. Out of the total 15 cases, nine (60%) had lower limb involvement and there was only one (11.11%) leg length discrepancy, only 1 (6.67%) patients had deep infection and 4 (26.67%) has superficial infection. There were treated with wound debridement and intravenous antibiotics followed by oral antibiotics. All patients were uneventful till last follow up (Table 1). When t test was applied it was found significant ($p<0.001$)

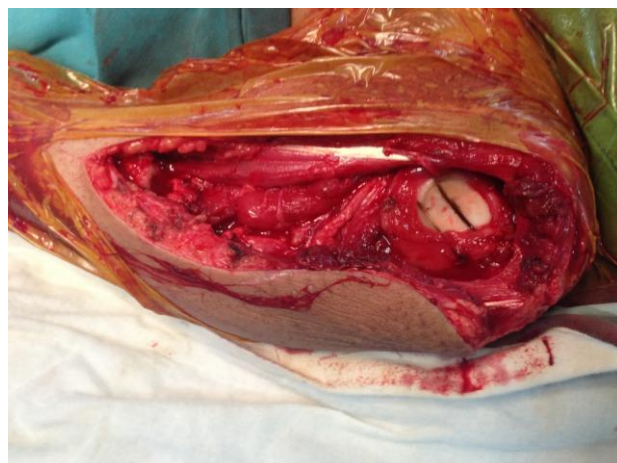
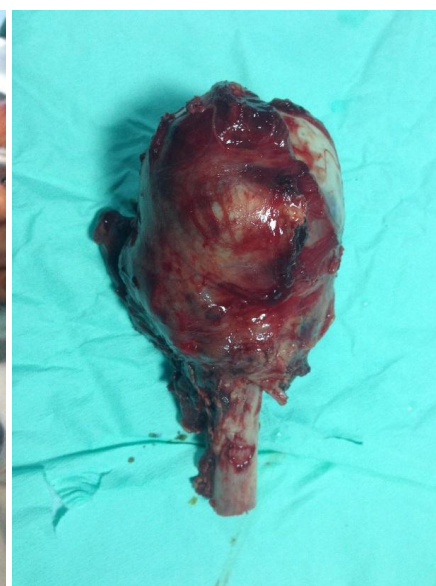
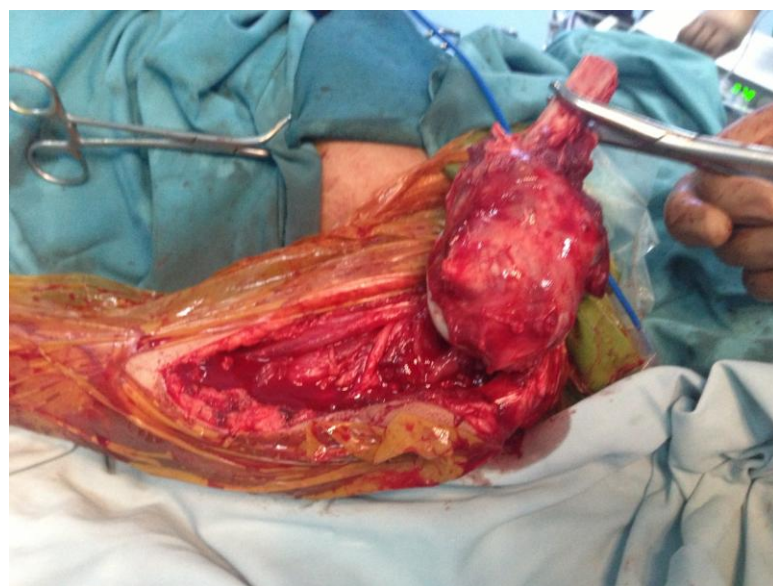
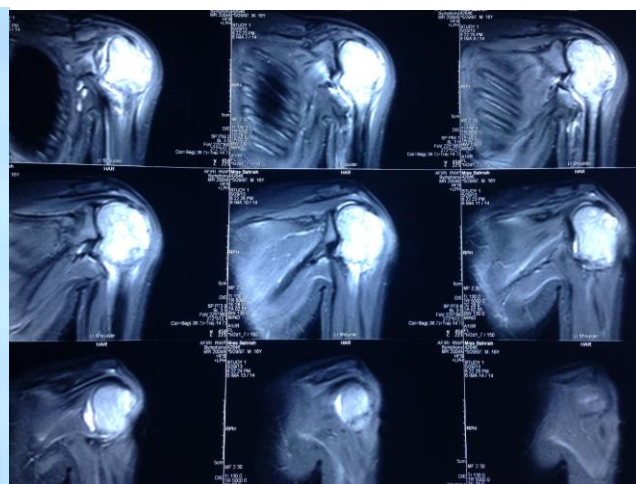
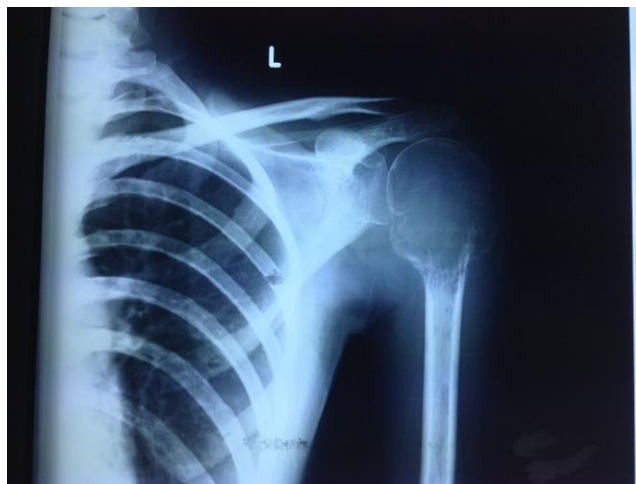
Table 1: Demographic data of the participants

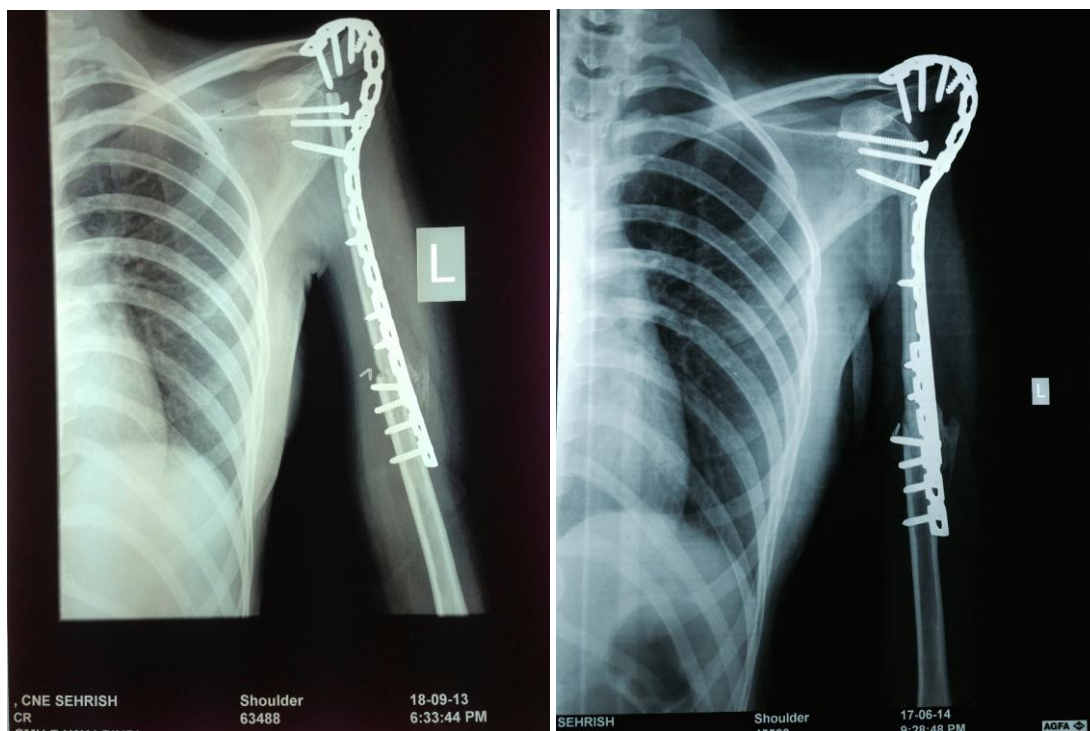
| Variables | Frequency (N=15) | Percent (%) |
|--------------------------------|-------------------|-------------|
| Gender | | |
| Male | 13 | 86.7% |
| Female | 02 | 13.3% |
| Age (Mean \pm SD) | 30.66 \pm 13.87 | |
| Site of Lesion | | |
| Proximal Humerus | 2 | 13.3% |
| Distal radius | 3 | 20% |
| Distal Femur | 3 | 20% |
| Proximal Tibia | 2 | 13.3% |
| Distal tibia | 5 | 33.3% |
| | 2 | 13.3% |
| Treatment | | |
| Resection arthrodesis with VFG | 05 | 33.3% |
| Mega prosthesis | 08 | 53.33% |
| Bi-focal segment transport | 02 | 13.3% |
| Complications | | |
| Superficial Infection | 04 | 26.67% |
| Deep infection | 01 | 6.67% |
| Limb Length Discrepancy | 01 | 6.675 |

*Vascular fibular graft (VFG).

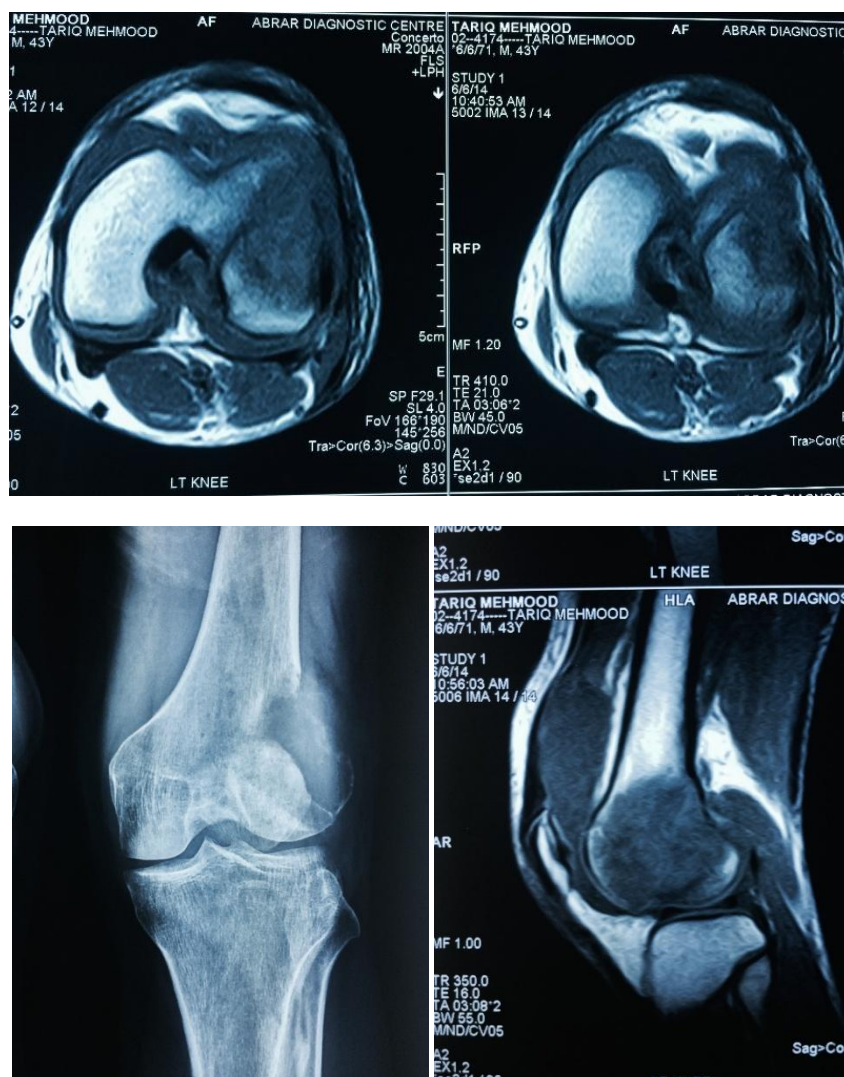
Table 2: t Test of Management of Campanacci III Giant Cell Tumors

| Variables | n | Mean | Standard Deviation | t | p-value |
|----------------------------------|----|------|--------------------|---------|---------|
| Management of Campanacci III GCT | 15 | 2.80 | 1.4735 | 242.328 | <0.001 |





Case 1: A 35 years old female with GCT left proximal humerus X-rays with MRI. Wide margin excision was done with strut fibular graft and recon plate.





Case 2: A 40 years old male with GCT left distal femur had wide margin excision with mega prosthesis done.

4. Discussion

Treating bone malignancy is a challenge for orthopedic surgeon. The appropriate treatment choice and rehabilitation is necessary. Different physical requirements are met according to location of tumor and age is of the patient is another challenge. It a tumor of young adult. We managed patient with different methods of treatment. Aiming patients' need and treatment effectiveness was our main task.

GCT tumor is common tumor amongst benign tumors. It is a tumor of young adults between 20 to 40 years of age with predominance in female compared with males. Mostly, they are located around joints. Approximately, 90% were found around the epiphyseal location. Due to their location around joint, their treatment is a difficult. Proper treatment and patient rehabilitation is a main task to achieve to attain good results.

In our study, there were 13 (86.7%) male and two (13.3%) females while data reported female predominance which is not similar to our study [9]. Majority seven (46.67%) patients were present between 41 to 50 years of age with their mean \pm SD

(30.66 \pm 13.87) which was similar to other reported data [9]. Ninety percent of GCT exhibits the typical epiphyseal location which was similar with data in our study [10, 11].

At diagnosis, approximately 12% of patients with GCT present with pathologic fracture [12-16] while in our study there were two (13.3%) had pathological fractures at the time of presentation. Out of the total 15 cases, nine (60%) had lower limb involvement and there was only one (11.11%) leg length discrepancy.

5. Conclusion

We concluded from the study that management of giant cell tumors with mega prosthesis, segment trans port and resection with free fibular graft was equally good, but patient satisfaction was better in patients who had resection with mega prosthesis.

6. Conflict of interest

The authors have no conflict of interest.

7. References

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