

Resection of Periarticular Giant Cell Tumor and Arthrodesis Using Ilizarov Fixator

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ABSTRACT

Objective: To see the outcome of resection of periarticular giant cell tumor and arthrodesis using ilizarov fixator.

Methods: This case series study was performed during June 2013 to June 2017. Patients of periarticular giant cell tumor were operated after counseling and consent at the Department of Orthopedics Surgery Chandka Medical College Hospital. After resection of the tumor, fixator was applied and transport was started after latent period of 7 days. Unifocal and bifocal transport was used. After docking fixator was retained till the regenerate was strong. Outcome was measured according to the ASAMI criteria. The data collected was statistically analyzed.

Results: 12 patients were included in this study. Out of 12 patients 8 were male and 4 were female. Mean gap after resection of the tumor was 8.25 cm. Mean age was 37.1 years. Results were promising according to ASAMI criteria. 3 patients suffered from complications, 2 suffered pin tract infection and one suffered non-union at docking site.

Conclusion: Resection of the periarticular giant cell tumor and arthrodesis using ilizarov fixator is good and cost effective method of bone gap management and limb salvage. Considering expensive endoprosthesis reconstruction and their complications ilizarov fixator is good at reconstructing the defects.

Key Words: Giant Cell Tumor, Ankle Arthrodesis, Ilizarov

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INTRODUCTION:

Giant cell tumor is the tumor of bone, though it is a benign tumor, it can behave aggressively, and has the tendency to metastasize¹. Local recurrence of giant cell tumor is seen in 50%². Prevalence is slightly higher in females³. Giant cell tumor

commonly presents in the third and fourth decade of life, it is rarely seen before closure of the nearby physis. In immature skeleton, metaphysis are the usual site⁴. Most common location is around the knee and wrist followed by sacrum, ankle and foot. Flat bones such as pelvis, sacrum, spine and ribs are less commonly affected (15% of cases)³. Hand bones are a very rare location of giant cell tumors accounting for 2% of cases⁵. Patients with giant cell tumor present with pain and swelling. Pathologic fractures are the presenting feature in 30% of patients⁶. Giant cell tumor is eccentric in location near joint⁷ with slight extension into the subchondral bone. CT and MRI are good at detecting the degree of extension into the subchondral bone and joint congruity⁸.

Due to periarticular location, treatment of giant cell tumor is very difficult. Different

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treatment options are available for the treatment of giant cell tumor of bone such as curettage, curettage, and application of local adjuvants as phenol and en block resection⁹. There is a high recurrence of tumor after curettage, mean recurrence rate is 42%. After en block resection recurrence rate is very low (0-16%)¹⁰. En block resection is indicated in cases when there is an extensive destruction of articular surfaces and soft tissue extension of the tumor, and when there is recurrence after curettage multiple times. After resection of the tumor, a large defect is created between bone ends. Reconstruction of the defects is possible with many methods including resection and acute docking with an intramedullary nail and later on bone lengthening, bone transport and arthrodesis with Ilizarov, vascularized free fibular graft and endoprosthetic reconstruction¹¹.

In this study, we share our experience of treating periarticular stage 3 giant cell tumors in our institute.



Fig-1: Figure Shows GCT of left Distal Tibia with Cortical break

METHODS:

This case series study was done at the Department of Orthopedics Surgery Chandka Medical College Hospital Larkana from June 2013 to June 2017. The inclusion criteria was periarticular giant cell tumor (knee and ankle), campanacci radiological stage III, bad skin condition (erythema, superficial wounds), age ranging from 30 to 50 years, both male and female. The patients of stage I, II, and those cases

having GCT at wrist or shoulder were excluded from the study. Patients were admitted through OPD. Diagnosis of giant cell tumor was made on the basis of plain radiographs of femur and tibia. Routine investigations as CBC, viral markers, ESR and CRP were done. Preoperative counseling regarding resection of the tumor and arthrodesis was done and patients were operated after taking consent. Resection of the tumor was done, after hemostasis and closure of wound over drain, ilizarov fixator was applied. For distal femur tumors proximal femoral corticotomy was done, distal tibial corticotomy was done for proximal tibial tumors and proximal tibial corticotomy was done for distal tibial tumors. Transport was started after a latent period of 7 days, at a rate of 0.25 mm four times a day and patients were discharged home after counseling them regarding pin tract care and rate of transport. Patients were called for follow-up every 4th week. On every followup, patients were evaluated clinically and radiologically. Data was collected in terms of age, gender, site of tumor (distal femur, proximal tibia, distal tibia), the gap after resection of the tumor, type of corticotomy (unifocal/ bifocal) and outcome variables in our study were effectiveness according to ASAMI criteria (excellent, good, fair and poor) and complications. Data was analyzed and mean was calculated for the quantitative variables as age, gap after resection of the tumor. The percentage was calculated for qualitative variables as gender, site of the tumor, type of corticotomy, outcome variables and complications.

OPERATIVE TECHNIQUE

En block resection of the tumor was done. After achieving hemostasis incision was closed over a ready vac drain. Ilizarov fixator was applied and corticotomy was done either unifocal or bifocal depending upon gap created after resection of the tumor. Distraction was started after a latent period of 7 days. Patients were allowed toe weight bearing once they were pain-free. All the patients were discharged once they were confident enough to do distraction themselves & were asked to come for followup

every 4th week. Clinical examination and radiographs were done at each followup. Full weight bearing was started after docking and formation of good regenerate. The frame was removed after consolidation of regenerate and union at docking site (Fig.I-V). Data was analyzed using SPSS-20.

RESULTS

Total number of patients included in our study was 12. Out of 12 patients, 8 were male and 4 were female. Mean age was 35.1 ± 7.27 years. Tibia was affected in 7 patients and 5 patients had the tumor in the distal femur. Mean defect after resection of the tumor was $8.25 \text{ cm} \pm 2.13 \text{ cm}$. Unifocal transport was done in 9 patients and bifocal transport was done in 3 patients. Mean followup was $18.25 \text{ months} \pm 5.49 \text{ months}$. According to ASAMI criteria, bone results were excellent in 10 patients and good in 2 patients. Functional results were excellent in 8 patients, good in 3 patients and fair in 1 patient. Out of 12 patients, 2 patients suffered from pin tract infection and 1 patient suffered from non-union at docking site. Cultures were taken from infected pin tracts and antibiotics were started according to culture sensitivity. Bone grafting was done to manage non-union at docking site. All of the patients were satisfied with the treatment.



Fig-II: The Skin condition of Patient with GCT



Fig-III: Per Operative Image of Distal Tibia



Fig-IV: Ilizarov Fixator applied after Resection

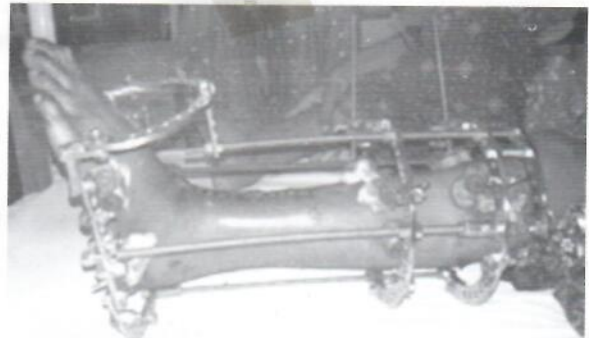


Fig-V: Side view Showing Frame Design

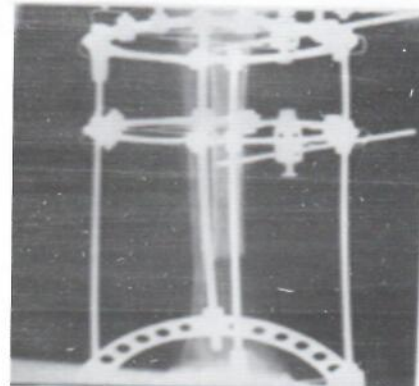


Fig: VI: Postoperative X-Ray shows Gap after Resection of the Tumor

DISCUSSION:

Periarticular giant cell tumor is a very difficult situation. Priority is given to articular salvage. Curettage is associated with high rate of recurrence. The treatment options available for reconstruction of the defect created after resection of the tumor are the use of custom made endoprosthesis and allograft-endoprosthesis. Patients who undergo endoprosthetic

reconstruction have early improvement and return early to their normal life¹¹. The use of endoprosthetic reconstruction is well studied in patients with malignant tumors, its role after resection of benign bone tumors is less studied¹². Allograft endoprosthesis reconstruction is also a good option in patients with periarticular giant cell tumor. These treatment options are very costly and people in our part of the world cannot afford these expensive treatments. Allograft endoprosthesis is not devoid of complications, they may result in infection and refracture¹³. Though there is the loss of movement at the knee and ankle joint, arthrodesis after the resection of tumor offers a good alternative to endoprosthesis reconstruction.

Resection and regeneration of new bone using distraction osteogenesis with Ilizarov apparatus provide stable construct, gradual lengthening of soft tissue¹⁴ and cost-effective treatment option. In our study bone and radiological results were excellent. Patient satisfaction was high. Ilizarov fixator is very versatile fixator, adjustments can be done in the frame according to the need during the course of treatment. Although treatment time is lengthy, patient satisfaction is high after good preoperative counseling. In our study bifocal and unifocal transport was done according to the need. The rate of transport was adjusted according to the regenerate at every followup. Ilizarov fixator is preferred over the uniplanar fixators due to its versatility, as adjustments are possible to correct any limb discrepancy and deformity during the course of treatment. Complications were seen only in 3 of our patients. The most common complication was pin site infection. Cultures were taken from the pin sites and antibiotics were started according to sensitivity. One of the patients suffered from non-union at docking site which was managed with bone graft. Bone graft was used in only one case in our study. Some people use routine bone grafting at the docking site to shorten distraction time and achieve early union at the docking site¹⁵. We reserve bone grafting at the docking site only in case of non-union. Union was achieved at the docking site in

all cases except one even without routine bone grafting.

CONCLUSION

Ilizarov fixator has long been used in the management of deformities, bone gaps and infected non-unions. It is also found to be very effective in managing large bony defects after the resection of bone tumors. Though arthrodesis with Ilizarov after bone transport sacrifices the joint, it provides stable bone regenerate and cost-effective treatment. It is a very good method of limb salvage. Complications of the treatment can be easily managed.

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