

# En-Bloc Excision and Ulnar Translocation for Aggressive Giant Cell Tumour (GCT) of Distal Radius

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## ABSTRACT

**Patients and methods:** On retrospective search of our hospital, we found 8 cases of GCT distal radius operated with en-bloc excision for tumour and reconstruction of distal radius with ulnar translocation at our institute during a period from January 2009 to December 2012 and we were able to follow these cases.

**Results:** Of the 8 patients analyzed, there were 5 males and 3 females with 6 left sided and 2 right sided involvement of distal radius. The mean age of patients was 28.7 years (21-43 years). There were 3 grade-II and 5 grade-III GCTs in this series. There were 2 cases of recurrent GCT initially treated with extended curettage with recurrence detected at 14 and 17 months.

**Conclusion:** Although complication rate is high, reconstruction of distal radius with ulnar translocation can be considered as a reasonable option after en-bloc excision of grade-II/III GCT.

**Keywords:** Distal radius, allograft, ulnar translocation, giant cell tumour.

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## INTRODUCTION

Giant cell bone tumour is a benign aggressive bone tumour of obscure origin presenting in 3<sup>rd</sup> and 4<sup>th</sup> decade of life and carries a definite female preponderance<sup>1</sup>. After distal femur and proximal tibia distal radius happens to be the most common site of occurrence for GCT<sup>2</sup>. This site has a further distinction of having more aggressive behavior of GCT with higher chances of recurrences and malignant transformation<sup>3,4</sup>.

Treatment options for GCT at this site include curettage with bone grafting or cementing, en-bloc excision and reconstruction with non-vascular or vascularized fibular autograft, osteoarticular allograft, ulnar translocation or endoprosthesis<sup>5,6,7,8,9,10,11,12,13,14</sup>. Although amputation would seem likely to be curative, it is seldom advised in a tumour that rarely metastasizes. The recurrence rate for primary treatment of GCT is relatively higher for curettage or extended curettage as compared to en-bloc excision, making later a more suitable and reliable option in cases showing aggressive lesions which so often is the case in distal radius<sup>2,3,8,15,16</sup>. Although providing the best chance of cure from GCT, en-bloc excision of distal radius presents complex reconstructive problems<sup>16,17,18,19,20,21</sup>. Reconstruction of wrist after en-bloc excision of distal radius is a challenging task, we have routinely used ulnar translocation for reconstructing distal radius and present here our experience with this procedure.

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## PATIENTS AND METHODS

On retrospective search of our hospital record, we found 8 cases of GCT distal radius operated with en-bloc excision for tumour and reconstruction of distal radius with ulnar translocation at our institute during a period from 01-01-2009 to 31-12-2012 and we were able to follow these cases. Patients were classified according to Campanacci radiological grading method consisting of three grades<sup>4</sup>. Grade-I tumour had a well defined border of a thin rim of mature bone and bony cortex was intact. Grade-II lesions had relatively well defined margins but there was no radio-opaque cortical rim. Grade-III was designated to the lesions with fuzzy borders, suggesting a rapid and possibly a permeative growth of the tumour.

All patients with grade-I tumours were treated with extended curettage in a hope to avoid more radical surgery. Grade-III tumours have been uniformly treated by ulnar translocation reconstruction. However, the decision of type of operative intervention (extended curettage vs resection/reconstruction) in grade-II tumours was based on individual case with one of the important consideration being the subcortical bone stock likely to be available after curettage. Ulnar translocation was the index surgery in 6 of the 8 cases and rest 2 were cases of recurrent in grade-II tumours was based on individual case with one of the important consideration being the subcortical bone stock likely to be available after curettage. Ulnar translocation was the index surgery in 6 of the 8 cases and rest 2 were cases of recurrent GCT initially treated with extended curettage and bone cementing for these grade-II tumours.

Patients were operated under general anaesthesia. A tourniquet was used at surgical site. Surgical approach chosen for distal radius depended on site of radiographic thinning or breach of cortical bone. Thus 5 cases were operated from dorsal exposure and rest 3 from volar. Biopsy tract if present was taken in the initial incision. Bone was resected at a level determined preoperatively based on extent of bone involvement on MRI plus a safe margin of 1.5-2cm. dissection remained extraperiosteal at all time in order to avoid spillage of tumours tissue and a soft tissue. Cuff was excised along with the tumour taking care not to damage neurovascular structures.

**RESULTS**

Of the 8 patients analyzed, there were 5 males and 3 females with 6 left sided and 2 right sided involvement of distal radius. The mean age of patients was 28.7 years (21-43 years). There were 3 grade-II and 5 grade-III GCTs in this series. There were 2 cases of recurrent GCT initially treated with extended curettage with recurrence detected at 14 and 17 months.

None of the cases had a pathological fracture or metastatic disease at presentation. Follow up duration in this series was 3 years. No patient was dis-satisfied as far as shape of wrist/cosmetics was concerned. There was no major complication related to the procedure. One patient developed superficial infection at operative site which settled after a prolonged course of antibiotics for 6 weeks. There were no graft related complications like graft resorbition or graft fracture. There were 3 cases of wrist subluxation, including one in the patient who had superficial infection in postoperative period and functional impairment with moderate activity. There was one case of soft tissue recurrence of GCT after 2 years which was treated with excision of mass. Rest of 7 cases had not shown any sign of recurrence at last follow up.

Two patients had non-union for which iliac crest bone grafting was repeated at 10 and 13 months and graft ultimately united at 14 and 16 months respectively there was radiological or intraoperative evidence of inadequate fixation or significant gap at fracture site and implant retained in both cases. The overall time of union in 8 patients averaged 34 weeks.

Table 1: Rate of non-union

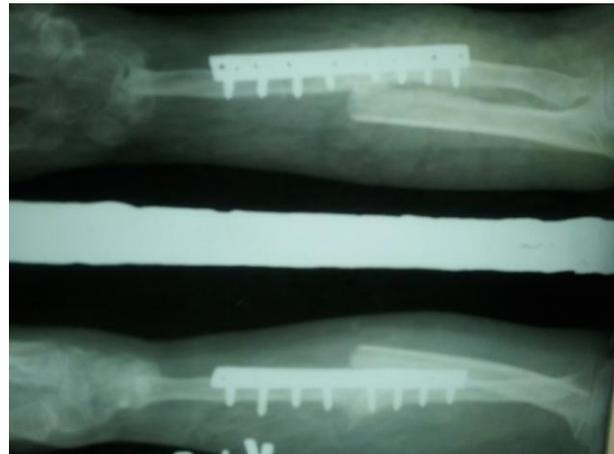
Rate	=n	Percentage
Union	6	75.0
Non-union	2	25.0

Table 2: Rate of infection

Rate	=n	Percentage
Yes	1	12.5
No	7	87.5

Table 3: Satisfaction of patients

Satisfied	=n	Percentage
Yes	6	75.0
Not	2	25.0



## DISCUSSION

The clinical behavior of GCT is unrelated to histological or radiological grading<sup>3,5</sup> and thus the decision to either salvage or excise the tumours bone is based on ability to achieve stability and function whatever may be the means used. The indications for en-bloc resection would thus include pathological fractures, extensive bone involvement with large tissue involvement and collapse of particular surface<sup>16</sup>. Frankly malignant and recurrent tumours may also undergo en-bloexcision or amputation.

Management of GCT of distal radius which represents around 10% of GCTs involving bone<sup>2,5</sup> is particularly challenging due to invariably extensive destruction of bone and an aggressive clinical behaviour<sup>3,4</sup>. En-bloexcision is a reliable procedure in terms of lower recurrence rates but creates a bony defect and thus is reserved for large lesions with extended curettage being the treatment of choice for smaller grade-I tumours<sup>2,8,13,15,16</sup>.

Ulnar translocation for the large defect created after resection of distal radius offers many advantages over other procedures. It has low donor site morbidity, with predictable and satisfactory functional results and is relatively free of major complications although minor complications occur frequently<sup>8,9,12,16,18</sup>. Most frequent complication in our series was wrist subluxation which occurred almost in every case. These were managed with removable wrist splint worn during night and as needed due to pain during the day time. This has been a frequently reported complication in other previously published series<sup>16,18,19</sup>. In a report of 24 cases, 10 cases of subluxation, 6 of which were asymptomatic. Aithat et al reported 3 instances of subluxation amongst 30 cases after an average follow up of 8.5 years<sup>19</sup>. Maruthainar et al also reported 4 cases (n=13) of wrist subluxation.

In our series, another significant complication was non-union in 2 of our patients which were treated with bone grafting. Nevertheless, we eventually achieved union in both of these cases. Delayed union or non-union has also been frequently reported by many authors. Perhaps the use of primary bone grafting of graft radius junction has decreased the incidence of non-union in more recent series<sup>16</sup>. We also had one case of superficial infection which was treated with prolonged course of antibiotics. Furthermore we had one case of soft tissue recurrence which was managed with repeat surgery and remained tumour free at the last follow up of 3 years. Overall complications were seen in 50% of patient in one series (4 patients). All patients were satisfied with the result as regards to the shape and cosmetic results of the surgery.

Due to relative rarity of this tumour, there have been few published studies evaluating results of ulnar translocation for distal radius resection. Similar results of fibular grafting and allograft reconstruction have been reported. However, this procedure always carries a risk of disease transmission, immunological relation and infection apart from having high complication rate. Moreover, lack of availability of allograft and specialized bone bank facilities may prevent its frequent use. Translocation of ulna is a procedure which has been used frequently with good results but sometimes may not give cosmetically acceptable results as there is narrowing of wrist and distal forearm giving an hourglass appearance to the limb. Endoprosthetic replacement of distal radius has also been reported by few authors but the results of such procedures have not been conclusively shown to be better than other existing treatment as most instances are of either case reports or very small series with relatively short follow up.

## CONCLUSION

To conclude, we believe that although results of ulnar translocation of distal radius show substantial loss of function as compared to most patients and comparable to all other available methods of such reconstruction. The technique also carries the advantage of not requiring the facilities of bone bank or microvascular surgery. The complication rates associated with such reconstruction of distal radius are universally high but do not preclude satisfactory results. Thus ulnar translocation of distal radius can be considered as a reasonable procedure after en-bloc excision of grade-II/III GCT.

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