



## Case Report

# Giant Cell Tumor of Distal end of Radius - Excision and Reconstructive Stabilization of the Wrist Joint with Avascularised Autogenous Fibular Graft

Authors

Dr N.Sravan Raju<sup>1</sup>, Dr Madhavi.K<sup>2</sup>, Dr P.Ashok Kumar<sup>3</sup>, Dr C.J Mani Kumar<sup>4</sup>

<sup>1,2</sup>Junior Resident of Orthopaedics, Andhra Medical College, Visakhapatnam, India

<sup>3</sup>Professor of Orthopaedics, Andhra Medical College, Visakhapatnam, India

<sup>4</sup>Assistant Professor of Orthopaedics, Andhra Medical College, Visakhapatnam, India

## Abstract

**Introduction:** Giant cell tumor of bone also known as osteoclastoma is one of the commonest bone tumor. The treatment of osteoclastoma is directed towards local control without sacrificing wrist joint function. This has conventionally been achieved by intralesional curettage with autograft reconstruction.

**A Case Report:** We report a case of a 26year old male patient who presented with swelling over the distal end of the right distal radius. Operated with en block excision and reconstructive arthroplasty with avascularised autogenous contralateral fibular graft.

**Results:** No post-operative recurrence were found. Patient had good range of motion at the last follow up visit and was cable of doing his daily activities.

**Conclusion:** Avascular autologous proximal fibular arthroplasty provides for excellent functional outcomes after wide resection in distal radius GCT .

**Keywords:** GCT, giant cell tumor, osteoclastoma, distal radius, Autologous fibular arthroplasty.

## Introduction

Giant cell tumor of bone better called osteoclastoma is one of the commonest bone tumor. Usually benign, they are locally aggressive and may occasionally undergo malignant transformation. These tumors typically occur in patients 20 to 40 years old, and there is a slight female predominance.<sup>1</sup>

The reported incidence of osteoclastoma in the Oriental and Asian population is higher than that in the Caucasian population and may account for 20% of all skeletal neoplasms.

The treatment of osteoclastoma is aimed at local control without sacrificing joint function. This has conventionally been achieved by intralesional curettage with autograft reconstruction.

This challenging tumor of the epiphysis which is "aggressive, potentially malignant" accounts for 5% of all bone neoplasms. Moreover it accounts for 20% of all bone neoplasms in India and China.<sup>2,3</sup>

Distal radius is the third most common site of occurrence following distal femur and proximal tibia. Tumors arising from this site are challenging as they follow a more aggressive clinical course,

have higher rates of recurrence and higher rates of metastasis to the lung.<sup>2,4,5</sup>

Curettage is the preferred treatment modality of for majority of the cases of GCT, but lesions in distal radius are the not ideal candidates for curettage owing to the relatively advanced stage at presentation and higher recurrence rates after curettage.<sup>6</sup>

Hence wide resection is very commonly performed for distal radius GCT. the common indications are extensive bony and soft tissue involvement, pathological fracture of the involved bone, articular cartilage collapse, local recurrence and malignant transformation.<sup>7,8</sup>

Reconstruction of the defect so produced is a demanding task for the orthopaedic surgeon and involves choosing from a variety of options, such as arthroplasty or arthrodesis using vascularized or non-vascularized fibular autograft, ulnar translocation, osteoarticular allograft and endoprosthesis

### Case Report

We present a case of a 22 yr old male patient with giant osteochondroma of left proximal humerus. It is an unusual presentation for its size and location as approximately 50% of the lesions arise in the lower limb 75% of which is around distal metaphysis

### Clinical Presentation

Patient had slow growing tumour for the past one year. He was asymptomatic and complained of only discomfort due to massive size of swelling extending into left axilla.

On clinical examination the distal radius was tender, firm to hard in consistency with palpable crepitus.

Radiographic studies revealed osteolytic lesion within the distal right radius affecting the epiphysis and metaphysis with breach in dorsal and volar cortex. which helped us conclude that it was probably a Campanacci Grade 2/ Enneking Grade 2 giant cell tumour variant. The biopsy

confirmed that the lesion was a giant cell tumour of distal radius.



### Operative Procedure

Wide excision of distal right radius was done followed by autogenous avascularised proximal fibula grafting. The surgery was performed in 3 steps:

The patient in a lateral position and draped. Spinal anesthesia with regional supraclavicular block was given. A tourniquet was applied to the opposite thigh (left).

### Stage 1: Harvesting of Contralateral Avascularised Autogenous Fibular Graft (Left Side)

A posterolateral incision was given over proximal half of fibula. The common peroneal nerve was identified and protected.<sup>9</sup> Avascular Proximal fibular graft was harvested.



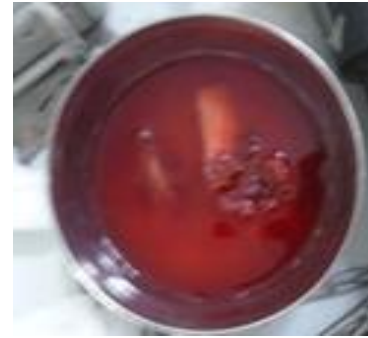
Harvested contralateral avascularised fibular graft



Postoperative x ray of contralateral leg

### Stage 2: Excision of Tumour from the right Distal Radius

An anterolateral approach was used to approach the right distal radius. Radial artery was then identified and retracted. Subperiosteal dissection of forearm muscles was done so as to avoid damage to blood supply. The pronator quadratus separates the tumour from flexor tendons and prevents its spread. Anterior interosseus vessels were then identified and ligated to prevent tumor embolization. The tumour was resected with a wide excision and enbloc resection.<sup>9,10</sup>



Excised tumor material

### Stage 3: Fixation of Fibular Graft to Wrist Joint

A prerequisite is an adequate length of fibula in order to maintain a normal ulnar variance. The fibula is then placed in such a way that the carpal bones are supported by the fibular head. The fibular head must be in direct contact with scaphoid. The graft is then fixed with a 3.5 DCP without tension<sup>8,9,10</sup> and 2 k-wires are passed to stabilize new radioulnar and radiocarpal joints.



Immediate postoperative x ray

### Post Operative Care & Functional Outcome

The wrist was then immobilised in a below elbow plaster of paris slab and bandage for nearly 8 weeks. The range of movement exercises were initiated at 8 weeks after removal of k-wires. At follow up of 1 year, there was no evidence of any local recurrence, which was again confirmed by FNAC. but there was a stitch abscess successfully treated with oral anti-biotics. Radiography confirmed the union of the radius with fibular graft junction.

The range of movements were dorsiflexion of 50°, palmar flexion of 60°, pronation of 50° and supination of 70°, ulnar deviation 25°. Patient was subsequently able to perform activities of daily living like eating and writing. He returned to his job as a municipality worker after 6months.



6 months follow up x-ray



1 year follow up x-ray



Functional results after 1 year

### Discussion

The clinical behaviour of GCT (osteoclastoma) is not related to histological or radiological grading and thus the decision to either salvage or excise the tumor is based on ability to achieve stability and function whatever be the means used.<sup>9,10</sup>

The indications for an en bloc resection would therefore be pathological fractures, collapse of articular surface and extensive bone involvement with large soft tissue involvement.<sup>9,10</sup>

Operative management of GCT of distal radius is critical due to extensive destruction of bone and an aggressive clinical behaviour. Wide excision is a better procedure in terms of lower rates of recurrence but creates a bony defect and so is reserved for large tumors with extended curettage being the treatment of choice for smaller grade I tumours.<sup>9</sup>

Ipsilateral non vascularised proximal fibular auto graft reconstruction of the defect created after resection of distal radius offers several advantages over other existing procedures.

The fibular head closely mimics the distal radius in both its shape and is one of the successful procedures<sup>11</sup>

It has a low donor site morbidity, with predictable and satisfactory functional outcome and is relatively free of major complications, although minor complications can occur frequently.<sup>9,10</sup>

We achieved better or similar functional results with respect to previously published series with grip strength of approximately 75% of contra

lateral normal side and average combined movements of 70%. particular noteworthy was relatively well retained forearm supination and pronation of the forearm which are most needed in terms of functional ability.

There were no complications like non-union, peroneal nerve injury, wrist subluxation. Though the full range of movements of the wrist is not achieved as normal side, the patient is able to do his daily activities without any discomfort or pain.

### Conclusion

Avascular autologous proximal fibular graft arthroplasty provides for excellent functional outcomes after wide resection in distal radius GCT. The operative procedure is relatively simple and does not need any costly imaging like CT angiogram and a multi-disciplinary team as in vascularised fibular graft and yet results in a good range of movements at the wrist.

### References

1. Unni KK, Inwards CY. Dahlin's Bone Tumors: General Aspects and Data on 10,165 Cases. Philadelphia, PA: Lippincott Williams & Wilkins, 6th ed. 2010: 225-242.
2. Szendroi M. Giant-cell tumor of bone. J Bone Joint Surg Br 2004;86(1):5-12.
3. Sung HW, Kuo DP, Shu WP, Chai YB, Liu CC, Li SM. Giant-cell tumor of bone: analysis of two hundred and eight cases in Chinese patients. J Bone Joint Surg Am. 1982;64(5):755-61.
4. O'Donnell RJ, Springfield DS, Motwani HK, Ready JE, Gebhardt MC, Mankin HJ. Recurrence of giant-cell tumors of the long bones after curettage and packing with cement. J Bone Joint Surg Am. 1994;76(12):1827-33.
5. Cheng JC, Johnston JO. Giant-cell tumor of bone: prognosis and treatment of pulmonary metastases. Clin Orthop. 1997;338(1):205-14.
6. McDonald DJ, Sim FH, McLeod RA, Dahlin DC. Giant-cell tumor of bone. J Bone Joint Surg Am. 1986;68(2):235-42.
7. Chadha M, Arora SS, Singh AP, Gulati D, Singh AP. Autogenous nonvascularized fibula for treatment of giant cell tumor of distal end radius. Arch Orthop Trauma Surg. 2010;130(12):1467-73.
8. Cheng CY, Shih HN, Hsu KY, Hsu RW: Treatment of giant cell tumor of the distal radius. Clin Orthop Relat Res. 2001;383(1):221-8.
9. EL SAYED ASHRAF KHALIL, M.D. FRCS; ALAA YOUNIS, et al. Surgical management of Giant Cell tumour of Bone, The Department of Surgical Oncology, National Cancer Institute, Cairo University. Journal of the Egyptian Nat. Cancer Inst., 2004; 16(3), September: 145-152.
10. P. Hussain, V.A. Singh. Giant Cell Tumour of Distal Radius: A case report and description of surgical technique: The Internet Journal of Orthopaedic Surgery. 2008; 8(2).
11. Koul AR, Patil RK, Philip VK et al. Reconstruction of lower end of radius using vascularised upper end of fibula. Indian J Plast Surg 2007; 40: 61-67.