



# Reconstruction of Distal Radius Giant Cell Tumor: A Case Report

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## Abstract

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**BACKGROUND:** Giant cell tumor (GCT) of distal radius poses problems for reconstruction following tumor resection. Reconstructive procedures such as vascularized and non-vascularized fibular graft, osteoarticular allograft, ceramic prosthesis, and mega prosthesis have been implanted for substitution of the defect in distal radius following resection. We described the outcome of distal radius GCT following wide resection and reconstruction with a locking plate and pedicle screw.

**CASE REPORT:** A 35-years-old female came with a chief complaint of a painful lump in the right wrist for 8 months. Magnetic resonance imaging (MRI) showed the appearance of a cutaneous GCT, Campanacci 3. We performed wide resection and reconstruction with a locking plate and pedicle screw system. In 6 months follow-up, there was no significant pain, no sign of infection, and a functional range of movement, wrist extension 0–60°, wrist flexion 0–30°, and preserved hands movements.

**CONCLUSION:** Reconstruction of distal radius GCT with a locking plate and pedicle screw system showed excellent functional outcomes. This method is a viable option as it provides good pain relief and functional improvement. However, the long-term outcome needs further evaluation.

## Introduction

Giant cell tumor (GCT) of the bone is a benign but locally aggressive tumor with a tendency for local recurrence [1], [2], [3]. The prevalence of GCT peaks during the 3<sup>rd</sup> decade, with 80% of cases occurring between 20 and 50 years of age. <3% of cases occur before the age of 14 years, and only 13% of cases occur in patients over the age of 50 years [4]. The distal radius is the third most commonly involved site of skeletal GCTs (10% cases) after distal femur and proximal tibia. Reconstruction of the distal radius following tumor resection is challenging and various techniques have been reported with varying outcomes [1], [2]. The goals of treatment are to achieve satisfactory removal of the tumor, to decrease the chance of local recurrence, and to preserve as much wrist function as possible [1].

This study reported the outcome of one way to manage GCT of the distal radius (Campanacci Grade 3) by wide resection and reconstruction with a locking plate and pedicle screw system.

## Case Report

A 35-year-old female complained of a painful lump in the right wrist for the last 8 months. There was no history of trauma, night pain, loss of body weight, and loss of appetite. There was also no history of chronic cough and chronic fever. The physical examinations showed no other abnormality. Karnofsky's score for the patient was 80.

On examination of the right wrist region (Figure 1), there was an immobile solid mass on the radius side palpated and was tender to touch. The overlying skin was in normal color and temperature. The range of movement (flexion and extension) of the right wrist was limited due to pain and swelling, 0–15° and 0–20°, respectively. There was no sign of disturbance of neurovascular status distal to the region. Plain radiograph and magnetic resonance imaging (MRI) of the right wrist showed in Figure 1.

MRI of the right wrist showed metaphyseal lesions one-third of the distal right radius extending into the epiphyseal with a narrow septum transition zone, clear margin, irregular edges; the measured size was 3.9 cm × 4.1 cm. There was no visible



Figure 1: (a) Clinical pictures; (b) X-ray; and (c) magnetic resonance imaging of the right wrist region

periosteal reaction. The lesion has destroyed the extensor cortex. There was also infiltration to the carpi ulnaris muscle, deep flexor digitorum muscle, flexor pollicis longus muscle, and pronator quadratus muscle. These images were characteristic to GCT (Figure 1c).

The patient was then diagnosed with GCT of the right distal radius Campanacci 3. The diagnosis was later confirmed postoperatively by histopathological examination (Figure 2). Wide resection and reconstruction with a locking plate and pedicle screw systems were then performed.

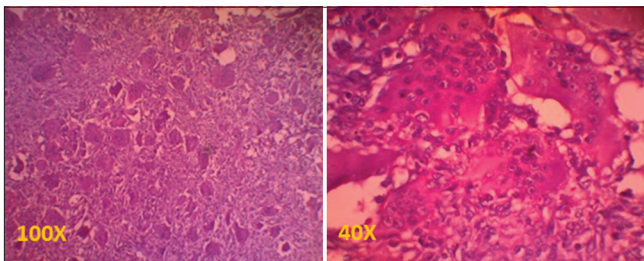


Figure 2: Histopathological appearance of giant cell tumor showing giant cells with multiple nuclei dominated osteoclast-like

During surgery, a mass on the radius side was found (Figure 3). We performed wide excision to the mass. Its size was 10 cm × 5 cm × 4 cm. Then, reconstruction with a locking plate and polyaxial pedicle screw system was performed. The outcome was evaluated 6 months postoperatively; the patient had no significant pain, no sign of infection, with wrist extension 0–60°, wrist flexion 0–30° (Figure 4), and no disturbance of hands

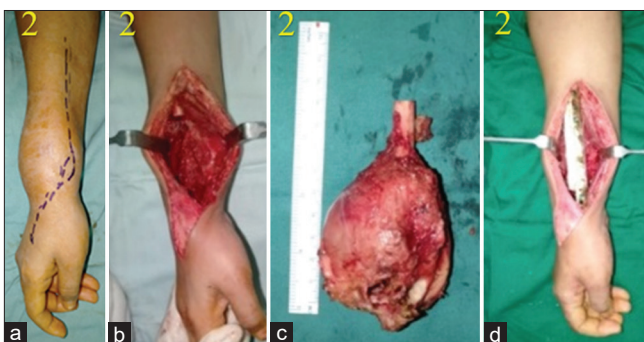


Figure 3: Durante operation (a) incision line; (b) before reconstruction; (c) the resected tumor specimen; (d) reconstruction using locking plate and pedicle screw system

movements. The overall functional outcome was good and musculoskeletal tumor society score was 28.



Figure 4: (a) Post-operative X-ray of right forearm; clinical evaluation after 3 months; (b) ROM flexion; (c) ROM extension

## Discussion

GCT is a challenge for the surgeons both for cure and rehabilitation. Most patients with GCT are young with normal life expectancy. Local recurrence and loss of joint function are still major problems following surgery [1]. When treating a primary bone tumor, the ultimate goal is the complete removal of the lesion. Preserving the function of the limb and planning for reconstruction procedures is not a priority and may be compromised when tumor excision demands otherwise. Prevention of local recurrence precedes maintaining limb function. It is no different in the treatment of GCT of the distal radius. It is a benign but aggressive bone tumor and according to Campanacci, most of them were classified into Grade II and III [4].

Wide resection of the distal radius has been recommended for Grade III GCT when the tumor breaks through the cortex on dorsal and volar sides and when it invades the wrist joint of more than 50% of the surrounding metaphysis [5]. When the surgeon opted for marginal or wide excision for distal radius GCT, the surgeon will need to stabilize the radius to the carpus; besides, this reconstruction will always involve the joint [4].

Prabowo and Abubakar reported an excellent result of a patient with GCT of proximal humerus Campanacci 3 managed by wide excision and reconstruction with pedicle screw and rod system [4]. In this case, following wide excision, we have performed reconstruction with a locking plate and pedicle screw system. This technique has a simple design, did not need graft, eliminate donor site morbidity; thus, besides it shorten the operation time, it also reduces the complication rates and the unit cost of patient care.

## Conclusion

The patient with GCT of distal radius had been performed wide resection and reconstruction with

locking plate and pedicle screw system. In 6 months follow-up, the patient showed satisfactory functional outcome. This approach provides good pain relief and functional improvement at a lower cost.

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