

Giant Cell Tumor of Distal End Radius: Wide excision, Ulnar translocation with Wrist arthrodesis using DVR Plate

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Abstract

Giant cell tumor is a benign, locally aggressive neoplasm of bone with peaks during third decade with 80% of cases seen between the age group of 20 to 50. GCT predominantly occurs in the distal femur, proximal tibia and distal end radius. Distal end radius GCT accounts for approximately 10 % of total skeletal GCT typically involves metaphyseal-diaphyseal junction. It is always a challenge to reconstruct the defect caused by the excision of the distal radius tumors since distal radius plays an important role in radio-carpal articulation. We present a case study of 63 years old male patient presented with complaints of pain and swelling over right wrist for one year approximately 6x5x4cm in size with no distal neurovascular deficit. MRI report was suggestive of peripheral non uniform non enhancing intermediate signal intensity rim causing complete destruction of distal end radius. Wide excision of the tumor along with capsule and centralization of ulna was done and fixed with long Distal Volar radial (DVR) plate with distal screws in 2nd and 3rd metacarpal base in 10 degrees of dorsiflexion. Various clinical pictures with diagnostic workup and intraoperative photos have been presented in the report.

Keywords: GCT, Radius, Tumors.

Introduction

Giant cell tumor is a benign, locally aggressive neoplasm of bone which is composed of sheets of neoplastic, ovoid mononuclear cells interspersed with uniformly distributed large osteoclast like giant cells⁽¹⁾. The prevalence of GCT peaks during third decade with 80% of cases seen between the age group of 20 to 50⁽²⁾. GCT predominantly occurs in the distal femur, proximal tibia and distal end radius⁽³⁾. Distal end radius GCT accounts for approximately 10 % of total skeletal GCT⁽⁴⁾. The sacrum is the most commonly affected site in the axial skeleton. 3 to 4% tumors are associated with pulmonary metastasis even with benign history⁽⁵⁾. GCT of bone typically involves metaphyseal-diaphyseal junction⁽⁶⁾. The Distal radius plays an important role in radio-carpal articulation. It is always a challenge to reconstruct the defect caused by the excision of the distal radius tumors⁽¹⁾. As per the current concepts for surgery of GCT, the aim is to salvage normal anatomy after complete excision of tumor, prevent its recurrence and restore the function of hand and forearm⁽⁷⁾. Various treatment modalities are advocated in the literature.

1) Extended curettage with or without reconstruction using autogenic /allogenic bone grafts or polymethyl methacrylate.

2) Resection and reconstruction with vascularized or non-vascularized proximal fibula (fibular head arthroplasty).

3) Resection with partial wrist arthrodesis (radio-scapholunate arthrodesis) using a strut bone graft.

4) Resection and complete wrist arthrodesis using an intervening strut bone graft⁽¹⁾.

5) Curettage with adjuvant therapy like phenol, liquid nitrogen, cauterization, hydrogen peroxide, alcohol, etc⁽⁶⁾.

Seradge described the novel technique of distal end radius reconstruction by ulnar translocation along with its soft tissue⁽⁸⁾.

Campanacci grading 1 and 2 usually do well with extended curettage alone or with bone graft or with cement reconstruction. Campanacci grade 3 lesions require resection of entire lesion and reconstruction of wrist⁽¹⁾.

We present a case study of distal end radius GCT operated successfully with wide resection, ulnar translocation and wrist arthrodesis using DVR plate.

Case Presentation

63 Years old male patient presented in our OPD with complaints of pain and swelling over right wrist for one year. There was no history of trauma, night pain, loss of body weight, loss of appetite. On examination there was tender solitary firm swelling over right wrist measuring approximately 6x5x4cm in size with mobile overlying skin and dilated veins (Fig no 1). The swelling was non fluctuant and no local rise of temperature. There was no distal neuro vascular deficit. Range of movements of right wrist was restricted 0 to 20 degree of flexion and 0 to 15 degrees of extension. X ray of right wrist AP and Lateral view (Fig 2) done followed by MRI of right wrist. MRI report was suggestive of peripheral non uniform

non enhancing intermediate signal intensity rim causing complete destruction of distal end radius approximately of size 6.4 x 5.8 x 4.8 cm (Fig 3).



Fig. 1: Showing swelling over Right wrist with mobile overlying skin and dilated veins.



Fig 2: Showing X Ray AP and Lateral view of Right wrist showing expansible lytic lesion with Soap Bubble appearance.

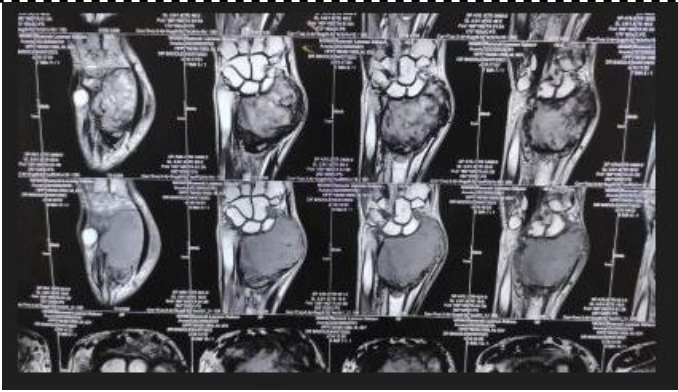


Fig 3: MRI of Right wrist showing peripheral non uniform non enhancing intermediate signal intensity rim causing complete destruction of distal end radius approximately of size 6.4 x 5.8 x 4.8 cm.

In supine position hand kept on hand table. Tourniquet was applied and Esmarch bandage was avoided. Under all aseptic precautions cleaning and draping done. Incision given over the third and fourth dorsal compartment. Extensor retinaculum is divided step wise to facilitate later repair and all extensor compartments were explored (Fig 4). Tendons were not encapsulated. Radial artery and ulnar artery were free. All neurovascular structures were identified and safe guarded. Wide excision of the tumor along with capsule was performed without breaching of capsule. The distal end of ulna prepared using burr. Scaphoid and other proximal row carpal bones prepared using burr. Centralization of ulna was done and fixed with long Distal Volar radial (DVR) plate with distal screws in 2nd and 3rd metacarpal base in 10 degrees of dorsiflexion(Fig 7). Vascularity checked. Haemostasis achieved. Incision closed in layers. Sterile dressing done. Volar plaster is applied until suture removal.



Fig 4: Intra-op image showing safeguarded extensor tendons.



Fig 5: Showing excised tumor which was sent for histopathological examination.

Discussion

GCT is a locally aggressive tumor and intra lesional excision in the form of curettage is associated with huge rate of recurrence⁽⁹⁾. Few case reports suggests that GCT of distal end radius is unpredictable aggressive and often metastasis to distant organs most commonly lungs⁽⁵⁾. Local recurrence and loss of joint function are challenging task to control GCT surgery⁽¹⁾. So, treating primary bone tumor the ultimate goal is to remove complete lesion and preserve the function of the limb. Various treatment options are available like En-bloc resection of the lesion and reconstruction with ipsilateral

proximal fibula auto graft(vascularized, non-vascularized),tricortical fill iliac graft, structural allograft ,distal ulna centralization etc. ⁽¹⁰⁾.The use of non-vascular proximal fibular graft to replace resected distal end radius was described by Mays et al⁽¹¹⁾ but this method is associated with multiple complications like delayed union, non -union and graft resorption, loss of function, deformity and failure of internal fixation⁽⁴⁾.Very few studies on ulnar translocation with assessment of functional outcomes have been published in medical literatures⁽⁴⁾.The ulnar translocation provides multiple advantages over use of vascular and non-vascular fibula and allo-graft⁽⁸⁾.In some studies use of distal radius replacement with artificial prosthesis have been described(6), but it is not convincing procedure due to many complications⁽¹²⁾.

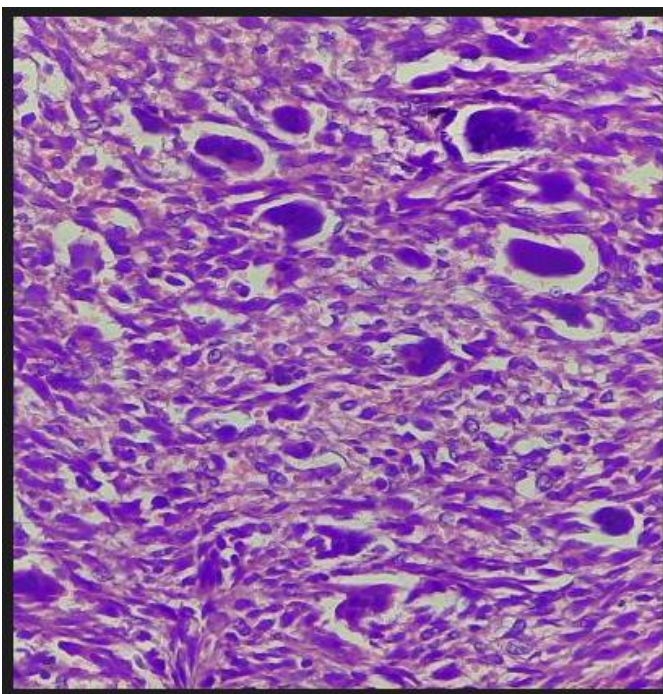


Fig. 6: 40X Microscopic image of histopathological specimen showing numerous giant cells.



Fig 7: Post Op Radiographic images showing ulnar translocation and wrist arthrodesis using DVR plate.

Wide excision and ulnar translocation with wrist arthrodesis help to provide forearm supination and pronation with preservation of hand function. The surgical timing for ulnar translocation is relatively shorter as compared to vascular and non-vascular fibular transfer⁽⁴⁾. Due to minimal dissection of ulna soft tissue attachments and its muscle attachments (FCU) was retained which helps to maintain good grip strength⁽⁴⁾. Though we resected long segment tumor ulnar translocation and preservation of pronator teres attachment at ulna helps in pronation and supinator muscle helps in forearm supination. Hence, we can provide some rotational movements to the patient⁽⁷⁾. Though we think translocation of ulna doesn't provide cosmetically acceptable appearance due to narrowing of wrist and distal forearm gives hour-glass appearance but it provides pain relief, good functional outcome. The tumors local recurrence is not dependent on reconstruction technique but depends on wide excision without tumor spillage in the wound⁽⁷⁾.

In our study Ulnar centralization and arthrodesis using DVR plate with 10-degree dorsiflexion achieved a satisfactory outcome. The advantage of this study is that surgery can be performed without Oncology team. It provides good union rate, painless and stable joint for

daily routine work. This technique is superior over fibular grafting as it avoids another incision over the uninvolved part of the body which increases the morbidity and high chances of common peroneal nerve injury. In our study wide excision was done without damaging the tumor, hence use of phenol was avoided. Recurrence can occur within 2-3 years hence at least three years follow-up is necessary.

Conclusion

Giant cell tumor of distal end radius: Wide excision and ulnar translocation with wrist arthrodesis using DVR Plate is a cost-effective technique. It provides rigid immobilization to facilitate early rehabilitation with good forearm rotational movements and grip strength. It avoids donor site morbidity as seen in fibula grafting.

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