Case Report

Giant cell tumor distal end radius: resection and reconstruction using proximal fibular graft

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Abstract

Background: Giant cell tumour forms 4% of all primary tumors. GCT distal radius is very rare. Current study presents a case of a 19 year female who was managed by wide excision and reconstruction with ipsilateral fibula. At 2 month follow up, patient had good range of motion at wrist joint and hand.
Keywords: Giant cell tumor, Fibular graft, Resection

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INTRODUCTION

Giant-cell tumors (GCT) are among the common benign tumors of bone and occur most frequently in young adults aged 18 to 40 years. The tumors present most commonly as lytic, expansile lesions in the epiphyseo-metaphyseal regions of the distal femur, proximal tibia, or distal radius.[1] The tumors, although often locally aggressive, remain benign with less than 3% having metastases.[1]

Proximity to carpus, poor muscle and soft tissue cover make GCT radius surgical treatment a challenging option.[2] Even with less invasive treatment e.g. curettage; high rates of recurrence have been reported with GCT Radius. Hence wide resection is frequently advocated in GCT distal radius esp. campanacci grade III lesions.[1] Current study report a case of GCT distal radius which was managed by wide resection and ipsilateral fibula reconstruction with ipsilateral fibula.

CASE REPORT

A 19 year female reported to us with a painful swelling of left distal forearm for last 1 month. Swelling was progressively increasing in size over last one month. There was no history suggestive of trauma or underlying systemic disease. Consent for examination, investigation and subsequent management was taken from the patient. Clinical examination revealed a globular swelling 5x4 cm all around distal radius with well defined margins, a firm consistency and tenderness on palpation. Swelling was fixed to underlying structures (Figure 1). Range of motion at wrist was grossly restricted. X-rays revealed a lytic-destructive lesion, thinned out cortices, blown out appearance and a wide zone of transition (Figure 2).

Figure 1: Clinical picture showing swelling distal radius.

Differential diagnoses entertained at this stage were chondroblastoma, aneurysmal bone cyst, osteosarcoma, brown tumour of hyperparathyroidism and giant cell tumour of bone. Normal serum alkaline phosphatase levels ruled out hyperparathyroidism.

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Figure 2: X-ray distal radius showing lytic destructive lesion, thinned out cortices, and blown out, a wide zone of transition.

MRI showed, Well defined lytic expansile lesion involving the distal epiphysis of the radius abuting the radiocarpal joint. The margins are irregular with relatively narrow broad zone of transition. Their is no evident periosteal reaction. No evidence of cortical break or fracture is seen.There is no matrix calcification.The lesion measures 30 x 26 x 35 mm (AP XTR XCC), suggesting benign bony neoplasm - Giant cell tumor more likely.
(Figure 3).

Histopathology following needle biopsy revealed stroma with giant cells, nuclei of giant cells and stromal cell were spindle to oval shape with uniform nuclear chromatin suggestive of giant cell tumor (Figure 4).

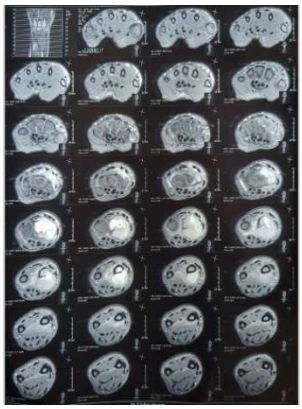

Figure 3: MRI showing well defined expansile lesion with diaphyseal extension and cortical break, with displacement of extensor and flexor compartment tendons.

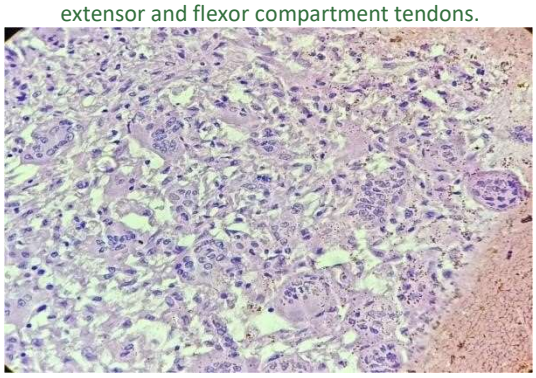

Figure 4: Histopathology showing stroma with giant cells, nuclei of giant cells and stromal cell.

Operative steps

After supine position and appropriate anesthesia a dorsal longitudinal incision was made on dorsum of left distal forearm islanding the biopsy scar. Tendons of extensor indices, extensor pollicis longus and extensor digitorum were dissected free from the tumor. Superficial radial nerve, tendons of extensor carpi radialis longus and brevis were entrapped by tumour and thus excised distally. Tumor was restricted on volar side by pronator quadrates. Radial vessels were identified and protected. Distal radius was resected seven centimeter from articular surface and specimen delivered (Figure 5).

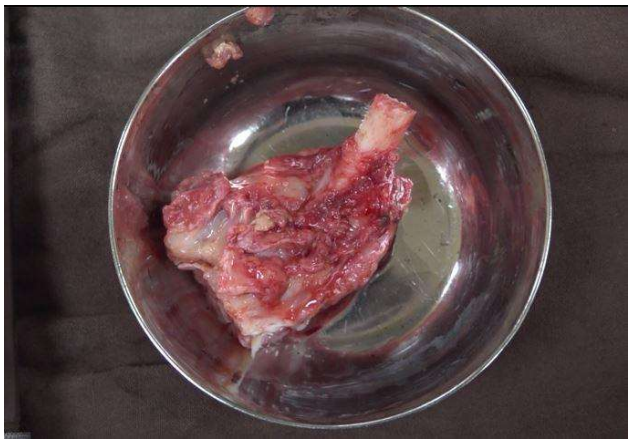

Figure 5: Resected tumor specimen.

Ipsilateral proximal fibula of the identical length was harvested protecting the common peroneal nerve. The fibula was plated to shaft radius using LCDCP while K wire fixation was done to stabilize distal radioulnar joint (DRUJ) while maintaining negative ulnar variance (Figure 6). The forearm with wrist was immobilized for three weeks in a short arm slab. POP slab was removed at 3 weeks and passive wrist and elbow physiotherapy started. Kirchner wires were removed at 4 weeks and both active and passive ranges of motion exercises were initiated at elbow and wrist. At Two month follow up patient was able to follow her routine daily activity with range of motion of 30degree dorsiflexion, 30 degree palmar flexion, pronation 70 degree

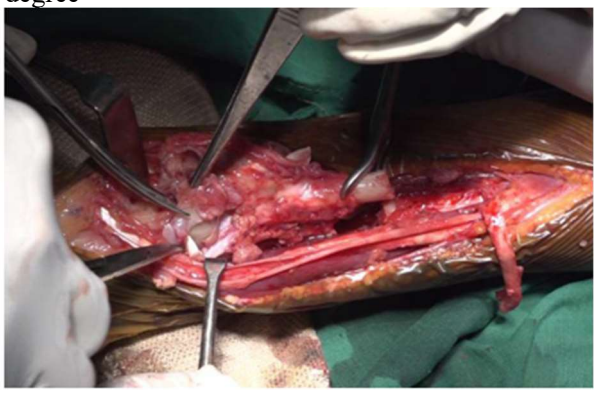

Figure 6: Reconstruction with ipsilateral fibula.

2 MONTH FOLLOW UP

Figure

DISCUSSION

Giant cell tumours of distal radius are known to exhibit highly aggressive behavior and a high recurrence rate (29% and 36%) especially in campanacci grade II and III lesions.[3] Grade I and II lesions are usually treated by extended curettage while Cheng's criteria guide the management of grade III lesions (resection if tumour invades the wrist, destroys more than 50% cortex or breaks through the cortex with an extra osseous mass in more than one plane).[4] Evaluating a technique of reconstruction is based on length of bone to be resected, relative ease of procedure, post-operative morbidity, complications, functional outcome and durability of the reconstructed segment. Various procedures which can be used to address reconstruction after distal radial resection can be separated under two headings-wrist arthrodesis or wrist reconstruction procedures.

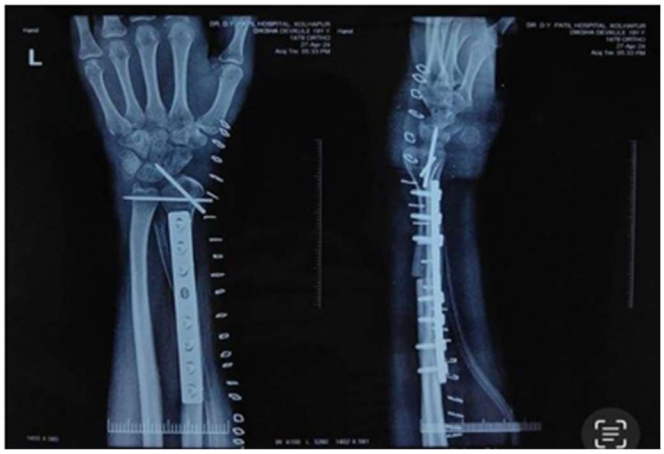

Figure 7: Functional outcome following GCT distal radius resection and reconstruction.

Advocates of resection and arthrodesis at wrist have used ulnar translocation, autologous fibular shaft arthrodesis and centralisation of carpus on ulna. Excellent scores have been reported with ulnar translocation with few complications like restricted prono-supination, proximal radio-ulnar synostosis and soft tissue recurrence.[5] Centralisation of carpus on ulna with ulnocarpal arthrodesis has been preferred by some in patients where large segments of radius need resection with not many complications.[4]

Some authors have reported reconstruction of distal radius defect along with wrist with reconstruction endoprosthetic replacement, ipsilateral proximal fibula (vascularised or non vascularised), osteoarticular allografts or articular fibular head.

Proximal carpal bones migration, ulnocarpal abutment, skin flap necrosis, wound infection and late aseptic loosening have been reported with endoprosthesis.[6] Complications noted with autologous fibula are superficial

infection, wrist subluxation, pain and functional impairment with moderate activity, soft tissue recurrence and nonunion.[7] Size matched osteoarticular allograft arthroplasty has been used by some with radiocarpal degeneration and mild distal radioulnar joint instability being the complications.[4] This option is limited by possibility of immunogenic reactions and nonavailability of bone banking facilities.[8]

Resection of distal radius and reconstruction with autogenous non-vascularized ipsilateral fibula offers several advantages like more congruency of carpal joint, rapid incorporation as autograft and easy accessibility without significant donor site morbidity. Structural change is also minimal. Complications noted with autologous fibula are superficial infection, wrist subluxation, pain and functional impairment with moderate activity, soft tissue recurrence and nonunion ,fibulo-carpal subluxation, fibula ulnar diastasis.[7] Wrist preserving or arthroplasty options appear attractive but have their own set of limitations. Ipsilateral vascularised proximal fibula or articular fibular head transfer preserve the wrist function and growth potential but need complex microvascular surgery necessitating facilities that may not be easily available. Also there is donor site morbidity in the form of persistent leg pain, lateral ligament laxity at knee, peroneal nerve palsy and dysaesthesia in the back of the leg.[4]

GCT of the distal radius has been best treated with excision of the distal radius and reconstruction by nonvascularised fibula with good functional results. Asavamongkolkul *et al.* reported good and excellent functional results in all seven patients of non-vascularised autogenous fibular graft reconstruction.[8] Our method of resection and reconstruction with non-vascularised fibular graft, internal fixation with DCP with primary bone grafting, use of stabilizing K-wires across the newly formed wrist joint and ligament reconstruction has been advocated by many other authors.[7]

CONCLUSION

Resection of the distal radius and reconstruction arthroplasty with non-vascularised proximal fibular graft is useful in preserving the functional movement and stability of the wrist as well as achieving satisfactory range of movement and grip strength.

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