ABSTRACT

Purpose. To review the outcome of wide resection and wrist fusion through centralisation of the ulna for recurrent giant cell tumour (GCT) of the distal radius in 10 patients.

Methods. Records of 7 women and 3 men aged 25 to 40 years who underwent wide resection and wrist fusion through centralisation of the ulna for grade I (n=6) and grade II (n=4) recurrent GCT of the distal radius were reviewed. Functional outcome was evaluated using the modified Musculoskeletal Tumor Society scoring system. Grip strength and range of motion of the metacarpophalangeal joint were also assessed.

Results. The mean follow-up period was 45 (range, 30–60) months. All tumours were benign and there was no evidence of metastasis. The mean grip strength was 45% (range, 30–70%) of the contralateral side. All patients achieved normal range of motion of the metacarpophalangeal and interphalangeal joints, but 4 patients had an extensor lag of the thumb. The mean time to wrist fusion was 6 (range, 4–8) months: 3 to 4 months for the 6 patients with bone grafting and 5 to 6 months for the 4 patients without bone grafting who developed painful subluxation necessitating total wrist arthrodesis using a plate and morcellised bone grafts.

Conclusion. Wrist fusion through centralisation of the ulna for recurrent GCT of the distal radius is a viable option, despite a loss of wrist motion.

Key words: arthrodesis; giant cell tumor of bone; radius; recurrence; ulna; wrist joint

INTRODUCTION

The recurrence rate of giant cell tumour (GCT) of bone is 20 to 50%. GCT of bone is an aggressive and potentially malignant lesion, with variable clinical behaviour. The distal femur and proximal tibia are the most common sites, accounting for 50% of all GCT of bone, followed by the distal radius (10%). About 5 to 10% of GCT of bone undergo malignant transformation and 3 to 4% are associated with...
pulmonary metastasis, even in cases with a benign history. 70 to 80% of patients are aged 30 to 40 years, with a female predominance. GCT of bone typically occurs at the metaphyseal-epiphyseal junction, often extending up to the subchondral area. After en bloc resection, reconstruction involves the use of an upper-end fibular bone graft (autograft or allograft), custom-made prosthesis, and methyl methacrylate, but none of these materials is safe from recurrence. Curettage and bone grafting has a high recurrence rate of 30 to 50%. Curettage with adjuvant treatment such as phenol, liquid nitrogen, hydrogen peroxide, methyl methacrylate, alcohol, and cauterisation can lower the recurrence rate to 30%. The extent of the surgery and subsequent functional deficit must be weighed against the risk of recurrence. Wide excision minimises the risk of recurrence, but it sacrifices the articular surface and results in a complex reconstruction requirement, along with the complications of repeated surgery, decreased quality of life, and the potential for post-surgical depression and increased dependence. This study reviewed the outcome of wide resection and wrist fusion through centralisation of the ulna for recurrent GCT of the distal radius in 10 patients.

MATERIALS AND METHODS

Records of 7 women and 3 men aged 25 to 40 (mean, 30.6) years who underwent wide resection and wrist fusion through centralisation of the ulna for grade I (n=6) and grade II (n=4) recurrent GCT of the distal radius between January 2010 and November 2014 were reviewed (Figs 1 and 2). The patients had previously undergone wide resection and reconstruction (n=6) or curettage and bone grafting (n=4) of the fibula.

According to the Campanacci staging system for cortical breach, grade I tumours involve a well-margined border of a thin cortical rim of mature bone, and the cortex is intact or slightly thinned but not deformed. Grade II tumours involve relatively well-defined margins but no radio-opaque rim. Grade III tumours involve a fuzzy border.

Under supraclavicular block or general anaesthesia and prophylactic antibiotic cover, the patient was placed in a supine position, and a dorsal S-shaped incision was made between the 3rd and 4th extensor compartment, with protection of the superficial sensory radial nerve. Taking a safety margin of 3 to 4 cm, the radius was resected, with an intact tumour capsule. The distal end of the ulna was denuded of cartilage and centralised by creating a square notch in the carpal bone (lunate). Iliac bone grafting was used in 6 patients. The ulna was stabilised with an intramedullary Kirschner wire up to the 3rd metacarpal and an oblique Kirschner wire.

Postoperatively, the limb was immobilised in an above-elbow cast for 3 months, followed by an above-elbow splint until bone union. The Kirschner wires were removed at 10 to 12 weeks. Patients

Figure 1  (a) Wide excision and reconstruction with a fibular autograft for recurrent giant cell tumour of the distal radius, (b) re-recurrence, (c) wide excision and wrist fusion through centralisation of the ulna and fixation with Kirschner wires without bone grafting, (d) nonunion and dislocation from the carpal notch, and (e) wrist arthrodesis by plating.
were followed up 6 weekly until 6 months and then 3-monthly until one year and then 6-monthly thereafter. Radiographs of the wrist and chest were assessed for recurrence and metastasis. Functional outcome was evaluated using the modified Musculoskeletal Tumor Society scoring system. Grip strength was assessed using a dynamometer, and range of motion of the metacarpophalangeal joint was assessed using a goniometer.

RESULTS

The mean follow-up period was 45 (range, 30–60) months. All tumours were benign and there was no evidence of metastasis. The mean grip strength was 45% (range, 30–70%) of the contralateral side. All patients achieved normal range of motion of the metacarpophalangeal and interphalangeal joints, but 4 patients had an extensor lag of the thumb. The mean time to wrist fusion was 6 (range, 4–8) months: 3 to 4 months for the 6 patients with bone grafting and 5 to 6 months for the 4 patients without bone grafting who developed painful subluxation necessitating total wrist arthrodesis in the functional position (10° dorsiflexion and neutral deviation) using a plate and morcellised bone grafts harvested from the proximal row carpectomy.

DISCUSSION

The optimal treatment for GCT of the distal radius remains controversial due to its complex anatomic structure. Curettage and bone grafting is justified only in well-contained tumours within an intact cortex, but the recurrence rate can be up to 50%. For aggressive GCT of bone, en bloc resection is preferred, as it minimises the risk of recurrence. For recurrent GCT of bone, repeated curettage and cementation, extended wide excision and reconstruction using the second fibula (vascularised / non-vascularised), and reconstruction using a prosthesis have been described. 33% of patients who underwent reconstruction of the distal radius with an allograft necessitated revision or amputation. Persistent pain after arthroplasty of the distal radius with a vascularised fibular graft necessitates wrist arthrodesis.

In our study, wrist fusion through centralisation of the ulna to the carpus achieved a satisfactory outcome. It is simple for an orthopaedic surgeon to perform, without the need of a microvascular and oncological team, and has low morbidity, a good union rate, and provides a stable joint for heavy work. The technique requires a minimum amount of grafts, which can be obtained from the morcellised carpus. It also avoids the need for graft harvesting and the associated donor-site morbidity such as damage to the common peroneal nerve (fibular graft) or the lateral cutaneous nerve of the thigh (iliac crest), or incisional hernia. The use of Kirschner wires (rather than a locking plate) is cost-effective, although longer cast immobilisation (12 weeks) is required for bone union. Nonetheless, wrist fusion results in a loss of pronation and supination in the forearm and flexion and extension at the wrist, a sizeable scar, decreased distal forearm circumference, extensor tendon lagging of the extensor pollicis brevis, abductor...
pollicis longus, and extensor pollicis longus, and the risk of infection, and other surgical complications. Recurrence can occur after a long latent period but usually in the first 2 years. Secondary malignancy usually occurs after 3 years. Thus, it is important to eradicate the primary tumour in the initial treatment. En bloc resection is recommended, especially for patients with high-grade tumours, recurrent tumours, pathological fractures, rapidly enlarging tumours, malignancy, and metastasis.1

CONCLUSION
Wrist fusion through centralisation of the ulna for recurrent GCT of the distal radius is a viable option, despite a loss of wrist motion.

DISCLOSURE
No conflicts of interest were declared by the authors.

REFERENCES