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DISTAL RADIUS RECONSTRUCTION USING FIBULAR GRAFTS

Orthopaedics

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ABSTRACT

Giant cell tumor (GCT) of bone is a locally aggressive tumor of bone. GCT involving the distal radius poses certain unique challenges in management. The resection of the tumor will almost always end up requiring a reconstructive procedure of the joint, for which several different methods of reconstruction have been explored. We present a case of a 29 year old lady with distal radius GCT. We performed a wide resection of the tumor, reconstructed the distal radius with free fibula graft and did a wrist arthrodesis using locking compression plate. We found that it provided a stable, painless wrist joint and good functional outcome.

KEYWORDS

INTRODUCTION

Giant cell tumor (GCT) of bone is a locally aggressive tumor of bone. It is most commonly found in middle aged adults [1]. Within the bone, it usually occurs at the meta-epiphyseal junction area of long bones, and often extends to involve the epiphyseal region as well [2]. The most common bones involved are the femur, tibia and radius [3]. GCT involving the distal radius poses certain unique aspects that make its management challenging. The proximity of metaphysis to the wrist joint and distal radio-ulnar joint mean that resection of the tumor will almost always end up requiring a reconstructive procedure of the joint. Several different methods of reconstruction of the distal radius and wrist joint have been explored. We present a case of distal radius GCT managed with wide resection of tumor, reconstruction of distal radius with free fibula graft and wrist arthrodesis using locking compression plate.

Case Report

A 29 year old lady presented to us with complaints of pain and swelling in her wrist for 8 months. The swelling had gradually increased in size over the past 8 months. The pain was insidious in onset, dull aching type, non-radiating, decreased with analgesics, and increased with movements of the wrist. She had no history of pain or swelling in other joints. She had no history of fever, weight loss or loss of appetite. She has no history of trauma. She had no medical co-morbidities. Systemic examination was normal. On examination of her left wrist, we found a solitary swelling over the volar aspect of the distal forearm and wrist. The swelling involved the radial aspect of the wrist. The swelling was bony hard and tenderness was present over the swelling. Margins were found to be ill defined. Swelling was immobile. Wrist movements were severely restricted with only ten degrees of dorsiflexion and palmar flexion present. Supination of 45 degrees and pronation of 60 degrees was possible. Grip strength was only 5Kg of the right hand compared to 16 Kg of the left. Pinch strength was reduced to 2kg of the right hand compared to 5kg of the left. Quick DASH score was 57.5.

Routine blood investigations were normal. Radiograph of the left wrist (*figure 1*) showed an expansile, lytic lesion involving the distal femur. The lesion involved the metaphysis and extended into the epiphysis of the distal radius, extending till the articular surface. Ballooning of the cortices were noted. Septations were noted within the matrix of the lesion. Narrow zone of transition was present. No periosteal reaction was noted. No other lesions were noted.

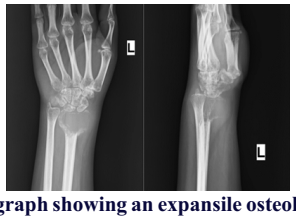

Figure 1: Radiograph showing an expansile osteolytic lesion in the distal femur. Ballooning of cortex, and presence of septations are characteristic of GCT.

Patient was diagnosed to have Giant Cell Tumor of the distal radius, grade III by Campanacci grading system. Patient underwent right distal radius GCT excision, reconstruction of distal radius using free fibular graft and wrist arthrodesis. Arthrodesis was performed using a 14 hole locking compression plate and screws (*figure 2*). Screws were also placed within the fibula graft to fix it to the locking plate and keep it in place.

Figure 2: Radiograph showing fibula graft in place of the excised distal radius, a wrist spanning locking compression plate and screws used for arthrodesis of wrist joint.

The excised specimen under histopathological examination showed mononuclear stromal cells, macrophages and multiple multinuclear giant cells, thereby confirming the diagnosis of GCT. The right hand grip strength improved to 10kg and pinch strength improved to 4.5kg. She had a Quick DASH score of only 13.6 at one year following the surgery. The patient was followed up regularly for a period of 3 years and found to have no recurrence of the tumor.

DISCUSSION

Curettage/Extended curettage of the GCT is the standard treatment option for GCT in any part of the body [4]. GCT occurring in the distal radius often extends into the epiphysis, sometimes up to the articular surface. Hence, a curettage or wide resection of the distal radius very often leaves insufficient bone stock for a stable wrist joint. Thus, the need for reconstruction of the distal radius or wrist joint is inevitable in most cases. Several different methods have been attempted, each having its own advantages and drawbacks. Osteoarticular allograft has been used since a few decades, but has reported several graft related complications and high rates of wrist degeneration [5]. Ulnar translocation with wrist arthrodesis has shown satisfactory results with preservation of rotational movement of forearm and hand function [6]. Wrist arthroplasty, including using 3D printing prosthesis, is a recent development that has the advantage of retaining wrist movements [7]. Iliac crest bone grafting with wrist arthrodesis can an option in selective cases where resection length is less than 6cm [8]. Reconstruction using fibula graft has shown excellent functional outcomes comparable with the other reconstruction modalities [9].

The advantage of using fibula graft is it can be used even for large defects, even in excess of 10cm. The drawback is the additional morbidity at the distant donor site [10].

CONCLUSION

We found that following excision of distal radius GCT, reconstruction of the distal radius using fibula graft, and wrist arthrodesis using locking compression plate provided a good functional outcome. It enabled the patient to have a stable, painless wrist joint.

Conflict of Interest

None

Consent

Informed consent has been obtained from the patient for this publication.

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