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Case Report

Carpus translocation into the ipsilateral ulna for distal radius recurrence giant cell tumour: A case report and literature review

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ABSTRACT

Giant cell tumour is a frequent benign neoplasm. It is characterized by local aggressive behaviour and frequent recurrence. The most common localization is the distal femur followed by proximal tibia (40%). The distal radius is the next place (10%). The recurrence in the distal radius in primary cases is reported 10%, in recurrent cases is almost 30% and depends to the kind and the stage of the tumour at the time of treatment. Multiple options have been reported for treatment of Campanacci III giant-cell tumour (GCT) of the distal radius after resection. Actually the treatment of recurrence remains a real dilemma. Several reconstructive options (e.g. resection arthroplasty, prosthetic replacement, arthrodesis, ulnar translocation, centralization of the carpus over the remaining ulna, use of vascularized or nonvascularized fibular graft, with or without, arthrodesis, have been described up to date.

We present a case of recurrence of GCT of distal radius after curettage, where we selected the centralization of the ulna into the carpus as a salvage procedure with satisfactory results. The procedure provides a valid option for the management of recurrent GCTs of distal radius offering excellent cosmetic and acceptable functional result.

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1. Introduction

Giant cell tumour (GCT) is a benign bone tumour, most commonly found in the distal femur and the proximal tibia, while distal radius is the third commonest site.^{1,2} Patients

with a primary giant cell bone tumour of the distal radius, are usually young adults³ and the goal of treatment of this tumour at the distal radius is complete removal of the tumour and reconstruction of the bone defect in order to preserve maximum function of the wrist joint.⁴ Treatment consists of either extended curettage followed by packing of the cavity

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with bone graft or methylmethacrylate cement.⁵ Extended curettage followed by packing of the cavity with bone graft or methylmethacrylate, or resection of the lesion followed by reconstruction with autograft or allograft are considered as the treatment of choice for the primary tumour.^{6,7} The recurrence rate of the GCT in the distal radius is 27%–54%, but although the recurrence rate of GCT is relatively high, an exact algorithm on how to treat them is lacking.⁸ Treatment of recurrence of GCT continues to be a major problem. Various treatment modalities for recurrence are mentioned in the literature and these include a) extended curettage, with or without reconstruction, using autogenic/allogenic bone grafts or polymethylmethacrylate (PMMA) b) resection and reconstruction with vascularized or nonvascularized proximal fibula (fibular head arthroplasty), c) resection with partial wrist arthrodesis (radio-schapholunate) using a strut bone graft and e) resection and complete wrist arthrodesis using intervening strut bone graft.⁹ Fusion of the wrist to the ulna is a technique that allows wide resection in the case of a primary aggressive or recurrent distal radial GCT and has been described only in a few reports.¹⁰

The aim of this case report is to present a simple technique and its advantages, of fusing the wrist to ulna in a functional position after a recurrence of a distal radial GCT.

2. Material and method

A 36 year old female presented at the outpatient clinic with a swollen and painful left wrist and distal forearm since five months. There was no history of injury, and a local general practitioner initially had treated the patient with a splint for 6 weeks without any success.

Clinical examination revealed swelling on distal forearm and wrist, without any localised pain at palpation. The range of movement was mildly decreased with some pain at extremes. Plain radiographs of the wrist showed an osteolytic lesion of the distal radius with well-defined borders and without sclerosis, new bone formation or calcification (Fig. 1).

The initial clinical diagnosis was a type II according to Enneking classification Giant Cell Tumour of the distal radius. Eventually the diagnosis was confirmed with MRI scan and an open biopsy. Taking under consideration the staging of the

tumour, it was decided to treat the patient with aggressive curettage through wide decortication (windowing) by dorsal approach. The tumour was removed with the use of multiple angled curettes, in order to identify and access small pockets of residual disease, and a high power burr in order to break the bony ridges and to extend the curettage as it is recommended. Finally, pulsatile jet lavage systems used at the end of the curettage to bare raw cancellous bone and physically wash out tumour cells. The bone void was filled with bone graft substitute calcium sulfate cement (MIIG X3, Wright Medical Technology, Inc, Arlington, TN) and the lesion was bridged with an external fixation for 2 months (Fig. 2).

The patient was followed-up regularly for 12 months post-operatively. During this period the calcium sulfate graft was gradually absorbed, but unfortunately symptoms were not resolved, the patient was still complaining for pain and swelling which were gradually increased. The wrist X-rays showed recurrence of the tumour (Fig. 3).

This time the tumour was staged as a type III GCS according Enneking's Classification. Systematic investigation was applied in order to exclude metastatic lesions, and decision was made for a wide resection of the tumour and fusion of the wrist to the ulna, creating a single-bone forearm and centralization of the ulna on the wrist.

During the operative procedure of the tumour was resected within optimal margins, the ulna was detached from the carpus by dividing the ulnar collateral ligament and resecting the triangular fibrocartilage complex. The articular surface of the distal ulna and proximal row carpal bones were decorticated, exposing the underlying cancellous bone. A mortise was created in the central portion of the carpus to accept the distal ulna, which was aligned with the third metacarpal. The hand and carpus were positioned in neutral flexion and extension and neutral to slight pronation. A properly moulded dorsal 3.5 dynamic compression plate was used for the fusion (Fig. 4).

A plaster cast was applied post-fixation for 6 weeks to protect the reconstruction.

3. Results

Routine follow-ups were performed at 6 weeks, 3, 6 and 12 months after surgery, and subsequently every year. The ulna-

Fig. 1 – Plain radiographs of the wrist showing the osteolytic lesion of the distal radius.

Fig. 2 – Bone void filled with bone graft substitute calcium sulfate cement (MIIG X3, Wright Medical Technology, Inc, Arlington, TN) and the lesion bridged with an external fixation.

Fig. 3 – The wrist X-rays showed recurrence of the tumour.

carpal arthrodesis was progressing satisfactorily and the patient satisfied with the outcome and the appearance of her forearm. On clinical examination the patient had full range of movement at the elbow and a fully functional distal hand.

Follow-up at 5 years shows no local problems, preservation of good elbow and hand function and successful ulno-carpal fusion without any systematic tumour complications (normal chest radiographs) (Fig. 5).

4. Discussion

Giant-cell tumour of the distal radius is a relatively rare neoplasm. It constitutes approximately 10% of all cases of giant-cell tumour of the bone.^{11,12}

The goal of treatment of any tumour is the complete eradication of the diseased tissue while preserving as much as possible the normal bony architecture and the joint function. The surgical approach to giant-cell tumours in the 19th century was routine amputation. Later on, this was changed by Joseph Bloodwood who suggested that simple curettage was usually sufficient.¹³ Treatment with curettage, either alone or followed by packing the cavity with autogenous bone or allograft for grade I and II giant-cell tumours offers a very good (90%) chance of cure. Acrylic bone cement (methyl-methacrylate) or other substitutes has been suggested as the alternative filler for the bone cavities.^{14–17} Grade III tumours treated with curettage are prone to high rate of local recurrence and complications. The choice of treatment can affect the recurrence rate with an up to 50% recurrence rate in some

Fig. 4 – Resection of the tumour within optimal margins and 3.5 dynamic compression plate for the fusion.

Fig. 5 – Follow-up at 5 years showing no local problems, good elbow and hand function and successful ulno-carpal fusion.

cases.^{11,18,19} Almost 70% of local recurrences of GCT occur within the first 2 years after treatment. Late recurrences are known and long-term surveillance is recommended in these patients.^{20,21} Resection of the tumour followed by arthroplasty or arthrodesis is the alternative option in these cases. En bloc resection of the tumour with the distal radius is recommended by many authors as the treatment of choice for recurrences. Reconstruction is necessary after adequate resection of the tumour, to preserve function and normal alignment. Translocation of the carpus into the ipsilateral ulna instead of traditional translocation of the central part of the ipsilateral ulna²² is a good option that centralize the ulna into the carpus and maintains the position of the hand near to the center of the forearm, ensuring good grip strength and forearm rotation, but no wrist motion as expected from a fusion. The length of the forearm can be maintained by using the appropriate length of the ulna. In addition, the appearance of the reconstructed forearm is acceptable. The procedure provides good regional vascularity in order to full feel good and quick arthrodeses. This technique also eliminates the need for microsurgical surgery, which is usually available only in specific centres. The proximal stump of the ulna remains stable, and is not affecting the aesthetic or functional result.

In 1921, Hey-Groves first described centralization of the ulna in to the carpus for infected nonunion of the radius, modified by Greenwood in 1932 and reported by Watson-Jones in 1934 and 1976, the technique entails centralization of the intact ulna over the distal radial remnant to form a one-bone forearm.^{23–26}

We have used this method of treatment as a salvage procedure for recurrence after reconstruction using curettage

with satisfactory results. The procedure has got several advantages, such as being a relatively simple procedure for the general orthopaedic surgeon, there is not donor site morbidity, and offers good union rate at the ulnocarpal junction site. The main disadvantage of the procedure is the rotational stiffness with the loss of pronation and supination movements at the elbow. Translocation of distal ulna into radius does preserve the pronation and supination of the forearm, but involves extensive mobilization of the translocated ulnar fragment, a with a predisposing risk of jeopardizing the local vascularity which could result to a non-union and also the fact that union has to be attained at two sites – between the translocated ulna to radius and between translocated ulna to carpus.²²

We found only four other articles in English literature describing this method for the treatment of distal radius Giant cell tumour. In 1996 Mukherjee et al report 3 cases using this method, in two cases following recurrence of tumour in the fibular graft, and in one as the primary procedure.²⁷ In 2008 Pradip Bhargava reported a case using this method in a 21 year male,²⁸ but the most important publication about this method was in 2008 by S. Bhagat,²⁹ who reported his results in a series of twenty-five patients that underwent wide resection of the distal radial giant cell tumours (GCTs) followed by ulno-carpal arthrodesis. There were 15 male and ten female patients, with an average age of 21.5 years and mean follow up was 2.4 years. Tumours included ten primary aggressive and 15 recurrent GCTs. Average time to fusion was 7.6 months. Five patients had persistent pain in the proximal forearm. Grip strength was 65% compared to the uninvolved side. Two patients had superficial wound infection, two underwent additional bone

grafting and three implant removals due to hardware prominence were carried out. There was no evidence of carpal instability or arthritis on clinical or radiological examination at the time of final follow up.

5. Conclusion

We conclude that centralization of ulna is a simple and effective salvage procedure for recurrence of Giant cell tumour distal radius and we suggest that the term of translocation of the carpus into the ulna instead of centralization of ulna into the carpus is a more estimated term.

Conflicts of interest

All authors have none to declare.

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