

Clinical and functional outcomes of resection and arthrodesis of radiocarpal joint for distal radius tumours utilising autologous non vascularised fibula graft.

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Introduction:

Tumours of the distal radius represent 3 percent of all upper limb tumours and is also the 3rd commonest site for giant cell tumours. The aim of any treatment in this region is complete removal of tumour and reconstruction of the defect, for which there are various proposed techniques. Because of the rarity of tumours in this region, there is no gold standard for reconstruction. Arthrodesis of the radiocarpal joint following resection is a well established procedure with various types of grafts described using vascularised and non vascularised fibula autografts, ulnar translocation, tibia cortical strut autograft and iliac crest graft with each having its benefits and disadvantages. Endoprosthetic replacement following resection of tumours has also been described with varying results. The aim of our study was to review the clinical and functional outcomes of patients who have undergone resection of distal radius tumours and reconstruction with arthrodesis of the radiocarpal joint with non vascularised fibula autograft at our institution.

Methodology:

Data was collected retrospectively from a prospective held data base at our institution which houses over 40,000 cases from 1986. All patients undergoing the named procedure were included in the study up till 2014 to allow at least 1 year follow up. Demographic and clinical data was collected along with functional outcomes which were evaluated with the MSTS and TESS scores. Comparative analysis were performed for different diagnosis, gender and age.

Results:

A total of 23 patients were identified from the database and one was excluded who had arthrodesis performed for chordoma of the distal ulna and one was later converted to endoprosthesis replacement of distal radius for persistent non-union. There were 11 female patients with the average age of the cohort being 32.3 years (Range: 10-60 years). The left wrist was involved in 14 patients and the commonest diagnoses were Giant cell tumour (n=10) and osteosarcoma (n=8). No patient had metastasis at presentation but at final follow up 3 patients were deceased and 1 was lost to follow up (Table 1). The average length of the fibula used as autograft was 8.4 cm and a wrist plate was used for arthrodesis in all cases except one where a Steinman pin was used. Two patients, both with GCT, developed local recurrence and both required below elbow amputation, one for malignant transformation at time of local recurrence and one for complex regional pain syndrome as well as local recurrence. (Table 1)

Delayed union requiring further surgery was needed in 4 patients of whom one patient was revised to an endoprosthesis following persistent non-union and pain. Ten patients required 13 further surgeries commonly for non-union and revision fixation. The average MSTS score was 63.5% and TESS was 71.38%.

On subgroup analysis according to diagnosis (GCT and sarcomas), the functional scores were lower for patients with GCT and the rate of re operation was also higher in these patients. The functional scores were higher for the 10-20 years and 41-60 years age group when compared with the 21-40 years group and also higher for male patients.

Conclusion:

Reconstruction of the radiocarpal joint after en bloc excision of distal radius tumours is a challenge. Various techniques have been described in the literature to restore the joint by either arthroplasty or arthrodesis. Arthroplasty is plagued by instability and early failure whereas arthrodesis provides a more stable construct. In our series of autologous non vascularised free fibula grafts we only found a non-union rate of 9.5% with only 1 patient reporting donor site morbidity. Although we accept that the heterogeneous nature of our cohort

maybe a relative weakness of our study, the rarity of these lesions will make any homogenous sample very small and insignificant. Based on our clinical and functional outcomes, we propose that autologous non vascularised free fibula graft is an option for reconstructing the radiocarpal joint following resection of distal radius tumours. Alternatives justify consideration if they have better function and lower complications.

No	Age & gender	Diagnosis	Status at last follow up and further surgeries.
1	37 F	GCT	AFD. Multiple local recurrences prior to arthrodesis following initial curettage and cementation.
2	22 F	Osteosarcoma	Deceased. Recurrent lung metastasis.
3	60 M	Chondrosarcoma	Deceased. Non sarcoma related.
4	16 F	Osteosarcoma	Alive with no evidence of disease (NED)
5	33 F	GCT	Alive with NED.
6	19 F	Osteosarcoma	Alive with NED. Revision required for non-union.
7	45 M	Mets from RCC	Deceased. Further advanced metastasis.
8	25 F	GCT	Alive with NED.
9	50 F	GCT	Alive after excision of local recurrence and below elbow amputation for severe RSD.
10	29 F	GCT	Alive after below elbow amputation following recurrent malignant GCT. Whoops procedure initially.
11	20 M	GCT	Alive with NED.
12	49 F	GCT	Alive with NED.
13	54 M	GCT	Non-union, failure of revision surgery, revised to EPR, further wound breakdown necessitating radial flap. Alive with NED and very good functional scores. (Not included in results).
14	22 M	Osteosarcoma	Alive with NED
15	56 M	Spindle cell sarcoma	Alive with NED
16	46 F	GCT	Alive with NED. Previous curettage and cementation followed by local recurrence and treatment with Denosumab for 12 months prior to arthrodesis. Neuropathic pain in foot but no motor weakness.
17	28 M	GCT	Alive with NED. Non-union proximal osteotomy site, required revision bone grafting, autologous iliac crest.
18	14 M	Osteosarcoma	Alive with NED.
19	10 M	Osteosarcoma	Alive with NED. Initial resection and fusion of ulna to lunate, later revised to ulnar translocation and fused with Steinman pin.
20	20 M	Osteosarcoma	Alive with NED. Non-union and bone grafting followed by fracture of graft and then revision fixation with bone grafting.
21	49 M	Osteosarcoma	Alive with NED. Ulnar head excision for abutment.
22	29 F	GCT	Alive with NED. Previous curettage and cementation followed by aggressive local recurrence and treatment with Denosumab prior to arthrodesis for 12 months.

Table 1: Details of patients with diagnosis, treatments and current status.