

Research Article
Orthopaedics

FUNCTIONAL OUTCOME OF RADIAL NECK FRACTURE TREATED WITH RADIAL HEAD EXCISION

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Article submitted on: 01 August 2017

Article Accepted on: 15 August 2017

Abstract:

Objective: The aim of our study was to evaluate the functional outcome of radial head excision for fractures of the radial head.

Materials and methods: Eleven closed fractures of the radial head treated by resection were reviewed. The mean age of the patients in the series was 39 years and 60% were men and 40% were women. 90% of the fractures were Mason type III and 10% of the fracture were Manson type II. The mean postoperative follow-up was 12 months (range, 3-18 months). The functional assessment of the elbow and wrist was made according to the criteria of Morrey and Cooney. Radiologically, elbow carrying angle, and presence of degenerative changes and calcifications in the wrist and elbow were assessed.

Results: All the patients presented a mean proximal migration of the radial head of 1.5 mm, and the carrying angle showed an average increase of 8.3°.

Conclusions: Despite the mechanical changes that were produced, excision of the radial head in adults barely changed upper limb function and more than 85% of the patients obtained excellent or good results.

Key words: Radial head fractures, Radial head excision, Functional outcome

Introduction

It is generally agreed that a comminuted fracture (Mason type III) of the radial head is best treated by excision when anatomical reconstruction is not possible.¹ Prosthetic replacement of the radial head in stable elbows is controversial. Many problems have been described at both wrist and elbow after resection of the radial head.^{2,3}

The purpose of the present study was to review the results of radial head resection after comminuted radial head fractures with no documented associated instability in patients who were younger than forty years of age at the time of the fracture.

Materials And Methods

We reviewed the case notes of 11 patients with comminuted fractures (Mason type III) of the radial head. We examined patients in our opd in between follow up of 3 months to 18 months. These patients completed a standard questionnaire concerning handedness, the history of other fractures, and operations or conditions involving the arm; pain at the elbow and wrist at rest on movement and at work; fatigue, paraesthesia and grip strength; and work and recreation including any changes due to the elbow condition. Personal satisfaction was recorded as good, fair or poor.

Examination included recording the range of movement of the left and right elbows and wrists, measurement of the valgus angle and the maximum valgus-stress angle of both elbows and of the circumference of the proximal forearms. Grip strength on both sides was tested by averaging three measurements using a Jamar hand meter. We used a functional rating index, modified from An and Morrey⁴ to assess the results of treatment in 11

patients' comparative anteroposterior and lateral radiographs of both wrists and both elbows, including maximum valgus-stress views, were taken. The elbow films were evaluated for bony overgrowth of the radial stump, valgus angle and valgus instability, periarticular ossification, proximal radio-ulnar synostosis, osteoporosis and degenerative changes. The wrist radiographs were studied for radial deviation, proximal movement of the radius and degenerative arthritis.

Results

They show that of 11 patients at a follow-up of 3 to 18 months, 9 had good or excellent results by the modified Morrey index^{4,27}. All were able to continue their work and daily activities without restriction. Only one patient assessed his result as fair, since he had had to stop playing cricket, and badminton, and change his job of a lift-truck driver. He had pain on lifting 5kg weight in his shop and had lost 25° of supination.

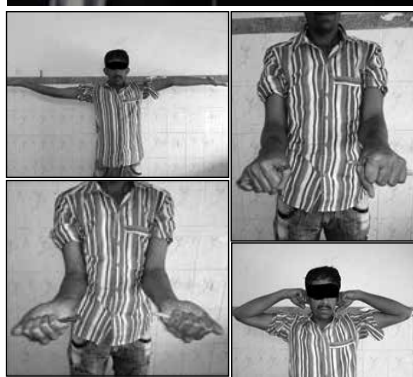
Elbow. Only 3 patients complained of elbow pain. One had diffuse pain at both elbow and wrist when lifting weights of over 15 kg with pronation and supination of his (non-dominant) forearm. There was loss of 20° of supination. Radiographs at the 9 months follow-up showed mild degeneration, some lateral periarticular ossification. The second patient was experiencing dorsolateral discomfort during strenuous work at the 6 months follow-up, but no functional impairment and only mild radiological degeneration. The third patient had slight pain laterally on strenuous activity, but had no functional restriction and no radiological changes. 8 patients had some limitation of elbow movement, but only one subjective result was fair. The valgus angle and maximum

valgus stress angle were measured using a handheld goniometer with the elbow in maximal extension.

Wrist. Two patients had wrist pain. One, who also had elbow pain, is described above. The other was a housewife with an aching sensation at the ulnar side of her nondominant wrist after strenuous work. Neither patient had restriction of activity or used analgesics. Three patients had loss of movement at the wrist, but two of them had had fractures of the wrists in the past. One patient with a stiff wrist had undergone previous surgery at the wrists. Only two patients had loss of grip strength. One was the former lift-truck driver described above and the other showed some muscular atrophy with 10° loss of both extension and pronation. The subjective result was good at 12 months with no restriction on work as a truck driver.

Radiological findings (Table III). Nine patients showed proximal migration of the radius of 1 to 3 mm, but eight of these had no complaints. One patient with radial migration of 2 mm had 20° loss of supination, respectively, which made it difficult to obtain standard films for the measurement of radial migration. Two of these patients had reduced elbow movement and overgrowth of the radial stump. Both overgrowth and periarticular ossification were seen in two patients with limitation of movement. Mild degenerative arthritis of the elbow with minimal osteophytes or joint narrowing or both was seen in 5 patients⁵.

Case 1: 38 year male having Post traumatic Radial Head fracture treated with Radial Head Excision with 6 month follow up



Case 2: 48 year male patient having Post traumatic Left side Radial Head fracture Treated with Radial Head Excision with 9 month follow up



Discussion

Early resection and mobilisation are recommended for Mason type-III fractures of the radial head to avoid later functional impairment^{1,3}, but some patients may have loss of extension^{3,6,7}. Our review showed a distinct discrepancy between loss of movement and subjective satisfaction, since only one patient was restricted in his activities. In the past, limited elbow movement after resection of the radial head has been attributed to damage to the cartilage of the humerus and the trochlear notch⁸, overgrowth of the radial stump⁹, or to bony osteophytes and periarticular ossification⁶. Our series is too small for statistical analysis, but there seemed to be some correlation between radial overgrowth or periarticular ossification and loss of mobility. All the patients with limited rotation of the forearm had definite heterotopic ossification. We have recently started to use a course of indomethacin after resection of the radial head to try to reduce such ossification.

Replacement of the radial head by prostheses remains controversial¹⁰.

Silicone implants have shown problems due to the material itself, and the lack of stiffness to withstand normal loads without deformation^{11,12}. Metal prostheses have given satisfactory results for unstable fractures of the radial head¹³⁻¹⁵, and vitallium heads used to treat fracture dislocations are reported to have given minimal problems with dislocation or implant failure¹⁶.

Biomechanical studies have shown that the medial collateral ligament of the elbow is important in providing valgus stability after resection of the radial head. The stabilising effect of the head comes into play only after this ligament has been disrupted^{5,17}.

Table I: Patients data

case number	1	2	3	4	5	6	7	8	9	10	11
age in years	29	36	40	26	45	55	51	31	35	42	39
Sex	male	male	female	female	Male	female	Male	male	male	female	Male
fracture type	III	III	II	III	III	II	III	III	III	III	III
Pain		+		+			+				
motion: in degrees											
Flexion	130	120	125	135	125	130	125	120	130	125	130
Extension	-10	0	0	0	0	0	-40	0	-10	0	0
Pronation	85	70	90	80	85	85	80	90	85	80	85
Supination	80	60	85	90	85	90	80	85	90	90	85
grip strength %	70%	95%	90%	95%	95%	90%	85%	90%	85%	75%	95%
increase in carrying angle	10	0	0	8	0	0	7	0	0	0	0
Valgus instability	-	-	-	-	-	-	-	-	-	-	-
Degenerative arthritis of the elbow	+	-	-	+	+	-	+	-	+	-	-
Degenerative arthritis of the wrist	-	-	-	-	-	-	-	-	-	-	-
Proximal radial migration (in mm)	3	2	1	-	0.5	1	3	0.5	2	1	-
elbow evaluation score points	72	85	92	81	95	90	77	89	82	87	88

Table II Results according to Functional rating index (modified Morrey index)

Results	Score	Number of patients
Excellent	90 to 100	2
Good	80 to 89	7
Fair	70 to 79	2
Poor	<70	0

Degenerative arthritis of the elbow	15	9	9	5
Degenerative arthritis of the wrist	0	0	0	0
Proximal radial migration (in mm)	1.6	2.5	3.1	1.5
elbow evaluation score points	76	92	95	85

Table III Comparison of different study

Factors/Study	Masayoshi Ikeda et al	Janssen et al	Samuel et al	Our Study
Pain	9	4	5	3
grip strength (<80%)	4	4	7	2
increase in carrying angle (degree)	8	7	11	8.3
Valgus instability	0	0	2	0

We found no valgus instability after resection of the radial head, and attributed this to intact medial collateral ligaments. We therefore support the opinion of Morrey et al that valgus stability is provided by an intact medial collateral ligament, and that no prosthetic implant is necessary after resection of the radial head when this ligament is intact^{5,17}. Proximal displacement of the radius with subluxation of the distal radio-ulnar joint after resection of the radial head has been described by many authors^{1,3,5-7,9,11,18-24}, but there

is disagreement as to the symptoms which may result. Some have reported no subluxation at the distal radio-ulnar joint^{8,25}, but Radin and Riseborough²³ described three patients with proximal radial migration after fractures of the radial head which had not been excised. Some authors describe no correlation between wrist complaints and subluxation of the distal radio-ulnar joint^{3,5-7,18-24}, but others have shown a relationship between the two^{6,9,11,19-22,24}. We found proximal radial migration in accordance with previous research, but no definite correlation between this migration and wrist complaints, functional impairment, or degenerative changes at the wrist or elbow²⁶.

Morrey et al⁵ describe a correlation between pain and degenerative arthritis of the elbow or wrist after resection of the radial head, but none between arthritic changes and functional impairment or loss of strength. We found no evidence of degenerative changes at the wrist in our series, and only mild arthritis of the elbow which was unrelated to limited movement or pain. No patient had ulnar nerve symptoms such as are described in cubitus valgus⁶. Osteoporosis of the capitellum was noted in three patients, but in our opinion, has no clinical significance⁶.

Conclusion

Our long-term follow-up shows that early resection of the radial head is a good treatment for comminuted fractures of radial head and neck. Prosthetic replacement seems to be indicated only when there is definite valgus instability after severe trauma.

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