



A COMPARATIVE STUDY BETWEEN FUNCTIONAL OUTCOME OF RESECTION AND RECONSTRUCTION OF RADIAL HEAD FRACTURES

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ABSTRACT

Background: Fractures of the radial head are most commonly undiagnosed among elbow fractures. Complications can occur if management is delayed or neglected. Though the management of these fractures has improved a lot, it still has a learning curve. **Materials and Methods:** 29 patients were divided into two groups- Group A (17 patients) operated with excision and Group B (12 patients) treated with reconstruction. Follow up was done at regular intervals and post operative clinical assessment was done using Broberg and Morrey rating system **Results and Conclusion:** Out of these two procedures, the difference in Broberg and Morrey score was not significant. But it was seen that in patients with Mason type II reconstruction showed better results than resection. In Mason III fractures, due to difficulty in achieving anatomical reduction, results were not good with reconstruction when compared with resection.

KEYWORDS : radial head, Mason, resection, reconstruction, Broberg and Morrey score

INTRODUCTION

Radial head is an articular structure which articulates both with capitulum as well as ulna and is an important lateral column stabilizer¹. Fractures of the radial head are most commonly undiagnosed among elbow fractures as it does not typically present with swelling and deformity in all cases. Hence it is mostly missed out as a soft tissue injury which can later lead the patient with disability.

Complications can occur if management is delayed or neglected. These mainly include restricted elbow range of motion. Based on the severity of injury and comminution, radial head fractures are divided into 4 types grading from low to high.

Before the development of fixation techniques, early excision of the radial head was advocated for Mason type 2,3 and 4 fractures. Goldberg, Peylan and Yosipovitch (1986)² and Coleman, Blair and Shurr (1987)³ claimed good results with early excision while Radin and Riseborough's (1966)⁴ results were less conclusive. Broberg and Morrey (1986)⁵ concluded that initial retention with delayed excision gave reasonable results. These varying results led to a search for better management techniques for radial head fractures.

Highlighting complications for radial head excision were unstable elbow, proximal migration of radius leading to positive ulnar variance and persistent wrist pain, cubitus valgus deformity which on long term led to tardy ulnar nerve palsy. Fixation also showed poor results because of either poor intra articular fixation or due to hardware mechanically hindering supination and pronation until principle of safe zone⁶ was introduced. Replacement also had complications like loosening of prosthesis and body reaction towards silicon or other material used which later on lead to elbow effusion and arthritis.

Though the management of these fractures has improved a lot, it still has a learning curve.

MATERIALS AND METHODS

A prospective study was done on a total of 29 patients; those fulfilling the inclusion criteria, was done to evaluate the outcome of radial head fractures (Mason type 2-4) treated by resection and reconstruction was done. Randomisation was done by computer generated random numbers.

29 patients were divided into two groups- Group A (17 patients) operated with excision and Group B (12 patients)

treated with reconstruction. Patients with age group 20-60 years were included in the study. Patients with Mason type 1 fractures were not included in the study.

Pre operative assessment included X-Rays in AP, lateral and radiocapitellar views in maximum possible supination and pronation for better visualisation of fracture pattern. 3DCT reconstruction of elbow joint was done to evaluate the number of fragments, degree of comminution and displacement, which will aid in planning of surgery, type of implant and placement. Implants used for fixation included Kirschner wires, Herbert screws and mini fragment screws.³

Follow up was done at regular intervals and post operative clinical assessment was done using Broberg and Morrey rating system.

Excellent: 95-100

Good: 80-94

Fair: 60-79

Poor: <60

Variable	No. of Points
Motion (total for each plane) (degrees)	
Flexion (0.2 x arc)	27
Pronation (0.1 x arc)	6
Supination (0.1 x arc)	7
Strength	
Normal	20
Mild loss (appreciable but not limiting; strength 80% that of contralateral side)	13
Moderate loss (limits some activity; strength 50% that of contralateral side)	5
Severe loss (limits everyday tasks, disabling)	0
Stability	
Normal	5
Mild (with activity, no medication)	4
Moderate (with or after activity)	2
Severe loss (limits everyday tasks)	0
Pain	
None	35
Mild (with activity, no medication)	28
Moderate (with or after activity)	15
Severe (at rest, constant medication, disabling)	0

OBSERVATIONS AND RESULTS

In our study, mean age of group A was 43.71 years and mean age of group B was 34.5 years. Males were predominantly involved than females due to more outdoor activities and more prone to trauma. Left side was involved in 11 patients in group A and 5 patients in group B. Associated injuries such as scaphoid fracture, trans scaphoid perilunate dislocation, fracture neck humerus, chest injury, etc. were present in 5 patients in group A and 2 patients in group B.

		Group A		Group B	
		No	%	No	%
Age	<40	6	35.29	8	66.67
	>40	11	64.71	4	33.33
Side	Left	11	64.71	5	41.67
	Right	6	35.29	7	58.33
Asso	+	5	29.42	2	16.67
Injury	-	12	70.58	10	83.33
Type	Mason II	9	52.94	6	50
	Mason III	8	47.06	5	41.67
	Mason IV	0		1	8.33

The average period of immobilization was 13.65 days and 21.92 days in group A and B respectively. The post operative average Broberg and Morrey score was 83.59 and 87.18 in group A and B respectively. The results were excellent in 4 cases, good in 8 cases, fair in 4 cases and poor in 1 case in group A and excellent in 3 cases, good in 5 cases, fair in 4 cases and 0 poor result in group B. Complications were present in 3 cases in group A and 1 case in group B.

		Group A		Group B	
		No	%	No	%
Period of immobilization	7	7	41.18	2	16.67
	15	6	35.29	1	8.33
	21	3	17.65	4	33.33
	30	1	5.88	5	41.67
Broberg & Morrey Score		83.59		87.18	
Result	Excellent	4	23.53	3	25
	Good	8	47.06	5	41.67
	Fair	4	23.53	4	33.33
	Poor	1	5.88	0	
Complications	+	3	17.65	1	8.33
	-	14	82.35	11	91.67

Case Illustration

CASE 1: A 60 yr old Male with Mason type II fracture treated with excision



Fig 1.a Pre op X-rays



Fig 1.b Post op Xray

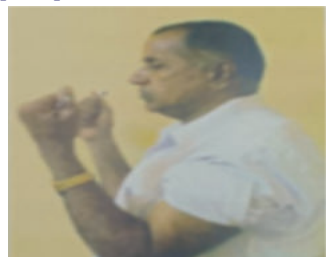


Fig 1.c

Result-Good
Broberg & Morrey score-91

CASE 2: A 19 yr old Male with Mason type II fracture treated with internal fixation with Herbert screw.



Fig 2.a Pre op X-rays



Fig 2.b Post op Xray

Broberg and Morrey score-99
Result -Excellent

DISCUSSION

Radial head fracture is common and accounts for up to one third of all elbow fractures. It was probably first described by Paul of Aegina (AD 625-690).⁷ In 1935, Jones stated that the fracture of radial head is a serious injury and whilst the prognosis is good for recovery of a useful elbow, rarely it is a normal elbow.⁸

In our study, the mean age was 43.7years and 34.5 years for group A and B respectively which is comparable to 41.1 years and 38.2 years age of study done by Masayoshi Ikeda, MD, Kazuhiro Sugiyama, MD, Chonte Kang, MD, Tomonori Takagaki, MD and Yoshinori, MD in 2005.⁹

Our study showed that although strength and stability were good after reconstruction of Mason 3 fractures, the elbow range of movements was decreased. This led to more disability when compared with patients treated with excision. We favour resection over reconstruction in severely comminuted fractures where anatomical fixation could not be achieved. This is in accordance with recommendation provided by Geel CW, Palmer AK, Ruedi T, Leutenegger AF (1990)¹⁰ and Kellam JF and Morrey in 1991¹¹.

In our study, most common mode of injury was high velocity road traffic accidents in both groups; group A (47%) and group B (67%) followed by slip and fall on outstretched hand 35% in group A and 33% in group B which is comparable to the findings of study conducted by Ikeda et al.⁹

In our study, the average immobilization period was 13 days in group A and 22 days in group B; extension lag average was 18.2 degrees and 17.3 degrees respectively; final ROM in all planes was satisfactory except for extension lag. These findings were comparatively longer for immobilization period than 8 days and 2 days respectively; extension lag was 15.5 degrees and 7.1 degrees respectively in study conducted by Ikeda et al.⁹

The average follow up in our study was 6 months whereas the average follow up in study conducted by Ikeda et al was 10 years for group A and 3 years for group B.⁹ Thus long term complications like elbow arthritis, tardy ulnar nerve palsy, proximal migration were difficult to comment in our study.

In our study, we used Broberg and Morrey scoring system to calculate functional outcome. The average score was 83.6 in

group A and 87.2 in group B which were similar to results achieved by Radin EL, Riseborough EJ (1966)⁴ and Ring et al (2002)¹².

In our study, the results were excellent in 23.53% cases; good in 47.06% cases in group A and excellent in 25% cases; good in 41.67% cases in group B. The remaining achieved fair results. One of the patients in group A with undiagnosed Essex Loppressti lesion had poor result. A similar study conducted by Janssen et al (1998)¹³ showed similar results.

CONCLUSION

Out of these two procedures that is resection and reconstruction of radial head, the difference in Broberg and Morrey score was not significant. But it was seen that in patients with Mason type II reconstruction showed better results than resection. The procedure suggested in Mason II is fixation with Herbert screw as it provides better stability when compared with other implants.

In Mason III fractures, due to difficulty in achieving anatomical reduction, results were not good with reconstruction when compared with resection. We recommend radial head resection in Mason III fractures where anatomical and stable fixation is not possible.

The main aim of treatment in radial head fracture should be to choose a surgical procedure which will provide earlier rehabilitation, painless full range of motion at elbow along with good strength and stability.

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