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A comparative study of functional outcome of type 2 and 3 radial head fracture treated with radial head excision versus radial head fixation

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Abstract
Background: This study was conducted to compare the results of radial head excision versus radial head open reduction and fixation in Type 2 and Type 3 Mason fracture of the radial head using the Quick Dash scoring system. This study suggested better Quick Dash score was associated with radial head fixation as compared to radial head excision.
Methods: Out of 40 participants who underwent surgery for Type 2 and 3 Mason radial head head fracture, 20 patients had undergone radial head excision and 20 patients had undergone open reduction and internal fixation. Patients were followed up post-operatively for upto 6 months and were evaluated on the basis of the Quick Dash scoring system.
Results: Out of 40 patients, 27 were males and 13 were females. The Mean age group of this study population was 38.8 years with an SD of 12.5 years. Even though, the elbow range of motion was comparable between the two groups, those who had undergone radial head excision had an average score of 52.5%, where bas those who had undergone radial had fixation had an average score of 60%. additionally patients those who had undergone radial head excision had complaints of elbow instability.
Conclusion: Mason Type 2 stable, displaced fractures can be treated satisfactorily with radial head excision, but in the presence of ligamentous injury, there are likely chances of elbow instability and patient may require long-term use of orthosis, whereas unstable, displaced type 2 Mason fracture and Type 3 communited fracture are better treated with open reduction and internal fixation with either k-wires, screws or plates with fewer complications.

Keywords: Trauma, elbow fracture, radial head

Introduction

- Radial head fractures account for upto 25-44% of all the elbow fractures. The frequency of these injuries has been noted to be higher in women and between the age group of 30-40 years [1].
- These injuries were classified on the basis of their severity by Mason in 1954 [2].
- He described four types of radial head fractures. Mason Type I included fractures which were undisplaced or minimally displaced. Type II injuries encompassed fractures with displacement, depression or angulation. Type III included comminuted fractures, and type IV included fractures with comminution and elbow dislocation [2].
- Earlier, the treatment of choice for Mason Type II fractures was radial head excision in case of failure of conservative management. Excision of the radial head with or without prosthetic replacement has been the mainstay in the management of Type III fractures. With an evolution in surgical techniques and instrumentation over the years, open reduction and internal fixation of Type II and Type III injuries are gaining popularity [3, 4].
- For undisplaced radial head fractures (Mason Type I), conservative management, like an above elbow slab is the treatment of choice [5]. For partial articular displaced fractures like Mason Type II, conservative management was considered a mainstay of treatment.
- Lindenhovius *et al*., concluded that for long-term management of partially displaced radial head fractures, open reduction and internal fixation had favourable outcomes but the complication rate was also 44% [6].

Complications associated with surgical treatment were hardware failure, nonunion, mal union, heterotopic ossification.

- Kaas *et al*., concluded in his nine retrospective series that there was insufficient evidence as to which method of management of radial head fractures was superior [7].
- For comminuted radial head fractures, Pearce. And Gallannaugh. Reported good results after open reduction and internal fixation of comminuted radial head fractures [8].
- Chen *et al*., concluded that replacement arthroplasty of the radial head had better functional outcomes as compared to the open reduction internal fixation group after two years of follow-up [9].

Materials and methods

This study is a prospective study conducted at MGM hospital, Kamothe over a period of 6 months from December 2019 to May 2020.40 Patients with Type 2 and type 3 Mason radial head fracture were included in this study.

Total no. of patients

40 Patients operated for Type 2 and type 3 Mason radial head fracture were divided in Group A and Group B by the Randomization method.

Group A patients:

20 patients who have undergone radial head excision

Group B patients:

20 patients who have undergone open reduction and internal fixation.

The collected data will be evaluated using appropriate statistical methods.

- **Period of follow-up**

All patients from Group A and Group B will be followed up post-operatively at 4 weeks, 8 weeks, 12 weeks, 24 weeks

- **Parameters for evaluation**

Quick dash Scoring System

- **Statistical tests**

The collected data will be evaluated using appropriate statistical methods.

Age

Mean age of the study population was 38.8 years with a standard deviation of 12.5 years. The mean age among Group A patients was 37.6 years and that among Group B patients was 40 years. This difference was found not to be statistically significant (P=0.486). Hence two groups were comparable in terms of age groups.

Gender

Out of total of 40 patients, 27 (65.75%) were males and 13 were females (35.25%). Two Study Groups were comparable in terms of gender distribution. (P=O.203).

Table 1: The distribution of patients is shown table given below.

	Men	Women	Total
Group A, n=20	12	8	20
Group B, N=20	15	5	20

Results

At 6 months follow-up evaluation, there was no significant difference in elbow range of motion i.e. flexion and rotation arc between the two groups. Among group A patients, 1 patient had a Quick Dash score of 100%, about 8 patients had a Quick Dash score of 75%, 6 patients had a score of 50%, 5 patients had a score of 25%. And among Group B patients who had undergone open reduction and internal fixation, 4 patients had a score of 100%, 10 patient had a score of 75%, 4 patients had a score of 50% and only 2 patients had a score of 25%. Complications associated with radial head excision was instability and risk or recurrent elbow dislocation, especially when it is associated with ligamentous injury. Instability was noticed in 4 patients of Group A. Main complications associated with Open reduction and internal fixation are Nonunion, implant failure and osteoarthritis especially in Type 3 communited fracture with more than 3 fragments. Among Group B patient's one patient had implant failure and one patient showed radiological signs of impending osteoarthritis.

Table 2: Quick dash scoring system

	0	25	50	75	100
Group A	0	5	6	8	1
Group B	0	2	4	10	2

Fig 1: Open reduction and internal fixation for Type 2 fracture

Fig 2: Radial head excision for type 2 fracture

Discussion

Mason Type 2 stable, displaced fractures can be treated satisfactorily with radial head excision, but in the presence of ligamentous injury, there are likely chances of elbow instability and the patient may require long-term use of

orthosis whereas unstable, displaced type 2 Mason fracture and Type 3 communited fracture are better treated with open reduction and internal fixation with either k-wires, screws or plates with fewer complications.

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