

# A Prospective Study of Comparison of Clinical Functional and Radiological Outcomes in Resection and Replacement Arthroplasty of Head of Radius in Acute Comminuted Fractures of Radial Head

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## ABSTRACT

The identification and treatment of radial head fractures began towards the end of 19th century. The aim of this study is to prospectively compare the clinical, functional, and radiological outcomes of excision and replacement of head of radius in acute comminuted fractures of the radial head at 2 weeks, 6 weeks, 3 months, 6 months, and 12 months. The mean age of the patients included in the study was 41.26(24- 66) and 43.1(24-70) for excision and replacement. Mechanism of Injury by road traffic accidents 33(55%), Fall or direct trauma 18(30%), Indirect injury 9(15%).

**Key words:** Radial head, Fractures, Forearm

**HOW TO CITE THIS ARTICLE:** Vijay Narasimman Reddy, Lionel John, E Kushwanth, Shradha Bora S, Aravind Ravichandran, A Prospective Study of Comparison of Clinical Functional and Radiological Outcomes in Resection and Replacement Arthroplasty of Head of Radius in Acute Comminuted Fractures of Radial Head, J Res Med Dent Sci, 2022, 10(2): 736-739

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**Received:** 04/02/2022  
**Accepted:** 08/02/2022

## INTRODUCTION

Fractures of the radial head were common injuries that account for around 20 percent of the injuries of elbow joint [1]. Modified mason classification type1 fractures are marginal undisplaced fractures which are treated mostly by conservative management and type 2 fractures are displaced and are treated by ORIF with plates or screws. The functional outcome of these injuries are exceptionally good compared to type 3 and type 4 fractures. Type 3 (comminuted) and type 4 (fracture- dislocations) were also associated with other elbow injuries (coronoid fracture and elbow dislocation) leading to significant instability of elbow and forearm [2].

For years, the comminuted radial head fractures were excised to prevent blockage of motion and capitellar damage [3]. Years later the importance of radio capitellar contact became established and replacement using prosthesis came into existence.

Radial head provides valgus stability to the elbow and longitudinal stability to the forearm in flexion. Moreover, it transmits 60% of load from forearm to arm through radio capitellar joint [4]. Excision of radial head is encountered with numerous complications including progressive valgus, instability, proximal migration of radius,

ulnohumeral osteoarthritis, wrist osteoarthritis and soft tissue ossification [5]. Despite these complications studies have proven good success rate with excision in type 3 fractures without either elbow instability or injury of the interosseus membrane (Essex Lopresetti type) and commonly in reduced demand of elbow functions [6].

Radial head replacement gives promising results in type 4 fracture dislocation injuries, Essex lopresetti injuries, coronoid fractures, failed excision/ fixation and in high functional demands [7]. Poor outcomes after replacement have also been reported due to osteolysis, loosening of implant, capitellar damage, overstuffing and laxity. Reports of early prosthetic failure requiring implant removal or revision are also encountered [8]. This study is a comparison of the clinical, functional, and radiological outcomes between excision and replacement through a prospective case-controlled method.

## METHODOLOGY

This is a prospective randomized case-controlled study with 60 patients diagnosed to have modified mason type 3 and type 4 radial head fractures and undergoing either excision or replacement. The duration of study was from MAY 2018 to OCTOBER 2020 and patients were followed up after the surgery for a period of 1 year. This study has been conducted in Sree Balaji Medical College and Hospital, Chromepet, Chennai. The duration of study was a period of 3 years.

This study was conducted with importance to clinical evaluation and outcome analysis of radial head excision and replacement, and to compare the outcomes of these procedures.

The indications for excision are broad and the replacement of radial head was with its risks of failure and revision. Our hypothesis is that both radial head excision and replacement can show better reproducible functional and clinical results in comminuted radial head fractures.

## RESULTS

The mean age of the patients included in the study was

**Table 1: Range of elbow flexion.**

Elbow flexion	Surgery	Mean (Degrees)	Std. Deviation	Number of patients
2 weeks	Excision	67.33	12.914	30
	Replacement	68.83	12.844	30
6 weeks	Excision	78.17	11.102	30
	Replacement	79.5	11.988	30
3 months	Excision	88.17	9.513	30
	Replacement	86.83	13.357	30
6 months	Excision	97.17	11.194	30
	Replacement	91.83	14.65	30
12 months	Excision	106.17	12.641	30
	Replacement	98	16.167	30

Repeated measures anova is used to find the mean difference between and within the group, this test has assumption of equal space of time assumed, to check this assumption Mauchly's test of sphericity is applied as this test doesn't satisfies the assumption with p-value >0.05 we go with greenhouse and Geiser effect.

There is a significant mean difference between the group from 2week to 1year in both the group with p-value <0.05 (0.021) and there is no significant mean difference between two groups with p-value >0.05 (0.411).

Repeated measures anova is used to find the mean

**Table 2: Range of forearm supination.**

Supination	Surgery	Mean(degrees)	Std. Deviation	N
2 Weeks	Excision	43.83	5.2	30
	Replacement	47.17	10.059	30
6 Weeks	Excision	54.17	7.437	30
	Replacement	53.67	9.908	30
3 Months	Excision	64.83	8.558	30
	Replacement	60	10.171	30
6 Months	Excision	74	10.619	30
	Replacement	68	8.469	30
12 Months	Excision	78.67	10.25	30
	Replacement	73	9.879	30

41.26(24- 66) and 43.1(24-70) for excision and replacement.

Mechanism of Injury by road traffic accidents 33(55%)  
Fall or direct trauma 18(30%) Indirect injury 9(15%).

### Postoperative immobilization

All patients were immobilized in an above elbow POP splint for a period of 2 days.

Active mobilization was started from the 3rd post-operative day (Table 1).

difference between and within the group, this test has assumption of equal space of time assumed, to check this assumption Mauchly's test of sphericity is applied as this test doesn't satisfies the assumption with p-value >0.05 we go with greenhouse and Geiser effect.

There is a significant mean difference between the group from 2week to 1year in both the group with p-value <0.05 (0.011) and there is no significant mean difference between two groups with p-value >0.05 (0.611) (Table 2).

Repeated measures anova is used to find the mean difference between and within the group, this test has assumption of equal space of time assumed, to check this assumption Mauchly's test of sphericity is applied as this test doesn't satisfies the assumption with p-value >0.05 we go with greenhouse and Geiser effect.

There is a significant mean difference between the group from 2week to 1year in both the group with p-value <0.05 (0.032) and there is no significant mean difference between two groups with p-value >0.05 (0.721) (Table 3).

**Table 3: Range of forearm pronation.**

Pronation	Surgery	Mean(degrees)	Std. Deviation	N
2 weeks	Excision	32.33	8.172	30
	Replacement	28.83	12.154	30
6 weeks	Excision	38.5	7.673	30
	Replacement	35.5	10.615	30
3 months	Excision	44.67	8.703	30
	Replacement	42.17	10.144	30
6 months	Excision	50.83	10.178	30
	Replacement	48.5	11.682	30
12 months	Excision	55	10.828	30
	Replacement	53.5	13.528	30

## DISCUSSION AND CONCLUSION

Radial head fractures are common injuries of the elbow. They occur mostly following Road traffic accidents and few other due to direct and indirect forces. Treatment of these fractures remain to be controversial in spite of numerous evolutions in the management of this fracture. In our study one case of excision and 3 cases of replacement were found to show poor outcome (less than 60) based on MEPI score.

Recent studies in the literature however question the superiority of replacement over excision. No significant difference in terms of MEPS, DASH, and ROM. He found increased rates of resurgery with replacement.

Replacement as unnecessary but simple excision would suffice for most elderly patients and without associated injuries. The choice of replacement surgery in elderly patients. The valgus stability and delayed ulno humeral arthritis were sought as the important advantages of replacement over excision.

Many retrospective studies have confirmed good results of replacement in cRHF with a maximum follow up of 5 years. He reported mean MEPS score of 91. He also reported the greatest number of complications including 39% reoperation rate. Other complications reported were 3 radio capitellar instability, 8 painful loosening and 5 ulnar nerve palsy [9-12].

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