

# To Study the End Results of Radial Head Excision in the Management of Displaced and Comminuted Radial Head Fractures in Young Adults

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**Abstract:** *Introduction:* Radial head fractures are the most common fractures of the elbow with an estimated incidence of 2.5 to 2.9 per 10,000 people per year. Radial head fractures can occur in isolation or as part of a more complex elbow dislocation or Essex-Lopresti injury. When confirmed that the fracture is in isolation, the goal of treatment is a pain-free, stable arc of motion in flexion-extension and pronation-supination. *Material and Methods:* It was a cross-sectional, Hospital based study conducted in the Orthopaedics Department of Agartala Government Medical College and Govind Ballabh Pant hospital, Agartala from October 2016 to October 2018 in 18 patients of displaced and comminuted radial head fracture in young adults. They were treated by radial head excision and evaluated using Mayo elbow performance index. *Result:* In this study total 21 patients with isolated displaced and comminuted radial head fractures without any ligamentous injury were included and evaluated after excision. Of these 18 patients, 14 were male (77.78%) and 4 (22.22%) were female. *Conclusion:* Radial head excision is a simple surgical procedure and not as technically demanding as ORIF or radial head replacement and that early post operative motion can be permitted. Short term outcome of radial head excision in displaced and comminuted radial head fractures in young adults yield good functional outcome, However in long term outcome there are chances of proximal migration of radius with chronic wrist pain and valgus deformity at elbow which contributes to the limitation of this study.

**Keywords:** Displaced and comminuted radial head fracture, Essex-Lopresti injury, Radial head excision, Mayo elbow performance index

## 1. Introduction

Radial head fractures are the most common fractures of the elbow with an estimated incidence of 2.5 to 2.9 per 10,000 people per year. The radial head consists of a concave dish which articulates with the capitulum and a flattened articular margin which articulates with the lesser sigmoid (radial) notch of the ulna. The non-articular margin comprises about one-third of the diameter and is more rounded and often devoid of cartilage<sup>1</sup>. Radial head fractures can occur in isolation or as part of a more complex elbow dislocation or Essex-Lopresti injury. When confirmed that the fracture is in isolation, the goal of treatment is a pain-free, stable arc of motion in flexion-extension and pronation-supination. The Mason classification system is widely used to describe these fractures<sup>2</sup>. Most radial head fractures are treated conservatively (Mason types I and II). Nonunion and fracture displacement are rare. Stiffness, however, can be a complication. If the patient has no block to range of motion, a sling and immediate use (as pain allows) predictably yields good results<sup>2</sup>. Historically, the treatment of choice for Mason Type II fractures was radial head excision in case of failure of nonoperative management. Excision of the radial head with or without prosthetic replacement has been the mainstay in the management of Type III fractures. With the advance of better surgical techniques and instrumentation over the years, open reduction and internal fixation of Type

II and Type III injuries are gaining popularity<sup>3</sup>. The majority of radial head and neck fractures are minimally displaced and are isolated injuries. These fractures typically have a good functional outcome with nonsurgical treatment. The optimal management of displaced radial head fractures has not been established<sup>1</sup>. Over the last decades, the radial head is increasingly recognized as an important stabilizer of the elbow. The radial head is an important secondary stabilizer in valgus and external rotation. Radial head excision alters the kinematics and varus-valgus laxity of the elbow with intact ligaments and that stability is improved after radial head arthroplasty<sup>4</sup>. Radial head resection may be a good option for isolated fractures in elderly patients, but it has been associated with variable results in younger patients. Undiagnosed concomitant injuries likely play a role in long-term outcome. Long-term arthrosis, valgus elbow instability, and longitudinal forearm instability have led many to avoid radial resection in younger patients<sup>1</sup>. Unstable fractures of the radial head commonly occur as part of a complex injury pattern, have fragments that are detached and mobile with little or no soft tissue attachments and are associated with osseous and ligamentous injuries to the elbow or forearm. The primary goal of treatment is to prevent dislocation or subluxation of the elbow and forearm, with restoration of the radiocapitellar contact essential for alignment and stability. When these fractures are not associated with elbow or forearm instability, partial or complete radial head excision

is an option, although in most cases when instability is present, other options include internal fixation or prosthetic replacement<sup>5</sup>.

**2. Methodology**

**Study Design**-Cross-sectional study.

**Study Place**-Department of Orthopaedics. Agartala Government Medical College and G.B Pant Hospital, Agartala, West, Tripura.

**Study period**-October 2016 to October 2018.

**Study population**-All patients with radial head fractures within age group 18–40 years attending department of Orthopaedics in Agartala Government Medical College and G.B Pant Hospital, Agartala, West, Tripura.

**Inclusion criteria**-Patients with age group 18–40 years, Displaced or Comminuted fracture of radial head.

**Exclusion Criteria**-Patients with age group <18 years and > 40 years, Open fracture of radial head, Patients with collateral ligament injuries, Fracture both bones of forearm, Radial head dislocation, Patients with polyarthritis like rheumatoid arthritis and pathological fracture, Patient not fit for surgery.

**Method of study**- Demographic information will be collected. Clinical evaluation was done by taking detailed history and physical examination of the affected site (inspection, palpation, active and passive range of movement were recorded) and X-ray of involved elbow antero-posterior & lateral view was done to achieve clinical diagnosis. Patients were assessed for pain in subjective manner (mild, moderate, severe).

**Selection of patients**-During years of study duration only 21 patients attending Orthopaedics OPD fulfilled all inclusion criterias but later on 18 patients came for regular follow up and were included in study.

**3. Results**

In this study total 21 patients with isolated displaced and comminuted radial head fractures without any ligamentous injury were included but 3 patients did not came for follow up, so total 18 patients were evaluated, Of these 18 patients, 14 were male(77.78%)and 4 (22.22%) were female.

**Table 1:** Age and sex distribution of patients

Age group(in years)	Number of cases	Male	Female
18-30	6	5	1
30-40	12	9	3
Total	18	14	4

**Table 2:** Distribution of patients according to gender

Gender	No. of cases	Percentage
Male	14	77.78%
Female	4	22.22%
Total	18	100%

**Table 3:** Distribution of patients according to side of the fracture

Side	No. Of cases	Percentage
Right	11	61.11%
Left	7	38.89%
Total	18	100%

**Table 4:** Distribution of patients by mode of injury

Mode of injury	No. of cases	Percentage
RTA	13	72.22%
Accidental fall	5	27.78%
Total	18	100%

**Table 5:** Distribution of patients according to type of fracture by Masons classification

Type of fracture	No. of patients	Percentage
Type 2	8	44.44%
Type 3	10	55.56%
Total	18	100%

**Table 6:** Distribution of patients according to interval between time of injury and time of surgery

Interval time	No. of patients	Percentage
< 1 week	3	16.67%
1-2 weeks	6	33.33%
2-3 weeks	5	27.78%
>3weeks	4	22.22%
Total	18	100%

**Table 7:** Distribution of patients according to post-operative wound complication

Complication	No. of patients	Percentage
Superficial infection	1	5.56%
Deep infection	0	0%

**Table 8:** Post-operative complications

Complications	No. of patients	Percentage
Infection	1	5.56%
Valgus instability	1	5.56%
Elbow stiffness	1	5.56%

**Table 9:** Elbow range of motion

Elbow range of motion (flexion –extension)	Number of patients
0 to 130	15
10 to 110	2
0 to 90	1
Total	18

**Table 10:** Pronation–Supination

Pronation	Number of patients	Supination	Number of patients
0 to 90	17	0 to 90	17
0 to 60	1	0 to 55	1
Total	18	Total	18

**Table 11:** Functional outcomes of patients according to MEPI-

Outcome	No. of Patients	Percentage
Excellent	9	50%
Good	5	27.78%
Fair	3	16.67%
Poor	1	11.11%
Total	18	100%

## Clinical Picture of Follow Up



**Pic:** Follow Up at 18 months (flexion)



**Pic:** Follow Up at 18 months (supination)



**Pic:** Follow Up at 18 months (Extension)



**Pic:** Follow Up at 18 months (pronation)

#### 4. Discussion

In this study 18 patients of isolated displaced and comminuted radial head fractures treated by radial head excision were included. Pre-operative and intra-operative details were taken as per performed proforma. Patients were followed up regularly for functional assessment in follow-up clinic at outpatient department. The collected data analyzed and compared with other studies.

In this study, average age of the patients was 31.44 years. Chen et al reported average age of 37 years<sup>8</sup>, Koslowsky et al reported average age of 38 years, Ikeda et al<sup>6</sup> reported average age of 41.1 years in the resection group and 38.2 years in the ORIF group, Karlsson MK et al<sup>7</sup> had a mean age of a mean age of 45 years. Hung-Yang Chien, et al<sup>16</sup> has a mean age of 38.62 years

In this study female patients were 22.22% (4) and male patients were 77.78% (14) Yalcinkaya et al<sup>9</sup> included 8 women and 5 men out of 13 cases. Yadav et al<sup>17</sup> had 80% male and 20% female in their study. Males were common (21 out of 29) in a study conducted by Meena et al<sup>12</sup>. Hung-Yang Chien, et al<sup>16</sup> had 30.72% female and 69.28 % male. There were 57 females (54%) and 48 males (46%) in Duckworth et al<sup>6</sup>.

Fracture radial head was 61.11% on right side and 38.89% on left side. Right side (53.3%) was more common in yadav et al<sup>17</sup>. Left side was commonly affected in Meena et al<sup>12</sup> (16 out of 29). Right side 53.85% was involved more in the study conducted by Hung-Yang Chien, et al<sup>16</sup>. 44.12% cases were of right side in Y.E. Akman et al<sup>13</sup>. Gonzalez Roldan CA20 et al. In their study of 44 patients with radial fractures found that out of these patients 30 (68.18%) patients had fractures on dominant side and 14 (31.82 %) patients had fractures on non- dominant side<sup>9</sup>.

In our study there was 44.44% of type 2 fractures and 55.56% of type 3 fractures. Meena PK et al. had 46.7% of



type 2 fractures and 53.3% type 3 fractures in the group of radial head resection where as Dr Prateek Yadav in his study found 36.6% of type 2 fractures and 63.3% of type 3 fractures.

Mode of injury in majority cases was RTA (72.22%) and accidental fall contributed to 27.78 %. Commonest mode of injury had been fall down with outstretched hand (53.33%) in yadav et al. Meena PK et al<sup>12</sup> found that RTA was the common mode of injury(16 out of 29). 84.62% cases were due to fall as found in Hung-Yang Chien, et al<sup>16</sup>. RTA caused 10.5% cases in Duckworth et al<sup>6</sup>. Mechanism of injury in majority of the patients with comminuted fracture of head of radius was found to be fall on outstretched hand (60%) followed by motor vehicular accidents (30%) and sports injury (10%) as stated in a study done by Dr. Abhijit M. Kadam and others<sup>16</sup>. Izzak F Kodde<sup>11</sup> in their overview of current concepts of the management of radial head fractures showed that fall on outstretched hand was found to be one the common mechanism of injury resulting in fractures of radial head. With increased motorization radial head fractures due to direct impact as a result of road traffic accidents is also becoming one of the common causes of these fractures.

Time interval (in weeks) between injury and surgery was < 1 week in 3 (16.67%) patients, 1-2 weeks in 6 (33.33%) patients, 2-3 weeks in 6 (27.78%) patients, > 3 weeks in 4(22.22%)patients. Surgery was done within 5 days of injury for 28 patients (83.3%) and 2 patients (6.7%) underwent surgery after 5 days in a study done by Dr. Prerak Yadav and Dr. Divyprasad Bamaniya in 2017.<sup>17</sup>

There was 1 (one) case of superficial wound infection which healed with oral antibiotic therapy. (5.56%). There was 25% infection rate in the study conducted by yadav et al. Kadam A M et al<sup>11</sup> found wound infection was (6.66%) Out of 18 patients 15 patients had elbow flexion upto 130 degrees and 2 patients ranging from 10 to 110 degree and 1 patient had elbow movement ranging from 0 to 90 degree

17 patients had pronation 0 to 90 degree and supination 0 to 90 degree and 1 patient had pronation 0 to 60 degree and supination 0 to 55 degree.

Only 1 patient (5.56%) had valgus instability in our study where as it was 16.6 % in yadav et al and (3.33%) in Kadam et al<sup>11</sup>. González-Roldán C A et al<sup>15</sup> in their study found there were four cases of valgus instability out of 44 patients (9.09%) 10 patients had mild to moderate pain at elbow which subsided after 1 year but 1 patient had mild chronic elbow pain (5.56%) which persisted till the end of our study. Thirty-nine patients (88.6%) had no elbow pain and in all other cases was mild or moderate as found by González-Roldán C A et al<sup>15</sup> in 2017

Out of 18 patients 9 had excellent outcome, 5 had good outcome, 3 had fair outcome and 1 had poor outcome in our study Based on the outcome of patients on the basis of MEPS scores it was found that 18 patients had excellent results (MEPS score more than 90) while 9 patients had good results (MEPS score between 75-89 ). Fair (MEPS score between 60-74) and poor (MEPS score less than 60)

results were found in 2 and 1 patients respectively in the study of Dr. Abhijit M. Kadam<sup>11</sup>. Results were rated as excellent in 5 elbows and good in 9 out of 13 patients in Yalcinkaya et al<sup>10</sup>. In the resection group of Akman Y E et al<sup>14</sup>, out of 15 patients 7 patients had excellent, 6 had good, and 2 had fair scores.

## 5. Conclusion

Debate exists in the treatment options of comminuted radial head fractures in young patients. But it is difficult to predict the outcome in excision or reconstruction or replacement of radial head in young patients in similar situation because the radial head contributes about 40% valgus stability of elbow. The goal of treatment in these type of fractures is correction of any block of forearm rotation, early range of motion with stability of forearm and elbow. Complications like pain, capital erosion, loosening and joint stiffness are known in radial head replacement in younger patients. Radial head excision is a simple surgical procedure and not as technically demanding as ORIF or radial head replacement and that early post operative motion can be permitted. Short term outcome of radial head excision in displaced and comminuted radial head fractures in young adults, yield good functional outcome as shown in this study. However in long term outcome there are chances of proximal migration of radius with chronic wrist pain and valgus deformity at elbow which contributes to the limitation of this study.

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## References

- [1] Rockwood C A, Green D P. Rockwood and Green's Fractures in Adults - 8e, section two, Upper Extremity: 1190-203.
- [2] Canale S T, Beaty J M. Campbell's operative orthopaedics - 12th edition, volume III, 2013, Elsevier Mosby, Philadelphia; 2870-71.
- [3] Shetty S K, Shetty A, Balan B, Ballal A, Rai H R, Hegde A. Excision Versus Fixation of the Radial Head: Comparison of Functional Outcomes. Journal of Clinical and Diagnostic Research. 2017 Feb, Vol-11(2): RC01-RC03.
- [4] Kodde I F, Kaas L, Flipsen M, Bekerom M P J v d, Eygendaal D. Current concepts in the management of radial head Fractures. World J Orthop. 2015 December 18; 6(11): 954-60.
- [5] Duckworth A D, Wickramasinghe N R, Clement N D, Court-Brown C M, McQueen M M. Radial Head Replacement for Acute Complex Fractures: What Are the Rate and Risks Factors for Revision or Removal?. Clin Orthop Relat Res (2014) 472:2136-2143.
- [6] Yoon A, King G J W, Grewal R. Is ORIF Superior to Nonoperative Treatment in Isolated Displaced Partial Articular Fractures of the Radial Head?; Clin Orthop Relat Res (2014) 472:2105-12.
- [7] Ikeda M, Sugiyama K, Kang C, Takagaki T, Oka Y. Comminuted fractures of the radial head. Comparison

- of resection and internal fixation. *J Bone Joint Surg Am.* 2006;87:76–84.
- [8] Karlsson M K,HerbertssonP, NordqvistA, HasseriurR, Besjakov J, Josefsson P O.Long-term outcome of displaced radial neck fractures in adulthood16–21 year follow-up of 5 patients treated with radial head excision; *Acta Orthopaedica* 2009; 80 (3):368–70.
- [9] DemirogluM,OzturkK,BaydarM,Kumbuloglu O F,SencanA,AykutS,KilicB.Results of screw fixation in Mason type II radial head fractures; *Demiroglu et al. SpringerPlus* (2016) 5:545.
- [10] Yalcinkaya M, Bagatur AE, Erdogan S, Zorer G. Resection arthroplasty for Mason type III radial head fractures yield good clinical but poor radiological results in the long term. *Orthopedics.* 2013 Nov;36(11):e1358ee1364.
- [11] Kadam A M, Khandekar A, Naik N , Patil S ,Deshpande S . Management of comminuted fracture of radial head by radial head excision and anconeus arthroplasty. *International Journal of Orthopaedics Sciences* 2018; 4(1): 308-312.
- [12] Kadam R, Sharma C, Pandhare S, Chhallani A, Gupta A, Sawant R . Functional outcome of radial head replacement in isolated radial head fractures. *International Journal of Research in Orthopaedics;* 2017 May;3(3):362-365.
- [13] Meena PK, Gaba S, Bobade S, Verma R, Borade A, Sonaje J, Chouhan A. Functional Outcome of Resection versus Reconstruction in Mason II-III Radial Head Fractures; A Short-Term Prospective Study. *Bull Emerg Trauma.* 2017;5(4):266-272. doi: 10.18869/acadpub.beat.5.4.453.
- [14] Akman Y E, SukurE, Circi E, Ozyalvac O N , Ozyer F , Ozturkmen Y . A comparison of the open reduction-internal fixation and resection arthroplasty techniques in treatment of Mason Type 3 radial head fractures. *Acta Orthopaedica et Traumatologica Turcica* 51 (2017) 118e122.
- [15] C.A. González-Roldán, A.M. Hidalgo-Ovejero, J. Ruiz-Ruiz, P. Mateo-Sebastián; Effects on the elbow of radial head resection following isolated radial head fracture in young patients; *An. Sist. Sanit. Navar.* 2017; 40 (2): 187-197.
- [16] Chien HY, Chen A CU, Huang JW, Cheng CY, Hsu KY. Short- to Medium-term Outcomes of Radial Head Replacement Arthroplasty in Posttraumatic Unstable Elbows: 20 to 70 Months Follow-up. *Chang Gung Med J* 2010;33:668-78.
- [17] Yadav P ,Bamaniya D. Short term outcome of patients with radial head fracture treated with operative management. *International Journal of Orthopaedics Sciences* 2017; 3(3): 320-327.