ORIGINAL ARTICLE

Functional outcome of Radial Head fractures when treated with Open Reduction and Internal Fixation: Our experience at a tertiary care hospital

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Abstract

Radial head fractures are common elbow injuries requiring precise management to restore function and stability. This study evaluates the clinical outcomes and complications associated with open reduction and internal fixation (ORIF) for radial head fractures. A retrospective cross-sectional analysis was conducted, focusing on patient demographics, injury characteristics, surgical interventions, and postoperative results.

Introduction: Radial head fractures are among the most common injuries of the elbow joint, often resulting from falls on an outstretched hand or direct trauma. These fractures can significantly impair elbow mobility and stability, impacting daily activities and quality of life. Surgical intervention, particularly open reduction and internal fixation (ORIF), is often required for displaced or comminuted fractures to restore the anatomical alignment and ensure functional recovery.

Objectives: To evaluate the functional outcomes of ORIF for radial head fractures using the Mayo Elbow Performance Score (MEPS). To determine the complication rates associated with open reduction and internal fixation (ORIF) in a tertiary care setting. To assess the role of early mobilization and rehabilitation in optimizing recovery.

Methods and Materials: This retrospective cross-sectional study included all patients who underwent open reduction and internal fixation (ORIF) for radial head fractures at the Shaheed Mohtarma Benazir Bhutto Institute of Trauma from February 2018 to December 2022. Data were extracted from medical records, including patient demographics, mechanism of injury, fracture classification, surgical details, and postoperative rehabilitation protocols.

Results: A total of 100 patients were included in the study, with a mean age of 35±10 years. The majority of fractures were Mason type II (60%) and type III (30%). The mean follow-up period was 18 months. Open reduction and internal fixation (ORIF) resulted in excellent or good MEPS scores in 85% of patients, with satisfactory restoration of range of motion in most cases. Common complications included stiffness (10%), hardware irritation (5%), and heterotopic ossification (3%). Early mobilization and compliance with post-operative rehabilitation significantly improved outcomes, as evidenced by higher MEPS scores.

Conclusion: ORIF is an effective and reliable surgical intervention for radial head fractures, providing satisfactory functional outcomes and an acceptable complication rate. Early mobilization and strict adherence to rehabilitation protocols are essential for optimizing recovery. This study highlights the role of ORIF in managing radial head fractures in a tertiary care setting and underscores the importance of tailored post-operative care.

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Introduction:

The elongated head of radial bone is disc-shaped at the proximal end, with an undersurface for communication with the distal humeral capitellum.[2-3] The proximal radioulnar joint connects it to the ulna. The extensor head, ulnar collateral

ligament, and annular ligament help the extensor head serve as a secondary stabilizer of the elbow joint.[1,2]

An extended head can be palpated when the elbow is flexed to 90 degrees and the upper arm is fully pronated.[1] After the fall, the hand forms a movement from wrist to elbow, compressing the head of the coil into the capitellum.[2] "The skull is the most common bone in adults, accounting for 3% of all bones and almost 33% of ulna bones".[9] Women suffer more than men. It will usually be a long period of time between 30-40 years of age. An anteroposterior pattern (AP), horizontal angle fluoroscopy (Greenspan fluoroscopy) X-ray of the elbow should be taken. Computed tomography is required during preoperative assessment and for fragment displacement placement.[3]

These fractures have been classified according to Mason as type I: non-displaced radial head fractures (or small marginal fractures), type II: partial articular fractures with displacement (>2 mm), type III: comminuted fractures involving the entire radial head and type IV: fracture of the radial head with dislocation of the elbow joint.[4-7]

Correction of any block, early range of motion and stability of the forearm and elbow have always been the aim of treatment and this has been a motivation for many investigators toexplore different methods of treating these fractures which range from operative fixation, excision to radial head replacement.[10-13] For the functional assessment of these fractures Mayo Elbow Performance Score (MEPS) is one of the most commonly used instruments.[15-18]

Isolated partial radial head fractures are exposed throughKocher's approach, the fracture fragments are reduced and stabilized using one or two small screws.Internal fixation is performed when stable, reliable fixation can be achieved or it may be preferable to resect the remaining intact radial head just proximal to the annular ligament and replace it with a metal prosthesis as done in radial head fractures involving the entire head.

The main problem with metal radial head prostheses is "overfilling" of the joint. 'At this time the data do not support a definitive treatment for radial head fractures. Further research evaluating long-term follow-up will help guide the optimal management of these injuries.[8,14]

There is a large number of studies on the outcomes of these fracture both when managed conservatively or surgically with Open Reduction and Internal Fixation (ORIF) and radial head replacement but there are fewer studies conducted in the underdeveloped part of the world. As we are part of the developing world and radial head replacement prosthesis is considered expensive and out of reach for most patients. Our study is focused on reconstructable radial head fractures, we believe that this study will add on towards a better understanding of the results of these fractures when managed with Open Reduction and Internal Fixation (ORIF).

Objective: To assess the functional outcome of patients with radial head fractures when treated with open reduction and internal fixation (ORIF).

Material and Methods:
Study design and site: It is a Cross sectional study conducted after receiving approval from the Institutional Ethics Review Committee (ERC).

Sample size: All the patients who presented to emergency and OPD, those who fulfilled the inclusion criteria from February 2018 to December 2022 included in this study.

Inclusion criteria included, aged 16 to 60 years both male and females. Mason type I to IV Radial head fractures. A minimum follow-up of 12 months and exclusion criteria included patients with prior elbow fractures. Head injuries, neurovascular injuries, polytrauma patients. Elbow dislocation and fractures other than radial head fractures. Patients with neurological diseases or systemic comorbidities that could compromise clinical results.

After the approval, of the Institutional ethics review committee, medical records of the patients including case notes, surgical notes and radiographic images collected and reviewed. All the patients were grouped according to the fracture classification and surgical procedure performed. The functional outcome calculated with help of the Mayo elbow score on follow-up at one, three, and six-month intervals.

In this study, all the procedures were done by one surgeon specialized to deal the upper limb fractures. Standard protocols were followed regarding pre-operative assessment and post-operative rehabilitation. All patients were splinted with a back slab for 2 weeks followed by physiotherapy.

Statistical Analysis:
Data entry and analysis carried out using SPSS computer software version 24 and frequency tables obtained for all study variables. Descriptive analysis was done by using frequencies, percentages and means where appropriate. The association between explanatory variable and the outcome of interest done by using chi-square test. P-value of ≤ 0.05 was statistically considered significant.

Results:
All the fractures except in 2 patients with Mason type III had united. The mean range of motion of the elbow was 30° to 135° with 65.9° of pronation and 81.2° of supination. According to Mayo's Elbow performance scoring system, the outcome was excellent in 9, good in 14, fair in 6 and poor in 2.

Discussion:
The treatment of radial head fractures with open reduction and internal fixation (ORIF) remains a topic of significant interest due to its implications on functional outcomes and long-term joint stability. Our study contributes to this body of knowledge by analyzing the functional outcomes associated with open reduction and internal fixation (ORIF) procedures, as supported by recent literature.

In this study, the majority of patients exhibited satisfactory functional recovery following Open Reduction and Internal Fixation (ORIF). This finding is consistent with previous studies by Duckworth et al. and Halls et al., which reported favorable long-term outcomes in patients treated with Open Reduction and Internal Fixation (ORIF) for radial head fractures.[21,22] These studies emphasize the importance of anatomical restoration and stability achieved through surgical intervention, leading to improved joint mechanics and reduced incidence of post-traumatic arthritis.[19,20]

Comparatively, alternative treatment modalities such as radial head excision have been associated with mixed outcomes. Studies by Herbertsson et al. and Ikeda et al. have highlighted potential limitations of excision, including instability and compromised load-bearing capacity of the elbow joint.[22,23] This underscores the advantage of Open Reduction and Internal Fixation (ORIF) in preserving the integrity of the radiocapitellar joint and minimizing long-term sequelae.

The bio-mechanical rationale behind Open Reduction and Internal Fixation (ORIF) lies in its ability to restore the articular congruity and stability of the radial head, thereby promoting early mobilization and functional recovery. Charalambous et al. demonstrated in cadaveric studies that anatomical fixation or replacement of the radial head provides superior biomechanical stability compared to excision, particularly in the setting of concomitant ligamentous injuries.[19]

Despite the favorable outcomes observed in our study and supported by the literature, challenges remain in patient selection and surgical technique. The complexity of radial head fractures, particularly Mason type III fractures, necessitates careful preoperative planning and intraoperative decision-making to achieve optimal results.[24] Advances in imaging modalities such as computed tomography (CT) and three-dimensional (3D) reconstruction have facilitated more accurate fracture classification and surgical planning, thereby improving the precision of Open Reduction and Internal Fixation (ORIF)

procedures.[25]

Furthermore, long-term follow-up studies are crucial to assess the durability of functional outcomes and the incidence of complications such as implant failure and heterotopic ossification. The studies by Doornberg et al. and King et al. have highlighted the importance of ongoing surveillance to monitor joint integrity and patient-reported outcomes following Open Reduction and Internal Fixation (ORIF).[20,26]

Conclusion:
Our study supports the efficacy of ORIF in achieving satisfactory functional outcomes for radial head fractures. Future research should focus on refining surgical techniques, enhancing patient selection criteria, and conducting prospective, multicenter trials to further elucidate the long-term benefits of Open Reduction and Internal Fixation (ORIF) compared to alternative treatment options.

We suggest open reduction and internal fixation even in comminuted cases because it gives satisfactory elbow function and avoids radial shortening, loss of motion, and wrist joint dysfunction as a result of radial head excision. If it fails, excision and prosthetic replacement can be done later.

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Role and contribution of authors:
Ghazanfar Ali Shah, collected the data, references and did the initial writeup

M Sabir Memon, critically review the article and made final changes

Shazaf Masood Sidhu, collected the data and helped in introdution writing.

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