Excision followed by Radial Head Arthroplasty: A Case Report

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Abstract- Any motion across the elbow requires an intact articulating radial head. With the rising trend in workouts, there is an increasing need to strengthen the elbow joint, whether for fine motor skills, dance forms, or heavy weightlifting. Literature indicates that approximately 90% of body weight can be transmitted across this joint. Fractures often occur when a patient falls onto an outstretched hand or when excessive axial load is transmitted from the wrist to the elbow joint. Most radial head displacements occur in children under five years old due to laxity in the supporting ligaments. This is followed by radial head dislocations associated with other forearm injuries in individuals during their third and fourth decades of life. Isolated occurrences of radial head fractures are rare, making pre-operative planning crucial when attempting to fix such fractures.

INTRODUCTION

The radial head is ellipsoid in shape and forms two distinct types of joints: a saddle-type joint at the radiocapitellar joint, which allows flexion and extension movements at the elbow, and a pivot-type synovial joint at the proximal radio-ulnar joint, which facilitates supination and pronation. Radial head fractures are common, accounting for one-third of all elbow fractures and approximately 1.5% to 4% of all fractures in adults. Typically, these fractures are associated with injuries to the osseous membrane, distal radial injuries (including distal radioulnar joint injuries), or Monteggia-type fractures. After dislocation, the radial head is prone to avascular necrosis (AVN) if fixation of the fractured or dislocated head is not performed. Its primary blood supply originates from the medial side of the radius through the nutrient artery, making the lateral part a watershed area that complicates fixation based on Mason's classification of fractures.

- Type I (un-displaced) can be managed conservatively.
- Type II with displacement ≥4mm, requires fixation via ORIF with Herbert screws or ORIF with T-plating after reduction using K-wires, followed by annular ligament repair.
- Type III necessitates radial head excision followed by arthroplasty.

Case:

A patient presented to the emergency department with a reported history of falling at work, sustaining injuries to her right elbow. She was diagnosed with comminuted radial head fractures with an intact ulna and proximal and distal radio-ulnar joints after a CT scan. The initial plan was to proceed with ORIF and Herbert screw fixation followed by annular ligament repair. A Kocher incision was made across the elbow, and extensor muscles were dissected distally until reaching the proximal incision margin. The safe zone for radial head fixation was identified. Reduction of the fracture was attempted using 1mm K-wires; however, fixation could not be achieved due to a step-off in the medial fragment observed in the AP view under C-arm guidance.

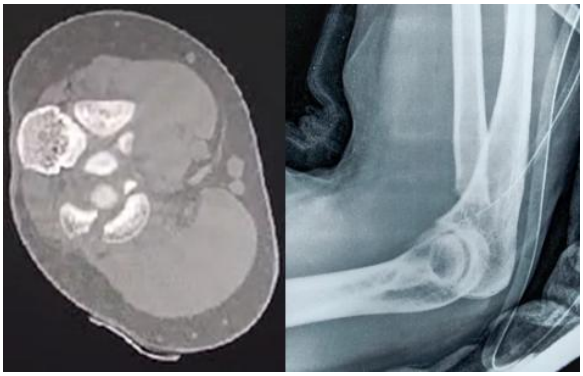

Fig.1 shows radial head fracture on admission

Fig.2 shows excision been done with slab in lateral position

Consequently, radial head excision was performed with a drain placed. Later, the patient underwent radial head arthroplasty through the same incision. The incision site remained clean with no gaping. The patient was placed in a supine position and fitted with

an above-elbow slab. Sutures were removed on postoperative Day 13 during an outpatient visit. The slab was discontinued after six weeks, and elbow range of motion exercises were initiated as tolerated. By three months post-surgery, the patient reported significant comfort while performing supination and pronation.

Fig. shows Full Range of movements at the right elbow joint

DISCUSSION

Radial head fractures, while relatively common among elbow injuries, present unique challenges in surgical decision-making, particularly when the fracture is comminuted and not amenable to open reduction and internal fixation (ORIF). The radial head plays a vital role not only in elbow joint stability but also in load transmission across the forearm, especially during pronation and supination. In complex injuries where anatomical reconstruction is not feasible, radial head excision followed by arthroplasty serves as a viable and often necessary treatment pathway to preserve joint function and prevent long-term complications.

In this case, the failure to achieve adequate reduction and stable fixation with K-wires necessitated a shift in the surgical approach. This decision aligns with the established guidelines for managing Mason type III fractures, where comminution and instability render conventional fixation techniques insufficient. Notably, radial head arthroplasty provides a mechanically stable alternative, helping restore valgus stability, especially in the presence of associated soft tissue injuries like annular ligament disruption.

Biomechanically, the radial head acts as a secondary stabilizer to valgus and axial loads. Its excision without replacement may predispose patients to valgus instability, proximal radial migration, altered wrist mechanics, and eventual development of arthrosis. Hence, immediate prosthetic replacement is advocated in such cases. In this patient, the use of a radial head prosthesis allowed for early mobilization and contributed to the preservation of forearm rotation, which is essential for day-to-day activities like writing, lifting, and driving.

The postoperative outcome in this case mirrored results from various clinical studies. The referenced retrospective study of seven patients demonstrated full range of motion and proper implant alignment, underscoring the reproducibility of good outcomes with meticulous surgical technique. Moreover, the long-term survivorship data from the 114-elbow study provides compelling evidence supporting the durability and efficacy of radial head prostheses in complex fracture scenarios. An average Mayo Elbow Performance Score of 88 at ten years suggests that the procedure not only restores functional range but also ensures sustained patient satisfaction.

Further supporting evidence from the literature highlights that early rehabilitation following arthroplasty contributes significantly to favorable outcomes. As seen in the present case, elbow mobilization commenced six weeks postoperatively, resulting in near-complete functional restoration by three months. Avoiding prolonged immobilization helps minimize stiffness—a common postoperative complication in elbow surgeries.

Nonetheless, RHA is not without potential complications. Issues such as implant loosening, overstuffing (leading to limited range of motion or capitellar wear), and heterotopic ossification must be anticipated. Thus, careful implant selection, appropriate sizing, and precise surgical execution are imperative to maximize outcomes.

This case also brings attention to the importance of intraoperative decision-making. While the initial plan involved ORIF, the inability to achieve stable fixation necessitated a prompt pivot to excision and prosthetic replacement—emphasizing the need for surgeons to be flexible and well-versed in multiple surgical modalities for radial head management.

CONCLUSION

Radial head arthroplasty represents a reliable and effective option for managing unreconstructable radial head fractures. It restores elbow kinematics, enables early motion, and reduces the likelihood of long-term degenerative changes. This case exemplifies successful adaptation to intraoperative challenges and

reaffirms the clinical value of RHA in complex fracture settings.

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