ORIGINAL RESEARCH PAPER
Volume - 15 | Issue - 02 | February - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

RADIAL HEAD ARTHROPLASTY IN A TERRIBLE TRIAD INJURY OF THE ELBOW: A CASE REPORT AND REVIEW OF SURGICAL PRINCIPLES

Orthopaedics

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ABSTRACT

Introduction: Terrible triad injuries of the elbow—comprising elbow dislocation, radial head fracture, and coronoid fracture—are complex injuries associated with instability and poor functional outcomes. Radial head arthroplasty is indicated when the radial head fracture is unreconstructible. We report the case of a 36-year-old male who sustained a terrible triad injury following a fall on an outstretched hand. Imaging revealed a comminuted Mason type III radial head fracture, a Regan–Morrey type II coronoid fracture, and posterolateral elbow dislocation. The patient was treated with radial head arthroplasty, coronoid fixation, and lateral collateral ligament repair. **Results:** At 12 months follow-up, the patient achieved a stable, painless elbow with a flexion–extension arc of 110°, a MEPS score of 95 (excellent/good), and no radiological signs of implant loosening or instability. **Conclusion:** Radial head arthroplasty, as part of a standardized surgical protocol, provides satisfactory functional and stability outcomes in terrible triad elbow injuries with unreconstructible radial head fractures.

KEYWORDS

Terrible Triad, Radial Head Arthroplasty, Elbow Instability,

INTRODUCTION

Terrible triad injuries of the elbow consist of a posterior elbow dislocation associated with fractures of the radial head and coronoid process. These injuries are inherently unstable due to osseous and ligamentous disruption and historically have been associated with poor outcomes, including stiffness, recurrent instability, and post-traumatic arthritis.

The radial head plays a critical role as a secondary stabilizer against valgus stress and axial loading, particularly in the presence of ligamentous injury. In cases where the radial head fracture is severely comminuted and not amenable to open reduction and internal fixation, radial head arthroplasty is recommended to restore stability and allow early mobilization.

The severity of injury is commonly described using established classification systems, including the Mason classification for radial head fractures and the Regan–Morrey classification for coronoid process fractures, which aid in guiding treatment decisions and prognostication.

This case report describes the management and 12-month clinical and radiological outcome of a terrible triad injury in a young adult, classified according to standard injury systems, treated with radial head arthroplasty as part of a comprehensive surgical reconstruction

Fig 1 Terrible Triad

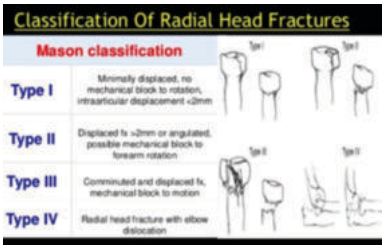

Fig 2 Mason Classification of Radial Head Fracture

Case Presentation

A 36-year-old right-hand-dominant male presented to the emergency department following a fall onto an outstretched right hand during a road traffic accident. He complained of severe pain, swelling, and deformity of the right elbow.

There was no history of previous elbow injury, chronic illness, or neurovascular disease.

On examination: The elbow was swollen and deformed, held in slight flexion. Active and passive movements were markedly restricted due to pain. Neurovascular examination revealed intact radial, median, and ulnar nerve function, with palpable distal pulses.

Plain radiographs Revealed:

- Posterolateral elbow dislocation
- Comminuted radial head fracture with elbow dislocation (Mason type IV)
- Coronoid Process Fracture (Regan–Morrey type II)

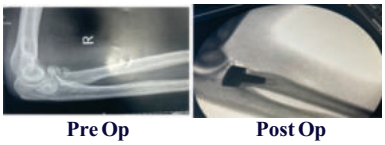

Fig 3: **Pre Op** **Post Op**

Surgical Management

Indication: Given the unstable injury pattern and unreconstructible radial head fracture, operative management was planned.

Surgical Technique

Surgery was performed under general anesthesia with the patient in the supine position and the arm placed on a radiolucent table using a lateral (Kocher) approach.

The comminuted radial head fragments were excised and replaced with a press-fit modular metallic radial head prosthesis. Trial implants were used to ensure appropriate sizing and to avoid overstuffing. The associated coronoid fracture was repaired using a suture lasso technique through the lateral approach, followed by ligament repair and intraoperative assessment of elbow stability. The wound was closed in layers, and a posterior splint was applied.

Fig 4 :
1. KOCHER approach
2. Radial head excised
3. Radial head prosthesis
4. Implant set

Postoperatively, the elbow was immobilized in a posterior splint for 7 days and then transitioned to a hinged elbow brace. Early supervised active-assisted range-of-motion exercises were initiated, and indomethacin was prescribed for 3 weeks for heterotopic ossification prophylaxis.

Outcome and Follow-Up

At 12-month follow-up, the patient reported no pain or instability and had returned to daily activities without limitation. Clinical outcomes showed a flexion–extension arc of 10°–120° and pronation–supination of 80°/85°, with a MEPS of 95 (excellent) and a DASH score of 8. Radiographs demonstrated a well-aligned radial head prosthesis without loosening, overlengthening, radiocapitellar arthrosis, heterotopic ossification, or other complications such as elbow stiffness, instability, infection, or ulnar neuropathy were observed.

DISCUSSION

Successful management of terrible triad injuries requires restoration of both bony and ligamentous stabilizers. The radial head plays a pivotal role in elbow stability, especially in the presence of ligament disruption. Radial head arthroplasty is preferred over excision or fixation in unreconstructible fractures, particularly in young, active patients. Correct implant sizing and meticulous ligament repair are critical to avoid complications such as overstuffing and instability. The excellent functional outcome observed in this case with radial head arthroplasty as part of terrible triad reconstruction.

CONCLUSION

Radial head arthroplasty combined with coronoid fixation and lateral collateral ligament repair provides excellent stability and functional recovery in terrible triad elbow injuries with unreconstructible radial head fractures. At 12 months follow-up, our patient achieved an excellent clinical and radiological outcome

Conflict of Interest: None to Declare
Source of Funding: Nil

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