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Case Report

Traumatic pure radiocarpal dislocation: a rare case report

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ABSTRACT

Radiocarpal joint dislocation is an extremely rare wrist injury, accounting for less than 1% of all traumatic wrist presentations. These injuries usually result from high-energy trauma and are frequently associated with severe ligamentous disruption, distal radioulnar joint (DRUJ) instability, or fractures. Early diagnosis and appropriate management are crucial to prevent long-term functional impairment. We report a case of a male patient who presented with severe wrist pain, swelling, and restricted movement one day following a road-traffic accident. Radiographic evaluation revealed dorsal radiocarpal dislocation (RCD) without associated fractures. Magnetic resonance imaging confirmed a pure ligamentous RCD with DRUJ instability. The patient was treated with closed reduction followed by percutaneous K-wire fixation of the radiocarpal joint and DRUJ. Immobilization was maintained for six weeks, after which progressive physiotherapy was initiated. At three-month follow-up, the patient was pain-free with significant improvement in wrist range of motion and grip strength. Follow-up radiographs demonstrated maintained radiocarpal alignment without evidence of subluxation or instability. Pure RCD is a rare but potentially disabling injury. Prompt diagnosis, early reduction, and appropriate stabilization are essential for favorable outcomes. Percutaneous K-wire fixation provides adequate stability in ligamentous injuries with persistent instability, while early rehabilitation is vital for optimal functional recovery.

Keywords: Radiocarpal dislocation, DRUJ instability, Wrist trauma, K-wire fixation, Ligament injury

INTRODUCTION

Radiocarpal dislocation (RCD) represents one of the rarest injuries of the wrist, comprising less than 1% of traumatic wrist injuries. These injuries are typically caused by high-energy mechanisms such as road-traffic accidents, falls from height, or industrial trauma. Diagnosis may be delayed or missed due to significant swelling, overlapping bony structures, and subtle radiographic findings.

Advances in imaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI) have improved diagnostic accuracy by enabling detailed assessment of ligamentous injuries and DRUJ involvement. Several classification systems have been proposed, including the Dumontier classification; however, treatment strategies remain heterogeneous owing to the rarity of the condition and lack of high-level evidence.[1]

We present a case of pure ligamentous RCD with associated DRUJ instability managed successfully with closed reduction and percutaneous K-wire fixation, along with a contemporary review of relevant literature.

CASE REPORT

A male patient presented to the emergency department with acute right wrist pain, swelling, and deformity following a road-traffic accident (motorcycle versus car).

The pain was severe, throbbing in nature, and aggravated by wrist movements. There was no history of prior wrist injury.

Clinical examination

Inspection

On inspection, there is diffuse swelling visible around the wrist.

Palpation

Palpation reveals marked tenderness localized over the radiocarpal joint and the distal ulna.

Range of motion

The patient's range of motion is severely restricted across all planes of movement.

Neurovascular status

The neurovascular status of the extremity remains intact, with no signs of sensory or circulatory deficit.

Grip strength

The patient's grip strength is significantly reduced, appearing secondary to acute pain.

Figure 1 (A and B): Plain radiographs show AP view and lateral view.

Imaging

Plain radiographs

Demonstrated dorsal displacement of the carpus relative to the distal radius without associated fractures.

MRI

Confirmed pure ligamentous RCD with disruption of the dorsal radiocarpal ligaments and associated DRUJ instability.

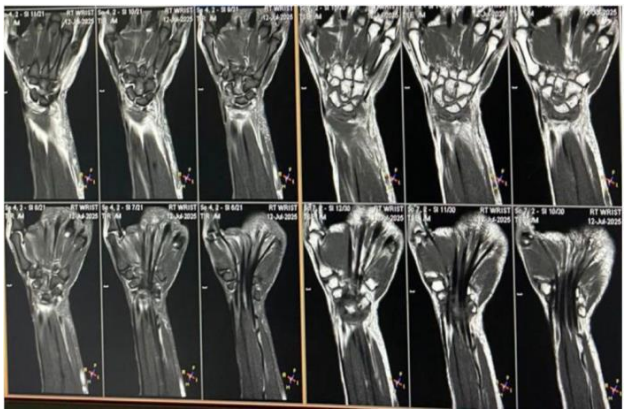

Figure 2: MRI.

Based on these findings, the injury was classified as Dumontier type I RCD.

Treatment

Under regional anesthesia, closed reduction of the radiocarpal joint was achieved. Due to residual instability, percutaneous K-wire fixation was performed across the radiocarpal joint. Additional K-wire stabilization of the DRUJ was carried out to address the associated instability. The wrist was immobilized in a below-elbow plaster cast.

Figure 3 (A and B): Post op X-rays shows AP view and lateral view.

Follow-up and outcome

Immobilization was maintained for six weeks, following which the K-wires were removed. A structured physiotherapy program focusing on gradual mobilization and strengthening was initiated.

At six-month follow-up the patient was pain-free. Wrist flexion, extension, ulnar deviation were achieved grip strength had significantly improved. Radiographs confirmed stable radiocarpal alignment without subluxation.

Figure 4.

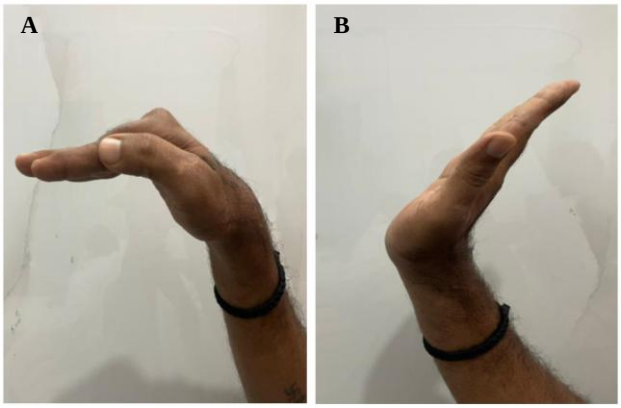

Figure 5 (A and B): 6 month follow up, flexion and extension.

Figure 7: 6 month follow up, ulnar deviation.

Figure 8 (A and B): 6 month postop x-ray shows AP view and lateral view.

DISCUSSION

RCD is an uncommon but severe wrist injury, accounting for less than 1% of all traumatic wrist injuries. Owing to its rarity and frequent association with ligamentous disruption and DRUJ instability, delayed diagnosis and suboptimal management can result in poor functional outcomes. Recent systematic reviews have emphasized the heterogeneity of injury patterns and treatment strategies reported in the literature.[1]

RCDs typically result from high-energy trauma such as road-traffic accidents or falls from height, leading to extensive ligamentous failure around the radiocarpal joint.[1,2] While fracture-dislocations are more commonly reported, pure ligamentous RCDs are exceedingly rare and often unstable. Bamal et al highlighted that many radiocarpal injuries do not fit neatly into traditional classifications, advocating an injury-pattern-based approach that considers ligament disruption, carpal alignment, and associated DRUJ involvement.[3]

DRUJ instability is increasingly recognized as a critical component influencing outcomes in RCDs. Ghaffari et al demonstrated that pure ligamentous RCDs frequently coexist with DRUJ instability, particularly in the presence of pre-existing ulnar variance or impingement.[6] Failure to identify and stabilize the DRUJ can result in persistent pain, loss of forearm rotation, and late instability. In our case, MRI played a pivotal role in detecting DRUJ involvement, enabling comprehensive stabilization.

Modern imaging modalities have significantly improved diagnostic accuracy. MRI allows detailed evaluation of dorsal and volar radiocarpal ligaments, the triangular fibrocartilage complex (TFCC), and DRUJ stability, while CT aids in identifying subtle fractures and carpal malalignment.[2,4] Patel et al proposed modifications to existing classification systems to incorporate combined radiocarpal and forearm injuries, underscoring the

limitations of older classifications such as Dumontier in capturing the full spectrum of injury patterns.[7]

Early reduction and stabilization remain the cornerstone of management. Systematic reviews and contemporary series recommend initial closed reduction followed by stabilization when instability persists.[1,4] Percutaneous K-wire fixation offers a minimally invasive and effective method for maintaining radiocarpal congruity, particularly in pure ligamentous injuries.[4,6] Open reduction and ligament repair are generally reserved for irreducible dislocations, gross instability, or associated fractures.[2,8]

Holzach et al and Richey et al reported improved functional outcomes when both the radiocarpal joint and DRUJ are stabilized early, followed by structured rehabilitation.[4,9] Arthroscopy-assisted evaluation and repair are gaining popularity in specialized centers; however, resource availability and surgeon expertise influence treatment choice.

Long-term outcomes depend on timely diagnosis, restoration of joint alignment, and maintenance of stability during healing. Sánchez-Mancisidor et al reported that delayed or inadequate stabilization is associated with chronic pain, stiffness, and post-traumatic arthritis.[5] Early mobilization following adequate stabilization is essential for regaining wrist motion and strength. In the present case, closed reduction with percutaneous radiocarpal and DRUJ fixation resulted in excellent short-term functional recovery, consistent with outcomes reported in recent literature.[1,6,9]

This case reinforces the importance of maintaining a high index of suspicion for RCD following high-energy wrist trauma. Comprehensive imaging, recognition of associated DRUJ instability, and individualized stabilization strategies are essential to optimize outcomes. Our management aligns with contemporary evidence supporting early stabilization of both the radiocarpal joint and DRUJ in pure ligamentous dislocations.

Current treatment trends

Contemporary management emphasizes early stabilization: Closed reduction as the initial step, percutaneous K-wire fixation for persistent instability. Ligament repair or arthroscopy-assisted intervention in selected cases.

Early fixation of both the radiocarpal joint and DRUJ has been associated with improved functional outcomes. Our treatment approach aligns with current recommendations advocating stability restoration followed by early controlled rehabilitation.

CONCLUSION

Radiocarpal dislocation is a rare but serious wrist injury requiring a high index of suspicion. Early diagnosis, appropriate imaging, prompt reduction, and adequate stabilization are essential for optimal outcomes. Closed reduction with percutaneous K-wire fixation remains an effective treatment for pure ligamentous injuries with instability. Early physiotherapy following immobilization plays a crucial role in functional recovery.

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