RESEARCH PAPER

TREATMENT OF ACUTE LUNATE DISLOCATION BY CLOSED REDUCTION AND CASTING: A CASE REPORT

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ABSTRACT

Background: Lunate dislocation is an uncommon, high-energy traumatic wrist injury. Due to its rarity, misdiagnosis or delayed treatment is common and frequently leads to poor functional outcomes, median nerve compression, and chronic joint dysfunction.[1,2] While open reduction and surgical repair of disrupted ligaments are typically performed in most cases to prevent long-term dysfunction, early-diagnosed acute dislocations may benefit from a conservative approach after stable closed reduction.[3-6]

Case Description: A 28-year-old male physical education teacher presented to the emergency department with acute pain, swelling, and median nerve paresthesia over the right wrist following trauma. Radiographic evaluation confirmed a diagnosis of acute volar lunate dislocation (Mayfield Stage 4 carpal instability).[3] Under general anesthesia, successful closed reduction was achieved using Tavernier's method.[7] With satisfactory intraoperative stability, a below-elbow cast was applied for three weeks, and oral methylcobalamin therapy was initiated. The patient's tingling sensation completely resolved over the first two weeks. At the 3-month follow-up, the patient experienced no pain at rest, demonstrated an exceptional extension/flexion range of 90°-0°-75° and pronation/supination range of 90°-0°-90°, and successfully resumed his professional duties.

Conclusion: Closed reduction and casting offer a highly viable, less invasive alternative treatment format for acute, early-diagnosed lunate dislocations when stable anatomical reduction can be promptly achieved.[9,10]

Keywords: Lunate Dislocation, Closed Reduction, Carpal Instability, Tavernier's Method, Case Report

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INTRODUCTION

Lunate and perilunate dislocations are uncommon but severe carpal injuries resulting from high-energy wrist trauma, typically involving forced hyperextension, ulnar deviation, and intercarpal supination. These injuries represent severe ligamentous disruptions and correspond to the final stage (Stage 4) of carpal instability as classified by the Mayfield criteria.[3] Because of their rarity and the complex anatomy of the carpal rows, approximately 25% of these cases are initially overlooked or misdiagnosed in emergency care settings.[4]

Figure 1: Mayfield Classification of Carpal Instability demonstrating the progressive progression from Stage 1 (Scapholunate dissociation) to Stage 4 (Volar lunate dislocation).

A delayed diagnosis or mismanaged treatment frequently leads to severe, irreversible long-term complications, including avascular necrosis of the lunate (Kienböck's disease), persistent median nerve compressive neuropathy, chronic instability, and advanced osteoarthrosis of the wrist joint.[2,4,8] While standard orthopedic consensus often favors early open reduction and direct internal surgical repair of the disrupted ligaments to secure stability and prevent joint dysfunction, certain acute, cleanly displaced injuries caught early can be successfully managed through conservative means.[5,6,9] This case report highlights the successful clinical management and excellent 3-month functional recovery of an acute volar lunate dislocation using closed reduction via Tavernier's method followed by standard cast immobilization.[7]

CASE DESCRIPTION

A 28-year-old male physical education teacher presented to the emergency department presenting with severe acute pain and mechanical swelling over his right wrist following a high-impact traumatic event. The physical presentation was accompanied by a clear tingling sensation and paresthesia along the palmar aspect of the hand, conforming exactly to the sensory innervation zone of the median nerve. On clinical examination, gross edema and visible deformity of the wrist architecture were noted, with immediate limitation of motion due to severe pain.

Standard radiographic imaging of the right wrist revealed a total volar displacement and rotation of the lunate, establishing a definitive diagnosis of acute isolated lunate dislocation (Mayfield Stage 4).[3]

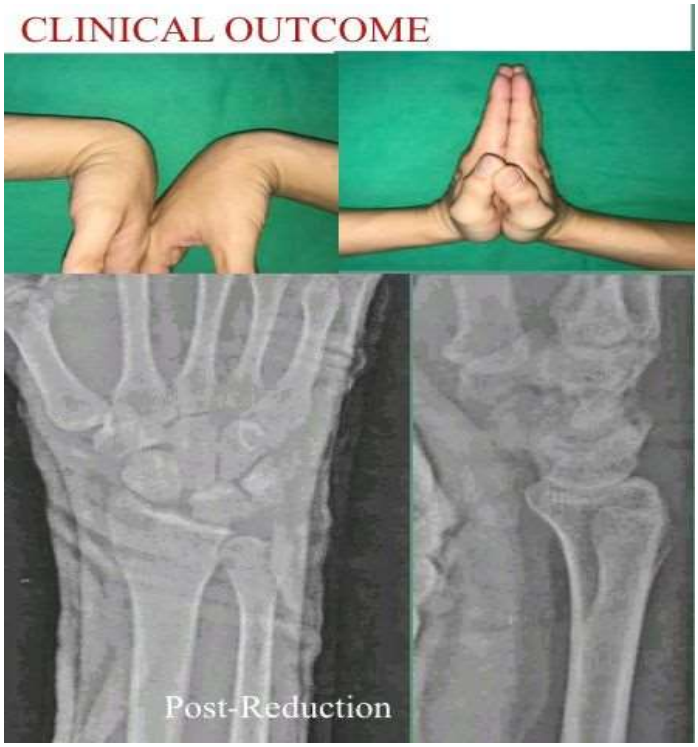

Figure 2:Pre-operative radiographs (Anteroposterior and Lateral views) showing total volar displacement and clear displacement of the lunate bone from the carpal architecture.

Therapeutic Intervention and Progress

The patient was immediately transferred to the operating theater. Under general anesthesia to achieve complete muscle relaxation, a closed reduction maneuver was performed utilizing Tavernier's method.[7] This involved applying steady, controlled longitudinal traction combined with specialized manual counter-pressure over the volar aspect of the displaced lunate to guide it back into its anatomical position within the carpal nest. Following the reduction maneuver, the wrist joint was clinically and fluoroscopically evaluated, demonstrating optimal alignment and satisfactory mechanical stability.[10]

A protective below-elbow plaster cast was applied to maintain immobilization for a duration of three weeks. To support neurological recovery and reduce the compressive median nerve symptoms,

concurrent treatment with oral methylcobalamin was initiated.[9]

The patient tolerated the intervention and subsequent immobilization smoothly. Notably, the median nerve paresthesia and associated tingling sensations gradually and fully resolved over the first two weeks post-reduction. The below-elbow cast was removed at the end of the third week, and the patient was immediately transitioned into a structured, progressive physical rehabilitation protocol.

At the formal 3-month follow-up evaluation, the patient reported being completely pain-free at rest, with only occasional mild discomfort during heavy physical exertion. Objective clinical metrics at 3 months revealed an exceptional range of motion (ROM) of the right wrist:

- **Extension / Flexion range**: 90° – 0° – 75°
- **Pronation / Supination range**: 90° – 0° – 90°

Figure 3: Clinical outcomes and Post-Reduction radiographs at follow-up. Top: Outstanding extension, flexion, and symmetry during the prayer/Namaste sign. Bottom: Successful alignment and stable anatomical reduction on AP and Lateral X-rays.

This complete functional recovery allowed the patient to fully resume his demanding professional duties as a physical education teacher and perform all regular activities of daily living without restriction.

DISCUSSION

The management of lunate and perilunate dislocations remains a significant therapeutic challenge due to their infrequent presentation and a high baseline risk for chronic functional morbidity. The absolute primary goals of treating carpal instability include achieving perfect anatomical reduction, ensuring adequate ligamentous healing, stabilizing any associated fractures, and providing robust support to the carpal architecture.[4,5]

Surgical strategies vary widely depending on the injury chronicity and surgeon

preference. Volar, dorsal, or combined surgical approaches are frequently utilized. While some researchers advocate for direct dorsal approaches based on the common rotation profiles of the lunate, modern clinical studies show highly comparable outcomes across different approaches, indicating that selection is largely guided by specific injury configuration and surgeon preference.[4,8]

In this specific case, utilizing Tavernier's method for closed reduction under general anesthesia achieved immediate anatomical restoration.[7] Followed by a concise 3-week casting duration and targeted neurotrophic support with methylcobalamin, this closed approach yielded an excellent 3-month outcome, characterized by a highly satisfactory, pain-free range of motion and full professional re-integration. It demonstrates that for acute, early-diagnosed, and stable carpal disruptions, a non-operative approach remains a powerful alternative that completely bypasses surgical scar tissue formation, surgical site risks, and severe post-operative stiffness.[9,10]

CONCLUSION

Acute lunate dislocations are orthopedic emergencies that require immediate clinical identification and prompt structural restoration. Closed reduction combined with an optimized casting timeline offers a safe, highly effective, and minimally invasive alternative treatment strategy for early-diagnosed, stable acute lunate dislocations, producing superb functional recovery and rapid symptom relief.[9,10]

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