CASE REPORT OPEN ACCESS

Closed K-Wire Fixation for the Treatment of Peri-Lunate Dislocation – A Case Series

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ABSTRACT

Perilunate dislocations and trans-scaphoid perilunate fracture dislocations are serious wrist injuries with the potential for lasting dysfunction if not treated appropriately. This case series presents three male patients with perilunate injuries treated using closed Kirschner wire fixation techniques in 2024. Each case involved varying levels of complexity and timing of presentation. One patient presented three weeks post-injury with a high palmar dislocation and underwent volar open reduction with ligament repair and K-wire stabilization. Another patient arrived within hours of a traffic accident and received closed reduction and percutaneous pinning within 24 hours. The third case involved a combined radial styloid and scaphoid fracture with lunate dislocation, managed using a dual surgical approach with internal fixation and ligamentous repair. These cases highlight the importance of timely diagnosis, injury-specific surgical planning, and the utility of K-wire fixation as a stabilizing method. Early intervention and tailored surgical techniques contribute to favorable outcomes in managing complex wrist injuries.

Keywords: Closed K-Wire Fixation, Peri Lunate Dislocation, Volar approach, Case series.

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INTRODUCTION

Perilunate dislocations and trans-scaphoidas perilunate fracture dislocations are rare but severe wrist injuries that may result in long-term dysfunction if not managed promptly. Accurate diagnosis and early surgical intervention are critical for restoring wrist stability and function[1]. Treatment options include closed reduction with Kirschner wire fixation, open reduction with internal fixation, and ligament repair [2]. Closed techniques have shown good outcomes in appropriate cases [3], while complex injuries benefit from volar or combined surgical approaches that allow repair of key ligaments such the scapholunate and lunotriquetral[4]. This study presents cases treated with tailored Kirschner wire fixation techniques.

CASE PRESENTATION

A single retrospective analysis of three male patients with perilunate or fracture dislocations received different operative treatments in the year 2024 at the tertiary care hospital, Karachi.

Case 1:

At the outpatient department, a 45-year-old male sought treatment for left wrist pain along with reduced movement. The patient previously experienced a motorcycle road traffic accident (RTA), which happened three weeks before his current condition emerged. When the incident occurred, the patient developed considerable swelling alongside complete wrist immobilization in his left hand. He responded to his injuries by visiting a bone setter who wrapped his wound and completed traditional medical practices. The medical expert told him to modify the duration of his dressing application to two days each time. The patient underwent numerous dressing changes during three weeks, but his wrist pain remained unchanged, as did his wrist movement capability.

The pictures taken at the OPD showed that the wrist had a high palmar perilunate dislocation. The lunate bone could be felt through examination during patient palpation on the forearm's volar surface, 4 centimeters above the wrist. Surgery proceeded through an open approach on the front side of the patient. Medical teams put the lunate bone into its proper anatomical placement before restoring function and repair to the scapholunate and lunotriquetral ligaments. Doctors placed a 2 mm Kirschner wire for ligament healing to achieve stabilization **Figure 1.** Wearing the wrist stabilizing back slab for four weeks helped with both immobilization and recovery.

Figure 1 A: Intraoperative Photograph Showing the Volar Approach for Lunate Reduction and Ligament Repair in Case 1

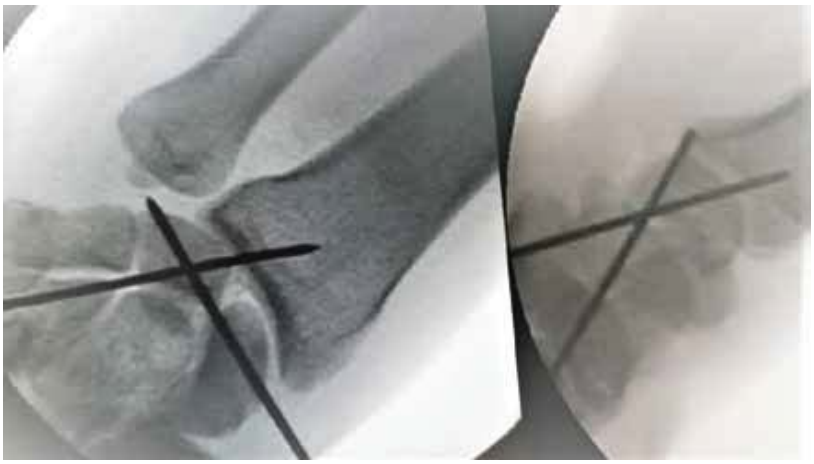

Figure 2 B: Intraoperative Radiographs Displaying K-Wire Fixation of the Lunate Following Closed Reduction in Case 2 (Lateral and Oblique Views)

Case 2:
A male aged 35 entered the emergency department four hours following his road traffic accident. During his assessment at the emergency department, the patient demonstrated extensive wrist pain while displaying wrist dislocation symptoms. Additional imaging tests validated the dislocation of the lunate bone. The healthcare team in the ED tried to perform sedated manual reduction, but it failed to correct the fractionated alignment. Medical staff scheduled a reduction under general anesthesia for the next day after the injury occurred, which amounted to less than 24 hours after the incident.

The technical procedure for closed reduction became successful after administering general anesthesia on the subsequent day. Doctors relocated the lunate to its proper position by manipulating it manually. Kirschner (K)-wires were used for stabilizing the lunate by maintaining proper bone alignment. The K-wires performed their essential role of lunate stabilization but still permitted surrounding ligaments to heal **Figure 2**.

The doctors placed the patient under general anesthesia and then used a cast across the wrist for 4–6 weeks. The patient received instructions to get X-rays periodically for checking the stability and complications related to K-wire placement at the surgical sites. The planned rehabilitation protocol began after immobilization for a progressive recovery of wrist movement and strength.

Figure 2 A: Preoperative Radiographs of the Right Wrist (Anteroposterior and Lateral Views) Showing Perilunate Dislocation in a 35-Year-Old Male Patient (Case 2)

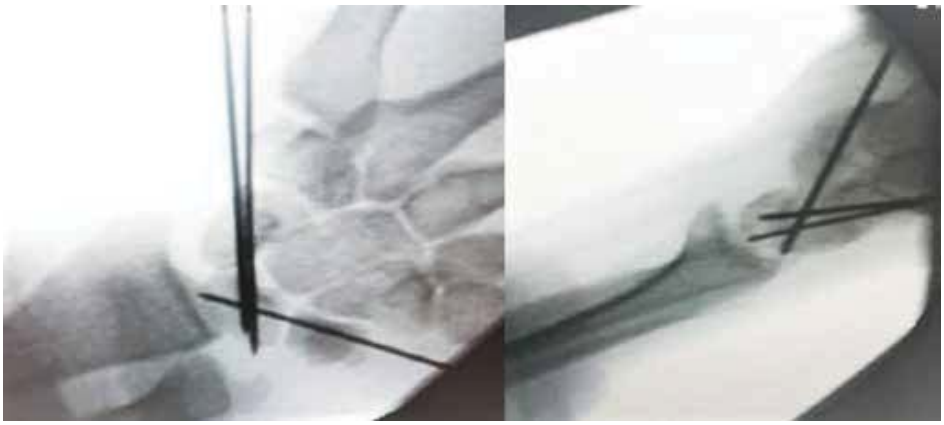

Figure 2 B: Post-operative Radiographs of the Right Wrist (Lateral Views) Illustrating K-Wire Fixation After Successful Closed Reduction and Lunate Realignment in Case 2

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Case 3:

The patient, a 32-year-old male, came to the emergency department (ED) because of right wrist pain caused by his motorcycle accident, which happened 28 hours earlier. During the accident, the patient reported a slip incident that caused his wrist to swell and hurt. The first clinical check demonstrated possible wrist fractures or dislocations affecting the wrist area. The obtained X-ray exams revealed multiple wrist injuries with fractures at the right radial styloid and scaphoid waist area, while also showing lunate dislocation. The exact nature of injuries, together with an essential requirement for exact realignment and stabilization, led to the surgical scheduling for the upcoming day.

The operation required dual incisions on the wrist's back and front to treat all injury components securely. The volar approach served to fix the scaphoid fracture with this same 3.5 mm screw insertion. The 3.5 mm screw achieved stability for treating the scaphoid waist fracture. To restore wrist stability, the surgeon placed the lunate into its correct position before repairing the lunotriquetral ligament to maintain normal wrist function.

A Kirschner wire was used for stabilization of the radial styloid fracture to maintain proper fracture alignment **Figure 3**. A volar dorsal back slab was implemented to place the wrist in its functional "glass-holding" position while protecting the healing structures of the wrist. The back slab needed to be worn by the patient for six weeks until they started their rehabilitation plan to improve wrist range of motion and strength. The patient received regular postoperative radiographic examinations in addition to checks to monitor lunate stability and fracture healing progress. A detailed physical therapy schedule existed for the end of immobilization to help patients regain wrist abilities gradually. The authors followed the PROCESS Guideline 4 to present their reported case study.

Figure 3 (Top): Preoperative Radiographs of the Right Wrist (Anteroposterior View) Demonstrating Radial Styloid and Scaphoid Fractures with Lunate Dislocation in a 32-Year-Old Male Patient (Case 3)

The study demonstrates how purpose-made surgical interventions provided effective treatment solutions for perilunate dislocations and trans-scaphoid perilunate fracture dislocations in three patients. The first patient received open volar treatment involving lunate relocation and scapho-lunate and lunotriquetral ligament repair and K-wire fixation stabilization for high palmar perilunate dislocation treatment. Successful recovery outcomes came from immobility during post-operative care. The patient developed a lunate dislocation that was diagnosed during the fourth hour after sustaining their wrist trauma. The procedure involved an open reduction, together with underwater general anesthesia, along with K-wire fixation to resolve the issue. Such early involvement with successful stabilization produced beneficial results.

Doctors employed both dorsal and volar approaches to treat this third case because it required treating a fracture at the radial styloid while fixing both the scaphoid waist fracture and lunate dislocation. The patient received treatment of lunate ligament repair alongside K-wire stabilization for the radial styloid fracture and scaphoid fracture screw fixation. Wrist functionality recovery happened through rehabilitation after patients received immobilization. The obtained results demonstrate that treatment approaches should depend on specific injury patterns to achieve optimal results. Open reduction followed by ligament repair results in optimal outcomes for delayed diagnoses, yet delayed reduction with K-wire stabilization provides good results for early isolated cases, whereas comprehensive treatment methods are needed for complicated injuries.

DISCUSSION

Complex carpal injuries known as perilunate dislocations (PLD) and perilunate fracture dislocations (PLFD) are difficult to diagnose and treat effectively[5]. Current research discusses many management strategies that evaluate open reduction against closed reduction techniques and K-wire fixation methods for treating these injuries. The reported case series backs up important conclusions drawn from existing research about PLD and PLFD medical treatment methods. The management techniques implemented in separate cases demonstrated wide-ranging options because the medical field presents a wide range of treatments and results according to published research.

Case 1: Open Reduction with Ligament Repair

The literature demonstrates that open reduction combined with internal fixation stands as the crucial approach for treating severe dislocations [6,7]. Carpal bone stability and intercarpal alignment require immediate attention through ligament repair because they determine proper postoperative outcomes. The K-wire application in this case supports Budoff's recommendation number by protecting the scaphoid and lunate ligaments from detrimental compression[8].

Case 2: Closed Reduction and K-Wire Fixation

The case shows how early proper Kirschner wire fixation under suitable circumstances can lead to favorable outcomes[8]. Early dislocation cases often respond well to closed techniques, although further evidence is needed regarding long-term outcomes in delayed presentations. It has also been demonstrated that closed reduction without ligamentous repair may result in better functional outcomes compared to open reduction in certain scenarios[7].

Case 3: Combined Dorsal and Volar Approach

A volar approach enables superior carpal bone exposure and improved surgical control in complex cases, as supported by previous studies[9,10,11]. Through this surgical method, medical professionals can treat associated fractures together with dislocations while ensuring complete care for injured patients. The method that surgeons implemented in this case has foundations in published data because it offers full treatment of both dislocations and linked fractures, leading to enhanced functional outcomes.

CONCLUSIONS

An individualized treatment strategy must be applied for perilunate and fracture dislocations because of their unique characteristics. The treatment of serious cases requires open reduction with internal fixation using K-wires and ligament repair, as shown in Case 1. The effectiveness of early closed reduction techniques exists, yet these methods become less potent after delays, as illustrated by Case 2. Multiple structure injuries benefit from a combined treatment approach that fits current recommendations for achieving the best results, as shown in Case 3.

CONFLICT OF INTEREST

None

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None

PATIENTS' CONSENT

Informed consent was obtained from all patients.

AUTHORS' CONTRIBUTIONS

Conceptualization & Design **OBZ:MH: MAK,** Data Collection & Case Documentation **MH:MH: HLH,** Surgical Management & Clinical Input: **OBZ: HLH,** Radiological Analysis & Interpretation: **OBZ: SH,**

Manuscript Drafting & Editing: MH: MAK, Literature Review, HM: SF, Final manuscript approved by all authors.

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