

**VOLAR PERILUNATE CARPAL FRACTURE
DISLOCATION: A CASE REPORT OF UNCOMMON
INJURY PATTERN****Mohammed A Akrawi* & Avadis A Muradian@**

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Abstract

Carpal fracture dislocations are relatively uncommon category of wrist injuries that often easily unrecognized and can be difficult to treat. We report a case of missed volar perilunate fracture dislocation in a 16 year old boy, and was treated operatively 40 days after injury by open reduction with the repair of ligaments. The outcome was satisfactory despite of the delay in diagnoses and surgery.

Introduction

Perilunate fracture dislocations (PFD) are rare carpal injuries, comprising of less than 10% of all wrist injuries, in addition the volar PFD accounts for less than 3%, and to our knowledge only a few cases have been previously reported¹⁻⁴. Approximately 20% of perilunate injuries are misinterpreted on the initial radiographs, that frequently missed, and most of such cases are diagnosed weeks after the accident⁵⁻⁸. Nonsurgical treatment of these injuries has been shown to produce inferior results and early open reduction is recommended to achieve anatomic alignment of the carpal bones^{4,8,9}. The purpose of this article is to determine the pattern of management for delayed volar PFD and to assess the outcome of open reduction.

Case report

A 16 year old boy sustained right wrist injury in a road traffic accident, at that time radiography was considered normal and the carpal injuries were misidentified, and he was managed by wrist

immobilization in a plaster splint for 2 weeks. After 40 days of injury the patient was referred to our clinic because of the persisting wrist pain and limitation of motion. On history, the patient could not remember the exact mechanism of the injury.

Physical examination revealed moderate swelling of the wrist with diffuse dorsal tenderness, decreased wrist flexion & extension, and no signs of nerve compression.

The plain radiographs (Figure 1) and Computed tomography (CT) scan (Figure 2) revealed volar displacement of the hamate and transverse fracture of the capitate with the proximal half of the capitate remained within its place, whereas the distal fragment displaced with the hamate volarly, and also there was a dislocation of the triquetrum with disruption of the luno-triquetral (LT) ligament, as well as associated chip triquetral fracture, and no disruption of the scapholunate (SL) interval could be identified.



Figure 1: Preoperative AP and lateral plain radiographs demonstrates the volar PFD with disruption of the LT ligament.

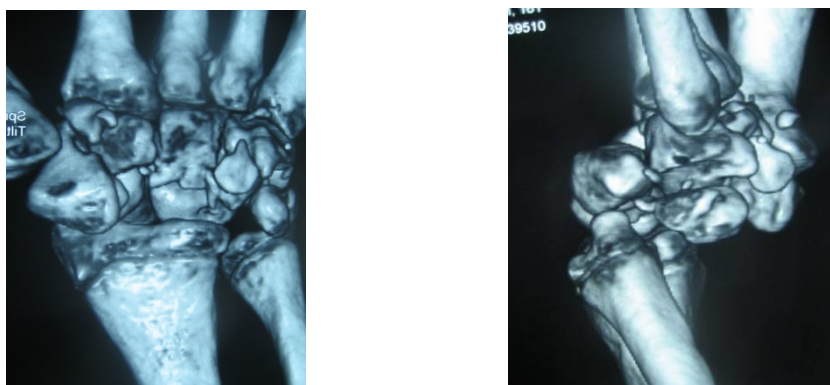


Figure 2: Preoperative CT scans of the wrist.

The patient was advised to undergo surgery. Initially under general anesthesia, the wrist was screened with an image intensifier, which clarified the radiographic findings. Surgery was performed with tourniquet control and the wrist was approached through a dorsal longitudinal incision centered over the Lister tubercle, the extensor retinaculum divided through the 3rd extensor compartment and the extensor pollicis longus (EPL) released and retracted radially with subperiosteal elevation of the 4th and 5th compartments ulnarly, then the dorsal wrist capsule opened and elevated by creating a radially based flap, the joint was irrigated thoroughly and the extent of injury was fully assessed (Figure 3).

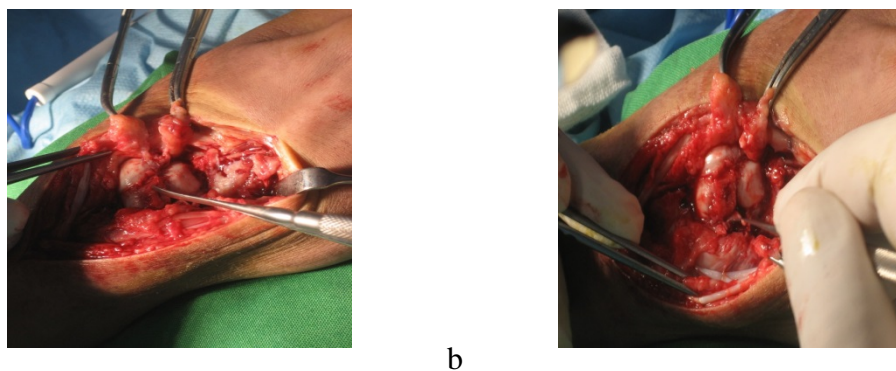


Figure 3 : Intraoperative pictures showing the dislocated hamate and capitate fracture, with torn SL ligament (a) and disruption of the LT ligaments (b)

The dislocated hamate and capitate fracture were reduced, and the reduced hamate was stabilized by K-wire that passed through it and the scaphoid, without fixation of the capitate fracture. Partial SL ligament rupture was found at its dorsal portion, and repaired by re-attachment of the ligament to the bone using bone anchors, with a horizontal mattress sutures (3-0 nonabsorbable suture) passed through the SL ligament and the two mini bone anchors that have been placed in the dorsum of scaphoid, then the sutures pulled and tied over the bone, and a percutaneous K-wire passed through both the scaphoid and lunate to stabilize the SL interval.

The triquetrum then reduced into the anatomic position, and fixed with a K-wire that passed percutaneously through the triquetrum and hamate, followed by the repair of LT ligament directly with two sets of 4-0 nonabsorbable suture anchors. Final fluoroscopic images were obtained before closing the incisions, to ensure the anatomic reductions or carpal

alignments, the dorsal capsule and the extensor retinaculum were repaired, leaving the EPL in the subcutaneous position, the skin was closed and the K-wires were bent and left out of skin, and the wrist was immobilized in an above elbow splint with wrist and forearm in the neutral position.

Postoperatively, elevation and digital exercises were encouraged, and the post-surgery radiographs showed anatomic reduction of the hamate and the capitate fracture, with accurate congruency of the SL and TL articulations (Figure 4). Two weeks later, the skin sutures were removed with further wrist immobilization for an additional 6 weeks, at which time the K wires and splint were removed, and mobilisation of the wrist with physical therapy was started.

Six months after surgery, the patient had regained satisfactory painless motion with a slight restriction, and radiographs at the latest follow-up demonstrated adequate alignment of the carpal bones, with healed fractures (Figure 5).

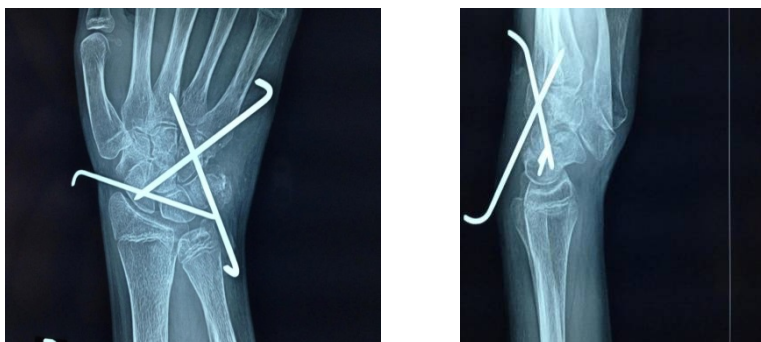


Figure 4 : Plain radiographs 2 days after surgery, AP and lateral views show the carpal reduction and transfixations.



Figure 5 : Plain radiographs of the wrist 6 months after surgery

Discussion

Volar PFD is particularly a rare injury pattern among the perilunate injuries of the wrist, mostly occurring in young males after high energy trauma. Unfortunately most of the PFDs are often missed initially because of improper evaluation of the initial radiographs, causing delay in recognition and in definitive management, which potentially leads to a serious complication^{5-7,8-11}.

We present an unusual case of volar PFD in young patient that missed initially, the injury was complex, with a volar dislocation of the hamate and displaced capitate fracture, and there was dislocation of the triquetrum due to LT ligament disruption.

Open reduction with SL and LT ligaments repair was carried out 40 days after injury, through the dorsal approach, this approach advocated by the most surgeons because it permits adequate exposure of the carpal rows, intercarpal joints, and the dorsal ligaments^{5,6,9,11}. The reduction of the dislocated hamate and capitate fracture was achieved with difficulty, and we only fix the hamate without fixation of the capitate fracture because the reduced fracture was rigid and stable. Also K-wires were passed through the scaphoid and lunate and through triquetrum and hamate to protect the ligaments repair and stabilize the SL and LT intervals. At 6 months after surgery, the patient reported

clinically good wrist function without residual pain, and X-rays showed accurate carpal bones alignment.

According to the previous reports, the capitate fractures account for only 1% to 2% of all carpal fractures, and commonly associated with PFDs¹²⁻¹⁵. Also the triquetral fractures and dislocations rarely occur in isolation, and 12% to 25% of triquetral injuries are the result of a PFD pattern¹⁶⁻²⁰. Volar hamate dislocations are exceedingly rare that can be easily missed, and also are a part of complex wrist injuries, and surgical management by open reduction even in neglected cases gives good results²⁰⁻²².

A considerable proportion of perilunate carpal injuries are frequently missed and often difficult to diagnose, that may not be obvious on the plain X-ray film because of the complex bony architecture, so most of the authors recommend CT scans or MR imaging to assess and diagnose these specific injuries¹⁻⁷. Open reduction and ligamentous repair of delayed perilunate injuries has been advised by several authors, but there is no agreement regarding the time limit. Reports of acceptable results with open reduction of unreduced PFDs have been published for delays up to 3 and 6 months after the injury, therefore attempting open reduction is still reasonable for perilunate injuries presenting in a moderately

delayed timeframe, and the results are closely correlated with obtaining an accurate reduction of the carpal fractures and dislocations⁵⁻¹⁰.

In volar PFDs, it is difficult to maintain reduction with closed treatment, as a result it has been advised that these injuries are often treated definitively and preferably with open reduction to minimize the risk of chronic disability and pain^{2,5,7,10}.

This case illustrates that the major pitfall in the management of volar PFD is delayed or missed diagnosis may be due to inconclusive radiographs, therefore obtaining appropriate X-ray and CT scans or MRI are mandatory for accurate diagnosis, and if there is any suspicion of carpal misalignment, early open reduction is essential to restore the alignment, and even in delayed diagnosis.

References

1. E.H. Masmejean, S.J. Romano. Palmar perilunate fracture dislocation of the carpus. *J Hand Surg (B)* 1998; 23B:2:264 – 265.
2. Min Jung Park. Volar perilunate dislocations: possible association with prior wrist injuries. *HAND* 2012; 7:217–220.
3. B. Youssef, S.C. Deshmukh. Volar perilunate dislocation: A case report and review of the literature. *Open Orthopaedics Journal* 2008; 2: 57-58.
4. Spencer J. Stanbury, John C. Elfar. Perilunate dislocation and perilunate fracture-dislocation. *J Am Acad Orthop Surg* 2011;19:554-562.
5. Peter M. Murray. Dislocations of the wrist. *JASSH* 2003; 3(2): 88- 99.
6. Guillaume Herzberg. Perilunate and axial carpal dislocations and fracture dislocations. *JHS* 2008; 33A:1659-1667.
7. Robert Yaghoubian. Diagnosis and management of acute fracture dislocation of the carpus. *Orthop Clin N Am* 2001; 30(2):295- 305.
8. Kin Ghee C, Andrew Y. H. Antipronation spiral tenodesis- A surgical technique for treatment of perilunate instability. *J Hand Surg* 2012; 37A:2611–2618.
9. David B. Jones Jr. Perilunate dislocations and fracture dislocations. *J Hand Surg* 2012; 37A:2168–2174.
10. Abdel Hakim A. Functional outcome of open reduction of chronic perilunate injuries. *J Hand Surg* 2012; 37A:1852–1860.
11. Prasad J. Sawardeker, Katie E. Fracture dislocations of the carpus: Perilunate injury. *Orthop Clin N Am* 2013; 44: 93–106.
12. Á. A. Rico, J. G. Martin. Pseudarthrosis of the capitate. *J Hand Surg* 1999; 24B (3): 382–384.
13. Dhananjaya S, Sumit A. Isolated capitate fracture with dorsal dislocation of proximal pole. *HAND* 2011; 6:333–336.
14. Munir A. Shah, Steven F. Fractures of the carpal bones excluding the scaphoid. *JASSH* 2002; 2(3):129- 140.
15. Jeffrey Marchessault, Matt Conti. Carpal fractures in athletes excluding the scaphoid. *Hand Clin* 2009;25:371–388.
16. Guzelali O, Bekir Y. Isolated triquetrum fractures. *Open J Orthop* 2015; 5: 186-188.
17. Mordechai Vigler, Alberto Aviles. Carpal fractures excluding the scaphoid. *Hand Clin* 2006; 22:501–516.
18. Noel F. Bartone. Fractures of the triquetrum. *JBJS* 1956;3A(2):353- 356.
19. David Braig, Georgios Koulaxouzidis. Volar dislocation of the triquetrum. *J Hand Microsurg* 2013; 13:1- 4.
20. Alexander P. Volar perilunar dislocation of the carpus. *JBJS* 1960;42A(6):1051-1057.
21. Krishna Kumar, Alaa Kawas. Surgical treatment of a neglected dislocation of hamate. *Open J Orthop* 2014; 4: 243-248.
22. L.R. Irwin, R. Paul. Complex carpal dislocation. *J Hand Surg* 1995; 20B (6):746- 749.