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Perilunate instability: A rare variant

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Abstract

Perilunate dislocations and perilunate fracture dislocations are rare injuries that occur as a result of high energy trauma. We describe a case of a volar fracture dislocation of the proximal pole of the scaphoid with an associated scapholunate and lunotriquetral ligament disruption as well as a lunate fossa fracture of the distal radius. These injuries are serious injuries that require a high degree of clinical acumen and radiographic scrutiny to allow for prompt treatment in order to avoid the sequelae of long-term complications that can arise. This case serves as a reminder of the complexity of these injuries and their associated mechanics.

Keywords

Perilunate dislocation, transscaphoid fracture dislocation

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Introduction

Perilunate dislocations (PLDs) and perilunate fracture dislocations (PLFDs) are rare injuries which occur as a result of high energy trauma.[1] The stability of the carpal bones is maintained by the perilunate ligaments and the scaphoid which acts as a bone bridge between the proximal and distal carpal rows. The case described is that of a volar fracture dislocation of the proximal pole of the scaphoid with an associated scapholunate and lunotriquetral ligament disruption as well as a lunate fossa fracture of the distal radius.

Simultaneous dislocation of the scaphoid fracture fragment with a perilunate ligament disruption is a rare occurrence with very few cases being reported in the literature. This patient's injury is a unique variant of PLFD with none of the cases described in the literature having an associated lunate fossa fracture. The pathomechanics related to perilunate instability with attention to the mechanics which may have led to the injury pattern in the reported case will be addressed in the discussion.

Case report

A 31-year-old right-hand dominant construction worker presented with a swollen, painful left wrist after a fall from a 15 feet height. He had no symptoms of median nerve compression and his neurovascular status was intact on presentation. Radiographic examination of his wrist revealed a scaphoid fracture with volar displacement of the proximal scaphoid fragment (Figure 1).

Closed reduction in the emergency department failed as the wrist was grossly swollen and unstable. An open surgical intervention for reduction and fixation of his scaphoid fracture was recommended. A computed tomography (CT) scan of his wrist to better delineate the fracture pattern was unavailable at the point in time at the institution and the decision was made to proceed without the CT scan in light of the inability to obtain a closed reduction acutely. Intraoperatively, he was found to also have a sagittal split through his lunate fossa with an associated scapholunate and lunotriquetral ligament disruption (Figures 2 and 3). A combined volar and dorsal approach was utilized to facilitate the proper reduction of his ligamentous and bony injuries. His scaphoid fracture and lunate fossa fracture were reduced and stabilized with partially threaded cancellous screws (Figure 4).

The disrupted ligaments were reconstructed using sutures and the radiocarpal joint stabilized with two Kirschner wires. He was treated for a 6-week period with a below-elbow cast after which the wires were removed and he underwent intensive physiotherapy. At 6 months post-operation, he had no complaints and returned to work as a construction worker. At 2 years follow-up, he reported minimal pain on strenuous activity but was still able to work in the construction

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Figure 1. Radiograph of wrist showing the dislocated proximal fragment of the scaphoid (white arrow).

Figure 2. Intraoperative photograph of the volar dislocation of proximal pole fragment of the scaphoid (white arrow).

industry. Radiographs revealed radiocarpal degenerative changes with post-traumatic ulnar carpal translocation (Type 1). He was counseled on the possibility of further intervention based on its progression and his limitations to function (Figure 5). At present, he can achieve 45° of active extension and 60° of active flexion with a decrease in pronosupination to 50°. Modified Mayo wrist score of 65 indicates a satisfactory function with a power grip strength of 26 kg in his left hand compared to 34 kg in his right hand.

Discussion

PLDs and PLFDs comprise a spectrum of injury patterns involving progressive perilunate instability, classically disrupting the scapholunate, capitolunate, and lunotriquetral joints. The first PLFD was described in 1855 by Malgaigne.[2] It was not until 1980 that Mayfield et al. proposed that the

Figure 3. Intraoperative photograph showing the reduced sagittal split through the lunate fossa of the distal radius (white arrow) and the scapholunate dissociation (black arrow).

injury occurred as a result of hyperextension with ulnar deviation and intercarpal supination and described the four stages of injury.[3–6] Weber and Chao attributed the associated scaphoid fracture seen in some cases to the extension of the wrist.[7,8] In cases where the scaphoid is fractured, the proximal pole of the scaphoid generally stays connected to the lunate by its ligamentous attachments. This results in a transscaphoid perilunate fracture dislocation (TSPLD). TSPLD injuries are considered a separate entity since they involve a scaphoid fracture rather than solely a scapholunate ligamentous disruption.[6]

Numerous complex variants of PLDs and PLFDs have been reported. One case of a transscaphoid lunate dislocation with ejection of the proximal pole of the scaphoid into the anterior compartment of the forearm has been described by Charmathi et al. Their case was however associated with a radial styloid fracture as opposed to a lunate fossa fracture as was found in this patient.[7]

The other peculiar aspect of the case described above was the lack of evidence of an associated perilunate injury on the initial radiographs. Herzberg[8] in 2013 recognized the occurrence of injuries with a transcarpal path of trauma but no true dislocation of the capitate from the lunate on the emergency radiographs. He proposed a modification to his classification to include these injuries as 'perilunate injury, not dislocated (PLIND) lesions'.[8] The injury sustained in this report can be classified under this new category. The associated pathomechanics involved in his case adds another variation to the complexity of injury patterns described in the published literature.

The pathomechanics of PLDs, PLFDs, PLINDs and their associated variants is commonly described based on their associated arc of injury. The traditional classification described by Johnson is that of greater and lesser arc injuries.[9] Two additional arcs have been described recently, which give a more comprehensive description of the mechanics associated with the variants.

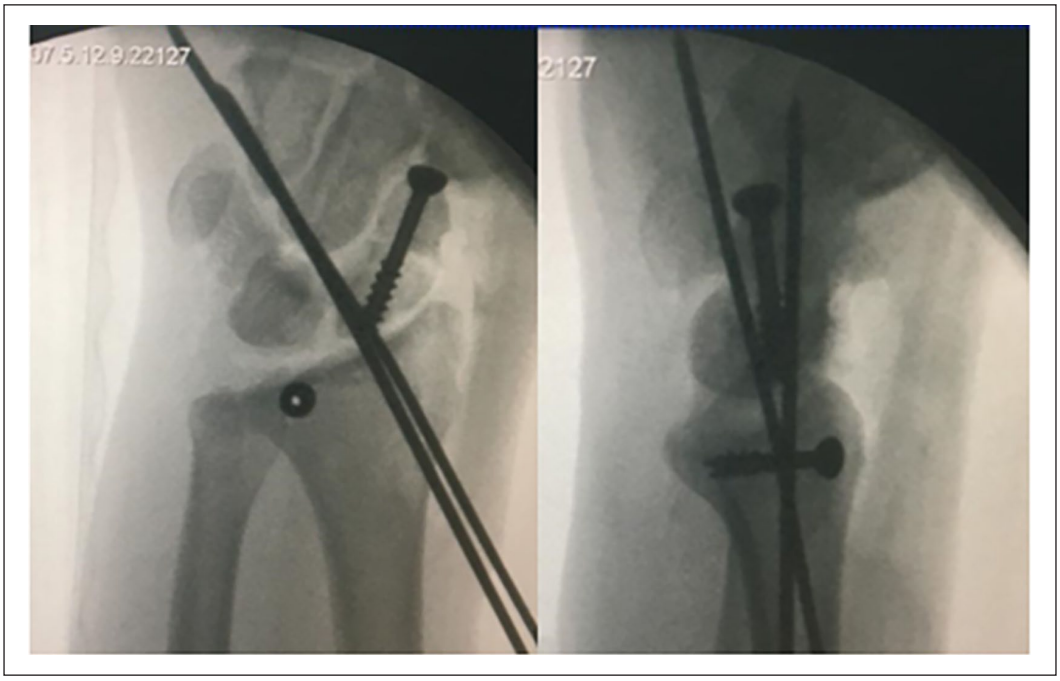

Figure 4. Intraoperative fluoroscopic images of reduced scaphoid and lunate fossa fractures with temporary Kirschner wire reduction of radioscaphoid joint.

Figure 5. Two-year follow-up radiograph showing radiocarpal degeneration.

Graham[10] in 2003 reported a third transverse wrist injury pattern, the 'inferior arc' injury. This takes into account the force passing from lateral to medial through the radiocarpal joint.[10] He proposed that the occurrence of a pure ligamentous disruption is rare with the presence of a fracture of the juxta-articular margin or the radial styloid being more likely. The presence of ulnar-sided pathology inclusive of an ulna styloid fracture and/or triangular fibrocartilage tear is, however, indicative of a higher degree of trauma. In 2008, Bain et al.[11] proposed the 'translunate arc' injuries. This classification recognizes the destabilizing forces which occur as a result of a concurrent lunate fracture and indicates a higher velocity wrist injury.[11] This arc of injury incorporates all perilunate injuries with an associated translunate fracture pattern.

The injury described in this case is proposed to have begun at the scaphoid resulting in its fracture. The energy then transferred along the greater arc of the carpus leading to the disruption of the scapholunate and lunotriquetral ligament. This

resulted in a perilunate instability and the separation of the carpus from the lunate. The energy transfer concluded with its exiting through the ulnar border of the radius resulting in the fracture of the lunate fossa of the radius. Based on the intraoperative findings, the patient may have initially suffered a TSPLD which spontaneously reduced. This would have resulted in the lack of evidence of dislocation on his initial radiographs.

Injuries such as these are more commonly associated with an ulna styloid fracture as the final stage as energy is dissipated from the radial to ulnar aspect of the wrist. Based on the arc of injuries described above and the proposed transmission of forces in this case, the complexity of these injuries is reiterated. The spectrum of injuries found in this case cannot be classified into one arc of injury; rather, it is more likely a result of disruption in a combination of the arcs of injury.

Prompt open reduction, carpal stabilization and ligamentous repair with fixation of displaced or unstable fractures is the universal recommendation for the treatment of these injuries.[12] The integrity of the scaphoid bone and the perilunate ligaments plays a crucial role in the maintenance of carpal stability and therefore every effort should be made to reconstruct these injuries. Despite this, up to 50% of patients may still develop post-traumatic arthritis.[4] Post-traumatic ulnar carpal translocation is a form of carpal instability which is typically found in patients with high energy injuries involving the greater arc. This pattern of instability is in keeping with the proposed injury pattern in the case presented.

This patient despite his progression to post-traumatic degenerative changes within a 2-year period still maintains a functional capacity which allows him to continue working as a manual labourer. This disparity between his functional status and his clinical and radiographic findings has been attributed to his motivation and desire for early return to work. We believe that this contributed to a more rigorous, self-directed rehabilitation process as opposed to the structured post-operative physiotherapy rehabilitation that is conventionally recommended.

Conclusion

PLDs, PLFDs, PLINDs and their associated variants are serious injuries which can present in a vast number of ways ranging from subtle to obvious radiographic findings. A high degree of clinical acumen is required to prevent the misdiagnosis of these injuries which can have grave consequences on the patient's long-term function. This case serves as a reminder of the complexity of these injuries and their associated mechanics. The patient's outcome also reiterates that a strongly motivated patient is a key factor in having a good functional outcome as interpreted by the patient despite a less than ideal clinical score based on conventional scoring systems.

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Ethical approval

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References

1. Prelorentzos G, Chronopoulos E, Kokkalis ZT, et al. Volar trans-scaphoid perilunate dislocation of the wrist: a case report. *Med Sci Case Reports* 2017; 4: 14–18.
2. Richard G. The active and exemplary life of JF Malgaigne, surgeon of Lorraine (1806–1865). *Ann Med Nancy* 1965; 4: 527–549.
3. Mayfield JK, Johnson RP and Kilcoyne RK. Carpal dislocations: pathomechanics and progressive perilunar instability. *J Hand Surg* 1980; 5A: 226–241.
4. Herzberg G, Comtet JJ, Linscheid RL, et al. Perilunate dislocations and fracture-dislocations: a multicenter study. *J Hand Surg Am* 1993; 18(5): 768–779, https://linkinghub.elsevier.com/retrieve/pii/036350239390041Z
5. Subramanian K, Arora B, Bhatnagar A, et al. Perilunate dislocation – case report and review of literature. *J Clin Diagn Res* 2017; 11(8): RD06–RD08, http://www.ncbi.nlm.nih.gov/pubmed/28969226
6. Sauder DJ, Athwal GS, Faber KJ, et al. Perilunate injuries. *Hand Clin* 2010; 26(1): 145–154, https://linkinghub.elsevier.com/retrieve/pii/S0749071209000961
7. Weber ER and Chao EY. An experimental approach to the mechanism of scaphoid waist fractures. *J Hand Surg Am* 1978; 3(2): 142–8, https://linkinghub.elsevier.com/retrieve/pii/S0363502378800628
8. Herzberg G. Perilunate injuries, not dislocated (PLIND). *J Wrist Surg* 2013; 2(4):337–45, http://www.ncbi.nlm.nih.gov/pubmed/24436839
9. Johnson RP. The acutely injured wrist and its residuals. *Clin Orthop Relat Res* 1980; (149): 33–44, http://www.ncbi.nlm.nih.gov/pubmed/7408318
10. Graham TJ. The inferior arc injury: an addition to the family of complex carpal fracture-dislocation patterns. *Am J Orthop* 2003; 32(9. Suppl.): 10–19, http://www.ncbi.nlm.nih.gov/pubmed/14599031
11. Bain GI, McLean JM, Turner PC, et al. Translunate fracture with associated perilunate injury: 3 case reports with introduction of the translunate arc concept. *J Hand Surg Am* 2008; 33(10): 1770–1776, https://linkinghub.elsevier.com/retrieve/pii/S0363502308005248
12. Su CJ, Chang MC, Liu Y, et al. Lunate and perilunate dislocation. *Zhonghua Yi Xue Za Zhi* 1996; 58(5): 348–354, http://www.ncbi.nlm.nih.gov/pubmed/903785