Complete dorsal dislocation of the carpal scaphoid with perilunate dorsal dislocation

Jong Woo Kang, Jong Hoon Park¹, Dong Hun Suh, Jong Woong Park¹

ABSTRACT
Complete dorsal dislocation of the carpal scaphoid combined with dorsal perilunate dislocation is an extremely rare carpal injury. We describe the case of a 23-year-old man who presented with a complete dorsal dislocation of the carpal scaphoid, combined with a perilunate dislocation. Surgical treatment was performed with open reduction and interosseus ligament repair. At 4 years follow up, the patient’s wrist pain had completely resolved without limitations of wrist joint motion and without evidence of avascular necrosis of the carpal scaphoid.

Key words: Carpal, dislocation, dorsal, perilunate, scaphoid
MeSH terms: Carpal bones, dislocations, trauma

INTRODUCTION
Most dorsal dislocation of the carpal scaphoid has been reported with axial dissociation of carpus or without other carpal injury.⁵-⁸ Complete dorsal dislocation of the carpal scaphoid associated with dorsal perilunate dislocation without axial dissociation of carpus is unique carpal injury which have not been reported until now to the best of our knowledge. We report such a case and discuss the injury mechanism, management, and outcome.

CASE REPORT
A 23 year old man presented with painful swelling in his right wrist after falling forward from 3 m height. On clinical examination, the wrist was found to be swollen, bruised and deformed. Multiple abrasions on the thenar area of the hand suggested that the suspected injury mechanism was an extension, supination and ulnar deviation force on the outstretched wrist.

Radiographs and three-dimensional computed tomography scan (CT) revealed complete dorsal dislocation of the carpal scaphoid and dorsal dislocation of the other carpal bones over the lunate. The scaphoid dislocation from the other carpal bones resulted in the complete loss of normal intercarpal connections and articulations around scaphoid. In other words, wide separations among the carpal bones indicated complete and simultaneous ruptures of the scapholunate, lunotriquetral, and scaphotrapezial ligaments including dislocations of scaphotrapezial, scapholunate, lunotriquetral, scaphocapitate, and radioscaphoid joint [Figure 1].

The patient was taken up for surgical intervention and perioperative findings revealed complete dorsal dislocation of the scaphoid without any adjacent soft tissue connections and perilunate dorsal dislocation with lunotriquetral ligament rupture. During the surgery, the scapholunate ligament was carefully repaired using suture anchors and the midsubstance tear of the lunotriquetral ligament was repaired with simple sutures after the reduction of dislocated carpal bones [Figure 2].

The reduced carpal bones were fixed with 4 K-wires to maintain their anatomical relationships and correct intercarpal articulations (three K-wires were inserted to maintain the scapholunate, lunotriquetral, and scaphocapitate joint articulations and the last one was inserted between trapeziocapitate joint to maintain the scaphotrapezial joint indirectly) and supplemental dorsal capsulodesis was performed with the scaphoid to prevent ulnar shifting of carpal bones [Figure 3]. Following the
surgery, the wrist was immobilized by the cast for 8 weeks. The K-wires were removed 8 weeks after the surgery and the patient began range of motion physiotherapy.

At 4 years followup, the patient did not have any pain or limitation of motion in his wrist. The range of wrist motion was 91% of contralateral normal wrist (the wrist extension, flexion, radial deviation, and ulnar deviation angle was 60°, 35°, 24°, 38°, respectively). The grip and pinch strength were 85% and 87% of the normal side, respectively. The Mayo wrist score was 90 point. The radiographs also showed maintenance of the carpal alignment and a magnetic resonance image scan of the scaphoid did not show any evidence of avascular necrosis [Figure 4].

**DISCUSSION**

Dorsal scaphoid dislocations are the rarest injury among scaphoid dislocations, and only four cases have been previously reported until now.1-4 Two of them are isolated dorsal dislocation of scaphoid without other carpal injuries, and another two cases are dorsal dislocation of scaphoid associated with axial dislocation of carpus.1-4 Complete dorsal dislocation of the scaphoid associated with dorsal perilunate dislocation without axial dissociation of carpus have not been reported until now to the best of our knowledge.

The mechanism of injury in this patient was a fall from 3 m height but the patient did not remember the exact wrist position at the time of impact. Nevertheless, the abrasion and ecchymosis of the thenar area of the injured hand indicated that the area of impact was the thenar area of the hand with the wrist in a hyperextended position. In other words, midcarpal supination and ulnar deviation of the wrist occurred. Actually, this mechanism has been known to result in a transscaphoid perilunate dorsal dislocation.5,6 However, one difference between transscaphoid perilunate dorsal dislocation and this case is that the scaphoid dislocated dorsally without fracture.

Horton et al. described that the injury involved a disruption of the distal carpus at the capitohamate joint and then extended proximally with disruption of the radioscaphocapitate, capitolunate and long radiolunate ligaments allowing the proximal scaphoid dislocation (type II scaphoid dislocation).7 They suggested that the mechanisms of injury attributed to both scaphoid dislocation and axial carpal dissociation include hyperextension injury with axial compression of the wrist.7 Therefore, we suggested that the severe axial compression force combined with wrist hyperextension and midcarpal supination induced complete scaphoid dorsal dislocation with perilunate dislocation rather than the scaphoid fracture. This suggested mechanism was also partially agreed with the others who reported that the dorsal scaphoid dislocation may be induced with the force of hyperextension and supination.5,6,8
Occasionally, this type of complex injury may be overlooked in the emergency room; therefore, careful diagnostic evaluation is essential. Initial diagnostic evaluation modalities are recommended to include anteroposterior, lateral, oblique and radioulnar deviation radiographs, as well as three-dimensional CT. However, standard radiographs and three-dimensional CT were sufficient to diagnose and determine a treatment option, in this case. Additional diagnostic modalities were also not required to evaluate the ligamentous injuries.

Most reports of scaphoid dislocations, with or without complex carpal injuries, indicated that the patients returned to their previous activities with minimal loss of motion after proper treatment. Proper treatment has been described as either closed or open reductions, regardless of the alignment achieved at the time of the reduction. Interestingly, in cases where the scaphoid was completely dislocated and migrated out of the wrist area (a bare scaphoid), the clinical treatment results have been free of complications, including avascular necrosis; only one case of avascular necrosis of the scaphoid has been presented. These good outcomes may be the result of the rapid revascularization of the preserved intraosseous vascular supplies from the surrounding soft tissues. Similarly, in less severe volar dislocations, the vascularity of the scaphoid was partly maintained by the intact soft tissue attachments, especially the scaphotrapezial ligament and dorsal capsular ligament.

Conclusively, in complex carpal injuries including complete carpal bone dislocation, the proper treatment option is open reduction and percutaneous K-wire fixation for maintaining carpal alignment. Especially, in order to achieve rapid revascularization of dislocated carpal bone, repair of intercarpal ligament structures is essential.

References
1. Inoue G, Maeda N. Isolated dorsal dislocation of the scaphoid. J Hand Surg Br 1990;15:368-9.
2. Richards RS, Bennett JD, Roth JH. Scaphoid dislocation with radial-axial carpal disruption. AJR Am J Roentgenol 1993;160:1075-6.
3. Amaravati RS, Saji M, Rajagopal H, Gururaj H. Neglected dorsal dislocation of the scaphoid. Indian J Orthop 2009;43:213-5.
4. Richards RS, Bennett JD, Roth JH.
5. Kanaya K, Wada T, Yamashita T. Scaphoid dislocation associated with axial carpal dissociation during volar flexion of the wrist: A case report. Hand Surg 2010;15:229-32.
6. Massicot R, Uzel AP, Céolin JL, Brouard P. Dorsal trans-scaphoid perilunate dislocation in a 9-year-old child. Eur J Pediatr Surg 2005;15:140-3.
7. Takase K. Dorsal transscaphoid transtriquetral perilunate dislocation with pseudoarthrosis of the scaphoid. Orthopedics 2008;31:123-7.
8. Horton T, Shin AY, Cooney WP 3rd. Isolated scaphoid dislocation associated with axial carpal dissociation: An unusual injury report. J Hand Surg Am 2004;29:1102-8.
9. Mayfield JK. Mechanism of carpal injuries. Clin Orthop Relat Res 1980;146:45-54.
10. Lee BJ, Kim SS, Lee SR, Jin JM, Yoon MG, Moon MS. Palmar scaphoid dislocation associated with dorsal perilunate dislocation: Case report. J Hand Surg Am 2010;35:726-31.
11. Kennedy JG, O’Connor F, Brunner J, Hodgkins C, Curtin J. Isolated carpal scaphoid dislocation. Acta Orthop Belg 2006;72:478-83.

How to cite this article: Kang JW, Park JH, Suh DH, Park JW. Complete dorsal dislocation of the carpal scaphoid with perilunate dorsal dislocation. Indian J Orthop 2016;50:444-6.

Source of Support: Nil, Conflict of Interest: None.