Unusual combined fracture dislocation of the wrist and metacarpophalangeal joints: Report of a case and a review of the literature

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【Abstract】Volar perilunate fracture dislocation is an extremely rare carpal injury, but associated with metacarpophalangeal joint dislocation of both the ipsilateral index and middle finger has never been reported. We report one case of a 28-year-old man who occurred after a high-energy trauma. After performing closed reduction of the metacarpophalangeal joint injury, open reduction of the wrist injury through volar approach was done, and a Kirschner wire fixation was used to stabilize the scaphoid fracture and lunotriquetral joint. After a 16 months’ follow-up period, the wrist regained a full range of motion without symptoms, and the fractured bone was strengthened in a good position.

Key words: Fracture bone; Dislocations; Carpal, bone; Metacarpophalangeal joint

Dorsal perilunate fracture dislocation is a relatively rare injury, although it is the most common type of perilunate fracture dislocations. However, a volar transscaphoid perilunate dislocation is fairly rare among the known cases of carpal fracture dislocations, and associated with metacarpophalangeal joint dislocation of ipsilateral index and middle finger has never been reported. We report here this case, and discuss details of the mechanism of the injury, the modality of treatment and outcome of this injury.

CASE REPORT

A 28-year-old, right-handed man fell from a five meter height onto the dorsum of his right hand, forcing his wrist in a hyper-flexed position. He presented at the emergency department 2 hours after trauma with pain and swelling in his right wrist as well as the index and the thumb. Physical examination revealed deformity of the wrist and the metacarpophalangeal joint of the index and middle finger. The carpus was more prominent volarily. The finger motion of both the index and the thumb was more limited. The findings of a neurovascular examination were normal. Multiple plain radiological examinations showed fractures at the scaphoid and a volar perilunate dislocation associated with dorsal dislocation of the index metacarpophalangeal joint and fracture dorsal dislocation of the major metacarpophalangeal joint (Figure 1).

One hour later and under general anaesthesia, a closed reduction was attempted for all injuries with traction applied by means of finger traps. Anatomical reduction was achieved only for metacarpophalangeal joints of both the index and the middle finger, but since the volar perilunate fracture dislocation was not reduced, we performed an open reduction using volar approach. The scapholunate interosseous ligament was intact, and the palmar radiocarpal ligaments were not completely ruptured, but were attenuated. The median nerve was not damaged. After reducing the lunate dislocation and the scaphoid fracture, percutaneous fixation was applied to the scaphoid fracture and lunotriquetral joint using K-wires.

The reduction was found to be stable under image intensifier. No carpal instability was confirmed with manual testing after the procedure. Postoperative radiographs revealed normal carpal and metacarpophalangeal bone relationships (Figure 2). The K-wires were removed 6 weeks later, and the short arm thumb spica cast was applied for 10 weeks after sufficient bony...
scaphoid union was confirmed on X-ray.

At the follow-up examination 16 months after operation, the patient reported slight residual pain; the wrist had regained 60 degrees of dorsal flexion and 50 degrees of palmar flexion (Figure 3). The grip strength (40 kg) was 89% of the value for the left side. The index and the middle finger had full range of motion. No evidence of avascular necrosis of the lunate was declared (Figure 4). The patient had returned to work at his previous occupation; he was satisfied with the result.

DISCUSSION

Volar perilunate fracture dislocations are extremely rare injuries, only accounting for 3% of all perilunate dislocations. \(^1\) Herzberg et al\(^2\) in a retrospective review of 166 perilunate dislocations and fracture dislocations identified only two volar transscaphoid perilunate dislocations. The first discussion of the management of a volar transscaphoid perilunate fracture dislocation was presented by Aitken and Nalebuff \(^3\) in 1960 through a case report.

Two mechanisms have been described in the literature: a dorsally applied pressure to a palmar-flexed wrist or forced hyperextension of the wrist. A substantial force is usually required to cause perilunate dislocations, such as falls from a height as described in our case.
Green and O’Brien suggested that volar perilunate fracture dislocations are the result of a fall onto a hyper-extended wrist without forearm supination. Niazi confirmed through a cadaveric study the theory of Green and O’Brien and described the anatomic lesions: rupture of the volar ligaments, supination of the proximal segment rupturing the scaphotrapezial ligament, and a significant momentum of force causing posterior shearing. Aitken and Nalebuff proposed that volar translation of the carpus is the result of a force directed to a palmar flexed wrist. We think that associated dorsal dislocation of metacarpophalangeal joint to volar perilunate fracture dislocations of the wrist is due to longitudinal force exerted through hyperextended finger and transmitted to metacarpo-phalangeal joint.

Simple volar perilunate dislocation treated conservatively by closed reduction followed by casting yields satisfactory results. If a displaced fracture of the scaphoid is associated, the open reduction with internal fixation of the scaphoid is necessary to stabilize the reduction. The internal fixation of the scaphoid improves fracture healing and reduces the risk of scaphoid nonunion and later midcarpal instability. We suggest that open reduction allowing anatomical reductions of the scaphoid, as well as the mid-carpal joint, and the restoration of the articular surface of the lunate are the most important aspects determining the prognosis.

The volar approach is therefore used to obtain stable fixation. We agree that volar approach is the surgical choice for volar perilunate fracture dislocations because it allows both carpal tunnel incision when there is median sensory deficit, and reparation of the ruptured palmar radiocarpal ligaments. A dorsal approach may be required if there is residual intercalary instability or difficulty in reduction. The dorsal approach further increases the risk of a scaphoid blood supply interruption, and compromises the circulation of the scaphoid. Furthermore, the blood supply of the displaced proximal scaphoid fragment can be partially or completely disrupted in trans-scaphoid perilunate dislocation, in addition to a significant risk of avascular necrosis of the proximal scaphoid fragment.

Volar perilunate fracture dislocation is an extremely rare injury, concurrent ipsilateral metacarpophalangeal joint dislocation can be easily overlooked. The diagnosis of simultaneous injuries and open reduction of a volar perilunate fracture dislocation and osteosynthesis of scaphoid fracture are the prerequisite for favourable results.

REFERENCES


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