CASE REPORT

Trans-scaphoid mid-carpal dislocation associated with radial styloid fracture: A rare injury

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Introduction

Carpal dislocation is an unusual and an uncommon injury. Perilunate dislocation and fracture dislocations represent 10% of all carpal injuries. 1 Traumatic carpal dislocation results in disruption of the normal relationship of the radio carpal and mid-carpal joints. Presented here is an unusual association of fractures of the scaphoid and radial styloid process plus a mid-carpal dislocation.

Case report

A 13-year-old right-handed boy fell off his bicycle injuring both wrists. He sustained a dorsally angulated metaphyseal fracture of the left distal radius. At the right wrist, the injury was much more complex, with a fracture of the scaphoid bone, mid-carpal dislocation and fracture of the radial styloid process (Illustration 1a and b). Both his wrists were manipulated into satisfactory position and immobilised in a below elbow complete plaster cast (Illustration 2).

The left wrist fracture recovery was uneventful. However, at 3 weeks, the right wrist injury was complicated by loss of position resulting in mid-carpal dislocation (Illustration 3). The right wrist was then examined and screened using image intensifier in theatre under a general anaesthetic to define the complexity of the carpal injury. Using the volar approach, the mid-carpal dislocation was openly reduced and stabilized with K-wires. The volar carpal ligaments were also repaired (Illustration 4). It was felt at the time of the operation that an adequate midcarpal joint congruency and stability was achieved. K-wires were removed subsequently at 6 weeks post-operation.

The second operation was complicated by mid-carpal subluxation, which was evident on radiographs taken at 3 months (Illustration 5). Scaphoid and radial styloid fractures healed uneventfully. It was decided at this stage that a surgical intervention was not indicated because the patient was pain free and skeletally immature.

At 1-year follow-up, the patient had 50° of palmar flexion and 20° of dorsiflexion at the right radiocarpal joint. He had a full range of supination and pronation at the right forearm and the radio-ulnar deviation was comparable to the left side. He was pain free and was able to pursue normal activities. Ankylosis between the capitate and the lunate was evident on radiographs. There was no further subluxation or osteoarthritis (Illustration 6).
At 2-years follow-up, patient was asymptomatic and had regained virtually full range of movement, and this was apparent on clinical examination. Follow-up radiographs did not reveal any new changes.

Discussion

Patients with post-traumatic carpal dislocation will present with wrist pain and swelling. The injury may be subtle, but is often significant. Ligamentous disruption between the proximal and the distal carpal rows, axial loading of the hyper-extended wrist with an intact radio-lunate ligament or a fall on a hyperextended wrist or hand can all lead to mid-carpal dislocation. Prolonged axial loading of the carpus after volar lunate dislocation can also lead to a dorsal mid-carpal dislocation and a volar radio-carpal dislocation.2

The carpus is an intercalated system of carpal bones, intrinsic and extrinsic ligaments, and the joint capsule. Scaphoid is the stabilizing link between the proximal and distal carpal rows. Carpal dislocation may reduce spontaneously or by self-manipulation before clinical and radiological examination and consequently be under diagnosed.16 Carpal dislocations are diagnosed late in up to 25% of cases.6 Damage to the median nerve is the most common associated injury in lunate and perilunate dislocations of the wrist.3

Isolated carpal bone fracture is quite unusual. This may partly be due to the fact that the force of impact is shared by all the carpal bones and ligaments because of their proximity to each other.
Nevertheless, isolated carpal fractures do occur and are often overlooked. Fractures of the proximal scaphoid, lunate and capitate are associated with osteonecrosis because of their precarious intra-osseous blood supply.

Stanbough reported an isolated scaphoid dislocation\(^{13}\) and Taleisink et al. described volar dislocation of both scaphoid and the lunate.\(^{14}\) Kopp reported on an isolated trapezoid dislocation.\(^{8}\) Mayfield et al. described the spectrum of ligamentous injury involving rotational subluxation of the scaphoid resulting in dorsal peri-lunate dislocation and volar lunate dislocation.\(^{9}\) Russell reported that 58 of their 59 patients sustained a fracture dislocation of the carpus resulting from hyperextension of the wrist.\(^{12}\) Campbell reported a fracture of the triquetrum associated with carpal dislocation in six of their 50 patients.\(^{3}\) Bonin and Greening described a fracture of the triquetrum in association with a perilunate dislocation and a fracture of the proximal pole of the scaphoid.\(^{1}\) Weseley and Barenfeld described a case of trans-scaphoid, trans-capitate, trans-triquetal perilunate fracture dislocation of the wrist.\(^{17}\)

Both closed and open reduction of fracture dislocations of the carpal bones have been practiced in the past. However, early open reduction of the trans-scaphoid mid carpal dislocation is recommended as the outcome is much superior to closed reduction.\(^{10,15}\) Moreover, anatomical reduction of the scaphoid fracture and mid-carpal dislocation has a significant influence on the prognosis of carpal injury. The incidence of avascular necrosis of the scaphoid and lunate is also higher with non-operative treatment.\(^{11}\) In the case presented here, open reduction and stabilization with K-wires was complicated by mid-carpal subluxation. This may have been a consequence of inadequate reduction and immobilization of the wrist for a very short period of time. In retrospect, we felt that the above-mentioned complication could have been prevented if this complex unstable injury was stabilized surgically at the time of initial presentation.

Cooney et al. identified avascular necrosis in 13 of the 21 patients with perilunate fracture dislocations. Five of the 13 patients had to undergo...
bone-grafting. Silastic replacement, vascularised bone grafts and arthrodesis have a place in the treatment of carpal injuries. Proximal row carpectomy can be considered as a salvage procedure.

The diagnosis of mid-carpal dislocation can be difficult and clinicians should have a high index of suspicion in patients with generalized ligamentous laxity, chronic wrist problems and with a history of trauma. Patients can have a good functional outcome despite carpal collapse. The successful recognition of a potentially complex carpal dislocation depends on adequate imaging. CT scanning to assess the nature of the carpal dislocation and intraoperative radiological screening are invaluable measures, which can aid in pre-operative planning and subsequent management of these complex injuries. However, clinical findings rather than radiological appearance should dictate management. The patient presented here sustained an unusual injury, which was complicated by mid-carpal subluxation, and from which he made a good functional recovery.

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