An unusual combination of radiocarpal fracture dislocation, scaphoid fracture and posteromedial elbow dislocation

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Introduction

Radiocarpal dislocations represent 0.2% of all dislocations. Only a few cases of a combination of radiocarpal fracture dislocation and scaphoid fracture have been reported. The second most common joint dislocated in adults is the elbow, which accounts for 20% of all dislocations. There is posterolateral displacement in most cases. Posteromedial dislocation of elbow in an adult is rare. Very few cases of a combination of radiocarpal fracture dislocation and elbow dislocation have been reported before. We report an unusual case of combination of all three: radiocarpal fracture dislocation, scaphoid fracture and posteromedial elbow dislocation. As far as we are aware, this has never been reported before. We postulate the mechanism of this pattern of injuries and review the literature.

Case report

A 22-year-old male fell off a ladder from a height of 8 feet on an outstretched left hand and complained of pain in his elbow and wrist. Physical examination revealed a severely swollen wrist and marked deformity of the elbow. The distal neurovascular function was intact. Initial radiographs showed a dorsal radiocarpal fracture dislocation (Fig. 1a and b) and a posteromedial dislocation of elbow (Fig. 2a and b). Other obvious fractures noted were a radial styloid fracture and a fracture through the waist of the scaphoid. The dislocations were manipulated under midazolam sedation and an above elbow back slab applied. Post reduction X-rays showed satisfactory radiocarpal reduction and the associated fractures were identified. The elbow reduction was satisfactory with no associated fractures. The upper limb was elevated in a Bradford sling with close observation of neurovascular function. The CT scan of the wrist (Fig. 3) revealed a comminuted fracture of the radial styloid, volar and dorsal rim fractures of radius, an ulnar styloid fracture, and an undisplaced waist fracture of scaphoid with normal carpal alignment. CT scan of the elbow showed no associated fractures.

After 24 h, he complained of increased pain and pins and needles in the radial three fingers. The pain increased on passive finger movements and he had reduced sensation in median nerve distribution in hand. Compartment syndrome was diagnosed and he was immediately taken to theatre where a forearm...
fasciotomy via Henry’s approach and a carpal tunnel decompression was performed. After a week, he had closure of fasciotomy wounds and an above elbow cast applied.

Three weeks after the injury, X-rays showed satisfactory fracture reduction and carpal alignment. He was put into a hinged cast brace to allow early movement at the elbow (Fig. 4). Three months after the injury, he had satisfactory function of the wrist and elbow joints with promising scaphoid union.

Discussion

Radiocarpal dislocation is the result of high energy translational shear forces causing the carpus as a whole to be torn away from its attachment to the radius and ulna. The postulated mechanism of dorsal radiocarpal dislocation is an association of hyperextension, pronation, and radial inclination after a fall on a dorsiflexed outstretched hand. Weiss et al found that the torsional element was essential for radiocarpal dislocation. These injuries are frequently associated with radial styloid fracture, ulnar styloid fracture, dorsal and/or volar marginal shear fracture. This case had all these above fractures. This patient had a volar rim fracture involving about 15% of the articular surface and less than 1 mm displacement. The fracture of radial styloid was moderately comminuted involving more than one third of width of the scaphoid fossa with more than 1 mm step in the articular surface. The distal radioulnar joint was normal.

The scaphoid is the most common carpal bone injured in a fall on a dorsiflexed outstretched hand. Forced radial deviation would produce a twisting force at the waist of the bone. Gilford et al suggested that a rotational load would create shear stress in the scaphoid leading to fracture. However, they are uncommonly associated with radiocarpal dislocation. In this case, the scaphoid fracture was undisplaced through the waist. CT showed the carpal alignment was normal.

Posteromedial dislocation of the elbow is uncommon and results from a varus stress on an extended or slightly flexed elbow as opposed to the more common posterolateral dislocation of elbow which results from a combination of valgus, supination and axial forces after a fall on an outstretched hand. There were no associated fractures in the elbow in this case.

The mechanism of this unusual combination of injuries could be explained as follows. As the ladder snapped he fell on his outstretched left hand by the side of his body. The outstretched dorsiflexed, radially deviated hand in pronation was forced into excessive pronation and as a result of strong compressive as well as torsional forces he sustained both scaphoid fracture and dorsal radiocarpal dislocation. With the body rotating externally on the elbow and the forearm in pronation (and varus) a posteromedial elbow dislocation is affected (Fig. 5).

Conservative management in this case is justified. For the marginal fractures of the distal radius no significant difference between closed or operative methods of treatment were observed when the articular surface was restored to less than 1 mm residual displacement. The styloid fragment is comminuted which may hinder fixation, fortunately the reduction of the fragment is satisfactory. Non-displaced fractures of the scaphoid with less than 1 mm of displacement can be treated with non-operative means, including a long arm cast with thumb spica extension.
Understanding the mechanism of injury is obviously important for interpreting the pattern of injuries, substantiating the radiographic findings, instituting treatment, anticipating complications, and providing adequate follow-up care.

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References