



MANAGEMENT OF UNUSUAL FRACTURE-DISLOCATION OF CAPITATE WITH TRIQUETRUM

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ABSTRACT

Case: Fractures of capitate are rare injuries, often associated with high-impact injuries. There is no definitive treatment protocol for management of these fractures. They are often missed, neglected or treated conservatively leading to complications. We report a case of fracture of the capitate with triquetrum. The capitate fracture was displaced proximally off its articulation and was internally fixed. The triquetrum was undisplaced and managed conservatively.

Conclusion: We report this case for the uniqueness of fracture and its management

KEYWORDS : Capitate fracture; CT scan; Triquetrum fracture; Surgical management

INTRODUCTION-

Fractures of the capitate are considered uncommon injuries of the wrist. They are usually associated with other carpal bone fractures and/or ligamentous injuries. Delay in diagnosis in these cases may however result in prolonged disability and avascular necrosis. Isolated, usually non-displaced, fractures are extremely rare.

STATEMENT OF INFORMED CONSENT-

This study involves 1 patient. Informed consent regarding the fracture, surgical management and its complications with permission for publication in academic interest has been obtained from the patient.

CASE REPORT-

A 21 year-old male, presented to our emergency room, 3 days after a road traffic accident. The mechanism of trauma was a fall on an outstretched hand with a metal bracelet at wrist. The hand was swollen and very painful. Clinically there were no signs of instability and distal neurovascularity was intact. Roentgenograms showed a displaced proximal fracture of capitate having lost its articulation with Triquetrum [Figure 1]. The wrist was screened by computed tomography to study the fracture morphology. It showed an undisplaced articular fracture in the proximal triquetrum [Figure 2].

The patient was initially placed on a short arm splint. Surgery was performed when the swelling subsided. Initial closed reduction was attempted but failed. Hence open reduction of 35 fracture was planned. Dorsal approach was adopted to approach the fracture. After incising the skin and subcutaneous tissue, the fractured proximal fragment was found to be dislocated and devoid of any soft tissue attachment [Figure 3]. Capitate fracture was treated by internal fixation with Herbert screw. After the reduction was satisfactory intraoperatively [Figure 4], the patient was immobilized by short arm cast, as triquetrum fracture was managed conservatively.

The cast was retained till 4th week postoperatively. Thereafter the wrist was gradually mobilized as tolerated. Full range of movements was achieved at wrist after 7 weeks. The patient was followed up at 3rd, 6th and 12th month postoperatively.

The X-ray at last follow up showed a healed fracture at capitate [Figure 5]. The wrist had near normal range of movements with no pain [Figure 6]. The movement at wrist was extension 0-90°, flexion

0-80°, radial deviation 0-15° and ulnar deviation 0-25°. CT demonstrated a completely healed capitate with asymptomatic nonunion at Triquetrum.

DISCUSSION-

The capitate is the largest amongst the carpal bones, strongly scaffolded by palmar ligaments. The capitate bone is well encased, in a surrounding of carpal bones (hamate, lunate, scaphoid and trapezoid) and rigidly fixed to the articulating base of the third and fourth metacarpal bones. The centre of rotation of the wrist lies within the head of the capitate, which makes the lever arm into the capitate rather short.

Most literature report isolated cases or limited series (1-8). Isolated fractures of the carpal bones, except for the scaphoid, are have low incidence of 0.3 – 1.9% (9). This reported low incidence of isolated capitate fractures is highly underestimated, due to the difficulties in detecting fracture radiologically (57 % of initial X-rays failed to show the fracture or were considered normal). They are transverse across the waist or oblique, involving the distal dorsal rim (1, 2).

Gelberman reported the distal to proximal 60% of capitate vascularity enumerating predisposition of neck of capitate fractures to avascular necrosis of the head (10). Any distraction or malposition at fracture site leads to delay in revascularization and union. Fractures of the capitate are usually associated with additional carpal bone fractures (scaphoid or hamate) (2, 11), or are part of the scapho-capitate syndrome of Fenton (2, 12). Stress fractures and pathological fractures have also been described (13, 14).

Different mechanisms of injury, producing capitate fractures, have been proposed (1, 12, 67, 15, 6). The most common is a fall onto the outstretched hand with an extended wrist. Mechanism of injury to capitate is usually due to a high-energy hyperextension force and are usually transverse in orientation. This applies a dorsiflexion force to the wrist whether in neutral or ulnar deviation, or in radial deviation (producing an associated perilunar dislocation). Second common injury mechanism is a fall onto the dorsum of the hand (15.4%), which applies a flexion force to the wrist. A direct blow or an axial trauma, transmitted through the heads of the second and third metacarpal bones in a clenched fist and flexed wrist, are also possible causes. Often though, the exact mechanism of injury is

difficult to determine. Our case report sustained a fall on outstretched hand (in hyperextension) with the bracelet over the wrist, presumably protecting the distal radius.

Clinical examination shows localized point tenderness with swelling over the fractured capitate. The diagnosis may be difficult radiologically (1) and when in doubt an isotope bone scan (15), a CT scan (2) or MRI (3) may be helpful or even necessary. Bone scan is a sensitive method for confirming and localizing bone injury. An abnormal bone scan necessitates further investigation with CT scanning. We therefore prefer MRI. This is the technical investigation of choice as it clearly depicts the fracture pattern and as it is a sensitive tool in the follow-up of avascular necrosis and fracture healing 83 (resolution of edema). In our patient, there was displacement of the proximal capitate, which was palpable over the distal segment. We preferred CT scan to augment the X-rays, for screening other carpal fractures.

Treatment modalities for managing capitate fractures include conservative management with early mobilization, excision of the proximal fragment, open reduction and internal fixation, and wrist arthrodesis (1,12). The outcomes of these treatment options have not been well determined. Schrijver et al (16) reported conservative treatment with initial analgesic cast immobilization generally 6 to 12 weeks immobilization, followed by rehabilitation in the treatment of non-displaced fractures. Displaced fractures should be reduced and internally fixed with K-wires (4, 5, 7) or Herbert screw (6). In our case report, initial closed manipulative reduction failed and hence the fracture was exposed and reduced, and stabilized with Herbert screw fixation. Triquetral fractures are the second most common carpal fractures with a prevalence of 96 18.3% (9). The majority of fractures are dorsal ridge fractures, which occur at the dorsal aspect of the triquetrum, and are best visualized on lateral radiographs. They result from impingement of the ulnar styloid process against the dorsal surface of the triquetrum during wrist hyperextension and ulnar deviation. Triquetral body fractures occur in low incidence and mostly occur in conjunction with perilunate dislocations (17). They usually can be treated non-operatively with a cast for 4 – 6 weeks. We encountered undisplaced triquetral body in our patient, which was managed conservatively.

CONCLUSION-

Association of capitate with triquetrum fractures is 105 a rare entity described in literature. Even though the capitate was fractured, completely displaced and devoid of soft tissue attachment, complete radiological union can be achieved. Conservatively-treated triquetrum has a tendency to heal in asymptomatic nonunion.

FIGURE LEGENDS-

Fig 1: Pre-operative X-rays showing fracture of Capitate. Triquetrum fracture cannot be demonstrated in the X-rays.

Fig 2: Saggital slice(left) of CT Hand showing capitate fracture while Axial slice(right) shows undisplaced fracture of triquetrum.

Fig 3: Intra-operative image showing displaced isolated proximal fragment of capitate without any soft tissue attachments.

Fig 4: Postoperative X-ray denoting stabilized fracture of capitate with Herbert screw.

Fig 5: 1 year follow-up X-ray of Capitate fracture.

Fig 6: 1 year follow-up of patient's functional range of movement at wrist.

Figure-1



Figure-2



Figure-3



Figure-4



Figure-5



Figure-6



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