CASE REPORT

Multiple carpometacarpal dislocations and an associated fracture of the hamate: an uncommon injury

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SUMMARY

Dislocation of the four ulnar carpometacarpal (CMC) joints with a concurrent fracture of the hamate is a rare injury, with a paucity of published cases. A great force is required to dislocate a CMC joint. Diagnosis can easily be missed, due to other serious associated injuries. Appropriate treatment of CMC joint dislocations usually leads to excellent outcomes. We present a case of dorsal dislocation of the four ulnar CMC joints after punching a wall. The injury was treated with a closed reduction and percutaneous transfixation with Kirschner-wires. Despite the extensive injury, the functional result was good (full and painless range of motion) at 12 weeks of follow-up.

disability. We report a case of simultaneous dorsal dislocation of all ulnar CMC joints.

CASE PRESENTATION

A 28-year-old right-handed man, a carpenter, without a relevant medical history, presented at the emergency room (ER). He had an extremely painful and swollen hand after punching a wall. Clinical examination of the right hand showed a gross swelling over the dorsum of the hand, and diffuse tenderness over the CMC area. Active movements of the wrist and fingers were restricted due to pain. No neurovascular deficit distal of the injury was noted. There was no evidence for general ligamentous laxity.

BACKGROUND

Carpometacarpal (CMC) injuries account for <1% of hand injuries, and may easily be missed. CMC dislocations usually occur due to a high-energy trauma, which is commonly seen in motorcyclists and boxers. These injuries frequently occur together with more life-threatening injuries. CMC dislocations are thought to be a result of a hyperflexion force on the metacarpal heads.¹ A high level of suspicion, careful clinical examination and appropriate radiological assessment lead to an early diagnosis, and proper management of this rare injury.²

Untreated cases or a delay in adequate treatment may lead to serious and long-term functional

INVESTIGATIONS

Plain radiographs of the right hand showed complete dorsal dislocation of the four ulnar CMC joints ([figure 1](#)). An additional CT scan of the right hand revealed a bony fragment at the base of the fifth metacarpal, which probably emanated from the hamate ([figure 2](#)). The thumb, and all metacarpophalangeal and interphalangeal joints were intact. The second to the fifth metacarpals were reduced at the ER, and resulted in a slightly better position. However, a subluxation of the CMC joints remained. The current situation was found an acceptable reduction for bridging the time until surgery within 48 h. The hand was immobilised with a plaster.

Figure 1 Antero-posterior radiograph of the right hand showing overlap of bases of ulnar metacarpals with loss of joint space. True lateral radiograph of the hand showing dorsal dislocation of all ulnar carpometacarpal joints.

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Figure 2 Axial slice of CT scan revealing an avulsion fracture of the hamate. The overlap of the base of the metacarpals can be seen.

TREATMENT

Two days after the injury, the patient was brought to the operating theatre for percutaneous fixation under loco-regional anaesthesia. After closed reduction under image intensifier guidance, the dislocation slipped into place, but required stabilisation. The second metacarpal was transfixed on the trapezoid using Kirschner-wires (K-wires). The fifth metacarpal was transfixed similarly on the hamate (figure 3). After radiological confirmation of an adequate position of the CMC joints and the hamate fracture, a volar splint was applied. Six weeks after the injury, the K-wires were removed and the patient was started on an intensive hand physiotherapy programme.

OUTCOME AND FOLLOW-UP

The postoperative recovery was uneventful. Nine weeks after the injury, the patient could return to work. At 3 months follow-up, functional results were excellent (figure 4). He had regained full and painless range of motion, and grip strength of both hands was similar.

DISCUSSION

Simultaneous dorsal dislocation of the four ulnar CMC joints with a concurrent fracture of the hamate is an extremely rare injury.³ CMC dislocations are often seen following high velocity trauma and frequently occur together with multiple or life-threatening injuries.^{2 4} The CMC joints have a complex anatomical configuration. The bases of the metacarpals are firmly joined with each other and the distal row of the carpal bones due to their irregular shaped articulations, producing a so-called keystone relationship.⁵ Tough ligaments, and surrounding muscles and tendons, further reinforce the joints. As a result, a great deal of violence is required to disrupt these joints. Direct force is the most common mechanism of injury.⁶ Whether the CMC joints dislocate volarly or dorsally depends on the direction of the force. When the joint is disrupted, avulsion fractures of the base of the metacarpal or the carpal bones may occur, due to the strong ligamentous attachments.⁷ On the volar side, the ligaments are also attached to the hamate. Therefore, multiple dorsal CMC dislocations may result in an avulsion fracture of the hamate. Owing to gross swelling that

Figure 3 Radiographs after closed reduction and percutaneous fixation with Kirschner-wires.

Figure 4 Radiographs of the right hand at 12 weeks follow-up.

may mask characteristic deformity and its association with other life-threatening conditions, metacarpal base injuries are frequently overlooked or misdiagnosed.⁸ Furthermore, overlap on the lateral radiograph may obscure delineation of the injury pattern. Therefore, most authors recommend at least one variant of an oblique view if there is a high index of suspicion for CMC injury.⁹ A CT scan of the hand could help in the assessment of possible simultaneous fractures, and provides additional information that is helpful for preoperative planning. Functional outcome of the hand is poor in untreated patients or in cases with delayed surgical intervention.⁵ Closed reduction and temporary K-wire fixation usually suffice in the treatment of early-diagnosed CMC dislocations. Fracture-dislocations often require open reduction and fixation.¹⁰ A period of postoperative immobilisation, and early active and

assisted functional use is vital in order to achieve a satisfactory outcome.¹⁰

In conclusion, applying a high index of suspicion and performing a good clinical examination are crucial in recognising this complex condition. Moreover, good quality anteroposterior, true lateral and 45° oblique views should be obtained for accurate diagnosis, and can assure proper management.

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Learning points

- Stability of the carpometacarpal (CMC) joint is provided by bony and soft-tissue constraints. Therefore, a great deal of force is necessary to disrupt these joints.
- Early recognition of this injury is vital for satisfactory functional outcomes, and disability of the hand is severe when untreated or in those with delayed treatment.
- In order to avoid missing CMC dislocations, a true lateral radiograph of the hand in addition to anteroposterior and oblique views is needed to make a diagnosis, and to avoid considerable morbidity.
- Early closed reduction should be attempted by experienced physicians in the emergency room, especially if there are no associated fractures.
- Follow-up treatment should include a period of immobilisation and intensive physiotherapy.

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