An Isolated Perihamate, Transtriquetral Fracture-Dislocation: A Case Report

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Traumatic hamate dislocation with a triquetral fracture is a rare injury usually associated with significant carpal soft-tissue and bony injuries. Here we present the case of an isolated ulnar column fracture-dislocation and describe mechanism of injury, classification, and treatment.

Case Report

A man in his late 20s presented to the emergency department with complaints of pain and swelling in the left hand. He had been transporting a heavy metal bin when it became unstable and tumbled, striking the dorsum of the hand. He immediately noted a hand deformity, accompanied by severe pain and an inability to move the fingers.

In the emergency department, physical examination revealed marked swelling and an obvious bony deformity of the hand. The skin was neither punctured nor lacerated; the gross sensory and motor branches of the radial, median, and ulnar nerves were intact distally. Both radial and ulnar pulses were 2+, and all fingertips demonstrated brisk capillary refill. Passive and active range of motion (ROM) of the wrist and ulnar 3 digits was extremely limited secondary to pain. Palpation localized the point of maximal tenderness to the dorsal-ulnar aspect of the carpus. A palpable anatomic defect was present over the ulnar column. Gentle axial loading of the little and ring fingers produced severe pain. The patient could not make a fist or fully extend his fingers secondary to pain.

Anteroposterior and lateral plain films of the hand/wrist showed an ulnar dislocation of the proximal pole of the hamate, a displaced fracture of the triquetrum, and a diastasis of the middle and ring metacarpal bases (Figure 1). A manipulative reduction was performed under local anesthesia using gentle axial traction and radial deviation of the ring and little fingers. Postreduction films of the hand/wrist showed anatomic reduction of the hamate dislocation, triquetral fracture, and metacarpal diastasis.

Once relocated, the wrist and hand were taken through complete gentle passive ROM under x-ray fluoroscopy to confirm reduction stability (Figure 2). According to this provocative test, the stability of the carpus was satisfactory. An ulnar gutter splint was applied to maintain the hand and wrist in radial deviation. The patient was discharged from the emergency department and was followed on an outpatient basis with serial plain films and clinical evaluations.

At 4-week follow-up, films showed anatomic position of the hamate and maintenance of the triquetral fracture in a reduced location (Figure 3). Clinically, the patient's edema had resolved; he demonstrated some tenderness to palpation and pain on ulnar deviation of the carpus. He had nearly full passive ROM to the fingers and wrist. The ulnar gutter splint was changed to a volar wrist splint, and the patient was instructed to start formal occupational therapy.

By 4 months after injury, the patient had recovered significantly. Forearm girth, 10 cm distal to the tip of the olecranon, measured 27 cm on the left and 28 cm on the right. The patient had 4+/5 grip strength compared with the dominant right side (Figures 4, 5). He demonstrated full wrist and carpal active and passive ROM, with the exception of a 10° loss of wrist dorsiflexion on the affected side. He had no tenderness to palpation of the carpus. Active ROM

Figure 1. Admission plain films show ulnar dislocation of the hamate, an associated triquetral fracture, and a diastasis of the bases of the ring and middle metacarpals.

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Figure 2. Postreduction films show the reduced hamate dislocation and triquetral fracture.

Figure 3. Four-week follow-up films show maintenance of the hamate reduction and triquetral fracture alignment.

was without any discomfort. There was minimal tenderness to forced ulnar deviation. Plain films showed a healed triquetral fracture and maintenance of the hamate reduction in its anatomic location (Figure 6). A 2-mm diastasis of the middle and ring metacarpal bases was noted, but the integrity and congruity of the carpometacarpal joints of the middle, ring, and small fingers remained intact.

Discussion

Anatomy

The hamate is a triangular bone wedged between the fourth and fifth metacarpals distally, the capitate radially, and the triquetrum proximally and ulnarly. The anatomic bony location and strong ligamentous attachments provide the hamate with nearly rigid stability. The anchoring ligaments

Figure 4. Four-month follow-up examination reveals excellent grip and 10° loss of dorsiflexion of the affected side.

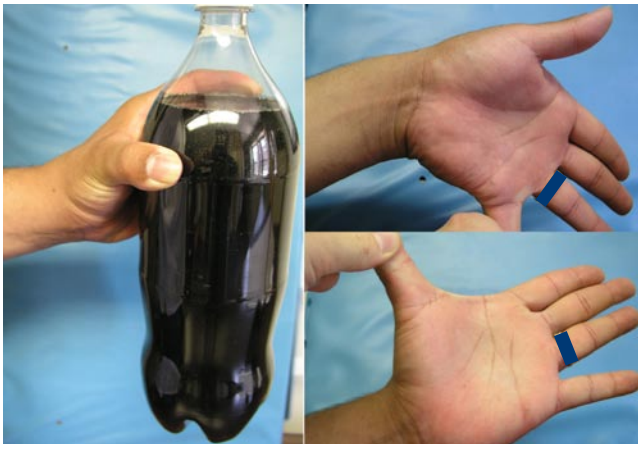

Figure 5. Four-month follow-up examination reveals strong, wide grip and nearly full range of motion of the left hand.

Figure 6. Four-month anteroposterior (AP) and clenched-fist AP films of the left hand show healing triquetral fracture, anatomic hamate reduction, and 2-mm diastasis of the middle and ring metacarpal bases.

are the pisohamate ligament, the volar and dorsal intercarpal ligaments, and the capitohamate interosseous ligament. Hamate motion is primarily flexion and extension in the sagittal plane; rotation and radial and ulnar movements are minimal, because its narrow proximal pole is wedged between the triquetrum and the capitate.

Injury Classification

Axial dislocations of the wrist are rare and are usually associated with significant trauma.[1,2] Garcia-Elias and colleagues[2] described a classification for carpal dislocations in which the carpus was divided into 2 axial columns—the ulnar column, which consists of the hamate, the pisiform, and the triquetrum, and the radial column, which is formed by the remainder of the carpal bones. According to this classification, 3 types of injuries can be identified: axial–ulnar, axial–radial, and axial–radial–ulnar.[2] Our patient sustained an injury in which a heavy metal object struck the dorsum of the left hand, imparting a large direct load that forced the hand into ulnar deviation, flexion, and axial translation. The hamate dislocated ulnarly, volarly, and through the fractured trapezium. This injury is classified as a perihamate, transtriquetral axial–ulnar disruption.[2] The manipulative reduction using traction and reversing the deforming force vector reduced the hamate dislocation; placing the wrist in radial deviation maintained the reduction.

Hamate dislocations are rare injuries that result from significant force applied to the dorsum of the hand. For that reason, they are commonly found in association with other carpal fractures and with soft-tissue, neural, and vascular injuries. Since 1901, fewer than 10 cases of axial–ulnar perihamate, transtriquetral fracture-dislocations have been reported.[1-7] All patients except 1 had associated significant carpal injuries that resulted in a fair to poor outcome. Most of these injuries required open reduction and internal fixation (ORIF) to achieve stability. Our patient is 1 of only 2 with ulnar column perihamate, transtriquetral fracture-dislocations to have had an excellent outcome, and is the only reported patient to have had no associated injuries. By 4-month follow-up, his symptoms had improved significantly, and he had returned to his previous occupation involving strenuous labor.

Conlusions

In our patient's case, a direct blow to the dorsum of the carpus resulted in an isolated ulnar column derangement. Previously reported perihamate, transtriquetral fracture-dislocations were consistently found to have a very high rate of associated severe soft-tissue and/or bony disruptions requiring, in most cases, ORIF and yielding poor outcomes. Here we have presented a rare case of perihamate, transtriquetral ulnar column fracture-dislocation in which the patient received no other associated soft-tissue or bony insults, and the carpus was stable after initial closed reduction.

This leads us to the hypothesis that, contrary to the previous observation that a significant force was required to inflict these injuries, ulnar column fracture-dislocations can result from an insult of moderate magnitude. The direction of the force vector may be of equal importance as its magnitude in determining the character of such injuries.

Four basic principles of treatment (as applied in this case) are worthy of note: (1) Closed reduction (with adequate anesthesia) was attempted by exaggerating and then reversing the mechanism of injury. (2) Postreduction gentle ROM examination confirmed reduction stability. (3) Postreduction plain films confirmed anatomic reduction of fracture-dislocation. (4) Adequate splinting maintained reduction.

Author's Disclosure Statement and Acknowledgement

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This paper will be judged for the Resident Writer's Award.