CASE REPORT

Dorsal hamatometacarpal fracture-dislocation in a gymnast

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A rare case of unstable hamatometacarpal joint fracture-dislocation in a gymnast is presented. It was treated conservatively with successful outcome.

Hamatometacarpal fracture-dislocation (HMFD) is a rare injury. Sports in which a blunt trauma to the ulnar side of the hand from a fall or in which the ulnar border of the hand is used to deliver blows as in karate are likely to produce such injuries. This injury can be very easily overlooked if the attending doctor is not aware of the clinical signs and the subtle radiographic findings,¹ leading to long term pain and weak grip strength.

Stable HMFDs can easily be treated by manipulation and casting. However, an unstable injury always requires a K wire fixation to stabilise the carpometacarpal (CMC) joint to prevent any long term complications of instability.² We present a rare case of unstable isolated HMFD successfully treated by a well moulded cast. To our knowledge, this is the first case report of an unstable HMFD injury in a gymnast.

CASE REPORT

A 20 year old amateur gymnast was practising on parallel bars when he slipped and fell, landing heavily on the ulnar border of his right hand. He immediately experienced severe pain, and the hand became progressively swollen. He attended the accident and emergency department complaining of increasing pain with inability to move the little finger. On examination, the little finger was rotated with minimal active motion. Orthopaedic opinion was sought, and a hamatocarpal fracture-dislocation with avulsion fracture of the hamate was diagnosed on further radiological assessment (fig 1). The finger was manipulated under sedation. Longitudinal traction with a volar displacing force was applied to the base of the 5th metacarpal at the CMC joint, leading to a satisfactory reduction. However, after reduction, the joint remained unstable dorsally. The patient was wary of having an internal fixation and requested non-operative treatment. While the joint was held in a reduced position, a well moulded plaster of Paris cast was applied which immobilised both the hamatometacarpal joint and the metacarpophalangeal joint. The position was confirmed on a radiograph. The patient was reviewed weekly and the cast was changed as it became loose after the swelling had subsided. After four weeks, it was removed altogether and the digits mobilised.

On review at three months, the patient had regained his grip strength and full range of motion of his little finger. The hamatometacarpal joint remained stable. At six months, the patient returned to his previous level of sporting activity and has been discharged from our care.

DISCUSSION

In a study by Henderson and Arafa,¹ 71% of their cases of CMC dislocation were missed by accident and emergency department doctors, and 25% of these were missed again on review by senior registrars and orthopaedic consultants. Only a third of these

cases were diagnosed correctly at original presentation. All cases with delayed presentation in their study group exhibited decreased range of motion and weak grip strength, contradicting earlier observations³ that unreduced CMC dislocations do not cause any disability. Half of their delayed presenters underwent CMC arthrodesis for pain and poor grip strength.

Isolated CMC dislocation of the hamatometacarpal joint was first described by McWhorter in 1918.⁴ This is a rare injury, and only a few cases have been reported.^{5–7} To our knowledge, no case of HMFD in a gymnast has been previously reported.

The hamatometacarpal articulation is a saddle joint with a convex base of the 5th metacarpal fitting into a concave facet on the hamate. Both bones have an additional flat facet for articulation with the 4th metacarpal. A striking feature of this articulation that distinguishes it from other CMC joints is its radioulnar slant in the frontal plane to allow 10–20° of supination, as seen when opposing the little finger to the thumb.⁸ This additional mobility comes at a price of increased instability with increased incidence of 5th CMC joint dislocation compared with the 4th CMC joint.⁹ The hamatometacarpal joint has strong volar, dorsal, and interosseous ligamentous attachments. These are further reinforced by broad insertions of the wrist flexors and extensors. Buttressing against volar dislocations are the hook of hamate, pisiform, and the pisometacarpal ligament extension of flexor carpi ulnaris, and dorsal dislocation is prevented only by the dorsal ligament. However, it is the intermetacarpal ligament between the 4th and the 5th metacarpals that are most important for stability. Berg and Murphy¹⁰ have shown that, even if all other attachments are severed, if this ligament is retained, no subluxation or dislocation can result. Cain *et al*¹¹ have classified HMFD into three types: type 1A and B, hamatocarpal fracture-dislocations with or without a dorsal avulsion fracture of the hamate; type 2, further fragmentation of the hamate; type 3, a coronal split of the hamate occurs. This classification works on the basis that the primary injury is a fracture of the 4th metacarpal and the resulting shortening leads to the hamatometacarpal dislocation. The drawback of this classification system is that it does not take into account the isolated HMFC dislocations without fracture of the 4th metacarpal.

The diagnosis of CMC dislocation is both clinical and radiological. The history is of a clenched fist striking a hard surface on its ulnar border. The dorsum is swollen with minimal rotation or shortening of the little finger. Anteroposterior and lateral views are most helpful. Nalebuff¹² suggested that additional oblique films in 30–45° pronation for dorsal dislocation and slight supination for volar dislocations may be helpful. It is important that proper attention is paid to clinical and radiological analysis if this injury is not to be missed. The

Abbreviations: HMFD, hamatometacarpal fracture-dislocation; CMC, carpometacarpal

Figure 1 Anteroposterior (A) and oblique (B) radiographs of the hand showing hamatometacarpal joint dislocation.

hand should be flat on the x ray film. Upon interpretation of the anteroposterior film, continuity and symmetry of the three double lines 1–2 mm apart should be sought. The proximal two pairs form a semicircle at the wrist and the midcarpal joints, and the last pair form a “flying seagull” or M shaped lines at the CMC articulations excluding the thumb.¹³ Any disruption of these lines or overlap of the articular surfaces should alert the doctor to look closely for a dislocation. An

Figure 2 Mechanism of dorsal hamatometacarpal joint dislocation. Arrows show the direction of the forces. 1, Interosseous ligament; 2, dorsal capsule; 3, extensor carpi ulnaris; 4, hook of hamate; 4a, avulsion fracture of hamate; 5, 5th metacarpal.

associated fracture of the hamate can be better visualised on a lateral radiograph of the hand, while a dorsal or volar dislocation can again be appreciated by lack of parallelism of the dislocated metacarpal among other parallel shafts. Once diagnosed, these injuries are easily reduced by manipulation under sedation; this may be successful up to 10 days after the injury. Thereafter unstable reduction should be held by a K wire. After three weeks, open reduction may be required.¹²

Even though the dorsal ligaments are stronger and more clearly defined, dorsal dislocations occur more often. Once the bony articulation is disrupted, the dynamic attachments to the base of the 5th metacarpal, namely the flexor carpi ulnaris and the extensor carpi ulnaris along with the hypothenar muscles, pull the base proximally, overlapping the hamate and shortening the digit clinically. This pattern of shortening may not be seen in other digits as they lack dynamic attachments. The ulnar directed force causing dislocation is equally opposed by the interosseous ligament and its bony attachment. Depending on which one fails first, an isolated dislocation or a fracture-dislocation similar to a Bennett fracture may result. The pull of the abductor digiti minimi and extensor carpi ulnaris contribute to the instability of dorsal dislocations that may remain even after satisfactory reduction. Fracture of the hamate is of no major consequence, except when the avulsion is large or the bone splits. In such cases it should be internally fixed.

In our case, the mechanism of injury was a fall on the ulnar border of a semiflexed wrist with a force directed to the head of the metacarpal, its one vector flexing the metacarpal with the other transmitted along the longitudinal axis of the 5th metacarpal shaft. This element of the force may be responsible for shearing off a fragment from the dorsal edge of the hamate articulation as the flexing vector continues to act around the axis of the hamatometacarpal joint (fig 2). The hamatometacarpal joint remained unstable after reduction and continued to dislocate dorsally on flexing of the 5th metacarpal. We elected to provide the patient with a well moulded cast. The reduction was held in place while the patient was followed up weekly; the plaster was changed as the hand became less swollen. Once the plaster was removed, the hamatometacarpal joint remained stable.

We emphasise that undetected hamatometacarpal joint dislocation leads to disruption of longitudinal and transverse

Take home message

Missed HMFD can end a promising sports career. Early detection with careful clinical assessment and radiological analysis for subtle signs, followed by appropriate treatment usually leads to an excellent result.

arches and therefore a weak and painful grip. Radiological and clinical signs are subtle on anteroposterior and lateral views, and additional views may be obtained if doubt exists. An unstable HMFD is ideally treated by closed or open reduction and internal fixation using a K wire. However, treatment by immobilisation in a well moulded cast can lead to a satisfactory outcome if kept under strict surveillance, as seen in our case. Finally a missed dislocation of the hamatometacarpal joint may lead to reduced grip and cut short a promising career in a gymnast.

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REFERENCES

- 1 **Henderson JJ**, Arafa MAM. Carpometacarpal dislocation. *J Bone Joint Surg [Br]* 1987;**69**:212–14.
- 2 **Bora FW**, Didizian NH. The treatment of injuries to the carpometacarpal joint of the little finger. *J Bone Joint Surg [Am]* 1974;**56**:1459–63.
- 3 **Whitson RO**. Carpometacarpal dislocation. A case report. *Clin Orthop* 1955;**6**:189–95.
- 4 **McWhorter GL**. Isolated and complete dislocation of the fifth carpometacarpal joint: open operation. *Surgical Clinics of Chicago* 1918;**2**:793–6.
- 5 **Laforgia R**, Specchiulli F, Mariani A. Dorsal dislocation of the fifth carpometacarpal joint. *J Hand Surg* 1990;**15**:463–5.
- 6 **Hsu JD**, Curtis RM. Carpo-metacarpal dislocation on the ulnar side of the hand. *J Bone Joint Surg [Am]* 1970;**52**:927–30.
- 7 **Vijayasekaran VS**, Briggs Patrick. Isolated dorsal dislocation of the 5th carpometacarpal joint. *Hand Surg* 2000;**5**:174–9.
- 8 **Lilling M**, Weinberg H. The mechanism of dorsal fracture dislocation of the fifth carpometacarpal joint. *J Hand Surg* 1979;**4**:340–2.
- 9 **Wagh RL**, Yancey AG. Carpometacarpal dislocations, with particular reference to simultaneous dislocation of the bases of the 4th and 5th metacarpals. *J Bone Joint Surg [Am]* 1948;**30**:397–404.
- 10 **Berg EE**, Murphy MD. Ulnarpalmar dislocation of the 5th carpometacarpal joint. Successful closed reduction. Review of the literature and anatomic re-evaluation. *J Hand Surg* 1996;**11**:521–5.
- 11 **Cain JE**, Shepler TR, Wilson MR. Hamatometacarpal fracture-dislocation: classification and treatment. *J Hand Surg* 1987;**12**:762–7.
- 12 **Nalebuff EA**. Isolated anterior carpometacarpal dislocation of the 5th finger. Classification and case report. *J Trauma* 1968;**8**:1119–23.
- 13 **Fisher MR**, Rogers LF, Hendrix RW. Systematic approach to identifying fourth and fifth carpometacarpal joint dislocations. *AJR Am J Roentgenol* 1983;**140**:319–24.