Acute ulnar carpometacarpal dislocations. Can it be treated conservatively? A review of four cases

Guus Storken · Rob Bogie · Edwin J. P. Jansen

Published online: 7 July 2011
© American Association for Hand Surgery 2011

Introduction

Dislocations of the ulnar carpometacarpal (CMC) joints are uncommon injuries. Initially, the injury is often overlooked or not found as an injury at all. Most cases presented in the literature advocate reduction with operative stabilization to prevent secondary dislocation. We present four cases of acute fourth and fifth CMC dislocations treated conservatively by closed reduction and splint immobilization.

Case Report

From May till September 2010, in four male patients, an ulnar CMC dislocation was diagnosed. They visited our emergency department after a direct trauma of the hand without any extensive additional trauma. In three patients, the injuries occurred as a result of a fist blow, and one patient had a motor vehicle accident. The patients (aged 24, 27, 36, and 65 years) presented with diffuse pain and swelling at the dorsum of the hand. Signs of neurological or vascular impairment were not observed. Radiographs showed dorsal CMC dislocation of the fourth and fifth CMC joints, without any associated major fractures (Fig. 1a, b). At the emergency department, all dislocations were immediately reduced by applying longitudinal traction

to the involved digits with pressure over the bases of the dislocated metacarpals. After reduction, the wrist was immobilized in a dorsal splint from below the elbow to the proximal interphalangeal joints with the wrist slightly dorsiflexed. Control radiographs showed adequate alignment of the CMC joints (Fig. 2a, b), and after 4 weeks, the splints were removed.

After 8 months (range, 6 to 9 months) radiographs showed no signs of secondary dislocation and all patients fully recovered without functional impairment (Fig. 3a, b).

Discussion

We presented four patients with uncomplicated ulnar CMC dislocations, which were treated successfully by early closed reduction (within 8 h after the accident) and splint immobilization.

CMC joint dislocations are uncommon injuries and account for <1% of all hand trauma, the thumb excluded [4]. Typically, the dislocation is dorsal and only occasionally palmar [6]. Generally, these dislocations are fracture dislocations due to avulsion of the ligaments. The size of the fracture fragments depends on the position, direction, and transmission of the trauma forces through the metacarpals (MC) [16].

Stability of the CMC joints is provided by the specific anatomical configuration of the CMC joints and the ligamentous attachments. The CMC joints of the index and long fingers are very rigid, allowing only approximately 1° to 3° of motion. In contrast, the CMC joints of the ring and small fingers have greater mobility due to their saddle configuration combined with looser ligamentous attachments [4,11,12]. Probably, this greater mobility causes the higher risk for dislocation in the CMC 4–5 compared to the CMC

G. Storken · R. Bogie · E. J. P. Jansen
Department of Orthopaedic Surgery, Orbis Medisch Centrum,
Dr. H. van der Hoffplein 1,
6162 BG Sittard-Geleen, Limburg, The Netherlands

G. Storken (✉)
Duitsepoort 54C,
6221 HH Maastricht, Limburg, The Netherlands
e-mail: g.storken@live.nl

Fig. 1 **a** Lateral and **b** oblique radiographs of the right hand showing a dislocation of the fourth and fifth CMC joints without any associated fractures

2–3 joints. Varied osseous morphologies of the CMC joints have been described. In particular, the anatomy of the fourth MC base and the corresponding hamate/capitate articulation may show some variations. The fourth MC base can proximally articulate with the hamate only or with both the hamate and the capitate. The clinical relevance of these shape and articulation variations is still uncertain [15].

Dislocations of the ulnar CMC joints are caused by a sudden force in the axial direction. As a result of this axial load, the volar base of the ring and small MC impacts into the hamate, which can cause an compression or avulsion fracture of the volar base of the ring MC. Subsequently, the

Fig. 2 **a** Lateral and **b** oblique radiographs of the right hand in a dorsal splint after closed reduction of the fourth and fifth CMC dislocations showing good alignment of the CMC joints

Fig. 3 **a** Lateral and **b** oblique radiographs of the right hand 8 months after the CMC dislocation. Anatomical alignment has been maintained

ring MC dislocates dorsally and also pulls the small MC along the intermetacarpal ligaments in a dorsal direction. This dorsal dislocation of the ring and small MCs can produce dorsal rim avulsion fractures of the hamate and capitate [16].

Swelling, pain, and a palpable lump are the main clinical findings. However, as a result of additional trauma, these

Fig. 4 PA radiograph of the right hand 8 months after the CMC dislocation showing the focus of the metacarpal cascade lines (*single red lines*) to a common spot in the distal radius and also the intact M-line (*double red line*) through all five CMC joints, indicating an anatomic position of the CMC joints

Fig. 5 PA radiograph of the right hand. The metacarpal cascade lines do not focus to a common point, demonstrating a CMC 4–5 dislocation (*single red lines*). The break in the M-line also emphasizes a CMC 4–5 dislocation (*double red line*)

findings are occasionally overlooked [4,14]. A true lateral view of the hand may demonstrate the dislocation, although overlapping of the joints can disregard the dislocation. On posteroanterior (PA) radiographs, some propose to use the so-called M-line parallelism of the CMC joints (Fig. 4). A break in this M-line suggests a dislocation (Fig. 5) [6]. Another method is to draw metacarpal cascade lines on a PA radiograph. These lines are superimposed through the central longitudinal axis of each finger MC. Normally, they focus to a common spot 2 cm proximal to the articular surface of the distal radius (Fig. 4) [9]. In case of a CMC dislocation, these lines do not focus to one spot (Fig. 5). Additionally, different oblique radiographs of the injured hand can be helpful to determine a CMC dislocation [3,4,7,14]. In doubt, and if a CMC dislocation is suspected, extra radiographs in different planes or a computed tomography scan are recommended [13].

A dislocated CMC joint can lead to considerable disability of the hand. Therefore, immediate reduction is necessary to achieve proper function of the hand [10,14]. Initially, closed reduction should be attempted, and generally, acute dislocations (up to 2 days) are easy to reduce [2]. If closed reduction is unsuccessful or the CMC dislocation is associated with major fractures, open reduction is recommended [4,14]. The open reduction is performed through a longitudinal dorsal incision over the dislocated CMC joint. The extensor carpal ulnaris (ECU), which inserts dorsally at the base of the fifth MC, has to be protected. After the ECU is carefully lateralized, the CMC joint is directly visible and can be cleaned of osteochondral debris. Then, inspection for occult fractures should be performed. Fracture fragments of adequate size require fixation. Subsequently, the CMC joint is anatomically reduced and fixated with Kirschner wires [12]. After 6 weeks, the Kirschner wires can be removed [8,12]. In

case of fracture dislocations with severe intra-articular comminution, a primary arthrodesis can be considered [14]. Take into account that an arthrodesis of the fourth and fifth CMC joints will decrease the motion of the transverse metacarpal arch and may predispose osteoarthritis at the triquetrohamate joint as a result of the compensatory movements in that joint [1].

Secondary dislocation after closed reduction and splint immobilization of dislocated CMC joints have been described and occurred within 2 weeks after reduction [7,10]. In one case, an asymptomatic dorsal subluxation occurred 4 months after the reduction [8]. Therefore, most authors suggest instantaneous operative stabilization with Kirschner wires after the reduction [4,10,11,14]. However, the acute ulnar CMC dislocations described in our report did not show secondary dislocation or functional impairment.

During follow up, radiographic controls are necessary to ensure adequate alignment of the CMC joints [3,5,10]. As mentioned, secondary dislocation occurs most frequently in the first 2 weeks after reduction. For this reason, we recommend at least one radiographic control in this period. Another radiographic control is advised after removing the splint in order to assure the alignment of the CMC joints. When a secondary dislocation occurs, an operative stabilization should be performed.

Conclusion

Ulnar CMC dislocations are infrequent injuries that can be missed easily. Immediate reduction is imperative. The cases reported represent acute, uncomplicated examples of dorsal ulnar CMC dislocations in which closed reduction was achieved easily. Although operative treatment is recommended in the literature, these cases show that conservative treatment through immediate reduction and splint immobilization can be sufficient. To assure anatomical alignment, frequent radiographs are required to rule out secondary dislocation.

References

1. Bain GI, Unni PM, Mehta JA, et al. Arthrodesis of ring finger and little finger metacarpal bases for little finger carpometacarpal joint arthritis. *J Hand Surg Br.* 2004;29(5):449–52.
2. de Beer JD, Maloon S, Anderson P, et al. Multiple carpo-metacarpal dislocations. *Hand Surg Br.* 1989;14(1):105–8.
3. de Witte D, Dawson I. A man with a painful right hand. *Ned Tijdschr Geneesk.* 2010;154:A1136.
4. Eichhorn-Sens J, Katzer A, Meenen NM, et al. Karpometakarpale Luxationsverletzungen. *Handchir Mikrochir Plast Chir.* 2001;33(3):189–97.

5. Enajat M, de Boer L, Smit JM. A dislocation of the carpal–metacarpal joints of the index, middle and ring finger. *Am J Emerg Med.* 2009;27(5):630.e1–2.
6. Fisher MR, Rogers LF, Hendrix RW. Systematic approach to identifying fourth and fifth carpometacarpal joint dislocations. *AJR Am J Roentgenol.* 1983;140(2):319–24.
7. Garcia-Elias M, Bishop AT, Dobyns JH, et al. Transcarpal carpometacarpal dislocations, excluding the thumb. *J Hand Surg Am.* 1990;15(4):531–40.
8. Hartwig RH, Louis DS. Multiple carpometacarpal dislocations. A review of four cases. *J Bone Jt Surg Am.* 1979;61(6A):906–8.
9. Hodgson PD, Shewring DJ. The ‘metacarpal cascade lines’; use in the diagnosis of dislocations of the carpometacarpal joints. *J Hand Surg Eur Vol.* 2007;32(3):277–81.
10. Hsu JD, Curtis RM. Carpometacarpal dislocations on the ulnar side of the hand. *J Bone Jt Surg Am.* 1970;52(5):927–30.
11. Lawlis 3rd JF, Gunther SF. Carpometacarpal dislocations. Long-term follow-up. *J Bone Jt Surg Am.* 1991;73(1):52–9.
12. Prokuski LJ, Eglseider Jr WA. Concurrent dorsal dislocations and fracture-dislocations of the index, long, ring, and small (second to fifth) carpometacarpal joints. *J Orthop Trauma.* 2001;15(8):549–54.
13. Pullen C, Richardson M, McCullough K, et al. Injuries to the ulnar carpometacarpal region: are they being underdiagnosed? *Aust N Z J Surg.* 1995;65(4):257–61.
14. Smith GR, Yang SS, Weiland AJ. Multiple carpometacarpal dislocations. A case report and review of treatment. *Am J Orthop (Belle Mead NJ).* 1996;25(7):502–6.
15. Viegas SF, Crossley M, Marzke M, et al. The fourth carpometacarpal joint. *J Hand Surg Am.* 1991;16(3):525–33.
16. Yoshida R, Shah MA, Patterson RM, et al. Anatomy and pathomechanics of ring and small finger carpometacarpal joint injuries. *J Hand Surg Am.* 2003;28(6):1035–43.