

Simultaneous Volar Dislocations of Carpometacarpal and Metacarpophalangeal Joints of the Thumb

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Abstract

Introduction: Multiple dislocations of joints in the hand are rare. Double dislocations of the thumb joints have only been reported on four previous occasions, in all cases reported to date, the joints have dislocated dorsally.

Case Report: We present the case of a 26-year-old male patient with simultaneous volar dislocations of the carpometacarpal and metacarpophalangeal joints of the thumb. There was delayed operative treatment of this injury with ligament reconstruction and stabilization of the metacarpophalangeal joint.

Conclusions: This rare case provides a mechanism to this type of injury, highlights the importance of initial, and repeated clinical and radiographic review, highlights the soft tissue component to this injury, and demonstrates how even delayed treatment can result in a good functional outcome.

Keywords: Thumb, Dislocation, Carpometacarpal, Metacarpophalangeal.

Introduction

The thumb joints are vital to the co-ordinated, multi-directional and precise movements of the hand. The thumb is positioned in a perpendicular plane to the other fingers, with the saddle-shaped carpometacarpal (CMC) joint providing six different planes of movement. The metacarpophalangeal (MCP) joint of the thumb is more like an interphalangeal articulation with movements restricted to one plane. Dislocations of joints in the hand are relatively common; however multiple dislocations of the thumb joints have been rarely described [1-6]. These dislocations involve high-energy axial loading injuries to the thumb, and can also be associated with fractures and ligament disruption. Stiffness and pain after injuries to these joints can result in significant impact on activities of daily living. There have been four other reports of double dislocations of the thumb in the literature. Our report of simultaneous volar dislocations of both of these joints is the first to be described.

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Case History

A 26-year-old right-handed male horse-trainer injured his right hand while riding, as he raised his arm to protect himself from a low branch. His hand collided with the branch whilst still holding onto the reins. He presented to the Accident and Emergency Department with a painful and obviously deformed right thumb. This was a closed isolated injury, and he had no neurological or vascular deficit of the affected thumb. Plain radiographs showed volar dislocations of both the CMC and the MCP joints. There was also a fracture of the volar aspect of the base of the first metacarpal, which appeared to be an avulsion-type (Fig. 1).

Under local anaesthesia block, the two dislocations were reduced with longitudinal traction, and the thumb was immobilized in a Bennett's cast. Upon review in fracture clinic one week later, the position of the CMC joint was excellent, but there was slight radial translation at the MCP joint (Fig. 2). The patient declined operative intervention at this stage, and was maintained in his thumb cast. The patient failed to attend subsequent clinic appointments, but was reviewed again four weeks after the injury. Unfortunately in the interim, the patient had attended a minor injuries department and had his cast changed (without a new X-Ray) after soiling it while at work. At this stage the CMC joint was again well reduced.



Figure 1. AP and lateral radiographs of the initial injury

but there was approximately 30 degrees of radial angulation of the proximal phalanx at the MCP joint (Fig. 3). At this point it was clear the patient required operative stabilization of the MCP joint.

At surgery, the CMC joint was stressed under fluoroscopy and proved to be stable. A dorsal approach was taken over the MCP joint in order to examine both collateral ligaments. The radial collateral ligament was intact but the ulnar collateral ligament was completely ruptured, with disruption of the capsule extending around to the dorsal aspect of the joint. The ulnar collateral was repaired by tying the ligamentous attachments from the metacarpal, to Mitek (De Puy Mitek, Warsaw, IN, USA) sutures anchored into the proximal phalanx. Finally the MCP joint was temporarily immobilized with a Kirschner (K) wire (Fig. 4).



Figure 2. AP and lateral radiographs at one-week post injury.

Post-operatively the patient continued to work with horses, despite advice to the contrary. The Kirschner wire was removed three weeks post-operatively due to a superficial pin site infection, which was successfully treated with systemic oral antibiotics (amoxicillin / clavulanic acid). The cast was kept on and finally removed at six weeks.

At three months the patient was working and able to perform most of his manual tasks, although he complained of weakened grip strength. He was found to have considerable stiffness at the 1st MCP joint, with range of movement limited from 0 to 30 degrees

At 12 months the patient was pain free without restriction of function, and although he could not fully extend his MCP joint, he could only flex to 50 degrees only (compared to 90 degrees on the contralateral side). There was no radio-ulnar instability and no distal



Figure 3. AP and lateral radiographs at four weeks post injury. Note the radial deviation at the MCP joint.



Figure 4. AP and lateral radiographs one week post-operatively

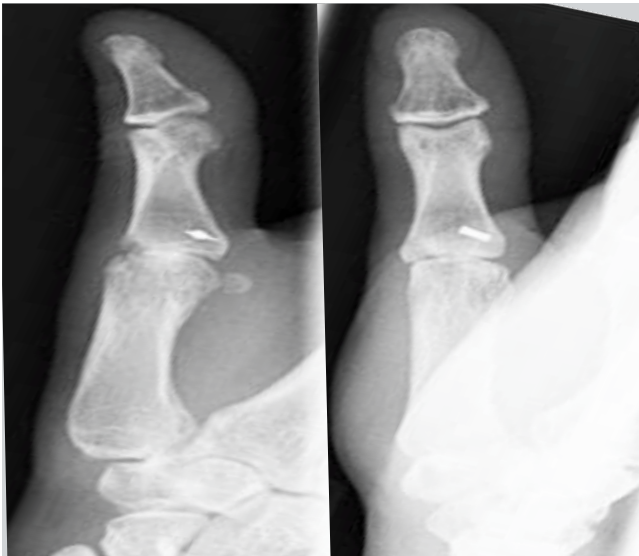


Figure 5. AP and lateral radiographs 12 months after the injury showing good reduction

neurovascular compromise (Fig. 5).

Discussion

Double dislocations of thumb joints are rare, there are only six previous reports of concurrent dislocations of the CMC and MCP of the thumb, and of these only one report also includes an associated fracture at the base of the thumb. Interestingly, in the other case reports, both the CMC and MCP dislocated dorsally. The accepted mechanism of this injury is a longitudinally directed force with hyperextension at the MCP, and slight flexion at the CMC joint [4]. Certainly all of the injuries described involved high-energy forces. Our patient had both dislocations in the volar direction. When questioned he described gripping the reins with hands together, and then raising both arms above his head for protection just prior to impact. This would cause his wrists to be flexed and radially deviated, with thumb metacarpals extended, and phalanges flexed. The authors feel that a longitudinally directed force with the thumb in this position would account for this unique injury.

In all of the previous reports, the CMC joint was unstable and required operative stabilization; with K-wires in four cases, and ligament reconstruction (Eaton's procedure) in two cases [1-6]. In two of these case reports, the radial collateral ligament of the MCP joint was unstable, and in another the ulnar collateral ligament was unstable. All of these ligaments required repair, with additional K-wire fixation in one of these

cases [2-6]. In their report of concurrent CMC and MCP joint dislocations, Drosos et al categorize MCP joint dislocations as simple (reducible with a closed technique) and complex (irreducible with closed technique, requiring open reduction) [6]. It has been postulated that the energy required to produce double dislocations causes more ligamentous damage, and hence greater instability that either injury on its own. Maintaining two anatomically reduced joints becomes inherently more difficult as a result [7].

Four weeks after the injury, the CMC joint of our patient was still in a good position, and although the lateral view of the MCP showed no subluxation / dislocation, the antero-posterior view of the MCP joint showed further radial angulation. Even though there was slight translation at the MCP joint at the one-week review, we were forced to opt for conservative management because the patient declined operative intervention. Certainly we did no harm by delayed operative fixation until three weeks later. In the case described by Ibrahim and Noor, the patient had both CMC and MCP joints dislocated for five weeks before operative repair was performed; the CMC joint was stabilized with a sole K-wire, and at the MCP joint a K-wire plus radial collateral ligament repair. Their patient had good functional recovery at one year follow up [2]. Farzan et al [5], report a case of a volar dislocated CMC which presented 3 months after the initial injury, due to pain and an inability to pinch and perform opposition. This required open reduction, reconstruction with Eaton's procedure, K-wire stabilization, and a thumb spica for six weeks. At four month follow up thumb opposition was possible and pain-free, pinch and grip were near normal compared to the contra-lateral side, and the global reduction in thumb movement was only 10 degrees [5].

This injury can be treated non-operatively if assessed accurately at presentation, with close follow up. Marcotte and Trzeciak, described a case of CMC and MCP dislocations, which were stable after closed reduction, with only slight laxity of the ulnar collateral ligament. Although the option of surgical stabilization was discussed, the joints remained anatomically reduced for the 5 weeks the patient remained in a cast. The patient continued to have clinical and radiological follow up monthly, for 3 months to confirm the joints

remained reduced. At 2 year follow up, the thumb was pain free, stable, with a good range of movement and no evidence of arthritis [7].

In our report, the patient was followed up for one year, similar follow up to the other reports. Moore et al followed up their patient for 9 years, with no evidence of arthritis or instability [4]. However, Gerard et al, did report degenerative changes in the CMC and MCP joints in a patient with double dislocations [8]. Given the severity of this injury, it is certainly conceivable that these patients would develop symptomatic degenerative changes in the long term.

Conclusion

Our literature review suggests there are many options for the treating this injury: operative or conservative treatment; treating both joints as separate injuries or together; and ligamentous repair and/or K-wire fixation. The key to these decisions seems to rest at the initial clinic review after successful reduction. If instability can be assessed here and operative or non-operative decisions made, then management can be tailored accordingly. Furthermore these injuries need weekly radiographic follow up if conservative treatment is opted for, so that any further subluxation or dislocation is highlighted early. Although the patient opted for initial conservative management, and even with delayed operative stabilization of one joint, the patient had a good functional outcome.

Clinical Message

Double dislocation of CMC and MCP joints of the thumb is rare entity; however it behaves similar to isolated injuries. Treatment is closed reduction and if instability persists, operative treatment can be planed. Even delayed cases give good results on appropriate treatment.

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