



Multiple Carpo-Metacarpal Joint Dislocations: A Case Series

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ABSTRACT

Introduction: Dislocations of the carpometacarpal (CMC) joint, particularly those affecting multiple joints, are exceptionally uncommon and frequently misdiagnosed owing to minor clinical and radiological indicators.

Methods: We present two cases of volar dislocation affecting the CMC joints. The initial case pertained to an elderly male who incurred a right-hand injury after a fall from a two-wheeler, leading to volar subluxation of the first, second, and third carpometacarpal joints, accompanied by a comminuted fracture of the trapezium. The second case related to a youngster who sustained a left-hand injury from an assault, resulting in volar dislocation of the second and third carpometacarpal joints. Both patients underwent effective treatment using closed reduction and internal fixation with Kirschner wires, subsequently followed by immobilization and rehabilitation.

Result: At the one-year follow-up, both individuals achieved complete functional recovery with sufficient grip and pinch strength.

Conclusion: These cases underscore the significance of comprehensive clinical assessment and suitable imaging in the diagnosis of CMC dislocations. Timely surgical intervention utilizing K-wire fixation is a straightforward yet efficacious method for attaining superior results in these rare accidents.

1. Introduction

Dislocations of the carpometacarpal (CMC) joint are uncommon injuries, representing fewer than 1% of all hand traumas. They generally arise from high-energy sources, including vehicular collisions, falls, or direct impact injuries. The CMC joints, especially the second and third, possess intrinsic stability owing to robust ligamentous and bony support, rendering dislocation exceedingly rare¹. Conversely, the fourth and fifth CMC joints exhibit greater mobility and are hence more often implicated in such accidents. Dislocations may occur in dorsal or volar orientations, with dorsal dislocations being more prevalent². Dislocations of multiple CMC joints, particularly volar kinds, are exceptionally uncommon and can remain undetected in acute situations due to widespread edema and overlaying bone structures on radiographs³. Delayed

diagnosis or insufficient treatment may lead to suboptimal functional outcomes, such as chronic discomfort, diminished grip strength, and rigidity⁴.

Prompt clinical suspicion, suitable imaging (particularly true lateral radiographs), and quick surgical intervention are crucial for optimum recovery⁵. This study presents two uncommon occurrences of volar dislocations affecting numerous CMC joints. Both patients underwent effective treatment using closed reduction and percutaneous K-wire fixation, yielding outstanding long-term functional results.

Case 1

A male patient in his late 60s visited our outpatient department two days after sustaining an injury to his right hand. He reported falling from a two-wheeler onto the dorsum of his right hand. The patient did not seek



immediate medical attention and opted to wait for the swelling to subside on its own. Upon clinical examination of the right hand, significant swelling over the metacarpals was observed. Palmar ecchymosis was evident on the dorsum of the hand, although no open wounds were noted. There was diffuse tenderness over the carpometacarpal (CMC) area, with intact capillary circulation and normal sensation. The patient experienced pain that restricted active movement of the wrist and fingers.

Radiographs of the right hand, including anteroposterior and true lateral views, revealed volar subluxations of the 1st, 2nd, and 3rd Carpometacarpal (CMC) joints. Additionally, there was an associated comminuted trapezium fracture evident in the right hand (Figure 1).



Figure 1: Preoperative radiographs of the right-hand demonstrating dislocation of the carpometacarpal (CMC) joint. **(A)** Anteroposterior (AP) image demonstrating the disturbance of the normal alignment of the carpometacarpal (CMC) joints. **(B)** Oblique image distinctly illustrating dorsal dislocation of the fourth and fifth CMC joints (red arrow) and **(C)** Lateral image illustrating the dorsal displacement of the metacarpal bases in relation to the carpal bones (red arrow).

The patient underwent closed reduction and internal fixation with multiple Kirschner wires (K-wires). Closed reduction was performed by giving traction along the longitudinal axis combined with pressure over the dorsal base of the Carpometacarpal (CMC) joints in the palmar direction. Reduction was confirmed under C-arm fluoroscopy, followed by insertion of multiple 1.5mm K-wires to maintain the reduction from distal to proximal

direction. A slab on the volar aspect of hand was applied, with the hand in a safe position. Post operatively radiographs were taken which demonstrated alignment of 1st, 2nd, and 3rd CMC joints (Figure 2). The patient was immobilized at the right hand for 6 weeks, followed by slab removal, and physiotherapy was initiated to address finger stiffness. At 3 months follow-up, the patient reported satisfaction with the range of motion, and by 1 year postoperatively, the patient achieved comparable grip strength and pinch strength as the unaffected hand.



Figure 2: Postoperative radiographs depicting K-wire fixation of carpometacarpal (CMC) joint dislocation. **(A)** Anteroposterior (AP) image illustrating effective reduction and stabilization of the fourth and fifth carpometacarpal joints utilizing crossed K-wires. **(B)** Lateral view verifying correct alignment and stable positioning of the metacarpal bases with transfixing K-wires.

Case 2

A male patient in his mid-20s presented to our outpatient department following an injury to his left hand, allegedly resulting from an assault. Clinical assessment of the left hand revealed pronounced swelling over the metacarpals and palmar ecchymosis on the dorsum of the hand. Similar to Case 1, diffuse tenderness was noted over the CMC area, with intact capillary circulation and normal sensation. The patient exhibited limited active movement of the wrist and fingers due to pain. Radiographs of the left hand, including anteroposterior and true lateral views, demonstrated volar dislocation of the 2nd and 3rd Carpometacarpal (CMC) joints (Figure 3).



Figure 3: Preoperative radiographs demonstrate fracture-dislocation at the distal radioulnar and radiocarpal joints. (A) Anteroposterior (AP) image of the left wrist demonstrating loss of normal joint congruity and cerebral disturbance. (B) Oblique view illustrating volar displacement of carpal bones with disruption at the radiocarpal joint (red arrow) and (C) The lateral image distinctly illustrates the dislocation and fracture fragments adjacent to the distal ulna, together with the volar displacement of the carpal components (red arrow).

The patient underwent closed reduction internal fixation with multiple Kirschner wires (K-wires). Similar to Case 1, closed reduction was achieved by giving traction over the longitudinal axis combined with pressure over the dorsal base of the Carpometacarpal (CMC) joints in the palmar direction, confirmed under C-arm fluoroscopy. Multiple 1.5mm K-wires were inserted to maintain reduction from distal to proximal direction. A slab on the volar aspect of hand was applied, with the hand in a safe position. Postoperative radiographs confirmed congruent joints of the 2nd and 3rd CMC joints (Figure 4). The patient was immobilized at the left hand for 6 weeks, followed by removal of the slab and initiation of physiotherapy for finger stiffness. At 3 months follow-up, the patient expressed satisfaction with the range of motion, and at 1 year postoperatively, achieved comparable grip strength and pinch strength as the unaffected hand



Figure 4: Postoperative radiographs of the right hand demonstrate closed reduction and internal fixation of the first, second, and third carpometacarpal (CMC) joints utilizing Kirschner wires (K-wires). (A) Anteroposterior view illustrating correct alignment of the CMC joints with K-wires in place. (B) True lateral image demonstrating the volar placement of the K-wires, hence confirming sustained decrease.

Discussion

Multiple carpometacarpal (CMC) joint dislocations are exceedingly uncommon. The fifth CMC joint is a saddle type of joint, granting it greater mobility when compared to the second, third & fourth CMC joints. Notably, the fifth metacarpal configuration inclines toward the ulnar side, while the fourth CMC joint is transverse^{6, 7}. The base of the fifth CMC joint serves as the insertion point for the flexor carpi ulnaris tendon, contributing to instability in this joint, unlike the second, third & fourth CMC joints where dislocation is uncommon⁸. The typical mechanism of injury involves high-velocity impact. There are two types of fracture dislocations, volar and dorsal, based on the direction of force of injury, with dorsal being more prevalent than volar. Simultaneous dislocations involving multiple CMC joints across different digits have also been documented^{9, 10}. In diagnosing such injuries, obtaining minimum two plain x rays, antero-posterior and lateral views, are imperative for accurate assessment. Lateral view radiographs help in discerning the direction of the



displaced CMC joints¹¹. Confirmation of the diagnosis was made via plain radiographs, although advanced imaging such as computed tomography may be necessary in cases of occult fracture¹². Surgical intervention is warranted in cases of open fracture dislocations, failed closed reduction resulting in joint instability, intra-articular damage, concomitant carpal or metacarpal fractures, or displaced avulsion fractures involving the extensor carpi ulnaris¹³. Treatment modalities include casting, closed reduction with percutaneous pinning (CRPP), and open reduction internal fixation. For cases without intra-articular involvement closed reduction with K-wire fixation is recommended¹⁴. Incorporating K-wiring technique helps avoiding the risks by ensuring secure stabilization. Open reduction is seldom advised for cases where closed reduction is ineffective. Currently, there is no consensus on the optimal duration for K-wire fixation of CMC joints. In these patients volar slab was used for immobilising the hand in a safe position for 6 weeks after which K-wire removal was done and slab was taken out, physiotherapy was initiated to prevent joint stiffness^{15,16}. Both patients were on regular follow-up at 1 month, 3 months, and 6 months postoperatively. During follow-up visits, they underwent a regimen of passive followed by active range of motion exercises for both hands. By the 6-month postoperative mark, the range of motion in the affected hands had returned to parity with the unaffected hands. Both patients successfully resumed their normal occupational and daily activities without any significant functional deficits.

Conclusion

Multiple carpo-metacarpal joint dislocations are often due to a high velocity injury. Thorough clinical examination is crucial, misdiagnosis is a common phenomena in such cases and hence plain radiographic studies especially true lateral views are essential for accurate diagnosis. Standard treatment approaches for fracture dislocations must be employed. Simple closed reduction combined with K-wire fixation is a straightforward and effective technique that yields excellent outcomes.

Conflict of interest

The authors declare no conflict of interest.

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