

## Case Report

# Volar dislocation of four carpometacarpal joint: A rarest injury

Garg Rajneesh<sup>1</sup>, Gupta Renu<sup>\*2</sup>, Singh Brijendra<sup>2</sup>, Siwach Rajeev<sup>1</sup>

<sup>1</sup>Department of Orthopaedics, Saraswati Hospital, Jodhpur, India

<sup>2</sup>Department of Anatomy, AIIMS, Jodhpur, India

### \*Correspondence Info:

Dr. Renu Gupta, MBBS, MD (Anatomy),

Assistant Professor,

Department of Anatomy, AIIMS, Jodhpur, India.

E-mail: [drrenu.gupta79@gmail.com](mailto:drrenu.gupta79@gmail.com)

### Abstract

This article reports a case of young male grievous with fracture dislocation of the four carpometacarpal (CMC) joints dislocation due to motor vehicle collision. Volar- radial deviation of the second and third CMC joints and volar- ulnar deviation of fourth and fifth CMC joints were observed. Patient was treated with closed reduction and fixed with 0.045 K wires. First wire was placed in third metacarpal and capitate and second wire was placed from fifth metacarpal base to the proximal row of carpals. Despite all effort complete reduction at fourth and fifth CMC joint was not achieved. Follow up radiographs at one month showed satisfactory reduction and patient is performing well till the last follow up. Intensive postoperative physiotherapy is vital to achieving a satisfactory outcome.

**Keywords:** carpometacarpal joint, volar radial, volar ulnar, K wires

## 1. Introduction

Metacarpal fractures and dislocation account for 1% of all hand injuries<sup>1</sup>. Men aged 10-29 have highest incidence of metacarpal injuries. Carpometacarpal (CMC) fracture dislocations are developed due to a direct high-energy blow on to the hand. Any type of displacement of the metacarpals is determined by the direction of the force applied to the hand at the time of injury<sup>2</sup>. The carpometacarpal joints of the hand are gliding type of joints. The distal row of the carpal bones articulates with the bases of the metacarpals and with each other. All ligaments like Intermetacarpal and carpometacarpal, as well as ligaments of the wrist flexors and extensors those are inserted to the bases of the second, third, and fifth metacarpals, reinforce the joints<sup>1</sup>.

Although volar type of CMC dislocation are very rare type of injury, but it was first described by McWhorter in 1918<sup>3</sup>. All of the ligamentous and tendinous structures are disrupted in the volar-radial displacement which may cause marked displacement of the metacarpal base. The pisometacarpal ligament remains intact in the volar-ulnar type of displacement, which preventing excessive displacement of the fifth metacarpal base. There are chances of concomitant soft tissue injuries like tendon laceration and neurovascular injury.

In the literature many cases were reported of one or two volar CMC joints dislocations which were treated by closed reduction and casting<sup>4,5</sup>, while open reduction and internal fixation is usually required in unstable type of injury. The patients usually complain of pain as well as grip weakness due to failure to diagnose these injuries or inability to maintain an anatomic reduction<sup>6,7</sup>. The purpose of this report is to present a case of all four CMC joints dislocations. It is a very rare injury. After extensive search on pubmed we did not find any case report of volar displacement of all four CMC joints injury.

## 2. Case report

A 22 year old, young male met with a motor vehicle collision and fell onto his forced palmer flexed right hand. He noticed immediate pain and deformity of his hand and presented himself to author. On physical examination marked widening in between all fingers as well as swelling with significant bruising over the dorsum of the wrist (fig 1) and hand was observed.

**Fig 1: Preoperative clinical photo showed marked widening in between all fingers and swelling with bruising over the dorsum of the wrist and hand**



**Fig 2: Preoperative clinical photo demonstrate volar deviation of hand**



Empty space over dorsal aspect of hand and bony prominences felt on thenar and hypothenar region (fig 2). Sensation over the median and ulnar nerve distributed area was intact. All thenar, hypothenar and interossei muscles were working properly. Capillary refilling was within normal limits. Anteroposterior radiograph showed widening of all intermetacarpal distance and normal relationship of distal row with base of all metacarpals found disturbed, second and third CMC joints was radially deviated and ulnar deviation of fourth and fifth CMC joints were observed (fig 3). On oblique view all four metacarpal was volarly dislocated. True lateral view was not taken due to severe pain as patient was not co-operating. CT scan was not done due to financial concerns.

**Fig 3: Preoperative oblique and anteroposterior radiograph showed widening of all intermetacarpal distance, disruption of relationship of distal row with base of metacarpals, volar- radial deviation of the second and third CMC joints and volar- ulnar deviation of fourth and fifth CMC joints**



Patient was taken to Operation Theater and closed reduction was performed under general anesthesia. Reduction was not stable on releasing traction, the metacarpals dislocated towards volar side hence fixed with 0.045 K wires. First wire was placed in third metacarpal and capitate and second wire was placed from fifth metacarpal base to the proximal row of carpal (fig 4).

**Fig 4: Postoperative radiograph showed fixation with K wires, one wire placed in third metacarpal and capitate and another one placed from fifth metacarpal base to the proximal row of carpal**



Despite all effort we could not achieved complete reduction at fourth and fifth CMC joint. Patient and his relatives did not agree for open reduction, hence no further procedure was undertaken and a volar POP slab was given for one month. After one month POP slab and K wire were removed and radiograph of hand was taken (Fig 5).

**Fig 5: Follow up radiograph after one month showing acceptable reduction.**



## Ethical Considerations

Informed consent was taken from the patients prior to operation and for the inclusion to the study.

## 3. Discussion

Volar dislocations of all four CMC joints are very rare injury. Only two reports of isolated volar index finger CMC dislocations<sup>8,9</sup> and two reports of volar CMC dislocations of the index and long fingers<sup>2,10</sup> are mentioned in literature. Volar CMC dislocations of the four ulnar metacarpals are reported by three authors<sup>4,11,12</sup>. In our case report not only volar dislocation of all four CMC joints but two CMC joints were dislocated towards radial side and two towards ulnar side which is a very rare occurrence.

Either dorsal or volar CMC dislocation may create severe consequences if they were not identified and treated adequately. Neurovascular evaluation is compulsory due to chances of injury to deep motor branch of the ulnar nerve in both dorsal<sup>13,14</sup> and volar CMC dislocations<sup>15,16</sup> and the median nerve is also affected by volar CMC dislocations<sup>2</sup>. But in present case report no neurovascular compromised had detected. Though many authors described open reduction of this fracture dislocation as the primary treatment but in present case we performed closed reduction and K wire fixation and follow up radiograph showed satisfactory reduction and patient is performing well till the last follow up. Intensive postoperative physiotherapy is vital to achieving a satisfactory outcome.

## References

1. Henry M. Fractures and dislocations of the hand. In: Buchholz RW, Heckman JD, Green DP, eds. *Rockwood and Green's Fractures in Adults*. Philadelphia, PA: Lippincott-Raven; 2001:369-374.
2. Weiland AJ, Lister GD, Villareal-Rios A. Volar fracture dislocations of the second and third carpometacarpal joints associated with acute carpal tunnel syndrome. *J Trauma* 1976; 16:672-675.
3. McWhorter GL. Isolated and complete dislocation of the fifth carpometacarpal joint: open operation. *Surg Clin Chicago* 1918; 2:793-796.
4. Bajekal RA, Kotwal PP, Menon D. Closed volar dislocations of the four ulnar carpometacarpal joints. *Injury* 1992; 23:355-356.
5. Berg EE, Murphy DF. Ulnopalmar dislocation of the fifth carpometacarpal joint—successful closed reduction: review of the literature and anatomic reevaluation. *J Hand Surg* 1986; 11A:521-525.
6. Hazlett JW. Carpometacarpal dislocations other than the thumb: a report of eleven cases. *Can J Surg* 1968; 11:315-323.
7. Hsu JD, Curtis RM. Carpometacarpal dislocations on the ulnar side of the hand. *J Bone Jt Surg* 1970; 52A:927-930.
8. Schutt RC, Boswick JA, Scott FA. Volar fracture dislocation of the carpometacarpal joint of the index finger treated by delayed open reduction. *J Trauma* 1981; 21:986.
9. Thomas WO, Gottliebson WM, D'Amore TF, Parry SW. Isolated palmar displaced fracture of the base of the index metacarpal: a case report. *J Hand Surg* 1994; 19A:455-456.
10. Harwin SF, Fox JM, Sedlin ED. Volar dislocation of the bases of the second and third metacarpals. *J Bone Jt Surg* 1975; 57A:849-851.
11. Kleinman WB, Grantham SA. Multiple volar carpometacarpal joint dislocation: case report of traumatic volar dislocation of the medial four carpometacarpal joints in a child and review of the literature. *J Hand Surg* 1978; 3A:377-382.
12. Kumar S, Arora A, Jain AK, Agarwal A. Volar dislocation of multiple carpometacarpal joints: report of four cases. *J Orthop Trauma* 1998; 12:523-526.
13. Peterson P, Sacks S. Fracture-dislocation of the base of the fifth metacarpal associated with injury to the deep motor branch of the ulnar nerve: A case report. *J Hand Surg* 1986; 11A:525-528.
14. Young TB. Dorsal dislocation of the metacarpal base of the little and ring fingers with ulnar nerve compression. *Injury* 1987; 18:65-73.
15. Gore DR. Carpometacarpal dislocation producing compression of the deep branch of the ulnar nerve. *J Bone Jt Surg* 1971; 53A:1387-1390.
16. O'Rourke PJ, Quinlan W. Fracture dislocation of the fifth metacarpal resulting in compression of the deep branch of the ulnar nerve. *J Hand Surg* 1993; 18B:190-191.