Carpometacarpal joint fracture–dislocation of the second to fifth finger

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Background
Carpometacarpal (CMC) joint fracture–dislocation of the second to the fifth finger is a rare hand injury associated with high-energy trauma. Due to severe swelling and overlapping of bones on the radiograph of the wrist–hand, dislocations are missed. We reported on a series of eight patients with CMC joint fracture–dislocation treated with closed reduction and percutaneous K-wire fixation.
Patients and methods
Eight cases of CMC joint fracture–dislocation were retrospectively studied. All patients were treated with closed reduction and fixation with K-wire. Functional assessment was done with Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH) score.
Results
The average QuickDASH score was observed to have improved from 75.76 to 1.9 from 6 weeks to 14 months of duration. Of the eight patients, three patients had a QuickDASH score of 0 at the end of 14 months.
Conclusions
Careful hand examination and radiographic assessment are necessary to avoid a missed diagnosis of CMC joint fracture–dislocation. Early closed reduction and fixation lead to excellent recovery of hand function.

Keywords:
carpometacarpal joints, dorsal dislocation, fracture, volar dislocation

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Introduction

Traumatic fracture dislocations of carpometacarpal (CMC) joints is a rare injury that presents in less than 1% of hand and wrist injuries [1]. CMC joint dislocation occurs with other associated fractures. Most CMC joint dislocations are missed on radiographs of wrist joint and hand due to overlapping of bones [2]. The severity of displacement depends on the position of the hand, wrist, and intensity of force applied. Dorsal CMC joint dislocations are more common than volar CMC joint dislocations. In addition, a divergent variety of CMC dislocations is very rare [3,4]. Delayed treatment of CMC dislocations results in poor functional outcomes and chronic residual pain [5].

Patients and methods

We treated eight patients with CMC joint fracture–dislocation in Mataria Teaching Hospital. The average age of the patients was 28 years. The consent is attached, and the study was approved by the Ethics Board of Orthopedics Department, Mataria Teaching Hospital, Cairo, Egypt. Four patients had dorsal fracture–dislocation of CMC joint and four had volar fracture–dislocation of CMC (Figs 1 and 2). Four cases had CMC joint dislocation in the second, third, and fourth joints; two cases had CMC joint dislocation in the second and third joints and two cases had CMC joint dislocation in the fourth and fifth joints. A road traffic accident was the mode of injury in all patients. Diagnoses on the radiograph of the wrist joint and hand were made on arrival to the Emergency Department of MTH. No cases of compartment syndrome were recorded. One case reported loss of reduction and one reported carpal boss deformity (Table 1). Patients were admitted with below elbow splint.

Surgical technique

All patients were operated in the operation room under regional block in supine position. The time interval from the onset of injury till the onset of surgery ranged from 6 to 8 h. Closed reduction was done under aseptic precautions and percutaneous Kirschner wire (K-wire) fixation (Fig.3). Attempts to exit the longitudinal K-wires from the metacarpal head recess were unsuccessful in a few cases [6]. In two cases, the intermetacarpal wire was used for stability.

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Figure 1

Anteroposterior, lateral, and oblique views of volar fracture–dislocation of the second and third carpometacarpal joint.

Figure 2

Preoperative clinical photograph of volar fracture–dislocation of the second and third carpometacarpal joint of the left hand.

Figure 3

Postoperative anteroposterior, oblique views of the left hand.

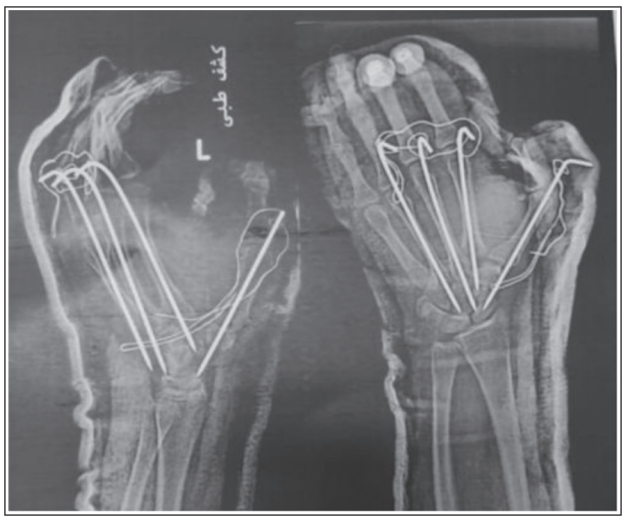
Alignment of fracture and joint reduction were evaluated under an image intensifier in anteroposterior, lateral, and oblique views. Below the elbow, the slap was applied and immobilization was continued for 6 weeks. K-wires were removed after 6 weeks. Physiotherapy was started 6 weeks postoperatively with

Table 1 Demographics and clinical parameters of eight patients

Numbers.	Age (years)	Sex	Type of fracture–dislocation	Joints dislocated	Closed/open fracture–dislocation	Associated fracture	QuickDASH score			Complication	Follow-up (months)
							6 weeks	4 months	10 months	14 months	
1	22	Male	Volar	2nd, 3rd, 4th	Closed		70.5	29.5	0	0	14
2	25	Male	Volar	4th, 5th	Closed	First metacarpal shaft fracture associated with CMC dislocation	22.7	30	2.3	2.3	10
3	19	Male	Dorsal	2nd, 3rd	Closed		68.2	25	0	0	10
4	28	Female	Volar	2nd, 3rd, 4th	Closed		77.3	28.5	9.1	2.3	Loss of reduction was revised	14
5	24	Male	Dorsal	4th, 5th	Closed	Comminuted fracture of neck of fourth metacarpal	84.1	45.5	20.5	2.3	Nonunion of neck of fourth metacarpal	14
6	38	Male	Volar	2nd, 3rd, 4th	Closed		81.8	43.2	2.3	0	Carpal boss deformity	14
7	25	Female	Dorsal	2nd, 3rd, 4th	Closed		22.7	30	2.3	2.3		10
8	25	Male	Dorsal	2nd, 3rd	Closed		84.1	45.5	20.5	1.9		14
Average							75.76	33.78	5.7	1.9		

QuickDASH score, Quick Disabilities of the Arm, Shoulder, and Hand score.

Figure 4



Six weeks postoperative anteroposterior, oblique views of the left hand.

Figure 5

One-year postoperative anteroposterior, oblique views of the left hand.

the metacarpal brace. Metacarpal brace was continued for 3–6 weeks. Active and passive mobilization of the wrist joint, metacarpophalangeal joints, and proximal and distal interphalangeal joints of fingers were started along with a metacarpal brace, to achieve good functional recovery. No stiffness of PIP or MCP joints were reported.

Follow-up was done at 6 weeks (Fig.4), 4 months, 10 months, 14 months (Figs 5 and 6), postoperatively with anteroposterior, lateral, and oblique radiograph of the wrist joint and hand. In addition, the functional assessment was conducted with Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH) score at 6 weeks, 4 months, 10 months, and 14 months postoperatively [7].

Results

The average follow-up was 10 months (range, 4–14 months). The average QuickDASH score was 75.76 at 6 weeks, 33.78 at 4 months, 5.7 at 10 months, and 1.9 at 14 months. The average QuickDASH score improved from 75.76 to 1.9 from 6 weeks to 14 months. Three of eight patients had a QuickDASH score of 0 at the end of 14 months.

Discussion

CMC joints are saddle joints that are stabilized by volar and dorsal ligaments, transverse metacarpal ligaments, long flexor and extensor tendons, and intrinsic muscles of the hand. Dorsal ligaments are stronger than volar ligaments. Furthermore, ulnar-sided CMC joints are more mobile than radial CMC joints [8]. Kumar and Malhotra [3] and Kumar *etal*. [5] described a 'divergent variant' of multiple CMC dislocations in which divergence is defined as volar dislocation of more than or equal to one joint with concomitant dorsal dislocation of more than or equal to one joint.

High-velocity injury is the most common mechanism of injury for CMC dislocation [9,10]. The type of CMC joint fracture–dislocation depends on the direction of force [11]. Previous reports have suggested that dorsal CMC joint fracture–dislocation is more common, but it was equal in our series [9,12].

On the anteroposterior radiograph, evaluation of the CMC joint is done by parallel 'M lines' as described by Gilula [13]. In a lateral radiograph, it is important to assess the direction of the displaced CMC joint fracture–dislocation [14].

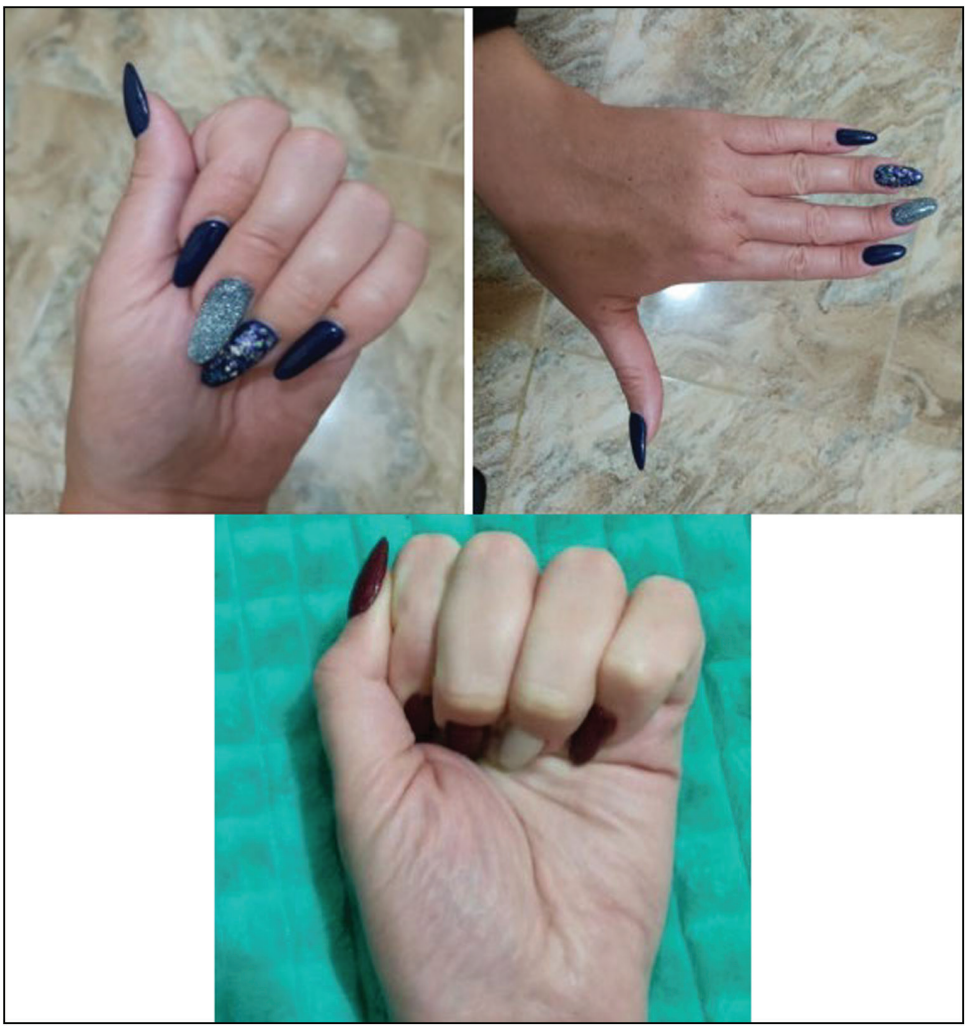
In this study, all cases were treated. Excellent results can be expected with normal anatomic reduction of the joint, as any loss of movement is compensated by the adjacent joint [15].

Physiotherapy of the hand and wrist joint is required after 6 weeks of immobilization to avoid postoperative stiffness [14,16]. In our case series, the average QuickDASH score improved from 75.76 to 1.9. Three patients of our series achieved a QuickDASH score of 0 at the end of 14 months follow-up.

Conclusion

CMC joint fracture–dislocation from the second to the fifth finger is an extremely rare injury that needs thorough clinical examination and radiological assessment. Missed diagnoses are frequently reported. Hence, CMC joint fracture–dislocation should be

Figure 6



Full range of flexion, an extension of left hand 14 months postoperatively.

considered on careful examination of the hand injury, in addition to true lateral radiograph of the wrist and hand. Early closed reduction and fixation are required for excellent functional results of the hand injury.

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Conflicts of interest
There are no conflicts of interest.

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