



ISOLATED DORSAL DISLOCATION OF ULNAR FOUR METACARPALS:A CASE REPORT

Orthopaedics

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ABSTRACT

Isolated dislocation of the multiple carpometacarpal joints without any associated fractures of the metacarpal and/or carpal bones is a less commonly reported injury. Even more rare is its occurrence after a minimal trauma to hand. We present a case report of a 21 year old gentleman presenting to us with isolated dorsal dislocation of ulnar four metacarpals, after he punched a wall with his fist being partially clenched. Successful closed reduction of the dislocation and stabilisation with multiple K wires was done for this injury under anaesthesia in the operating theatre. Early recognition and anatomical reduction are essential in achieving good long-term outcomes in such uncommon injuries.

KEYWORDS

INTRODUCTION

Simultaneous pure dislocation of multiple carpometacarpal (CMC) joints without any associated fracture is a rare injury. In a review of 1,621 fractures and dislocations of the wrist and hand, Dobyns et al¹ reported only three (0.2%) such cases of dorsal dislocations of ulnar four metacarpals. The injury can be easily missed on initial presentation in a busy emergency department in the light of normal looking routine PA and oblique radiographs of hand, especially when assessed by a junior colleague. It is usually sustained after a high energy trauma like road traffic accident or after fall from height or punching a hard surface. Missed or delayed treatment of such cases are associated with long term disability, reduced grip strength and osteoarthritis of hand.² We present a rare case report of an isolated closed dorsal dislocation of ulnar four metacarpals and its management. We will also highlight the main points in early diagnosis and management of this injury and review the CMC anatomy.

CASE REPORT

A 21 year old gentleman presented to the emergency department with injury to his right hand after he punched a concrete wall with a partially clenched fist. There were no other associated injuries. His past medical history was suggestive of alcoholism but he denied any other problems. He also had an allergy to penicillin. On examination he had diffuse swelling and tenderness over the dorsum of his hand. Distal neurovascular examination was normal. Routine PA and oblique views of his hand (Figure 1) did not show any fracture and he was prescribed analgesia and given splintage for the injury by the emergency department. As his pain was not controlled by the routine analgesia and he was not found safe to discharge, he was referred to the orthopaedics team for their opinion who requested a true lateral view of hand, which demonstrated the dorsal dislocation of ulnar four metacarpals.



Figure 1: Initial PA, oblique and Lateral view depicting dislocation of all four ulnar metacarpals.

He was taken to theatre the next day where a closed reduction of dislocation was performed under general anaesthesia. After the reduction an oblique K wire (1.6 mm) was used to stabilise 5th CMC joint and a transverse K wire was put across 3,4,5 the metacarpal in reduced position and another oblique K wire was used to stabilise 2nd CMC joint. The reduction was checked intraoperatively by stress testing (figure 2) and was found to be stable. The hand was immobilized in a dorsal POP to allow the swelling to settle down and

for comfort purposes for 2 weeks. The pins were removed at 4 weeks in clinic under local anaesthesia after which he was referred for regular physiotherapy and intensive hand therapy. He was regularly followed up at 6 weeks, 3 months and 6 months and showed a gradual improvement and at final review at 6 months had full pain free ROM of all joints of right hand with return to normal function and therefore he was discharged. Subsequent radiographs (PA, Lat, Obl) done (figure 3) at follow up showed a normal alignment of CMC joint and maintenance of reduction.

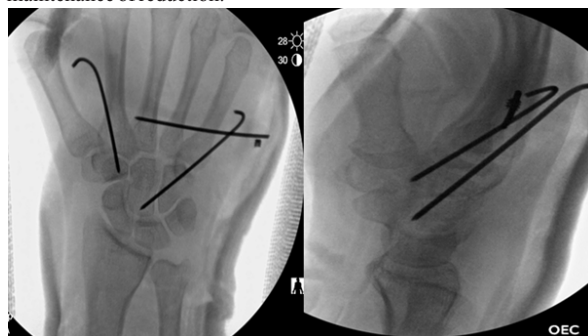


Figure 2: Intra operative radiographs showing reduced CMC joints and K wires in situ.



Figure 3: Six Months postoperative films showing reduced CMC joints.

DISCUSSION

Isolated CMC joint dislocations without any associated fractures are extremely uncommon injuries with very few cases reported in the literature. The cases are easily missed especially in acute settings.³ We feel this case report as unique for the following reasons: (1) Isolated pure dislocation of ulnar four metacarpals without an associated fracture or neurovascular deficit is rarely reported injury. Most documented studies in literature are of fourth or fifth CMC joint dislocation. (2) This injury occurred after relatively minor trauma to hand. (3) We propose that early diagnosis and timely treatment of this injury can have a good overall outcome.

The structure and shape of CMC joints along with soft tissue constraints contribute to the stability of these joints. The first four

CMC joints are of gliding variety (arthrodial diarthrosis) while the fifth is a modified saddle joint. The second and third CMC joints only allow a few degrees of motion.^{4,9} Proximally metacarpals articulate with the distal row of the carpal bones and with each other in complex interlocking configurations. Four intermetacarpal and six CMC ligaments strengthen these joints dorsally and volarly.⁵ Out of these the volar are weaker compared to the dorsal ligaments, thus making dorsal CMC dislocation more common than the volar. Additional reinforcement is provided by insertion of wrist flexors and extensors into the bases of the second, third, fourth and fifth metacarpals.⁶ Also anatomically the third CMC joint is located proximally to the other CMC joints and forms a stable central 'key post' of the hand allowing no possible movement.^{7,8} However, the fifth CMC joint, being a saddle joint allows for greater mobility along with power grip. However, it comes at the cost of increased predisposition to injuries and dislocations.⁷

Normally these injuries are associated with significant trauma such as road traffic accidents or falls from height, or as in our case low energy trauma such as punching a wall or fist fights may also be the causative factor.^{3,4} We postulate a force directed posteriorly to the palmar bases of the metacarpals with the wrist in flexed position along with axial loading of metacarpals might lead to failure of the ligaments and the resultant dislocation. If the ligaments remain intact, the resultant forces produce avulsion fractures instead of dislocations.

Generalised swelling and tenderness on the dorsum of hand should alert the clinician that there may be a fracture or dislocation despite innocuous looking radiographs. There would be also shortening of the affected rays but the dorsal lump due to dislocation may be obscured by the swelling.⁹ Also neurovascular status of the limb should be carefully assessed and clearly documented.

Standard radiographs should include PA, lateral and oblique views to assess the injury. On the PA view the articular surfaces of each CMC joint should be parallel with 1.0-2.0 mm clear space between them.⁹ Any overlap should raise the doubt of dislocation. Also on the PA view a broad letter "M" should be formed bounded proximally by the distal articular surfaces of trapezoid, capitate and hamate, and distally by the base of second to fifth metacarpals.¹⁰ Chmell et al¹¹ described the oblique metacarpal line, which is drawn across the distal articular surface of third, fourth and fifth metacarpal heads tangentially on a PA view of hand. Any deviation from this line can be due to a fracture or dislocation. The oblique views of the hand will demonstrate the second CMC joint anatomy in 20 degrees of supination and of the fourth and fifth CMC joint in 30 degrees of pronation.⁹ The true lateral view is invaluable and mostly makes the diagnosis clear.³ Parkinson et al noted the angle subtended by the long axis of second and fifth metacarpal on a lateral view of hand to be greater than the normal (mean angle, 9.8 degrees) in cases of dislocation.¹² Computed tomography (CT) is often used for definitive diagnosis. It is helpful in delineating occult or missed carpal bone fractures on radiographs and also aids in surgical planning.

Treatment of these complex injuries is often controversial as there is lack of studies in literature comparing treatment methods and mostly there are case reports or series involving a small series of patients. Management options include closed reduction and cast immobilisation¹⁴, closed reduction⁷ or an open reduction^{8,15} with K wire fixation. Giacomo et al reported excellent functional outcome at 9 months in a similar case with closed reduction and casting but this method has been associated with subluxation in two other studies.⁸ Closed reduction and K wire fixation is advocated by the current literature⁷ which was done in this case. Open reduction with internal fixation is indicated in dislocation with massive swelling or in cases with interposed soft tissue which impedes closed reduction or in chronic dislocations more than 3 weeks old.^{3,4}

CONCLUSION

This case report presents an infrequently reported dorsal dislocation of the ulnar four metacarpals at the CMC joint without any associated fractures. Although this injury is typically associated with mechanisms involving a significant amount of trauma, the particular position of the hand and wrist at the time of injury may allow this dislocation pattern to occur with a relatively minor trauma. There are characteristic radiographic features useful to identify this injury which can help in initiating timely appropriate treatment and obtaining favourable functional outcome.

REFERENCES

1. Dobyns J.H., Linscheid R.L., Cooney W.P., III Fractures and dislocations of the wrist and hand, then and now. *J. Hand Surg. Am.* 1983;8(5 Pt 2):687-690.
2. Imbriglia J.E. Chronic dorsal carpometacarpal dislocation of the index, middle, ring and little fingers: a case report. *J Hand Surg Am* 1979;4:343
3. Henderson JJ and Arafat MAM. "Carpometacarpal dislocation: an easily missed diagnosis". *Journal of Bone & Joint Surgery British* 69.2 (1987): 212-214.
4. Gunther SF. The carpometacarpal joints. *Orthop Clin North Am* 1984;15:259-277.
5. Flatt AE (1959) *The Care of Minor Hand Injuries*. CV Mosby (ed) St. Louis.
6. Rockwood CA and Green DP (1996) Fractures and dislocations of the hand. In: Rockwood CA and Green DP (eds) *Fractures in adults*, 4th edn. Lippincott Raven, Philadelphia pp 701-702.
7. Jebson PJ, Engber WD, Lange RH. Dislocation and fracture-dislocation of the carpometacarpal joints. *Orthop Rev* 1994;Suppl:19-28.
8. Hartwig RH, Louis DS. Multiple carpometacarpal dislocations. A review of four cases. *J Bone Joint Surg [Am]* 1979;61:906-908.
9. Gurland M. Carpometacarpal joint injuries of the fingers. *Hand Clin* 1992;8:733-44.
10. Woon CYL & Chong KC & Low CO (2006) Carpometacarpal joint dislocations of the index to small finger: Three cases and a review of the literature. *Injury Extra* 37:466-472.
11. Chmell S, Light TR, Blair S J: Fracture and fracture dislocation of ulnar carpometacarpal joint. *Orthop Rev* 1982;11:73-82.
12. Parkinson RW, Paton RW. Carpometacarpal dislocation: an aid to diagnosis. *Injury* 1992;23:187-8.
13. Kirkham SG, Gray RJ. Multiple carpometacarpal dislocations and an ipsilateral scapho-trapezium-trapezoid fracture-dislocation: a rare pattern of injury. *J Orthop Surg.* 2004;12:267-9.
14. Mueller JJ. Carpometacarpal dislocations: report of five cases and review of the literature. *J Hand Surg [Am]* 1986;11:184-188.
15. Smith GR, Yang SS, Weiland AJ. Multiple carpometacarpal dislocations. A case report and review of treatment. *Am J Orthop* 1996;25:502-506.
16. Giacomo, Lorenzo Maria Di et al. "Carpometacarpal Joint Concurrent Dislocation of Four Long Finger: Results of A Non-Operative Management." (2016).