

# Traumatic Floating 1st Metacarpal in a 14-Year-Old Boy Managed by Close Reduction and Thumb Spica Immobilization: A Rare Case Report

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## What to Learn from this Article?

Rare injury, diagnosis, management and results

## Abstract

**Introduction:** Double dislocation of thumb metacarpal (MC) is a rare injury which may be secondarily complicated by growth plate injury in children. The management of floating 1st MC is also controversial since the treatment ranges from simple reduction to complex reconstruction surgeries. It is also important to understand the long-term results of different management strategies (close reduction, K-wire fixation, ligament reconstruction) as any residual stiffness or instability of thumb may result in severe disability of the hand.

**Case Report:** A 14-year-old boy with an alleged history of injury to the thumb due to a fall. The postulated mechanism of injury was forced hyperextension of thumb and axial loading of hand in the prone position. On examination, there was prominent bony swelling over the dorsal aspect of carpometacarpal (CMC) and metacarpophalangeal (MCP) joints which was very tender with diffuse swelling over entire thumb. X-ray showed dorsal dislocation of both MCP and CMC joints, without any fracture (bony avulsion) or volar plate avulsion. Treatment was by way of closed reduction performed by axial traction followed by forced flexion at MCP joint with continuous pressure over the dorsal aspect of the joint. The reduction of CMC joint was done by direct pressure over the dorsal aspect and full abduction of thumb. Following reduction, the thumb was immobilized in a thumb spica.

**Conclusion:** Thus, we conclude it is possible to manage a case of floating 1st MC by closed reduction and immobilization, using proper reduction technique. However, a careful clinical and radiological assessment should be done beforehand for signs of bony injury or ligamentous instability.

**Keywords:** Floating 1st metacarpal, Double dislocation of thumb, Metacarpal injuries

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DOI:  
10.13107/jocr.2250-0685.224

## Author's Photo Gallery



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Journal of Orthopaedic Case Reports | pISSN 2250-0685 | eISSN 2321-3817 | Available on www.jocr.co.in | doi:10.13107/jocr.2250-0685.224

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## Introduction

Double dislocation of 1st metacarpal (MC) is an extremely rare injury compared to other joints of the hands which are more commonly dislocated [1]. To the best of our knowledge, only five cases have been reported in the English literature for floating 1st MC injury [2]. In our case both the dislocations were dorsal with metacarpophalangeal (MCP) dislocation being Type 1 Drosos et al. classification (simple vs. complex) [3]. Floating 1st MC is an extremely rare injury especially in children primarily due to weakness of physis, which translates (Salter and Harris Type 1 and 3) instead of joint getting dislocated.[4] However, dorsal dislocation of MCP joint in children has been reported in the literature [5].

Complex dislocations are characterized by volar plate interposition and flexor pollicis brevis buttonholing around head of dislocated MC. Management of complex dislocation is mostly surgical as close reduction is almost impossible [5]. This situation can become even more complicated if adductor pollicis encircles the head of MC.

## Case Report

A 14-year-old boy presented to our Accident and Emergency Department with an alleged history of the high-energy injury to the thumb of dominant hand due to a fall while playing cricket. The postulated mechanism of injury was forced hyperextension of thumb and axial loading of hand in the prone position. Immediately after the injury, he felt severe pain in right thumb and was unable to move it due to pain. Furthermore, he noticed deformity of thumb in the form of abnormal bony prominence over base of thumb and carpometacarpal (CMC) joint.

There was no history of such episode in the past or any history suggestive of generalized ligament laxity in the boy.

On clinical examination, there was prominent bony swelling over the dorsal aspect of CMC and MCP joints which was very tender with diffuse swelling over entire thumb. There was a palpable step over palmar aspect of MCP joint through which head of 1st MC was palpable on applying pressure. At CMC joint, the prominence of 1st MC base dorsally made the anatomical snuff box practically not palpable with tendons of abductor pollicis longus and extensor pollicis brevis pushed to the sides. Both the joints were locked in the dislocated position with any attempt for movement caused extreme pain to the patient. The base of proximal phalanx stood over the center of

MC neck dorsally, making a major ligamentous injury/tear unlikely. Sensations and capillary refill time were normal over the distal part of the thumb making a vascular compression or nerve injury unlikely. [Fig 1] The movements at interphalangeal joint of the thumb were restricted, mainly due to mechanical pressure due to diffuse swelling. There was no external injury or clinical sign suggestive of any other joint injury in the hand.

Clinically the differential diagnosis ranged from subluxation/dislocation involving both joints, with no or partial ligamentous injury. Though no bony crepitus was felt on clinical examination, a subtle bony injury or volar plate avulsion cannot be ruled out completely.

Thus, a clinical diagnosis of floating 1st MC was made due to dorsal dislocation/subluxation of both CMC and MCP joints without a likely bony/ligamentous injury (though could not be confirmed clinically).

To investigate further, an X-ray was done, which showed dorsal dislocation of both MCP and CMC joints without any fracture (bony avulsion) or volar plate avulsion [Figs. 1 and 2]. We believe the MCP joint dislocation occurred first due to hyperextension and axial loading followed by CMC joint which dislocated during continued pronation of the hand during the fall.

Immediately, in view of increasing swelling and severe pain, a decision of trial close reduction under regional block was taken. Closed reduction was performed by axial traction followed by forced flexion at MCP joint with continuous pressure over the dorsal aspect of the joint. The reduction of CMC joint was done by direct pressure over the dorsal aspect and full abduction of thumb.

Following reduction, the thumb was immobilized in a thumb spica and a check X-ray was performed to confirm the reduction and to rule out any fracture or growth plate injury [Fig. 3].

Clinically, there were no sign suggestive of vascular compression or loss of sensation after application of thumb spica.

### Follow-up

Initially, the patient was followed-up regularly as an outpatient every week, and follow-up X-rays were done every week for first 2 weeks and later 2 weekly till 6 weeks from injury. The spica cast was removed at 6 weeks, and the thumb was examined for any instability due to collateral ligament damage.

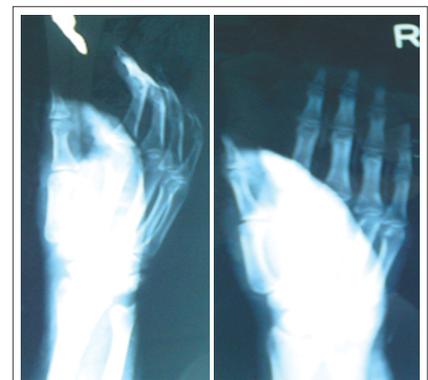
He was evaluated again after 2 weeks of plaster removal for residual pain, swelling, thumb range of motion, stiffness, and



**Figure 1:** Midprone and oblique view of the hand showing complete dislocation of the metacarpophalangeal joint without any bony injury.



**Figure 2:** Anteroposterior and lateral view of the hand showing complete dorsal dislocation of the metacarpophalangeal joint without any bony injury.



**Figure 3:** Post-reduction X-ray showing complete reduction of both joints without any incongruity, in anteroposterior and lateral.

grip strength. No restriction of movement, instability, or weakness was found as compared to opposite normal thumb.

An MRI scan performed at 8 weeks showed minimal residual edema in ulnar collateral ligament with small capsular tear near MC end of MCP joint.

Clinically and radiologically, there were no signs suggestive of growth plate injury or ligament injury resulting in laxity, during follow-up visits.

At present, the patient is 4 years follow-up, he is actively engaged in sports activities, and there is no complaint regarding restriction of movement or stiffness of the hand. Since then there has been no history of any similar episode either

## Discussion

Human thumb which enjoys a wide range of mobility at the cost of stability is the most crucial contributor to an efficient functional hand. Most dislocations of the thumb at the MCP and CMC joint are dorsal, and volar dislocations are rare [6]. Volar dislocations of the MCP joint are, usually, unstable and practically impossible to reduce by closed manipulation alone as they are often complicated by soft tissue interposition or associated intra-articular fractures [2]. Only one case has been reported in the literature so far for volar dislocation of both the joints, which was associated with avulsion type MC base fracture which was fixed using a K-wire through dorsal approach [2]. According to Khan et al., the possible mechanism of injury was axial force acting on the extended CMC joint with interphalangeal joint flexed [5]. This fact is well-supported by previous reports of interphalangeal and MCP dislocation of the thumb where MCP joint dislocated in volar direction and required open reduction [7,8]. Furthermore, Interposition of the volar plate and flexor tendon can convert a simple dislocation to a complex one, requiring an open reduction [9,10].

The spectrum of management ranges from closed reduction, closed reduction plus percutaneous pinning to open reduction with or without capsular or ligament reconstruction [11, 12]. The literature is more inclined toward surgical management as close reduction is either difficult to perform or associated ligamentous injury forces them for a surgical intervention such as Eaton's ligament reconstruction for a better functional outcome [13]. Here, we were able to manage floating 1st MC injury by only close reduction and immobilization without any residual instability or stiffness. Instability could be due to either radial collateral or ulnar collateral ligament injury. Even in cases where close reduction is possible, subclinical injury of collateral ligament/capsule should be suspected and repeat clinical examination should be done on first visit (2 weeks) when the pain and swelling has settled down. We believe that long-term prognosis of floating 1st MC injuries is essentially dependent on early detection and management of collateral ligament, anterior oblique ligament, and intra-articular injuries, however, Ibrahim and Noor reported a case of delayed

capsular/ligamentous repair after 3 weeks with good results [14].

Contrary to our case, where we were able to manage CMC injury closed, most of the previously published cases required an operative stabilization for instability either with K-wires or complex ligament reconstruction (Eaton's procedure) [1,3,6,11,12, 14]. Of these, two cases had radial collateral ligament injury, and one case had ulnar collateral ligament damage [5].

As double dislocation is a high energy injury and is often associated with high-grade ligamentous injury, slight residual instability at both joints may affect the overall functional outcome very badly. We agree with Marcotte et al. that even complex injuries like floating 1st MC can be treated nonoperatively if correct clinical assessment of the extent of injury can be made first up, followed by careful outpatient follow-up [15].

Here, we followed-up the patient for 4 years without any sign of instability or arthritis. However, other reports, like by Gerard et al. did report degenerative changes in the CMC and MCP joints [4]. Moore et al. in a 9-year follow-up reported no evidence of arthritis or instability [1]. We believe conservative treatment can be a reasonable option for floating 1st MC injury with no bony injury and minimal ligamentous instability, however, it is too early to comment on long term results given the severity of this injury.

## Conclusion

It is possible to manage a case of floating 1st MC by closed reduction and immobilization, using proper reduction technique. However, a careful clinical and radiological assessment should be done beforehand for signs of bony injury or ligamentous instability.

Both the injuries should be evaluated together rather than taking them as separate injuries. Regular weekly follow-up is essential to pick up any instability early and suggest the patient surgery accordingly.

Here, both the injuries were managed satisfactorily by nonoperative methods with good functional outcome.

## Clinical Message

Management of floating 1st metacarpal is possible by close reduction in cases where there is minimal or no ligamentous instability. High index of suspicion is required in follow-up visits to switch over to surgical intervention if chances of future instability and consequent arthritis arise. The forces acting during primary injury and technique of close reduction should be clearly understood before attempting close reduction. Furthermore, undue force during reduction should be avoided in children as it may result in physeal injury. However, for knowing long-term results of close reduction, a longer follow-up period is required.

## References

1. Moore JR, Webb CA Jr, Thompson RC. A complete dislocation of the thumb metacarpal. *J Hand Surg Am* 1978;3:547-9.
2. Khan H, Darcy P, Magnussen P. Simultaneous volar dislocations of carpometacarpal and metacarpophalangeal joints of the thumb. *J Orthop Case Rep* 2012;2(3):8-11.
3. Drosos GI, Kayias EH, Tsioros K. "Floating thumb metacarpal" or complete dislocation of the thumb metacarpal: A case report and review of the literature. *Injury* 2004;35:545-8.
4. Gerard F, Tropet Y, Obert L. Trapezo-metacarpal and metacarpophalangeal dislocation of the thumb associated

- with a carpo-metacarpal dislocation of the four fingers. *Chir Main* 1999;18:205-8.
5. Canale TS. Fractures and dislocation in children. In: Canale TS, Beaty JH, editors. *Campbell's Operative Orthopaedics*. 11th ed. Philadelphia: Mosby Elsevier; 2008. p. 1531-725.
  6. Afshar AR, Mirzatoloei MD, Abdi-Rad I. Concurrent dislocations of carpometacarpal and metacarpophalangeal joints of the thumb. *Arch Iran Med* 2005;8:221-2.
  7. Lee JC, See HF, Low CO. Simultaneous open dislocations of the interphalangeal and metacarpo-phalangeal joints in a thumb – A case report. *Singapore Med J* 1996;37:318-9.
  8. Tabib W, Sayegh S. Simultaneous dislocation of the metacarpophalangeal and interphalangeal joints of the thumb. *Scand J Plast Reconstr Surg Hand Surg* 2002;36:376-8.
  9. Dutton RO, Meals RA. Complex dorsal dislocation of the thumb metacarpophalangeal joint. *Clin Orthop Relat Res* 1982:160-4.
  10. Hughes LA, Freiberg A. Irreducible MP joint dislocation due to entrapment of FPL. *J Hand Surg Br* 1993;18:708-9.
  11. Farzan M, Siassi M, Espandar R. Thumb carpometacarpal joint volar dislocation: A case report. *Acta Med Iran* 2002; 40(1): 52-4
  12. Jari S, Waseem M, Srinivasan MS. Simultaneous Bennett's fracture and metacarpophalangeal dislocation of the same thumb in a soccer player. *Br J Sports Med* 2000;34:463-4.
  13. Uchida S, Sakai A, Okazaki Y, Okimoto N, Nakamura T. Closed reduction and immobilization for traumatic isolated dislocation of the carpometacarpal joint of the thumb in rugby football players. Two case reports. *Am J Sports Med* 2001;29:242-4.
  14. Ibrahim S, Noor MA. Simultaneous dislocations of the carpometacarpal and metacarpophalangeal joints of the thumb. *Injury* 1993;24:343-4.
  15. Marcotte AL, Trzeciak MA. Nonoperative treatment for a double dislocation of the thumb metacarpal: A case report. *Arch Orthop Trauma Surg* 2008;128:281-4.

**Conflict of Interest: Nil**  
**Source of Support: None**

#### How to Cite this Article

Tyagi HR, Kamat N, Wajekar S, Mandalia SH. Traumatic Floating 1st Metacarpal in a 14-Year-Old Boy Managed by Close Reduction and Thumb Spica Immobilization: A Rare Case Report. *Journal of Orthopaedic Case Reports* 2014 Oct-Dec;4(4): 44-47