CASE REPORT

First Carpometacarpal Joint Dislocation and Review of Literatures

Farivar Lahiji, MD; Reza Zandi, MD; Arash Maleki, MD

Research performed at Akhtar and Arad Hospitals, Tehran, Iran

Received: 5 February 2015 *Accepted: 7 June 2015*

Abstract

Dislocation of the first carpometacarpal (CMC) is a rare occurrence. Treatment of this dislocation varies from closed reduction and casting to ligament repair. Neglected dislocation or incomplete reduction of the 1st CMC cause chronic instability and painful arthritis, muscle imbalance and decreased grip force.

In our study 6 patients is evaluated that were visited in less than 24 hours from their injury. All were primarily reduced and except one patient later injured ligament were repaired. All patient after 6 months had normal range of motion without pain and they had not any complaint.

Stability at the 1st CMC joint is dependent on static and dynamic forces. However, dislocation of the 1st CMC occur rare, but important function of the thumb specially in gripping and grasping makes it a significant problem. Injured ligament should repair for increased stability of 1st CMC joint, because neglected dislocation or incomplete reduction cause chronic instability and painful arthritis.

Key Words: Cast, First cmc dislocation, Reduction, Stability

Introduction

First carpometacarpal (CMC) dislocation is a rare occurrence and accounts for approximately 1% of all hand fractures (1). Gedda in 1954 mentioned dislocation without skeletal trauma associated with loss of function of the thumb without Bennett's fracture (2). Most cases are posterior dislocation, although some believe all cases are posterior dislocation but some anterior dislocations have been reported CMC dislocation rarely occurs in children & adolescents (3-8).

The most common mechanism of 1st CMC dislocation is axial loading while the thumb is in a flexed position (9). Recurrent dislocation / subluxation of the 1st CMC can be traumatic or idiopathic (4). Although CMC dislocation without a fracture is rare, the important functions of the thumb especially in gripping and grasping makes CMC dislocation to have significant effects on hand's functions.

Material and Method

This study is a case report study. Data on the 6 patients (4 male, 2 female) with acute 1st CMC joint dislocation visiting Akhtar and Arad hospitals (Tehran, Iran) between 2008 and 2009 were collected.

All patients were visited in less than 24 hours from their injury. All were primarily reduced and except one patient later injured ligament were repaired.

The patients were visited 4 to 9 months after initial trauma. Clinical examination and hand radiography were done in each visit.

Case Report

The first patient was a 30 Y/O man who had bilateral direct trauma complaining of pain at the base of both thumbs. He had an osteochondral fracture at the volar aspect of the base of the 1st metacarpal on the right hand (UCL injury) along with 1st carpometacarpal dislocation. He later underwent dorsal and oblique collateral ligament repair and open reduction and internal fixation (ORIF) of 1st carpometacarpal with a pin and a short thumb spica cast. The cast was removed after 6 weeks. The second case was a 25 year old man who'd fallen from a motor bike and had pain in the base of the thumb. The patient did not consent to surgery and had immediate

Corresponding Author: Arash Maleki, Orthopedic Department Akhtar Hospital, Shahid Beheshti Medial University, Tehran, Iran
Email: arashmal@yahoo.com

AB&JS THE ONLINE VERSION OF THIS ARTICLE ABJS.MUMS.AC.IR

closed reduction and discharged with a short thumb spica cast.

The third patient is a 32 year old man who had an operation for repairing the ligament injury at the 1st CMC joint and was discharged with a short thumb spica cast [Figure 1].

Patient number four was a 17 year old female who had fallen down during skiing, she had open repaired of the dorsoradial ligament and the joint capsule and pinning of the 1st CMC. She had a short thumb spica cast.

The 5th case was a 35 year old male who had also fallen down while skiing. He had close reduction in emergency room then open repair of his ligament and six weeks of thumbspica cast.

The last case is a 16 year old female who had fallen down. She had tenderness and swelling at the base of thumb. Her 1st CMC dislocation was reduced and then she had thumbspica cast for 6 weeks after ligament was repaired.

All patients had near normal range of motion without tenderness, and didn't have any complaints.

Discussion

In this report we described 6 cases of 1st CMC dislocation. Five of them were managed by surgical repair of the ligament. The 6th case refused surgery and was treated by thumb spica cast. The result was good regarding pain relief and regaining range of motion in all patients [Table 1].

This injury is a rare occurrence and accounts for approximately 1% of all hand fractures (1). The CMC joint is a saddle joint (7). The shape of the joint contributes to its stability although ligaments and joint capsule are mainly responsible (6).

The 1st CMC joint moves in three ways: flaxion/extension, abduction/adduction, pronation/supination (opposition & retropulsion) (6).

Stability at the 1st CMC joint is dependent on static and dynamic forces. Static forces include the anatomic shape of the joint and anterior / posterior interosseous ligaments. Dynamic forces include the force of the muscles acting on this joint (10-12).

Four ligaments give this joint stability include anterior oblique, dorsoradial, posterior oblique and intermetacarpal. Recent studies consider the dorsoradial ligament the most important in presenting dislocation (7, 13-15).

For the trapeziometacarpal's ligaments are mentioned; 3 intra capsular and 2 extra capsular (16).

The anterior oblique ligament is an intracapsular ligament which originates on the palmar tubercle of the trapezium and attaches to the palmer tubercle of the first metacarpal. It is a thick and broad structure which becomes tense in extension, abduction and pronation.

The ulnar collateral ligament is extra capsular originating obliquely from the flexor ligament to the proximal palmar aspect of the first metacarpal connecting with the inter metacarpal ligament. This ligament become tense in extension, abduction and pronation. This ligament is frequently elongated in degenerative trapeziometacarpal arthritis.

The intermetacarpal ligament is extra capsular between the bases of the first and second metacarpals originating from the dorsal aspect of the second metatarsal base near the attachment of extensor carpi radialis longus and becomes taut in extension, opposition and supination. It is a thin ligament unrelated to degenerative arthritis.

The posterior oblique ligament is the first intermetacarpal ligament originality like a far from the dorsal lip of the first metacarpal. It becomes taut at the end of supination. It doesn't become elongated in CMC arthritis until the final stages when it become lax (16).

Some say the anterior oblique ligament is the main factor in the stability of the trapeziometacarpal joint supported by the ulnar collateral ligament however others believe the dorsoradial ligament is the main factor, so that injury to this ligament is solely responsible for dislocation even if the other ligaments are intact (15, 16).

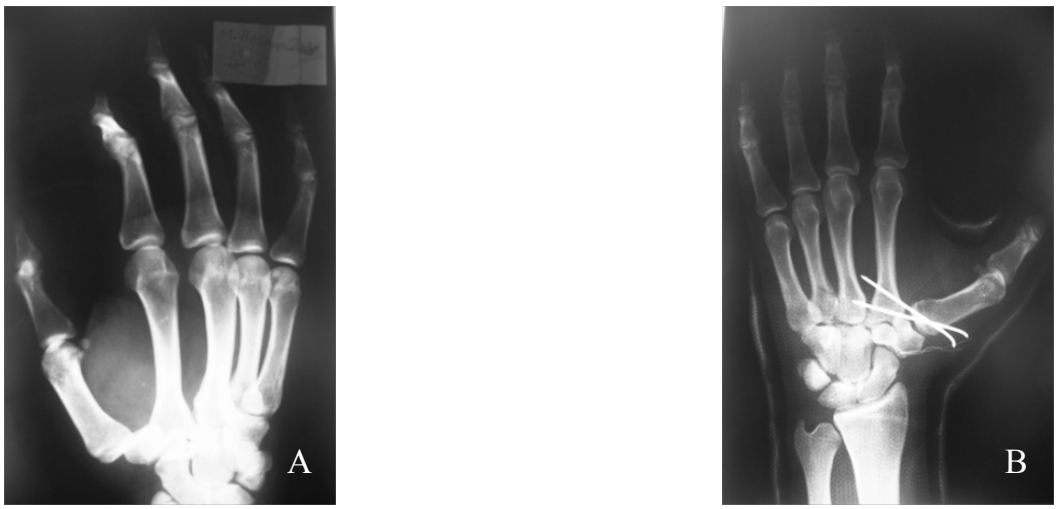

Figure 1. Traumatic 1st CMC dislocation in a 32-year-old male. A. AP view of CMC dislocation. B. AP view of the same hand after reduction, ligament repair and pinning.

Table 1. The patients with 1st CMC joint dislocation and their conditions in our study

Number	Age	Sex	Time Of Presentation	Treatment	Outcome
1	30	male	The same day	Ligament repair Orif 1st CMC	asymptomatic
2	25	male	The same day	Closed reduction Thumbspica cast	asymptomatic
3	32	male	The same day	Ligament repair	asymptomatic
4	17	famale	The same day	Ligament & capsule repair Pinnig 1st CMC	asymptomatic
5	35	male	The same day	Ligament repair	asymptomatic
6	16	famale	The same day	Closed reduction Thumb spica cast	asymptomatic

1st CMC dislocation is often initially missed. Patients come in with localized pain and swelling (13,14). An oblique view radiography is also needed in addition to standard Anterior-posterior and lateral views (9). Stress radiographies are also important where the two thumbs are pressed together parallel to the film on the AP view. In case of dislocation the base of the metacarpal dislocates laterally on the trapezium (6).

Ligaments are ruptured distally on the metacarpal attachment it can be complete or partial, complete ligament tears result in posterior dislocation of the 1st CMC and Partial ligament tears result in subluxation (5, 6).

Abductor policis longus is a cause in recurrent dorsoradial dislocation of 1st CMC, therefore supportive treatment will not be effective and surgical ligament reconstruction is recommended to prevent secondary OA (17). Neglected dislocation or incomplete reduction of the 1st CMC cause chronic instability and painful arthritis, muscle imbalance and decreased grip force (6).

Due to instability of 1st CMC surgical treatment is recommended (18-20). Some advocate anchor suturing and pin fixation then pins are removed after 6 weeks and ROM is begun (5).

However primary reduction and thumb spica casting for 4-6 weeks seems to be appropriate (5). In 1973 Walt & Hooper used casting with or without pinning in the treatment of 1st CMC dislocation. In their study 7 patients came in on the day of injury and 5 patients came in between 3 days and 3 weeks. All patients received a thumb spica cast and in three patients pinning to increase stability and pinning in another to prevent redislocation. During the follow-up between 4 months and 7 years, 7 patients had complete recovery without pain and instability or any radiologic changes while 2 patients had posterior subluxation and weakness and discomfort in gripping. The Eaton method for latent repair of the ligament was performed for these patients (2).

Simoman & Trumble state that closed reduction cannot prevent instability and arthritis in the long term. In 8 cases closed reduction and pinning for 6 weeks was done, three cases needed surgical reconstruction for symptomatic instability and one case for post-traumatic arthritis (21). Eaton believed results of reduction were largely unpredictable even when the joint is cross-pinned. However in most cases surgical treatment is necessary.

Walt & Hooper treated nine patients with closed reduction and casting and three patients with closed reduction and pinning. Three patients from the first group and one from the second group showed joint instability (2).

Henry in pure 1st CMC dislocation recommended ligament repair in order to achieve painless movement and stability, the joint is held in the reduced position with pins for six weeks. In three months light pinch and gradually power pinch is started (3).

Jeong et al. reported a case of bilateral thumb carpometacarpal joint dislocations. They treated one side with closed reduction and percutaneous K-wires fixation and the other side was treated by an open reduction and reconstruction of the ligament. At the 16-month follow-up, the patient demonstrated a normal range of motion, strength and no joint instability. They believe that ligament reconstruction had advantage in two planes, reconstituting the volar oblique ligament and also creating a new ligament radially in a part of the joint capsule, which was weak and membranous (22).

Iyengar et al. believe that Isolated traumatic dislocation of the carpometacarpal joint of the thumb is left untreated, resulting mechanical instability of this joint interferes with normal function of the hand and can lead to articular degeneration of the joint. Most are amenable to closed reduction with or without supplementary pinning. They present a case of a 21 year old female patient with continual instability of the carpometacarpal joint of her right thumb, following closed reduction and pinning. Surgical stabilization was achieved by anterior oblique ligament reconstruction using a Modified Eaton- Littler's technique. At 1 year follow-up evaluation the patient was pain free with no clinico-radiological evidence of instability (23).

However, dislocation of the 1st CMC occur rare, but important function of the thumb specially in gripping and grasping makes it a significant problem. Injured ligament should repair for increased stability of 1st CMC joint, because neglected dislocation or incomplete reduction cause chronic instability and painful arthritis.

Farivar Lahiji MD
Arash Maleki MD
Department of Orthopedic Surgery, Akhtar Hospital, Shahid Beheshti Medical University, Tehran, Iran

Reza Zandi MD
Department of Orthopedic Surgery, Taleghani Hospital, Shahid Beheshti Medical University, Tehran, Iran

References

1. Hove LM. Fractures of the hand. Distribution and relative incidence. Scand J Plast Reconstr Surg Hand Surg. 1993; 27(4):317–9.
2. Watt N, Hooper G. Dislocation of the trapezio-metacrpal joint. J Hand Surg Br. 1987; 12(2):242-5.
3. Henry M. Hand fractures and dislocations. In: Bucholz R, Court-brown C, Heckman J (editors). Rockwood and green's fractures in adults. 7th ed. Philadelphia: Lippincott williams & wilkins. 2010; P 600-709.
4. Strauch RJ, Behrman MJ, Rosenwasser MP. Acute dislocation of the carpometacarpal joint of the thumb: an anatomic and cadaver study. J Hand Surg Am. 1994; 19(1):93-8.
5. Calandruccio J, Jobe M. Fractures, Dislocations, and Ligamentous Injuries. In: Canale T, Beaty J (editors). Campbell's operative orthopaedics. 11th ed. Philadelphia, Pennstlvania: Mosby Elsevier. 2008; p. 3929-31.
6. Glickel S, Barron A, Catalano L. Dislocations and ligament injuries in the digits. In: Green D, Hotchkiss R, Pederson W, Wolfe S (editors). Green's operative hand surgery. 5th ed. Philadelphia, Pennstlvania: Churchill livingstone. 2005; p.382-6.
7. Sawalha S. Volar dislocation of the thumb carpometacarpal joint: A case report. Injury extra. 2008; 39(10):332-4.
8. Farzan M, Siassi M, Espandar R. Thumb carpometacarpal joint volar dislocation: A case report. Acta Med Iran. 2002; 40(1):52-4.
9. Pizon AF, Wang HE. Carpometacarpal dislocation of the thumb. J Emerg Med. 2010; 38(3):376–7.
10. Ahmad S, Plancher KD. Carpometacarpal dislocations of the fingers. Operat Tech Sport Med. 1996; 4(4):257-67.
11. Black DM, Watson HK, Vender MI. Arthroplasty of ulnar carpometacarpal joints. J Hand surg Am. 1987; 12(6):1071-4.
12. Green DP. Dislocations and ligamentous injuries of the hand. Surg Musculoskelet system. 1990; 1(1):385-448.
13. Gunther SF. The carpometacarpal joints. Orthop Clin North Am. 1984; 15(2):259-77.
14. Gore DR. Carpometacarpal dislocation producing compression of the deep branch of ulnar nerve. J Bone Joint Surg Am. 1971; 53(7):1387-90.
15. Strauch RJ, Behrman MJ, Rosenwasser MP. Acute dislocation of the carpometacarpal joint of the thumb: an anatomic and cadaver study. J Hand Surg Am.1994; 19(1):93-8.
16. Imaeda T, An KN, Cooney WP 3rd, Linscheid R. Anatomy of trapeziometacarpal ligament. J Hand Surg Am. 1993; 18(2):226-31.
17. Chen VT. Dislocation of the carpometacarpal joint of the thumb. J Hand Surg Br. 1987; 12(2):246-51.
18. Pizon AF, Wang HE. Carpometacarpal dislocation of the thumb. J Emerg Med. 2010; 38(3):376-7.
19. Glickel SZ, Barron OA, Catalano LW. Dislocations and ligament injuries in the digits. In: Green DP, Pederson WC, Hotchkiss RN, Wolfe SW, Roselius E (editors). Green's operative hand surgery. 5th ed. Philadelphia, PA: Elsevier/Churchill Livingstone; 2005.
20. Klein DM, Belsole RJ. Percutaneous treatment of carpal, metacarpal, and phalangeal injuries. Clin Orthop Relat Res. 2000; 375(2):116–25.
21. Simonian PT, Trumble TE. Traumatic dislocation of the thumb carpometacarpal joint: early ligamentous reconstruction versus closed reduction and pinning. J Hand Surg Am. 1996: 21(5):802-6.
22. Jeong C, Kim HM, Lee SU, Park IJ. Bilateral Carpometacarpal Joint Dislocations of the Thumb. Clin Orthop Surg. 2012; 4(3):246-8.
23. Iyengar K, Gandham S, Nadkarni J, Loh W. Modified Eaton-Littler's Reconstruction for Traumatic Dislocation of the Carpometacarpal Joint of the Thumb—A Case Report and Review of Literature. J Hand Microsurg. 2013; 5(1):36–42.