

Ligamentous Reconstruction of Traumatic Dislocation of Thumb Carpometacarpal Joint: Case Report and Review of Literature

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What to Learn from this Article?

1. Diagnosing rare injuries require high index of suspicion and aim is not to miss them.
2. Adequate reconstruction with or without suture anchors is required thumb CMC dislocation in high demanding patients eso in sports persons and athletes.

Abstract

Introduction: Thumb carpometacarpal dislocation is a rare injury with many treatment options described in literature.

Case Description: A 47-year-old male patient presented to hospital with an isolated dorsal dislocation of the thumb carpometacarpal joint. Closed reduction of the dislocation could be easily done but joint was grossly unstable and redislocated. Repair of ruptured dorsoradial ligament and joint capsule was done with immobilization for 6 weeks. At 2-years follow-up evaluation, the patient was pain free and returned to his previous level of activity. No restriction of carpometacarpal movements or residual instability was noticed. Radiographic examination showed normal joint congruity and no signs of osteoarthritis.

Conclusion: Capsuloligamentous repair can be considered the treatment of choice in thumb carpometacarpal dislocations with instability after closed reduction.

Keywords: First carpometacarpal dislocation, Ligament reconstruction of dislocation, thumb carpometacarpal joint instability.

Introduction

Thumb determines prehension in the hand. The main function of prehension, opposition takes place at carpometacarpal joint of thumb [1]. Fracture dislocation of thumb carpometacarpal joint, Bennetts fracture is a more common injury than isolated dislocation. Carpometacarpal (CMC) dislocation accounts for less than 1% of all hand injuries [2]. It is the result of force transmitted axially when thumb is in partial flexion. Dislocation is associated with capsular and ligamentous injuries due to which instability persists even after reduction [3,4,5].

Treatment of choice for CMC joint dislocation is controversial. Different options for treating dislocation are closed reduction and cast application, closed reduction and K wire fixation, open reduction and ligamentous reconstruction. Case reports available in literature have limited evidence to come to an conclusive and universally accepted management guidelines [6-11]. We managed

a case of dislocation of thumb CMC joint by open reduction and repair of capsule and ligament and followed it up for 2 years with excellent results.

Case Description

A 47 year old, right hand dominant banker presented to emergency department after a fall from motorcycle. There was pain and swelling at the base of left thumb. On examination there was deformity and tenderness at the radial side of hand at the base of the thumb and restricted thumb movements. Anteroposterior and oblique radiographs of the hand showed dislocation of trapeziometacarpal joint. Patient also had an undisplaced lateral malleolar fracture which was managed conservatively.

Fig 1

Procedure

Closed reduction was easily possible with traction and minimal

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Figure 1: X-ray showing dislocation of thumb carpometacarpal joint.



Figure 2: Intraoperative picture showing ruptured capsuloligamentous structures and intact articular surfaces.



Figure 3: Postoperative radiograph showing joint stabilized by k wire.

manipulation without anaesthesia but joint was found to be grossly unstable and surgical intervention was planned. Regional anaesthesia was given and tourniquet was applied. Incision was given on the dorsoradial side of wrist along the border of first metacarpal. The superficial radial nerve, branch of radial artery were retracted. Dorsal ligament complex was torn intrasubstance and capsular tear was also present but articular cartilage was intact. Joint was stabilized using a K wire with thumb in abduction and extension. End to end capsular repair was done by 3.0 vicryl sutures and ligament repair was done by nonabsorbable sutures. This was reinforced by a slip of flexor carpi radialis tendon which was passed under the tendon of abductor pollicis longus with few intermittent sutures with nonabsorbable sutures. Wound closure was done and below elbow cast was applied. Post operatively reduction was confirmed by check X-ray. Suture removal was done on 12th day. K wire was removed after 6 weeks and mobilization started.

Fig 2, Fig 3

Results

Patient gained painless, complete range of movements by 6 months and returned to his occupation with no difficulty in carrying out any preinjury level activity. At the end of 2 years, patient had full range of movements and no instability. Radiographic examination showed no signs of subluxation or early osteoarthritis.

Fig 4, Fig 5

Discussion

Thumb CMC joint is biconcavoconvex joint which permits movements in multiple planes. The articular surfaces of the CMC joint of the thumb resemble two reciprocally opposed saddles whose transverse axes are perpendicular. The shape of the articular surfaces provides a degree of intrinsic stability, but the ligaments and joint capsule play the principal role in stabilization. There are four major ligaments: volar (anterior oblique),

intermetacarpal, dorsoradial, and dorsal oblique (posterior oblique) [1,4-7]. Strauch *et al* in a cadaveric study found that the dorsoradial ligament complex was the primary restraint to dorsal dislocation and responsible for obtaining joint stability in thumb opposition [5].

Closed reduction and cast application and percutaneous pinning have been advocated by many authors. Overall out of 16 reported cases 6 required surgery for instability. Closed reduction and K-wire fixation was associated with more complication and revision surgery in 7 cases [10-16]. Repair of ligaments has been found to be associated with least complications. Simonian and Trumble compared early ligamentous reconstruction with closed reduction and pinning. Four out of 8 patients initially managed with closed reduction and percutaneous k wires underwent revision with open reduction with ligamentous reconstruction because of recurrent instability. Based on many reports, it can be concluded closed reduction and casting can be definitive treatment option in cases where thumb carpometacarpal joint was found to be stable after immediate and anatomic reduction [4].

Isolated CMC dislocation is associated with various degrees of joint capsule and ligament damage. We intraoperatively found torn dorsoradial ligament complex but intact volar ligaments. This was also found in case reports by Fotiadis *et al* (1 case) and Shah and Patel (4 cases) where dorsal capsuloligamentous complex was completely ruptured but the volar ligament was intact. Repair of capsule and ligaments is to be considered in such cases.

Fig 6

Eaton-Littler described ligament reconstruction method for painful thumb with hypermobility [14]. In this technique, the FCR slip, based distally is released in continuity till its insertion on the index metacarpal. It is then re-routed through a drill hole in the base of the thumb metacarpal, under the abductor pollicis longus insertion and secured on the radial side of the joint. Iyengar *et al*, [15] modified this classical technique by restricting the release of FCR slip 2 to 2.5 cm short of its insertion. This slip was then directed in an oblique



Figure 4: Follow up x-ray at 6 months.



Figure 5: Clinical picture at 6 months showing good range of movements.

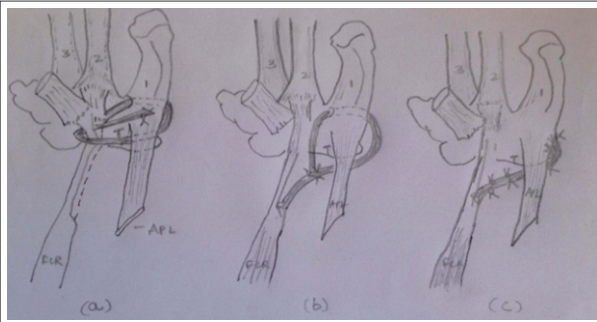


Figure 6: (a)Eaton-Littler's technique (b)Modified Eaton-Littler's technique-Iyengar et al (c) Ligament repair and Augmentation by FCR in this case .

manner to reproduce the direction of active action of the anterior oblique ligament. They routed the FCR slip through the extra-articular bone tunnel and sutured in a taut position back to itself. The routed FCR slip covered both the dorsal (Dorso-radial ligament) and volar aspect (volar beak ligament) of the carpometacarpal joint by passing under the abductor pollicis longus tendon. In our study ligament and capsule was repaired end to end and reinforced with slip of FCR tendon sutured to repaired ligament and capsule on either side of joint line. Alternatively suture anchors can be used to reconstruct ligaments. Fotiadis *et al*, Okita *et al* and Ansari *et al* have used suture anchors effectively with good results in patients with high demands [14-15].

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STUDY	NO OF CASES	TREATMENT METHOD	RESULT
Bosmans B et al	2	Closed reduction and cast application	Normal range of motion (rom)without instability
Simonian P.T., Trumble T.E et al	17	1. Closed reduction + K wire fixation (8 cases) 2. Ligamentous reconstruction (9 cases)	1.Instability requiring surgery in 4cases(50%) 2.Good results with normal range of motion
Watt N et al	12	1. Closed reduction + cast (9 cases) 2. Closed reduction + pinning + cast (3 cases)	1. Asymptomatic instability 2. No pain/ instability
Jacobsen CW	1	Closed reduction + pinning	Good result
Khan A.M et al	1	Closed reduction and cast	Good rom without instability
Fotiadis E et al	1	Ligament reconstruction with suture anchor	Normal rom without residual instability
Okita G et al	1	Ligament reconstruction with suture anchor	Good rom with no signs of instability
Ansari M T et al	3	Ligament reconstruction with suture anchors	Good rom with no signs of instability in all cases
Iyengar K et al	1	Ligament reconstruction with modified Eaton Littlers technique	Good rom with no signs of instability
This case	1	Ligament reconstruction	Good rom with no signs of instability

Conclusion

Careful assessment and high index of suspicion is required to identify ligament injury after thumb CMC dislocation. Ligament repair is indicated for instability after reduction. Ligament repair is associated with uniformly good results in various studies in literature. Different methods of ligament reconstruction are available for operating surgeon to choose.

Clinical Message

Diagnosing ligament injury is important in isolated carpometacarpal dislocations. Complications of inadequate treatment can increase recurrent instability, joint degeneration and chronic pain. Repair of capsuloligamentous tear is treatment of choice for instability after closed reduction of thumb CMC dislocations. Stable joints after reduction can be managed with casting or percutaneous pinning. In patients with high demands reconstruction with suture anchors can be considered.

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