

Complex Metacarpophalangeal Joint Dislocation: A Study on Kaplan Lesion and its Effective Management through the Becton Approach

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Abstract: *Background:* Dislocation of metacarpophalangeal joint of hand is a uncommon injury. They are divided into simple or complex dislocation. Complex metacarpophalangeal joint also called "Kaplan Lesion". Complex dislocation occur most commonly in the index finger. These injuries are irreducible, most often result of volar plate interposition which makes these lesion a must for open reduction. We treated two cases of Kaplan Lesion, one patient 27 years old male and another one 28 years female, both were labour by occupation who were successfully operated by dorsal approach.

Keywords: Kaplan's lesion, Metacarpophalangeal joint, Dorsal approach, Becton approach, volar plate interposition, complex metacarpophalangeal joint dislocation.

1. Introduction

Metacarpophalangeal dislocation are less common than interphalangeal dislocation. They occur most common in index finger. MCP joint dislocation are rare because of strong connective tissue support around the joint and basal location in hand. [1]The term complex dislocation was first described by Farabeuf and later Kaplan published his article describing numerous anatomical interposition of structure which prevent close reduction therefore requiring open reduction. [4]

The patho - anatomy involves dislocation of head of metacarpophalangeal which gets button holed within the anatomical soft tissue around it.

Kaplan's original description clearly indicates the pathoanatomy – The fibrocartilaginous plate avulsion from its weakest attachment, the volar aspect of 2nd MC neck. The flexor tendon and pretendinous band are displaced ulnarly and lumbricals radially to metacarpal head. The fibrocartilaginous plate is displaced dorsally over the metacarpal head where it becomes wedged between the base of proximal phalanx and metacarpal head. The lateral collateral ligaments which are abnormally displaced lock the phalanx in abnormal dorsal position. Distally the natatory ligament situated dorsal to metacarpal head with volar plate; proximally the superficial transverse ligament extends across the metacarpal neck volarly.

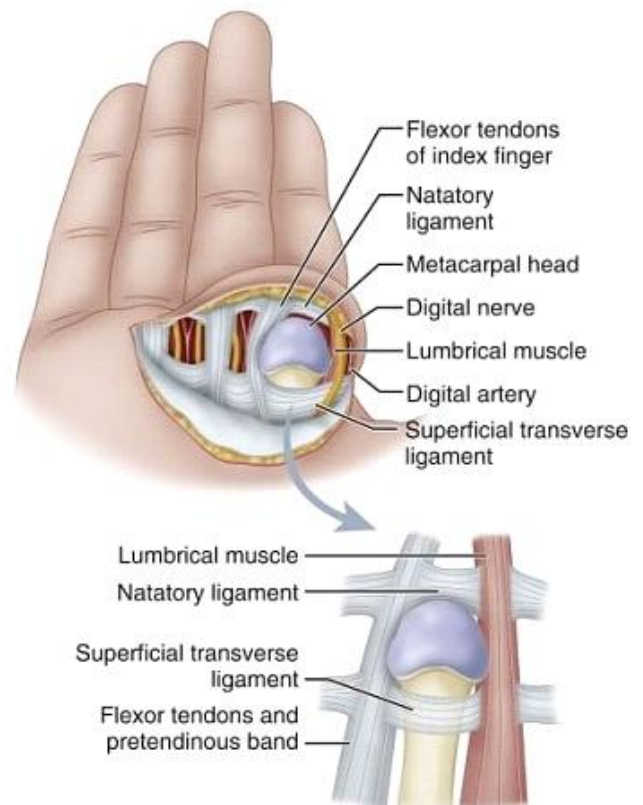


Figure 1: Kaplan open reduction of dislocation of second metacarpophalangeal joint. (Courtesy - Campbell's Operative Orthopaedics)

Attempt for close reduction in situations will tighten the noose around the head and vigorous multiple attempts may lead to fracture of metacarpal head. So open reduction is useful in this condition.

They are divided into simple reducible and complex irreducible dislocation where simple require reduction without surgical procedure and complex entails surgical intervention.^[2]

Case Series:

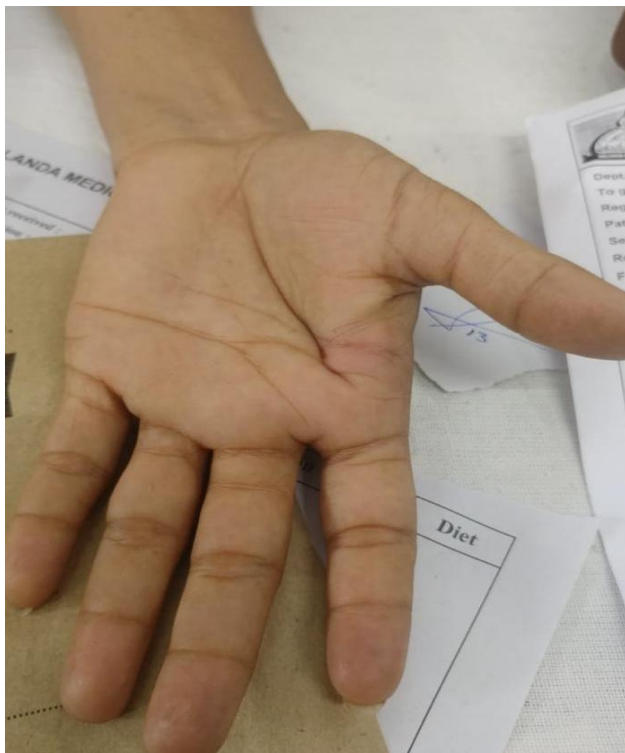
One patient 27 years old male and second patient 28 years old female, both were labourer by occupation presented to the emergency department with complaints of pain, swelling and deformity. First patient was doing his work when a brick suddenly fell on his hand. He felt pain followed by swelling and deformity on the dorsum of left hand. Second patient was also doing her work when a sand bag fell on her hand. She also had the same complain.

Clinical findings:

Swelling on inspection, tenderness on palpation and restricted movement of index finger. Tenting of skin over base of index finger on volar side was seen.



Figure: Tenting of the skin at the base of the index finger on volar aspect of hand



Radiograph of left hand shows:



Figure: Dorsal dislocation of MCP joint of left and right index finger respectively

Under digital block anaesthesia, close reduction was attempted in emergency but was unsuccessful. Therefore the decision was taken for surgical reduction by dorsal approach in both cases.

Surgical procedure:

With proper consent from the patient & first degree relatives, patient in supine position & under regional anaesthesia in the form of brachial block. Pneumatic tourniquet was used to obtain bloodless field during surgery. Painting and draping were done to have an aseptic and antiseptic environment. Dorsal approach was used and 4 cm midline incision were made in dorsal aspect of index finger, splitting longitudinally the underlying extensor tendon and joint capsule as well. The collateral ligaments were found caught within the joint which were released. Then the volar plate was visible which was strong, taut, shiny & glistening

white in colour. The volar plate was dorsally dislocated. A longitudinal incision was made over the plate in the centre & with a small bone lever on the head of the metacarpal was gently elevated and allowed to relocate.

The wrist was flexed volar ward to release the tension on the flexor tendons. Traction on the finger and flexion of the MCP joint reduces the dislocation.

Stability and adequacy of reduction was noted by moving the finger in flexion and extension. The capsule was re-sutured and extensor mechanism was reconstructed using vicryl sutures. This prevents instability and iatrogenic subluxation/dislocation. The wound was washed thoroughly and skin was sutured with nylon. A slab was applied on volar side up to proximal IP joint in functional position which was removed after 3 weeks.



Figure: Dorsal (Becton) approach for Kaplan lesion and reduction of MCP joint with the help of small bone lever.

Post - op Xray:

Figure: Post-op X- ray shows reduction of the 2nd MCP joint in both the cases.

Follow - up:

Patients were discharged on 5th post - operative day. The sutures were removed on 12th post - operative day. The splint was discarded after 3 weeks allowing gradual mobilization.

Patients were followed weekly for first 3 weeks and later once a month for 3 visits. Total visits were 6 and the duration of follow - up were 3 months.

X - rays were done post - operatively and at 3rd and 6th week. Gradual flexion and extension exercise was started. Hyperextension was avoided.

Result:

As follow - up after 6 weeks, the average patient's active ROM consisted of MCP joint hyperextension to 5° and 80° of flexion, proximal IP joint extension to 0° and flexion to 80° and DIP joint extension to 0° and flexion to 65° on an average.

X - rays confirmed maintenance of reduction.

2. Discussion

In the dorsal approach it was required to extensively release the volar structures along with the volar plate, thus the primary impediment and the risk to radial neurovascular bundle was high. That's why dorsal approach was popularised in which the risk to injury to neurovascular bundle was much less as it lies between the metacarpal head and skin volar wards. It was Becton et al who reported a series of 9 cases complex metacarpophalangeal joint dislocation treated by both approaches. He found that few patients treated with volar approach had a sensory loss on

the radial aspect of the injured finger while those treated with dorsal approach had full recovery with normal function. He concluded that the dorsal approach was the right approach to treat such lesions.

Out of the 2 main approaches described for open reduction - volar and dorsal, extensive literature has been written on volar approach by Kaplan and other authors. The need to release the superficial transverse metacarpal ligament and distal transverse fibres was advocated by Kaplan. De Coster advised not to release them unless they obstruct or interfere in reduction. The risk of iatrogenic dislocation following release of ligament is also reported.

Murphy reported the role of volar subluxation of deep transverse metacarpal ligament which forms a part of noose around the head of metacarpal and prevents reduction. This also needs release if it prevents reduction. Osteochondral fractures were noted in nearly half of these lesions. The fracture fragments are on the dorsal side and are ideally addressed by dorsal approach.

The main culprit of this lesion is volar plate. It dislocates dorsally and lies between the joint which prevents the reduction. It can be directly visualised by naked eye and by dorsal approach. Volar plate, as mentioned earlier provides stability to the joint volar wards.

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