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Dorsal Approach for Management of Complex Kaplan's Dislocation

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ABSTRACT

Complex metacarpophalangeal dislocation is an uncommon injury where the index is the most commonly involved finger. The most common mechanism involves hyperextension of digits at the metacarpophalangeal joint. Such dislocation needs open reduction as the volar plate becomes entrapped between the metacarpal head and proximal phalanx making close reduction difficult. Approaches for open reduction can be dorsal, volar, and lateral. In our patient, we commenced a dorsal approach for reduction and additional stabilization done with K-wire. An early range of movement was initiated and resulted in good functional recovery.

Keywords: Dislocation; metacarpophalangeal; plate; volar.

INTRODUCTION

Complex dorsal dislocations of the MCP (metacarpophalangeal) joint so-called Kaplan's lesions are uncommon injuries among which the index is the most commonly involved.[1] Most common mechanism of such injuries is forced hyperflexion of digits on an outstretched hand.[2] Pathoanatomy involves breakage of the volar plate with maintaining its attachment from deep transverse ligament which then interposes between the metacarpal head and base of the proximal phalanx. Further, flexor tendons on the ulnar side and lumbricals on the radial side form a tight constriction noose or a button hole-like phenomenon for the metacarpal head preventing close reduction.[3] In this injury puckering of the volar skin is common over the metacarpal head and is considered a pathognomonic feature. [1,4] Open reduction can be achieved by dorsal, volar, and lateral approaches for such injuries.[3,5]The aim of this study is to report this uncommon form of dislocation and the use of the dorsal approach for its management.

CASE REPORT

A 40-year-old male presented to the Emergency Department following Road Traffic Accident who suffered a hyperextension injury on the right index finger. Pain and swelling over the right index finger and second MCP joint were chief complaints and on examination, the deformity was marked with dimpling of volar skin (Figure. 1) with normal distal neurovascular status. Antero-posterior, oblique and lateral radiographs were taken. (Figure. 2) which also showed a dorsal osteochondral fragment. Closed reduction was unsuccessful so we shifted the patient into the operative room for open reduction.

Figure 1. Clinical picture showing pathognomonic sign with dimpling of volar skin.

USG-guided brachial block was given to the patient and a tourniquet was applied to obtain a bloodless field. After achieving an aseptic field a single sagittal incision was given over the MCP joint dorsally. Extensor mechanisms were identified and they are incised on the ulnar side which was later repaired. The use of 11 number blade was used to incise the capsule longitudinally which made the MCP joint visible. A fractured head of the metacarpal

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was found. Ligaments were imbricated in the joint which was released. The volar plate was visualized (Figure. 3) and a longitudinal incision over the volar plate was given. Freers' elevator was used for reduction. Under direct visualization, joint stability was checked in full flexion and extension. The fracture fragment was fixed with a 1.5 mm K-wire (Kirschner wire) by transfixing the MCP joint from the proximal phalanx to the metacarpal. Capsule and extensor mechanisms were repaired. Tourniquet was deflated, hemostasis was maintained and closure was done in layers. The dressing was applied along with a dorsal blocking splint with metacarpal joint in neutral position. Immediate postoperative X-ray was taken which showed a maintained reduction. (Figure. 4) The neurovascular evaluation was rechecked which was normal.

Figure 2. Pre-Operative X-ray of second metacarpophalangeal joint dislocation in Antero-posterior, Oblique and lateral view.

Figure 3. Intraoperative picture showing volar plate and dorsal osteochondral fragment.

The suture was removed after 14 days. The K-wire was removed after four weeks along with a splint. Gradual joint mobilization was initiated after four weeks and strengthening exercises began after six weeks. At six week follow-up, an extension of the MCP joint was 5° and flexion of 70°, PIP joint extension of 0° and flexion of 90° and DIP joint extension 0° and flexion of 70°.

Figure 4. Postoperative X-ray following open reduction and fixation with K-wire.

DISCUSSION

Complex dislocation of MCP joints requires open reduction as the interposing structures in the joint space will not allow for close reduction. However, there is still controversy about the superiority among approaches.

The dorsal approach was first described by Farabeuf claiming that it would provide good visualization to release entrapped volar plate and less chance of neurological injury.[6] Dorsal approach has additional advantages as it helps to fix associated osteochondral fractures.[7] Our case had an associated dorsal osteochondral fracture so we performed the dorsal approach.

The volar approach was first used by Kaplan as this approach provides better and more direct visualization of the anatomical and pathological structure hindering reduction especially volar plate.[1] In the volar approach, care should be taken not to damage the neurovascular bundle. It also provides complete anatomic restoration of the joint and aids in the repair of the volar plate which is necessary for late stability.[8]

The lateral surgical approach has an advantage as it provides access to both volar and dorsal structures, easy fixation of the osteochondral fragment, and reduces the risk of tendon adhesions, and scar retraction which limits joint movements.[5]

The most common complication related to this injury is joint stiffness, possibly resulting from soft tissue trauma,

prolonged immobilization, or from osteochondral fracture, and related degenerative changes in the long term.[9]

Excessive fibrosis which leads to a reduced range of motion is a common complication due to prolonged immobilization and poor soft tissue handling.[8]

The amount of motion regained is inversely proportional to the duration of immobilization.[10] So, a full range of finger immobilization is advocated from the first postoperative day with dorsal extension blocking slab which will be maintained for 3 weeks and active finger extension was allowed after 3 weeks.[1]

CONCLUSIONS

Complex MCP joint dislocations are complete and irreducible dislocations that require an open surgical approach for reduction and proper alignment. Volar and dorsal approaches are common surgical approaches to follow. Early reduction within 24 hours will provide excellent functional outcomes. We recommend using the dorsal approach if there is an associated osteochondral fragment which helps in anatomical reduction and rigid fixation and minimizes the risk of neurological injury.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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