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Case Report

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2 CASES OF OPEN COMPLEX KAPLAN'S DISLOCATION OF THUMB AND OF 2ND TO 4TH METACARPOPHALYNGEAL JOINT ASSOCIATED WITH IPSILATERAL ANTERIOR SHOULDER DISLOCATION; A RARE CASE REPORT

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ABSTRACT

Dorsal metacarpophalyngeal dislocations are uncommon variety of hand injuries. Especially when they are open type. Open type of Dorsal Metacarpophalyngeal dislocation of the 1st ray or the Thumb are even more uncommon. We report two cases, one having open type of metacarpophalyngeal dislocations of 2nd to 4th fingers except little finger and other having open type of Metacarpophalyngeal dislocation of the Thumb. Both were associated with Ipsilateral Anterior Shoulder Dislocation. According to our review of literature, ipsilateral shoulder dislocation have not been reported with such injuries. The pathognomonic feature of these injuries are fall on outstrectched fingers and a hyperextension force exerting on the metacarpophalyngeal joints. Simple or Complex variety of dislocations depends on whether the joint would get reduced by open or closed means. The characteristic finding of these type of injuries is the presence of an interspersed volar plate in between the metacarpophalyngeal joint either of the long fingers or the thumb. Both of our cases,inspite of being open in nature were irreducible by closed means and were of complex variety and had to be open reduced under vision after splitting the entrapped volar plate and tendons of FDP and in one case the metacarpophalyngeal joint of the thumb had to be fixed with 1 Kirschner wire. Both the patients had ipsilateral shoulder dislocation which were reduced in a closed fashion. Early anatomical reduction of the dislocated joints coupled with relatively early physiotherapy regimen gives good to excellent functional results as both in our patients. There are reports of isolated dorsal dislocations of metacarpophalyngeal joints of long fingers as well as of the thumb. But there are no reports mentioned in literature where there is associated ipsilateral shoulder dislocation. Both of our cases we had an open variety of Irreducible Complex Metacarpophalyngeal joint Dislocation as well as ipsilateral shoulder dislocation.

KEYWORDS: Open; Complex MCP Joint dislocation; Ipsilateral shoulder dislocation.

INTRODUCTION

Dorsal Metacarpophalyngeal dislocations are rare but debilitating hand injuries. The mechanism of injury appears to be a forcible hyperextension of the metacarpophalyngeal joints.[1,3,7] The injury pattern becomes even more rare when the entire dislocation is an open variety and is irreducible or complex. There are previous reports on open variety of MCP dislocation but they were easily closed reduced like the ones reported by McCarthy (1980), Wright (1985) and Araki et al. (1987).[4] The concept was described by Kaplan in 1957 in his classic article which described the pathologic feature of buttonholing of the metacarpal head and the anatomic factors preventing reduction.[3]

The preventing factors for reduction include the volar plate which breaks at its weakest point at the neck of the metacarpal and it gets displaced dorsally wedging in between the metacarpal head the proximal phalynx.[2,7,8] This was the principle factor according to Kaplan preventing reduction.[3] But more recently more factors have been shown to be equally important. Those include the transverse fibres of the Superficial and Deep Transverse Metacarpal Ligament, the natatory ligaments, lumbrical muscles and sometimes osteochondral fractures.[7,9]

As far as the MCP joint of the thumb is concerned, the mechanism of injury appears to be same. The appearance of sesamoids in the increased joint space in the MCP joint after dislocation in pre-operative Radiograph is quite pathognomonic of a complex variety of dislocation of Thumb.[1,9] These cases require open reduction and internal fixation with Kirschner wire and in some cases repair of the Radial Collateral Ligament after checking the lateral stability after reduction.[1] There are no confirmed reports regarding the mobilization schedule for such injuries. We have to wait till wound healing and be careful not to have secondary complications of open wounds like infection and gaping. Relative early

mobilization by 4 weeks is accepted time to prevent complications like stiffness, arthritis and pain.

Normally these type of hand injuries are isolated events. In addition to that, since both these injuries were of Open variety, it is very easy to miss out on associated injuries. A high index of suspicion should always be maintained while dealing the patients to search for other associated injuries like in both of our patients, there was ipsilateral Anterior shoulder dislocation.

CASE REPORT

We report two cases of ipsilateral open dislocation of metacarpo-phalyngeal joints and ipsilateral closed shoulder dislocation. One Patient had open volar dislocation of 2nd to 4th fingers and One patient had open dislocation of 1st metacarpophalyngeal joint.

Case1-The first patient, a 30 year old truck driver by occupation had a motor vehicular accident while driving truck had a direct impact injury to the right hand, presented immediately within 2 hours of injury. There was lot of contamination of the wound and soft tissue injury .Immediate wash was given in the Emergency room with at least 5 litres of plain Normal Saline after which a temporary sterile dressing was put. A thorough full body examination was done clinically to rule out other injuries.

We tried a closed reduction under sedation in the emergency room but because of soft tissue interposition, closed reduction was unsuccessful. The patient was taken immediately to the operating room after confirming Nil Per Mouth status of the patient. The MP joint of the index, middle and ring fingers was dislocated and the metacarpal head was trapped between the flexor tendon with its torn flexor sheath on the medial side and a contused lumbrical muscle and on the lateral side. The neurovascular bundle was also visualized but found to be intact. There was a lot of contamination which was also visualized on radiographs. (fig1).

Figure1-Anteroposterior and lateral Xray of hand showing dorsal dislocation of the 2nd to 4th metacarpophalyngeal joint with a lot of contamination.

The volar plate was detached from the neck of the metacarpal and wedged on the dorsal side within the joint preventing reduction especially for the index and middle fingers. Inspite of the injury being open, reduction was difficult. Finally, the volar plate was incised and released after which the joint was reduced. Closeby to all the finger MP joints the lumbrical muscle and flexor tendon sheath were contused but not completely torn. They were debrided and loose Non-Absorbable Vicryl sutures were taken. Adequate wash was again given for the wound. Good debridememt was done and primary closure of the wound was successfully done(figure2).

Figure 2-postoperative xray showing reduction of the metacarpophalyngeal joint.

At the same time, a Successful closed reduction was also done for the ipsilateral right shoulder joint. (figures 3,4).

Figure3-Preoperative xray of right shoulder showing anterior fracture dislocation.

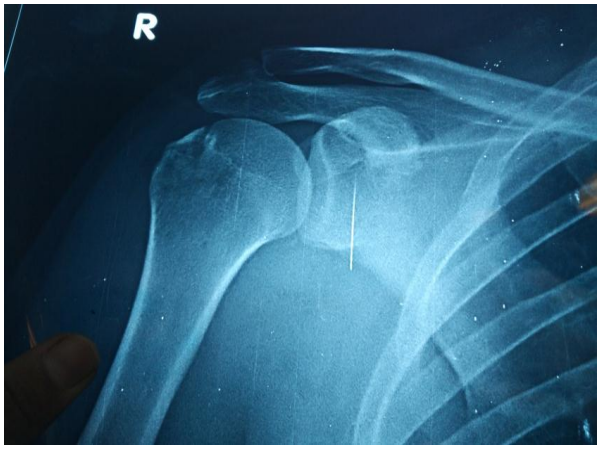

Figure4-Postoperative xray of right shoulder showing reduction of the joint.

The patient had ipsilateral fracture dislocation of the shoulder with greater tubercle fracture which was conservatively managed with an arm-pouch sling for 6 weeks.

There was good stability after reduction of the dislocation. Therefore, we did not put any additional K-wires. After wound closure the MP joints were immobilized in their functional position of 90degrees of flexion in a plaster slab while the interphalangeal joints were not immobilized. A postoperative radiograph was taken which also confirmed the reduction of all three MP joints. Intravenous antibiotics in the form of 3rd generation Cephalosporins and intravenous Amikacin was given for 2 days. Wounds were dressed every 3rd day after discharge till the end of 15 days after which stitches were removed and a repeat X-ray was done which showed maintenance of reduction in both the metacarpophalyngeal joints and shoulder joints.

The patient was regularly followed up thereafter. Active and passive mobilization was started after 4 weeks of plaster slab immobilization. Patient regained full range of active movements at metacarpophalyngeal joints as well as the shoulder joints. At 10-week follow-up, the patient's active range of motion consisted of MP joint hyperextension to 5° and almost 80° of flexion, proximal interphalangeal joint extension to 0° and flexion to 90° and distal interphalangeal joint extension to 0° and flexion to 70°. The shoulder regained good to excellent range of motions after a good physiotherapy session.

Final functional Outcomes were based on The DASH score and the American Society for Surgery of the Hand (ASSH) Total Active Flexion (TAF) score.[11,12] The ASSH TAF score grades results as excellent (flexion >=220), good (flexion 120–80), or poor (flexion <=80).
A DASH Score of 0 points reflects no disability, whereas a score of 100 points signifies maximum disability. The occurrence of deformity, pain, loss of strength and sensitivity were also considered.

Table 1: American Society for Surgery of the Hand (ASSH) Total Active Flexion (TAF) score system

Degree of flexion	Rating
TAF from MCPJ to DIPJ: digit 2–5	
>220	Excellent
120–80	Good
<80	Poor
TAF from MCPJ to IPJ: thumb	
>220	Excellent
120–80	Good
<80	Poor

Clinical Assessment Committee. Total Active Flexion (TAF) scale, American Society for Surgery of the Hand (ASSH) report. New Orleans, 1976. TAF, total active flexion; MCPJ, metacarpophalangeal joint; DIP, distal interphalangeal joint; IPJ, interphalangeal joint.[11]

Case2-This patient 60 years male had an Grade 2 open dislocation of right 1st metacarpophalyngeal joint with a contused lacerated wound over volar aspect of 1*1 cms alongwith right ipsilateral shoulder dislocation. The antero-posterior x-ray of the hand showed dorsal dislocation of the 1st MCP joint. The x-ray showed the pathognomonic feature of complex Kaplan's dislocation with the sesamoids hinged in between the joint. (figure5).

Figure 5-Pre-operative anteroposterior xray of patient2 showing 1st MCP joint dislocation with the characteristic hinging of sesamoids.

Similar management technique was used like the previous patient. Adequate wash and one dose of antibiotic was given in the Emergency Room. A Gradual and a careful attempt was made for closed reduction under sedation but was unsuccessful as we had anticipated. Patient was taken in the operating room and under general anaesthesia, Open reduction was done for the metacarpophalyngeal joint using a Dorsal approach. Although the open wound was on the volar surface or the thenar eminence, still we preffered a dorsal approach as it is more safer to prevent the volar neurovascular structures. After incising skin and subcutaneous tissues, the displaced volar plate was incised helping the relocation of the joint. The capsule was also found to be torn. The volar plate and the sesamoids were found to be firmly anchored at the dorsal aspect of metacarpal head preventing extraction. Dorsal approach helped to examine both the collateral ligaments. K-wire was put for additional stability. Wound was adequately debrided and primary closure was done alongwith the volar plate which was sutured back to the periosteum of the metacarpal. Postoperative x-ray showed good reduction and alignment of the 1st MCP joint. (figure6).

Figure6-Postoperative xray showing joint reduction.

Closed Reduction was done for the ipsilateral shoulder joint(figure7,8).

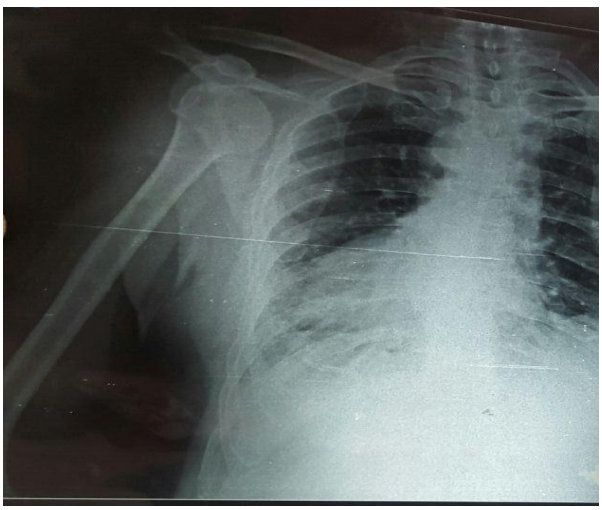

Figure7-Preoperative xray of shoulder dislocation.

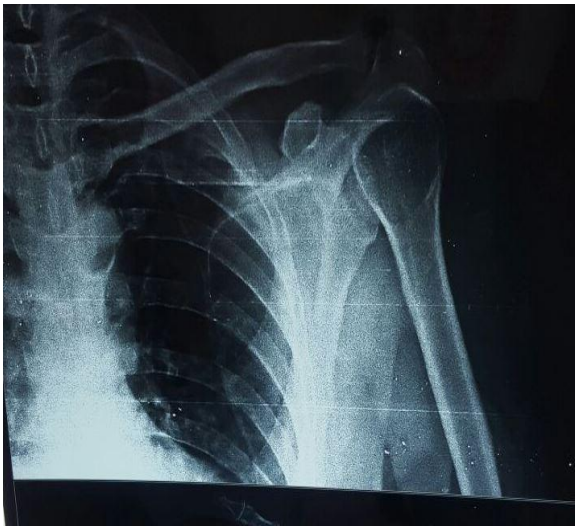

Figure8-Postoperative x-ray showing reduction of shoulder joint.

Wound dressings were done every 3rd day till the 15th day after which stitch removal was done. K-wire was removed after 4 weeks and the immobilization thumbspica slab was also removed (figure9).

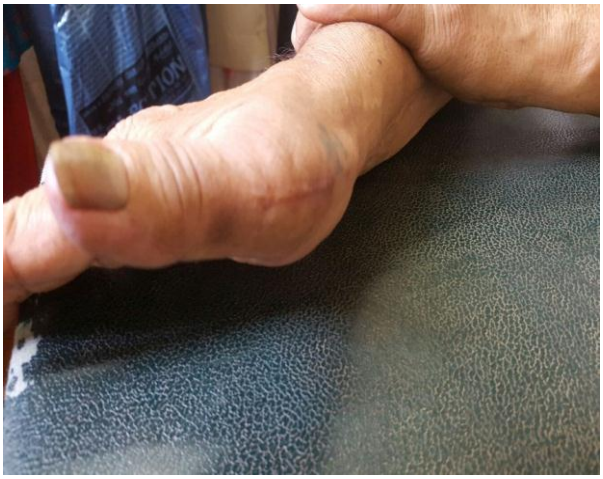

Figure9-Surgical wound healing at 4 weeks.

Check-Xrays were taken at this time before removal of K-wire which showed good healing of the joint and maintenance of reduction of ipsilateral shoulder joint. Active and Passive assisted exercises were also started at the same time.

Patient regained full range of movements at thumb including pinch grip and grasping strength and also for the ipsilateral shoulder joint after a good physiotherapy session for 4 -6 weeks. Thereafter, patient was regularly followedup every month. Both the patients are still under our follow-up after 18 months and having excellent range of movements. (figure10).

Figure10-Good grip strength and complete fist making at 12 months follow-up

DISCUSSION

Dorsal metacarpophalyngeal dislocations of the thumb and other long fingers are uncommon injuries produced as a result of hyperextension injuries to the MCP joints. The concept was classically described by Kaplan in his famous article.[3] Isolated Dorsal MP joint dislocations tend to occur most frequently among the exposed border digits, with the index finger most commonly affected, followed by the small finger and most rarely isolated dislocations are seen for Middle and ring fingers.[10] The classification into simple and complex variety depends upon whether the joint is reducible or not by closed means. Simple dislocations have more chances to get reduced in a closed fashion.[9] X-ray would reveal hyperextension upto or less than 90 degrees for simple dislocations whereas in complex variety, the x-ray would show more of a parallel arrangement of the metacarpal and the proximal phalynx. At this stage of hyperextension, the head of the metacarpal becomes easily palpable alongwith the classical puckering of the volar skin as described by Kaplan.[2,3,9]

Open variety of Dorsal MCP joint dislocations are even rarer.[4] Both our cases had open MCP joint dislocations. The rarity of our injuries increase when both our cases had ipsilateral anterior shoulder dislocation. High index of suspicion has to be maintained while dealing with such cases especially in a busy emergency ward like ours where there are high volumes of trauma cases. Based on the available reports open dorsal dislocations of the MCP joints are very rare including that of the thumb.[12]

The common barriers to prevent easy closed reduction include volar plate, flexor tendons, natatory ligament, lumbrical muscles, superficial and deep transeverse metacarpal ligament which tighten around the metacarpal head forming a tight noose.[6] For the thumb, the capsule, collaterals and sesamoids also pose a significant problem in getting a successful closed reduction.[9]

Release of all the above structures may be required in various cases depending upon individual cases. Recent reports have described the significance of release of dorsally displaced transverse fibres of DTMCL to achieve accurate reduction especially for the second metacarpal.[3,7] Eaton also suggested its significance after observing the direct relationship of the DTMCL with the volar plate when they are closely attached anteriorly at the neck of metacarpals.[3] Various authors have described both the dorsal and volar approaches to achieve reduction. In some cases, it is even recommended to do a dual anterior and a dorsal approach if the volar plate is not getting released easily.[5,8,9] Volar approach carries a high risk of injury to the digital nerves and vessels but provides diret visualization of the volar plate being released as advised initially by Kaplan.[3] But a dorsal incision prevents injury to the digital nerves and vessels in addition to the soft tissue structures also being released. A dorsal incision was originally well described by Farabeuf.[3,10] It also helps in reducing any osteochondral fractures if there are any. Especially in cases of thumb MCP joint disloactions.[8,10] Only possible disadvantage of dorsal based incision is splitting of volar plate which may compromise the stability of the MCP joint and delay in healing.[10]

In our first case, open dislocations were present for 2nd to 4th fingers. The open wound was anterior over the volar surface. Therefore, we approached the joints from the same wound and got a successful reduction by releasing the soft tissue interposition.

For our second case, there was less than 1cm open wound anteriorly. Therefore, we took another dorsal based incision. C-arm guidance was used for accurate rduction and to watch for any associated osteochondral fractures. It also helped in checking immediate post-operative stability.

There are no fixed and consensus views about the start of mobilization program after such injuries. But it is widely accepted that in cases of isolated dislocations, mobilization can be started within 2- 3 weeks.[9] Mclaughlin proposed that mobility regained after surgery is inversely proportional to amount of immobilization period.[3] Failure to achieve this may cause joint stiffness, arthritis, chronic pain instability and other disabilitating symptoms.[6,9]

CONCLUSION

Open MCP dorsal joint dislocations of the long fingers and thumb are very uncommon injuries. A high index of suspicion should be maintained while addressing such type of injuries to look for associated injuries. Like in our case where both the patients had ipsilateral anterior shoulder dislocation. It is very easy to miss out on associated injuries especially when the primary Kaplan's dislocation is of open variety. Both the cases had volar plate injuries and repair was required for both the cases. The surgical approach depends on the surgeon preference

and also on the presentation of the injury. Like in our cases, both the patients were treated by both the approaches. Relatively early mobilization provides a good to excellent functional outcome and prevents postoperative joint stiffness and resulting disability.

Both the cases in the case report highlights two rare phenomenon. One is open nature of Complex irreducible Kaplan's dislocation and other phenomenon of associated ipsilateral Anterior Shoulder dislocation.

For articles involving Human patient studies-Both the patients gave the informed consent to the publication of the case study.

Conflict of Interests: None.

Conflicting Interest: None

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