

CASE REPORT

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Joint Stiffness Caused by Metacarpophalangeal Joint Trauma, an Overlooked Complication of the Hand Trauma Cases

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ABSTRACT Hands are frequently vulnerable to trauma. Soft tissue injuries can be recognized during inspection and fractures are frequently visible in radiological studies, however joint subluxations can be easily overlooked. We present a 33-year-old male patient who has third metacarpophalangeal joint dislocation because of hand trauma. An operation was planned for exploration and reduction. No complications were observed during the follow-up period. Sufficient range of motion was achieved on the second month follow up visit. After complex hand trauma occurred, early recognition of the problem, planning surgical treatment as soon as possible and early post-operative rehabilitation are required in order to have excellent results.

Keywords: Joint dislocations; joint capsule; metacarpophalangeal joint

Hands are frequently vulnerable to trauma since they play an indispensable part in our daily lives. Soft tissue injuries can be recognized during inspection, fractures are frequently visible in radiological studies, however joint subluxations can be easily overlooked especially if they are accompanied by other injuries such as fractures, flexor or extensor tendon lacerations. For these complicated hand injury patients, physicians should know the mechanism of trauma and examine each anatomical structure of the hand systematically. In this study, we aimed to report a case of a patient with metacarpophalangeal (MCP) joint subluxation who additionally suffered from a metacarpal fracture and extensor tendon injury, and discuss the challenges about the diagnosis and the treatment plan.

CASE REPORT

A 33-year-old male patient applied to our outpatient clinic. He had second metacarpal fracture and exten-

sor tendon injury of the fourth finger which were operated 4 weeks ago in an emergency department of another hospital. Because of the shaft metacarpal fracture of the second finger, closed reduction and fixation with K-wires had been performed. Extensor tendon of the fourth finger also had been repaired. Four weeks after surgery, the patient presented to our clinic with decreased range of motion of the third MCP joint and pain. On physical examination, 1 cm horizontal scar on the dorsum of the third MCP joint, significant reduction in range of motion of the third MCP joint and pain during passive and active movement was observed. The hand examination was performed again after administration of local anesthetics and passive range of motion of the third MCP joint was still significantly limited. Approximately 10-20° passive flexion was obtained under local anesthesia. On radiological images, base of the proximal phalanx of the third finger was deviated volarly and radially. MCP joint space of the third finger was significantly decreased. Closed reduction was

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not sufficient to correct complex volar subluxation. An operation was planned for exploration and reduction. Incisions were made to the previous scar on dorsum of the third MCP joint. Extensor tendon was intact, but fibrotic adhesions to the surrounding tissue was remarkable. Fibrotic tissues were removed. An attempt to reduce the joint was performed but could not be achieved. Therefore another incision was made volarly in order to visualize the volar aspect of the joint. Flexor tendons, collateral ligaments and volar plate were intact but contracted due to fibrosis. They were surgically released from the fibrotic tissues and the reduction could be performed eventually. Joint capsule was reconstructed and repaired in order to support and stabilize the joint. The joint had a normal range of motion in the end of the operation. The patient was followed with a physiological hand splint with dorsal blockage. Passive flexion exercises were allowed after the second day of the postoperative period. Active-passive flexion and passive extension exercises began after the second week of the operation, followed by stretching exercises on the sixth week. No complications were observed during the follow-up period. Approximately 70° flexion and 10° extension were obtained on the second month after surgery. No complications were observed at 4, 6 and 12th month follow up. No additional surgeries like tenolysis, contracture release were needed. An informed consent has been signed.

DISCUSSION

Hand injuries are the common conditions in our daily activities. Approximately 20% of patients who admit to emergency services due to trauma have hand injuries.¹ Although hand injuries are one of the major reasons of the emergency visits, metacarpal dislocations are relatively rare.² A dislocation is simple when it is easily reducible in closed manner and complex when open reduction is necessary.² Dorsal dislocations are more frequent than volar dislocations.³ Complex dorsal dislocations have been previously reported in the literature.⁴ In 1965, McLaughlin reviewed 45 cases of metacarpophalangeal joint dislocation requiring surgical reduction, only one of these cases involved volar dislocation.⁵ Until 1995, only 10 additional cases have been reported.⁶

In a simple dislocation, the volar plate is not interposed within the joint, and the base of the proximal phalanx remains in contact with the articular surface of the metacarpal head.² Kaplan described the pathogenesis and anatomy of irreducible dislocations.⁷ The most important structure preventing reduction is volar plate. However, the surrounding tendons and ligamentous structures form a tight noose around the metacarpal neck preventing closed reduction.⁷

Joint hyperextension is the most common mechanism of MCP dislocation which results in trapping of the volar plate between the joint space leading to dorsal displacement of the basis of the proximal phalanx.⁶ Volar dislocation can occur through a hyperflexion or hyperextension injury.² Wood and Dobyns reported three cases of complex volar dislocations of the MCP joint. Because the mechanism was unclear in all 3 cases, they studied 10 cadaveric specimens subjected to a hyperflexion moment with a proximal translational force applied to the proximal phalanx.⁴ The authors proposed that the mechanism of dislocation was hyperflexion of the joint and rotational forces on the proximal phalanx.⁴ However Betz et al. reported a case of volar MCP joint dislocation with a clearly documented hyperextension injury.⁸ In our case, we believe that the injury was caused by rotational forces, less significantly by hyperflexion, with the dorsal capsule interposed displacing proximal phalanx volarly.

Closed reduction is the first treatment option for dislocations and subluxations in the MCP joint. Beck and Klena reported 2 volar dislocations that they treated with closed reduction.⁹ Takami et al. reported on two cases of volar dislocation of the MCP joint of the ring finger that were successfully treated closed.¹⁰ Our subluxation case was not reduced with closed reduction. Most probably explanation failure of closed reduction in our case is late presentation. Takami et al. believed that closed reduction is possible for volar dislocations when treatment is rendered ≤ 2 weeks after the injury.¹⁰

Open reduction has 2 surgical options including volar and dorsal approaches.¹¹ The original surgical approach described by Farabeuf uses a dorsal incision.¹² Kaplan described a volar approach for treat-

ment of complex dorsal dislocations.⁷ Mechanism of trauma and time of presentation after trauma were reported to be an important factor of incision selection.^{2,13} With palmar approach being a better option to expose the joint space and volar plate, it also predisposes neurovascular bundles to injury. If the mechanism of trauma is unknown, combined approach was found to be a better choice. Paul et al. recommend that both a combined dorsal and volar approach who presented late >3 weeks after injury.² In our case, we preferred dorsal approach initially but we had to combine it with palmar approach. Dorsal approach did not result in sufficient reduction and range of motion of the joint in our patient.

Early recognition of the problem is one of the major contributor of outcomes. Then appropriate surgical treatment and early post-operative rehabilitation are required in order to have excellent results. However, complicated cases that are accompanied by other injuries such as fractures, flexor-extensor tendon and/or neurovascular bundle injury can make it difficult for the physician to do so. In addition to the

detailed physical examination, anteroposterior, lateral and especially oblique radiographs should be obtained and examined carefully by the surgeon in emergency situation. All that attempts will lead to the optimal range of motion and a shorter interval for the patients to return back to their daily life.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

All authors contributed equally while this study preparing.

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