

Four open metacarpophalangeal joint dislocations

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Although small joint closed dislocations of the hand are common injury types, traumatic open dislocation of the metacarpophalangeal (MCP) joint is a rare injury, and there are limited cases reported in the literature.^[1-4] Small joint dislocations of the hand can often be treated with closed reduction without the need for open and complex surgical procedures.

Metacarpophalangeal joint dislocation was first described in the literature by Farabeuf^[5] in 1876, and until 1957, developments in the mechanism, treatment, and follow-up of closed and open MCP joint dislocation have remained stable. Kaplan^[6] identified four constricting factors surrounding the metacarpal head, which cause its buttonholing into the palm, that gained popularity this year, and defined it under two subtitles as simple and complex. When the literature was reviewed, the order of frequency was determined as the fifth, second, third, and fourth MCP joints, provided they are closed dislocations.^[7,8]

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ABSTRACT

Multiple dislocations of the metacarpophalangeal (MCP) joint are uncommon, and those that are open are always complex and need a surgical intervention for reduction. Metacarpophalangeal joint dislocations are often closed. Cases of open dislocations at the volar side of the hand that presents with skin tearing are exceedingly rare and are of a complex type. These should be urgently reduced following surgical debridement, and surgical reconstruction should be performed if necessary. In this report, we describe a 55-year-old male right-hand dominant mason that presented with open volar dislocations of the second, third, fourth, and fifth MCP joints after a fall on his outstretched hand. In conclusion, high-energy blunt trauma to the MCP joint can seriously affect hand functions when appropriate treatment is delayed, and therefore, it is an accepted principle that definitive reconstruction should be done as quickly as possible to obtain optimal functional results.

Keywords: Complex, dislocation, metacarpophalangeal joint, open, simple.

Multiple open volar dislocations of the MCP joints without fracture occur in high-energy blunt trauma in a mechanism of an outstretched hand, causing hyperextension of the phalanges, which overloads the metacarpal head, piercing the skin at the palm.

Here in this paper, a case of multiple open volar dislocations of the second, third, fourth, and fifth MCP joints of the right hand was reported to present clinical and therapeutic data of an exceptional trauma with its mechanism. In addition, a brief and up-to-date literature review will be presented.

CASE REPORT

A 55-year-old male right-hand dominant mason, presented with open volar dislocations of the second, third, fourth, and fifth MCP joints with an exposed metacarpal head but without any complaints of neurovascular deficits and fractures (Figure 1). During the operation, the structures that hindered the reduction were interposed volar plates



Figure 1. Preoperative clinical and radiological views of the case.



Figure 2. Late postoperative clinical views of the case.

at second and third MCP joints; therefore, the volar plates were dissected into two longitudinally equal parts so that the joint could be reduced and then repaired by using 2/0 polyglactin with multiple interrupted over-and-over sutures. Strangulated metacarpal head between the flexor tendon and lumbrical muscles at the fourth and fifth MCP joints was reduced by pulling the fingers distally and applying a direct force to push over. In addition, interposed volar ligaments and massive edema were found to be an obstacle to the reduction. A short arm brace was postoperatively applied to the

MCP joint in 70° of flexion and the interphalangeal joints in full extension for three weeks, after which active and passive exercises were begun. A written informed consent was obtained from the patient for the publication of his images and other clinical information.

Our patient was followed up three months after the operation and after the full-time hand physiotherapy was completed and the result was marked by a functional recovery of the hand with a full range of motion of MCP joints, an outstanding Palmo-digital grip (EH101; Camry Scale, CA, USA) result with a total active motion of 255°, and an almost complete extension of the long fingers with an overall extension deficit of 5° (Figure 2). The patient was able to return to work after 48 days.

DISCUSSION

Metacarpophalangeal joint dislocations are uncommon and often present as closed. The pathological anatomy of the dorsal MCP joint dislocation was first described by Kaplan^[6] in 1957, and it is defined as buttonholing of the metacarpal head through the volar plate and into palmar structures. Since its description, a few case series of dorsal MCP joint dislocations have been reported. Dorsal MCP joint dislocation can occur due to a fall on the outstretched hand causing

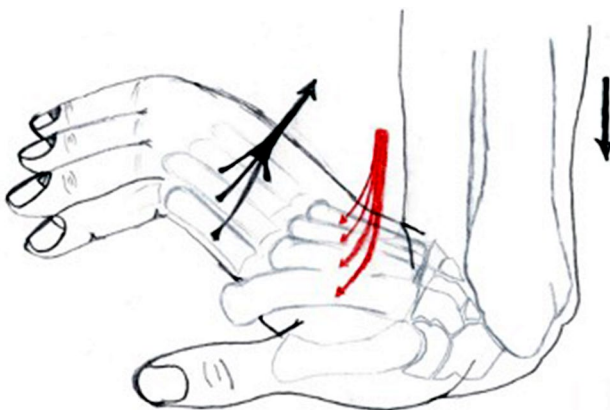


Figure 2. Schematic drawing of the open dislocation mechanism of metacarpophalangeal joints.

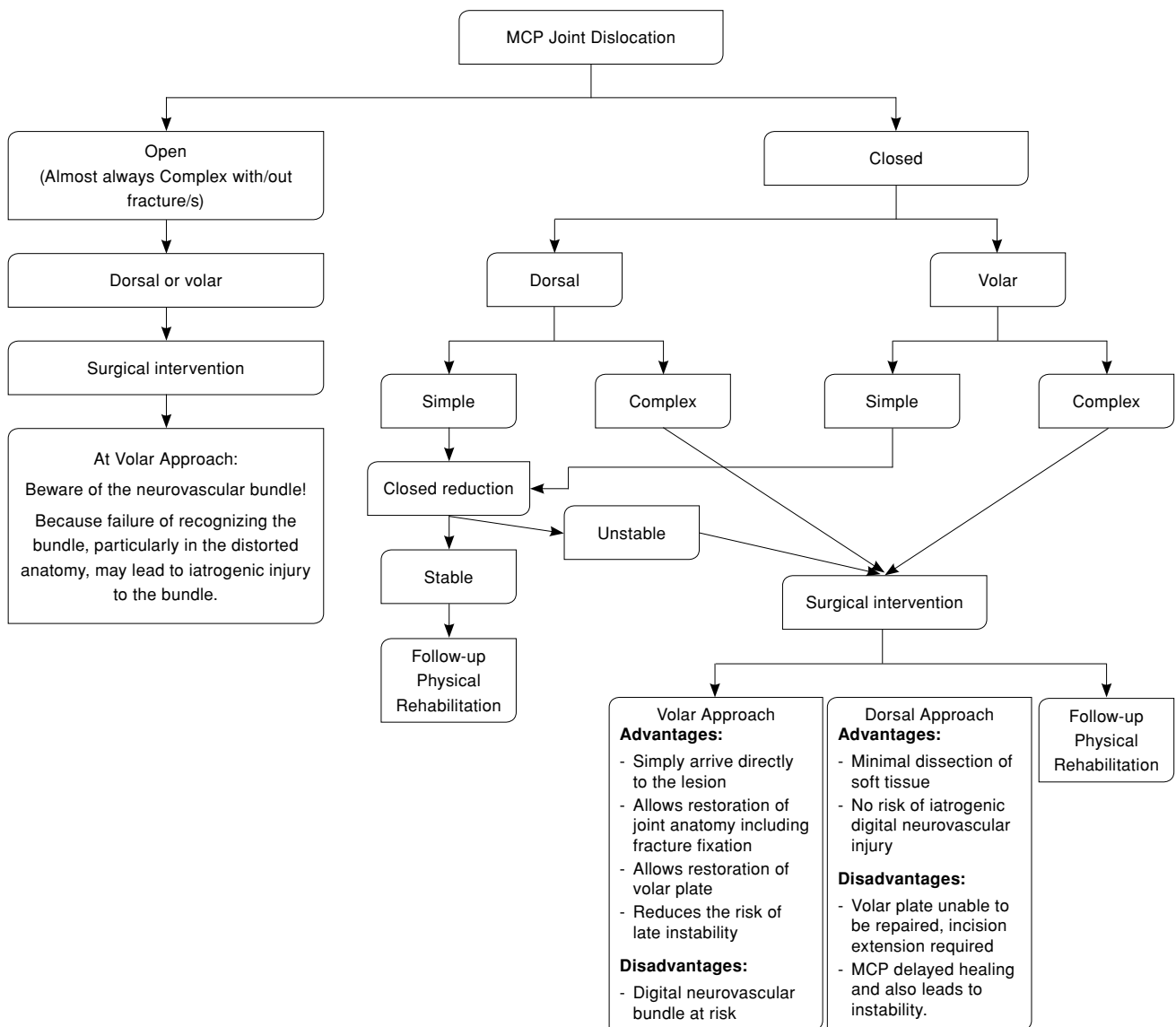


Figure 4. Suggested classification and treatment algorithm with the advantages and disadvantages of surgical approaches of MCP joint dislocation.

MCP: Metacarpophalangeal.

forcible hyperextension of the joints, as in this case report, demonstrated in Figure 3 according to the patient's description of the event causing the trauma. However, the mechanism of volar dislocation has been controversial in the literature; therefore, we described a few studies to bring clarification to the underlying processes.

Renshaw and Louis^[9] suggested that the forced hyperextension of the MCP joint dislocates the volar plate at the base of the first phalanx as a possible mechanism. However, this mechanism could not be reproduced on cadaver fingers to end

up with MCP joint dislocations.^[9] On the contrary, Wood and Dobyns^[10] proposed a translational forced hyperflexion of the MCP joint on the dorsal surface of the first phalanx as a possible mechanism. This was able to be replicated on cadaver fingers.^[10] The collateral ligament ruptures on the affected MCP joint suggest that a rotatory component to the injury has occurred, as described by Diaz Abele et al.^[7]

Metacarpophalangeal joint dislocations are defined as complex or simple in the literature, depending on whether the volar plate is entrapped in the joint or not. However, when the current

literature is reviewed, it is seen that a considerable number of cases of single or multiple open MCP joint dislocations, the latter presented in this publication, have been reported. Therefore, in the classification of MCP joint dislocations, the initial evaluation should define it as open or closed before describing whether it is dorsal or volar and simple or complex. Based on existing studies,^[1-3,8-10] particularly a review by Diaz Abele et al.,^[7] and our own experience, we recommend that this damage be addressed intraoperatively with the least amount of delay, and preoperative measures to decrease the injury are discouraged. The proposed classification and treatment algorithm is presented in Figure 4.

It is accepted in the literature that reduction is possible with closed methods in simple closed dislocations, that is when the volar plate preserves its anatomical position. In this maneuver, the dislocated finger is firmly grasped with the specialist's thumb and index finger, and traction is performed along the axis of the hyper-flexed finger. At this stage, it should be ensured that traction is not performed along the axis of the metacarpal joint. While the traction is maintained, the base of the dislocated phalanx is strongly pushed against the metacarpal head, and the MCP joint is reduced and neutrally flexed. However, it should be kept in mind that if the presence of instability in the MCP joint after closed reduction is detected, surgical reconstruction should be performed.

Herein case put together many rare characteristics of an injury of MCP joints, consisting of multiple open dislocations without fracture of the MCP joints of the index finger to the little finger. In the case of multiple open dislocations of the MCP joints, as in all other injuries, it is essential to achieve proper medical management and prompt surgical reconstruction at the first medical center if possible or referral to another capable center for definitive treatment.

In conclusion, early and appropriate treatment is critical to accomplish acceptable outcomes in open MCP joint dislocations. Delayed or inappropriate treatment, prolonged postoperative immobilization,

and inadequate rehabilitation lead to failed clinical outcomes. It is crucial to avoid over hyperextension to prevent the subluxation postoperatively; otherwise, digital nerve damage decreases the range of motion, and degenerative arthritis of the hand joints can be encountered.

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