

Open Dislocation Injury of the Metacarpophalangeal Joints III–V: Case Report

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Summary: A 79-year-old man sustained left open metacarpophalangeal joints III–V dislocation injury in the dorsal direction associated with avulsions of the volar fibrocartilaginous plates. Surgical revision became necessary. Three months after the injury, the patient was very satisfied with his intermedium outcome; however, complete restoration of hand function was not observed at this time. To our knowledge, this is the first case presentation in the literature that describes such an injury involving the metacarpophalangeal joints III–V. (*Plast Reconstr Surg Glob Open* 2021;9:e3424; doi: 10.1097/GOX.0000000000003424; Published online 12 February 2021.)

The preservation of motion in the metacarpophalangeal joint (MCPJ) has a top priority. A stable and functioning MCPJ is the key to the satisfactory function of the overall finger. The stable active extrinsic motion-arc modulates synergistically the intrinsic function in the proximal and distal interphalangeal joint (PIPJ/DIPJ) for a powerful extension and fist closure.

Concerning these aspects, the treatment of injuries at the MCPJ should involve the restoration of joint anatomy and stability in every instance to avoid post-traumatic osteoarthritis.

CASE REPORT

A 79-year-old man sustained left open MCPJ III–V dislocation injury in the dorsal direction associated with avulsions of the volar fibrocartilaginous plates (VFCPs) after a fall downstairs (Figs. 1 and 2). There were no neurovascular deficits. The surgical reduction was done through the open wounds in the palm. After that, there were stable MCPJs; thus, refixation of the VFCPs became not necessary. The injured hand was immobilized with a dorsal blocking splint typically in the intrinsic-plus position for 2 weeks, and then physiotherapy was started. Three months after injury, we observed unchanged well-aligned MCPJs radiographically; extension of all long fingers had been completely restored (Fig. 3), and the patient was very satisfied with his intermedium outcome at this time. However,

physiotherapy must be continued due to incomplete fist closure (Fig. 4) with a decreased flexion of 20 degrees in the MCPJs II–V as measured by us, and reduced grip strength compared with that of the contralateral hand.

DISCUSSION

Based on the classic article by Kaplan in 1957¹ (in which the buttonholing of the metacarpal head into the palm and the anatomy of the constricting factors preventing reduction by closed methods of the MCPJ II dislocation in the dorsal direction was described), this injury is often referred to as the “Kaplan’s injury.” However, MCPJ dislocation injuries were published quite earlier in 1876 by Farabeuf,² and in a review article including 10 reported cases in the literature from 1883 to 1911 by Le Clerc.³ This dislocation injury is uncommon and mainly observed in the dorsal direction, but also less often in the volar direction.⁴

The MCPJ dislocation injury in the dorsal direction is produced by striking the volar surface of the outstretched finger, and results typically in a hyperextended proximal phalanx. However, the middle and distal phalanges are slightly flexed,⁵ but closed MCPJ dislocation injury of the thumb in children can be overlooked.⁶ Kaplan¹ described in a closed MCPJ dislocation injury in the dorsal direction the pathognomonic puckering of the skin in the proximal palmar crease, which is caused by the intimate connection of the longitudinal pretendinous band and transverse fibers of the palmar fascia with the palmar skin. Typically for an MCPJ dislocation injury in the dorsal direction, the prominent metacarpal head in the palm is limited laterally by the flexor tendons and the lumbrical muscles, proximally by the superficial transverse metacarpal ligament, and distally by the natatory ligament and the volar fibrocartilaginous plate.¹ It is to be considered as a high-energy injury and can be associated with a simultaneous fracture or fracture-dislocation injury at the carpometacarpal joint of the same finger.^{7,8}

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Fig. 1. Initial finding: clinical photograph showing the open wounds with the exposed metacarpal heads III–V in the palm.



Fig. 2. Initial finding: posterior-anterior radiograph demonstrating the open dislocation injury in dorsal direction at the MCPJs III–V. The long fingers III–V are hyperextended in the MCPJs and flexed in their PIPJs and DIPJs. Note the avulsions of the VFCPs III–V (arrows).

Open MCPJ dislocation injury is a rare condition accounting for a relative portion of 10.8% of all references in the literature, and in 63.6% of them, more than 1 MCPJ is involved (1 reference: MCPJs II and III, 2 references: MCPJs II–IV, 5 references: MCPJs II–V).⁹ To our knowledge, our presented case is the first report in the literature that describes an open MCPJ dislocation injury in the dorsal direction involving the MCPJs III–V. To avoid post-traumatic instability in the MCPJ, potentially leading to post-traumatic cartilage destruction and resulting in osteoarthritis, surgical revision with the restoration of joint anatomy should be done as soon as possible.

Independently of the involvement of 1 or more MCPJs, closed reduction of closed dislocation injuries is rarely successful.^{1,5} The rationale behind this condition is that the disrupted VFCP of the MCPJ is displaced over the head of the metacarpal, landing on the dorsum of this bone, where it becomes wedged between the base of the proximal phalanx and the head of metacarpal.¹ Hence, the volar approach is more recommended for treatment of closed MCPJ dislocation injury in the dorsal direction than the dorsal approach; it offers the surgeon more direct visual access to the pathologies involving the volar neurovascular bundles and possible flexor tendon entrapment, facilitates the surgical release, and enables refixation of the volar fibrocartilagenous plate, if necessary.^{1,5,9,10} However, refixation of the VFCP is controversial; it can lead to joint stiffness if done, and not all patients report instability if



Fig. 3. Three-month follow-up: clinical photograph showing complete restoration of long fingers' extension.



Fig. 4. Three-month follow-up: clinical photograph showing the incomplete fist closure at this time based on decreased flexion in the MCPJs II–V (ie, joint stiffness).

refixation was not done.⁹ These therapeutic approaches are also applicable for open dislocation injuries independently of involvement of 1 or more MCPJs, and reduction should be done through the open wound. Postoperative care includes immobilization in a dorsal blocking splint

protecting against hyperextension and allowing a full range of active flexion (ie, intrinsic-plus), and physiotherapy should start 2–3 weeks after surgery.^{5,9}

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