

## Volar dislocation of the metacarpophalangeal joint of the thumb: A case report



Serdar Yüksel <sup>a,\*</sup>, Oktay Adanır <sup>b</sup>, Ozan Beytemur <sup>b</sup>, Mehmet Akif Gülec <sup>b</sup>

<sup>a</sup> Trabzon Kanuni Training and Research Hospital, Trabzon, Turkey

<sup>b</sup> Bağcılar Training and Research Hospital, Department of Orthopedic and Traumatology, Istanbul, Turkey

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### ABSTRACT

We present an 18 year-old patient with a volar dislocation of the metacarpophalangeal joint of the thumb. Open reduction was performed through a dorsal incision. Because of the soft tissue interposition such as dorsal capsule, volar plate, dislocated extensor pollicis longus and brevis tendons, ruptured ulnar collateral ligament; open reduction, soft tissue and ligament repair are recommended for this type of thumb dislocations.

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### Introduction

Volar dislocations of the metacarpophalangeal (MCP) joint of the thumb rarely occur. Dorsal dislocations of the MCP and carpo-metacarpal joint of the thumb is more common than volar dislocations.<sup>1–3</sup> In the English literature only twenty six cases have been reported to our knowledge. Literature indicates that open reduction is the most common treatment for this type of trauma.<sup>4,5</sup> The condition is referred to as simple if closed reduction is successful, as complex if open reduction is necessary due to interposed soft tissue.<sup>1</sup> The purpose of this paper is to present a rare case of volar irreducible complex dislocation of the MCP joint of the thumb treated by open reduction.

### Case report

The patient's written consent was taken. A 18 year-old right hand dominant boy fell down on the right side. He described fallen on his hand when MCP joint was on hyperflexion position. He was first seen at emergency department. Physical examination showed

severe swelling, tenderness and deformity of the MCP joint of the thumb. Active range of the MCP joint was painful and limited. The X-ray examination showed volar dislocation of the MCP joint of the thumb with no fracture (Fig. 1). Closed reduction was applied under regional lidocaine anesthesia but it was unsuccessful. The surgical exploration was performed on the next day through a dorsal incision. Under axillary block with tourniquet control, a longitudinal incision was made along the dorsum of the MCP joint of the thumb. Surgical findings showed the metacarpal head herniated through a tear in the dorsal capsule. The dorsal capsules had entered the MCP joint and were the limiting factors in preventing reduction with the ruptured ulnar collateral ligament (UCL). There was also a tear of the UCL (Fig. 2). The extensor pollicis longus (EPL) and extensor pollicis brevis (EPB) tendons had subluxed ulnarly. Tendons were extracted and reduced easily by using a blunt probe. We did not notice any tear of the volar plate. After removal of the interposed dorsal capsule and reduced the EPL and EPB tendons the reduction was easily accomplished. After the dorsal capsule and UCL were repaired (Fig. 3) the wound was irrigated with saline and skin was closed. The UCL was sutured to the remaining stump at the palmar base of the proximal phalanx with a no:2-0 Ethibond. The dorsal capsule was repaired with nonabsorbable sutures. Thumb was immobilized in a thumb spica cast for 3 weeks (Fig. 4). We did not confirm any instability at the MCP joint after repairing the dorsal capsule and UCL and did not use kirschner wire to transfix the joint in the reduced position. After 3 weeks active range of motion

\* Corresponding author.

E-mail address: [serdar84yukse@gmail.com](mailto:serdar84yukse@gmail.com) (S. Yüksel).

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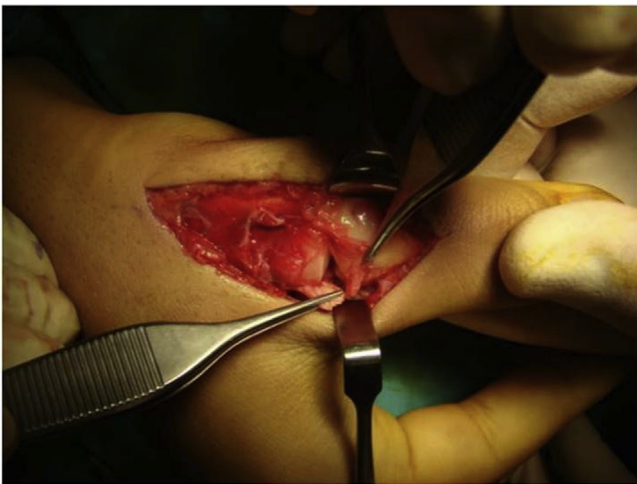


**Fig. 1.** X-ray demonstrating a rare volar metacarpophalangeal joint dislocation.

exercises were begun. Our follow-up was 36 months. According to last physical examination of the patient, there was no pain, stiffness and tenderness at the MCP joint of the thumb with a 10° loss of flexion at the MCP joint compared with the uninjured thumb. Pinch strength was normal compared with the uninjured thumb. He was performing usual daily activity without limitation.

## Discussion

Volar dislocation of the MCP joint of the thumb occurs rarely. First case was described by Singhal in 1974.<sup>6</sup> Only twenty six cases have been reported in English literature to our knowledge.



**Fig. 2.** The intraoperative photograph of complex volar dislocation of the metacarpophalangeal joint of the thumb. The metacarpal head herniated through a tear in the dorsal capsule. The extensor pollicis longus and extensor pollicis brevis tendons cannot be seen, they subluxed volar and ulnarly. The ruptured stump of the ulnar collateral ligament is seen.



**Fig. 3.** The repaired dorsal capsule, ulnar collateral ligament and adductor aponeurosis are seen before skin closure.

According to the reported cases common surgical findings are metacarpal head herniated through the tear of the dorsal capsule, EPL and EPB tendons dislocation and rupture of the UCL and volar plate. Gunter and Zielinski (1982) reported a case of irreducible volar dislocation of the MCP joint of the thumb in which EPB and EPL tendons was trapped beneath the metacarpal head.<sup>7</sup> We confirmed a tear of dorsal capsule and ruptured UCL and dislocated EPL and EPB tendons ulnarly.

Senda and Okamoto (2014) described a new classification for this type of MCP joint dislocations; type A: stable, type B: blocked



**Fig. 4.** X-ray demonstrating reduction of the metacarpophalangeal joint of the thumb and immobilization with thumb spica cast after open reduction.

and type C: unstable.<sup>5</sup> According to the new classification which seems to be useful, type A: stable, type B: blocked and type C: unstable. In type A, only one case needed open reduction due to volar plate interposition, other cases did not require open reduction and they were stable after open reduction. The injury mechanism is hyperextension passive pressure to the dorsum of the proximal phalanx. Type B is the most commonly reported MCP joint volar dislocation.<sup>5</sup> The principal mechanisms are reported to be hyperflexion or direct blow to the dorsum and all cases were associated with UCL rupture and required open reduction. The outcome is typically a stable joint but there is loss of range of motion up to %70 of the uninjured side. Type C is associated with gross ligament injury and instability following closed reduction. When the collateral ligaments do not stabilize the MCP joint, the thumb flexors pull the phalanx toward the palm, resulting palmar subluxation of the MCP joint. For this type dislocation, treatment is early open reduction and ligament reconstruction. Despite the treatment recurrent joint dislocation may occur. The outcome is not to be good with stiffness, pain and loss of pinch strength.<sup>5</sup> Our case was type B, dorsal capsule was extending into the MCP joint and it was the cause of the unsuccessful closed reduction with the dislocated extensor tendons. The mechanism seemed to be hyperflexion of the MCP joint or a blow to the dorsum of the proximal phalanx in flexion and it forced the joint hyperflexion and it leads to volar dislocation of the proximal phalanx and rupture of the UCL, that was similar with other cases which previously described by Singhal (1974), Miyamoto et al (1986), Alioto and Pellegrini (1993), Tung et al (1996).<sup>4,6,8,9</sup>

Most of the cases indicate an open reduction to obtain the reduction.<sup>5</sup> Of the previous cases reported in the English literature, only seven cases were treated by closed reduction (Singhal 1974, Garcia et al. 1991, Proubasta 1993, Catalan Amigo et al. 2007, Beck JD and Klena JC 2011).<sup>6,11–14</sup> They did not describe any obstacles to the closed reduction. Other reported cases required open reduction by a dorsal incision.<sup>4,6</sup> We also tried closed reduction, but we could not achieve concentric reduction. The main obstacle to the closed reduction was determined interposition of the dorsal capsule, volar plate and the two extensor tendons in the MCP joint.<sup>4,14</sup> Glickel et al (1999) emphasized that palmar dislocation of the thumb MCP joint may be irreducible by closed methods.<sup>15</sup> Open reduction through a dorsal approach is recommended because of easily remove incarcerated soft tissue from the joint and easily repair the UCL and easily reduce the dislocated EPL, EPB tendons.

The main problem of these dislocations is loss of pinch strength which is closely related with the unrecognized and so unrepaired UCL of thumb. The collateral ligaments must be torn at least in part.<sup>16</sup> If closed reduction was successful surgery was performed only UCL was displaced outside the adductor aponeurosis (Stener's lesion), examined by palpation.<sup>17</sup> Even after successful closed reductions, the UCL may also have been torn; that needs the attention

of the physician. Incomplete ruptures of the UCL of the thumb are common and need only proper protection with a thumb spica cast for 4–6 weeks.<sup>17</sup> Acute complete rupture of the UCL should be repaired by surgically. If the diagnosis and treatment is delayed it will lead to instability at the MCP joint and loss of pinch function.<sup>5,10</sup>

The literature has very restricted information about the volar dislocation of the MCP joint of the thumb. Volar MCP joint dislocations are very rare conditions so, no one has enough experience. Because of the impairment of grip and pinch function associated with chronic instability of the MCP joint of the thumb, also volar dislocations of the MCP joint should be considered very carefully.<sup>10</sup> Surgical exploration and repair is needed due to the severe soft tissue disruption in these volar dislocations of the MCP joint of the thumb.

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