

Dorsal Approach Decreases Operative Time for Complex Metacarpophalangeal Dislocations

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Purpose Complex metacarpophalangeal (MCP) dislocations require open surgical reduction, but surgeons disagree about the best surgical approach. We hypothesized that a dorsal approach would require less operative time than would a volar approach and result in a decreased need for a secondary approach.

Methods We performed a retrospective chart review of all isolated irreducible dorsal MCP dislocations treated at 2 level 1 trauma centers between 2005 and 2015. We recorded the initial surgical approach (volar or dorsal), total operative time, and whether the surgeon used a second surgical approach. Operative times for initial volar approach versus initial dorsal approach, hand surgeon versus non-hand surgeon, and thumb versus other digits were compared using the 2-tailed Student *t* test. We used Fisher exact test to compare the need for a second approach between the volar and dorsal approach groups.

Results A total of 21 patients (22 digits) with MCP dislocations required surgical reduction. Average operative time was longer for the 14 patients who underwent the initial volar approach (70 minutes) than for the 7 who underwent an initial dorsal approach (45 minutes). Six of the 14 MCP joints approached volarly (42%) required a second dorsal approach. None of the 7 patients in the dorsal group required a second approach.

Conclusions Using a dorsal approach to reduce complex MCP dislocations reduces operative time and decreases the need for a secondary approach. (*J Hand Surg Am.* 2016;41(9):e259–e262. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic IV.

Key words Complex dislocation, metacarpophalangeal joint, open reduction.



UNLIKE MANY OTHER DISLOCATIONS in the digits, metacarpophalangeal (MCP) joint dislocations often require open reduction in the operating room. When the joint dislocates, the proximal phalanx typically moves dorsal to the metacarpal head,

dragging the volar plate into the joint. When the interposed volar plate prevents closed reduction, the MCP dislocation is considered a “complex” MCP dislocation and requires open surgical reduction.

Surgeons do not agree on the best surgical approach to treat this problem. In Kaplan’s¹ original description of the surgical anatomy in 1957, he theorized that the transverse metacarpal ligament and flexor tendon form a noose around the metacarpal head, preventing reduction. Because these structures all reside on the volar side of the joint, he recommended a volar approach. Likewise, Murphy and Stark² advocated a volar approach in their review of 10 MCP dislocations in 1967. Many other authors promote a volar surgical approach because they believe it allows better visualization and protection of the digital nerves, which are not visible through a dorsal approach.^{3–5}

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Received for publication January 18, 2016; accepted in revised form May 30, 2016.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

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0363-5023/16/4109-0011\$36.00/0
<http://dx.doi.org/10.1016/j.jhssa.2016.05.020>

Successful reduction cannot always be obtained through a volar approach. Becton et al⁶ described 4 patients who had an initial volar or radial approach but required a second dorsal incision for joint reduction. This additional approach requires more operative time and results in greater soft tissue disruption and an increased risk of subsequent stiffness.

More recent evidence suggests that a dorsal approach alone more often results in successful reduction than does a volar approach alone. Afifi et al⁷ created a cadaver model of dorsal MCP joint dislocation to examine what structures prevent joint reduction. They found that division of the volar plate was both necessary and sufficient for joint reduction. The joint could not be reduced after division of the superficial transverse metacarpal ligament, deep transverse metacarpal ligament, natatory ligament, flexor tendon, or lumbrical unless the volar plate was also divided. Because the volar plate has been displaced onto the dorsum of the metacarpal head, a dorsal approach provides ready access to this key structure. Several authors describe how the volar plate can easily be identified and divided through the dorsal approach, allowing reduction of the joint with minimal soft tissue injury.^{6,8} Bohart et al⁹ also described 9 cases in which MCP dislocations were reduced solely through a dorsal approach. No comparative study between the 2 approaches has been published to date.

We hypothesized that the dorsal approach would allow easier MCP joint reduction than would the volar approach, objectively defined as decreased operative time. Because the cadaver study indicated that volar plate division was necessary for reduction, and the dorsal approach provides good visualization of the volar plate, we also hypothesized that a second approach would be required less frequently after an initial dorsal approach.

MATERIALS AND METHODS

We completed an institutional review board application at 2 level 1 trauma hospitals and obtained approval before beginning the study. We found 209 patients using the International Classification of Diseases—Ninth Revision code for closed dislocation of the MCP joint between January 2005 and January 2015. Upon chart review, we identified 26 of the 209 patients who had a closed irreducible MCP joint dislocation of any digit. All other patients had either a reducible MCP dislocation or an incorrect International Classification of Diseases—Ninth Revision code. We excluded 5 patients with additional injuries involving the same hand (1 perilunate dislocation, 1 with multiple carpometacarpal dislocations, and 3 with crush or other hand injuries). The remaining 21 patients were treated by 12 different surgeons. For each patient, we recorded

injury mechanism, sex, digit injured, operative time (documented in the electronic medical record as the difference between incision time and surgeon end time, which includes dressing application), and use of a second approach based on the dictated operative report.

Statistical analysis

We analyzed continuous variables (eg, operative time) using 2-tailed Student *t* test. A 2-tailed Fisher exact test was used to evaluate categorical data (use of a second approach).

RESULTS

The study population (Tables 1, 2) consisted of 15 males (15 digits) and 6 females (7 digits), average age 30 years. Patients described a hyperextension injury in 11 cases, a fall on the hand in 5, a sports injury in 3, and blunt trauma in 2. The thumb (8 digits) and index finger (9 digits) were the most commonly injured digits in the study, followed by the middle (2 digits), little (2 digits), and ring (1 digit). All dislocations were dorsal and documented as irreducible by closed means. One patient (patient 1 in Table 2) had 2 MCP dislocations in the same hand. Both were successfully reduced from a dorsal approach with a total operative time of 71 minutes. We excluded this case from operative time analyses because of an inability to determine the operative time per digit, but included these 2 digits in an analysis of the need for a secondary approach.

Fourteen patients (14 digits) underwent an initial volar approach with a mean operative time of 70 minutes. Surgeons used a dorsal approach first in 7 patients (8 digits). Mean operative time was significantly shorter for the 6 cases approached initially dorsally (45 minutes; $P < .05$) included in the operative time analysis.

Five digits (5 patients) experienced an associated osteochondral injury to the metacarpal head. Three were managed from a dorsal approach and 2 from a combined approach (volar and then dorsal) (Tables 1, 2). Because the presence of an osteochondral injury may complicate treatment, we performed a second analysis excluding these patients. This analysis also yielded a statistically significant difference in mean operative time between the dorsal approach (mean, 36 minutes; SD, 8.3) and volar approach groups (mean, 68 minutes; SD, 28) ($P < .05$).

Twelve surgeons performed the 21 different surgeries. Six surgeons (3 orthopedic and 3 plastic) had completed a hand fellowship, possessed a Certificate of Added Qualification in hand surgery, or had both. Six surgeons (5 orthopedic and 1 plastic) had no additional hand surgery training or qualifications. Four surgeons exclusively used a dorsal approach and

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