

Extension Block Pinning for Unstable Proximal Interphalangeal Joint Dorsal Fracture Dislocations

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Purpose To evaluate the outcomes of extension block pinning used to treat unstable dorsal fracture dislocations of the proximal interphalangeal (PIP) joint. The factors affecting the functional outcome were analyzed.

Methods A series of 53 patients with 55 dorsal fracture dislocations of the PIP joint treated with closed reduction and extension block pinning were retrospectively reviewed. Additional percutaneous intramedullary fracture reduction (16 cases) or open fracture reduction (4 cases) had been performed. The radiological and clinical evaluations were included.

Results At a mean follow-up of 5.2 years (range, 1.0–10.6 years), 39 patients with 41 injured fingers were evaluated. The fracture fragments involved 30% to 69% (mean, 50%) of the articular surface of the middle phalanx. The mean range of motion was 80° (range, 35° to 115°) at the PIP joint with a mean extension loss of 6° (range, 0° to 50°) excluding 2 joints that were salvaged with arthrodesis. The mean range of motion of the distal interphalangeal joint was 68° (range, 5° to 90°). The mean visual analog scale for digit pain was 1.5/10. The reduction of the joint was achieved intraoperatively in all cases. However, after the hardware removal, recurrent minimal subluxation was observed in 12 cases (29%). Recurrent subluxation was associated with increased residual pain. The length of follow-up time had a positive correlation, whereas the patient age had a negative correlation with the range of motion of the injured PIP joint.

Conclusions The extension block pinning technique is a simple and valuable technique for treating unstable dorsal PIP fracture-dislocation injuries producing satisfactory long-term results. (*J Hand Surg Am.* 2016;41(2):196–202. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic IV.

Key words Extension block pinning, proximal interphalangeal joint, fracture dislocation, K-wire.

DORSAL FRACTURE DISLOCATIONS OF THE proximal interphalangeal (PIP) joint can be disabling injuries resulting potentially in chronic pain, stiffness, and degenerative arthritis.¹ If the fracture

involves more than 30% to 50% of the middle phalanx articular surface, major articular and ligamentous support of the joint is lost. In this case, the injured joint becomes unstable and operative treatment is usually required.^{1,2} A number of surgical techniques have been described, including transarticular pinning,^{3,4} extension block pinning,^{5–11} various dynamic traction systems,^{12–17} and open reduction and internal fixation.^{4,18–22} Hemihamate arthroplasty^{23–26} and volar plate arthroplasty^{27–29} offer options for reconstructing joints with a severe or chronic injury.

For the extension block pinning technique, the dorsal fracture dislocation of the PIP joint is closed reduced, and a K-wire is drilled into the distal, dorsal aspect of the proximal phalanx to block the terminal extension of the PIP joint and to prevent dorsal dislocation. The

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TABLE 1. Demographic Data of All Patients and the Follow-Up Cohort

	All Patients	Follow-Up Cohort
Number of patients	53	39
Number of injured fingers	55	41
Mean age (range)	42 y (17–68 y)	44 y (17–68 y)
Male/female	34/17	24/15
Dominant/nondominant	23/32	16/23
Mean time interval from injury to operation (SD, range)	10 d (7 d, 1–37 d)	9 d (7 d, 1–27 d)
Finger involved		
Index	5	5
Middle	14	11
Ring	23	15
Little	13	10
Additional injuries		
Tendinous mallet finger	1	1
Bony mallet finger	3	3
Shaft fracture of the distal phalanx	1	1
Base fracture of the fifth metacarpal	1	1

currently published accounts of this technique are limited to small case series.^{5–11}

The aim of this study was to assess retrospectively the functional and radiological outcomes of extension block pinning for PIP joint dorsal fracture dislocations. The impact of radiological and clinical parameters on the final range of PIP joint motion and pain was examined.

MATERIALS AND METHODS

Patients

Institutional review board and ethical committee approval was obtained for this study. The patient data system was accessed to identify patients who had undergone K-wire fixation for digital fracture or dislocation at our medical center between April 2000 and March 2009. Thereafter, by a more thorough review of their medical records, a consecutive series of 53 patients with 55 PIP joint dorsal fracture dislocations were identified (Table 1) as having been treated with extension block pinning.

Operative technique

The PIP joint dislocation was reduced by closed methods by applying axial traction to the digit and then flexing the joint. Next, a retrograde 1.2- to 1.4-mm K-wire was drilled at an angle of 0° to 31° (mean, 8°) to the coronal plane through or beside the central slip tendon into the distal, dorsal aspect of the proximal phalanx (Figs. 1–3) to block terminal extension of the

PIP joint and to prevent the dorsal dislocation of the middle phalanx. Under fluoroscopic control, the joint congruency was assessed. Further attempts to reduce fracture fragments were performed in 20 cases. In 16 of these cases, where the osteochondral articular fragments remained impacted, a percutaneous intramedullary fracture reduction was performed, as described previously.³⁰ In 4 cases, volar open reduction of fracture fragments was performed, and in 2 of these cases, additional K-wires were used to fix fracture fragments.

Postoperative care

Immediately after surgery, passive exercises of the injured PIP joint (limited by the extension block) were guided by a physiotherapist. Active motion of the distal interphalangeal and metacarpophalangeal joints was encouraged. Patients were instructed to clean the pin sites daily. After a mean of 22 days (range, 14–33 days), the extension block K-wire was removed. This was followed by free mobilization and physiotherapy consisting of active and passive motion exercises for the affected joint as well as the adjacent joints.

Follow-up evaluation

The medical records and radiographs of all 53 patients were reviewed. The patients were contacted and asked to return for a clinical and radiological examination. Active and passive range of motion (ROM) of interphalangeal joints was assessed in the affected and contralateral digits. The tip-to-palm distance and rotation deformities

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