SCIENTIFIC ARTICLE

Percutaneous Pinning of Fractures in the Proximal Third of the Proximal Phalanx: Complications and Outcomes

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Purpose Two common techniques for fixation of extra-articular fractures at the proximal phalanx base are transarticular (across the metacarpophalangeal joint) and extra-articular cross-pinning. The aim of this study was to assess the complications and outcomes of these 2 techniques. Our hypothesis was that transarticular and extra-articular closed reduction and percutaneous pinning of base of proximal phalanx fractures have similar complication rates and outcomes.

Methods A retrospective chart review identified 338 patients with base of proximal phalanx fractures. We treated 50 isolated fractures with closed reduction and percutaneous pinning using 1 of 2 techniques: transarticular (25 fractures through the metacarpal head) or extra-articular (25 fractures cross-pinned through the base of the proximal phalanx). Outcome measures included total active motion and complications.

Results We found a substantial overall complication rate in both groups. The mean total active motion for the transarticular group and cross-pinning group was 201° and 198°, respectively. Proximal interphalangeal joint motion was notably affected; nearly half of the patients in each group had flexion loss greater than 20° (average, 27°) at the proximal interphalangeal joint. Nearly a third of patients in both groups had fixed flexion contracture greater than 15° at the proximal interphalangeal joint. There were more secondary procedures in the transarticular group (6) than in the cross-pinning group (2). There was no statistical significance between groups in any of the outcome parameters used.

Conclusions Closed pinning minimizes additional soft tissue injury and allows for early motion, but neither fixation method was superior in terms of the measured parameters. In addition, overall results were not as good as what has been reported in the literature. *(J Hand Surg 2012;37A:1342–1348.*

Type of study/level of evidence Therapeutic III.

Key words Complication, percutaneous, phalanx, proximal, outcome.

Phalanx fractures account for 23% of all below-elbow fractures in the United States; most occur in the proximal phalanx.[1] Proximal phalanx fractures can be the source of considerable morbidity. Coonrad and Pohlman[2] reported that 7 of 27 adults required corrective osteotomy after closed reduction and splinting. Treatment depends on several factors, including fracture location, fracture type, patient factors, and surgeon preference and experience.

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Percutaneous pinning is a suitable method of fixation for these fractures.[3–5] Two common techniques for extra-articular proximal phalangeal base fractures are transarticular (pin crosses the metacarpophalangeal [MCP] joint) and extra-articular cross-pinning. Advocates for percutaneous pinning have reported excellent results, with advantages including early active motion and minimal soft tissue damage.[5,6] This retrospective study assessed the complications and clinical outcomes of using these 2 techniques. Our hypothesis was that transarticular and extra-articular closed reduction and percutaneous pinning of base of proximal phalanx fractures would have similar complication rates and outcomes.

MATERIALS AND METHODS

After we obtained institutional review board approval, we performed a retrospective chart review for 2005 to 2010 in a large hand surgery practice, to identify fractures of the base of the proximal phalanx. We found a total of 338 patients using a Current Procedural Terminology code search that included codes 26727 and 26735. Inclusion criteria included acute (within 2 wk of injury), isolated, transverse or short oblique, extra-articular fractures in the proximal third of the proximal phalanx in skeletally mature patients. All fractures were considered unstable and therefore not amenable to closed treatment. Unstable fractures were defined as any angulation greater than 5° to 10° in the coronal plane and greater than 20° in the sagittal plane with pseudoclawing on clinical examination. We excluded open injuries, more than 1 fracture, skeletally immature patients, presentation later than 2 weeks after injury, and proximal phalanx fractures of the thumb. We also excluded fractures distal to the proximal third of the proximal phalanx because these fractures are often treated in an open fashion with either pins or plates. Conversely, proximal-third, extra-articular fractures are almost exclusively pinned, and hence were the focus of this study. There were 25 fractures in each group, which represented all includable fractures from the Current Procedural Terminology code search that met the inclusion criteria. Within the transarticular group, there were 17 fractures in the little finger, 3 in the ring finger, and 5 in the index finger. The cross-pinning group included 20 fractures in the little finger, 4 in the ring finger, and 1 in the index finger.

We reduced closed and percutaneously pinned all fractures using 1 of 2 methods: transarticular (through the metacarpal head) or extra-articular cross-pinning from the base of the proximal phalanx. Eight fellowship-trained, orthopedic hand surgeons performed all procedures. Surgeon preference dictated which particular technique was used. The mean age was 45 years for both groups (range, 18–89 y). The average follow-up time was 8 months (range, 6–11 mo). Mean time to surgery was 6 days for both groups (range, 1–14 d).

We treated all patients in the operating room using either regional or general anesthesia. In both groups, we treated all fractures with 2 Kirschner wires. We used modified transmetacarpal head fixation as described by Belsky et al[3] for all transarticularly pinned fractures. We placed longitudinal traction on the affected finger and flexed the MCP joint 60° to 80°, and the proximal interphalangeal (PIP) joint to 45°. We corrected angulation and rotation, and drove 2 antegrade 1.1-mm (0.045-in) Kirschner wires across the flexed MCP joint into the subchondral bone of the proximal phalangeal head (Figs. 1, 2). Fractures in the extra-articular cross-pinning group were similarly reduced and then had cross-pins placed from the radial and ulnar base of the proximal phalanx (Figs. 3, 4). We attempted to consistently insert the Kirschner wire as radial and ulnar as possible, to decrease the chance of piercing the lateral bands. In both groups, we left Kirschner wires outside the skin and splinted the fractures for 3 to 7 days. Within 1 week, a certified hand therapist initiated early active range of motion of the interphalangeal joints, including early active tendon gliding exercises. The therapist also addressed edema control with compressive dressings within a week after surgery. The MCP joint was protected with a dorsal extension block splint for 4 weeks. We removed the Kirschner wires at 3 to 4 weeks, at which time we encouraged aggressive active range of motion. Gentle passive range of motion was initiated at 6 to 8 weeks under the supervision of a hand therapist.

The operating surgeon assessed and recorded outcome measures, including total active motion as measured with a goniometer (Patterson Medical, Bolingbrook, IL) and complications. Total active motion of the digit was defined as the sum of active flexion measurements of the MCP, and PIP and distal interphalangeal (DIP) joints of a digit minus the active extension deficits of the same 3 joints (normal is between 260° and 270°).[6] Complications were defined as pin loosening, pin track infection, flexion loss, or extensor lag (defined as greater than 15°) at any joint, residual flexion contractures (defined as greater than 15°) at any joint, malunion, nonunion, and any secondary procedures. Secondary procedures included tenolysis, capsulotomy, osteotomy, and open reduction internal fixation.