Management of Proximal Interphalangeal Joint Hyperextension Injuries: A Randomized Controlled Trial

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Purpose To compare the effectiveness of buddy strapping and aluminum orthosis for treatment of proximal interphalangeal (PIP) joint hyperextension injuries. We also evaluated the effect of age on the outcome by comparing our results in adults and children.

Methods One hundred twenty-one consecutive patients with a PIP joint hyperextension injury of the index, middle, ring, or little finger and without fracture were evaluated. Patients were randomly assigned into 2 groups. In the first group, treatment included buddy strapping of the injured finger to its neighbor noninjured finger for a week. In the second group, immobilization was secured with an aluminum extension blocking orthosis for a week in 15° flexion. Assessment of motion, edema, pain, and strength were performed weekly for the first month and then at 3, 6, and 12 months after injury.

Results The patients treated with buddy strapping exhibited similar outcomes compared with those treated with aluminum orthoses. In patients with full recovery, buddy strapping allowed earlier recovery of motion and resolution of edema and pain compared with aluminum orthosis immobilization. Furthermore, PIP injuries appear to have better outcomes in children than in adults.

Conclusions Buddy strapping is easy and effective treatment for PIP joint hyperextension injuries. *(J Hand Surg Am. 2014;39(3):449–454. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic I.

Key words Finger, hyperextension injury, proximal interphalangeal joint (PIP), randomized controlled trial (RCT), volar plate (VP).

HYPEREXTENSION INJURIES TO THE proximal interphalangeal (PIP) joint represent one of the most common injuries of the hand, especially during sports. Despite their frequency, these injuries are occasionally underestimated. This is mainly due to the negative x-ray findings, which do not exclude the presence of a major injury to the soft tissues stabilizing the joint including the volar plate (VP).[1,2] Meticulous clinical examination and adequate knowledge of the soft tissue anatomy can identify these nonosseous injuries and prevent late complications, such as persistent pain and edema, loss of normal motion, deformity, and post-traumatic arthritis.[3,4]

Forced hyperextension of the joint may lead to various types of injury, ranging from a partial tear of the VP to an avulsion fracture of the phalanx. There is no consensus regarding the ideal treatment for these injuries, with some hand surgeons favoring

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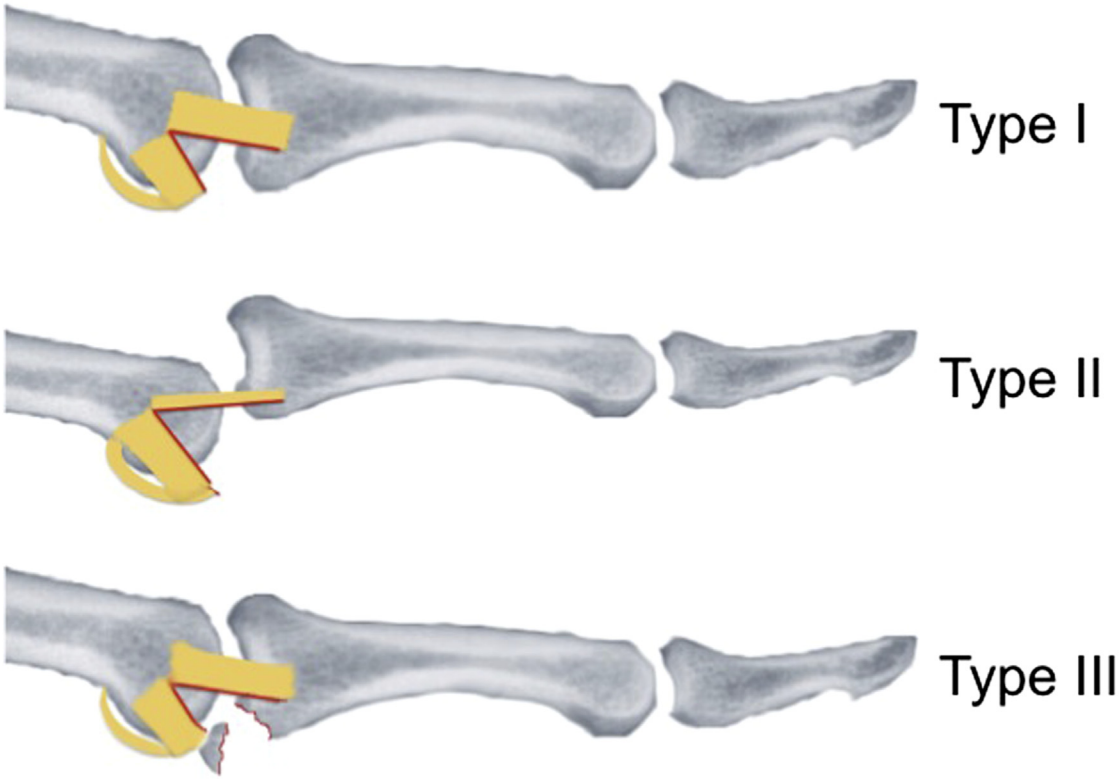

FIGURE 1: Eaton Classification for injuries of the volar plate and avulsion fractures.[10] Type I: hyperextension injury to the volar plate and collateral ligaments, with no dislocation of the joint or presence of fracture. Type II: presence of dorsal dislocation of the PIP joint associated with volar plate and collateral ligament injury. Type III: presence of fracture (typically at the base of the middle phalanx), associated with the hyperextension injury.

immobilization whereas others suggest early active mobilization.[5–7] A recent systematic review concluded that there was insufficient evidence regarding the efficiency of immobilization in treating hyperextension injuries.[5,8,9] The literature does not differentiate among the various types of injuries sustained and proposes similar treatment irrespectively of the type of injury. Furthermore, most studies have been conducted in children, because in this age group, PIP joint hyperextension injuries occur frequently.

In addition, hyperextension injuries are problematic in those who develop chronic stiffness, pain, and flexion contracture. It is unclear whether there is an association between the treatment approach and the risk for complications. Therefore, we evaluated whether the type of treatment was a factor that could be related to the complication rate or outcome.

The primary purpose of this study was to compare the outcome of 2 commonly used treatment approaches in patients who sustained PIP joint hyperextension injury without fracture. We also evaluated the effect of age on the outcome by comparing our results in adults and children. We hypothesized that immediate mobilization of the injured joint would have a beneficial effect and that children would exhibit a better outcome compared with adults when a less restrictive treatment such as immediate mobilization would be applied.

MATERIALS AND METHODS

From January 2007 until December 2010, all consecutive patients who sustained a hyperextension injury without fracture (Eaton types I and II) to the PIP joint of any finger except the thumb were included in the study (Fig. 1).[10] The criteria used for distinguishing between type I and type II injuries were either a history of dislocation that was reduced by the patient automatically, or the presence of dislocation at presentation to us. The study was approved by our institutional review board. All patients gave their informed consent to participate in the study. All patients had standard anteroposterior and lateral radiographs. The diagnostic criteria were a history of a hyperextension mechanism, edema, hematoma, or ecchymosis of the PIP joint and tenderness on its volar aspect. The exclusion criteria were