Irreducible Palmar Dislocation of the Proximal Interphalangeal Joint
A Case Report

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ABSTRACT: Irreducible palmar dislocation of the proximal interphalangeal joint in which the central slip remains intact is a rare injury. A noose formed by the extensor mechanism traps the condyle of the proximal phalanx. The collateral ligament is avulsed and the volar plate is disrupted. Closed reduction was unsuccessful in this case. Open reduction achieved a good result. Key indexing terms: Extensor tendon injuries; Volar PIP dislocation.

Introduction

Although injuries to the proximal interphalangeal joint are common, palmar (anterior) dislocations are rare. These dislocations can be irreducible by closed methods when a soft tissue noose traps a condyle of the proximal phalanx, when there is interposition of soft tissue in the joint, or when both occur. Rarely, a bone fragment may block reduction.¹,² The English literature documents few cases in which a volar dislocation was irreducible due to a longitudinal tear in the extensor mechanism trapping the proximal phalanx: a so-called buttonhole dislocation.³,⁴ The tear occurs between the lateral band and central slip. Either the lateral band or the lateral band and central slip are volar to the condyle of the proximal phalanx, forming a noose around it. This paper reports an additional case of an irreducible buttonhole palmar dislocation of the PIP joint.

Case History

A 34-year-old black male car wash attendant presented to the emergency room a few hours after injuring his left, nondominant index finger. The finger was encircled by a cloth that was snared by a buffing machine. His finger was twisted and flexed by the cloth.

Physical examination revealed that the index finger had normal vascularity and sensibility. The PIP joint was swollen and tender diffusely. The patient could not actively move the joint from its resting position of 45° of flexion. A rotational deformity of the middle phalanx with respect to the proximal phalanx was present (Fig. 1). X-ray examination revealed a volar dislocation of the middle phalanx (Fig. 2).

Closed reduction was attempted under metacarpal block anesthesia using the method described by Eaton.⁹ This was unsuccessful, so the next morning an open reduction was accomplished under IV regional anesthesia. The extensor mechanism was explored through a dorsal curved skin incision. The ulnar condyle of the proximal phalanx protruded through a longitudinal tear between the radial lateral band and the central slip, which was intact. The ulnar collateral ligament was avulsed (Fig. 3). The ulnar lateral band and central slip were volar to the condyle. They were relocated dorsally with a nerve hook (Fig. 4). The extensor mechanism was repaired with 5-0 nylon suture. The collateral ligament was left unrepaired because the joint was stable. Immediately after reduction, the passive PIP joint motion was from 0° to 100°. On the fifth postoperative day, the bulky hand dressing was removed and a dorsal aluminum splint was used to hold the PIP joint in extension. The index finger was also buddy-taped to the middle finger. At the two week postoperative interval, he was started on active range of motion exercise but he continued to wear the aluminum splint between exercise periods. One month postoperatively he was begun on intermittent dynamic splinting for the PIP flexion. Six months post-reduction, he had active PIP motion from 10° to 90° and passive motion from 5° to 90°. On flexion he lacked 2.5 cm of reaching the distal palmar crease. His PIP and DIP motion were normal.
Discussion

Johnson and Greene reported the first irreducible palmar PIP joint dislocation in 1966. The pathoanatomy in their case included a longitudinal tear in the extensor mechanism with trapping of the condyle of the proximal phalanx by the lateral band. The collateral ligament was ruptured. Additional isolated cases were reported in the Japanese literature in 1968. In 1970, Spinner and Choi described the mechanism of palmar dislocation in detail. Experimentally, they produced palmar dislocation when a varus or valgus force combined with an anteriorly directed force was applied to the base of the flexed middle phalanx. The pathoanatomy included a rupture of the central slip, avulsion of the collateral ligament, and a tear of the volar plate. In their clinical series, a central slip rupture was present in every case, and they had no buttonhole dislocations. Subsequently additional cases of irreducible palmar buttonhole dislocations have been reported in the English literature. These cases all had a longitudinal tear in the extensor mechanism without disruption of the central slip. The Japanese also documented two additional cases. Baugher and McCue reported an irreducible volar dislocation in which an articular fracture of the middle phalanx blocked reduction. Peimer’s recent review
described an irreducible volar dislocation due to interposition of an avulsed collateral ligament with an attached bone fragment. A volar or buttonhole type dislocation must be suspected when a rotational deformity is associated with a volar PIP dislocation. Reduction may be difficult. It sometimes can be accomplished by closed methods using the technique described by Eaton. Postreduction AP and lateral x-rays are necessary to establish that complete reduction has been obtained and to rule out associated fractures. The radiographic findings in incompletely reduced dislocations may be subtle and limited to slight widening of the joint, slight volar subluxation, or slight rotation of the middle phalanx with respect to the proximal.

Open reduction is mandatory when there is an incomplete reduction. When buttonhole dislocations are operated on acutely, the extensor mechanism can be repositioned anatomically. The collateral ligament may be left unrepaired if there is sufficient joint stability to stress testing after reduction. In cases that are seen late, repositioning of the extensor mechanism may be impossible and the lateral band and scar tissue may have to be excised to obtain reduction. When the central slip is intact, motion may be instituted early after reduction. Although a functional range of motion may ultimately be obtained, it is unrealistic to expect restoration of normal motion.

In general, volar dislocations are not of the buttonhole variety, and are usually associated with a rupture of the central slip. The volar plate and collateral ligament are also disrupted, and thus both static and dynamic joint stability are compromised. Surgical exploration and repair of injured structures is often indicated; however, Eaton and Green and Rowland have recently suggested that even these injuries may be treated closed if a complete reduction can be obtained.

The key factor for the occasional hand surgeon is to understand the usual pathoanatomy as described, and then treat the patient, whether by open or closed methods, with this in mind. Attention must be paid to support or repair of the central slip so as to avoid chronic deformity, such as boutonniere or fixed flexion contracture.

Summary

Buttonhole type volar PIP dislocations are rare injuries. They are associated with significant soft tissue injury to the PIP joint. The collateral ligament and volar plate are disrupted and the extensor mechanism is damaged, but the central slip is still intact. Closed reduction may be successful, but open reduction is mandatory if it is not. Chronic deformity can occur if reduction is inadequate or if the injury is unrecognized. A stable, functional joint can result, but there is a predictable loss of joint motion.

References