Operative repair of a chronic, ulnar proximal interphalangeal dislocation of the little finger with an excellent functional result

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MW Neumeister, A Mowlavi, K Andrews. Operative repair of a chronic, ulnar proximal interphalangeal dislocation of the little finger with an excellent functional result. *Can J Plast Surg* 2002;10(1):33-36.

Chronic dislocations of the proximal interphalangeal joint are not common. The instability and physical impairment, however, can render the digit or hand quite dysfunctional. A case report of the reconstruction of a nine-year chronic proximal interphalangeal joint dislocation of the left little finger is presented. The functional recovery is described. A literature review of the treatment of chronic dislocations of the proximal interphalangeal joint is also discussed.

Key Words: *Little finger; Proximal interphalangeal joint; Ulnar dislocation*

Common sequelae of proximal interphalangeal (PIP) joint dislocations are stiffness, chronic instability and degenerative arthritis (1). The risk of these complications is increased in cases of chronic dislocations, prolonged post-operative immobilizations and associated intra-articular fractures. Proponents of surgical repair of chronic dislocations have used various methods to minimize immobilization time in an attempt to improve outcome (1-5). Other surgeons stress the avoidance of surgical repair because of the potential to promote scarring, further edema and stiffness (6-8). Published treatment recommendations for chronic PIP joint dislocations specific to the little finger are

Correction chirurgicale d'une dislocation interphalangienne proximale chronique de l'auriculaire, du côté cubital : excellents résultats fonctionnels

RÉSUMÉ : Les luxations chroniques de l'articulation interphalangienne proximale ne sont pas rares. Toutefois, l'instabilité et la gêne physique peuvent causer un dysfonctionnement assez important du doigt ou de la main. Voici un cas de reconstruction de l'articulation interphalangienne proximale de l'auriculaire gauche présentant une dislocation chronique depuis neuf ans. L'article fait état du rétablissement fonctionnel. Suit une discussion sur l'examen de la documentation concernant le traitement de la luxation chronique de l'articulation interphalangienne proximale.

scant. The case of a chronic left little finger PIP joint dislocation with severe ulnar angulation is presented. Operative repair of the deformity was attempted, despite a nine-year chronicity. An excellent functional outcome was achieved.

CASE PRESENTATION

A 32-year-old ambidextrous man presented to the surgeon's office and complained of severe ulnar deviation of the left little finger at the PIP joint (Figure 1). The finger had sustained repeated soft tissue injuries, including dislocation at the PIP joint. The patient experienced recurring hand injuries because he was a regular participant in rugby. There

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Figure 1) Left A 27-year-old man presented with a nine-year history of a lateral dislocation of the left little finger at the proximal interphalangeal joint. **Right** The volar view of the severely deviated middle phalanx dislocation

had been no fractures or apparent tendon injuries in the past. The repeated injuries to the patient's PIP joint were treated with splinting and buddy taping to the ring finger. Over a period of nine years, the ulnar deviation at the PIP joint had become extremely prominent and now interfered with his daily activities by catching on objects and clothing. The patient was able to grasp objects; however, he had a weakened grip strength. The patient had stopped playing aggressive contact sports and had taken on an office job at the time of presentation.

Examination of the little finger revealed a reducible lateral (ulnar) dislocation of the middle phalanx at the PIP joint. There was no crepitation on joint manipulation. Complete instability of the radial collateral ligament was noted. While held in the reduced position, full active flexion and extension were observed, although the extensors were noted to be subluxed to the ulnar side. A bony, exostotic prominence was palpated over the ulnar condyle of the proximal phalanx. There was a paucity of tenderness. The vascularity and sensibility in the finger were normal. There were no other significant findings on examination.

The x-rays revealed mild remodelling on the proximal phalangeal articular surface (Figure 2). The joint space was otherwise preserved. It was apparent that the radial collateral ligament was severely attenuated, and the extensor central slip was subluxed ulnarly. The patient was informed of various treatment options including conservative management in the form of splinting and buddy taping to the ring finger. The surgical options included joint stabilization with reconstruction of the radial collateral ligament and extensor centralization; PIP joint fusion; PIP joint arthroplasty and stabilization; or amputation of the little finger at the PIP joint. Because the lateral (ulnar) dislocation was reducible, and full active and passive range of motion were obtainable, the patient decided to undergo PIP joint stabilization with reconstruction of the radial collateral ligament and extensor tendon centralization.

Figure 2) Anteroposterior x-ray of the chronic proximal interphalangeal joint dislocation of the left little finger. The articular surface is intact. There is some lateral remodelling of the proximal phalanges

Under regional (Bier block) anesthesia, a longitudinal incision was made over the dorsoradial aspect of the little finger PIP joint. The skin and subcutaneous tissues were reflected to identify the tissue over the radial side of the joint. A radial collateral ligament was not identifiable, but rather, the joint was covered with indiscreet, redundant scar tissue over the joint capsule. The central slip was attenuated, and the extensor tendon was subluxed ulnarly. The joint was easily reduced to anatomical alignment. There was no tethering of the ulnar collateral ligament.

The radial collateral ligament was reconstructed with a palmaris longus tendon graft. The graft was delivered through two small incisions on the volar forearm. The tendon graft was measured to approximate the span across the radial PIP joint. The distal and proximal tendon ends were fixed to the middle and proximal phalanges, respectively, with Mitek-mini anchors (Mitek Products Inc, USA). The phalangeal cortices were scored with a rongeur before fixation of the tendon ends to promote further scarring at the tendon-bone interface. The tendon was also woven into the attenuated scar tissue over the radial joint capsule. The extensors were centralized after releasing the ulnar transverse retinacular ligament and were sutured to the radial joint capsule.

Figure 3) *Left* The two-year postoperative result showing excellent alignment. *Center* Volar view of the reconstructed, realigned proximal interphalangeal joint of the left little finger. *Right* The range of motion is preserved and the patient has regained full functional capacity

The joint was put through a passive range of motion and appeared to be stable. Following wound closure, the finger was splinted in extension with the ring finger to protect the collateral ligament reconstruction. Although the patient was not completely compliant, the splint was maintained in place for four weeks. The finger remained buddy taped to the ring finger for another six weeks to allow active range of motion. Unrestricted activity subsequently commenced. At the two year follow-up, the patient had full active and passive flexion and extension (Figure 3). Subjective grip strength had improved, and the patient had no difficulty with daily activities. The joint was stable and pain free, albeit with dorsal radial swelling.

DISCUSSION

The soft tissue constructs of the PIP joint bestow its remarkable stability, yet permit unrestricted flexion and extension through a natural arc. The middle phalanx can usually extend at the PIP joint beyond neutral to 10° to 15°. Further extension is restricted by the thick fibrocartilaginous volar plate because of its attachments to the middle and proximal phalanges. Flexion at the PIP joint can normally achieve an arc of 90° to 105°. This motion is limited by the dorsal central slip, the dorsal joint capsule, the volar skin and the subcutaneous tissue. Lateral joint movement at the PIP joint is negligible when the finger is in extension. Obtaining a few degrees of radial and ulnar movement is possible when the PIP joint is slightly flexed. The oblique collateral ligament and the more horizontal accessory collateral ligament prevent lateral movement. The volar plate, joint capsule and extensor mechanism also contribute to lateral stability. Together, these soft tissue restraints stabilize the PIP joint to permit a stable and functional grasp, pinch and fine manipulation.

A dislocation at the PIP joint results from acute disruption of the joint's restraining elements. Dorsal dislocations are most common, resulting from hyperextensive forces

that rupture the volar plate at its attachment to the middle phalanx. An articular fragment of the volar base of the middle phalanx may remain attached to the volar plate. The accessory collateral ligaments tear, as do the collateral ligaments, to varying degrees. The middle phalanx is displaced dorsally to ride over the end of the proximal phalanx. Volar dislocations, although not as common as dorsal dislocations, result from forced flexion at the PIP joint, which is often associated with a traction force applied to the finger. These injuries disrupt the central slip, dorsal capsule and collateral ligaments. The middle phalanx is forced volarly to rest under the distal end of the volar proximal phalanx.

Lateral dislocations of the middle phalanx at the PIP joint are rare. A radial and volar load (usually while the finger is in extension) tear the collateral and accessory collateral ligaments, the volar plate and the joint capsule (4,9). The transverse retinacular ligament is disrupted at the injured side to allow displacement of the middle phalanx in the contralateral direction. There is often a tendency for the middle phalanx to sublux volarly or dorsally with lateral dislocations. Ulnar dislocations, with injury to the radial collateral ligament, are more common than radial lateral dislocations.

Acute dislocations of the middle phalanx at the PIP joint are usually treated conservatively with blocking splints that allow protected flexion and extension, but guard the lateral restraining structures that were disrupted. This treatment regimen preserves motion, decreases the chance of stiffness and allows healing of the soft tissue. PIP joint dislocations are commonly associated with swelling, tenderness and loss of range of motion, ultimately impairing function because of edema and bleeding around the PIP joint, which promote the influx of proinflammatory mediators and cells to foster fibrosis and soft tissue contractures.

Chronic injury to the involved collateral ligaments and volar plate promotes fibrosis, laxity and/or deformity.

Neglecting these chronic injuries may result in an irreducible dislocation with dysfunctional bony remodelling. Excessive bony remodelling will not permit reduction.

CONCLUSIONS

A patient with a chronic lateral (ulnar) dislocation of the small finger PIP joint of nine years' duration is presented. The dislocation was reducible and motion was painless. Chronic dislocations are often fraught with impairments such as stiffness, limited motion, joint remodelling and degeneration, swelling and pain (6). Operative considerations must include the ability to restore stable anatomical alignment of the joint, the degree of cartilage destruction from wear and remodelling, tendon subluxation, and the possibility of introducing stiffness and pain.

Anatomical restoration and reconstruction of the PIP joint is usually avoided if significant joint remodelling and cartilage damage are observed. Attempts at reconstruction of these joints lead to a painful joint that has limited function, particularly while forcibly grasping objects. PIP joint arthroplasty, fusion or free joint transfers may offer a reconstructive means of regaining function. Reducible dislocations that have a well maintained joint space with preserved cartilaginous articulations are often suitable to joint realignment and collateral ligament reconstruction. However, the in situ ligaments are frayed and attenuated, and are usually not amenable to direct coaptation. Various other means of reconstructing the collateral ligaments have, therefore, been described. Fascia, tendon and synthetic materials have been used to reconstitute lateral stability (8-12). Anchoring the neoligament has been achieved through pull out wires over buttons, passing the neoligament through the phalanx and suturing the graft to the contralateral ligaments, and using Mitek screws (8-14). Any malalignment of the extensor mechanism should be addressed following skeletal stabilization. The transverse

retinacular ligament becomes severely attenuated while the central slip remains attached to the dislocated middle phalanx. The contralateral transverse retinacular ligament and lateral band may contract over time, resulting in displacement of the extensor tendon toward the dislocated side. Tendon centralization with release of the offending transverse retinacular ligament restores anatomical alignment. The flexor tendons should remain in their fibro-osseous canal and, therefore, do not require further attention. The pull of the flexor tendons may, in fact, act to reduce the dislocated PIP joint during active flexion. As the middle phalanx is drawn into flexion, its base slides across the proximal phalangeal condyles into a more anatomical position. The lateral dislocation deformity recurs during finger extension due to the lack of lateral support and because of the misdirected force of the subluxed extensor tendons.

Clinical studies on the results of surgical corrections of chronic PIP joint dislocations have illustrated the unpredictable nature of functional restoration (4,5,14-18). The evaluation of a candidate for collateral ligament reconstruction should include joint reducibility and degeneration, patient occupation and compliance, the finger involved, associated passive and active range of motion, pain, and likelihood of a return to functional motion.

Protection of the reconstructed collateral ligament is mandatory for six to eight weeks to allow optimal incorporation of the graft. Buddy taping or protective blocking splints offer stability during controlled passive and active range of motion to prevent PIP joint stiffness or contractures.

A patient with a severe, chronic ulnar dislocation of the PIP joint of the left little finger has been presented. Tendon graft reconstruction of the radial collateral ligament and extensor tendon realignment offered this patient excellent range of motion to the little finger and a return to productive employment.

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