

ULNAR SUBLUXATION OF THE EXTENSOR DIGITORUM COMMUNIS TENDON: A CASE REPORT AND REVIEW OF THE LITERATURE

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INTRODUCTION

Ulnar subluxation of the common extensor tendon at the metacarpophalangeal (MCP) joint of the hand is a relatively uncommon problem in the non-rheumatoid patient. Four etiologies have been described in the literature: post-traumatic, spontaneous or degenerative, congenital, and focal epileptic dislocations^{19,23}. The disorder most commonly involves an oblique or longitudinal tear of the radial sagittal fibers of the long finger^{1,7,14,32}. Reported treatment options include splinting,^{1,2,4,26} realignment and direct repair,^{13,14} and various forms of tendon reconstruction^{2-4,7,8,10,19,20,32}.

We report a case of a chronic post-traumatic ulnar subluxation of the extensor tendon to the long finger, its surgical treatment, and a review of the literature surrounding this disorder.

CASE REPORT

A thirty-two year-old right hand dominant male sustained an injury to his right long finger when a truck spring fell onto his hand. He had immediate pain and swelling about the dorsal aspect of the third MCP joint. His pain persisted and became disabling. Eventually, a "tendon repair" procedure was performed at another institution. Postoperatively, he was immobilized in a short arm cast for four weeks. Despite treatment, he had no relief of his symptoms and continued to complain of pain and "locking" of the MCP joint of his long finger. He denied any symptoms prior to the above mentioned injury.

On examination, a healed 1.5 centimeter transverse scar was noted over the MCP joint of the long finger of his right hand associated with mild soft tissue swelling. There was no joint effusion or sign of infection. He had full active and passive ranges of motion of the MCP joint. There was, however, a visible and palpable "snapping" of the extensor tendon as the MCP joint was extended. The tendon was visibly subluxated into the ulnar gutter between the metacarpal heads of the long and ring fingers (Fig. 1). There was no pain or tenderness on the palmar side, and no triggering of the flexor mechanism. Motor and sensory examinations were within normal limits.

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Figure 1
Preoperative photograph of the dorsal aspect of the long finger MCP joint of the right hand. Notice the periarticular swelling and ulnar displacement of the extensor tendon.

Surgical exploration revealed a markedly attenuated and scarred radial sagittal band with an ulnarly dislocated extensor tendon (Fig. 2). The ulnar sagittal fibers needed to be released before the tendon could be reduced. The sagittal fibers of the radial side were trapped in scar and also required release. An attempt was made to use a small junctura tendon between the extensor tendons of the long and ring fingers to correct the ulnar subluxation of the involved tendon. However, this caused the tendon to subluxate into the radial gutter with flexion of the MCP joint. Therefore, the junctura tendon was repaired to its origin on the ring finger. A proximally based slip from the radial side of the central tendon of the long finger extensor was created to act as a "check rein" (Fig. 3). This was dissected free, passed down beneath the radial lateral



Figure 2

Intraoperative photograph of the flexed long finger MCP joint illustrating the ulnarly subluxated extensor tendon with the attenuated radial sagittal fibers. [Fingers down, index to the right.]



Figure 4

Intraoperative photograph demonstrating the slip of extensor tendon passed beneath the radial lateral band.



Figure 3

Intraoperative photograph demonstrating the proximally based, radial slip of the central tendon to be utilized as a "check rein" to prevent recurrent ulnar subluxation of the extensor tendon.



Figure 5

Intraoperative photograph showing completed reconstruction.

band (Fig. 4) and sutured back upon itself to prevent ulnar subluxation of the extensor tendon. The sagittal band of the radial side was imbricated with a "pants-over-vest" technique. The ulnar sagittal fibers were repaired to a flap created from the dorsal capsule (Fig. 5). The long extensor tendon was then stable in flexion and extension over the center of the metacarpal head.

Postoperatively, the patient was maintained in a volar splint with the MCP joints slightly flexed for four weeks. Gentle active range of motion exercises were then initiated. At twelve months follow-up, the extensor tendon to the long finger remained centered over the MCP joint (Fig. 6a and 6b). At last follow-up, he had an active range of motion of five to ninety-five degrees of MCP flexion and was pain free.

DISCUSSION

The first report of this condition was published by Legouest¹⁶ in 1868. Sir James Paget²⁴ and Marsh¹⁷ each followed with a small series in 1875 and 1896 respectively. Further reports and discussion of the pathology and treatment have followed.

Patients most often present with complaints of pain and/or swelling at the MCP joint or spontaneous dislocation of the extensor tendon. These symptoms may be associated with complaints of "catching" or "locking" and the inability to fully extend the digit. As noted above, four etiologies of extensor tendon subluxation have been reported:

(1) Traumatic dislocation is usually described as being caused by a direct injury to the dorsal aspect of the incompletely flexed finger. The digit is driven into further flexion and ulnar deviation against a strongly contracting

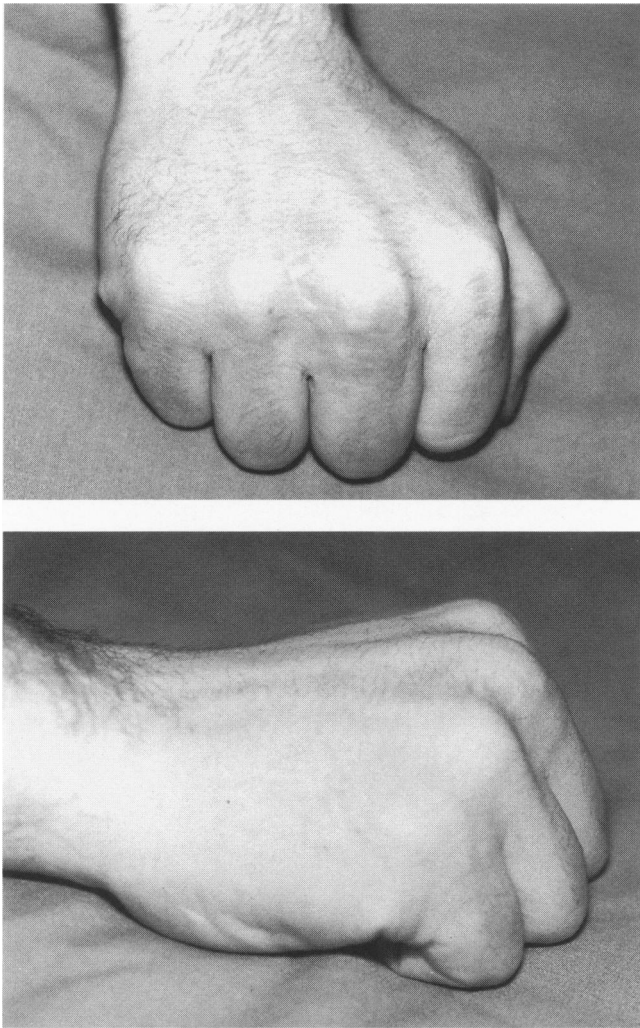


Figure 6a and 6b

One year follow-up photographs showing extensor tendon to the long finger of the left hand centrally located over the MCP joint.

extensor muscle^{3,32}, this creates a longitudinal or oblique rent in the radial sagittal fibers^{1,7,14,32}.

(2) Spontaneous or degenerative dislocations are likely due to underlying laxity of the joint capsules^{8,11,12} or atrophic changes in the sagittal fibers^{8,12}. Other factors include variation in the anatomic configuration of the extensor mechanism, especially as it pertains to the long finger extensor tendon passing over the MCP joint^{13,14,32}.

(3) Congenital extensor tendon subluxation is thought to be secondary to congenitally weak periarticular structures^{19,32}.

(4) Chronic, persistent myoclonic jerks in a patient with focal myoclonic epilepsy has also been reported to cause extensor tendon dislocation²³.

Combining the forty-seven patients compiled by Araki, et al,¹ with other reported cases in the literature, we were able to identify eighty-one patients with ninety-four dislocated extensor tendons. All but four were ulnar disloca-

tions, and 73% involved the long finger. Fifty-three patients suffered traumatic injuries, twenty-four had spontaneous dislocations, with congenital and epileptic dislocations being diagnosed in the remaining four patients.

Smith demonstrated that the principal function of the sagittal band was to extend the proximal phalanx²⁹. The sagittal bands and extensor hood also act to stabilize the extensor tendon in the midline over the dorsal aspect of the MCP joint²⁹. Zancolli analyzed the dynamic forces contributing to this central stabilization³³. He found the tendon to be stabilized throughout flexion and extension by the radial fibers of the hood and the sagittal bands. The radial interosseous muscles were also found to contribute through their pull on the extensor hood³³. Tubiana and Valentin observed the sagittal bands arising from the transverse metacarpal ligament and passing dorsally to and over the extensor tendon³¹. Ishizuki showed that the sagittal band could be further dissected into superficial and deep layers which encompass the tendon¹³. In this series it was noted that those patients with spontaneous dislocations invariably disrupted only the thin, superficial layer of the sagittal band just radial to the extensor tendon. Traumatic dislocations on the other hand, ruptured through both the superficial and deep layers. This usually occurred at a distance of several millimeters from the radial border of the tendon¹³. Cross-sectional anatomic studies have demonstrated that the tendon of the long finger is more rounded, sits higher on the transverse fibers, and has a relatively looser fibrous attachment when compared to the more oval tendons of the index, ring, and small finger^{14,32}. Additionally, a more distal incorporation of the long finger extensor tendon into the extensor hood was noted¹⁴. This is felt to explain the relatively increased tendency of the long extensor tendon to sublux^{14,32}.

In the normal situation, the force tending to displace the extensor tendon in an ulnar direction is greatest in full extension, decreases as flexion proceeds from zero to sixty degrees, and then increases again from sixty to ninety degrees of flexion. Once ulnar subluxation has begun, the force required to prevent further displacement increases significantly¹⁴. Koniuch et. al. demonstrated in fresh cadaveric specimens that two thirds of the radial sagittal fibers needed to be cut before the extensor tendon would dislocate. Even then dislocation would occur only if the MCP joint was flexed ninety degrees with a minimum of sixty degrees of palmar wrist flexion¹⁵. Morohashi, et al, stated that for a complete dislocation of the extensor tendon to occur, the intertendinous fascia must be completely torn with a partial tear of the sagittal fibers²¹. Radial dislocation could not be created even by complete transection of the ulnar sagittal fibers with the joints of the wrist or fingers in any position¹⁵. This was felt to be

secondary to the tethering effect of the juncturae tendons and the normal slight ulnar deviation at the MCP joint¹⁵. Araki was able to demonstrate radial subluxation of the long extensor tendon in a fresh cadaveric hand by transection of the intertendinous fascia and the ulnar sagittal band, followed by flexion of the long finger MCP joint while applying resistance to all the extensor tendons¹. The authors concluded that the unbalanced pull of the radial intertendinous fascia was able to dislocate the tendon into the radial gutter between the index and long finger metacarpal heads¹.

The majority of reported cases have undergone surgical treatment of this lesion either primarily or following failure of immobilization. However, there are reports of successful treatment of dislocated extensor tendons via splinting alone, especially in the acute setting^{1,2,4,5,18,26,28}. Bunnell recommended nonoperative initial management with prolonged splinting to allow injured structures to heal². In a recent paper, Ritts, et al, reported good results in two patients treated with extension splinting of the MCP joint initiated within ten days of injury²⁶. Araki's review entailed a total of thirteen patients treated nonoperatively with splint immobilization¹. Four of his own patients did well when treatment was initiated within ten days of injury. However, he also reported four treatment failures in this group. Of these, three were not immobilized until at least three months after injury. Four patients who were simply observed all had poor results. Carroll, et al, also presented seven patients who were treated with six weeks of splint immobilization⁴. Four did well, regaining full range of motion without recurrence of subluxation, while three patients subsequently required operative intervention. The length of time from injury to initiation of treatment in this series was not mentioned.

Successful surgical treatment has been reported and advocated by multiple authors with several surgical procedures being described. Haberern¹⁰ in 1902, and later Razemon²⁵ and Straus³⁰ had success with reattaching the extensor tendon to the radial aspect of the hood via flap construction with the ulnar side sutured over the top of the tendon. Bunnell in 1948 simply translated the tendon radially on the aponeurosis without the ulnar flap². Simple tendon realignment and repair of the sagittal fiber defect has been advocated as "both simple and effective" by Kettelkamp et al,⁵ and is recommended by Ishizuki¹³ for acute traumatic and spontaneous cases. Kettelkamp reported full, painless range of motion without recurrence of subluxation in five patients with up to five year follow-up¹⁴. Ishizuki performed direct repair of thirteen patients with acute traumatic or spontaneous ulnar dislocations of the long extensor tendon¹³. These authors reported good results and no recurrences with a minimum follow-up of one year. Wheeldon used a "conveniently situated" junc-

tura tendon which he detached from the ring finger extensor tendon, crossed over the extensor tendon of the long finger from the ulnar side, and anchored into the radial side of the sagittal fiber defect to augment its repair³². He reported no recurrences at one year. Fitzgerald⁹ and Culter⁶ each reported using a strip of fascia while Bunnell³ used a piece of palmaris longus tendon as a check rein to prevent recurrent subluxation. Elson used a distally based slip of the extensor tendon itself which he looped laterally and sutured into the deep palmar transverse ligament in one patient with good results. A similar operation was described by Michon and Vichard, whereby the distally based extensor tendon slip was anchored to the radial side of the capsule²⁰. McCoy and Winsky, in two patients, utilized a proximally based tendon slip from the radial side of the tendon which they passed deep to the lumbrical tendon and sutured back upon itself¹⁹. They also reported no recurrences at fifteen and twenty months follow-up. Carroll et al used a distally based ulnar portion of the extensor tendon which was passed deep to the tendon and sutured down around the radial collateral ligament⁴. Their patients all had previously failed conservative management with splinting of the MCP joint for six weeks. Satisfactory results without recurrences were observed in these three patients with five tendon dislocations.

In the case presented, the patient had already failed a direct repair of the sagittal fibers and was left with a chronically dislocating extensor tendon. As noted above, he had a scarred, attenuated radial sagittal band which was insufficient to hold the extensor tendon over the MCP joint. We thus initially attempted to correct this problem by suturing a junctura tendon from between the long and ring fingers to the extensor tendon of the index finger. However, this actually caused the extensor to dislocate into the radial gutter. The more involved reconstruction detailed above was carried out with satisfactory results.

Postoperatively, most authors recommend protective immobilization of the MCP joints for a period of four to six weeks, followed by a range-of-motion program. Recently, Koniuch has advocated the use of dynamic splinting in the immediate post-operative period¹⁵.

SUMMARY

Ulnar subluxation of the extensor digitorum communis tendon at the MCP joint occurs infrequently in the non-rheumatoid patient and is secondary to one of four reported etiologies: traumatic, spontaneous, congenital, or epileptic. If symptomatic, patients may present with pain, swelling, a sensation of the tendon "snapping", "catching", "locking", or the inability to fully extend the MCP joint. Conservative and operative interventions have been recommended as treatment options. In the acute traumatic dislocation (less than ten days post injury), satisfactory results may be obtained with simple splinting with the

MCP joint in extension. Patients who have failed conservative management or have a more chronic or degenerative dislocation may require surgical correction. The successful surgical repair must meet two requirements: (1) the tendon must be accurately aligned over the MCP joint to diminish the forces causing the dislocation to occur, and (2) the repair must be able to withstand the ulnar forces incurred during flexion of the joint¹⁴. Realignment of the extensor tendon and direct repair of the radial sagittal band may be sufficient in acute traumatic, congenital, or spontaneous cases if the tissue is sufficient. In chronic dislocations or in cases with atrophic or degenerative tissue, reconstruction with augmentation of the radial restraints to the extensor hood is advised.

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