Bilateral spontaneous flexor digitorum profundus tendon rupture of the fifth digit: case report and literature review

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Introduction

Spontaneous rupture of the digital flexor tendons is almost always associated with rheumatoid arthritis or other diseases of the skeleton. Rarely does it occur in otherwise healthy individuals, with less than 30 such reported cases in the literature [4]. To date, only one case of bilateral spontaneous rupture of flexor digitorum profundus (FDP) tendons has been reported with rupture of tendons of different digits [10]. Here, we report a case of bilateral spontaneous FDP tendon rupture of the small fingers.

Case Report

A 42-year-old right-handed writer presented with a 2-week history of inability to flex his right small digit at the distal interphalangeal joint (DIPJ). Prior to his symptoms, he was lifting heavy gardening tools and sustained pain in his right forearm and right small digit. He had no prior trauma or significant medical history.

Physical examination revealed an inability to actively flex the right small digit at the DIPJ (Fig. 1). While carpal tunnel view radiographs were normal, magnetic resonance imaging (MRI) revealed a hypoplastic flexor digitorum superficialis (FDS) tendon and a mid-palmar rupture of the FDP tendon of the right small finger. The MRI showed no evidence of any other soft tissue or bony abnormalities.

As a writer, our patient required sufficient movement and joint stability of his small digit for typing. To achieve this, the authors chose to perform a tenodesis of the remnant of the FDP tendon. During the operation, a mid-palmar rupture of the FDP tendon of the right small digit was confirmed and retraction of the proximal segment of the FDP tendon was noted. The proximal rupture was fully released and a tenolysis was performed by sharply incising the scar tissue surrounding the area. The soft tissue and neurovascular bundles were retracted and the end of the FDP and all scar tissue between the FDS and FDP tendons were released. A Mitek suture was used to perform the tenodesis and the end of the FDP tendon was sutured to the middle phalanx, with the DIPJ of the small digit flexed at 15°.

The only unusual findings at the time of surgery were reactive synovitis and an intact, but hypoplastic, FDS tendon (Fig. 2). The latter finding had been seen on MRI. Of note, the FDP tendon was of normal caliber. The right small digit synovial tendon was sent to pathology, which revealed inflammatory nonspecific fibrosis. Blood work and rheumatological work-up were completely normal.

Postoperatively, the patient had an uneventful course. He regained sufficient function of the DIPJ of his right small finger and returned to his writing career without any difficulty. Four years later, he presented with a similar injury in his left small digit. Again, there was a mid-palmar rupture of the FDP to his left small digit associated with a hypoplastic FDS to the same digit. Based on his prior successful

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Fig. 1 Preoperative images showing inability to flex the DIPJ of the right fifth digit when attempting to make a fist

tenodesis, the patient requested the left small FDP to be treated in a similar fashion. The latter was performed with a satisfactory result.

Discussion

Spontaneous flexor tendon ruptures are rare. They are defined as those occurring intratendinously, in otherwise healthy individuals [2]. Intratendinous rupture is reported to occur only when more than 50 % of the tendon is lost [9]. Most cases of tendon rupture occur with chronic inflammatory conditions such as rheumatoid arthritis, gout, and bony pathology, leading to attrition of the overlying tendon. Documented bony pathology leading to this type of injury

Fig. 2 Intraoperative image showing a vessel loop around the hypoplastic FDS tendon to the right fifth digit. A retractor is around the remnant of the proximal FDP tendon of the right fifth digit, adhered to the FDP tendon of the fourth digit

include hook of hamate fracture, scaphoid nonunion, pisotriquetral instability, and Colles fracture [1]. None of these were identified in our patient. However, previous studies have stated an association between repetitive minor trauma and spontaneous flexor tendon rupture [3]. This may explain the etiology of spontaneous rupture in our patient, who types for a living.

The demographics of our case are in keeping with previously reported cases of spontaneous tendon rupture, i.e., involvement of the small finger, rupture within the palm, and male patient over 40 years of age [1]. In two previous reports, spontaneous mid-palmar rupture of the small finger FDP tendon occurred as a result of an anatomic variant [4, 8]. In both these reports, there was a common FDP tendon to the ring and small finger, which bifurcated at the mid-palmar level. Rupture occurred at the level of the bifurcation. This was not the case in our patient. Up to 80 % of spontaneous tendon ruptures of the hand occur near the origin of the lumbrical muscle in the palm. As a vascular watershed zone, hypoxic changes may be responsible for intrinsic susceptibility of the tendon to rupture [1].

On both occasions, our patient was found to have an intact, but hypoplastic small finger FDS tendon. In a recent series of five patients with spontaneous FDP tendon rupture, one patient was also found to have a small, thread-like FDS tendon of the involved digit. Given that anatomic variations of the FDS of the small fingers are relatively common (13 to 34 %) [5], and even absent in 5.7 % hands [11], these could be incidental findings. However, the sling of the FDS tendon at Camper's Chiasm is classically thought to function as a pulley to increase the mechanical advantage of the FDP tendon [5]. The small finger may be more susceptible to closed rupture due to the sometimes deficient superficialis system [2]. We hypothesize that the hypoplastic FDS led to increased biomechanical strain on the FDP, leading to spontaneous rupture on both occasions in our patient.

The treatment options following mid-palmar rupture of the FDP to the small finger include transfer of FDS of the ring finger to the FDP of the small finger [6] and tendon grafting. However given our patient's desire to maintain independent motion of the small finger and joint stability, we chose to perform tenodesis using the FDP remnant. One of the benefits of performing a tenodesis in this case was to prevent hyperextension of the DIPJ, which would be detrimental to his ability to type [7]. A previous report of bilateral spontaneous FDP tendon rupture occurred in two different digits 10 years apart (9). This is the first ever report of bilateral spontaneous rupture of the FDP tendon of the same digit associated with a hypoplastic FDS tendon (8).

Conflict of Interest The authors have no conflicts of interest to disclose.

References

1. Bois AJ, Johnston G, et al. Spontaneous flexor tendon ruptures of the hand: case series and review of the literature. *J Hand Surg Am.* 2007;32:1061–71.
2. Boyes JH, Wilson N, et al. Flexor-tendon ruptures in the forearm and hand. *J Bone Joint Surg Am.* 1960;42:637–46.
3. Corten EM, van den Broecke DG, et al. Pisotriquetral instability causing an unusual flexor tendon rupture. *J Hand Surg Am.* 2004;29:236–9.
4. Davis C, Armstrong J. Spontaneous flexor tendon rupture in the palm: the role of a variation of tendon anatomy. *J Hand Surg Am.* 2003;28:149–52.
5. Gonzalez MH, Nikoleit J, et al. The chiasma of the flexor digitorum superficialis tendon. *J Hand Surg Br.* 1998;23:234–6.
6. Hartford JM, Murphy JM. Flexor digitorum profundus rupture of the small finger secondary to nonunion of the hook of hamate: a case report. *J Hand Surg Am.* 1996;21:621–3.
7. Kleinert HE, Schepel S, Gill T. Flexor tendon injuries. *Surg Clin North Am.* 1981;61:267–86.
8. Masaki F, Isao T. Spontaneous flexor tendon rupture of the flexor digitorum profundus secondary to an anatomic variant. *J Hand Surg Am.* 2007;32:1195–9.
9. McMaster P. Tendon and muscle ruptures. Clinical and experimental studies on the causes and location of subcutaneous ruptures. *J Bone Joint Surg Am.* 1933;42:637–46.
10. O'Sullivan ST, Reardon CM. Bilateral spontaneous rupture of flexor digitorum profundus tendons. *Arch Orthop Trauma Surg.* 1998;117:294–5.
11. Puhaindran ME, Sebastin SJ. Absence of flexor digitorum superficialis tendon in the little finger is not associated with decreased grip strength. *J Hand Surg Eur Vol.* 2008;33:205–7.