Flexor Tendon Entrapment Caused by Intratendinous Tumor-Like Chronic Proliferative Tenosynovitis

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J Hand Microsurg 2019;11:50–53

Abstract

Keywords

- flexor tendon entrapment
- proliferative tenosynovitis
- reduction flexor tenoplasty
- chondroid metaplasia

The flexor tendon can be enlarged in chronic tenosynovitis, and it may sometimes trigger flexor tendon entrapment, but there have been no reports of its evaluation on preoperative imaging or postoperative pathologic examination. The case of a 54-year-old man who suffered flexor tendon entrapment due to intratendinous tumor-like tissue between the first and second annular pulleys, which was identified on magnetic resonance imaging preoperatively, is described. Ulnar superficialis slip resection and reduction flexor tenoplasty of flexor digitorum profundus were effective procedures for the release of flexor tendon entrapment under wide-awake surgery with local anesthesia. On postoperative pathologic examination, chondroid metaplasia was identified, in association with infiltration of chondrocytes and inflammatory cells into the flexor tendon fibers and tenosynovium. Preoperative imaging was useful in a case of chronic or severe tenosynovitis to assess the condition of flexor tendons, and wide-awake surgery was the appropriate procedure for the treatment of this case.

Introduction

Flexor tendon entrapment causing restriction of active flexion motion is frequently encountered, mainly due to stenosing flexor tenosynovitis.¹ In other cases, intratendinous ganglion,² intratendinous gout,³ *Mycobacterium* infection,⁴ rheumatoid tenosynovitis,⁵ sarcoidal granulomatous tenosynovitis,⁶ mucopolysaccharidosis,⁷ and others have been described as the cause of trigger finger or flexor tendon entrapment with the formation of intra- and extratendinous tumor or a proliferative lesion. There have been some reports of flexor tendon enlargement and trigger finger other than those involving first annular (A1) pulley,^{7–9} but the cause of tendon enlargement was not definitely diagnosed because histologic examination was not performed. A case of flexor tendon entrapment due to tumor-like thickened tendons with proliferative intratendinous fibrous tissue and chondroid metaplasia between first and second annular (A1 and A2) pulleys is reported.

Case Report

A healthy 54-year-old man without any history of gout or trauma who was engaged in forestry was unable to flex his middle finger. Occasional local pain around the A1 pulley bothered him 3 years ago, and active finger flexion gradually became restricted over 1 year. When he arrived at our hospital, although there was no restriction of finger extension, active flexion was completely impossible at the proximal and distal interphalangeal joints. Physical examination showed a slightly raised skin lesion at the palmar base of the middle finger. Magnetic resonance imaging (MRI) showed thickened flexor digitorum profundus (FDP) and flexor digitorum superficialis (FDS) between the A1 and A2 pulleys. In addition, fibrous tissues existed into the flexor tendon fibers, in addition to the tenosynovial space between the FDP and FDS (► **Fig. 1**). Surgery was performed with a wide-awake procedure under local anesthesia. At operation, the A1 pulley and the first cruciate pulley were

received

June 26, 2017

accepted after revision

March 16, 2018

published online

May 4, 2018

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DOI <https://doi.org/10.1055/s-0038-1645951>

ISSN 0974-3227.

Fig. 1 Preoperative T2-weighted magnetic resonance image. **(A)** Sagittal view. Flexor tendons are thickened and enhanced between the A1 and A2 pulleys. **(B)** Axial view. Fibrous tissues infiltrate into the flexor tendon itself, in addition to the space between the flexor tendons in the middle finger.

released followed by a Bruner-type skin incision. The proximal half of the A2 pulley was elevated with a flap from the remaining insertion of the ulnar side. The FDP and FDS were wrapped with thin fibrous scar-like synovial tissue and enlarged, but they showed natural color (►Fig. 2A). On microscopic examination, it was difficult to distinguish the borderline between the normal tendon and proliferated scar-like tissues. The FDP was entrapped at the area of the A2 pulley, and the FDS was at the distal region of the A1 pulley. First, the thickened ulnar half-slip of the FDS was detached and resected at the chiasma level according to ulnar superficialis slip resection (USSR) to reduce the total flexor tendon volume.^{1,10} However, after this procedure, the tendon entrapment was not completely released and FDP gliding when passing through the A2 pulley was not smooth. Then, the FDP was made slender as in partial longitudinal spindle-shaped removal within an enlarged tendon (►Fig. 3), referring to reduction flexor tenoplasty.^{1,11} These manipulations reduced the flexor tendons, and the remaining radial half-slip of the FDS and FDP could pass through the pulley smoothly, which was confirmed by the patient performing active flexion at the time of surgery. After repairing the proximal half of the A2 pulley, which was elevated by the flap before the tendon operation (►Fig. 2B), the skin incision was closed directly.

On histologic examination, the resected half-slip of the FDS was thickened, and chondroid metaplasia was seen within the flexor tendon fibers (►Fig. 4). In addition, the resected synovial membrane around the tendon showed slight

Fig. 2 **(A)** Elevated FDP by a green silicone sheet. The tendon itself is thickened, and there is a slight scar adhering to the volar surface of the tendon. **(B)** After USSR and reduction flexor tenoplasty.

Fig. 3 The schema of reduction flexor tenoplasty of the FDP.

proliferative change. Moreover, proliferation of capillaries and infiltration of lymphocytes were confirmed (►Fig. 5). The final pathological diagnosis was chronic proliferative tenosynovitis with scar-like change.

The patient had an uneventful recovery. For postoperative rehabilitation, active and passive tendon gliding exercises were started without restrictions from the day after surgery to 2 months postoperatively. Compression of

Fig. 4 Pathologic image of resected ulnar half-slip of FDS. Chondroid metaplasia is seen between the flexor tendon fibers (magnification $\times 40$).

Fig. 5 Resected synovial tissue around the tendon. Proliferative synovium with scar formation is seen, and proliferation of capillaries and infiltration of lymphocytes are confirmed (magnification $\times 100$).

A2 pulley with use of the other hand was only needed to prevent rupture of the partial repaired pulley during the active flexion exercise. At 12 months postoperatively, the patient could move the affected finger with full flexion and extension (**► Fig. 6**) and his grip strength was 41 kg for the involved left side, compared with 45 kg for the contralateral side.

Discussion

Among patients with flexor tenosynovitis, slight visible scar formation on the tendon surface was sometimes encountered during surgical release of the tendon sheath. On some occasions, micro-rupture of the flexor tendon was also confirmed, but this minute change could not be detected on most preoperative imaging tests. As in this case, enlargement of the flexor tendon itself, especially that which could be identified on preoperative examination, is a rare occurrence.

Enlargement of the flexor tendon has sometimes been described in chronic tenosynovitis, and it caused tendon entrapment with the trigger in the A1 pulley or other site. In particular, enlargement was identified without involvement of the A1 pulley, and simple release of the A1 pulley was not adequate. In such cases, reduction in total flexor tendon volume by half superficialis slip resection or reduction flexor tenoplasty of the FDP was needed with or without A3 or partial A2 pulley release in most situations.^{1,9–11}

There have been reports of histopathologic studies of hypertrophic A1 pulleys of trigger fingers, but reports about the affected flexor tendon itself and the tenosynovium covering the tendons have been very few.^{12–14} Lundin et al¹² reported that tendinosis, which was characterized by micro-ruptures, collagen degradation, or hyper- and hypocellularity, occurred in trigger finger, and these findings suggest that trigger finger could start within the tendon, not only the pulley or tenosynovium. Uchihashi et al¹³ reported chondroid metaplasia on electron microscopy around the tenosynovium in patients with trigger fingers. In this case, this chondroid metaplasia was clearly identified within flexor tendon fibers, and

Fig. 6 Active extension (**A**) and flexion (**B**) at 12 months after surgery.

no similar histopathologic reports were found elsewhere. This histopathologic result supports the findings previously described.

In this case, the MRI finding was useful for the understanding of the clinical condition and the decision related to the skin incision. Preoperative imaging tests such as

ultrasonography or MRI are helpful and desirable for the diagnosis of tendon entrapment disorders to assess the condition of flexor tendons, especially for patients with chronic or severe tenosynovitis.

Funding

None.

Conflict of Interest

None.

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