

Late Secondary Rupture of Flexor Tendons in the Palm of the Hand

Toshitaka Okabayashi*, Hiroshi Arino, Koichi Nemoto

Department of Orthopaedic Surgery, National Defense Medical College, Tokorozawa, Japan
Email: t-okabayashi@umin.ac.jp

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Abstract

Normal tendon substance is strong and is unlikely to break before the muscle origin, muscle, musculotendinous junction or the insertion yield. In almost all the cases, closed ruptures of the flexor tendon within the tendinous portion have been described in association with distinct underlying pathologies. We report a case of flexor tendon rupture of the index finger which seems to be associated with previous trauma occurred more than 40 years ago and abnormal healing.

Keywords

Flexor Tendon Rupture, Previous Trauma, Abnormal Healing, Tendon Transfer, Quadriga Syndrome

1. Introduction

Normal tendon substance is strong and is unlikely to break before the muscle origin, muscle, musculotendinous junction or the insertion yield [1]. In almost all the cases, closed ruptures of the flexor tendon within the tendinous portion have been described in association with distinct underlying pathologies. Many of the previously reported cases have been attributed to bone abnormalities such as congenital anomalies of the carpals, Colles' fractures, Bennett's fracture, carpal fracture, carpal dislocations, and Kienböck's disease. Other nonosseous causes include anomalous muscle and anomalous tendon. Here we report a case of flexor tendon rupture of the index finger which seems to be associated with previous trauma and abnormal healing.

2. Case Report

A 49-year-old male teacher caught his right index finger in a door. When he tried to pull out it, his index finger

*Corresponding author.

was hyperextended. Afterwards, he was unable to flex his index finger and had a pain at the distal end of the palmar forearm. These findings led to the diagnosis of subcutaneous flexor tendon rupture of the index finger, and surgery was performed. However, at the distal end of the palmar forearm—where he had pain—there was no tendon rupture, but flexor tendons were adherent to each other. Further exploration to the carpal tunnel revealed similar intertendinous adhesions (**Figure 1(a)**). The distal ends of the ruptured flexor digitorum profundus (FDP) and flexor digitorum superficialis (FDS) tendons of the index finger were identified under the A1 pulley, and they were pale and atrophic (**Figure 1(b)**). These findings suggested pathological rupture. In the patient's past history, he had been cut by a straw cutter at the distal palmar crease of the right hand when he was 6 years old and had had nothing but a wound closure at a nearby hospital (**Figure 2**). As an end-to-end suture was impossible, we performed a tendon transfer using the FDS tendon of the ring finger, which was found to be pale and atrophic over a range of 5 cm at the level of the metacarpophalangeal joint (**Figure 1(c)**). Thus, this tendon was reinforced with the excised proximal FDP tendon of the index finger before interlacing into the distal remnant of FDP tendon of the index finger (**Figure 1(d)**). After 8 weeks, he returned to work. A total active motion (TAM) was 150° at 4 months postoperatively (**Figure 3**).

3. Discussion

Verdan [2] coined the term “quadriga syndrome” to describe the FDP tendon imbalance that occurred when this tendon was advanced and sewn to the extensor over the end of an amputation stump. He drew an analogy of the condition to that of a Roman charioteer guiding four horses with interconnected reins. Restrictive excursion through one rein (or profundus tendon) limits the excursion of the other three. Tsuge *et al.* [3] stated that quadriga syndrome could occur even in the flexor tendon injuries.

In this case, it is presumed that flexor tendons of the index, middle and ring fingers had been cut and only a wound closure had been done; but the ruptured tendons could heal because of young age. However, flexor tendons had adhered to each other at the level of the carpal tunnel as was the case in “quadriga syndrome”, and they

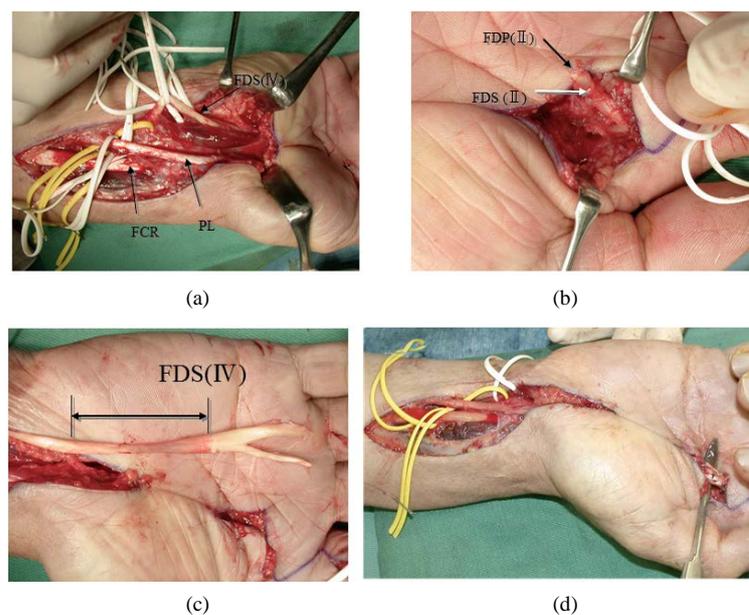


Figure 1. Operative findings: (a) Flexor tendons were adherent to each other at the level of the distal end of the palmar forearm and carpal tunnel; (b) Tendons of flexor digitorum profundus (FDP) and flexor digitorum superficialis (FDS) of the index finger were completely ruptured at the level of the metacarpophalangeal (MP) joint. The black arrow indicates the FDP distal remnant. The white arrow indicates the FDS distal remnant. These amputation stumps were noted to be pale and atrophic; (c) The FDS tendon of the ring finger was pale and atrophic over a range of 5 cm at the level of the MP joint; (d) The FDS tendon of the ring finger reinforced with the excised proximal FDP of the index finger, and was interlaced into the distal remnant of FDP of the index finger. PL: palmaris longus tendon. FCR: flexor carpi radialis tendon.

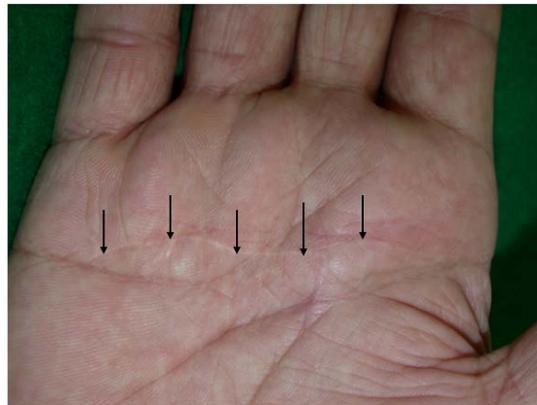


Figure 2. Postoperatively, we found a scar (black arrows indicate) at the distal palmar crease of the affected hand in this preoperative photograph.

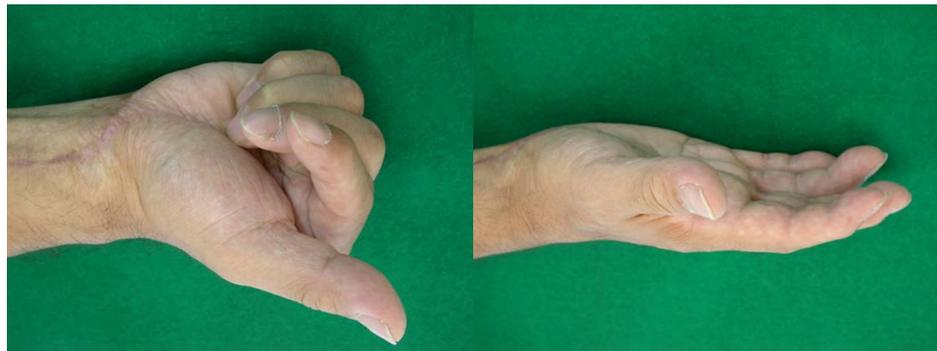


Figure 3. A total active motion (TAM) of the index finger was 150° at 4 months post-operatively.

had been unable to glide smoothly afterwards. Consequently, normal mechanical stress probably had not been transmitted to the ruptured tendons, and amputation stumps were bridged with frail scar tissue, which might be called “stress shielding”. And more than 40 years later, this unusual intratendinous rupture occurred at this scar tissue, when forced flexion of the index finger was opposed by sudden hyperextension.

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Competing Interests

The authors declare that they have no competing interests.

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