CASE REPORT

Spontaneous flexor tendon rupture in the palm

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SUMMARY

Spontaneous flexor intratendinous ruptures are rare and incompletely understood. They occur within the substance of the tendon, and in the absence of underlying pathological processes or direct trauma. We present an unusual case of spontaneous flexor digitorum profundus tendon rupture in the palm.

BACKGROUND

Spontaneous flexor tendon ruptures, first termed by Boyes in 1960,¹ occur within the tendon substance in the absence of intrinsic or extrinsic pathological processes. They are rare compared to the more common closed flexor tendon ruptures resulting from flexor digitorum profundus (FDP) tendon avulsion at their insertion. Awareness of these unusual injuries is important for preoperative planning to reduce surgical morbidity associated with unnecessary surgical incisions and dissection.

CASE PRESENTATION

A 63-year-old right-handed retired male hospital porter presented to the emergency department with an inability to flex the distal interphalangeal joint of his right index finger. While putting on his shoes 4 h previously, he experienced a 'snap' sensation localised within his hand. He was a non-smoker and there was no history of trauma to the hand or systemic disease. He also had no previous procedures to his hand. On examination, there was no palpable mass, significant tenderness or ecchymosis.

INVESTIGATIONS

X-ray showed no bony abnormality (figure 1).

TREATMENT

Four days post injury the patient underwent surgical exploration of the suspected closed FDP tendon rupture under general anaesthetic. As the most common site of closed rupture is at the FDP osteotendinous junction, an initial incision was made in flexor zone 1 of the right index finger (figure 2). The FDP tendon was found to be intact. A second separate incision was made over the A1 pulley and extended proximally where the distal FDP tendon end was found in flexor zone 3. The proximal FDP end was identified in the carpal tunnel (figure 3). The FDP tendon was normal on gross examination with no evidence of attrition or other pathology (figure 3) and was therefore not sent for histological examination. The tendon was repaired with a core 4-strand 3/0 prolene Adelaide repair and a 6/0 prolene epitendinous suture. A dorsal splint in the intrinsic plus position was applied postoperatively.

Figure 1 Anteroposterior (A) and lateral view (B) X-rays of the right index finger showing no bony abnormality.

OUTCOME AND FOLLOW-UP

Within the first week postsurgery, the patient was reviewed by our hand therapists and began early active mobilisation. At 6 months postoperatively he has normal return of hand function.

DISCUSSION

Tendons perform the function of force transfer from muscle to bone to bring about joint movement. Longitudinally aligned collagen fibre bundles

Figure 2 A volar half-Bruner and longitudinal incision was initially made on the right index finger distal phalanx.

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Figure 3 A second Bruner incision was made over the right hand A1 pulley and extended proximally. A third incision was made to retrieve the proximal tendon end in the carpal tunnel. The tendon ends of the flexor digitorum profundus zone 3 rupture are shown post retrieval.

give tendons high tensile strength. McMaster's² early work demonstrated that the tendon is the strongest part of the musculotendinous unit. Closed flexor tendon ruptures therefore usually occur at their bony insertion.

FDP tendon avulsion injuries are relatively common and occur due to stress concentration at the hard-soft tissue interface.³ These injuries are also called 'jersey fingers', owing to their association with sports, where the flexed distal interphalangeal joint is hyperextended or forcefully flexed against passive extension. These injuries were classified by Leddy and Packer⁴ into three types, based on the presence or absence of an avulsed bony fragment and the degree of proximal tendon retraction.

Closed ruptures within the substance of the tendon are uncommon. They usually occur secondary to an underlying pathological process such as rheumatoid arthritis. Boyes *et al*¹ distinguished a small subgroup of intratendinous ruptures in which no underlying pathological process could be identified, and termed these spontaneous tendon ruptures. These tendon ruptures are rare, with around 60 reported cases in the literature. Bois *et al*⁵ reviewed 43 such cases and found that 80% occurred in flexor zone 3, with the FDP being involved in 82% of cases. There was a predilection for the little (64%), ring (14%) and middle (10%) fingers. Only 4% of spontaneous ruptures occurred in the FDP of the index finger. In a recent single centre series, all 12 cases involved the little finger.⁶

Imbriglia and Goldstein⁷ speculated that the predisposition to spontaneous FDP tendon rupture in the little finger may arise as it absorbs proportionately more stress load through the FDP, with less input from the flexor digitorum superficialis tendon. Their series of patients with spontaneous FDP tendon ruptures of the little finger provides an insight into the typical presentation, with all patients describing a 'snap' or 'pop' and 90% carrying out an occupational task involving flexion against resistance at the time of injury. Pain was described as minimal to moderate, and occurring in the palm or the finger. The majority of reported cases occur in the dominant hands of middle-aged men who work or have worked in manual jobs,^{5 6} as in our patient.

The aetiology of these ruptures is likely multifactorial, and microscopic pathology may be present in some cases. Kannus and Jozsa⁸ evaluated biopsy specimens from ruptured tendons in various sites including the Achilles and biceps tendons. On comparison with healthy age-matched tendons, they found characteristic histopathological patterns such as hypoxic degenerative tendinopathy, mucoid degeneration and calcifying tendinopathy occurring in all ruptured tendons, but only in 34% of controls.

Within the flexor tendons specifically, Folmar *et al*⁹ reviewed 12 ruptures in non-rheumatoid hands, and found that all were likely caused by either intrinsic tendon pathology, or extrinsic pathology such as lunate fracture non-union resulting in attrition rupture. Attrition ruptures are, in fact, a separate entity and occur when the tendon frays over a rough bony surface, which can result from trauma, particularly at a site where the carpal bones act as fulcrums for the flexor tendons, such as the FDP tendon of the ring finger on the hook of hamate.¹⁰ A case of tendon rupture secondary to asymptomatic non-union of the hamate hook has been reported,¹¹ and such asymptomatic pathology may underlie a proportion of spontaneous intratendinous ruptures, although evidence of macroscopic attrition would be expected. Anatomical tendon variations have also been cited as possible weak points causing spontaneous rupture, such as at the bifurcation of a common FDP tendon to the ring and little fingers.¹²

Although our patient had a good outcome, the lack of pre-operative investigations such as ultrasound or MRI resulted in an unnecessary initial distal incision. Unnecessary incisions can increase the risk of adverse scarring, postoperative flexion contractures and injury to underlying neurovascular structures during dissection.¹³ Radiographs are routinely used, but will only accurately demonstrate the presence of an avulsed bony segment, and can miss tiny fragments. Ultrasound findings in closed flexor tendon injuries have been shown to correlate with surgical findings¹⁴ and are more accurate than physical examination alone.¹⁵ MRI has been shown to accurately depict the location of tendon rupture and the gap between tendon ends.¹⁶ We propose that preoperative imaging such as ultrasound should be used to determine the site of injury in closed flexor tendon injuries where there is no clear evidence of an avulsion injury.

Learning points

- ▶ Spontaneous flexor intratendinous ruptures are rare and occur in the absence of underlying pathological processes or direct trauma.
- ▶ The aetiology of these ruptures is likely multifactorial and suggested factors include repetitive trauma, tendon anomalies and vascular alterations.
- ▶ In the absence of avulsion fractures on X-ray, we recommend that all patients with closed flexor tendon injuries should have further preoperative imaging to determine the site of rupture. This would facilitate preoperative planning and reduce surgical morbidity associated with unnecessary surgical incisions and dissection.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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