

CASE REPORT

Closed traumatic avulsion of both ring finger flexors with successful primary repair more than 4 weeks after injury and a review of the literature[†]

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Abstract

Closed flexor digitorum profundus (FDP) tendon avulsions are a recognized injury in hand surgery. However, closed tendon avulsion of both flexor tendons in the same digit is rare, with the few cases reported in the literature and presented here. Management includes primary repair ideally within the first 2 weeks to achieve optimal outcome. While beyond 4 weeks a two-stage repair is the dictum, we present a case where both tendons were avulsed but primary repair of the FDP was possible more than 4 weeks after the injury, with a good outcome. This case highlights that primary tendon repair at 32 days, the longest noted in the literature in this group of patients, can result in a good outcome even if the injury is more than 4 weeks old. However, good intraoperative decision-making is key and the skillset must be present for conversion to a two-stage repair if necessary.

INTRODUCTION

Closed flexor digitorum profundus (FDP) tendon avulsions are a recognized injury in hand surgery. However, avulsion of both flexor tendons in the same digit is rare.

We will discuss this case and review the few cases reported in the literature.

CASE REPORT

A 35-year-old man presented 4 weeks after a hyperextension injury to his dominant right ring finger (RRF), sustained while

attempting to catch a heavy falling box. Examination showed loss of normal cascade of the RRF, no active flexion of the distal and 10° flexion of the proximal interphalangeal joint, but a full passive range of motion (PROM). Ultrasound showed an avulsion of the FDP tendon with the stump under the A2 pulley and the flexor digitorum superficialis (FDS) tendon appeared intact but swollen at A1.

Surgical exploration was performed 4 days later under a general anaesthetic. A Brunner incision was performed at the A5, A3 and A1 levels revealing rupture of both flexor tendons with the proximal limbs held under the A1 pulley (Fig. 1) The tendons were oedematous and the pulleys contracted, so that it was not

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Figure 1: Image showing FDS and FDP avulsion in the RRF in zone 1.

possible to advance both flexors distally under the A2 pulley. The FDS was therefore resected proximally to the chiasma and the FDP was advanced to the distal phalanx without requiring tendon lengthening. It was inserted using intraosseous fixation to the base of the distal phalanx with 3–0 nylon Bunnell core suture and 5–0 nylon epitendinous sutures to the periosteum of the distal phalanx.

The patient was placed in a dorsal splint and flexor tendon rehabilitation was started at Day 5 post surgery using an adapted Belfast regime and he had 20 therapy sessions over 5 months.

The active range of movement after 5 months was metacarpophalangeal joint 0–82, proximal interphalangeal joint 4–102 and distal interphalangeal joint 10–20°.

DISCUSSION

Review of the literature shows the mechanism leading to rupture of both flexors in a single digit, involves forced flexion, hyperextension, a direct blow or an attrition rupture [1].

There were seven case reports of closed avulsions of both flexor tendons. The patient demographics and mechanism of injury are summarized in Table 1 with management and outcomes.

Table 1. Table showing previous studies and their outcomes

Author	Patient's age, sex,	Mechanism	Finger(s)	Location of Rupture	Days after injury	Technique	Follow up period (months)	Outcome
This case	35, Male	Hyper-extension	RRF	FDS: Zone 2 FDP: Zone 2	32	FDS: resected FDP: primary repair Intra-osseous		MPJ 0/82° PIPJ 4/102° DIPJ 10/20° Tip to distal palmar crease = 0 cm
Jordon et al	20, Male	Jersey Finger	LMF	FDS: Zone 2 FDP: Zone 2	14	FDS: resected	4	Full movement of PIP and arc of 20–70° at DIPJ
Soro et al	30, Male	Jersey Finger	LLF	FDS: Zone 3 FDP: Zone 1	0	FDP: primary repair FDS immediate reconstruction with palmaris longus Tendon graft FDP primary repair with Z-plasty lengthening	6	MCPJ 0/95° PIPJ 10/85° DIPJ 10/25° Tip able to touch palm Returned to work

(Continued)

The decision about whether to repair both flexor tendons or only the FDP is controversial. Some authors indicate that restoration of FDS tendon is needed to provide independent PIPJ flexion and increased power grip [2]. However, it increases the risk of tendon adhesions and therefore may reduce the total range of finger movement. Other authors have excised the FDS tendon to avoid this problem [3].

Tang [4], performed a randomized controlled trial comparing repair of both tendons with repair of FDP only, within 2 weeks of injury. In this study, there was no significant difference in active range of movement between the two groups, with the total active movement (TAM) of 204° in fingers with repair of FDP only and 187° when both tendons were repaired [4]. These injuries however were sharp tendon divisions rather than avulsions. He further concluded that resection of the FDS tendon is not detrimental to finger motion.

In a more recent paper by Tang [5], he believes that urgent primary repair is preferable although delayed primary repair within 1 to 2 weeks gives similar results. Very delayed primary repair (>3 or 4 weeks after injury) may be attempted with success. We equally agree with Tang, but this should however be performed by an experienced hand surgeon, in order to make an expert intraoperative decision as to whether to proceed with secondary tendon reconstruction [5].

Our patient had a good outcome in 5 months, with a TAM of 79% of the contralateral ring finger, using the original Strickland classification, lacking full active flexion at the DIPJ, due to adhesions at this level.

This case highlights a successful primary repair of the FDP, after avulsion of both flexors in a single digit at 32 days, which is the longest period noted in our extensive literature review of this cohort of patients and gives further evidence of successful outcome in the much delayed primary repair cohort.

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Table 1. Continued

Author	Patient's age, sex,	Mechanism	Finger(s)	Location of Rupture	Days after injury	Technique	Follow up period (months)	Outcome
Naohito et al.	49, Male	Fell on edge of step (blunt trauma)	LLF	FDS: Zone 2 FDP: Zone 2	20	FDS resected FDP primary repair	4	Full movement at the PIPJ, 20–70° at DIPJ
Cheung & Chow	24, Male	Jersey Finger	RRF	FDS: Zone 2 FDP: Zone 1	4	Both tendons repaired. Tendons suture to periosteal flap and FDP reinforced by pull-out	3.5	Full range of motion of MCPJ & PIPJ with a 4° flexion contracture at DIPJ
Ogun et al	21, Male	Jersey Finger	RRF	FDS: Zone 2 FDP: Zone 1	0	FDS resected FDP pull-out	19	Total active range of movement (TAM) 230 degrees
Lanzetta & Conolly	28, Male	Hyper-extension	RRF	FDS: Zone 2 FDP: Zone 1	3	Two stage repair	4	Full recovery of extension & flexion.
Backe & Posner	23, Male	Hyper-extension	RRF	FDS: zone 2 FDP: zone 1	4 weeks	Palmaris Longus tendon graft to FDP	Not indicated	Full extension & active flexion to within 1.5 cm of the mid-palmar crease.

LLF, left little finger; LMF, left middle finger; RRF, right ring finger.

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CONFLICT OF INTEREST

None.

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