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Original Article

Delayed rupture of all finger flexor tendons (excluding thumb) following nonoperative treatment of Colles' fracture: A case report and literature review

Ignacio R. Proubasta^{*}, Claudia G. Lamas, Luis Natera, Natalia Arriaga

Orthopaedic Department, Hand Surgery Unit, Hospital Sant Pau (Barcelona), Barcelona Autònoma University, Barcelona, Spain

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ABSTRACT

Aims: We report a case of delayed all digital flexor tendon ruptures after nonoperative management of distal radius fracture.

Methods: An 84-year-old woman, noted loss of flexion of your fingers. She had a history of Colles' fracture 40 years before, which had been left untreated. Darrach procedure were carried and a tendon transfers for the flexor tendon ruptures.

Results: Despite attempts of early active mobilisation, a poor operative outcome was observed.

Conclusion: Tendon rupture can occur several months or years after the injury, and prompt recognition and treatment can minimize disability.

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1. Introduction

Flexor tendon rupture after nonoperative treatment of distal radius fracture is a rare complication. Only 27 cases have been reported in the literature (Table 1). The fingers and number of tendons ruptured in the reported cases is variable but the flexor pollicis longus (FPL) rupture predominate,^{1,7,8,11,12,13,16,18,21,23} followed by flexor digitorum profundus (FDP) and superficialis (DFS) of the index finger.^{4,6,7,8,9,14,16,18,21,22} The middle, ring and little fingers flexors are less commonly involved, but when they are is frequent to observe involvement of several

fingers.^{2,3,5,8,10,17,19} However, rupture of all digital flexors is exceptional. In this regard, only three cases have been reported,^{15,20,23} one of them affecting the flexor pollicis longus.²³ Our case is the fourth case in the literature.^{15,20,23}

2. Case report

An 84-year-old woman with a previous distal radius fracture 40 years ago and that was treated nonoperatively, noted that she was unable to flex sequentially the interphalangeal joints of the little, ring, middle and index fingers during the last year.

^{*} Corresponding author. Orthopaedic Department, Hospital Sant Pau, Mas i Casanovas, 90, 08025 Barcelona, Spain. Tel.: +34 93 5537031. E-mail address: iproubasta@santpau.cat (I.R. Proubasta).

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Table 1 – Cases reported in the literature.

First Author	Year	Age	Sex	RT	TFI-R (months)	VBS	VDCU
McMaster	1932	35	M	FPL	4	Yes	No
Broder	1954	71	M	FDP (3,4,5), FDS (4, 5)	24	Yes	Yes
Boyes	1960	–	–	–	–	–	–
Southmayd	1975	72	M	FDP (2)	0	Yes	No
Younger	1977	60	F	FDP (5), FDS (4, 5)	12	No	Yes
Cooney	1980	–	–	FDP (2)	3	Yes	No
		–	–	FDP (2)	3	Yes	No
Wong	1984	60	M	FPL, FDP (2)	1	Yes	No
Diamond	1987	77	F	FPL, FDP (2, 3, 4), FDS (2, 3, 4, 5)	3	No	No
Rymaszewsky	1987	18	M	FDP (2)	8	Yes	No
Minami	1989	83	F	FDP (3, 4, 5), FDS (4, 5)	108	Yes	Yes
Roberts	1990	17	M	FPL	2	Yes	No
Ashall	1991	18	M	FPL	4	Yes	No
Egawa	1993	56	–	FPL	96	–	–
Santana	1993	15	F	FDP (2), FDS (2, 3)	1,5	Yes	No
Loon	1997	62	F	all FDPs and FDSs	204	No	Yes
Takami	1997	49	M	FPL, FDP (2)	1	Yes	No
Wada	1999	74	F	FDP (4, 5), FDS (3, 4, 5)	300	No	Yes
Kato	2002	80	F	FDP (2), FDS (2)	240	Yes	No
		71	M	FPL, FDP (2)	24	Yes	No
Murase	2003	80	F	FDP (3, 4, 5)	120	No	No
Lamas	2004	77	F	all FDPs and FDSs	84	No	Yes
Suppaphol	2007	70	F	FPL	4, 5	–	–
		71	F	FPL, FDP (2, 3), FDS (2)	18	Yes	Yes
Ishii	2009	62	F	FDP (2)	48	Yes	Yes
Iyer	2012	90	F	FPL, all FDPs and FDSs	6	Yes	No
Present study	2014	84	F	all FDPs and FDSs	480	No	Yes

M = male; F = female; FPL = flexor pollicis longus; FDP = flexor digitorum profundus; FDS = flexor digitorum superficialis; RT: ruptured tendon; TFI-R = time from injury to tendon rupture; VBS = volar bony Spike; VDCU = volar dislocation caput ulna.

Physical examination revealed a radially deviated wrist with volar prominence of the ulnar head and impossibility to flex the interphalangeal joints of the digits, excluding the thumb (Fig. 1). The patient had no restriction of motion in the wrist but the forearm was swelling and tenderness around the distal radioulnar joint. The neurological examination was normal and laboratory tests showed negative rheumatoid arthritis reaction.

Radiographs revealed a volar luxation of the ulnar head and osteoarthritic changes in the ulnocarpal joint (Fig. 2). Operative exploration confirmed complete ruptures to the FDS tendons and the FDP tendons of the index, middle, ring and little fingers. Therefore, the ulnar head was to be displaced volarly and perforating the volar wrist capsule (Fig. 3). The distal ulna was then resected (Darrach procedure). FDS tendons were sacrificed and reconstruction of the FDP were performed by flexor carpi radialis transfer to the distal stumps of FDP of the index, middle and ring fingers and a palmaris longus transfer to the distal stump of FDP of the little finger.

Despite attempts of early active mobilisation, a poor operative outcome was observed. At 12 months review the patient used the hand as a supportive unit with minimal flexor function as the case report cited by Iyer et al.²³

3. Discussion

Acute and delayed ruptures of flexor tendons in patients with closed distal radius fractures occur less often than extensor

tendon ruptures. Extensor pollicis longus (EPL) tendon rupture has been documented as a complication in about 1% of closed distal radius fractures and it is thought to be due to attrition or fracture injury to the tendon at Lister's tubercle,⁶ while the pathogenesis of the flexor tendons rupture is controversial, although two principal causes have been postulated²¹: 1) the acute partial or total flexor tendon rupture at the time of injury by fracture fragments¹ and 2) chronic attritional rupture²¹ due to anterior bone prominence and/or bony

Fig. 1 – Preoperative image demonstrating loss of flexion of digits and wrist deformity.

Fig. 2 – Radiographs of the wrist at the time of tendon ruptures. A) Posteroanterior radiograph demonstrating osteoarthritis changes in the ulnocarpal joint. B) Lateral radiograph demonstrating volar displacement of the ulnar head.

spur^{12,4,6,7,9,11,12,14,16,18,22,23}, ulnar head displaced volarly^{5,10,15,17,20}, or both simultaneously.^{2,10,21}

With regard to the acute partial or total flexor tendon rupture, they have been reported to occur shortly after the fracture (range 4 h–6 weeks after the injury) and the mechanism was severe initial displacement of fracture fragments or the presence of a bony spur. The reports with this mechanism of injury, supported McMaster's explanation that partial division of the tendon by a sharp bony spur had taken place with incomplete healing, finally resulting in rupture.¹ In the cases of chronic attritional rupture, the timing is quite long (range 8 months–40 years). Based in our case and the reported cases with delayed rupture of flexor tendons after malunited distal radius fracture (Table 1), we recommend clinical and radiographic follow-up of these patients with the purpose to identify the presence of any sharp bony spur or prominence in the anterior aspect of the distal radius, ulnar head displaced

volarly, or both. Tendon rupture can occur several months or years after the injury, and prompt recognition and treatment can minimize disability. In these cases, resection of any bony prominence and/or Darrach procedure, should be considered after fracture healing and before the tendon rupture occurs, because the surgical reconstruction of tendon ruptures is difficult and the outcomes obtained in these patients were poor, especially when all flexor tendons were implicated, as in our case. In this regard, operative flexor reconstruction by tendon graft and transfer is recommended. However, attention should be pay to finger contracture and tendon adhesions postoperatively, because these complications are common in elderly patients, worsening the outcome.¹⁹

Conflicts of interest

All authors have none to declare.

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Fig. 3 – Intraoperative picture showing complete flexor tendon ruptures and ulnar head displaced volarly (*).

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