

# An Unusual Jersey Finger

D Solomon

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## Abstract

An avulsion of the flexor digitorum profundus (FDP) tendon from its insertion is typically described as a jersey finger. The patient in this case presented with pain and loss of motion of his dominant ring finger after grasping the jersey of an opposing American football player in an attempt to tackle him. This mechanism is typical of a jersey finger; however, his injury included avulsions from the insertions of both FDP and flexor digitorum superficialis (FDS) tendons. A combined avulsion of both FDP and FDS has been described in very few closed injuries and never from the typical jersey finger injury. This patient's injury was repaired primarily, followed by flexor tendon rehabilitation protocol allowing him to return to active function.

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## CASE REPORT

A 28 year-old male sustained a right dominant ring finger injury while playing football. His flexed finger caught another player's jersey during an attempted tackle.

One week after injury, he presented to our clinic. The ring finger was slightly swollen and ecchymotic at the distal interphalangeal joint (DIP) and he was tender at the volar base of the digit. The finger was held in the extended position. The patient was unable to actively flex the DIP, and was able to actively flex the proximal interphalangeal joint (PIP) to 10 degrees. Passive flexion of the DIP was to 60 degrees and the PIP to 90 degrees, both limited by pain and swelling.

A diagnosis of an avulsion of both the FDP and FDS tendons was made and the patient was taken urgently to the operating room. Under brachial tourniquet control, a volar Brunner approach was made and the FDP and FDS were identified.

## Figure 1

Figure 1: FDS and FDP easily identified



The tendons had retracted to the level of the A2 pulley. Both tendons were hemorrhagic at their distal ends. The FDS vinculum longa was intact but the FDP vinculum was disrupted. A periosteal flap was raised at the FDP insertion site and the FDP repaired through drill holes to the base of fingernail. An 0 Prolene suture was Bunnell weaved through the distal tendon, was passed through the drill holes and tied over a button. Each limb of FDS was repaired in a similar fashion with 2-0 Prolene, through drill holes at insertion site at mid-portion of middle phalanx, and tied over a button.

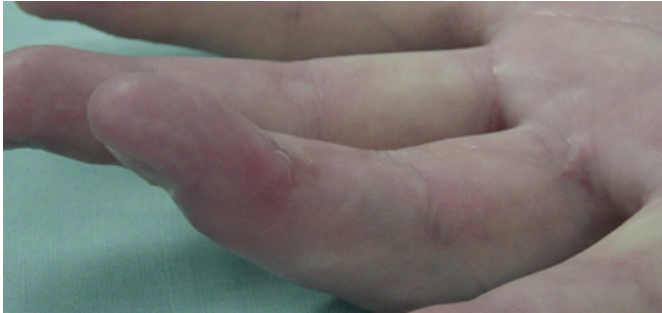
An extension-block splint at 60 degrees PIP flexion was applied after wound closure. The patient commenced a modified Duran flexor rehabilitation protocol at one-week follow-up.

Three-months after surgery, right ring finger Total Active Motion was 200 degrees compared to 250 degrees on opposite ring finger. Grip strength was 74% of opposite side

with Jamar testing. Active ROM at the DIP was 5 – 35 degrees, PIP 15 – 90 degrees, MCP 0 – 95 degrees. He had a one-centimeter flexion lag. He had returned to full military duty and was transferred to a new duty station.

### Figure 2

Figure 2A and B: Active extension (2A) and flexion (2B) showing total active motion of right ring finger



### Figure 3



## DISCUSSION

A typical jersey finger occurs when a rugby or American football player attempts to tackle another player but inadvertently grabs the player's jersey. The resulting hyperextension of a forcefully flexing finger can result in

avulsion of the FDP insertion. In most cases, the ring finger is the affected digit. In 1977, Leddy and Packer described three subtypes of this injury.<sup>(1)</sup> Type I represents an avulsion with retraction of the FDP tendon to the palm. A type II injury retracts only to the PIP joint with the vinculum longa remaining intact; it is the most common subtype. Type III is the most unusual, involving a large avulsed fragment of bone from the distal phalanx. It retracts to the A4 pulley.

Combined closed injuries to both FDP and FDS are extremely unusual. Over half the time this occurs, the tendons are found to have previous damage or disease. McMaster demonstrated that 50 percent of the tendon thickness or strength must be lost prior to a midsubstance rupture.<sup>(2)</sup> An avulsion represents a different mechanism and type of injury.

Only twelve cases of combined closed FDP and FDS avulsion have been reported.<sup>(3,4,5,6,7)</sup>

Boyes reported on 8 combined avulsions and fewer than half of those avulsions were due to hyperextension injury.<sup>(3)</sup> It was difficult to determine which of the insertional avulsions involved diseased or previously injured tendons in Boyes' report. The treatment included excision of the involved tendons and staged grafting. One patient later underwent digital amputation for unresolved stiffness.

Folmar reported a series of twelve flexor tendon ruptures in ten patients in which two patients had combined atraumatic ruptures of FDP and FDS.<sup>(8)</sup>

Backe and Lanzetta recommended excision and silicone rod interposition with delayed tendon grafting and reported good results.<sup>(4,5)</sup> Cheung and Chow reported a case in which a primary repair of FDS and FDP to periosteal flaps with FDP augmentation with pull-out wire was performed with excellent results.<sup>(7)</sup> They reported flexion contracture of only 4 degrees and the patient regained 51% grip strength compared to the uninjured side. Based on this report, they recommended primary repair to be a viable option in the treatment of this injury.

Lanzetta elegantly proposed a possible mechanism for this unusual injury.<sup>(9)</sup> FDP, then subsequently FDS, can rupture with sudden unintentional forced hyperextension of the DIP while the FDP is maximally contracted; or by flexion of the digit against a non-elastic object when the resistance is greater than anticipated. A normal tendon will usually rupture at its bony insertion rather than within its substance

or at the musculotendinous junction. Several authors explain the biomechanics of the ring finger, and why it is the most frequently involved digit in FDP avulsions.<sup>(10,11,12)</sup>

The lack of independent extension of the ring finger when the other digits are tightly flexed is of great importance. This is the corollary from Verdan's explanation of quadriga; with the ring finger fully extended, it is impossible to actively flex the middle and small finger DIP joints.<sup>(12)</sup>

When the index, middle or small finger is hooked and the remaining fingers are flexed, a forced hyperextension will result in an independent extension of the isolated digit. If only the ring finger is hooked or extended, its inability to independently extend can result in avulsion of the profundus tendon.

### CONCLUSION

A combined FDP and FDS avulsion is an extremely rare type of jersey finger injury. If identified early, primary anatomic repair should be performed. Whether the repair is performed by creation of a periosteal flap, drill holes and pull-out suture or wire, or suture anchors; post-operative rehabilitation is critical in maintaining passive range-of-motion of the digit and tendon gliding. Excision of a slip of the FDS may also be considered to diminish tendon adhesions. Either way, early anatomic repair can afford restoration of function in this potentially debilitating injury.

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### References

1. Leddy JP, Packer JW. Avulsion of the profundus tendon in athletes. *J Hand Surg* 1977; 2: 66-69.
2. McMaster PE. Tendon and muscle ruptures: clinical and experimental studies on the causes and location of subcutaneous ruptures. *J Bone Joint Surg* 1933; 15:45:705-722.
3. Boyes JH, Wilson JN, Smith JW. Flexor tendon ruptures in the forearm and hand. *J Bone Joint Surg* 1960; 42A: 637-646.
4. Backe H, Posner MA. Simultaneous rupture of both flexor tendons in a finger. *J Hand Surg* 1994; 19A: 246-248.
5. Lanzetta M, Conolly WB. Closed rupture of both flexor tendons in the same digit. *J Hand Surg* 1992; 17B, 479-480.
6. Matthews RN, Walton JN. Spontaneous rupture of both flexor tendons in a single digit. *J Hand Surg* 1984; 9B: 134-136.
7. Cheung KMC, Chow SP. Closed avulsion of both flexor tendons of the ring finger. *J Hand Surg* 1995; 20B: 78-79.
8. Folmar RC, Nelson CL, Phalen GS. Ruptures of flexor tendons in hands of non-rheumatoid patients. *J Bone Joint Surg* 1972; 54A: 579-584.
9. Lanzetta M, Conolly WB. Biomechanical explanation of a simultaneous closed rupture of both flexor tendons in the same digit. *Aust NZ J Surg* 1996; 66: 191-194.
10. Gunter GS. Traumatic avulsion of the insertion of flexor digitorum profundus. *Aust NZ J Surg* 1960; 30: 1-9.
11. Lanzetta M, Conolly WB. Letter to the editor. *J Hand, 21A*, 6: 1114-1115, 1996.
12. Verdan C. Syndrome of the quadriga. *Surg Clin North Am* 1960; 40: 425.

**Author Information**

**Daniel J. Solomon**

Department of Orthopaedic Surgery, Naval Medical Center San Diego