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Diagnosis and Management of Flexor Digitorum Profundus Tendon Avulsion (Jersey Finger)

Urgent Message: Forced hyperextension of a flexed digit may strain or rupture the flexor digitorum profundus tendon from the distal phalanx. Prompt diagnosis and treatment of acute injury are key in the prevention of permanent finger dysfunction.

Alyssa Marchman, BS; Sarah Brouwer, BS; William Beauchamp, DO

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Editor's Note: *While the images presented here are authentic, the patient case scenarios are hypothetical.*

Questions for the Clinician at the Bedside

1. What is a jersey finger, and how does it present clinically?
2. What is the typical mechanism of injury?
3. How is jersey finger diagnosed?
4. When should patients with a jersey finger injury be referred to a specialist for surgery?

Abstract

Flexor digitorum profundus tendon avulsion, or "jersey finger," occurs when a fully flexed distal interphalangeal (DIP) joint is forcefully hyperextended. This injury typically occurs in sports and presents with the isolated inability to flex the affected finger's DIP joint. Jersey finger requires early surgical intervention to avoid long-term finger dysfunction. This hypothetical case of a 17-year-old-male with a jersey finger injury highlights the importance of a thorough physical examination in all finger injuries upon presentation to urgent care.

Introduction

Classically, the mechanism of injury in avulsion of the flexor digitorum profundus (FDP) tendon is via forced hyperextension of a fully flexed distal interphalangeal (DIP) joint, most commonly, the ring finger. This hyperextension can rupture the FDP tendon from its insertion site at the volar distal phalanx and may even avulse a fragment of bone from the insertion site along with it. This injury is most often sustained in sports, typically football or rugby, when a player's finger is tangled in an opponent's jersey, leading to the eponym "jersey/rugby finger" (**Image 1**).

Clinical Scenario

A 17-year-old male presented to urgent care with pain at the distal phalanx of the left ring finger, ongoing since 3 nights prior, when he felt a "popping" sensation while grasping an opponent's jersey during an attempted tackle in a football game. He stated that he had been unable to make a complete fist since the injury.

Physical exam revealed a resting hand with the left ring finger in slight extension at the DIP joint relative to the other fingers. Further examination showed mild edema and ecchymosis over the volar (palmar) distal

Author Affiliations: Alyssa Marchman, BS, Lincoln Memorial University, DeBusk College of Osteopathic Medicine, Harrogate, Tennessee. **Sarah Brouwer, BS,** DeBusk College of Osteopathic Medicine, Harrogate, Tennessee. **William Beauchamp, DO,** Highpoint Orthopedic Associates, Ascension Saint Thomas, Gallatin, Tennessee. Authors have no relevant financial relationships with any ineligible companies.

Image 1. Jersey Finger Impact Location

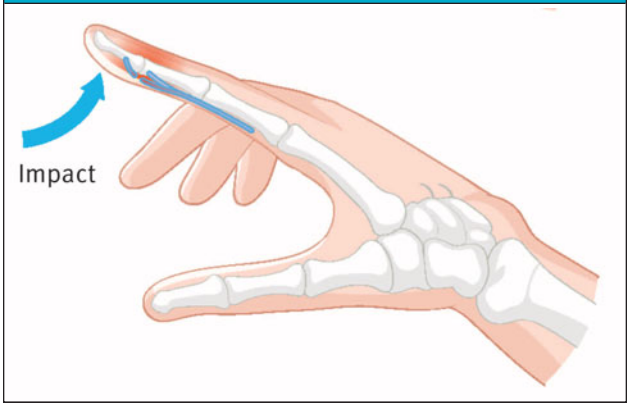
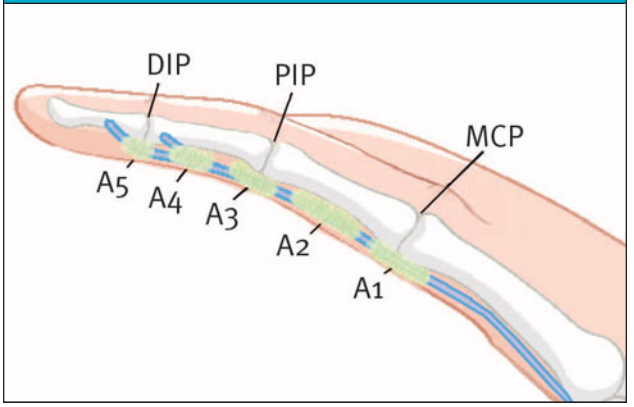


Image 2. Finger Joints and Ligaments



phalanx and positive tenderness to palpation along the DIP joint. When comparing the range of motion between hands, the patient was unable to actively flex the left ring finger at the DIP joint. However, proximal interphalangeal (PIP) joint flexion remained intact. No palpable deformities were noted along the finger. Neurovascular status was intact with capillary refill less than 2 seconds in the affected finger.

Postero-anterior and lateral view radiographs of the left ring finger were obtained, which were negative for acute pathology, including phalanx fracture and/or dislocation. A diagnosis of FDP tendon avulsion, or jersey finger, was made based on the clinical presentation and physical exam findings.

Relevant Anatomy

Finger flexion is controlled by 2 main tendons: the flexor digitorum superficialis (FDS) and the FDP. These flexor tendons travel through a fibro-osseous sheath consisting of synovium and fibrous bands before attaching to their respective insertion sites. The FDS inserts on the middle phalanx to primarily control PIP joint flexion, while the FDP inserts on the base of the distal phalanx to control DIP joint flexion.[1] The fibrous bands of the tendon sheath comprise the flexor tendon pulley system and are termed either annular or cruciate ligaments based on their shape. These ligaments keep the flexor tendons in close proximity to the phalanges, preventing bowstringing of the tendons. Digits 2 through 5 each have 5 annular ligaments (A1-5) **(Image 2)** and 3 cruciate ligaments (C1-3).[2] The A1, A3, and A5 pulleys are located over the metacarpophalangeal joint (MCP), PIP, and DIP joints, respectively. The A2 and A4 pulleys are located over the diaphysis of the proximal phalanx and middle phalanx, respectively.[3]

Clinical History

Patients, most commonly young athletes, present with acute finger injury after grabbing an opponent's jersey during a sports game. However, isolated DIP joint function should be assessed in all finger injuries, regardless of patient population. Patients may complain of finger pain and swelling localized to the palmar DIP joint as well as difficulty making a fist due to DIP joint extension. Clinically, the finger will be observed in an extended position at rest.[4]

Clinicians should have a high index of suspicion for jersey finger injury in any patient with loss of DIP joint flexion, regardless of their endorsed clinical history or mechanism of injury. Various activities have been implicated in jersey finger injury, including karate,[5] weightlifting,[6] and falling.[7] The injury often manifests in a manner that leads to it being misdiagnosed as a sprain, underscoring the importance of healthcare professionals accurately identifying its distinctive clinical presentation.[8]

Physical Exam

The skin will appear intact with swelling and bruising located over the volar DIP joint and distal phalanx.[4] Palpation along the finger generally elicits pain most significantly at the site of the retracted tendon.[4,8] Additional tenderness is often present over the base of the distal phalanx. A palpable mass representing the retracted FDP tendon may be located as proximally as the A1 pulley along the affected digit.[3]

Active range of motion testing is the most critical part of the encounter for diagnosis of jersey finger. To assess FDP integrity, stabilize the patient's PIP joint in full extension while instructing the patient to actively flex their distal phalanx at the DIP joint. This movement should be impaired, leaving the distal phalanx extended

despite attempts at flexion.[8] This can also be assessed by the patient demonstrating an inability to make a complete fist due to isolated distal phalanx extension. PIP joint flexion should remain fully intact. Of note, the exam may be limited due to pain rather than true impairment in motion. If needed, a local digital nerve block can be utilized to evaluate finger range of motion more accurately.[4] Neurovascular status distal to the injury should be assessed and will likely be intact.[5]

Imaging

Diagnosis of jersey finger is typically clinical, based on the loss of isolated DIP joint flexion. However, x-rays, particularly lateral views, are indicated to assess for avulsed bone fragments and phalanx fractures. Ultrasound and magnetic resonance imaging (MRI) can be used to delineate the degree of tendon retraction to evaluate the different types of injuries, if needed.[3]

Urgent Care Management

The injured finger shoulder be placed in a splint, maintaining slight flexion at both the PIP and DIP joints. All acute jersey finger injuries should immediately be referred to an orthopedic/hand surgeon, as quick surgical intervention is recommended.[9]

Discussion of Advanced Management

The degree of injury to the FDP is designated by the Leddy and Packer classification system into 1 of 5 subtypes based on the severity of tendon retraction and absence/presence of bone avulsion. This classification system ultimately guides treatment recommendations. Type I injuries are characterized by tendon retraction to the palm. This damages the vincular system that supplies blood to the FDP tendon and requires surgical repair within 7-10 days of injury. Type II injuries occur when the tendon retracts to the A3 pulley and warrant surgical intervention within 3 weeks.[3] Type II injuries are the most common.[10] Type III injuries involve an avulsed bone fragment connected to the ruptured tendon with retraction to the A4 pulley **(Image 3)**. The bone fragment prevents further retraction of the tendon, allowing for repair up to 6 weeks after injury. Type IV injuries occur when the avulsed bone fragment is no longer attached to the ruptured FDP tendon.[3] Type V injuries have a concomitant bony avulsion and distal phalanx fracture. Type IV and V injuries are less common but should be treated with quick surgical intervention, similar to Type I injuries, because tendon retraction to the palm and vincular disruption is possible.[4]

Image 3. Radiograph of Avulsion Fracture in a Type III or IV Jersey Finger Injury

Unfortunately, prompt treatment of jersey finger may be hindered by initial misdiagnosis or delay of presentation. Clinicians and patients may mistake jersey finger, especially in the absence of an avulsed bone fragment on radiographs, with a jammed or sprained finger.[5,6,8] Patients not treated with appropriate and timely surgical intervention may develop chronic pain, decreased PIP joint range of motion, flexion contracture, loss of grip strength, and/or a notable finger deformity. Management of chronic jersey finger is dependent on several factors—but can be nonoperative or operative based on the degree of finger dysfunction and tendon retraction present.[8,11]

Due to the risk of long-term dysfunction, athletes injured in-season should not delay surgery to finish their season. Depending on the sport, athletes can likely expect to return to play 3 months after repair.[3,12]

Next-Level Urgent Care Pearls

- Isolated PIP and DIP joint range of motion should be evaluated in acute finger injuries
- A digital nerve block can help assess finger range of motion when pain may limit the exam
- Though not required for diagnosis, ultrasound can confirm the presence of a ruptured FDP tendon when x-rays are negative
- Prompt diagnosis and surgical referral of FDP tendon avulsions are critical in preventing long-term dysfunction
- In-season athletes should not delay surgical treatment until the off season

Red Flags and Legal Pitfalls

- FDP avulsion may be misdiagnosed as a finger sprain or jammed finger
- Chronic pain, loss of grip strength, and deformity are possible consequences of delayed treatment

Clinical Scenario Conclusion

Evaluation with ultrasound confirmed the patient had tendon retraction of the FDP to the palm, known as a Type I jersey finger injury. The patient's hand was placed in a splint for digit immobilization, non-steroidal anti-inflammatory drugs and ice were recommended for pain control, and the patient was immediately referred to an orthopedic surgeon. Operative management, along with the associated risks, was discussed with the patient/guardian and ultimately pursued. The surgery was successful, and the patient eventually regained full range of motion of his DIP joint without any complications.

Takeaway Points

- A typical mechanism of injury for FDP avulsion is forced hyperextension of an actively flexed DIP joint
- The pathognomonic finding is an isolated inability to actively flex the affected finger's DIP joint
- Surgical management of acute FDP avulsion is recommended regardless of whether radiographic imaging displays an associated avulsion fracture of the distal phalanx ■

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