

## Case Report

# Infectious versus Inflammatory Flexor Tenosynovitis: A Little, Big Problem

**Urgent message:** Infectious flexor tenosynovitis is an orthopedic emergency that can cause long-lasting disability through tendon necrosis and permanent digital contracture if unrecognized or mismanaged.

MARY A. LANE, MD

### Introduction

Flexor tenosynovitis is an inflammation of the tendon sheath that can be caused by either introduction of infection or various inflammatory conditions ranging from autoimmune arthropathies to crystal joint depositions. Flexor tenosynovitis caused by infection is an orthopedic emergency. It can cause long-lasting disability through tendon necrosis and permanent digital contracture if unrecognized or mismanaged. On the contrary, flexor tenosynovitis caused by inflammation does not usually constitute an emergency and can be managed on an outpatient basis. Likewise, it is imperative that physicians are able to make an educated case as to which form of tenosynovitis they are dealing with—infectious versus inflammatory. Unfortunately, the two forms of flexor tenosynovitis can be difficult to distinguish in some instances.

Many cases of flexor tenosynovitis are seen in urgent care centers and on the “fast track” side of Emergency Rooms (ERs) because of the misconception among both patients and triage personnel that the condition is only

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**Mary A. Lane, MD**, is a fast track emergency medicine physician at Florida Hospital Fish Memorial, Orange City, Florida and board certified in Family Medicine.



a simple finger infection. The result is frequent misdiagnosis as “finger cellulitis” or an “allergic reaction.” Health care providers must be vigilant in recognizing cases of flexor tenosynovitis so as to prevent subsequent disability associated with the diagnosis.

**Figure 1.**



The patient's right fifth digit at presentation. She reported a 4-day history of pain, erythema, and edema in the digit after tending to her garden.

**Figure 2.**



In comparison with an unaffected digit on the patient's left hand (finger pointing up at left), the patient's right fifth digit (at right) clearly is edematous..

**Case Presentation**

A 52-year-old woman presented to a small community ER with a 4-day history of progressive swelling and erythema to her right fifth digit (Figure 1).

She was triaged to the “fast track” side of the ER and listed on the tracking board as having an “allergic reaction.” She stated that 4 days earlier, she had been tending her garden in the afternoon and by that night, noted gradual onset of burning pain, erythema, and edema around her right fifth digit. She denied pruritus. The patient stated that she had been wearing gloves and did not recall any trauma (abrasions, insect bites, etc.) to her fifth finger. Her symptoms had gradually worsened. In the ER, the patient’s pain was rated a 7/10 and radiated up the right forearm with any movement of the digit. She denied fevers, chills, vomiting, or other systemic symptoms.

It is noteworthy that the patient gave a history of a similar occurrence in the same digit 5 years earlier. She stated that at that time, she was seen in the ER and given a loading dose of intravenous (IV) antibiotics and dis-

charged home to continue oral antibiotics. The symptoms eventually resolved. She claimed that her finger then had been just as red, swollen, and painful as it is now. She stated that since that incident she has had reduced mobility in her right fifth digit, but that it was not permanently contracted as a base line.

**Observation and Findings**

Evaluation of the patient revealed the following:

- T: 98.6°F
- HR: 63
- RR: 11
- BP: 128/80
- PMHx: Negative
- Sx Hx: Negative
- FH: No known history of inflammatory arthropathies or autoimmune conditions,
- SH: Negative
- Meds: None. No known drug allergies

The patient presented with a right fifth finger flexed

**Table 1. The Four Kanavel Signs**

1. Fusiform edema – often described as a “sausage digit.”
2. PIP joint in flexion
3. Pain with passive extension (most specific)
4. Tenderness on palpation of the flexor tendon sheath

at the proximal interphalangeal (PIP) joint that could not be extended actively or passively without triggering severe pain. Swelling around the digit was fusiform and marked erythema extended onto the palmar aspect of the woman’s hand (Figure 2). She had tenderness along the flexor tendon. No nidus of infection could be identified. The patient’s neurovascular exam was intact.

### Diagnostic Studies

Finger x-ray showed soft-tissue swelling but was otherwise within normal limits. Neither bony involvement nor radio-opaque foreign body was noted.

CBC demonstrated a normal WBC (without a left shift,) but a small elevation in eosinophils was noted.

CMP was within normal limits.

SED rate showed mild elevation at 27.

CRP showed elevation at 17.

### Diagnosis

Presumed infectious flexor tenosynovitis until proven otherwise.

Suppurative flexor tenosynovitis is primarily a clinical diagnosis and neither labs nor imaging studies can confirm the diagnosis (see general discussion below.) The gold standard for confirmation is fluid sampling.

This patient met clinical criteria for this diagnosis based on Kanavel’s Signs (Table 1). These signs were identified by Dr. Allen B. Kanavel, an American Surgeon in 1912, and are considered to be sensitive for purulent flexor tenosynovitis. The signs were designed to differentiate between a deep infection of the tendon versus a more superficial infection, such as cellulitis or a localized abscess.

### Differential/Decision Making

1. Allergic reaction – Eosinophils were elevated, and an acute allergic reaction could mimic the appearance of flexor tenosynovitis. Nonetheless, the clinical his-

tory of gradually worsening symptoms does not fully support this differential.

2. Inflammatory flexor tenosynovitis – The lack of nidus of infection and the patient’s prior history of a similar episode could support a possible inflammatory arthropathy. However, the patient’s presentation included all of Kanavel’s Signs, making an infectious source highly suspect.
3. Infectious flexor tenosynovitis vs. superficial infection—The incident did start after the patient had been gardening and a small puncture wound (for instance, from a thorn—a common flexor tenosynovitis culprit) would not necessarily be readily identifiable. The patient had all of the classic Kanavel’s Signs, favoring the diagnosis of a deep rather than superficial infection. Knowing that the patient’s symptoms had been gradually progressing over the course of 4 days (and that the consequences of missing a possible deep infectious etiology could be grave), a treatment approach that addressed the possibility of a deep infectious source was adopted.

### Course and Treatment

The patient’s finger was splinted into the “safe position” and she was asked to keep the digit elevated. Her tetanus status was checked and a tetanus shot was administered. She was given 2 g IV cefazolin in the ER and transferred to a large tertiary care facility where hand surgery was available. A hand surgeon started IV vancomycin but no response was seen at 24 hours and the patient was taken to the operating room for surgical intervention. Purulent material was found at the level of the tendon and multiple cultures for bacteriology and mycology were obtained. A postoperative diagnosis of “tenosynovitis” was made by the hand surgery. No further imaging was performed at the accepting hospital (x-ray was negative at the transferring hospital, but that only ruled out radio-opaque foreign bodies. Plant matter is not radio-opaque.) No mention of a foreign body was noted on the postoperative note.

IV antibiotics were continued for an additional 3 days. Clinical improvement was noted and the patient was discharged home with a prescription for 500 mg cephalexin QID x 7 days and follow up on an outpatient basis. No culture growth was ever noted. The pathology report revealed “Remnants of fibroconnective tissue displaying florid acute inflammation and extensive necrosis. Negative for Malignancy. The histological features in this case could also be consistent with abscess.”

## General Discussion

The two categories of flexor tenosynovitis are infectious and inflammatory. In some cases it can be difficult to tell apart these etiologies.

Infectious flexor tenosynovitis is usually secondary to some minor skin trauma to the digit. A complication of infectious tenosynovitis is pyogenic flexor tenosynovitis—formation of an abscess at the base of the digit. The abscess is classically described as being in the shape of a “horse-shoe.” *Staphylococcus aureus* is the most common pathogen, but many other bacteria have been implicated in human bites, such as *Eikenella corodens*.

How is infectious tenosynovitis treated? Initially the patient’s tetanus status should be updated, the digit splinted, labs and an x-ray obtained, and a hand surgeon consulted. If you are practicing in an urgent care center and a patient’s presentation is suspicious for a possible infectious etiology and all four Kanavel’s Signs are present, he/she should be referred to a local ER for consultation with a hand surgeon. If you are practicing in an ER that does not have a Hand Surgery consultant on call, the patient may need to be transferred to a larger tertiary care facility. Early presentations can be managed conservatively with IV antibiotics and close observation, assuming the patient is not immunocompromised. Cefazolin is the first-line antibiotic of choice, but erythromycin or vancomycin can be used as an alternative.<sup>1</sup> If no improvement is noted within 24 hours, surgical intervention often is warranted. Risk factors for poor outcomes despite surgical intervention include, but are not limited to, diabetes, peripheral vascular disease, renal failure, human bite wounds (“fight bites”), late presentations (defined as >7 days,) digital ischemia, and subcutaneous purulence.

Inflammatory flexor tenosynovitis is often secondary to inflammatory arthropathies such as rheumatoid arthritis and psoriatic arthritis. However, overuse syndromes (stenosing flexor tenosynovitis “trigger finger”) and gout/pseudogout located in the PIP of a finger are other common etiologies.

How is inflammatory flexor tenosynovitis treated? That depends on the cause. Most cases are treated with nonsteroidal anti-inflammatory drugs, application of ice as needed, and splinting. A short course of oral steroids may be taken to reduce inflammation, and steroid injections may be administered. Additional medications, such as methotrexate for rheumatoid arthritis, may be initiated in certain instances, again, depending on the cause.

It can be difficult to distinguish infectious from inflammatory tenosynovitis when no obvious nidus of infection exists (and no subcutaneous purulence is seen) because

some forms of inflammatory tenosynovitis can also display Kanavel’s Signs. However, the best clinical predictor we have of tendon involvement is presence of all four Kanavel’s Signs.

Vital signs, laboratory tests, and imaging studies all can provide clues to the diagnosis, but it is difficult to confirm an infectious etiology without incision and drainage. Vital signs are variable, and a patient may be afebrile in both clinical conditions. Leukocytosis or a left shift is more likely with infectious versus inflammatory tenosynovitis, but there have been many cases reports where a patient’s white blood count and sedimentation rate were within normal limits in both instances.

Imaging studies (x-ray, computed tomography, and magnetic resonance imaging (MRI) can assess for presence of bony abnormalities and foreign bodies, but in most cases, they also cannot offer a definitive answer as to whether flexor tenosynovitis (infectious or inflammatory) is present. Findings, even on MRI, are often nonspecific.<sup>2</sup> For that reason, clinical presentation and fluid sampling remain the gold standard for diagnosis.

## Case Discussion

It appears (given that purulent material was found on incision and drainage) that this was, indeed, a case of infectious tenosynovitis. The pathology report described “remnants of fibroconnective tissue displaying florid acute inflammation and extensive necrosis.” While the inflammation is acute, was the necrosis secondary to this particular infection or was the necrosis present from the presumed finger infection that the patient described having occurred 5 years earlier? Could that also have been an episode of infectious tenosynovitis?

## Conclusion

The case described here underscores the importance of being vigilant when treating finger infections. It has been said, “A diagnosis you don’t think of is a diagnosis you can’t make.” Always think of the possibility of suppurative flexor tenosynovitis when forming your finger infection differential. ■

## References

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## Suggested Reading

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