

EM CASE OF THE WEEK

BROWARD HEALTH MEDICAL CENTER DEPARTMENT OF EMERGENCY MEDICINE

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Infectious Flexor Tenosynovitis is considered an orthopedic emergency. Be wary of this condition and start the proper management, as it can lead to finger amputation and decreased quality of life in patients.

EM CASE OF THE WEEK

EM Case of the Week is a weekly “pop quiz” for ED staff. The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.



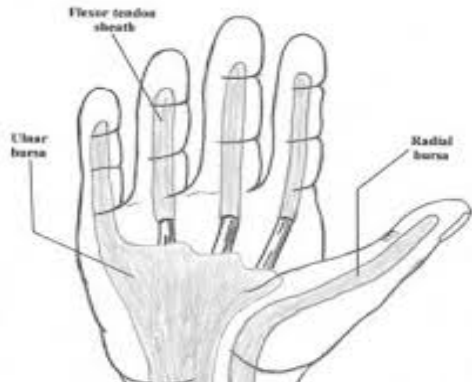
Infectious Flexor Tenosynovitis

A 35 year old male presents to the ED with 2 days of right index finger pain and swelling. He says he is a contractor and he builds houses for a living. Two days prior, he was hammering nails into wood when he accidentally drove a nail partially into his right index finger along the palmar surface. His vital signs are stable but he stated he had a fever yesterday night. His pain is localized and is constant and nothing will make it better. He says moving his finger makes the pain worse. You are suspecting an infectious form of flexor tenosynovitis. On physical exam, you know to look for the Kanavel signs. Which of the following is NOT one of the Kanavel signs used to help diagnose infectious flexor tenosynovitis?

- A. Digit held in semi-flexed posture.
- B. Pain on passive extension of the affected digit.
- C. Obvious sign of a puncture wound in the affected finger.
- D. Tenderness along the course of the tendon sheath.
- E. Fusiform swelling of the affected finger.



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Tenosynovitis

The correct answer is C. Kanavel described four cardinal signs that characterize infection of the flexor tendon sheath. These signs include fusiform swelling of the entire digit, exquisite tenderness along the course of the tendon sheath, a digit with a semi-flexed posture, and pain with attempted passive extension of the digit. Clinical practice has shown that these clinical signs are useful for diagnosis of infectious flexor tenosynovitis, but no studies have validated their sensitivity and specificity.

The most reliable Kanavel sign according to one study is pain on passive extension of the digit.

The sign that most effectively differentiates pyogenic flexor tenosynovitis from other diagnoses such as herpetic whitlow and septic arthritis is tenderness along the flexor tendon sheath that may extend into the palm.

It is important to also note that the absence of trauma does not rule out tenosynovitis. So even though there may not be an obvious sign of a puncture wound (choice C), do not rule out tenosynovitis.

Discussion:

Tenosynovitis is characterized as the inflammation of a tendon as well as its sheath. The most acute cases involve the flexor tendon of the hand, and will usually disrupt the function of the flexor tendon. These cases are generally secondary to infection but can also be from other causes such as diabetes, overuse, or arthritis. Septic flexor tenosynovitis has the ability to rapidly destroy a finger's functional capacity and is considered an orthopedic emergency.

This infection can be directly introduced to the tendon sheath through a skin wound, but can also be spread hematogenously. When seen from a puncture wound, one should consider the bacteria that live on human skin. Staphylococcus aureus and Streptococcus species are the most common agents. If an animal bite is present as a puncture wound, consider Pasteurella multocida. (cont'd on next page)

Take Home Points

- Usually the patient will present about 2-5 days after the incident (cut, puncture wound).
- The Kanavel signs are important to recognize to help diagnose the infectious flexor tenosynovitis. If diagnosed, this is an orthopedic emergency.
- The four Kanavel Signs are: symmetric swelling of the entire digit, exquisite tenderness along the course of the tendon sheath, positioning of the digit in a semi-flexed posture, and pain with attempted passive extension of the digit.
- The role of prompt broad spectrum IV antibiotics followed by oral antibiotics is important. Surgical treatment may also be warranted.

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and click on the "Conference" link. All are welcome to attend!

Pyogenic flexor tenosynovitis (PFT) will result from an infectious agent multiplying in the closed space of the flexor tendon sheath and synovial fluid medium. The gliding mechanism is interfered with because the inflammation within the tendon sheath quickly interferes with the gliding mechanism, which leads to adhesions and scarring. The ultimate consequences of this can be tendon necrosis, disruption of the tendon sheath and digital contracture. Early diagnosis is key, since prognosis is correlated with severity of the condition. Some risk factors for poorer outcomes are: age over 45 years, presence of diabetes mellitus, ischemic changes during presentation and subcutaneous purulence.

Differential: Gonococcal tenosynovitis, inflammatory tenosynovitis from chronic conditions, herpetic whitlow, pyarthrosis, gout, pseudogout, dactylitis, phalanx fracture, arthritis, subcutaneous abscess.

Signs and Symptoms: Patients with PFB will typically present with pain and swelling 2-5 days after an incident. Symptoms will present later in immunocompromised patients. The pain and swelling typically is localized to the palmar aspect of one digit. Patients will usually have a history of trauma, but not always. A puncture wound can also be found. Patients may present with the Kanavel signs as described above. It is important to note that the Kanavel signs may be absent in patients who have recently been given antibiotics, are in an immunocompromised state, have chronic infections, or are presenting early with the condition.

Workup and Diagnosis: For all types of tenosynovitis, diagnosis is primarily clinical. Radiographs of the hand can be obtained to rule out bony trauma or presence of a retained foreign body. MRI and ultrasound are unnecessary for diagnosis. MRI can be helpful, but is expensive and a diagnosis can be made without it. Laboratory tests such as WBC count, erythrocyte sedimentation rate and C-reactive protein level are non-specific and unhelpful for initial diagnosis, but may be warranted as a baseline for future monitoring of treatment response.

From an ED standpoint, broad spectrum IV antibiotics must be ordered for pyogenic tenosynovitis as described below under "treatment". From an overall medical standpoint, a

culture of the suppurative synovial fluid is necessary before definitive antibiotic treatment is given. Cultures ordered should be aerobic, anaerobic, fungal, and acid fast bacilli. Non-suppurative fluid may show negative birefringent crystals indicating gout or positive birefringent crystals, indicating pseudogout.

Staging is as follows:

Stage 1. Inflamed synovial sheath is distended with serous exudative fluid.

Stage 2. Purulent fluid causes distension of the sheath.

Stage 3. Septic necrosis of tendon and pulley occurs.

Treatment: For the pyogenic subtype, if diagnosed early, medical treatment can be used for uncomplicated infections. Timing remains controversial. From an emergency department standpoint, medical management must be started and an orthopedic consult obtained.

Non-surgical management of pyogenic tenosynovitis begins with prompt broad spectrum IV antibiotics. Some antibiotics that can be used are vancomycin combined with piperacillin/tazobactam, or vancomycin and ciprofloxacin. If discharge is warranted, oral antibiotics must be continued for ten days. Patients can be discharged on cephalexin. For MRSA, clindamycin must be given.

Uncomplicated cases of pyogenic tenosynovitis that are found early may be treated medically. However, many surgeons advocate for surgical therapy in any case of infectious tenosynovitis, as timing remains controversial. If a surgical approach is necessary an open irrigation and debridement is an option. Closed continuous irrigation can also be performed, and there is no statistical difference between the effectiveness of closed vs open irrigation. The novel method of irrigation is to use bupivacaine which has been linked to shorter periods of continuous irrigation and shorter hospital stays. Complications of PFB that can arise include stiffness secondary to flexor tendon adhesions, joint capsular thickening, destruction of the sheath and pulley system, loss of skin, and amputation.

Draeger, R., & Bynum, D. (2012). Flexor Tendon Sheath Infections of the Hand. *Journal of the American Academy of Orthopaedic Surgeons*, 373-382.

Foster, M et al. (2016). Tenosynovitis Treatment & Management [Internet]. Available from www.Medscape.com



ABOUT THE AUTHOR:

This month's case was written by Ricky Patel. Ricky is a 4th year medical student from NSU-COM. He did his emergency medicine rotation at BHMC in January 2016. Ricky plans on pursuing a career in Obstetrics & Gynecology after graduation.