Flexor tenosynovitis. An anatomically driven urgency in hand infections. A case report

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Case Report

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Background:
Hand infections are a common clinical problem ranging from superficial to life- and limb-threatening conditions, necessitating prompt and appropriate management. The historical emphasis on surgical drainage, pioneered by figures like Kanavel based on detailed anatomical studies, remains a cornerstone of treatment for deep infections. Timely and anatomically informed surgical drainage remains the primary treatment for these deep infections, often combined with organism-specific antibiotics guided by culture results. This paper will explore the intricate interplay of hand anatomy, the evolving understanding of infection pathogenesis, and current surgical and antibiotic management strategies to optimize outcomes in patients with hand infections. We present the case of a 52-year-old male with a deep space hand infection treated with surgical drainage, intravenous antibiotics and irrigation, pointing the importance of appropriate treatment in the discussion and review of literature.

Keywords: Hand infections, tenosynovitis.

Hand infections are a common clinical problem ranging from superficial to life- and limb-threatening conditions, necessitating prompt and appropriate management. While hand infections are commonly encountered, serious deep infections like septic arthritis, pyogenic tenosynovitis, and abscesses each constitute less than 10% of hand infections. [1] A thorough understanding of the confined spaces, fascial planes, and tendon sheaths is critical, as these dictate the pathways of infection spread and the potential for rapid increases in pressure leading to ischemia and necrosis. The historical emphasis on surgical drainage, pioneered by figures like Kanavel based on detailed anatomical studies, remains a cornerstone of treatment for deep infections. Preoperative antibiotic use, particularly in collected infections like phlegmons, may even be associated with increased complications. [2] Serious infections such as flexor tenosynovitis, deep space infections, and necrotizing fasciitis require urgent or emergent intervention to prevent substantial morbidity, including pain, stiffness, functional deficits, and potential amputation. Timely and anatomically informed surgical drainage remains the primary treatment for these deep infections, often combined with organism-specific antibiotics guided by culture results. [3]

Case report

We present the case of a 52-year-old man who presented with swelling in the dorsal and palmar regions of the fourth finger of his left hand, which had been present for 5 days.

He had history of type 2 diabetes of 20 years' duration and stage III chronic kidney disease of 10 years' duration.

The current condition began seven days prior to evaluation suffering trauma to the fourth finger of his left hand with a wooden thorn while cleaning his house. He presented with a gradual increase in volume and temperature in the dorsal and volar regions of the affected finger, which progressed to the palmar and dorsal regions, pus-initiated leaking from the trauma site two days prior to arrival, image 1. The physical exploration showed us a flexed resting position and pain with passive extension of the affected finger with augmented temperature and swelling, causing intense pain after palpation along the flexor tendon sheath. Laboratory and imaging workup is shown in table 1 and figure 2.

Flexor tenosynovitis with spread to deep space of the hand was diagnosed.

Brunner incisions were made in volar and dorsal area of the finger, and a dorsal and palmar

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Figure 1. Dorsal and volar aspect at arrival, swelling of the fourth finger and extension to palmar and dorsal aspects of the hand with edema of adjacent fingers. Necrotic tissue on dorsal side of 4th finger at distal interphalangeal joint area.

incisions also for pus drainage. A 5fr tube was inserted on the dorsal area which was used for irrigation with povidone iodine and saline solution during five days as shown in image 3.

After intravenous antibiotics with carbepenemics adjusted to kidney function, hand space irrigations with splinting of the affected finger a notorious improvement was observed clinically as shown image 3, and in laboratory work up a descent of inflammatory cells to normal range was observed Discharged was made with attendance to wounds department every 2 days. Getting a full recovery of de infectious process. He presented with rigid finger 2 months after, for which he refused surgical treatment and continued with rehabilitation therapy.

Blood work results at arrival	
Creatinine	mg/dl
Glucose	203 mg/dl
Hematocrit	36%
Hemoglobin	12.8 g/dl
Platelets	422 x 10^3uL
Leucocytes	18x10^3 uL

Table 1. Lab results.

Discussion

Flexor tenosynovitis is an important hand infection due to its potential for significant morbidity if not promptly and appropriately managed.

Flexor tenosynovitis is considered an urgent or emergent scenario requiring timely medical and surgical intervention. Delayed treatment can lead to substantial morbidity, including pain, stiffness, and even amputation. [4] While classically diagnosed based on Kanavel's four cardinal signs, the clinical presentation can be variable, and not all signs may be present, his can lead to missed or delayed diagnoses, this patient presented the four signs at his evaluation.[5] The hand contains numerous enclosed and confined spaces, including synovial sheaths of flexor and extensor tendons, bursae (radial and ulnar), and deep

Figure 2. Anterior and oblique x ray of left hand: Shows diffuse swelling of the soft tissues with a medial phalangeal fracture distally of the 4th finger in the left hand with the 5fr tube inserted for irrigation.

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Figure 3. Notable decrease in swelling on dorsum of the hand and palmar side.

fascial spaces (thenar, midpalmar, hypothenar, and dorsal), the flexor tendon sheaths are confined synovial spaces with limited vascularity, creating an environment conducive to bacterial growth. [6] Infection within these sheaths can rapidly increase pressure, impairing vascular supply and potentially causing tendon necrosis and rupture, furthermore, the flexor sheaths of the thumb and little finger communicate with the radial and ulnar bursae, respectively, and these bursae can communicate via the space of Parona, allowing for proximal spread of infection to the palm and even the forearm, potentially forming a horseshoe abscess. [7]

Bacterial proliferation and increased pressure within the flexor tendon sheath can severely impair the gliding mechanism of the tendons, leading to significant loss of hand function, even with appropriate treatment, some degree of stiffness may persist.[8]

The primary treatment for flexor tenosynovitis is surgical evacuation of pus, often involving irrigation of the tendon sheath. Some authors suggest closed sheath catheter irrigation, while others advocate for open volar incisions to allow for thorough debridement.[9] Antibiotics are a crucial adjunctive treatment, the optimal length of antibiotic therapy is unclear, but they are typically given after cultures are obtained and for 7 to 14 days. In some cases, continuous catheter irrigation can be used to dilute bacterial virulence factors and inflammatory cytokines within the confined synovial sheath as done with this patient. Splinting in the "position of safe immobilization" helps to reduce pain, prevent flexion contractures and stiffness, and promote healing Elevation reduces edema by improving venous and lymphatic drainage.[10]

The outcome of flexor tenosynovitis can be influenced by factors such as the stage of the infection, the presence of subcutaneous purulence, septic necrosis of the tendon or tendon sheath, or signs of digital ischemia, as well as patient comorbidities like diabetes, renal failure, and peripheral vascular disease, later presentations and the presence of these factors are associated with poorer functional results.[11]

Conclusion

The effective management of hand infections is fundamentally underpinned by a comprehensive understanding of the hand's intricate anatomy. The sources emphatically illustrate how the hand's confined spaces, fascial planes, and synovial sheaths dictate the progression and potential spread of infection, as exemplified by flexor tenosynovitis and the formation of horseshoe abscesses via the space of Parona. The limited vascularity within these anatomical compartments, particularly in synovial spaces, directly impacts treatment strategies by reducing the efficacy of antibiotics alone and often necessitating surgical intervention for adequate source control.

Conflicts of interests

None declared by the authors.

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