

EVIDENCE SUMMARY

Infected Flexor Sheath (Pyogenic Flexor Tenosynovitis)

Overview

- Pyogenic flexor tenosynovitis (PFT) is an uncommon closed-space infection of the hand [1].
- Pyogenic flexor tenosynovitis (PFT) can result in severe stiffness [1].
- Pyogenic flexor tenosynovitis (PFT) can result in other sequela [1].

Anatomy & Pathophysiology

GENERAL DEFINITION

- PFT can result in severe stiffness and other sequela [1].

HAND ARCHITECTURE & FUNCTIONAL UNITS

- The hand is both an organ designed to obtain information and an organ of execution [3].
- The hand consists of 19 bones, 17 articulations, and 19 muscles situated entirely within the hand, and about the same number of tendons activated by the forearm muscles [3].
- The distal half of the hand is separated into five digits which flex toward the palm [3].
- The thumb has a more proximal and lateral position, allowing movement inward and outward from the palm [3].
- The four fingers are the distal extension of the carpometacarpal part of the hand [3].
- The hinges of finger movements are located at the thenar crease and at the transverse distal palmar crease, not at the bases of the digits [3].
- When fingers are extended and separated, their tips lie on the circumference of a circle whose center is the head of the third metacarpal [3].

CUTANEOUS ANATOMY

- The palm forms a cutaneous unit extending from the distal transverse crease of the wrist up to the transverse crease at the base of the digits [4].

- The palmar integument is subdivided into two separate zones by the oppositional crease of the thumb, which constitutes the oblique axis of the hand [4].
- The skin of the radial portion covers the thenar eminence and the external part of the palm and is the mobile portion [4].
- The skin of the ulnar and distal portion covers the hypothenar eminence where the skin has poor mobility [4].
- The central triangular part of the palm has fixed and poorly vascularized skin covering almost directly the superficial palmar aponeurosis [4].
- The integument of the palmar face of the digits is subdivided into phalangeal units separated by digital flexion folds [4].
- When a digit is completely flexed, the integument of adjacent phalanges comes into contact in the zones of the flexion creases, establishing areas of cutaneous contact in the form of a diamond [4].
- The sides of the diamond-shaped cutaneous contact zones do not undergo variations in length during movements of flexion and extension [4].
- Incisions made along the lines of the diamond-shaped cutaneous contact zones present a minimal chance of retraction [4].
- The dorsal slope of the web spaces has a gradual incline and its supple skin is not adherent to the subjacent region [4].
- The palmar surface of the web spaces is flat and precipitously interrupted, with skin densely adherent to the commissural skeleton [4].

INTRINSIC MUSCULATURE & EXTENSOR APPARATUS

- There are seven interosseous muscles, four dorsal and three volar [5].
- The dorsal interossei are abductors [5].
- The volar interossei are adductors [5].
- The middle finger has two dorsal interossei (abductors) and no volar interossei (adductors) because the central axis of the hand lies within it [5].
- Each dorsal interosseous muscle, with the exception of the third, has two muscle heads: a superficial head and a deep head [5].
- The superficial head of the dorsal interosseous muscles abducts and weakly flexes the proximal phalanx [5].
- The deep head of the dorsal interosseous muscles forms a lateral tendon, or lateral band, at the level of the MP joint [5].
- The deep head of the dorsal interosseous muscles flexes and weakly abducts the proximal phalanx while extending the middle and distal phalanges [5].
- Transverse fibers arch dorsally from each lateral band to join each other over the dorsum of the finger, flexing the proximal phalanx [5].
- Oblique fibers (spiral fibers) from the lateral bands insert onto the lateral tubercles at the base of the middle phalanx and extend the middle phalanx (PIP joint) [5].

- The lateral bands are joined by the lateral slips of the extensor tendon to form the conjoined lateral band [5].
- The two conjoined lateral bands to each finger unite at the distal third of the middle phalanx to form the terminal tendon [5].
- The terminal tendon inserts at the base of the distal phalanx to extend it [5].
- The flexor digiti quinti brevis is structurally and functionally similar to the deep head of the dorsal interossei, forming the ulnar lateral band of the little finger [5].
- Each volar interosseous muscle has only one muscle head and none of them insert onto the proximal phalanx [5].
- The volar interossei form the ulnar lateral band of the index finger and the radial lateral band of the ring and little fingers [5].
- The abductor digiti quinti and flexor digiti quinti brevis are similar in both structure and function to the superficial and deep heads of the dorsal interossei, respectively [5].
- The opponens digiti quinti arises from the pisohamate ligament and the hook of the hamate and inserts onto the ulnar side of the diaphysis of the fifth metacarpal [5].

METACARPAL & CARPAL ANATOMY

- The metacarpal arch is endowed with a great deal of adaptability because of the mobility of the peripheral metacarpals [8].
- The thumb metacarpal is independent and articulates with the trapezium [8].
- The index metacarpal is the most firmly fixed [8].
- The ring metacarpal has about 10 degrees of mobility in flexion and extension [8].
- The fifth metacarpal is semi-independent, articulates with the hamate, and has a range of flexion–extension of approximately 20 degrees [8].
- The second to fifth metacarpals are bound together by various fibrous structures, the most distal of which is the deep transverse intermetacarpal ligament [8].
- The deep transverse intermetacarpal ligament is also named the interglenoid ligament because it ties together the anterior “glenoid ligaments” of the metacarpophalangeal articulations, known as the “volar plates” [8].
- The longitudinal arches are composed of a fixed portion, the carpometacarpal, and a mobile portion, the digits [8].
- The keystones of the longitudinal arches are the metacarpophalangeal articulations [8].
- The thick anterior glenoid capsules of the metacarpophalangeal articulations, known as volar plates, prevent hyperextension [8].
- The volar plates are interconnected by the transverse interglenoid ligament [8].
- The flexor retinaculum maintains and restrains the tendons of the extrinsic flexors of the digits within the carpal canal [8].

- The palmar tendons, especially the profundus, are kept close to the axis of flexion–extension of the wrist by the flexor retinaculum [8].

VASCULAR ANATOMY

- The “princeps pollicis” artery is the terminal branch of the radial artery [9].
- The “princeps pollicis” artery crosses the first intermetacarpal space and runs along the ulnar side of the first metacarpal bone [9].
- The “princeps pollicis” artery emerges onto the subcutaneous palmar tissue at the level of the cutaneous flexion crease of the metacarpophalangeal joint [9].
- At the level of the metacarpophalangeal joint crease, the “princeps pollicis” divides into two terminal rami, namely the collateral palmar arteries of the thumb [9].
- The collateral palmar arteries of the thumb run along the digital tunnel symmetrically and are of equal caliber [9].
- An arcade located deep in the flexor tendon joins together the two arteries at the level of the distal metaphysis of the first phalanx [9].
- Vessels originating from the subtendinous arcade enter the “vincula” and irrigate the flexor tendon [9].
- In anatomical studies, only 15% of dissections of the palmar arteries of the thumb fall into the classical “typical” category [9].
- In the second segment of the thumb (between MCP and IP creases), the main artery is the ulnar collateral artery [9].
- The subtendinous anastomosis situated at the level of the neck of the first phalanx acts as a “moderator” between the two collateral arteries [9].
- In the pulp segment of the thumb, the two arteries are of similar size and run through the thick fatty subcutaneous padding [9].
- The dorsal arteries of the thumb originate from terminal branches of the radial artery at the level of the anatomical snuff-box [9].
- The posterior area of the thumb is vascularized by two arteries which originate from the palmar arteries at the level of the first metacarpal [9].

SURGICAL APPROACH CONSIDERATIONS

- Distal palmar incisions are transverse, while proximal palmar incisions tend to be more longitudinal with the distal end curving radially [10].
- In the distal palm, structures lying between the metacarpal heads are not protected by the palmar fascia [10].
- The superficial volar neurovascular arch should be protected when deeper exposure is required in the palm [10].
- The most important structure in the thenar area is the recurrent branch (motor) of the median nerve [10].

- Anatomic studies have shown that there is no single longitudinal incision in the proximal palm that completely avoids the palmar cutaneous branches of the median and ulnar nerves [10].
- The volar zigzag finger incision directly exposes the volar surface of the flexor tendon sheath without requiring mobilization of either neurovascular bundle [10].
- The volar midoblique incision crosses the flexion creases obliquely in the midline of the finger between the neurovascular bundles [10].

Classification

- Pyogenic flexor tenosynovitis (PFT) can result in severe stiffness and other sequela [1].

Clinical Presentation

- Pyogenic flexor tenosynovitis is an uncommon closed-space infection of the hand [1].
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Investigations

- Diagnostic tests such as imaging and serum laboratory studies are useful in the determination of hand pathology but can be expensive, time consuming, and often nonspecific [2].
- A careful physical examination is essential to direct care and future testing if indicated [2].

Key Evidence

- [L5] Pyogenic flexor tenosynovitis (PFT) is an uncommon closed-space infection of the hand that can result in severe stiffness and other sequela. [1] ([10.2106/jbjs.rvw.26.00015](https://doi.org/10.2106/jbjs.rvw.26.00015))

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