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HAND INFECTION

Essay

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BY

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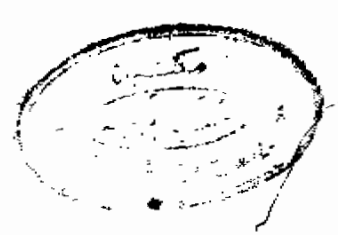
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I N T R O D U C T I O N

S U R G I C A L A N A T O M Y

SURGICAL ANATOMY

Skin of the hand has an extensive sensory supply . Despite the fact that the palmar skin has a thick keratin layer and is upholstered by a tough bolster of fat so that it can withstand the insult of hand manual labor . This skin has the greatest sensory supply of the body (one fourth) $\frac{1}{4}$ of total porcinian (touch) corpuscles in body are in the pulp and skin of hand . (Flatt, 1979).

Skin over the thenar eminence is thinner than that over the head of the metacarpal bones and that of the hypothenar eminence . Over the central area of the palm the skin is rendered extremely tight and resistant by fibrous septa which bind it to the palmar aponeurosis (deep palmar fascia). These septae are a distinctive feature of the subcutaneous tissue in this region . The close connection between the skin and resistant palmar fascia enables the center of the palm to withstand great pressure and so pus can not accumulate superficial to palmar fascia but makes a way upward through skin and collects under the epidermis . Skin of the finger is thick, immobile on volar surface but on dorsum thin , mobile and has little subcutaneous fat and permits a free movement over underlying deep fascia. (Mcvay , 1984).

Fascia anchors volar skin to bone to make pinch grip stable , the midlateral fibers of Cleland ligament keep skin sleeve from twisting about the digit (Dumpy , 1981).

PALMAR APONEUROSIS

Palmar aponeurosis is a special thickening of deep fascia in central portion of the hand . It is triangular in shape with a blunted apex attached to distal edge of flexor retinaculum and palmaris longus tendon and the base divides opposite the heads of metacarpal bones into four slips on going to each four medial fingers. At division it is strengthened by transverse fibres as the general direction of the fibers is longitudinal. The vessels and nerves passing between these slips and the lumbrical muscles .Each slips divides into two processes between which pass the flexor tendon and diverge and dip to attach to(1)Transverse metacarpal ligament (2) Fibrous flexor sheath (3) The whole length of the inner and outer borders of the 1st phalanx of the digit (4) Proximal part of the inner and outer borders of the 2nd phalanx of the digit (Duplessis , 1975).

There are deep connections between the palmar aponeurosis and all four metacarpals in the distal part of the hand . Kaplan expressed the opinion that the palmar aponeurosis normally has no attachment at all to bone and does not continue into the fingers. (Hollinsheed , 1982).

HAND COMPARTMENT

Palmar aponeurosis continuous laterally and medially

with the thinner deep fascia over the muscles of the thenar and hypothenar eminence and deeply, medial to muscles of thenar and lateral to those of the hypothenar, with septa that pass dorsally to attach to 1st and 5th metacarpals, respectively thus dividing the palm into three compartments, central behind aponeurosis contains tendons of superficial and deep flexor, ~~lumbrical~~ sheaths, most digital nerves, palmar arterial arches and median nerve, most digital nerves and two major fascial spaces (midpalmar and thenar). (Hollinshead, 1982).

The dorsal boundary of the central compartment is bone and anterior surface of interossei. The lateral or thenar compartment contains the short muscles of the thumb, long flexor of thumb, the abductor pollicis brevis which most radial and flexor pollicis brevis lies to ulnar side of the abductor brevis and opponens pollicis which lies deep to the other two muscles, also contains vessels and nerves to thumb (It not contain adductor pollicis). It contain vessels and nerves to thumb which lie at first in central compartment then leaves it to thenar .

The medial compartment or hypothenar contains abductor digiti minimi, the most ulnar, the flexor digiti minimi and opponens digiti minimi. (Spinner, 1984).

SYNOVIAL SHEATHS OF FLEXOR TENDON

The tendon of flexor pollicis longus provided by synovial sheath from two fingers breadths proximal to upper margin of carpal ligament to its insertion and called the radial bursa and made of visceral and parital layers which attached to tendon in vinculum breva and vinculum longum . Fig.(1)

Synovial sheaths for flexor digitorum sublimis and profundus tendon begin as pollicis longus and extend to lower level on ulnar side than radial and continue to little finger to the insertion and ends in middle of the palm to other fingers. It is called ulnar bursa which divided into three pouchs (Peritendinous, intertendinous, retrotendinous pouchs) that communicates on ulnar side of bursa (Meleney, 1949) .

FIBROUS FLEXOR SHEATHS

It is a deep fascia on volar surface of the finger which thickened to become able to hold the flexor tendons in contact with phalanges and joint during flexion of finger. The edge of each sheath attached to margins of its phalanges and margin of metacarpophalngeal and interphalangeal joints. The proximal end continuous with palmar aponeurosis, distal end to anterior surface of terminal phalanx beyond the

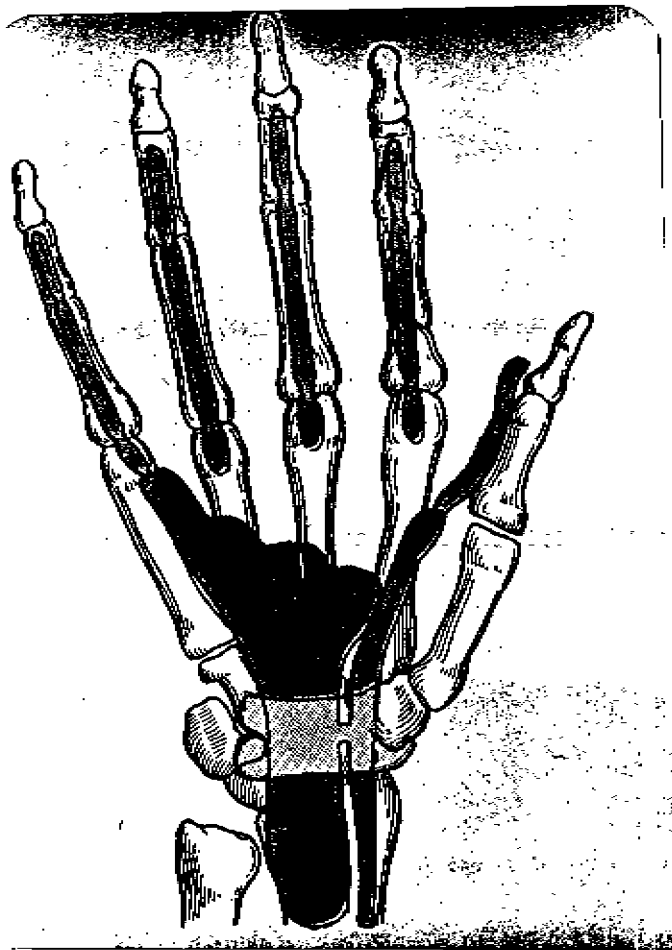


Fig.1) Synovial sheaths of flexor tendons.

insertion of profunda tendon . The fibrous sheath forms with phalanges a canal for long tendon to lie .

Skin is adherent to fibrous flexor sheath at creases. So pulp is a separate space and infection can spread from one space to its neighbours only through the neurovascular digital bundles (El-Rakhawy, 1982).

The digital flexor sheaths of 2nd and 3rd and 4th digits begin at the level where the thenar and midpalmar spaces end . Pus in these tendons sheaths may therefore burst and infect the palmar spaces .

DORSUM OF THE HAND

Skin on dorsum is of fine texture, studded with short hairs and provided with sebaceous glands. The presence of hairs, sebaceous glands and columns of fat under the dermis predispose to furuncle and carbuncle formation (Anson and Mcvay 1971).

ANATOMY OF THE NAIL PLATE

The depression between the periphery of the nail plate and the skin which demarcates the nail is called perionychium. This is divided into the eponychium proximally at the base

of the nail the hyponychium at the digital border of the nail plate and the paronychia laterally on both sides of the nail plate, periphery the base of the nail plate lies within a cul-de-sac of germinal epithelium on both its superficial and deep surface. The nail bed or matrix on which the nail plate lies is divided into two areas the proximal germinal portion whose digital boundary is the distal border of the lunula or moons and the sterile major portion of the nail bed extending out to the free edge of the nail plate .
(Sandzen , 1980).

THE NAIL FOLD SUBUNGUAL SPACE

The subcuticular plane beneath the nail fold is potentially continuous at the sides of the nail with subungual space deep to the nail and resulting abscess can not be drained effectively unless part of the nail is removed
(Keen, 1981).

FASCIAL SPACES OF THE HAND

They are potential spaces in hand filled with loose tissue . Boundaries of the spaces are important as they may limit the spread of infection .

THENAR SPACE

Thenar space lies under the outer half of the hollow of the palm and triangular in shape delineated on one side by the adductor pollicis in the depth of the hand at which point this muscle is covered by adductor fascia. On the ulnar side limited by the septum located between the third metacarpal and adhesions to the crest of the synovial bursa of the flexor tendons. Fig.(2)

On radial side there is union of the thenar fascia with the midpalmar fascia . On volar surface covered by the flexor tendons of index and long fingers and their tendon sheaths and more superficially by the midpalmar fascia . Proximally the space is closed by the junction of the radial and ulnar digital synovial sheaths and the extensors move the wrist and the anterior interosseous foscia, distally the space opens towards the first and 2nd interdigital folds (Sabisten, 1981.).

MIDPALMAR SPACE

The midpalmar space lies on the ulnar side of the hand and in the depth of the palm and triangular in shape . Anteriorly the flexor tendons of the ring , middle and little fingers and their synovial sheaths and the midpalmar fascia delineate this space.(Fig.2).

Posteriorly the space limited by anterior interosseous fascia over the interosseous muscles of the 3rd and 4th intermetacarpal spaces. On ulnar side these potential spaces are closed by anterior interosseous fascia, the fascia covering the hypothenar muscles, and the midpalmar fascia all of which join together to make one thick band . The space is limited on radial side by the connection of the distal synovial sheath designated as the ulnar bursa with the crest of the third metacarpal. Proximally the contact of the digital synovial sheath bursa with continuation of the anterior interosseous fascia closes the space. Distally it reaches almost to the level of the distal palmar crease.

SUPERFICIAL MIDPALMAR SPACE

Lies under the palmar aponeurosis the central part and posteriorly tendons of flexor digitorum superficialis and profunda it contains branches of ulnar nerve, median nerve and superficial palmar arch .

LUMBRICAL CANAL

Lumbrical muscles have a delicate fascial sheath of fibrofatty tissue that surrounds the tendon . The canal is a distal diverticulum of the palmar space. The 3rd and 4th

lumbrical sheaths is a diverticula of the midpalmar space(Fig.2) The 1st from thenar space, the 2nd sheath may be a diverticulum of either thenar or midpalmar. Pus in the midpalmar space is usually drained by splitting the web between the 3rd and 4th or the 4th and 5th digits and opening the sheath of the lumbrical in the space (Last, 1981).

ANATOMY OF THE WEB

The three webs of the palm lie between the four slips of attachment of the palmar aponeurosis. From the skin edge they may be said to extend proximally as far as the metacarpophalangeal joints, a distance of about an inch and half (4 Cm). Between the palmar and dorsal layers of the skin lie the superficial and deep transverse ligaments of the palm, the digital vessels and nerves and the tendons of the interossei and lumbrical on their way to the extensor expansions . The web is filled in with a packing of loose fibrofatty tissue (Last, 1981).

WEB OF THE THUMB

It lack both superficial and deep transverse ligaments. The deep fascia pass across from palmar to dorsal surfaces of web and beneath it lie the transverse head of adductor pollicis and first dorsal interosseous muscle .

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