HAND INFECTIONS AMONG SOLDIERS

THESIS PRESENTED

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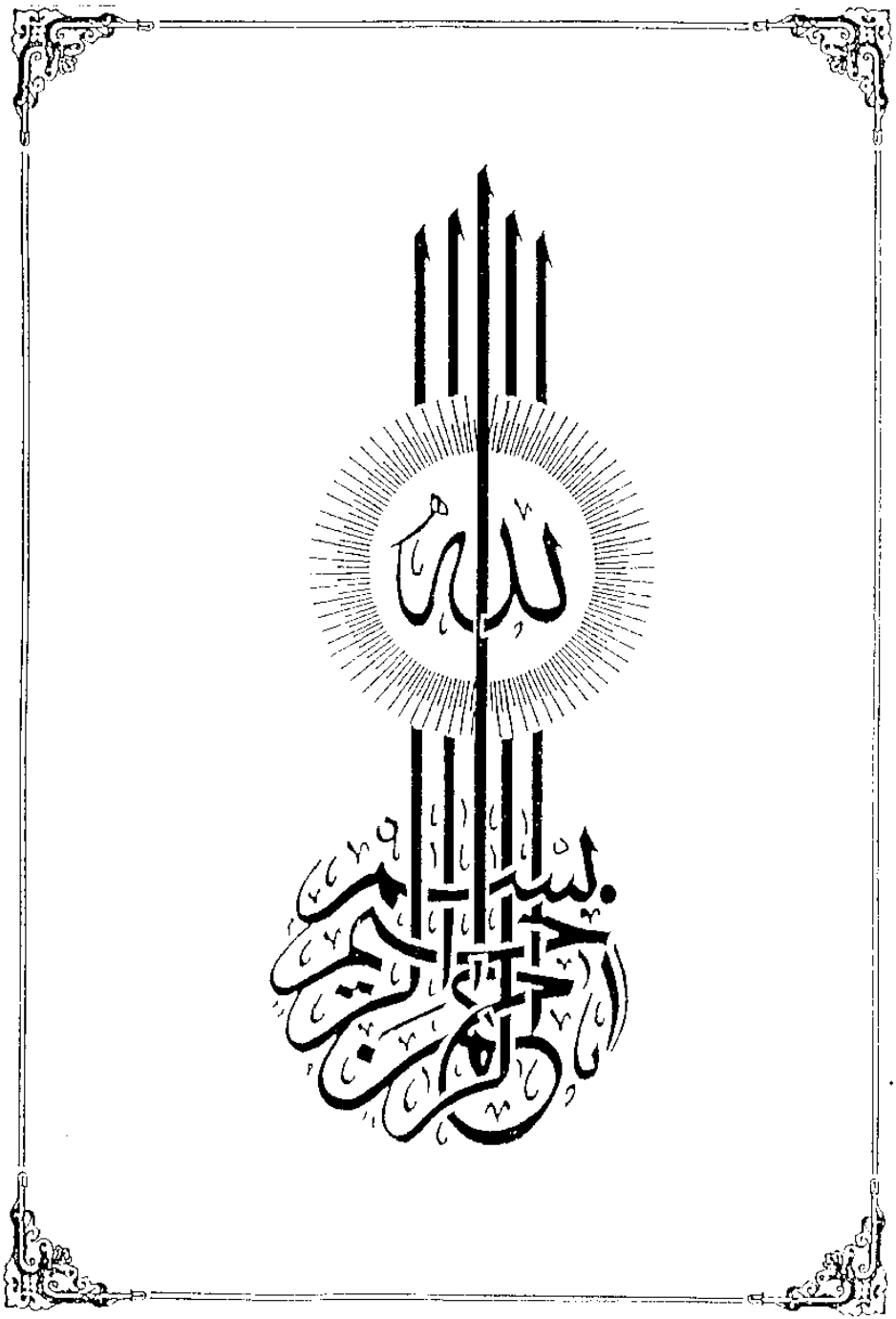

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SURGICAL ANATOMY OF THE HAND [1,2,3]

The skin of the palm is characterised by flexure creases and papillary ridges or finger prints which occupy the flexor surfaces, skin is steadied by its firm attachement to the palmar aponeurosis, fibrous bands connect the two and divide the subcutanous fat into small loculi, forming a water cushion capable of withstanding, considerable pressure. Skin of the dorsum of the hand is quite different, it can be picked up from the underlying tendons moved freely over them, large veins lie beneath the skin, they drain from the palm so that pressure of gripping does not impede venous return.

Palmar Aponeurosis is a strong unyeilding ligament. It fans out in a thick sheet towards the base of the fingers where it divides into four slips one for each finger and each one divides into two which diverge and dip down to be attached to the transverse metacarpal ligament, fibrous flexor sheath, the whole length of the inner and outer borders of the first phalanx of the digit, and the proximal part of the inner and outer border of the second phalanx of the

digit. Palmar aponeurosis is thick in the middle of the palm and is thinner over the thenar and hypothenar muscles. It gives firm attachment to the skin of the palm to improve the grip and it protect the underlying tendons.

Fascial spaces of the hand:

These are, midpalmar, thenar, forearm space , dorsal subcutaneous space, dorsal subaponeurotic space. The midpalmar , thenar and forearm spaces all lie deep to the flexor tendons and their synovial sheaths.

The mid-palmar space lies under the inner half of the hollow of the hand, It shape is triangular , with the flexor tendons with their lumbricals muscls and synovial sheathes little, ring and middle fingers anteriorly.

The dense fascia covering the interossei and metacarpal bones are posterior to this space. The fibrous partition between the thenar and midpalmar space is radial to the latter. This partition extends between flexor tendon and fascia on the under surface of flexor tendons and the fascia covering the interossei and the adductor of the thumb.

The hypotnenar muscles lie on the ulnar side. This space reaches the level of the distal margin of the transvers carpal ligament Proximally sometimes this space is continuous with the forearm space by a small tunnel behind the flexor sheaths at the wrist. This space reaches almost to the level of the distal palmar crease distally. The lumbricals have delicate facial sheath that infection of this space causes infection of the related lumbrical sheaths. Each lumbrical sheath may therefore almost be looked on as a diverticulum of the mid palmar space to which it is related. The first lumbrical sheath would therefore be a diverticulum of the thenar spade. The second lumbrical sheath may be adiverticulum of either the thenar or the mid-palmar space.

Pus in the mid-palmar space is usually drained by slitting the web between the third and fourth and fifth digits and opening the sheath of the lumbrical in the space.

The thenar space lies under the outer half of the hollow of the palm. It is triangular in shape.

The short muscles of the thumb, the flexor tendons.

the flexor tendons of index finger and the first and seoond lumbricals lie anteriorly. The adductor pollicis, mainly its transverse head, lies posteriorly.

The flexor pollicis longus tendon in its synovial sheath which is called the radial bursa lie radialy. The septum between the 2 spaces, mid-palmar and thenar separates this space from the mid pllmar.
Thenar space reaches to the proximal transverse palmar crease . The first lumbircal sheath and sometimes the second extend as distal diverticulae of the space proximally. It reaches the distal border of the anterior annular ligament (transverse carpal). The digital flexor sheaths of the second, third and fourth digits begin at the level where the thenar and mid-palmar spaces end. Pus in these tendon-sheaths may therefore burst into and infect the palmar spaces.

The fore arm space is a facial interval deep to the flexor tendons in the distal part of the forearm. The flexor digitorum profundus in its synovial sheath(ulnar bursa). The flexor pollicis longus in its synovial sheath (the radial bursa) lie anteriorly . The pronator quadratus and the interosseous membrane

are posterior.

Distally it reaches the level of the wrist. It is continuous with the intermuscular spaces of the forearm , proximally.

Pus may track from the space any distance into the forearm, coming into relationship with the median and ulnar nerves as well as other forearm structures.

The space extends laterally to the outer and inner borders of the forearm, and is drained by incisions along these borders.

The forearm space becomes infected by extention from the synovial sheaths of the flexors, especially from the unlar bursa.

Pus presents behind the tendons in this bursa and not in front of them; because, the synovial sheath almost opens into tye space behind the tendons, as little connective tissue intervening in front, it is more firmly attached to the tendons.

On the dorsum of the hand the areolar tissue is much looser than in the palm which does not admit of much swelling because of the unyielding nature of the

palmar fascia. Therefore in palmar infection the swelling is usually on the dorsum because of the lymphatic drainage in this direction. The extensors of the fingers are connected to each other by fibrous tissue, which forms with the extensor tendons an aponeurotic barrier between 2 spaces- the dorsal subcutanous and the dorsal subaponeurotic spaces. These spaces are both triangular, with the apex of the triagnle at the wrist and the base at the knuckles.

Proximally, they are continuous with the subcutanous tissue of the forearm.

Distally, they are continuous with the subcutanous tissue of the webs of the fingers.

Midially, and laterally, they ware continuous with the subcutanous tissue around the ulnar border of the hand and second metacarpal respectively. These two spaces are therefore much more extensive and less well circumscribed than the palmar spaces.

Creases of hand and fingers are just proximal to the thenar and hypothenar eminences, the proximal one marks the level of the wrist joint. The distal one marks the level of the proximal border of the

transverse carpal ligament. The superfacial palmar arch is three finger breadths distal to the proximal crease. The deep palmar arch is 2 finger breadths below this crease.

Creases of the palm are of little value as handmarks for the deeper structures. The creases between the palm and fingers are not at the level of the metacarpophalangeal joints. These joints are 2 cm proximal to the creases.

The interphalangeal creases are found between the first and second phalanges, the proximal marks the joint. The crease between the second and third phalanges marks the joint.

When the fingers are flexed to afist the prominences at the joints are formed in every case by the proximal of the two bones forming that joint. When the digits clenched into afist, the metacarppophalangeal joint is 1-3 cm distal to the prominence of the knucle, and the proximal interphalangeal joint is 0.6 cm distal to the prominence at the joint.

The pulp space is aclosed subcutanous compartment full of fat. It is lined by skin superficially and by the

periosteum of the terminal phalanx deeply. The space is transversed by the terminal part of the digital vessels after they have given off a small tributary to the base of the phalanx before entering the space. The compart - ment is divided by fibrous septa into smaller locules . From this description of the pulp space we notice that tension rises quickly after inflammation and may cause necrosis of the bone if not releived and the proximal third of the distal phalenx having its blood supply - outside the compartment is not affected and can rege- nerate and reconstruct the necrosed bone.

The web space is a subcutanous space filled with loose areolar tissue, it extent between the distal palmar. crease and bases of the finger.Distally it communicates with the first compartment of the finger, Distally it communicates with the first compartment of the finger, proximally it is continous with the subc- utanous tissue of the palm supercicial to the palmar aponeurosis. The web space have deep extentions into the palm along the lumbrical muscles to reach the deep plamar spaces, i.e. The mid palmar and thenar spaces.

The tendon-sheaths are all arranged on the same plan , the tendon is invested by aglistening endothelial lined membrane which plays inside a second endothelial-. lined membrane, the two layers being joined at their extremities. The sheath forms a sac closed at both ends. In the hand, over the phalanges, the flexor tendons have fibrous sheaths and synovial sheaths.

The fibrous sheath forms with the bones an osteo-fascial tunnel which retains the tendon in place. It is attached to the medial and lateral borders of the phalanges where it is strong and to the ligaments of the joints of the finger, where it is weak, to allow freedom of movement. The palmar fascia is attached to the first and the base of the second phalanx.
The synovial sheaths of the sublimis and profundus slips to each of the second , third, fourth and fifth digits have a common sheath which extends from the neck of the metacarpal bone to the base of the distal phalanx, where the profundus ends. Over the middle third of the metacarpals, these tendons, with the exception of those to the fifth digit, have no sheaths. Proximal to this the tendons are invested by another sheath which extends upwards as far as 2.5cm.

above the wrist-joint. The sheath invisting the tendons to the fifth digit continuous proxmially without interruption to joint the common flexors sheath at the wrist. The common flexor sheath with its extention along the little finger tendons is the ulnar bursa. Not infrequentlythere may be an interuption in the ulnar bursa , the arrangement of the sheaths being identical with that of the other fingers. Atenosynovitis of the little finger would in such cases be held up by such an interruption to the weal of the person concerned. The tendon of the thumb has asheath which extends from the base of the last phalanx to apoint 2.5 cm above the upper border of the wrist-joint. This is called the radial bursa. The flexor carpi radialis has asheath which extends from apoint 2.5 cm, above the wrist to the insertion of the tendon. The radial and ulnar bursa pass under the flexor retinaculum (transverse carpal ligament). Their relation to each other here is of great importance. They may be quite separate from each other or they communicate with each other in 50% of cases.

Thus in tenosynovitis of the little finger the infection may spread up the sheath and infect the synovial