

👉 PALM AND FASCIAL SPACES

◆ Functions of Hand

● Designed for:

- Grasping
- Precise movements
- Tactile sensation

👉 Large representation in motor cortex → fine control

● SKIN OF HAND

◆ Features

- Thick
 - Hairless
 - Firmly bound to deep fascia
 - Immobile
 - Creased (at movement sites)
 - Contains numerous sweat glands
-

◆ Cutaneous Innervation

Palmar Surface

- Median nerve → lateral 3½ fingers
 - Ulnar nerve → medial 1½ fingers
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Additional Supply

- Thenar eminence:

- Superficial branch of radial nerve
 - Lateral cutaneous nerve of forearm
-

◆ Special Muscle: Palmaris Brevis

- Inserted into skin of palm
- Supplied by:
 - Superficial branch of ulnar nerve

 Function:

- Corrugates skin of hypothenar eminence
 - Improves grip of hand
-

 DEEP FASCIA OF PALM

◆ Components

- Palmar aponeurosis
 - Flexor retinaculum
-

● PALMAR APONEUROSIS ★

◆ Definition

- Thickened triangular deep fascia in center of palm
-

◆ Attachments

📌 Apex (Proximal)

- Continuous with:
 - Palmaris longus tendon

Base (Distal)

- Divides into 4 slips → medial 4 fingers

Sides

- Sends fibrous septa to metacarpals, divides palm into compartments:
- Central compartment
- Thenar compartment
- Hypothenar compartment

◆ Functions

- Protects underlying structures
- Provides firm grip

- Anchors skin
-

- ◆ Muscle Attachments

- Palmaris longus
 - Palmaris brevis
-

 FLEXOR RETINACULUM

- ◆ Definition

- Strong fibrous band across wrist
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- ◆ Function

- Converts carpal groove → Carpal tunnel
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- ◆ Structures Passing Deep to It

- Median nerve
 - Flexor tendons:
 - Flexor digitorum superficialis
 - Flexor digitorum profundus
 - Flexor pollicis longus
-

● CLINICAL CORRELATION

- ◆ Dupuytren's Contracture

 Definition:

- Fibrosis and shortening of palmar aponeurosis
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Features:

- Flexion deformity of:
 - Ring finger
 - Little finger
-

Treatment:

- Surgical incision
 - Physiotherapy
 - Collagenase injection
-

 QUICK REVISION

Palm fascia = Palmar aponeurosis + Flexor retinaculum

Palmar aponeurosis:

- Triangular
- 4 slips
- Protective

Flexor retinaculum:

- Forms carpal tunnel

Clinical: Dupuytren's → flexed ring & little finger

CARPAL TUNNEL

◆ Definition

- A fibro-osseous tunnel at the wrist

- Formed by:
 - Carpal bones (floor & sides)
 - Flexor retinaculum (roof)
-

- ◆ Boundaries

- 📌 Roof

- Flexor retinaculum (transverse carpal ligament)

- 📌 Floor & Walls

- Carpal bones:
 - Pisiform
 - Hamate
 - Trapezium
 - Capitate
 - Trapezoid
 - Triquetrum

● CONTENTS OF CARPAL TUNNEL

◆ Structures Passing Beneath Flexor Retinaculum

- Median nerve
- Tendons:
 - Flexor digitorum superficialis (FDS)
 - Flexor digitorum profundus (FDP)
 - Flexor pollicis longus (FPL)
- Tendon of flexor carpi radialis (in separate compartment)

● STRUCTURES PASSING SUPERFICIAL TO FLEXOR RETINACULUM

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- Tendon of palmaris longus
 - Ulnar nerve
 - Ulnar artery
 - Palmar cutaneous branch of median nerve
 - Palmar cutaneous branch of ulnar nerve
 - Tendon of flexor carpi ulnaris
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CARPAL TUNNEL SYNDROME

- ◆ Definition
 - Compression of median nerve within carpal tunnel
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◆ Causes

- Repetitive wrist movements
 - Inflammation of flexor tendons
 - Fluid retention (e.g., pregnancy)
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◆ Symptoms

- Paresthesia (tingling)
 - Burning sensation
 - Pain
 - Numbness (lateral 3½ fingers)
 - Worse at night
-

◆ Signs

- Thenar muscle wasting

- Loss of thumb opposition
-

- ◆ Treatment

- Wrist splint
 - Anti-inflammatory drugs
 - Surgical decompression (cut flexor retinaculum)
-

● INSERTION OF FLEXOR TENDONS

- ◆ Flexor Digitorum Superficialis (FDS)

- 📌 Insertion

- Middle phalanx (splits into two slips)

- 📌 Function

- Flexes:
 - Proximal interphalangeal (PIP) joint
-

- ◆ Flexor Digitorum Profundus (FDP)

- 📌 Insertion

- Distal phalanx

- 📌 Function

- Flexes:
 - Distal interphalangeal (DIP) joint
-

- ◆ Important Concept

👉 FDS tendon splits to allow FDP tendon to pass through

👉 Called Camper's chiasm

● QUICK COMPARISON

Tendon	Insertion	Action
FDS	Middle phalanx	Flexes PIP
FDP	Distal phalanx	Flexes DIP

🔥 QUICK REVISION

Carpal Tunnel:

- Median nerve + 9 tendons

Superficial:

- Ulnar nerve + artery + Palmaris longus

CTS:

- Pain + tingling + numbness → Thenar wasting

FDS → PIP flexion

FDP → DIP flexion

FIBROUS FLEXOR SHEATHS

◆ Definition

- Strong fibrous tunnels present on the anterior surface of fingers

- Extend from:
 - Head of metacarpal → distal phalanx
 - Provide a passage for flexor tendons
-

◆ Attachments

Sides:

- Attached to margins of phalanges

Proximal:

- Open

Distal:

- Closed
 - Attached to base of distal phalanx
-

◆ Structure

- Form fibro-osseous tunnel (with bone)
 - Tendons pass within this tunnel
-

Thickness:

- Thick over bones → prevents bowstringing
 - Thin over joints → allows movement
-

◆ Contents

- Flexor digitorum superficialis (FDS) tendon
 - Flexor digitorum profundus (FDP) tendon
 - Covered by synovial sheath
-

SYNOVIAL FLEXOR SHEATHS

◆ Definition

- Synovial covering around flexor tendons
 - Reduces friction during movement
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◆ Important Features

- FDS & FDP tendons share a common synovial sheath
 - This sheath:
 - Continues into little finger (continuous)
 - Forms ulnar bursa
-

◆ Types

1. Ulnar Bursa

- Common sheath for:
 - FDS + FDP tendons
 - Extends into little finger
-

2. Radial Bursa

- Synovial sheath for:
 - Flexor pollicis longus
 - Extends into thumb
-

3. Digital Synovial Sheaths

- Surround tendons in each finger
-

FIBRO-OSSEOUS SHEATH

◆ Components

- Fibrous sheath (outer)
 - Synovial sheath (inner)
-

◆ Function

- Provides smooth gliding of tendons
 - Prevents bowstringing during flexion
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SPECIAL STRUCTURES

- ◆ Vincula (Mesotendon)
 - Small synovial folds
 - Connect tendon to sheath

 Function:

- Carry blood vessels to tendons
-

PULLEYS (ANNULAR & CRUCIATE)

- ◆ Annular Pulleys
 - Strong bands
 - Keep tendons close to bone
-

- ◆ Cruciate Pulleys

- Cross-shaped
 - Allow flexibility
-

POTENTIAL SPACES OF HAND

◆ Spaces:

- Midpalmar space
 - Thenar space
-

Importance:

- Can get infected
 - Infection spreads along synovial sheaths
-

● CLINICAL CORRELATIONS

◆ 1. Trigger Finger

 Cause:

- Thickening/swelling of tendon or sheath

 Mechanism:

- Tendon gets stuck in sheath

 Feature:

 Finger locks during movement

◆ 2. Tenosynovitis

 Definition:

- Inflammation of synovial sheath

 Spread:

- Infection can spread:
 - From ulnar bursa → little finger
 - From radial bursa → thumb
-

◆ 3. Horseshoe Abscess

- Infection spreads between:
 - Radial bursa (thumb)
 - Ulnar bursa (little finger)
-

QUICK REVISION

Fibrous sheath → Strong tunnel

Synovial sheath → Reduces friction

Ulnar bursa → FDS + FDP (little finger)

Radial bursa → FPL (thumb)

Clinical:

- Trigger finger
- Tenosynovitis
- Horseshoe abscess

VINCULA LONGA & BREVA

◆ Definition

- Small vascular synovial folds (mesotendons)

- Connect flexor tendons → anterior surface of phalanges
 - Resemble a mesentery
-

◆ Function

- Carry blood vessels to tendons
 - Maintain nutrition of tendons
-

◆ Types

I. Vincula Brevia (Short)

- Short bands
- Attach near interphalangeal joints
- Connect:
 - Tendon → phalanx (close proximity)

2. Vincula Longa (Long)

- Long, slender bands
- Connect tendon to proximal phalanx

TENOSYNOVITIS OF FLEXOR SHEATHS

◆ Definition

- Infection/inflammation of synovial sheath of flexor tendons

◆ Features

- Sheath becomes distended with pus

- Finger held in semi-flexed position
 - Severe pain on extension
 - Increased pressure → may cause rupture
-

◆ Spread of Infection

- From little & ring fingers → ulnar bursa
 - From thumb → radial bursa
-

● SPACE OF PARONA

◆ Definition

- Potential space in distal forearm
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- ◆ Location

- Between:

- Pronator quadratus (deep)
 - Flexor tendons (superficial)
-

- ◆ Continuity

- Communicates with:

- Carpal tunnel
 - Midpalmar space
-

- ◆ Clinical Importance

- Infection can spread:

- From radial bursa
- From ulnar bursa

- From midpalmar/thenar spaces

👉 Leads to proximal spread of pus

● FASCIAL SPACES OF PALM

- ◆ Main Spaces
 - Midpalmar space
 - Thenar space
-

◆ MIDPALMAR SPACE

📌 Boundaries

- Anterior:
 - Flexor tendons (3rd, 4th, 5th digits)
 - Lumbricals (2nd-4th)
 - Palmar aponeurosis
 - Posterior:
 - Interossei fascia
 - Metacarpals
 - Lateral:
 - Intermediate palmar septum
 - Medial:
 - Medial palmar septum
-

◆ THENAR SPACE

 Boundaries

- Anterior:
 - Thenar muscles
 - Flexor tendons of index finger
 - First lumbrical
 - Palmar aponeurosis
 - Posterior:
 - Adductor pollicis
 - Lateral:
 - Lateral palmar septum
 - Tendon of FPL + radial bursa
 - Medial:
 - Intermediate palmar septum
-

LUMBRICAL CANALS

- ◆ Definition

- Potential spaces around lumbrical tendons
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- ◆ Importance

- Provide pathway for spread of infection
 - Connect to palmar spaces
-

 DORSAL SPACES OF HAND

- ◆ Types

- Dorsal subcutaneous space
 - Dorsal subaponeurotic space
-

- ◆ Clinical

- Infection can accumulate → hand swelling
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 PULP SPACE OF FINGERS

- ◆ Structure

- Contains fat divided by fibrous septa
 - Septa attach:
 - Skin → periosteum of distal phalanx
-

- ◆ Feature

- Closed compartment
-

- ◆ Blood Supply

- End arteries present
-

- ◆ Clinical: FELON 🔥

- 📌 Definition:

- Infection of pulp space
-

- 📌 Features:

- Severe pain
 - Increased pressure
-

- 📌 Complication:

- May compress vessels →
👉 Necrosis of distal phalanx
-

QUICK REVISION

Vincula → Blood supply to tendons

Brevia → Short

Longa → Long

Spaces:

- Midpalmar + Thenar

Infections:

- Tenosynovitis → Pain on extension
- Parona space → Spread to forearm
- Felon → Pulp infection

-> The End <-