MEDICAL EDUCATION RESOURCE

Fascial Spaces of the Hand

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Definition

- **Fascial spaces** are **potential spaces** formed between the **deep fascia, tendons, and muscles** of the palm and dorsum of the hand.
- These spaces allow **free movement of structures** during hand activity but can become **dangerous sites for pus accumulation** in infections.

Importance

- Knowledge of fascial spaces is crucial because **hand infections** can spread rapidly through these compartments, often requiring **early drainage** to prevent functional loss.

Types of Fascial Spaces

1. Pulp Space (Digital Space)

- Found in the **palmar aspect of each finger tip** between skin and bone.

Boundaries:

- **Anterior:** Skin and fibrous septa.
- **Posterior:** Distal phalanx (bone).

Clinical Note:

- **Whitlow (felon):** Infection of pulp space ? severe throbbing pain due to tight septa ? may cause **osteomyelitis** of distal phalanx.

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2. Thenar Space

- Located **beneath the thenar muscles**, on the **lateral side of the mid-palmar septum**.

Boundaries:

- **Anterior:** Flexor tendons and palmar fascia.
- **Posterior:** Adductor pollicis.
- **Medial:** Mid-palmar septum.
- **Lateral:** Thenar muscles.

Contents:

- Tendons of *flexor pollicis longus* and *flexor tendons of index finger* with their synovial sheaths.

Communications:

- Proximally with the **radial bursa** (sheath of FPL).

- May communicate with **space of Parona** in the forearm through the carpal tunnel.

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3. Mid-Palmar Space

- Located **deeper and medial** to the thenar space.
- Largest space of the palm.

Boundaries:

- **Anterior:** Flexor tendons of middle, ring, and little fingers.
- **Posterior:** Interossei and third–fourth metacarpals.
- **Lateral:** Mid-palmar septum.
- **Medial:** Hypothenar muscles.

Contents:

- Portions of flexor tendons of middle, ring, and little fingers with lumbricals.
- Deep palmar vessels and digital nerves.

Communications:

- Proximally with the **space of Parona** (between pronator quadratus and flexor tendons in forearm).
- Distally with **lumbrical canals** toward web spaces.

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4. Hypothenar Space

- Found **beneath hypothenar muscles**, on medial side of palm.

Boundaries:

- **Anterior:** Palmar skin and fascia.
- **Posterior:** Fifth metacarpal and its interosseous muscle.

Contents:

- Hypothenar muscles (abductor, flexor, opponens digiti minimi).

Clinical Note:

- Infections here remain **localized** due to strong fibrous septa.

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5. Dorsal Subaponeurotic Space

- Found on **dorsum of hand** beneath extensor tendons.

Boundaries:

- **Anterior:** Dorsal interossei and metacarpal bones.
- **Posterior:** Deep fascia and extensor tendons.

Communications:

- With **intermetacarpal clefts**, allowing pus to track between fingers.

6. Space of Parona (Forearm Space)

- Potential space in lower forearm, **between flexor tendons and pronator quadratus**.
- Communicates with **thenar and mid-palmar spaces** through the carpal tunnel.

Clinical Note:

- Common site of **extension of palmar infections** (especially from ulnar or radial bursae).

?? Clinical Anatomy of Fascial Spaces

1. Spread of Infection

- Infections can spread through **continuity of synovial sheaths and fascial spaces**:
  - **Thumb infection ? radial bursa ? thenar space ? Parona's space.**
  - **Little finger infection ? ulnar bursa ? mid-palmar space ? Parona's space.**
  - Leads to **hourglass-shaped abscess** across wrist and forearm.

2. Clinical Features of Palmar Abscess

- Severe **pain and swelling** of palm (especially on flexion).
- **Tenderness** along infected compartment.
- **Finger flexion fixed**, dorsal hand appears puffy (due to dorsal spread).

- **Fever** and **loss of grip strength** common.

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3. Surgical Drainage Points

- **Thenar space abscess:** Incision along lateral border of thenar eminence.
- **Mid-palmar space abscess:** Incision along medial palmar crease (avoiding digital nerves).
- **Pulp space abscess:** Longitudinal incision on lateral side of finger.
- **Parona's space abscess:** Drainage via incision above flexor retinaculum.

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4. Diagnostic Differentiation

SITE	MAIN INVOLVED FINGER(S)	COMMON COMMUNICATION
Thenar space	Thumb, index	Radial bursa
Mid-palmar space	Middle, ring, little	Ulnar bursa
Pulp space	Single digit	None
Parona's space	Forearm extension	Thenar & mid-palmar spaces

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5. Radiological & Surgical Relevance

- MRI/ultrasound used to localize deep palmar abscesses.
- Early **fasciotomy and drainage** essential to preserve hand function.

- Delay ? fibrosis ? loss of **fine movements and contractures**.