

BONES & JOINTS OF HAND

BONES OF HAND

- ◆ Total Bones = 27
 - Carpal bones = 8
 - Metacarpals = 5
 - Phalanges = 14
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CARPAL BONES

- ◆ Arrangement

- 8 bones arranged in 2 rows

- 📌 Proximal row (Lateral → Medial)

- 👉 Scaphoid - Lunate - Triquetrum - Pisiform

- 📌 Distal row (Lateral → Medial)

- 👉 Trapezium - Trapezoid - Capitate - Hamate

- 💡 Mnemonic: You saw a beautiful cat

- 👉 "She Looks Too Pretty, Try To Catch Her"

- ◆ General Features

- Each carpal bone has 6 surfaces

- Mostly articular surfaces (covered with hyaline cartilage)

Non-articular surfaces:

- Lateral surfaces of scaphoid & trapezium
 - Medial surfaces of triquetrum, lunate, pisiform
 - Palmar surfaces → mostly non-articular
 - Dorsal surfaces → mostly non-articular
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INDIVIDUAL CARPAL BONES

◆ SCAPHOID

- Boat-shaped
- Has tubercle (attachment of flexor retinaculum)
- Articulates with radius → important in wrist joint

 Clinical:

👉 Most commonly fractured carpal bone

◆ LUNATE

- Crescent/half-moon shaped
- Central bone of proximal row

💡 Clinical:

👉 Most commonly dislocated carpal bone (anterior dislocation)

◆ TRIQUETRUM

- Pyramidal shape
 - Has facet for pisiform
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◆ PISIFORM

- Pea-shaped sesamoid bone
- Lies in tendon of flexor carpi ulnaris

Attachments:

- Flexor retinaculum
- Abductor digiti minimi



Clinical:

👉 Related to ulnar nerve (groove on lateral side)

◆ TRAPEZIUM

- Quadrangular
- Has groove for flexor carpi radialis tendon

Important:

- Distal surface = saddle-shaped (sellar)

👉 Forms thumb CMC joint

◆ TRAPEZOID

- Smallest bone of distal row
 - Shoe-shaped
-

◆ CAPITATE

- Largest carpal bone
 - Has rounded head
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◆ HAMATE

- Wedge-shaped
- Has hook (hamulus)

Attachments:

- Flexor retinaculum
 - Hypothenar muscles
-

FLEXOR RETINACULUM

◆ Definition

- Thick fibrous band over anterior wrist
 - Converts carpal groove → carpal tunnel
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◆ Attachments

Lateral:

- Scaphoid
- Trapezium

Medial:

- Pisiform
- Hook of hamate

◆ Contents (Carpal Tunnel)

- Median nerve
- Flexor tendons (FDS, FDP, FPL)

 GUYON'S CANAL 

◆ Definition

- Fibro-osseous tunnel at wrist
 - Extends from pisiform → hook of hamate (~4 cm)
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◆ Contents

- Ulnar nerve
 - Ulnar artery
-

💡 Clinical:

👉 Guyon's canal syndrome = ulnar nerve compression →
Sensory loss + weakness of intrinsic hand muscles

● METACARPALS

◆ Number = 5

- Each has:
- Base (proximal)
- Shaft
- Head (distal)

◆ Key Features

- Head forms knuckles
- 1st metacarpal → most mobile (thumb)

 PHALANGES

- ◆ Number = 14
 - Each finger: 3 phalanges
 - Proximal
 - Middle
 - Distal
 - Thumb: 2 phalanges only
-

JOINTS OF HAND

- ◆ 1. Radiocarpal Joint (Wrist)
- Type: Condyloid synovial
- Movements:
- Flexion
- Extension

- Abduction
 - Adduction
-

◆ 2. Intercarpal Joints

- Between carpal bones
 - Type: Plane synovial
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◆ 3. Carpometacarpal (CMC) Joints

◆ Thumb CMC:

- Type: Saddle joint ★
- Movement:
- Flexion/Extension
- Abduction/Adduction
- Opposition

- ◆ 4. Metacarpophalangeal (MCP) Joints

- Type: Condylloid
- Movements:
- Flexion/Extension
- Abduction/Adduction

- ◆ 5. Interphalangeal (IP) Joints

- Type: Hinge joint
- Movement:
- Flexion/Extension only

 CLINICAL CORRELATIONS 

◆ Scaphoid Fracture ★

- Most common carpal fracture

- Types:

1. Distal

2. Waist (most common)

3. Proximal



Important:

- 👉 Risk of avascular necrosis (AVN) (retrograde blood supply)

◆ Lunate Dislocation

- Usually anterior dislocation

- Can compress median nerve

◆ Carpal Tunnel Syndrome

- Compression of median nerve
 - Causes:
 - Pain
 - Numbness
 - Tingling
-

◆ Guyon's Canal Syndrome

- Compression of ulnar nerve
 - Affects:
 - Hypothenar muscles
 - Interossei
-



QUICK RECALL:

- Carpals:
 - Proximal: S L T P
 - Distal: T T C H
 - Most fractured → Scaphoid
 - Most dislocated → Lunate
 - Thumb joint → Saddle
 - Carpal tunnel → Median nerve
 - Guyon canal → Ulnar nerve
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METACARPALS

◆ General Features

- 5 miniature long bones
 - Numbered 1 → 5 (lateral → medial)
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- ◆ Parts of Each Metacarpal

-  1. Base (Proximal)

- Irregularly expanded
 - Articulates with carpal bones
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-  2. Shaft (Body)

- Concave palmar surface
 - Dorsal surface:
 - Flat
 - Triangular area distally
-

3. Head (Distal)

- Rounded
 - Forms knuckles
 - Articulates with proximal phalanges
-

◆ Special Feature of 1st Metacarpal

- Shortest & stoutest
- Has convexo-concave articular surface → Articulates with trapezium

 Important:

 Allows wide range of thumb movements (opposition)

 PHALANGES 

- ◆ Number

- Total = 14 per hand
- Each finger → 3 phalanges
- Proximal
- Middle
- Distal
- Thumb → 2 phalanges only
- ! (No middle phalanx)

- ◆ Parts of Phalanges

-  Base

- Concave articular facet


Shaft

- Tapers distally
-

Head

- Pulley-shaped articular surface
-

Distal Phalanx Special Feature

- Terminal tuberosity:
 -  Horse-shoe shaped
 - Supports fingertip pulp & nail
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SESAMOID BONES OF HAND

◆ Definition

- Small rounded bones within tendons
 - Develop at sites of pressure & friction
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◆ Examples

- Pisiform → in tendon of flexor carpi ulnaris
 - 1st metacarpal → usually 2 sesamoid bones
 - Thumb IP joint → 1 sesamoid
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● JOINTS OF HAND

◆ Classification

- Intercarpal joints
 - Carpometacarpal (CMC) joints
 - Intermetacarpal joints
 - Metacarpophalangeal (MCP) joints
 - Interphalangeal (IP) joints
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INTERCARPAL JOINTS

- ◆ Type
 - Synovial plane joints
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- ◆ Features

- Between carpal bones
 - Capsule surrounds joints
 - Synovial membrane lines cavity
-

- ◆ Ligaments

- Anterior
 - Posterior
 - Interosseous
-

- ◆ Nerve Supply

- Deep branch of radial nerve
 - Deep branch of ulnar nerve
 - Anterior interosseous nerve
-

- ◆ Movement
 - Gliding movements
-

CARPOMETACARPAL (CMC) JOINTS

- ◆ General
 - Synovial joints
 - Reinforced by ligaments:
 - Anterior
 - Posterior
 - Interosseous
-

- ◆ 1st CMC Joint (Thumb) 

- Between trapezium & 1st metacarpal
 - Type → Saddle joint
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- ◆ Movements of Thumb

- Flexion → flexor pollicis brevis
 - Extension → extensor pollicis longus & brevis
 - Abduction → abductor pollicis longus & brevis
 - Adduction → adductor pollicis
 - Opposition → opponens pollicis ★
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METACARPOPHALANGEAL (MCP) JOINTS

- ◆ Type

- Synovial condyloid joints
-

- ◆ Movements

- Flexion
 - Extension
 - Abduction
 - Adduction
-

- ◆ Ligaments

- 📌 Palmar ligaments (Volar plates) ★

- Strong fibrocartilage
 - Prevent hyperextension
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Deep transverse metacarpal ligament

- Connects heads of 2nd-5th metacarpals
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Collateral ligaments

- Strong, cord-like
 - Stabilize joint
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◆ Muscles Acting

- Flexion:
 - Lumbricals
 - Interossei
 - Flexor digitorum superficialis & profundus
- Extension:
 - Extensor digitorum

- Extensor indicis
 - Extensor digiti minimi
 - Abduction:
 - Dorsal interossei
 - Adduction:
 - Palmar interossei
-

INTERPHALANGEAL (IP) JOINTS

- ◆ Type
 - Hinge joint
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- ◆ Movement

- Only flexion & extension
-

- ◆ Special Feature

- Palmar plates:
 - Smooth surface
 - Allow tendon gliding
-

CLINICAL CORRELATIONS

- ◆ Osteoarthritis of Hand

- Degeneration of cartilage
- Leads to:
- Pain

- Stiffness
 - Joint deformity
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◆ Bennett's Fracture ★

- Fracture at base of 1st metacarpal
- Involves CMC joint

💡 Important:

👉 Causes instability of thumb

◆ Buddy Splint

- Injured finger tied to adjacent finger
 - Provides support & alignment
-

FINAL EXAM BOOSTER

MUST REMEMBER:

- ✓ 1st metacarpal = most mobile
 - ✓ Thumb = saddle joint
 - ✓ MCP = condyloid
 - ✓ IP = hinge
 - ✓ Palmar plates prevent hyperextension
 - ✓ Bennett's fracture = base of thumb
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QUICK RECALL:

- Metacarpals → 5 long bones
- Phalanges → 14 (3 each, thumb 2)

- Joints:

- CMC → Saddle (thumb)
- MCP → Condyloid
- IP → Hinge

- Special:

- Scaphoid → fracture
- Lunate → dislocation
- Bennett → thumb fracture

-> The End <-