ULNAR NERVE PALSY & Mx.

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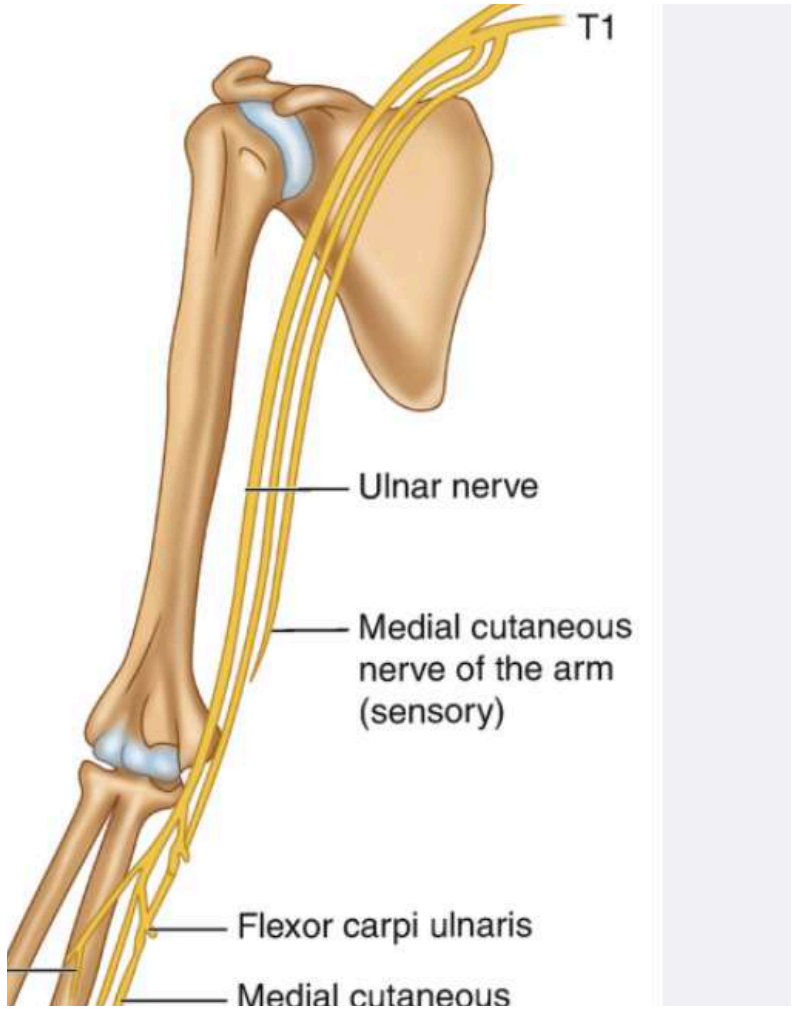
Anatomy:-

- Root value: (C7) C8 T1
- Medial cord of brachial plexus
- Musicians nerve
- Fine motor movements of hand

Plane between the **axillary artery** (lateral) and the axillary vein (medial).

It proceeds down the medial aspect of the arm with the brachial artery located lateral.

In the forearm, the ulnar nerve pierces the two heads of the **FCU.**

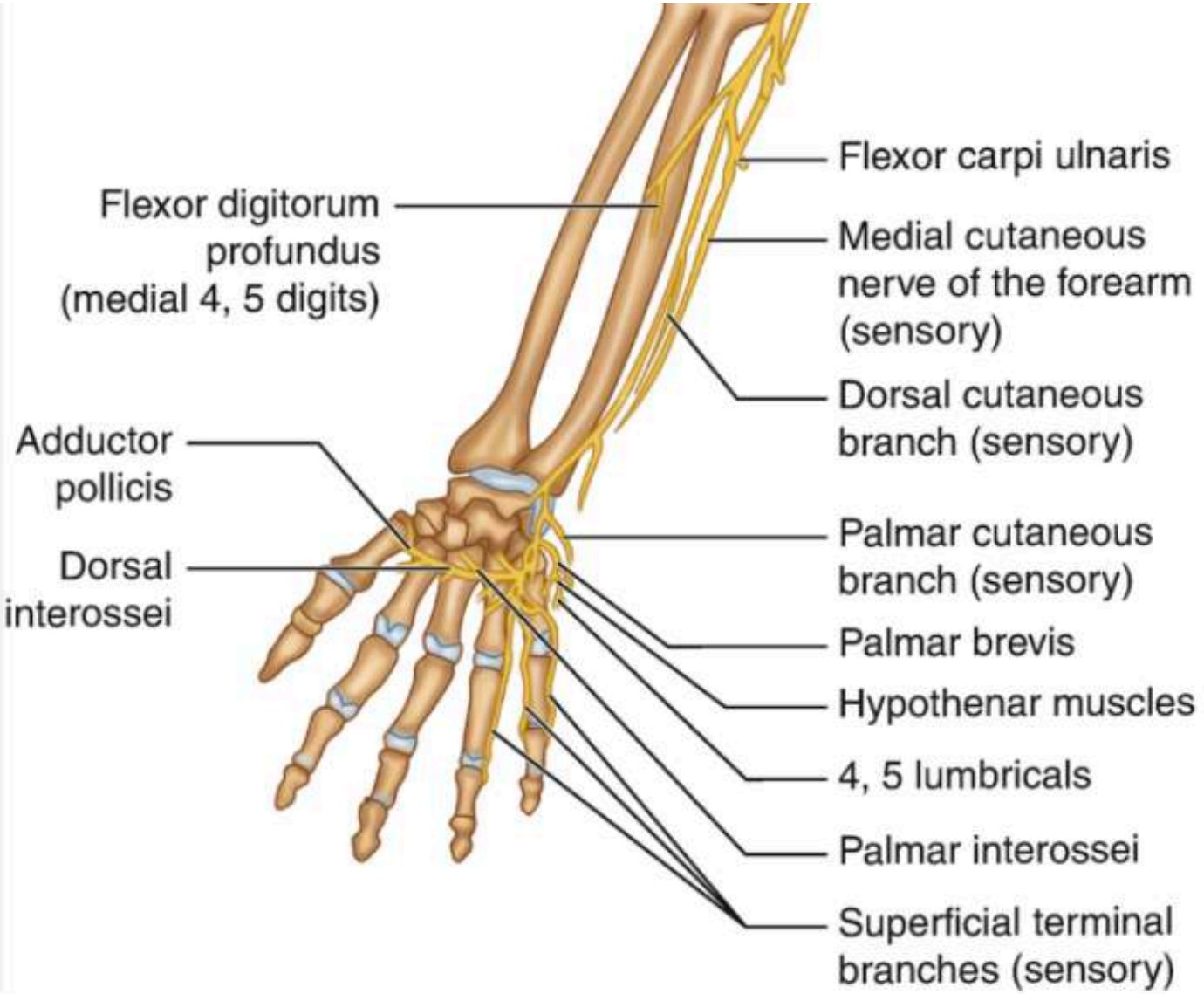


Three main branches arise in the forearm:

Muscular branch – innervates two muscles in the anterior compartment of the forearm.

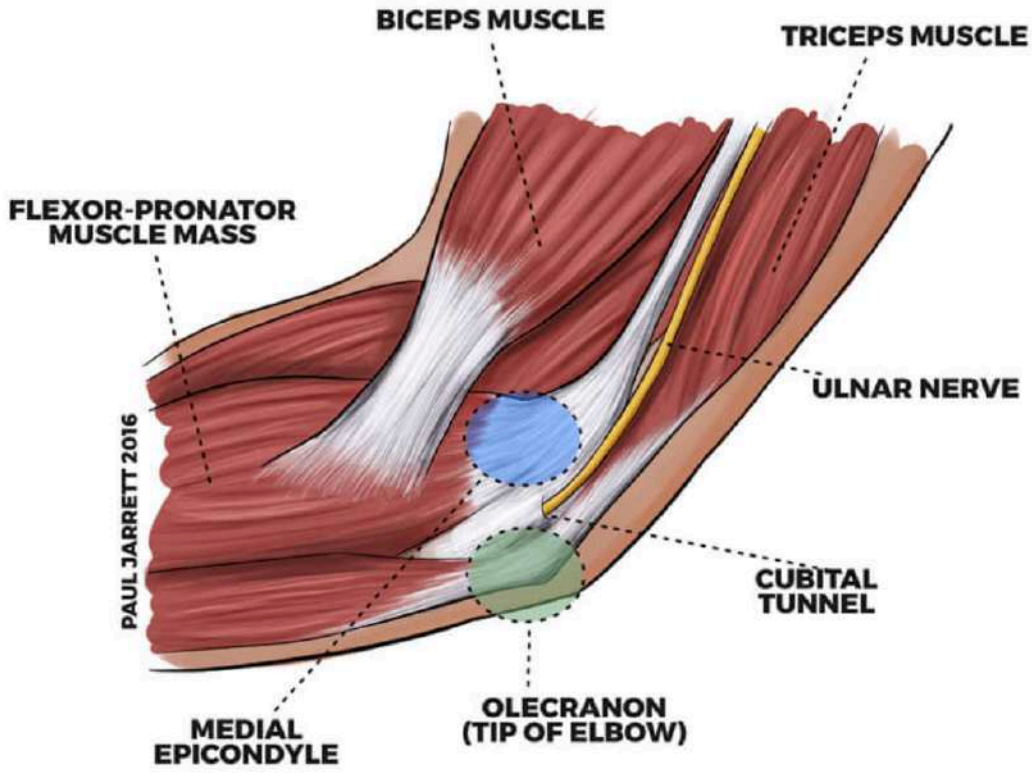
Palmar cutaneous branch – innervates the medial half of the palm.

Dorsal cutaneous branch – innervates the dorsal surface of the medial one and a half fingers, and the associated dorsal hand area.



- Cubital tunnel:

At the mid-point of the arm, the ulnar nerve penetrates the medial fascial septum to enter the posterior compartment of the arm. It passes posterior to the elbow through the **ulnar tunnel** (small space between the medial epicondyle and olecranon). Here, it also gives arise to an articular branch which supplies the elbow joint.



WRIST:

Superficial to the **flexor retinaculum**, and is medial to the ulnar artery

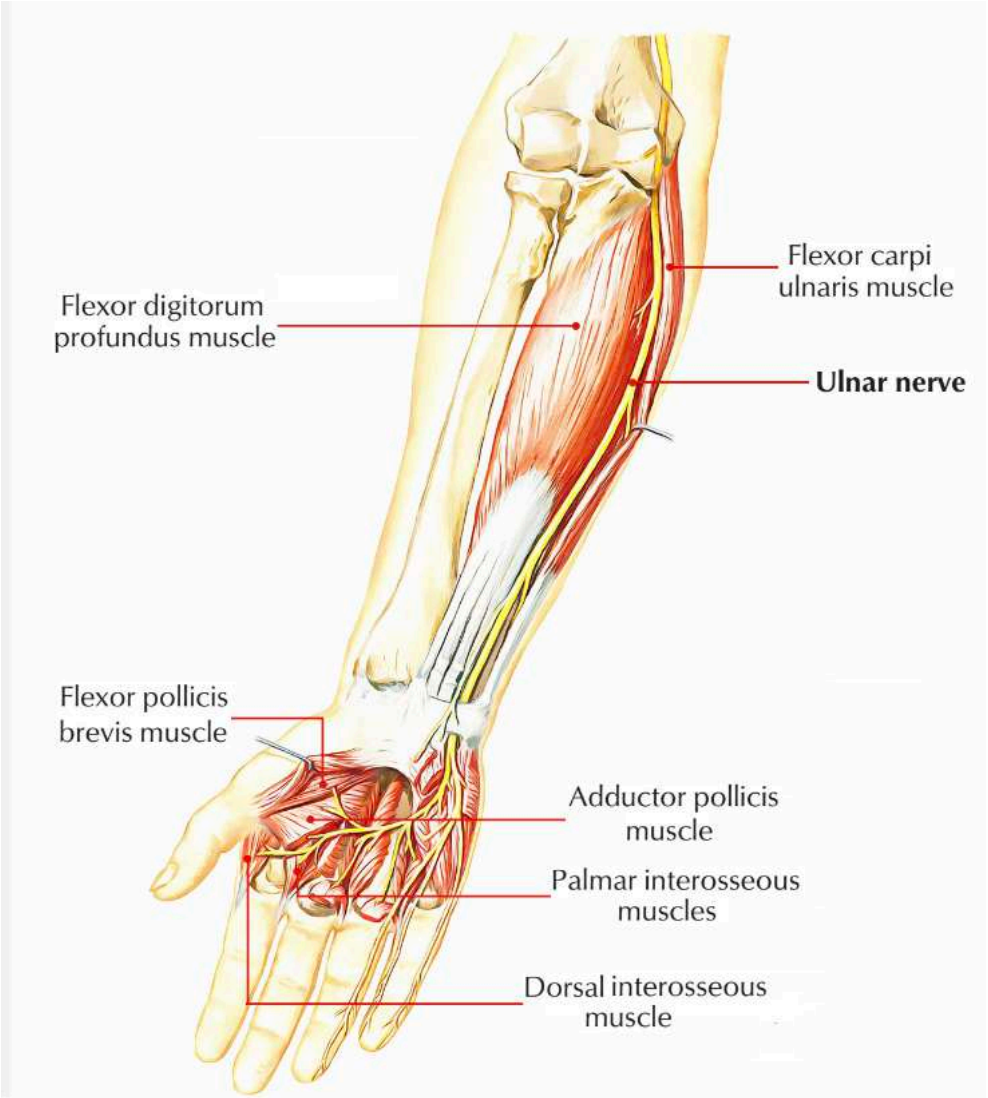
Enters hand via Guyons canal: terminates by giving rise to superficial and deep branches.

HAND:

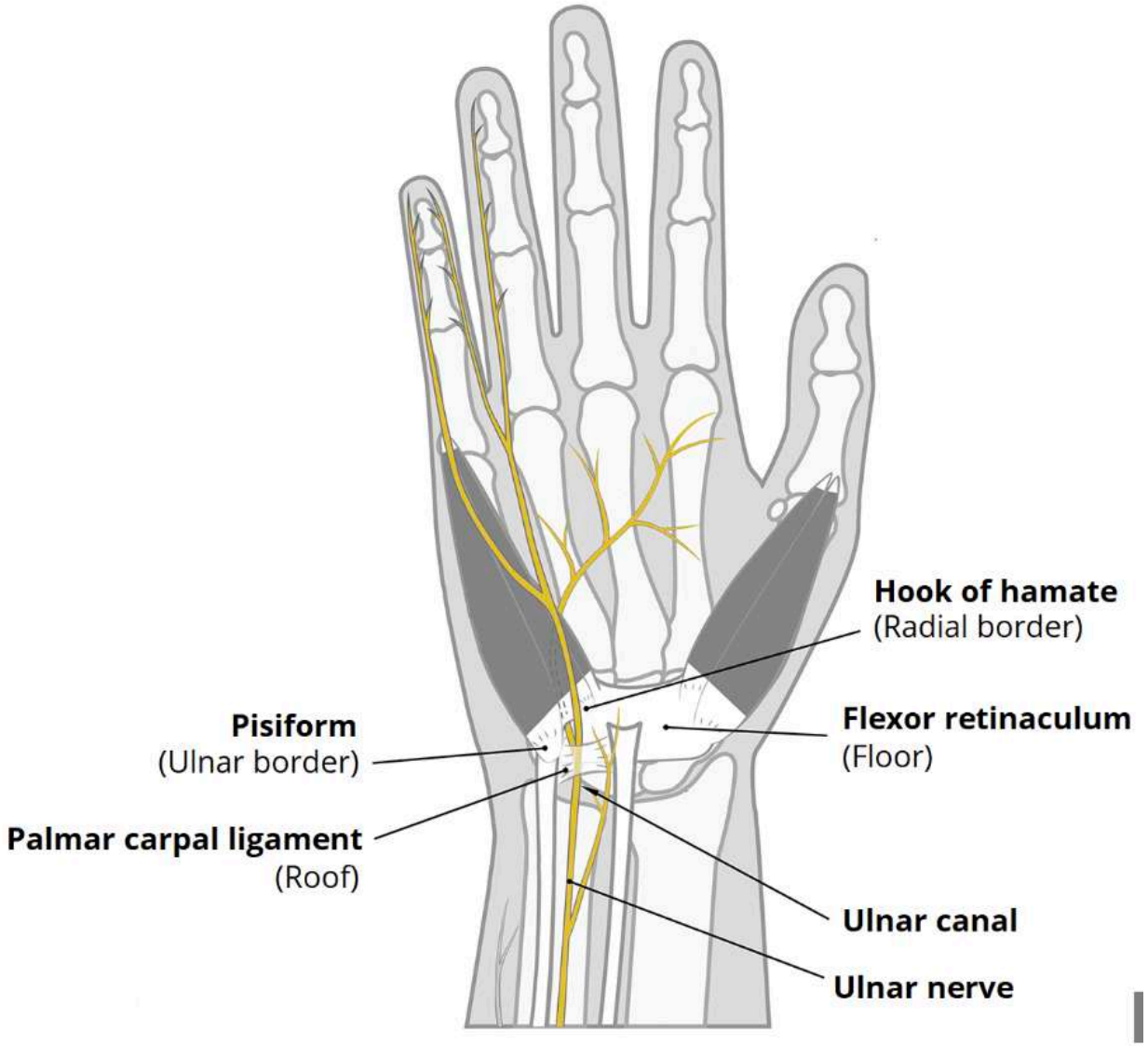
The majority of the intrinsic hand muscles are innervated by the **deep branch** of the ulnar nerve:

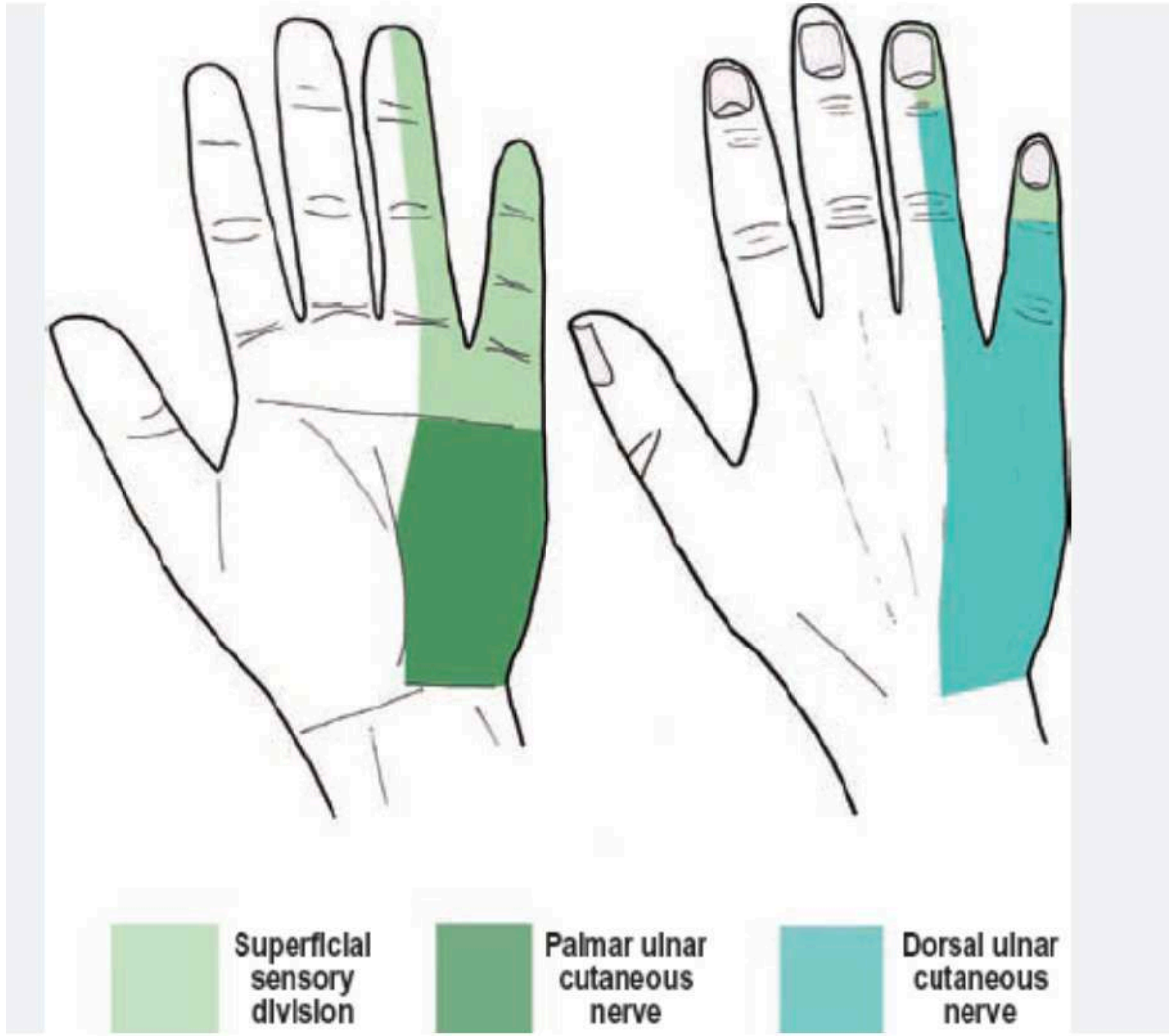
- Hypothenar muscles (FDM, AbDM, ODM)
- Medial two lumbricals
- Adductor pollicis, FPB deel head
- 3PAD + 4DAB

The **palmaris brevis** is an exception :superficial branch of the ulnar nerve.



- Guyon’s canal:





Etiology:

- Trauma
- Inflammatory
- Leprosy
- Occupational
- Cubital tunnel syndrome
- Guyons canal
- Tumors

Clinical signs

- To diagnose ulnar nerve palsy/ injury
- Differentiate from median nerve palsy
- Differentiate from high and low ulnar nerve palsy
- Signs: Name , description, etiology
- Journal of hand surgery, 2014**

- Andre- Thomas :

  - Wrist flexion with attempted IP extension

  - Use of tenodesis effect to compensate for loss of lumbrical function
    Weakness of intrinsics / lumbricals

Duchenne claw sign:

- Attempted extension of all fingers - Hyperextension of MP and flexion of IP of ring and little fingers

- Extrinsic extensors overactive at MP joint
- due to intrinsic extensor palsy (lumbricals)

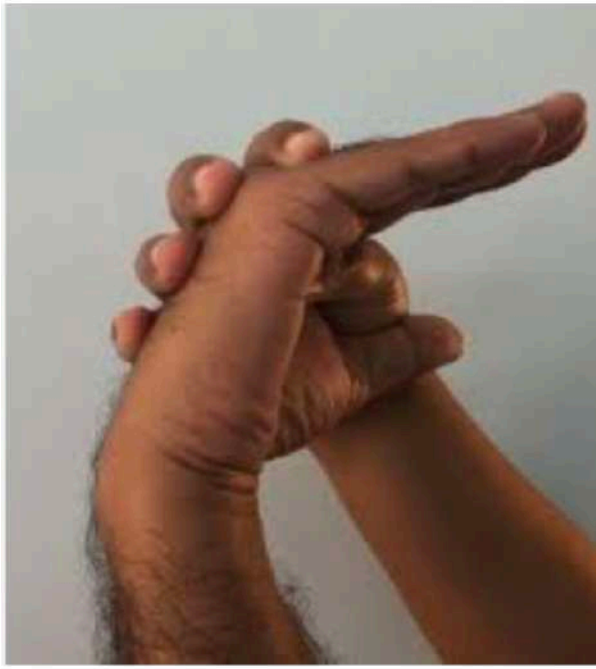
- Ulnar claw

Bouvier sign:

- Differential passive positioning of the MP joints

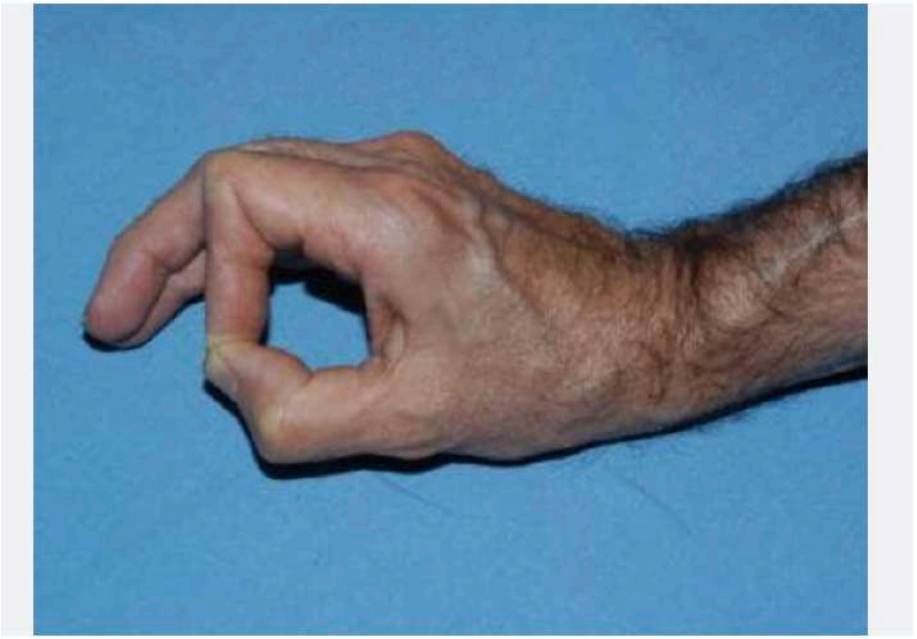
- Passive MP hyperextension - unable to extend IP joints
  - Loss of action of the intrinsic extensors/ lumbricals
  - Intrinsic tightness

- Passive MP flexion - able to extend IP joints
  - Action compensated by the extrinsic extensors (radial nerve
  - Can help to choose procedure for claw correction
  - Reveals no joint contracture



Bunnel sign:

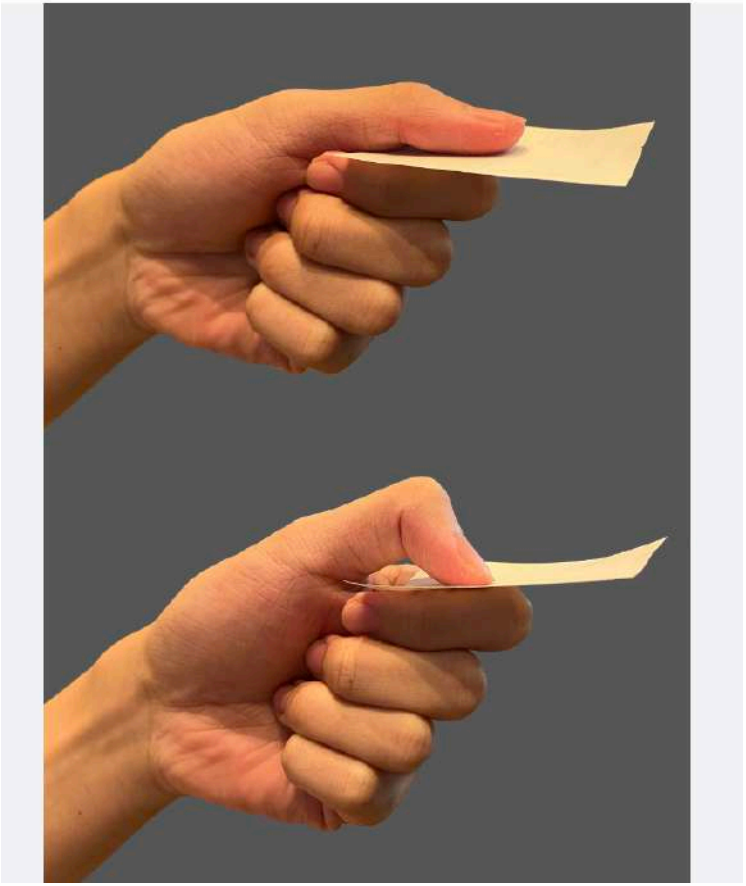
- Inability of thumb to pinch index to make an “O”
- Loss of action of ADDUCTOR pollicis and deep head of FPB
- Action taken over by FPL for pinch.



Froment sign:

- Hyperflexion of the thumb IP on attempted
- key pinch

- Flexor pollicis longus compensates for the
- lack of action of adductor pollicis and the
- first dorsal interossei needed for pinch.



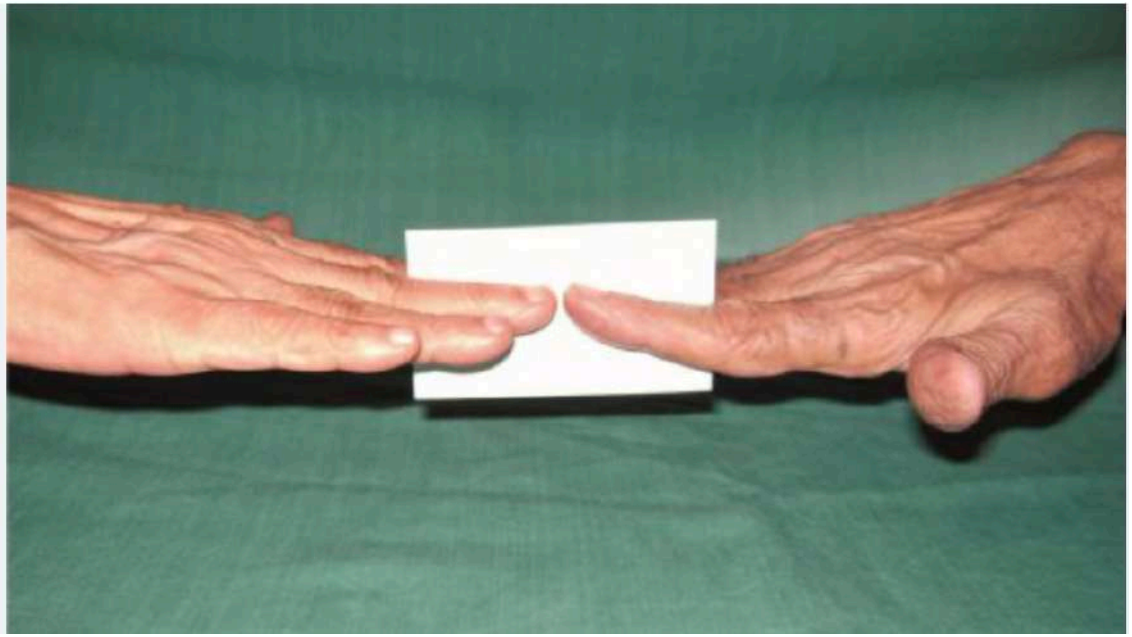
Earle - Vlastou:

- Inability of to cross the middle finger over the index finger.
- Weakness of interossei preventing adduction and abduction

EGAWA test:

- Inability to abduct or adduct the middle finger with MP in flexion.
- Weakness of interossei

Card test



Pitres - testut

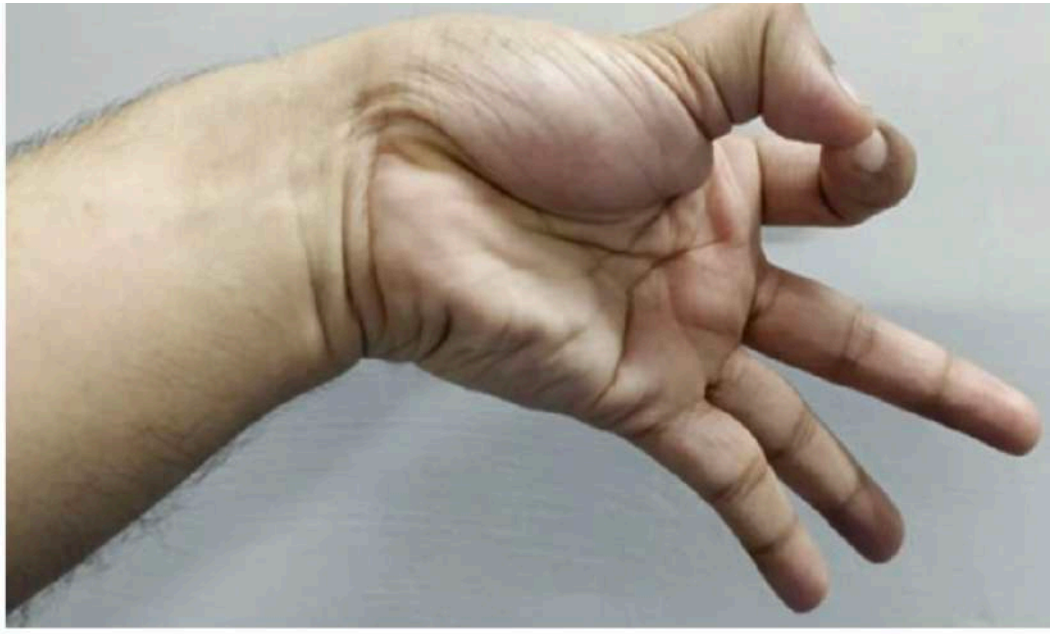
- Inability to abduct the middle finger radially or ulnarly when keeping it flat on a table surface
- Decrease in the transverse diameter of the hand
- Inability to extend tips of all fingers to make a cone

- Weakened dorsal interossei
- Weakened intrinsics
- Weakened palmar interossei

Jeanne sign:

- Thumb MP hyperextension with attempted tip pinch

- Lack of function of adductor pollicis and weakness of MP joint volar plate and joint capsule in chronic palsy



Masse sign

- Flattening of the transverse metacarpal arch and loss of bulk of hypothenar region leading to the inability to cup water in hand

- Weakness of the interossei and hypothenar muscles.

Mumenthaler sign:

- Loss of dimple on the hypothenar region on attempted little finger abduction

- Due to loss of action of hypothenar and palmaris brevis.

Pollock sign:

- Inability to flex the ring and little finger DIP

- Loss of action of those FDP

Sunderland sign:

- Inability to rotate, supinate and oppose the little finger to the thumb
- Loss of action of FDM, OPDM and AbDM

Wartenberg sign

- Inability to adduct the abducted little finger

- Overaction of the extensor digiti minimi which inserts on the ulnar border of the base of PPx
- Palsy of the 3rd volar interossei

Inverted pyramid sign

- Inverted triangular pyramid is hollow in thenar eminence.

- Wasting of the transverse head
- of the adductor pollicis
- Chronic cases

Confrontation sign:

- When a patient holds her/his palms with abducted fingers

and forcefully opposes the abducted little fingers , the fingers with palsy get pushed leading to asymmetry.

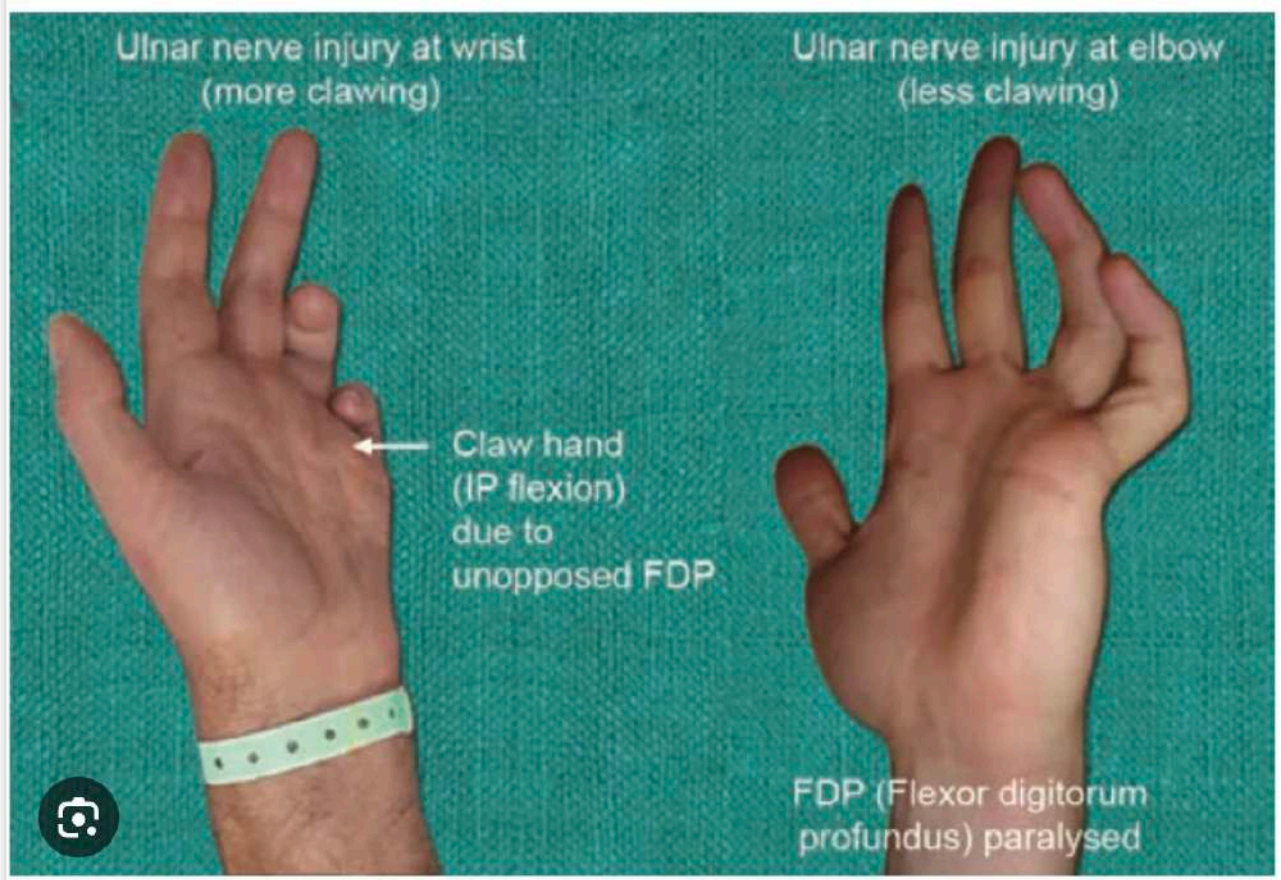
* YOUTUBE Ulnar nerve palsy signs - Dr.PS

- ULNAR PARADOX ?

- Proximal lesions lead to less severity of the claw

As FDP also get affected and leads to less flexion of the IP of ring and little fingers

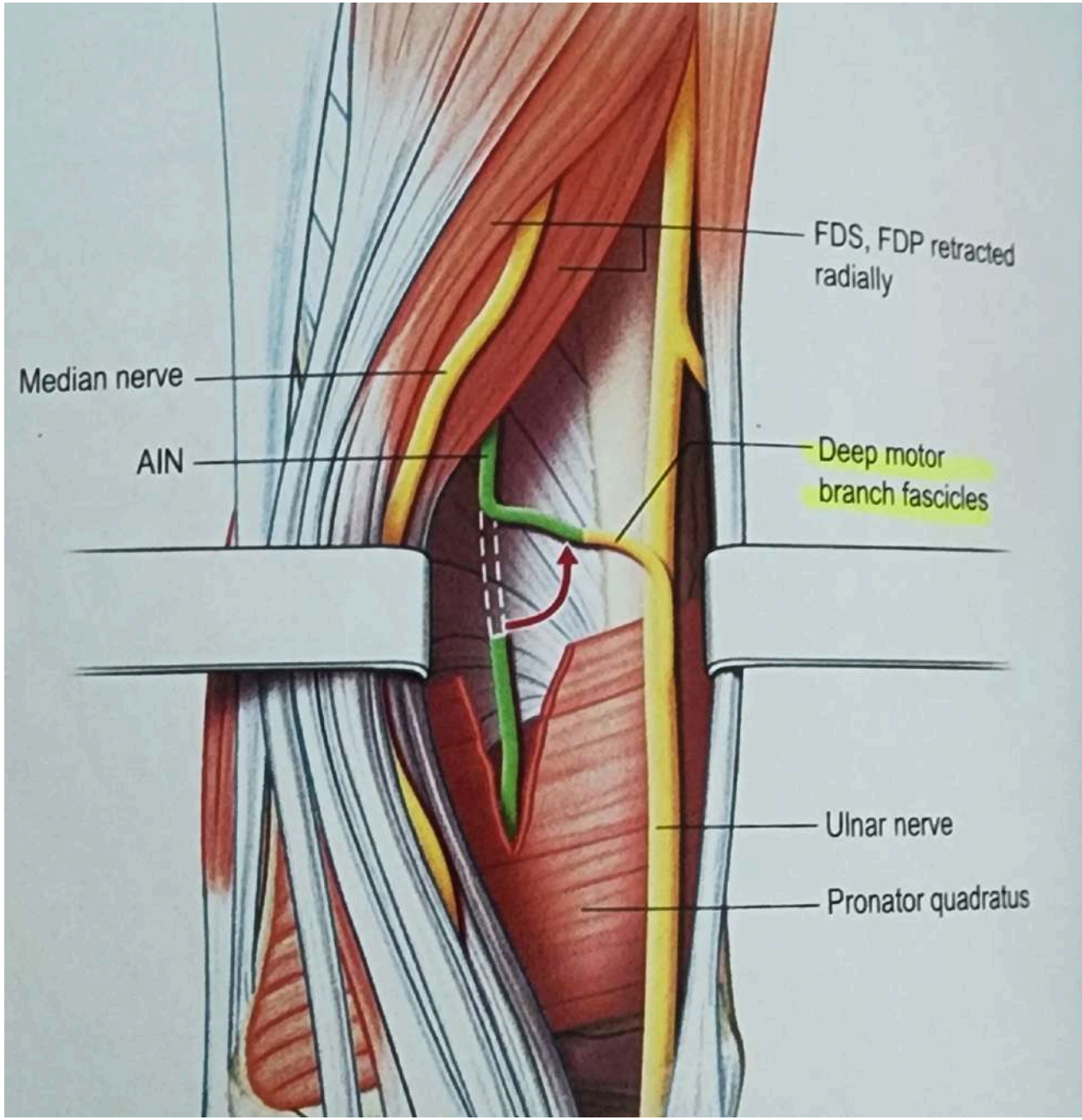
*High ulnar nerve palsy leads to less severe claw as opposed to low ulnar nerve palsy.



Nerve transfers:

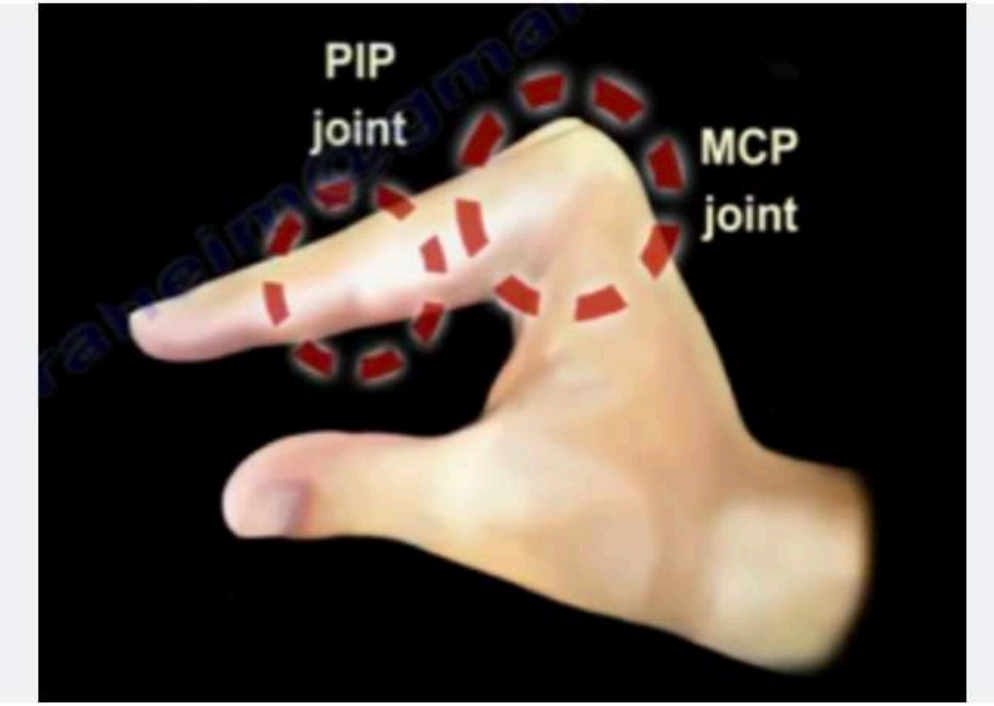
- Basic principles of nerve repair *

- Motor: AIN to deep motor branch of ulnar nerve at forearm level
- Aims to restore intrinsic function



Intrinsic plus position:

- MP in flexion and IP in extension
- Contracture due to spasm of intrinsics
- Position for splinting as it keeps
- collateral ligaments relaxed



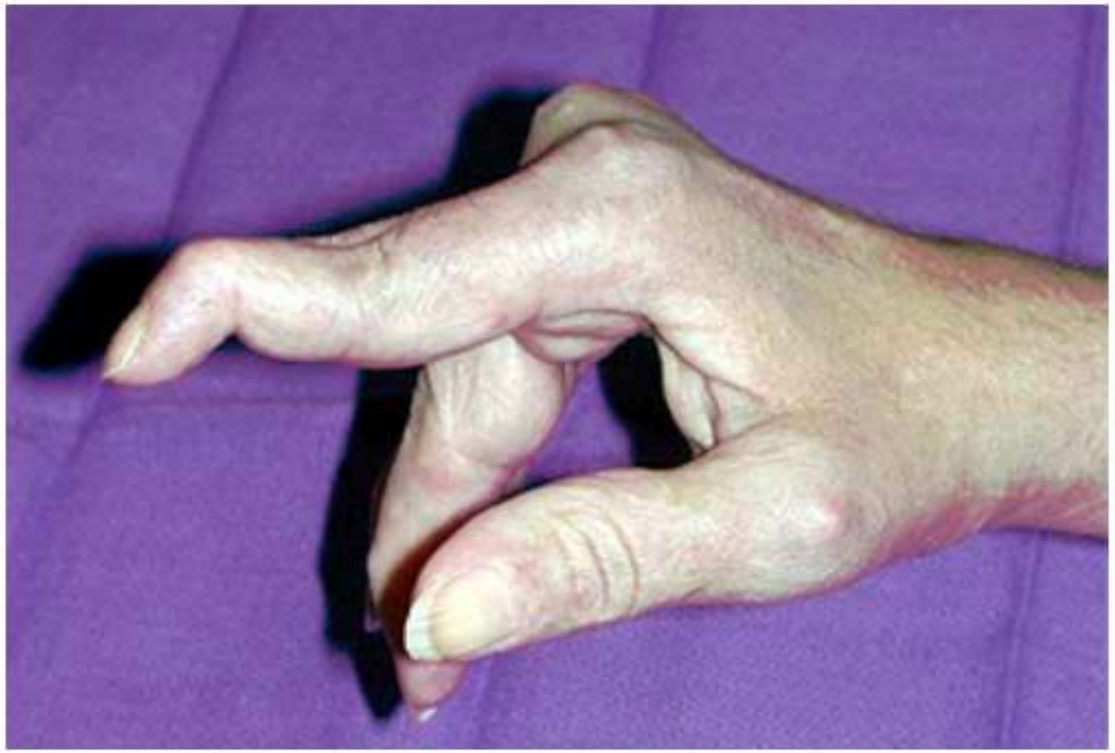
- Intrinsic minus deformity:

- MP hyperextension, PIP and DIP flexion
- Strong extrinsic and weak intrinsics.

- Ulnar, median nerve palsy
- Volkmans
- Leprosy

- Swan neck deformity:

- Hyperextension at PIP and flexion at DIP
- Volar plate laxity
- Imbalance between extensors and flexors at PIP
- Injury to extensors
- Mallet, Rheumatoid



Boutonniere deformity:

- Flexion at PIP and hyperextension at DIP
- Rupture of central slip
- Volar migration of lateral bands

- Rheumatoid
- Injury

Sensory transfer:

- Topography of ulnar nerve:
- SMS : sensory - motor - sensory , medial to lateral

- 3rd webspace fascicle of median nerve end to end to main sensory component of the ulnar nerve
- End to side of dorsal cutaneous br. to sensory component of median nerve
- Release of guyons canal and carpal tunnel*

Tendon transfers

Function to be Restored	Preferred Tendon Transfer
Clawing of the ring and small fingers	2 slips of the ring finger or long finger FDS to the radial lateral bands; proximal phalanges; or A1 or A2 pulleys of the ring and small fingers
Clawing of all 4 fingers	EF4T or PL4T transfers to the radial lateral bands of the long, ring, and small fingers and the ulnar lateral band of the index finger; or to the combined interosseous tendon insertions
Thumb adduction	ECRB + tendon graft to adductor pollicis
Index finger abduction	Accessory APL to first dorsal interosseous
Severe thumb MCP joint hyperextension	MCP joint arthrodesis
Fixed thumb IP joint flexion contracture	IP joint arthrodesis
Weak DIP joint flexion ring and small fingers	Side-to-side tenorrhaphy of the ring and small finger FDP tendons to the long finger FDP tendon

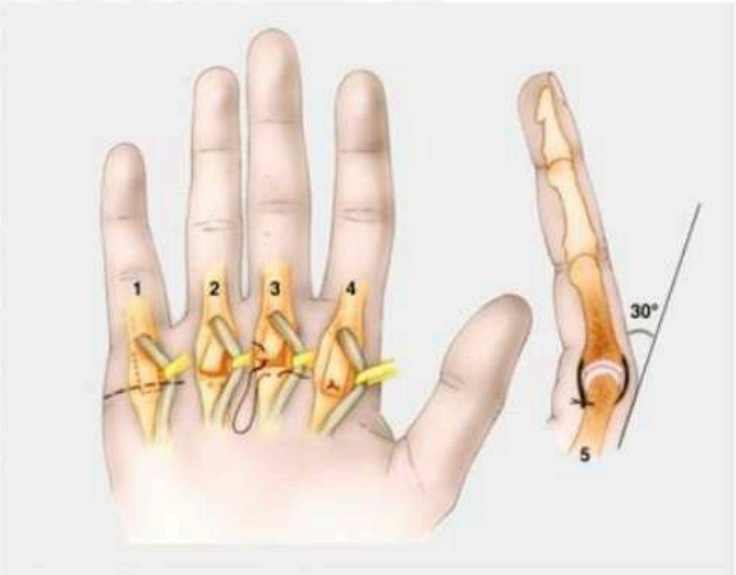
Claw correction/ Intrinsic function:

- Static - dynamic ?
- Bouviers manoeuvre

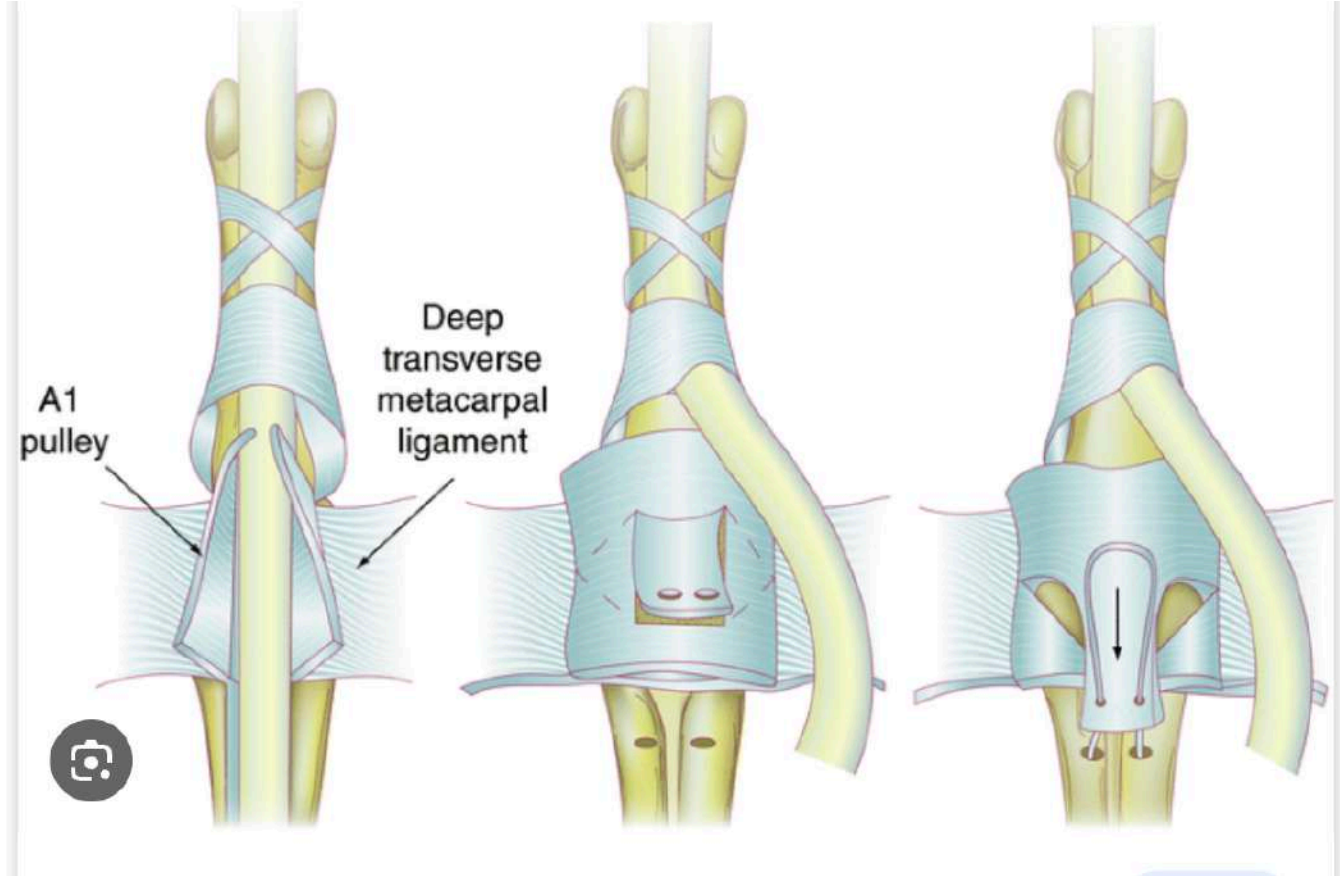
- STATIC: for correction of MP hyperextension
- Zancolli capsulodesis
- Omer modification
- Tenodesis: Parkes, Omer, Fowler, Riordan

Zancolli capsulodesis

- For moderate deformities.
- A1 pulley cut.
- U flap in volar plate sutured proximally to flex MCPJ 30 degrees.



- Omer capsulodesis:



- Parkes Tenodesis:

- Tendon grafts sutured to TCL

- Passed volar to the deep transverse inter Metacarpal ligament

- Sutured to the radial lateral band of each finger.

- Fowler - sutured tendon grafts to extensor retinaculum

- Riordan used distally based strips of ECRL and ECU.

** Mimic action of lumbricals.

Tendon transfer:

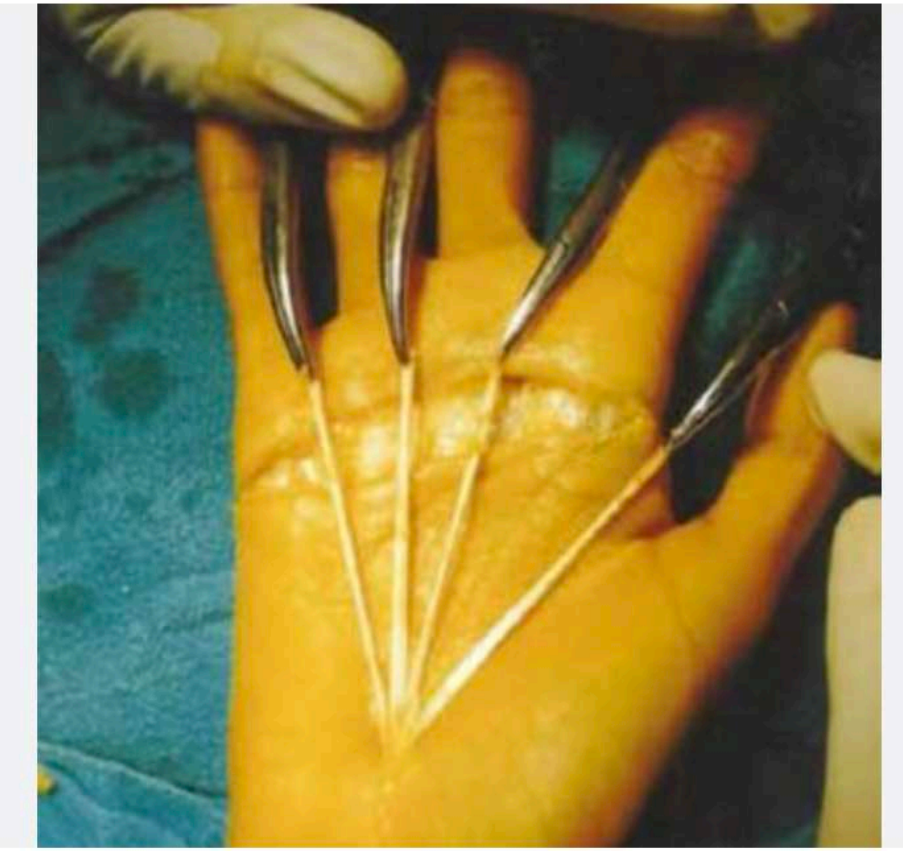
- Dispensable tendon
- Harvest site
- Route of transfer
- Pulley
- Line of pull
- Insertion
- Angle
- Immobilisation

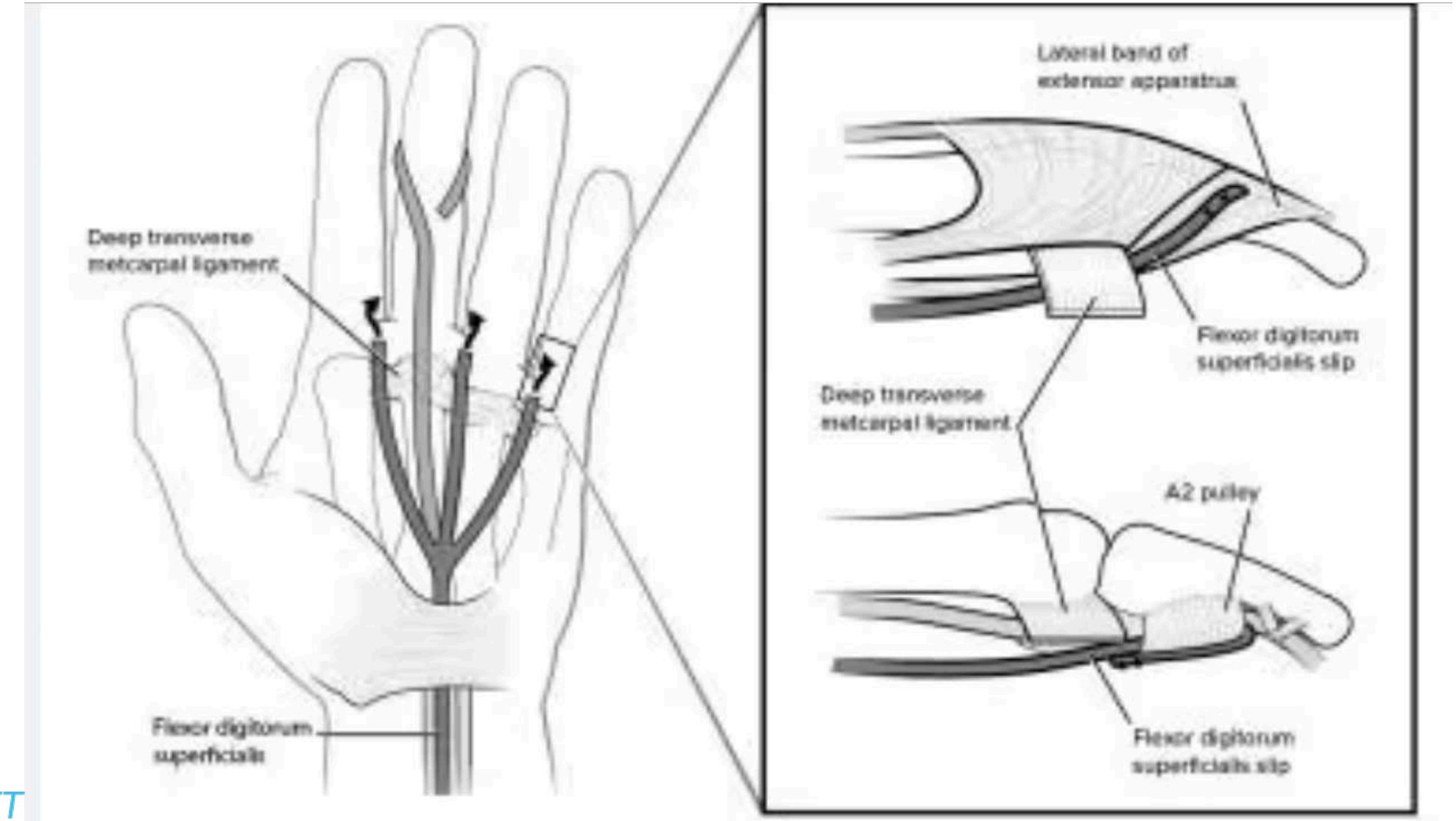
Claw correction

- MODIFIED STILES - BUNNELL: (Littler modification)
- Isolated low ulnar nerve palsy
- Ring finger FDS
- Divided proximal to PIP joint via crease incision
- Divided into 2 slips
- Inserted at radial lateral bands - ring, little finger
- Lumbrical canals
- Wrist neutral, MP 45-55 flexion, IP full extension for suturing
- Tenodesis for assessment
- Wrist slight flexion, MP 70 flexion, dorsal block splint
- 3 to 4 weeks - INTRINSIC PLUS POSITION

Zancolli Lasso:

- Low ulnar palsy
- FDS ring and small fingers
- Divide distal to A1 pulley
- Withdraw proximally
- Loop around A1 pulley
- Suture onto self



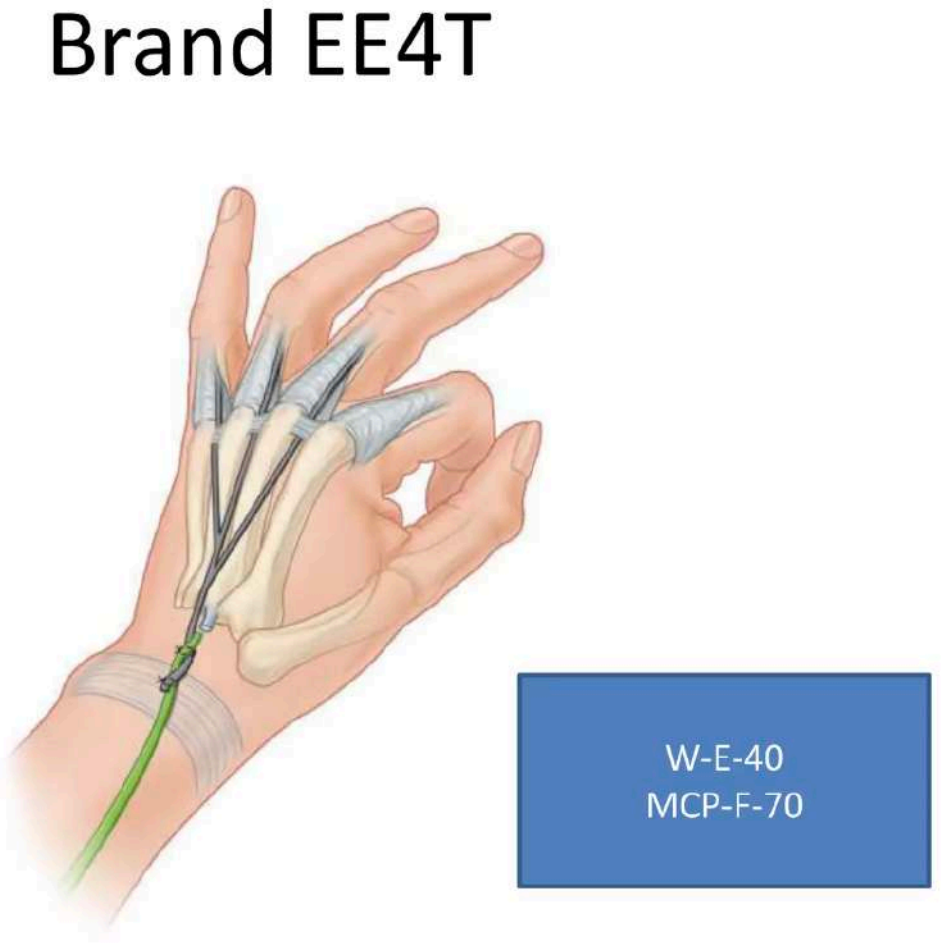


- High ulnar nerve palsy:
- FDS of middle finger

- Disadvantages:
- FDS ring not expendable in high ulnar or combined palsy
- Can cause overcorrection of claw and swan neck
- Can cause PIP flexion contracture at donor finger.

BRAND EE4T

- ECRB
- 3 to 4 tabled tendon graft
- Passed dorsal to solar
- Intermetacarpal spaces
- Lumbrical canals
- Radial lateral bands middle, ring and little
- Ulnar lateral band index



- EE4T: Extensor tendon, Extensor route, 4 Tail.

BRAND EF4T:

- ECRL via tendon graft
- ECRL brought proximally
- Carpal tunnel route
- Same insertions
- EF4T: Extensor tendon, Flexor route, 4 Tail

Fritschi PF4T:

- Modification
- Palmaris longus used as donor
- Disadv: Weak donor

- Palande:
- “ Direct interossei activation”
- ECRL +/- Palmaris longus via tendon grafts
- Modified : FDS ring finger 5 slips

- 1st slip - around 1st dorsal interosseous
- 2nd - 1st palmar & 2nd dorsal
- 3rd - 2nd palmar & 3rd dorsal
- 4th - 3rd palmar & 4th dorsal
- 5th - Hypothenar muscles

- MP flexed at 60 and IP straight
- Slips sutures onto self
- Start with radial side index and then ulnar side
- Alternate to create balance
-Confim by tenodesis

- Dorsal splint : Wrist neutral, MP 90 flexion and IP straight

- Transfer for correction of ulnar deviation little finger:

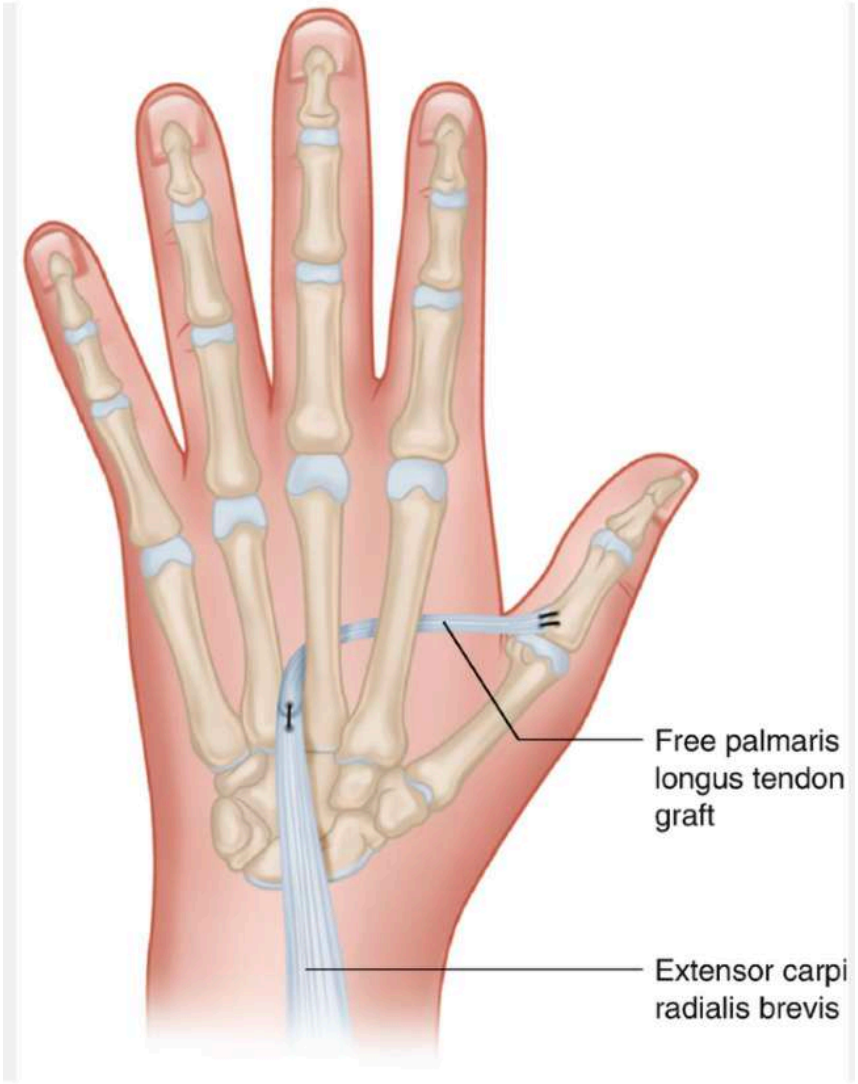
- Fowler modification
- Ulnar half of EDM detached
- Volar to deep transverse metacarpal ligament
- sutured to radial collateral ligament at base of PPX

- Transfer for thumb adduction / Key pinch:

- SMITH transfer : ECRB - graft - 2nd interMC space -
- adductor tubercule
- (ECRL / EIP / Brachioradialis)

- LITTLER : Ring FDS - passed deep to flexor tendons
- BRAND modification - Passed through window

in palmar fascia and subcutaneously



- Transfer for index abduction:

- Bunnell : EIP - graft - 1st dorsal interosseous

- Bruner: EPB

- Hirayama: Palmaris longus
- Riodran : FDS ring finger

HIGH ulnar nerve palsy:

- Additional muscles affected : FDP R, L and FCU

Before claw correction:

1. Side to side tagging of FDP mid to ring, little

2.FDS mid 2 slip transfer to FDP ring and little

- For strong ulnar deviation and wrist flexion:

FCR transfer to FCU

Combined ulnar and median palsy

LOW palsy:

1. Prevent adduction contracture 1st web
2. Index abduction - APL (Neviaser) transfer
3. Thumb adduction - ECRB via graft (Smith) transfer/ FDS ring
4. Opponensplasty - EIP (Burkhalter)
5. Claw correction - EF4T (Brand)

* Last 2 procedures are done in final stages of correction

High combined palsy:

- Correct finger flexion first as it is important crude function
- Transfers for it can accentuate claw further.

1. ECRL - finger flexion
2. Brachioradialis - thumb flexion FPL
3. EIP - Opponensplasty
4. Tenodesis/ capsulodesis for passive claw correction

* FDMA flap innervated by radial nerve for sensation to tip of thumb

Combined ulnar and median palsy:

- 1. Which are the most important functions to be restored?
- 2. Which are the expendable donors?
- 3. Which procedure should be done first?
- 4. Are procedures required for sensation?
- 5. When should static procedures be considered?

Function to Be Restored	Preferred Tendon Transfer
Thumb opposition	EIP to APB
Finger flexion	ECRL to the 4 FDPs, can be combined with tenodeses of the DIP joints of the ulnar 3 digits
Thumb flexion	Brachioradialis to FPL
Clawing of all 4 fingers	Static tenodeses, Zancolli capsulodesis, or PIP joint arthrodeses
Thumb adduction	ECRB + tendon graft to adductor pollicis
Index finger abduction	Accessory APL to first dorsal interosseous
Severe thumb MCP joint hyperextension	MCP joint arthrodesis
Improve palmar hand sensation	Fillet flap of the index finger; or first dorsal metacarpal artery flap to resurface the thumb–long finger web space; or nerve transfer of superficial radial nerve to distal median nerve

THANK YOU

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