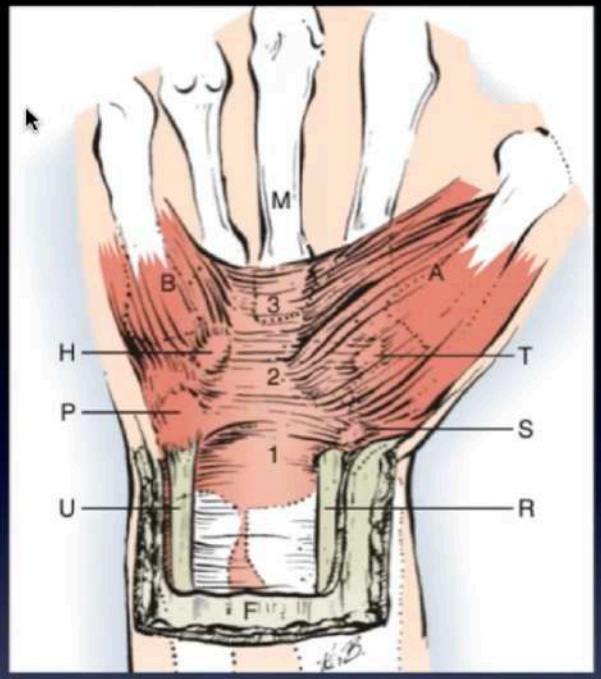

MITTAL HAND
MICROSURGERY CENTRE

Concept - carpal tunnel syndrome

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DNB , FNB [Hand & Microsurgery]
Director [Mittal Hand Microsurgery centre, Jaipur]
Senior consultant - SDMH, Jaipur

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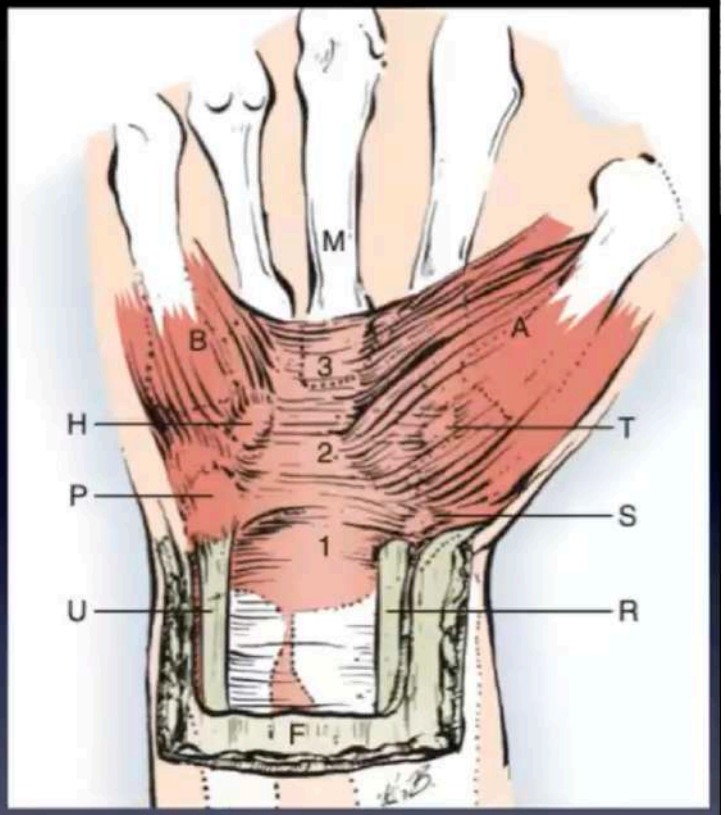
Anatomy



- Ulnar border - Triquetrum and Hook of hamate
- Radial border - Scaphoid , Trapezium
- Three zones
- Proximal - [Deep forearm fascia]
- Central - [Transverse carpal ligament]
- Distal - [Aponeurosis of Thenar and Hypothenar muscle]

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- Median nerve at wrist - 30 fascicle
- recurrent branch - motor branch has 2 fascicle in volar position and sensory branch in radial ulnar and dorsal position
-

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Relation- Carpal tunnel

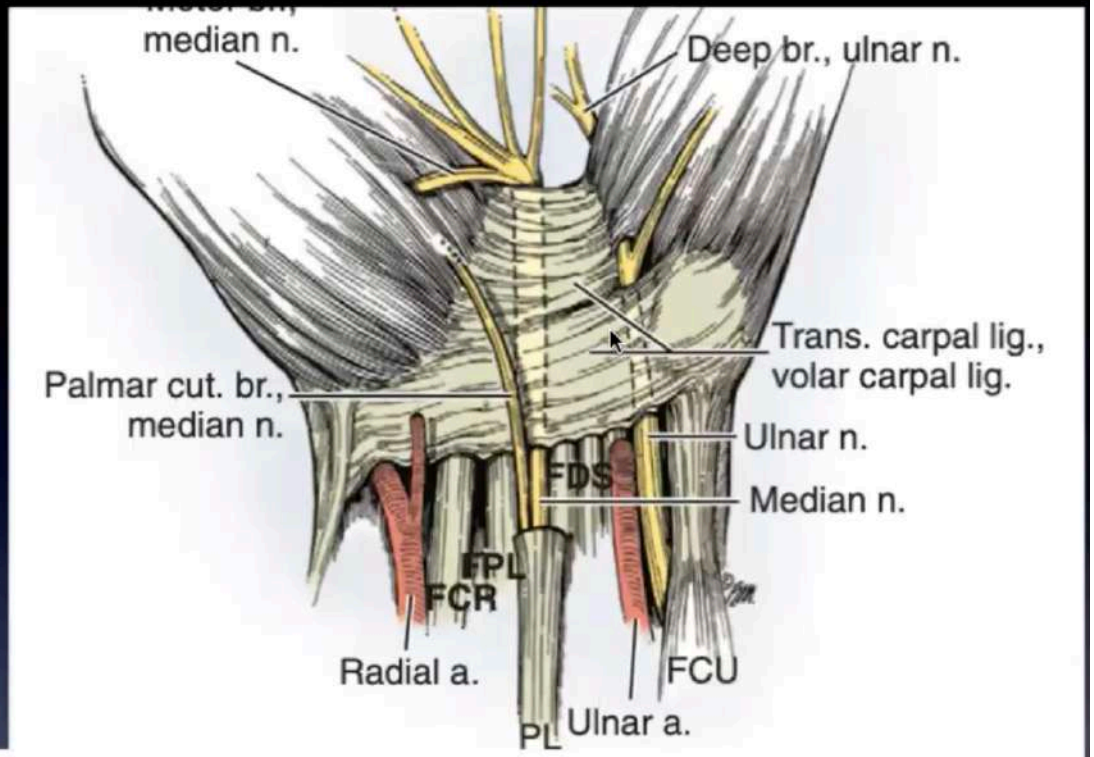

Figure 30.8 The palmar cutaneous branch of the median nerve lies radial to the median nerve and ulnar to the flexor carpi radialis (FCR) tendon. It may pierce either the volar carpal or transverse carpal ligament or the antebrachial fascia before it becomes subcutaneous. FCU, flexor carpi ulnaris; FDS, flexor

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Variation - recurrent motor branch of Median nerve
Most common pattern is - Extraligamentous

- A- extra ligamentous
- B- Sub ligamentous
- C- Trans ligamentous
- D-origin - ulnar border
- E- Motor branch lie on top TCL

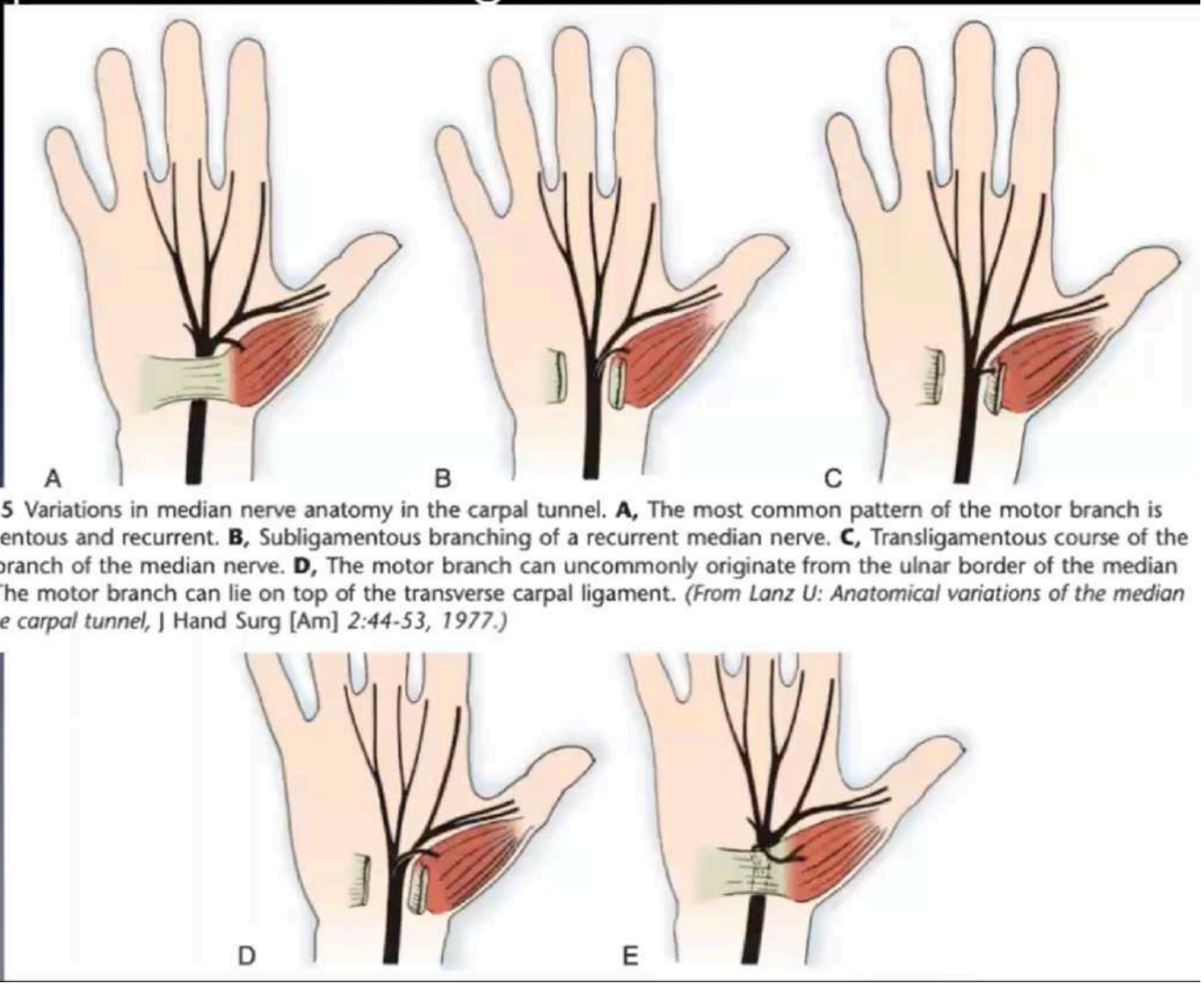

Figure 30.5 Variations in median nerve anatomy in the carpal tunnel. **A,** The most common pattern of the motor branch is extraligamentous and recurrent. **B,** Subligamentous branching of a recurrent median nerve. **C,** Transligamentous course of the recurrent branch of the median nerve. **D,** The motor branch can uncommonly originate from the ulnar border of the median nerve. **E,** The motor branch can lie on top of the transverse carpal ligament. *(From Lanz U: Anatomical variations of the median nerve in the carpal tunnel,* J Hand Surg [Am] *2:44-53, 1977.)*

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Grade III Variation - High division of Median nerve

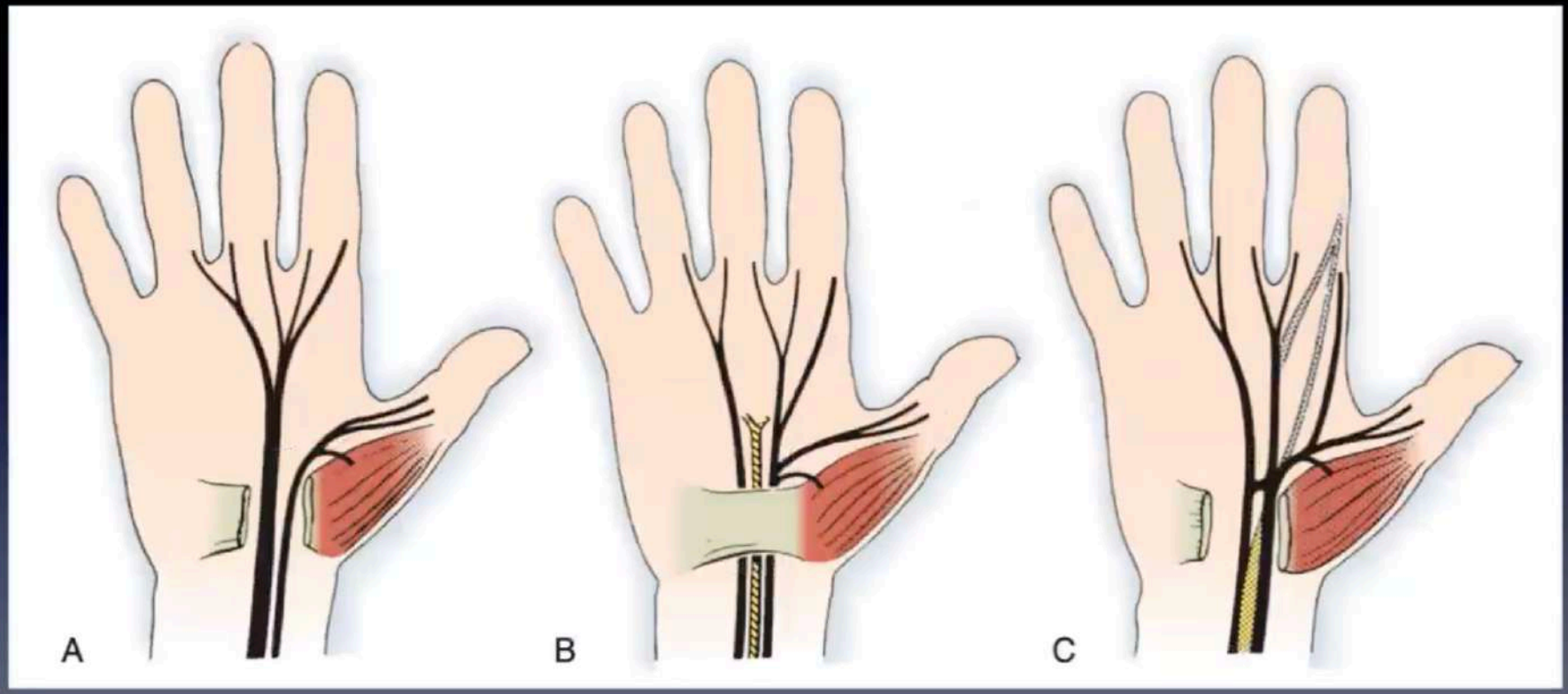

Figure 30.6 Variations in median nerve anatomy in the carpal tunnel. Group III variations include high divisions of the median nerve (**A**) that may be separated by a persistent median artery (**B**) or an aberrant muscle (**C**). *(From Lanz U: Anatomical variations of the median nerve in the carpal tunnel,* J Hand Surg [Am] *2:44-53, 1977.)*

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Grade IV Variation - Thenar branch of Median nerve

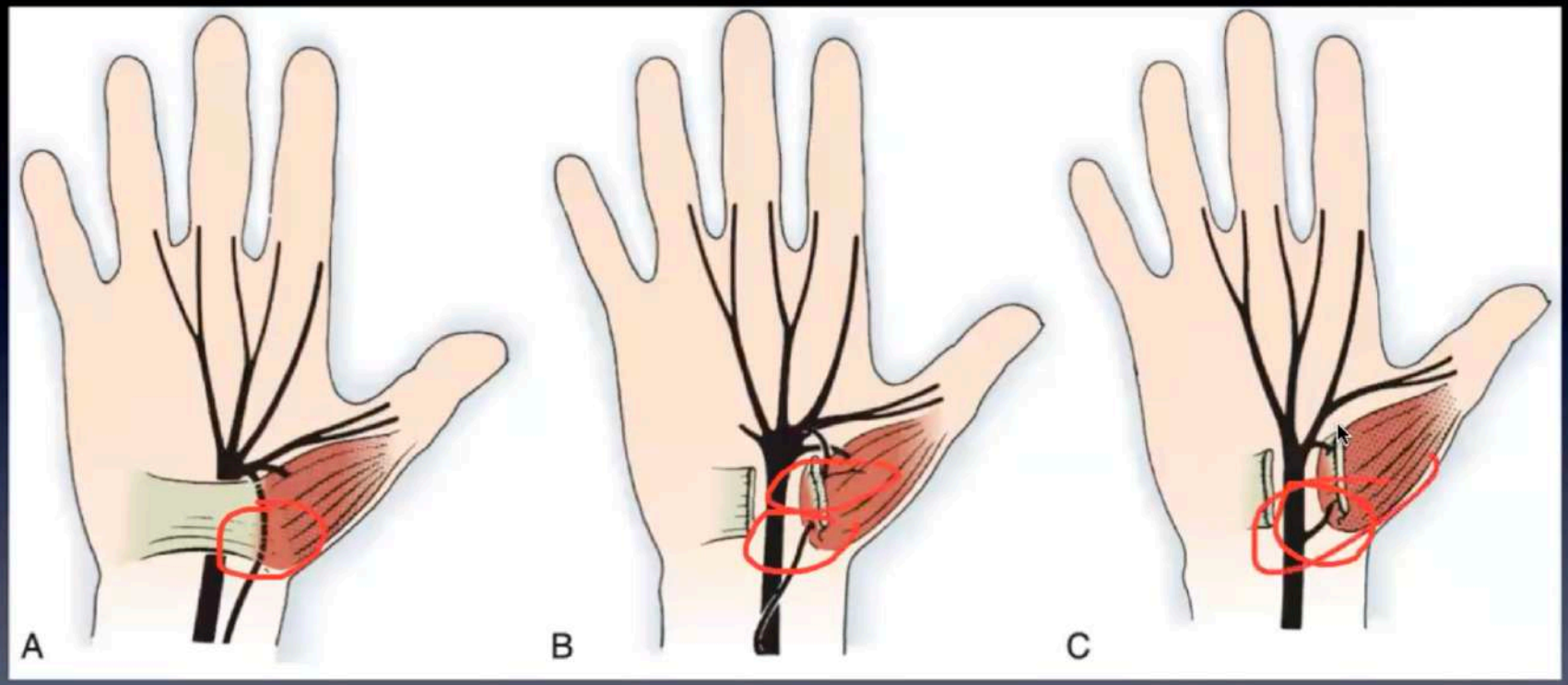

Figure 30.7 Variations in median nerve anatomy in the carpal tunnel. Group IV variations include rare instances in which the thenar branch leaves the median nerve proximal to the carpal tunnel: **A,** accessory branch; **B,** accessory branch from the ulnar aspect of the median nerve; **C,** accessory branch running directly into the thenar musculature. *(From Lanz U: Anatomical variations of the median nerve in the carpal tunnel,* J Hand Surg [Am] *2:44-53, 1977.)*

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Pathphysiology

- Potentially two sites of compression
- Proximal edge of TCL - Phalens test - Wrist flexion test is positive
- Hook of hamate - Hour glass deformity of median nerve present - positive median nerve compression Durkans test but Negative phalens test

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Initial Presentation

- Intermittent Numbness and parenthesis at Night
- Due to combination of
- **wrist flexion** during sleep [compression at proximal edge of TCL] and **fluid shift** in Horizontal position of hand
- These symptom are in vascular nature which culminate endoneural edema
-

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Progression

- Symptoms are frequent in day time precipitated by pinching and wrist flexion that lead to chronic edema

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No single test absolutely confirm CTS

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Test

- Positive **Tinels sign**
- **Phalens test for 1 minute** - passive wrist flexion test [best performed with elbow extended [ulnar nerve symptom occurs with elbow flexed]

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Probability of CTS - .86 when all four are positive

- 1. Abnormal Hand diagram
- 2. Abnormal Semmes Weinstein sensibility test
- 3. Positive Durkans test
- 4. Night pain
- **When all our are negative than probability of having CTS is .0068**

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Caveats of Electrodiagnostic test

- Severe **conduction Defeciet doesn't predict** the final outcome or return to work after CTS release
- **Sensory** abnormality occur **before motor** abnormality [Distal sensory latency slow before distal motor latency
- [Reason - median nerve at wrist has 94 % sensory fiber, and diameter of sensory fiber is more than motor]

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If Distal motor latency is abnormal with Normal SNAP

- **Then Rule out**
- C8 Radiculopathy ,
- Anterior horn cell ,
- Isolated recurrent motor branch compression

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Caveat of NCV

- NCV will not return to normal after CTS release even with full clinical recovery due to retrograde fiber degeneration or incomplete demylenation

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Nonoperative Management

Nonoperative therapy includes splinting the wrist in a neutral position, steroid injections, and management of any underlying systemic diseases. Steroid injection offers transient relief in 80% of patients, but only 20% will be symptom-free 12 months later. Those most likely to benefit from conservative management have had symptoms for less than 1 year, only intermittent numbness, normal 2PD, less than 1 to 2 ms prolongation of distal motor and sensory latencies, and no motor findings. Forty percent of this group will remain symptom free for longer than 12 months.[11]

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Mild CTS

Failed trial of conservative treatment with splints, nonsteroidal anti-inflammatory drugs (NSAIDs), and activity modification for at least 1 month

No sensory or motor loss, nocturnal symptoms, and/or transient paresthesia only with prolonged gripping or pinching

No thenar wasting, no change in 2PD

May have a prolonged 2PS, normal NCS, increased comparative sensory index (CSI), or slowing of distal median SNAP amplitudes but with a normal distal motor latency.

Normal electromyograph (EMG)

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Moderate CTS

Failed trial of splinting and/or cortisone injections

Frequent daytime symptoms even without gripping

May have abnormal 2PS and 1PS, 2PD greater than 15 mm

No wasting of APB but may have weak abduction

NCS may show slowing of distal SNAPs

Distal motor latency slowing of less than 1 to 2 ms, but no drop in amplitude

Normal EMG

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In primary carpal tunnel release these Are not indicated

- Neurolysis
- Epineurotomy
- Synovectomy

Contraindications

Contraindications include untreated hypothyroidism, diabetes, or other metabolic neuropathy.

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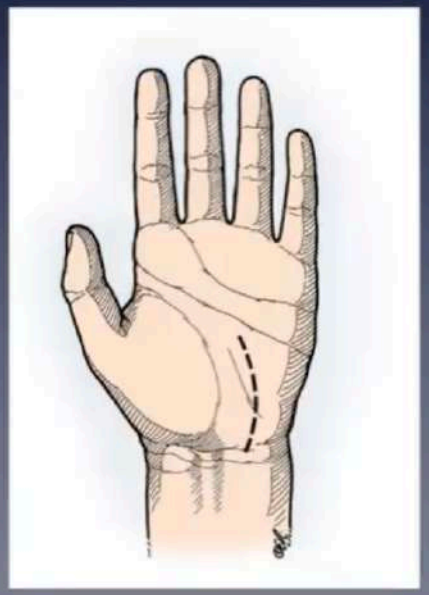
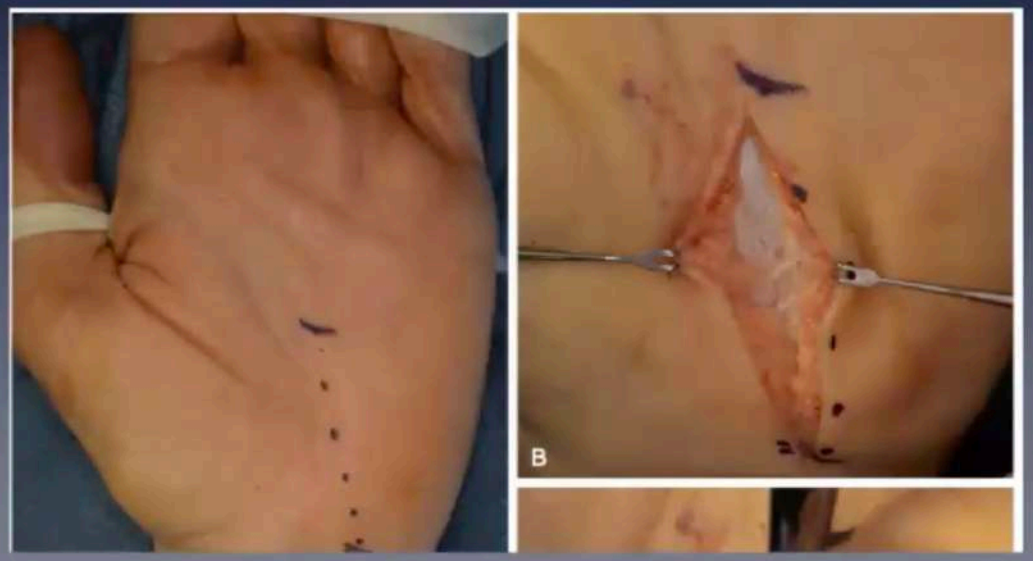
Open technique - preferred

- Incision 6mm ulnar to Thenar crease to prevent scarring of median nerve
- Ulnar side of PL
- Ulnar to flexed ring finger
-





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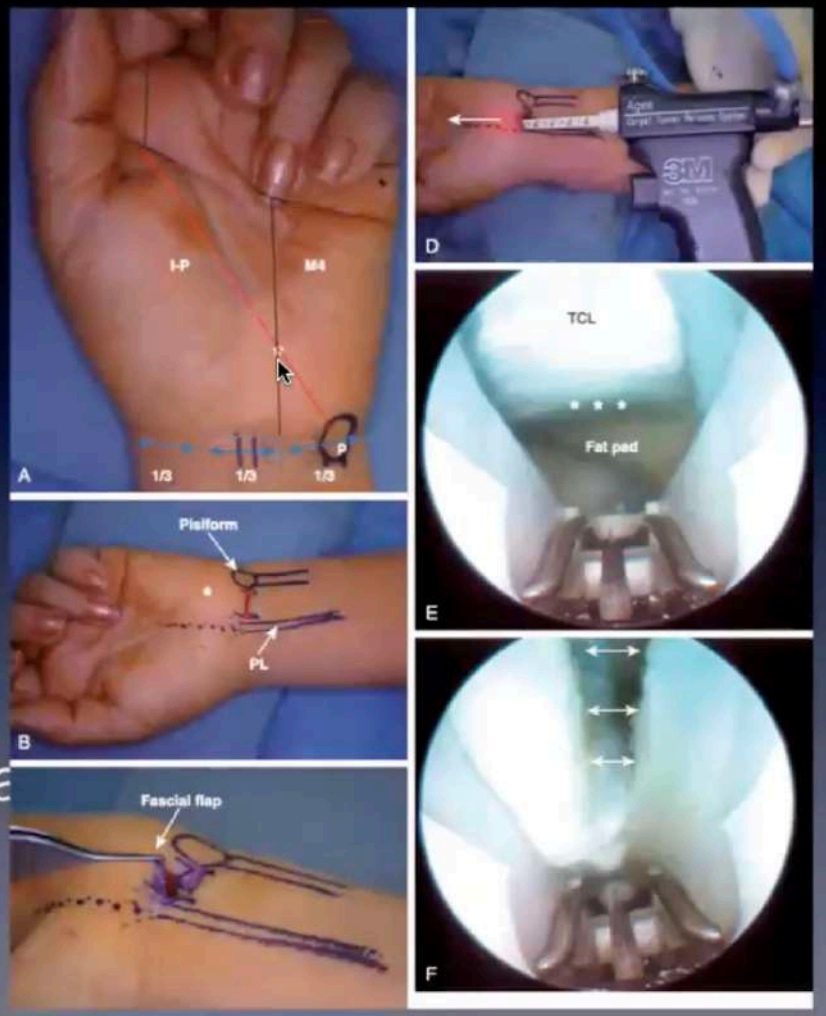
Endoscopic technique

- Chow two portal
- Age single portal
- Landmark - Index pissiform line , 4 th meta



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Dynamic procedure to restore Thumb abduction

- FDS [Bunnel , Royle- Thompson technique
- EIP
- ADM [Huber transfer]
- PL [Camitz procedure]
- Others - ECU, ECRL, EDM

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