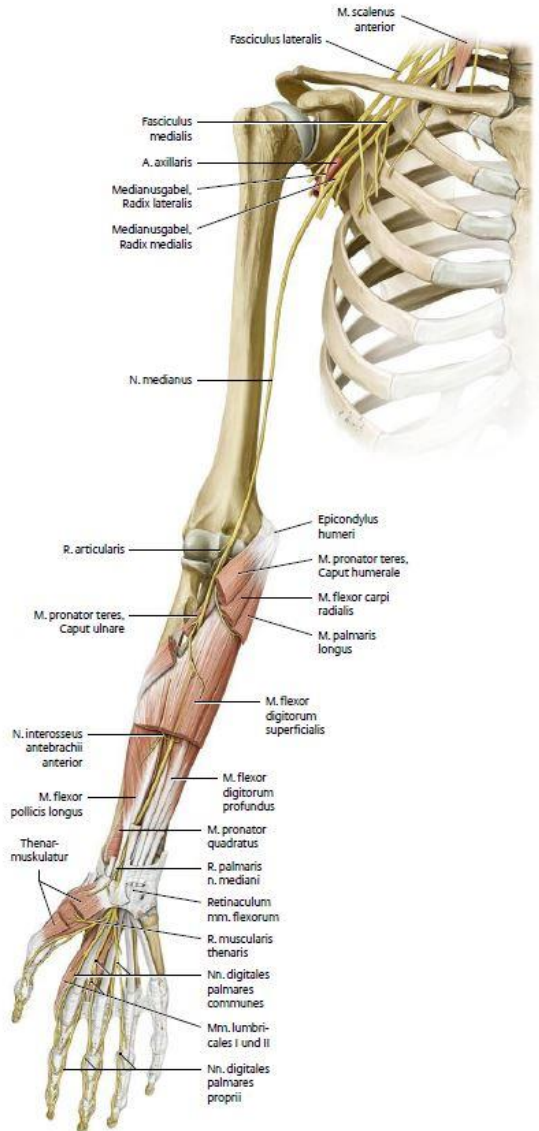


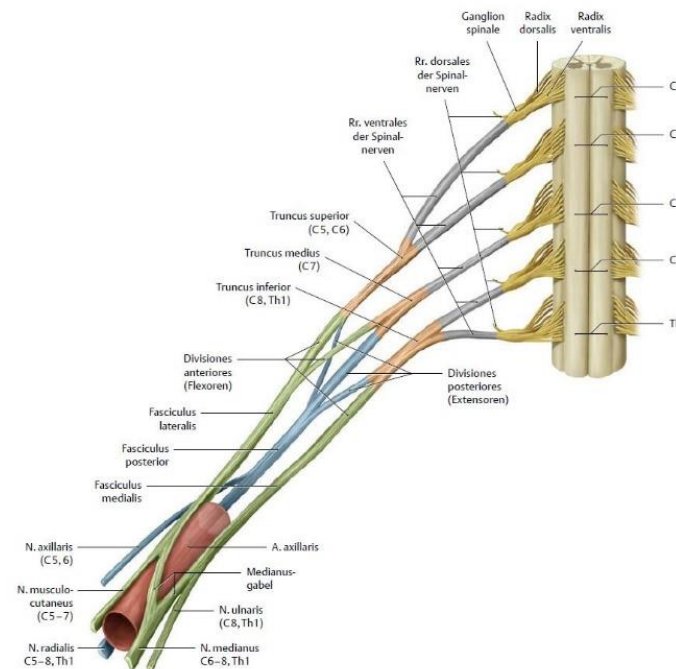
Median nerve entrapment

Ramon Büchel



Median nerve - anatomy

- Nerve fibers of segments C5-Th1
- Medial and lateral fascicle



Median nerve - anatomy

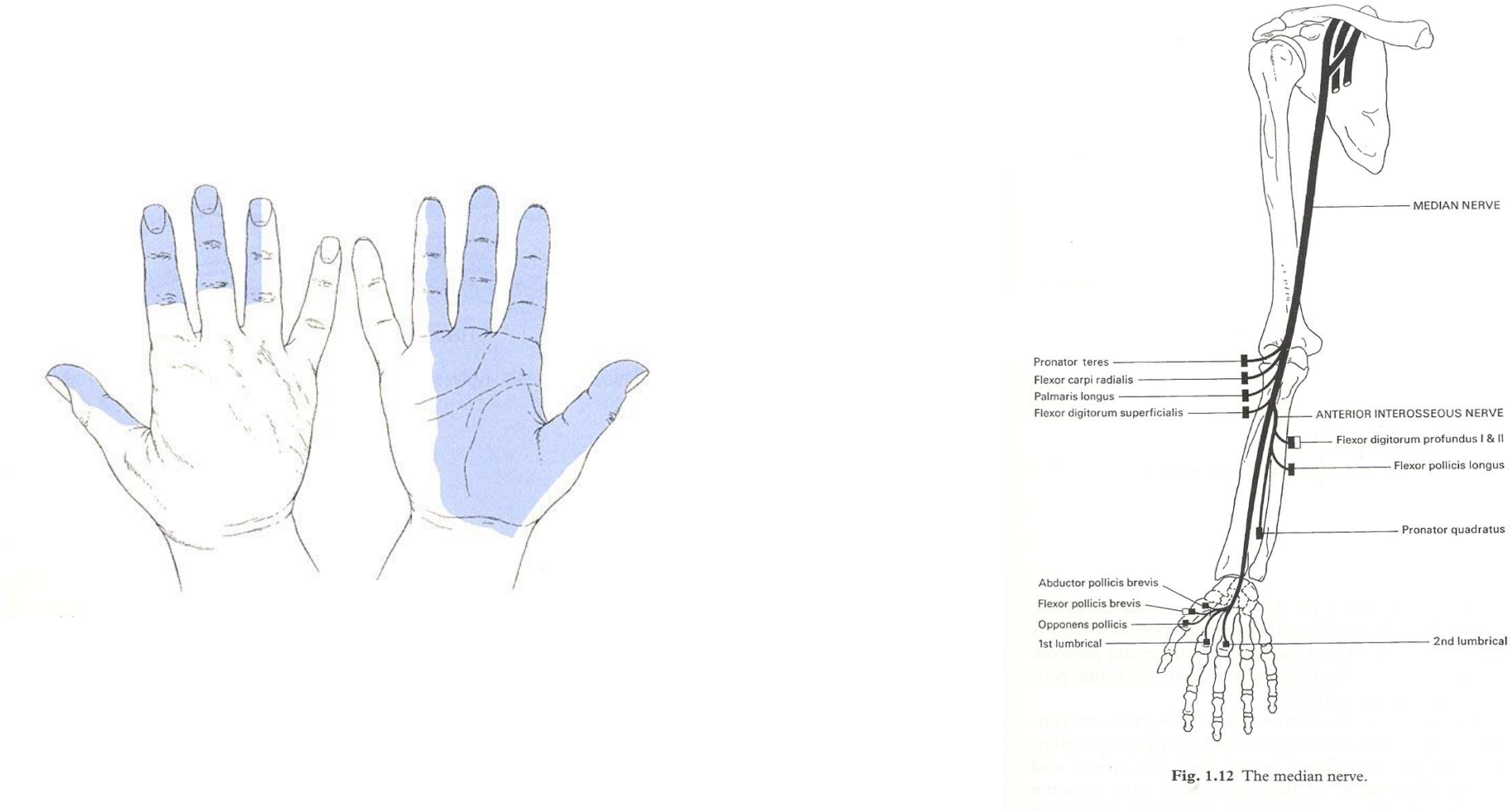
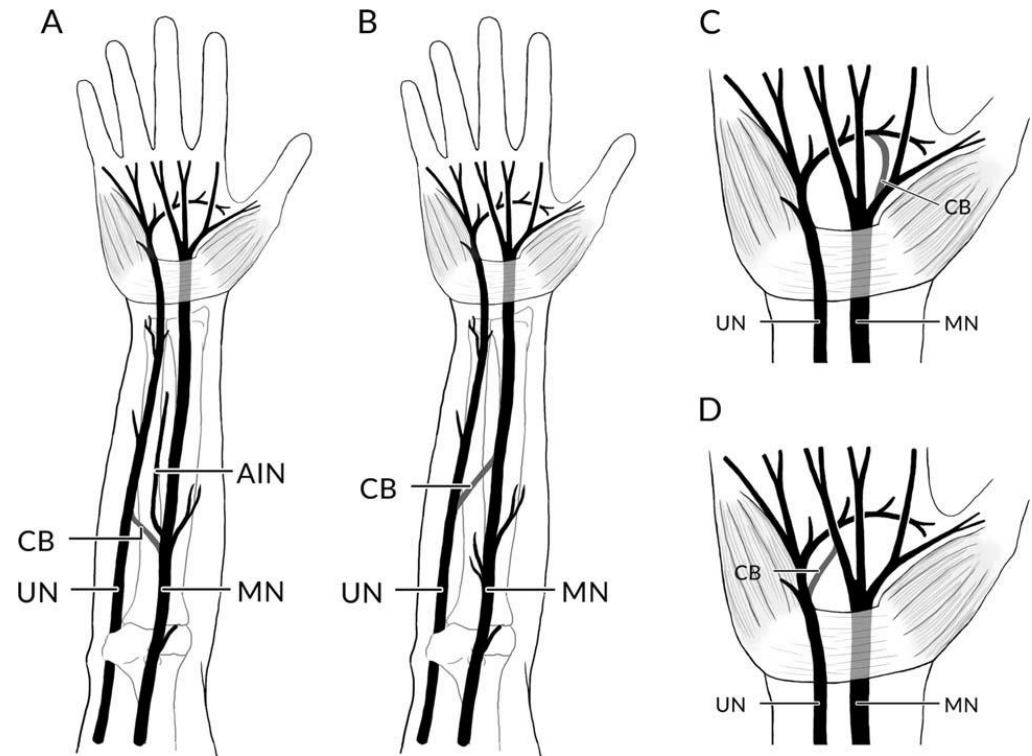


Fig. 1.12 The median nerve.

Median nerve - anatomy

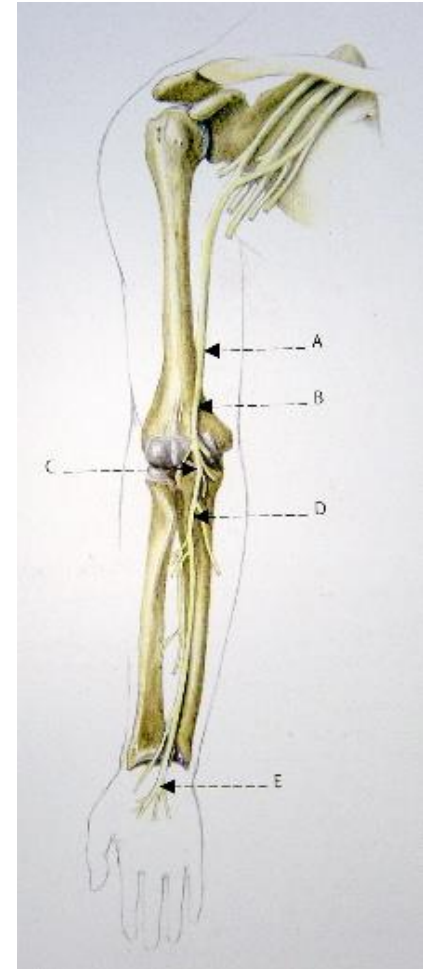
Connecting branches between the median and ulnar nerve:

- a. Martin-Gruber (median → ulnar) 20%
- b. Marinacci (ulnar → median) 1%
- c. Riche-Cannieu (motoric) 55%
- d. Berrettini Anastomose (sensitive) 60%



Regions of entrapment

- Struthers` - ligament
- Lacertus fibrosus
- Pronator teres muscle
- FDS- arcade
- Carpal tunnel



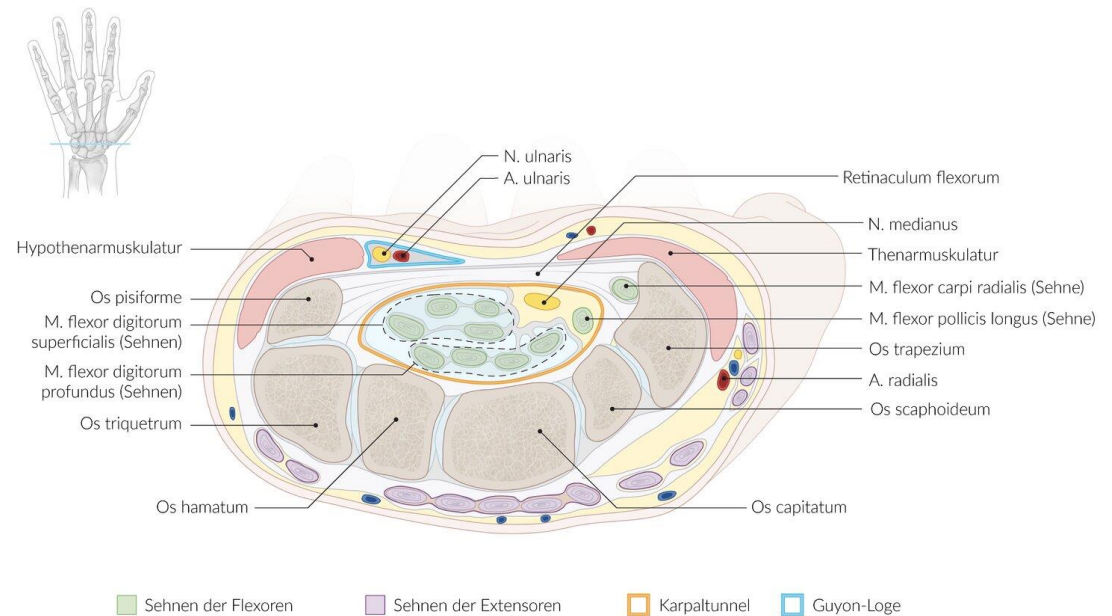
Carpal Tunnel Syndrome (CTS)

Ramon Büchel

CTS – definition and anatomy

- Definition: Entrapment of the median nerve in the carpal tunnel with sensory and/or motor deficits.

- Constitutional bottleneck
- Diameter 2cm
- Thickness of flexor retinaculum: 1-2mm



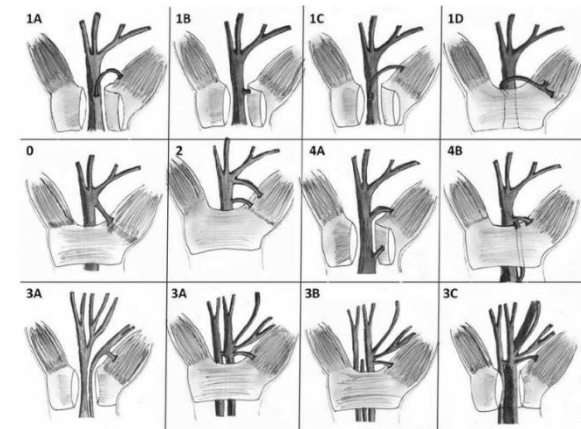
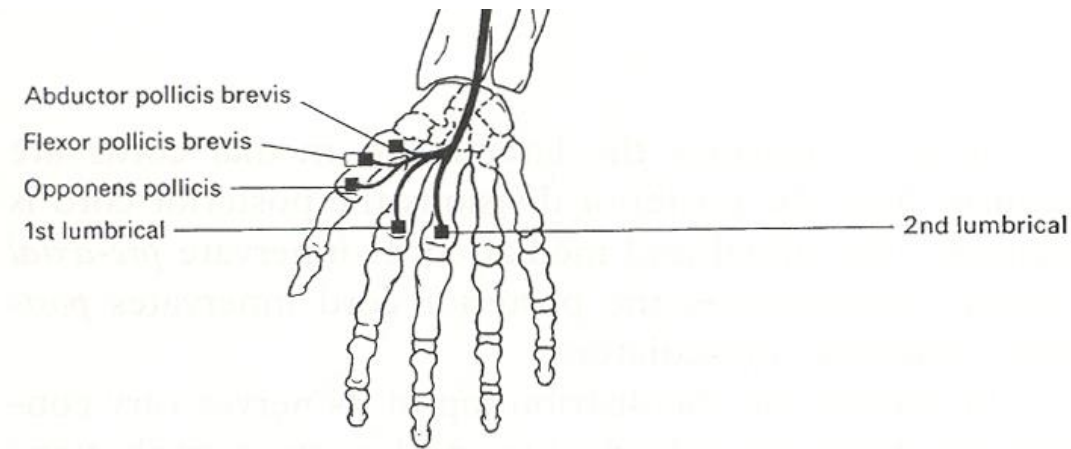
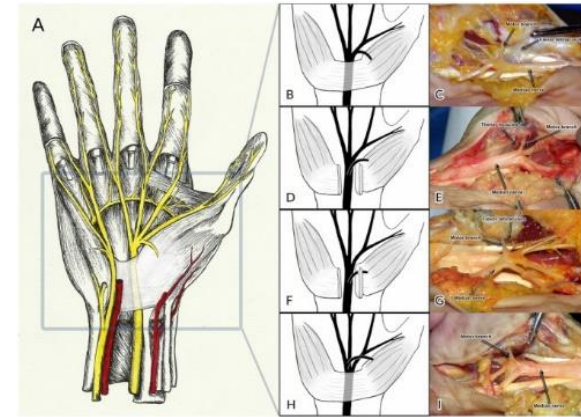
CTS - anatomy

- Ramus palmaris: 4-6cm proximal to the rascetta, sensory innervation of thenar
- Bottleneck 2cm distal of proximal edge



Variations of the thenar motor branch

- Extraligamentous (45%), subligamentous (30%) and transligamentous (25%)
- «million dollar nerve»
- 2% ulnar!



CTS - epidemiology

- Most common compression neuropathy
- Prevalence 3-10%
- F : M = 2-3 : 1
- M: continuous increase with age
- F: peak at the age of 55 years (menopause), up to 60% in third trimester
- Bilateral in more than 50%
- Concomitant disease: TVS (20%)

CTS - etiology

Systemic

- rheumatologic diseases
- gout
- chondrocalcinosis
- amyloidosis
- mucopolysaccharidoses
- raynaud syndrome

Infectious

- tuberculosis
- histoplasmosis
- lepra
- Lyme disease
- carpal arthritis
- bacterial infection in the carpal tunnel

Endocrine

- diabetes mellitus
- pregnancy
- menopause
- acromegaly
- disease of parathyroid gland
- disease of thyorid gland

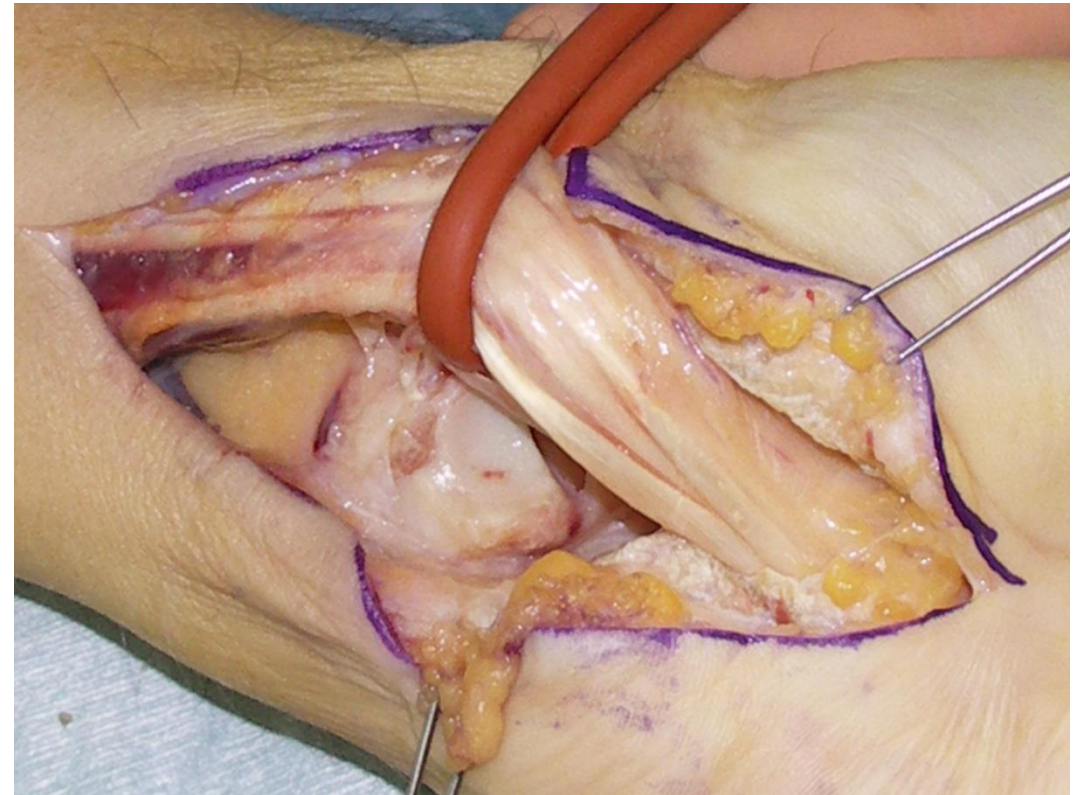
Toxic

- insect bites
- snake bites
- drugs

CTS - etiology

Traumatic causes

- Distal radius fracture
- Fracture of carpalia
- Carpal dislocation
- Crush injuries
- Compartment syndrome because of burns



Lunate dislocation into carpal tunnel

CTS - etiology

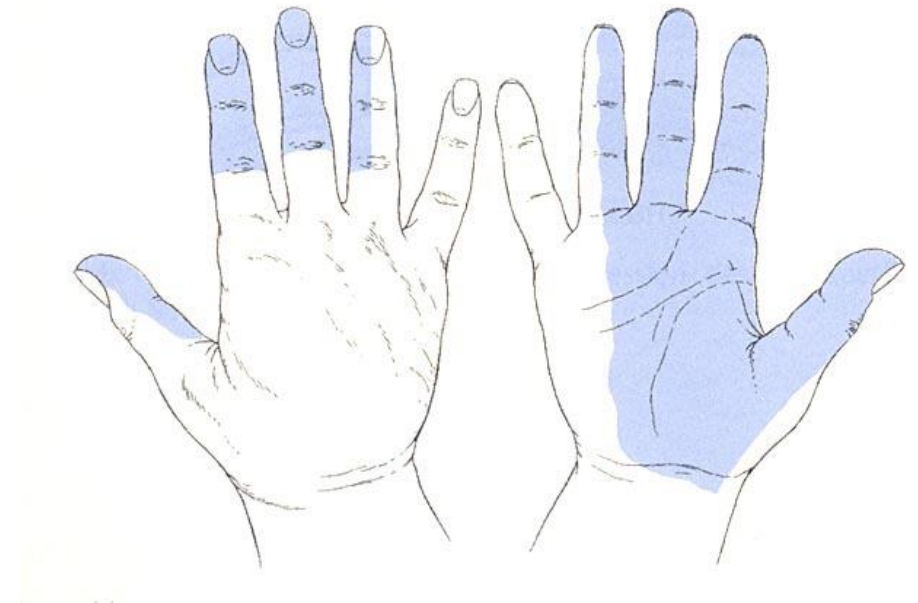
Occupational causes

- external pressure
- angled wrist
- repetitive wrist movements
- use of force with flexed wrist
- vibrations

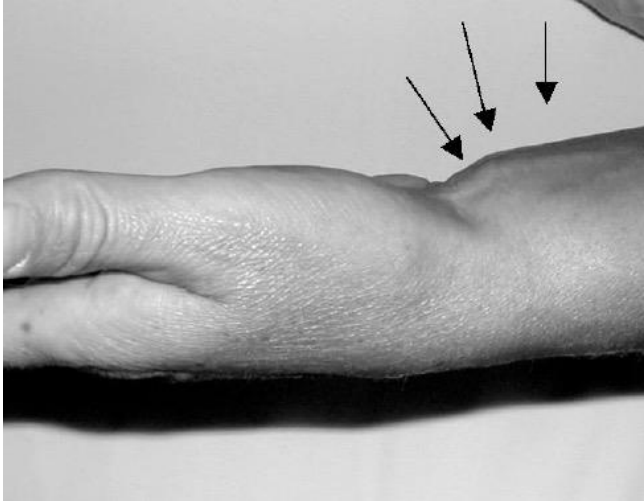


CTS - patient history

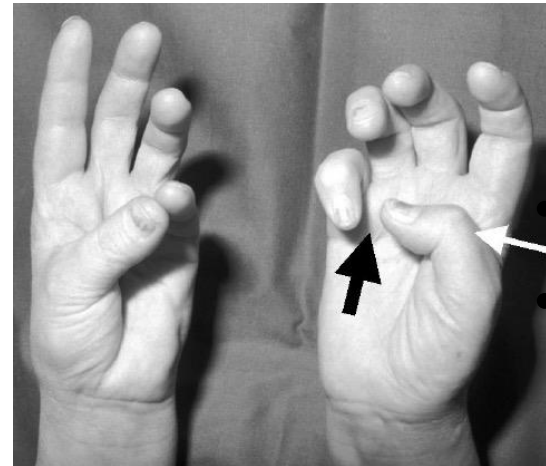
- Paraesthesia and pain (nocturnal complaints)
- Permanent numbness
- Provocation by wrist extension
- Pain extending to the elbow or shoulder
- Impaired dexterity (coordination)
- Thenar atrophy
- Improvement by shaking out



CTS – clinical examination



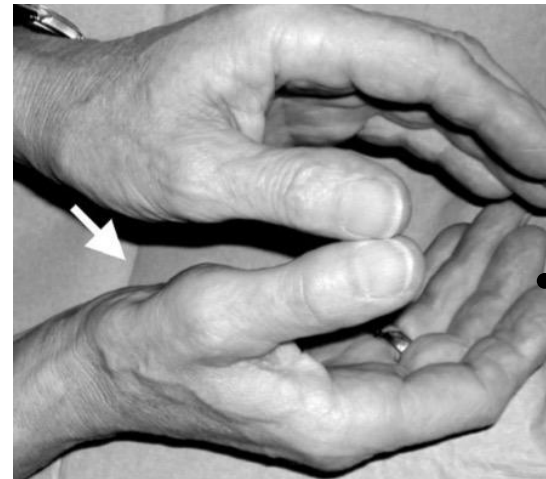
Swelling (10-20%)



M. opponens
(and APB)



Bottle sign



Thenaratrophy

CTS – clinical examination

M.abductor pollicis brevis (APB)

M.opponens (& APB)

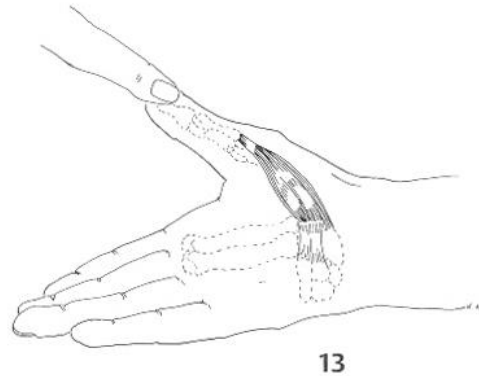
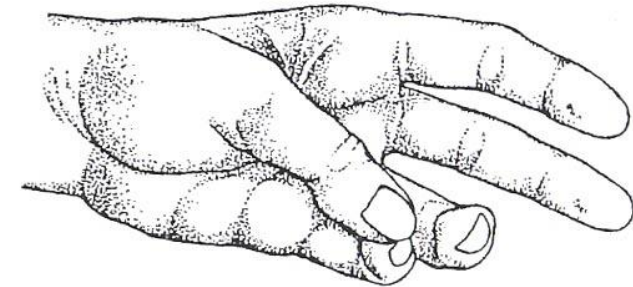
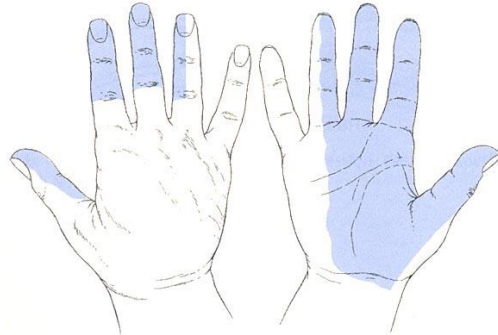


Abb. 13 Funktionsprüfung M. abductor pollicis brevis; Innervation: N. medianus, Funktion: Palmarabduktion Daumen (unterstützt Endgelenkstreckung).

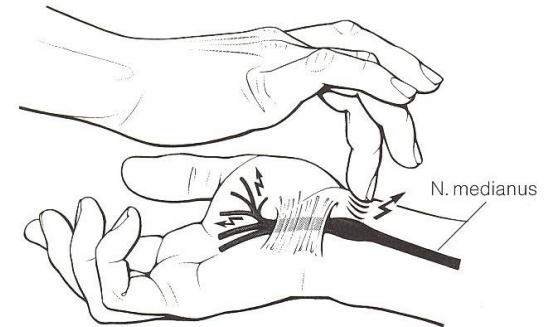


CTS – clinical examination

Light moving touch



Tinel sign



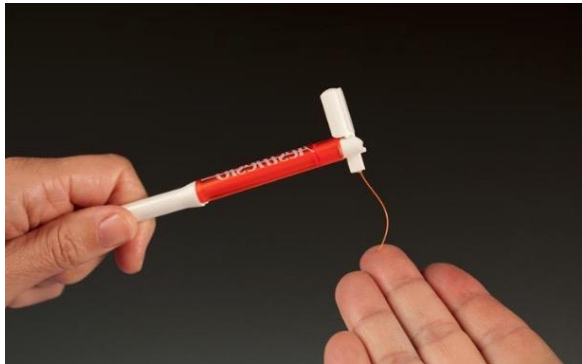
Phalen's maneuver



McMurtry-test



CTS – clinical examination



Semiquantitative tests

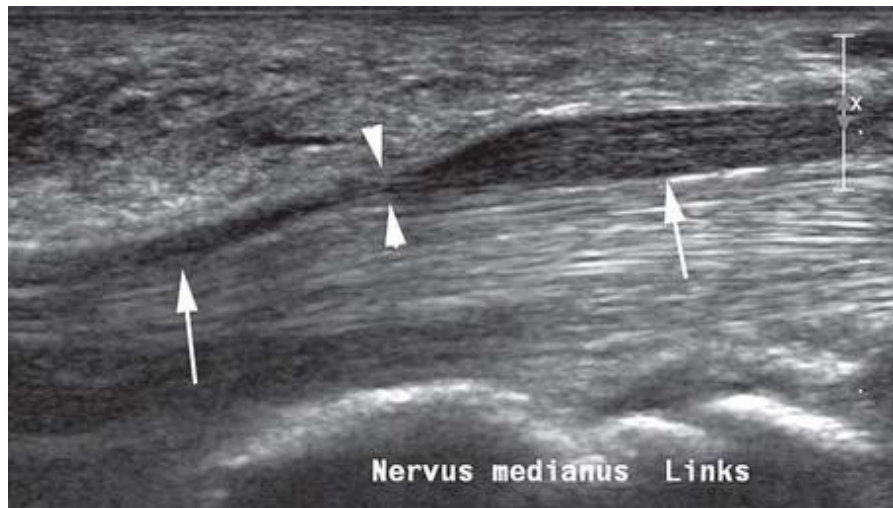
- Semmes-Weinstein Monofilament (1960)
- 2- point-discrimination (1835)

Provocation maneuvers

- Durkan Test (1991) (30s)
- Tetro-Test (1998) (60s)
- Gilliatt Test (1953) (60s)

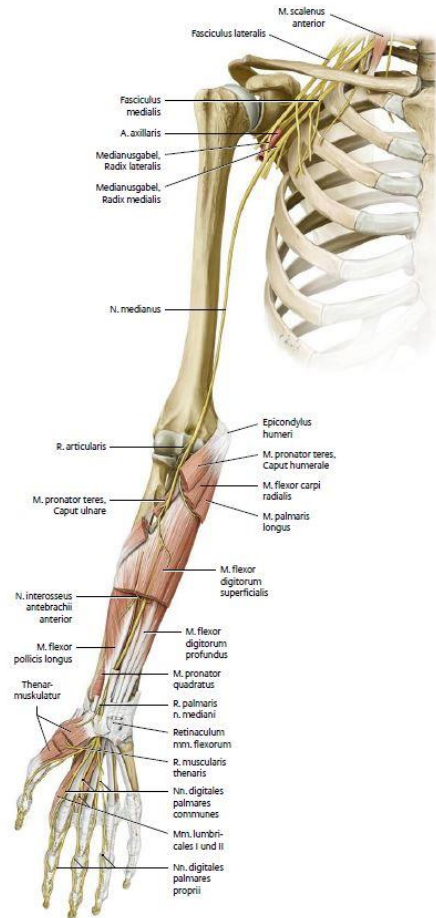
CTS imaging / testing

- X-ray wrist (osteoarthritis, trauma history)
- Sonography



- MRI - tumor?, synovitis?
- Nerve studies:
 - Motor: latency
 - Sensory: velocity

CTS - differential diagnosis



- Cervical disc herniation
- Affection of brachial plexus
- Proximal entrapment of median nerve
- Neuritis
- Neuropathy / Polyneuropathy
- Focal dystonia

CTS treatment

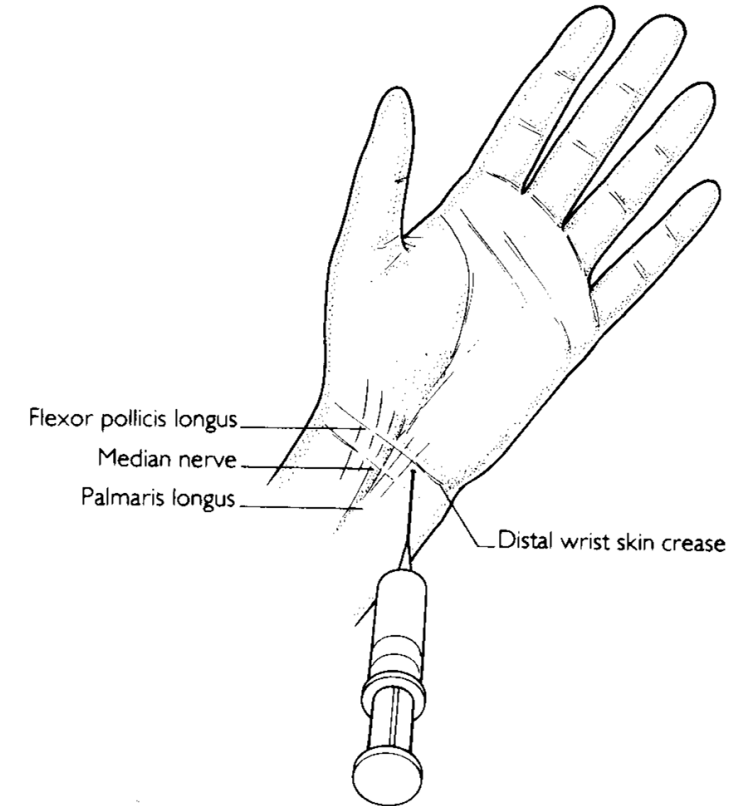
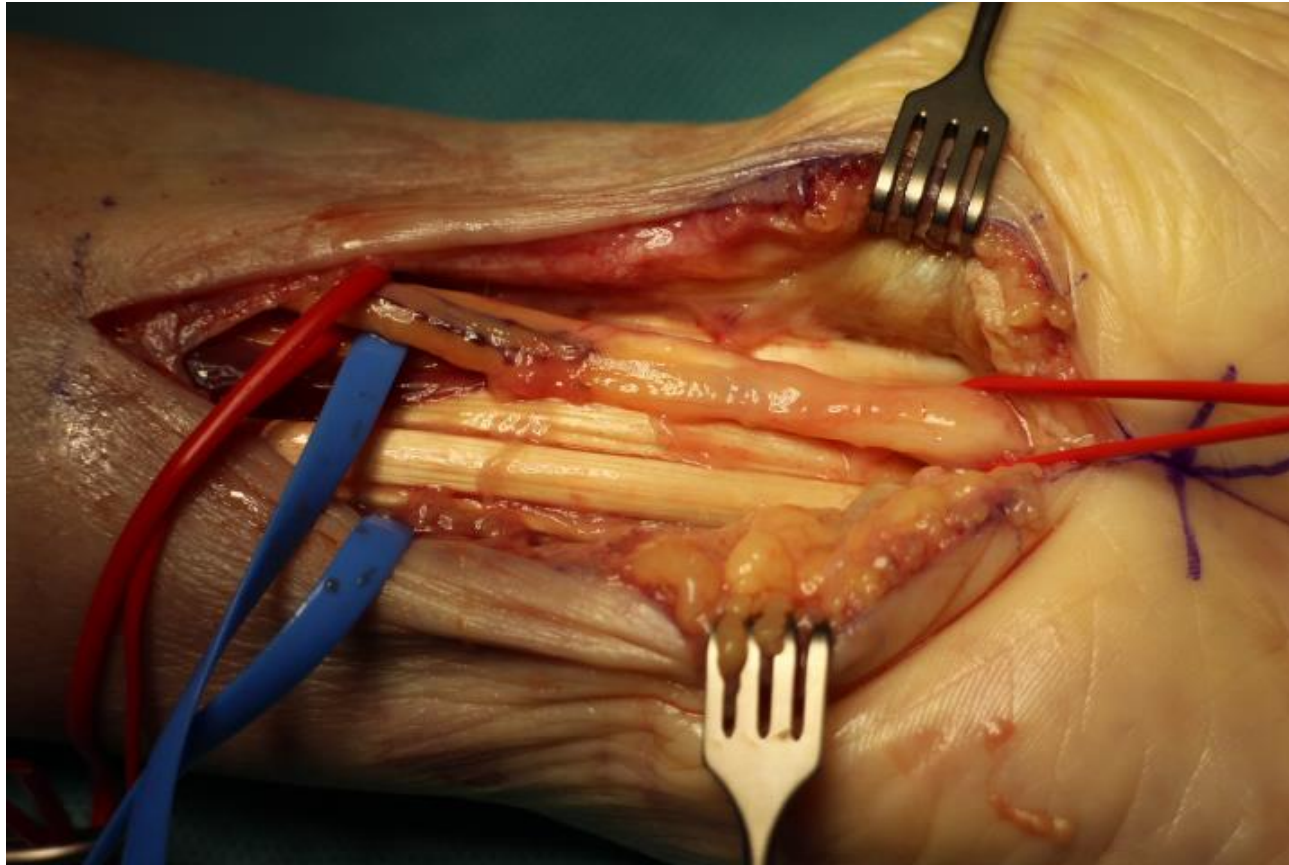
conservative

- Wrist brace
- Avoid inadequate and repetitive wrist movement
- Ergonomics
- Median nerve gliding exercises
- Systemic cortisone
- Local steroid infiltration

operative

- Endoscopic or open

Local steroid infiltration



CTS - operation

Indication

- Damage of median nerve
- Acute CTS
- Symptoms despite conservative treatment

Contraindication

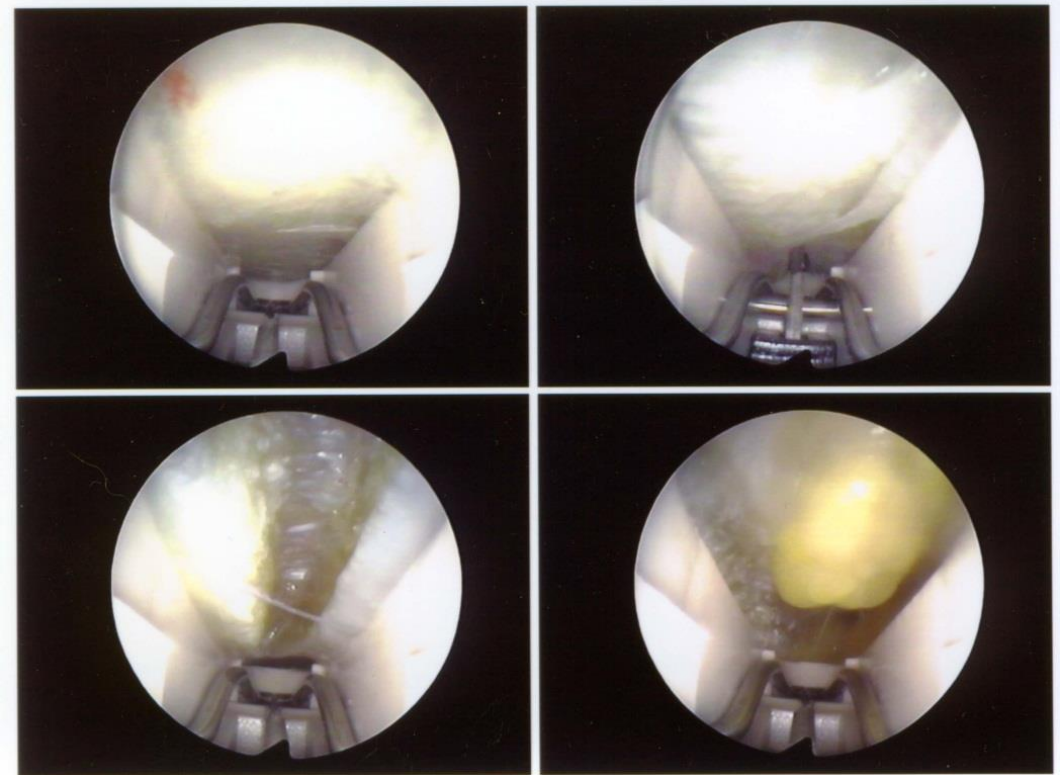
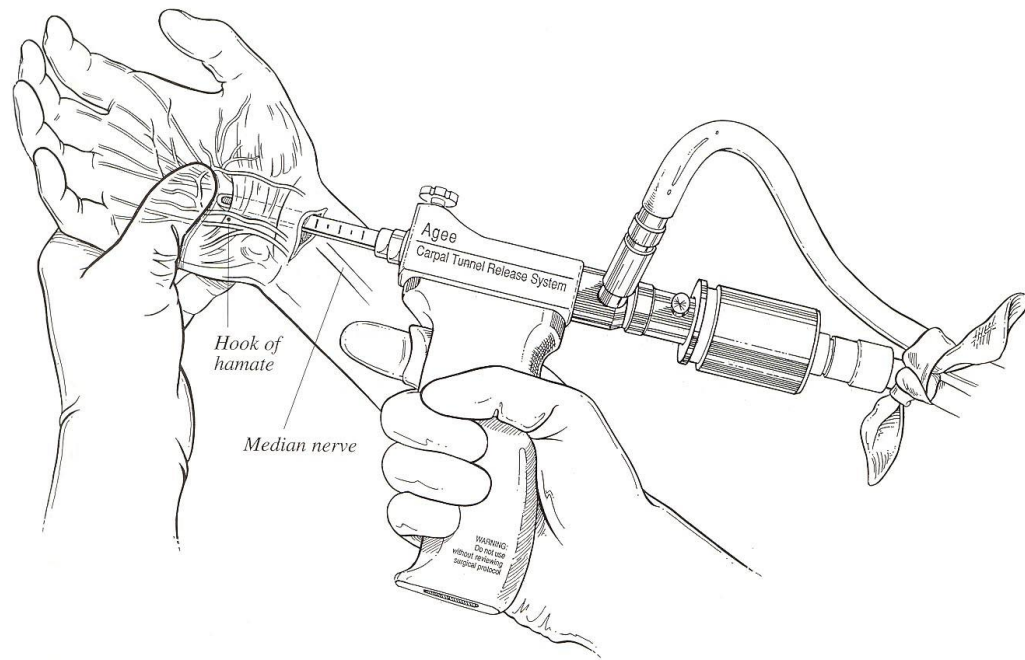
- Inoperability (anticoagulation, neurodermatitis, problems with antiseptic agents)

CT-release - anaesthesia

- Local anaesthesia
- WALANT
- IVRA
- Plexus anaesthesia
- General anaesthetic



CTS - Endoscopic release

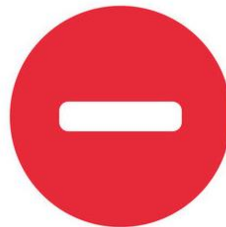


CTS: Open versus endoscopic

open

- Identification of all structures
- Flexibility to react during operations

- Scar complications

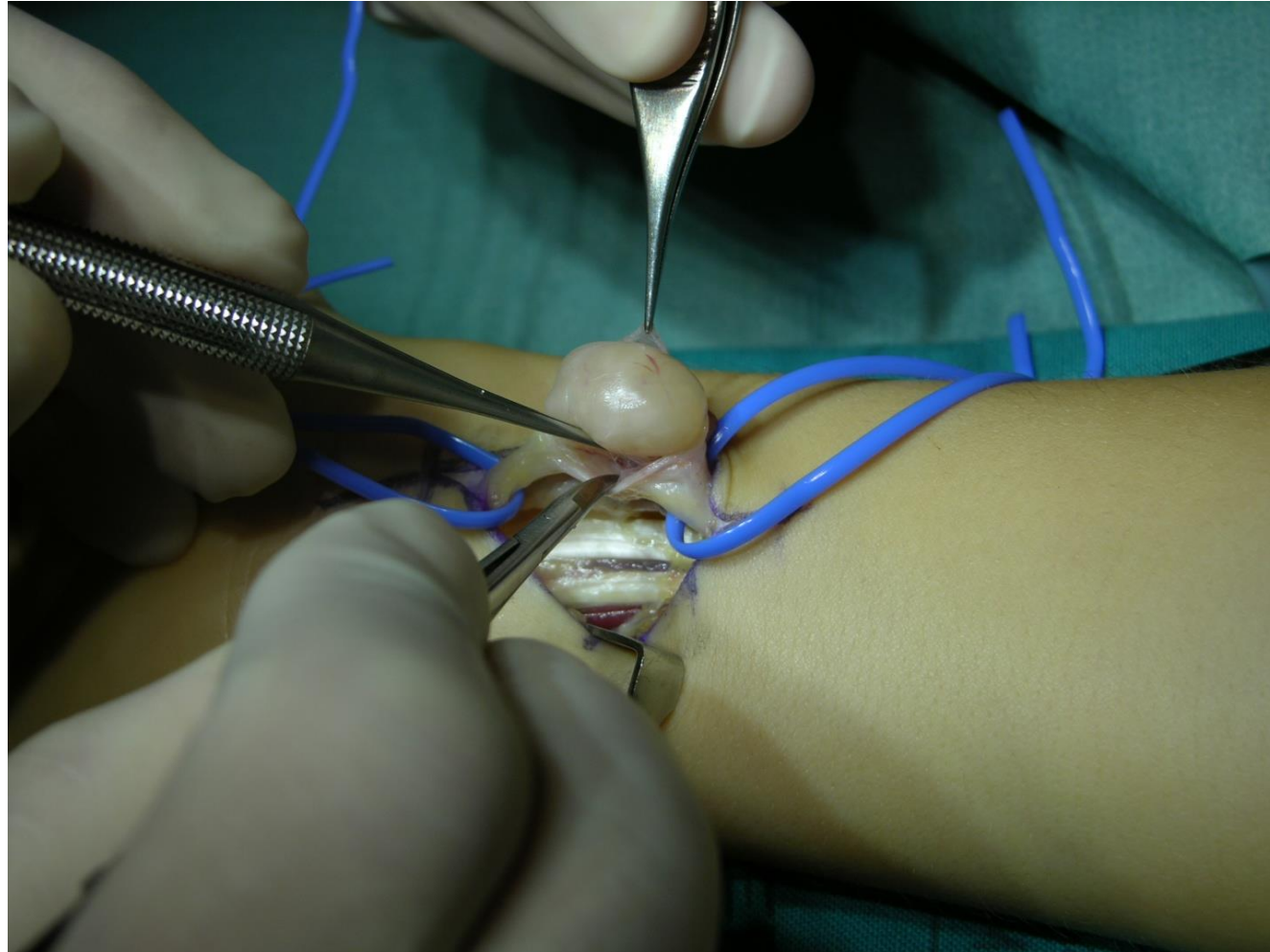


endoscopic

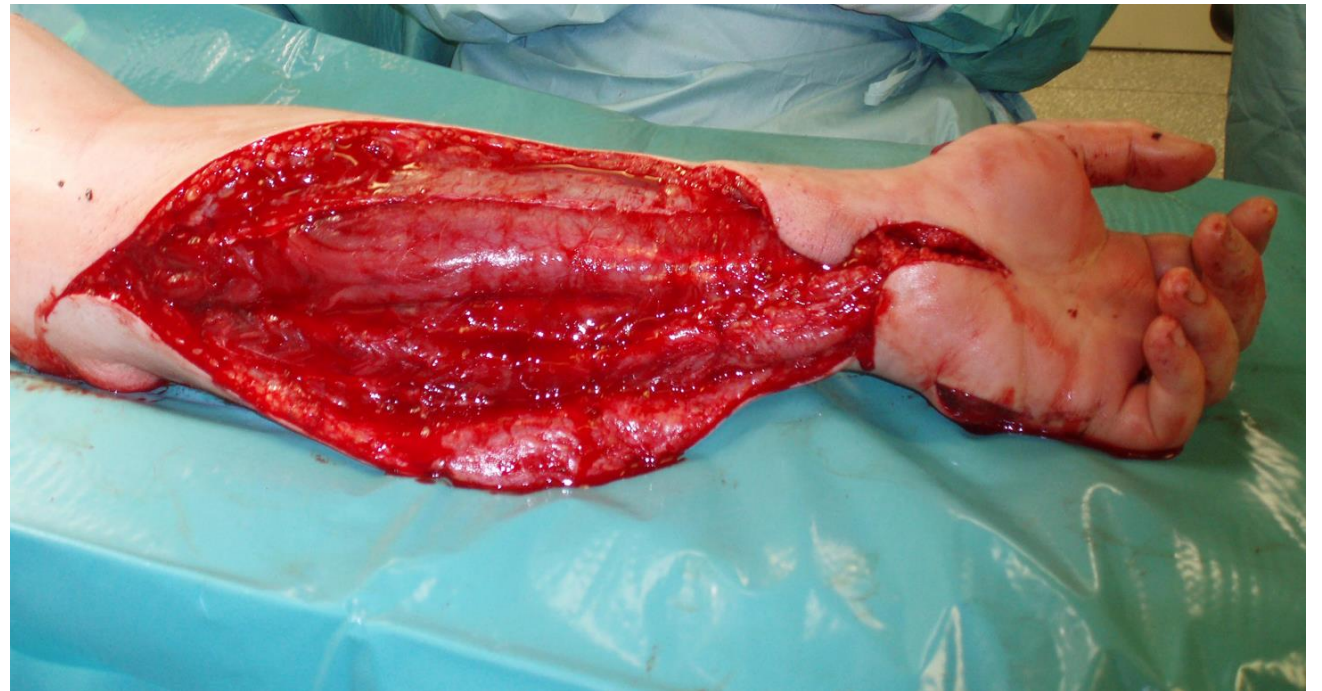
- Earlier return to work
- No scar at palm

- Difficult overview
- Expensive

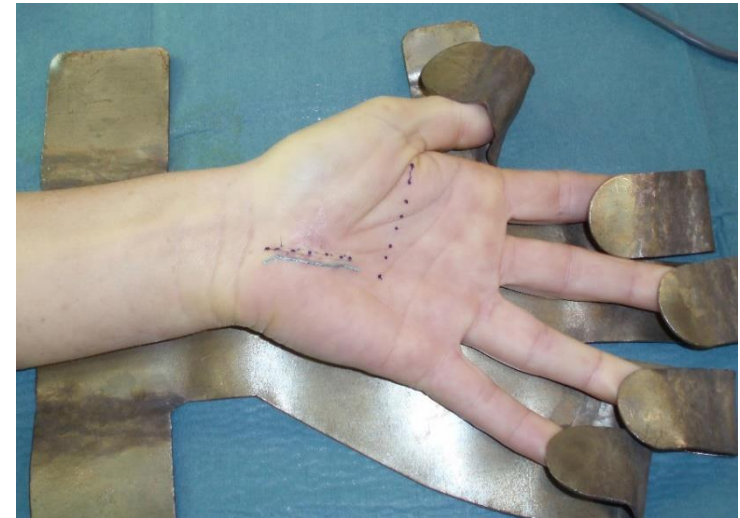
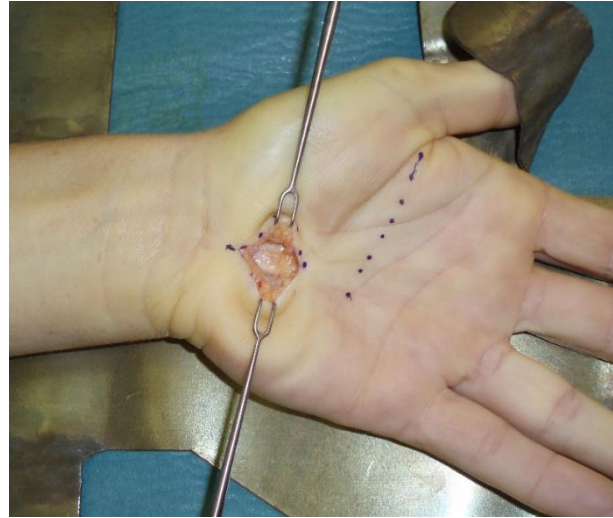
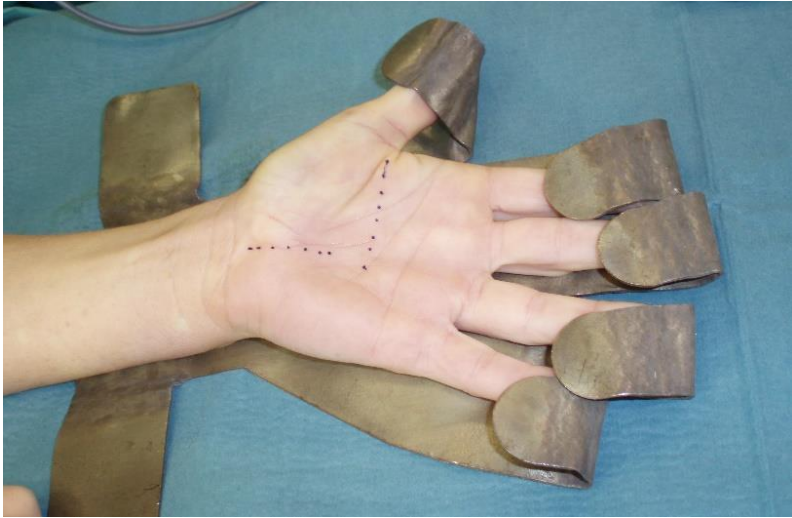
Schwannoma of median nerve



Snake bite



CTS at KSF and KSM: Open release



- Walk-in
- Operation steps...
- Splint during two weeks

Complications

- **Nerve lesions:** (connecting branches!, thenar motor branch, R. palmaris, ulnar nerve, median nerve)
- Vessel or tendon lesions
- Adhesions
- Nerve irritations
- Infections
- **Pillar pain:** “diffuse aching pain and tenderness in the thenar and hypothenar area”
- Bleeding
- Wound healing disorder
- **Complex Regional Pain Syndrome (CRPS)**
- Recurrence

Thank you for your attention

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