

# **Introduction to peripheral nerves injury and entrapment**

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# Objectives

- \* **Anatomy of the nerve.**

- \* **Nerve injury:**

  - Causes, Classification**

  - Diagnosis, aim and timing of Surgery.**

  - Rate of nerve regeneration.**

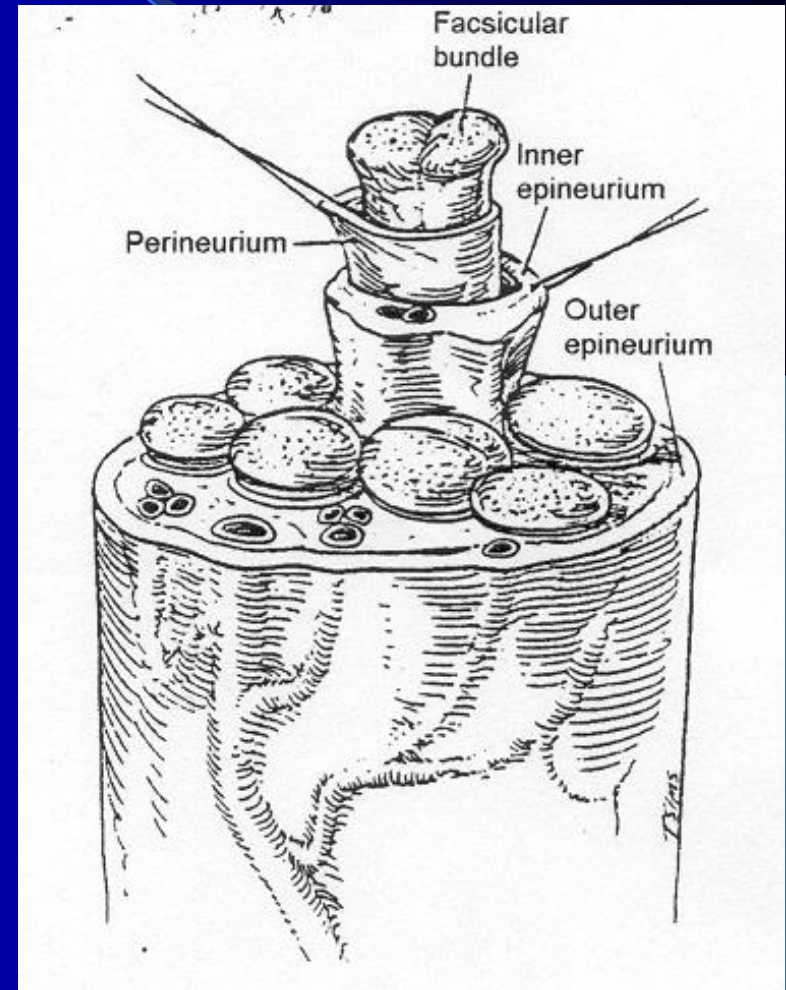
- \* **Entrapment:**

  - Carpal tunnel syndrome.**

  - Ulnar nerve entrapment at elbow.**

# Anatomy of the nerve

- Anatomy
  - Endoneurium
    - Surrounds axons of peripheral nerves
  - Perineurium
    - Surrounds individual fascicles
  - Epineurium
    - Surround the nerve trunk



# Classification of peripheral nerve injuries

- **Neuropraxia:** physiological cut of the nerve.
- **Axonotmesis:** interruption of the axons and myline sheath.
- **Neurotmesis:** complete anatomical transection of the nerve.

# Causes and mechanisms of Peripheral nerve injuries

- **Stretch-related injuries:** The most common, such as Erb palsy.
- **Trauma:** The second common such as those created by a knife.
- **Compression:** Third common such as Saturday Night palsy” due to radial nerve compression, entrapment.
- **Iatrogenic:** injection, during surgery.
- **Electrical injury:** results in severe and wide spread neural and soft tissue injury
- **Irradiation injury:** following radiotherapy

# Diagnosis of peripheral nerve injuries

- **History of trauma:** analysis of the type, date, mechanism, presence of associated injuries.
- **Clinical physical examination** of the injured nerve.
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- **Electro diagnostic evaluation:** NCV & EMG studies.
- **Relevant radiographic studies**

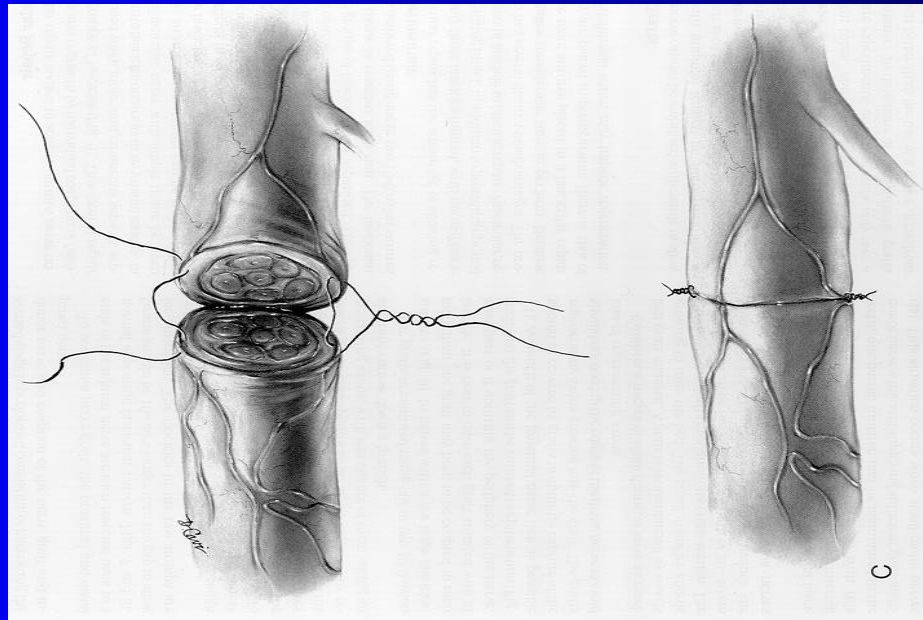
# Nerve injury: The Aim of Surgery

- Exploration:

1- restore continuity of the nerve if it is injured

Or

2- to decompress if there is entrapment.



# Nerve injury: time of repair

- Immediate or delayed??



# **Nerve injury: Rate of nerve regeneration**

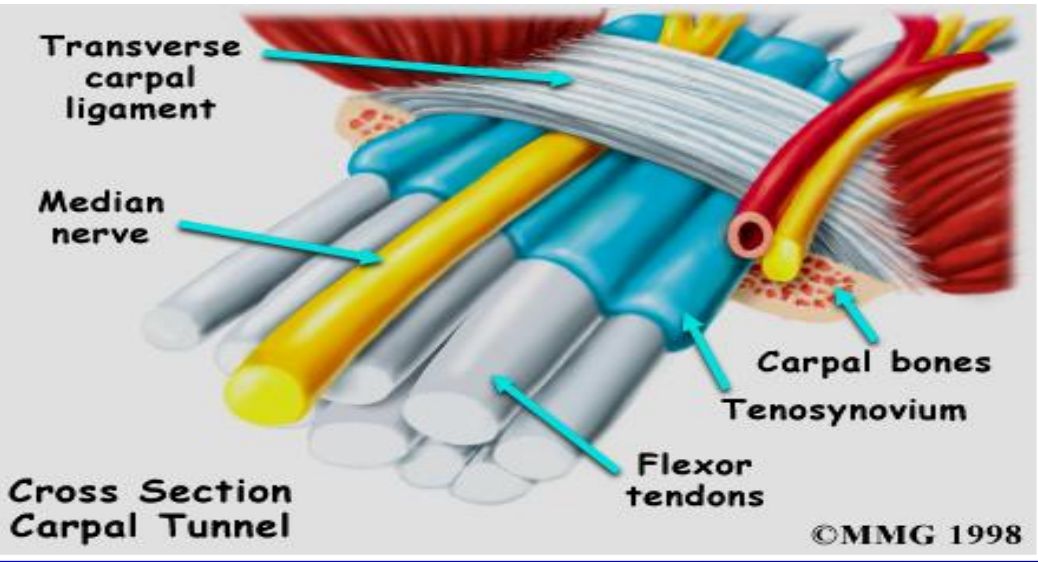
- **distal regeneration occurs at a rate of 1mm per day (about 1 inch per month), may be longer (when?)**



**Entrapment**

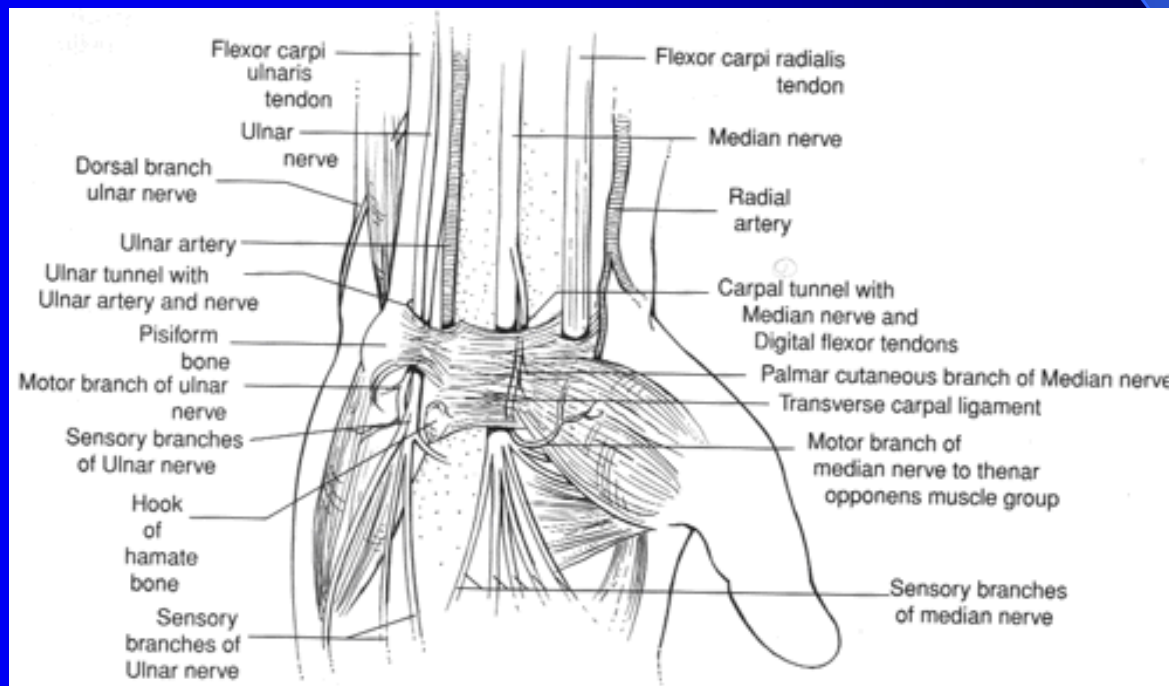
# Carpal tunnel syndrome

- Carpal tunnel syndrome (CTS) is defined as an entrapment of the median nerve in the wrist by the flexor retinaculum



# Carpal tunnel syndrome

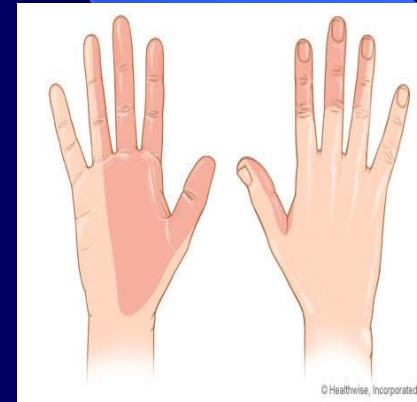
- **Pathogenesis:** compression, edema, ischemia that may be followed epineural fibrosis later on.



# Carpal tunnel syndrome

## Clinically:

- Pain and tingling in the lateral 3.5 fingers.
- Pain increase at night (nocturnal paresthesia) and manual work.
- Atrophy and wasting of muscles supplied by the median n in late stage (what are these muscles).
- Other sites of pain?? Forearm?? Palm
- Provocative tests
- Rule out cx causes.
- Nerve conduction study (mild, moderate, sever).



# Carpal tunnel syndrome

## Provocative tests:

- **Positive Tinel's Sign:**

- pain, numbness, or tingling in the median nerve distribution when tapping over the proximal wrist crease

- **Positive Phalen's sign:**

- pain, numbness, or tingling in the median nerve distribution resulting from complete palmar flexion of the wrist for about 60 seconds

- **Reverse Phalen's test:**

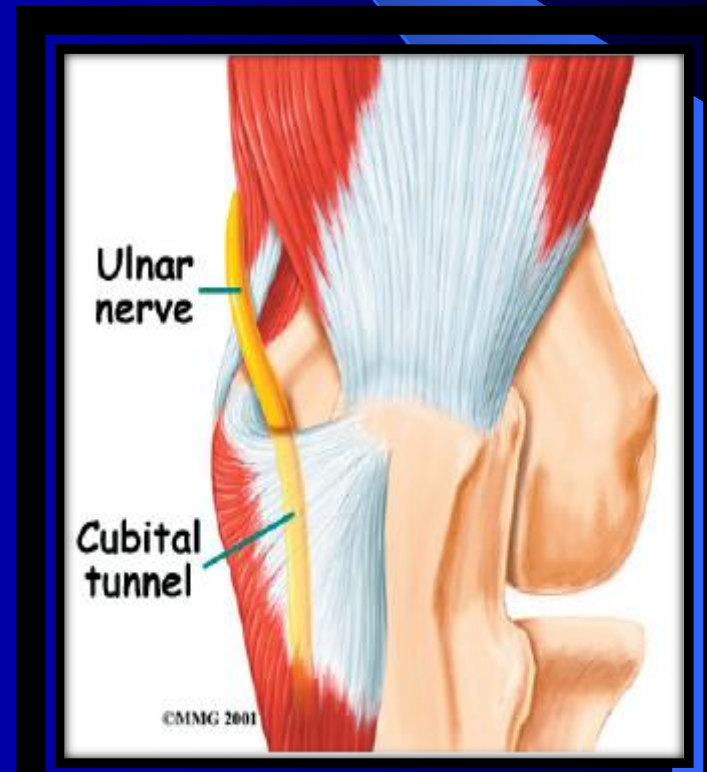
- **Compression test:**

# Carpal tunnel syndrome

- **Management:** ??? Conservative or surgical

# Ulnar nerve entrapment at elbow (tardy ulnar)

- Compression of the ulnar nerve in the cubital tunnel (at the back of humerus medial epicondyle)
- It is the 2<sup>nd</sup> most common entrapment after carpal tunnel syndrome.



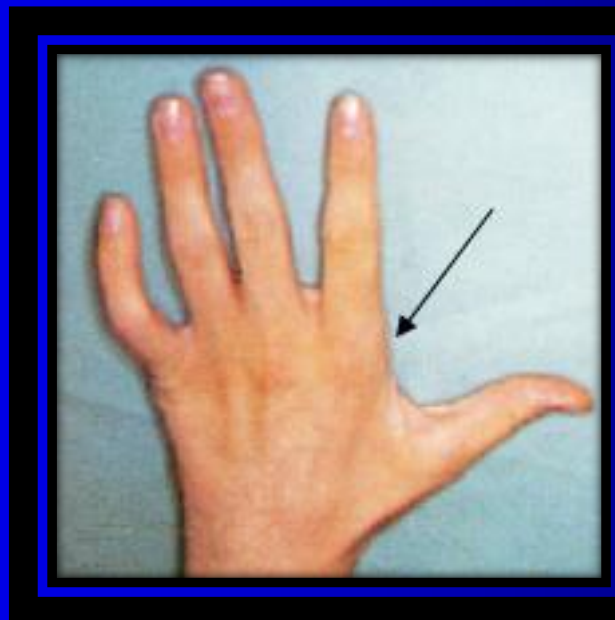
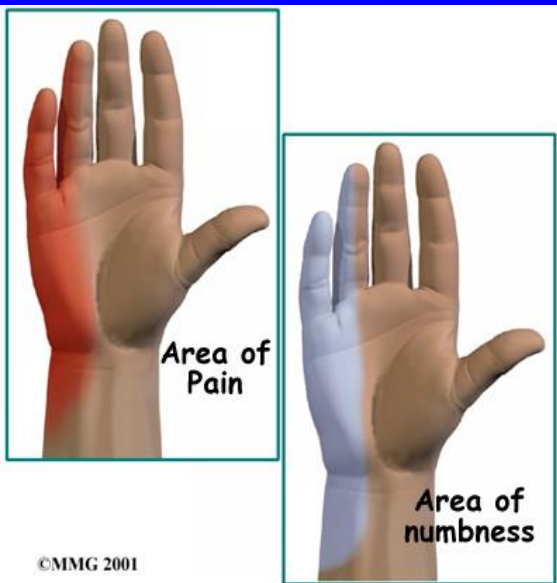


# Ulnar nerve entrapment at elbow (tardy ulnar)

## Clinically:

Paresthesias, numbness and pain in the disturbance of ulnar nerve distal to compression.

Atrophy and wasting of muscles supplied by the ulnar n in late stage (what are these muscles).



# Ulnar nerve entrapment at elbow (tardy ulnar)

## – Wartenberg's sign:

- Abducted little finger due to weakness of third palmar interosseus.

## – Froment's sign:

- Grasping sheet of paper between thumb and extended index finger lead to flexion of distal thumb phalanx ( done by FPL which is supplied by anterior interossus n) due to weak thumb adduction (done by adductor pollicis)

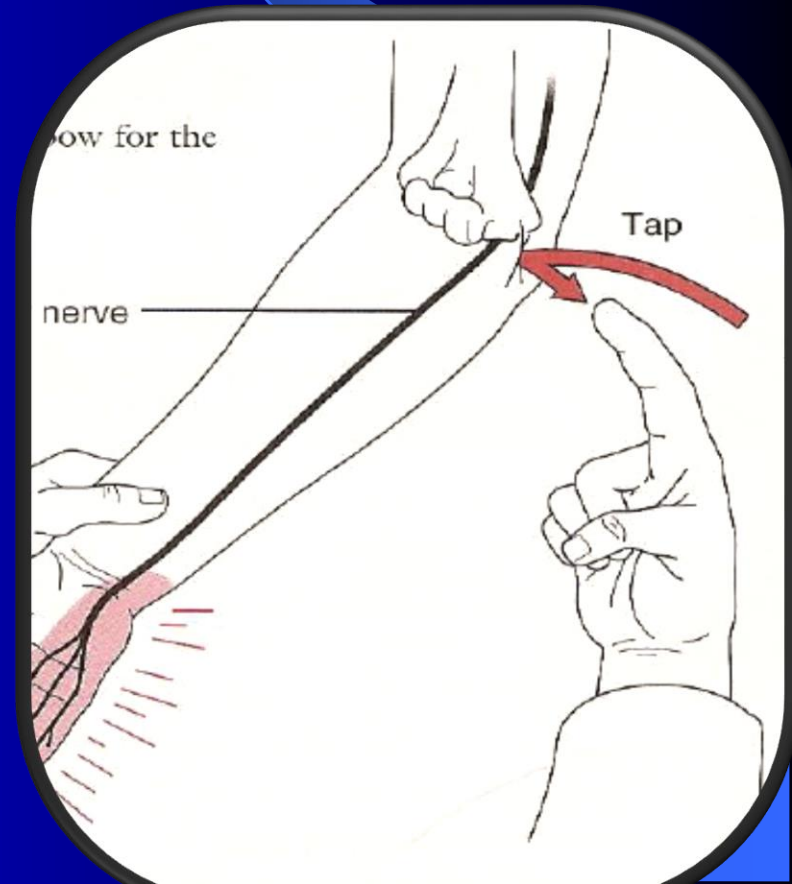


# Ulnar nerve entrapment at elbow (tardy ulnar)

## Provocative tests

(tinel's sign, Elbow flexion-pressure test)

## Nerve conduction and EMG.



# Ulnar nerve entrapment at elbow (tardy ulnar)

- **Management:** ??? Conservative or surgical



**Thanks**