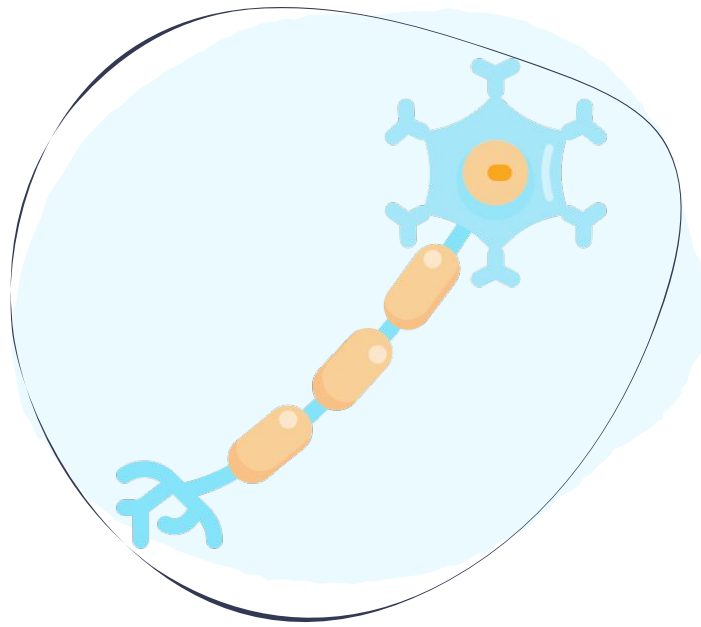





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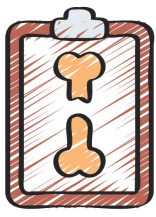


# Common Peripheral Nerve Problems & Injuries

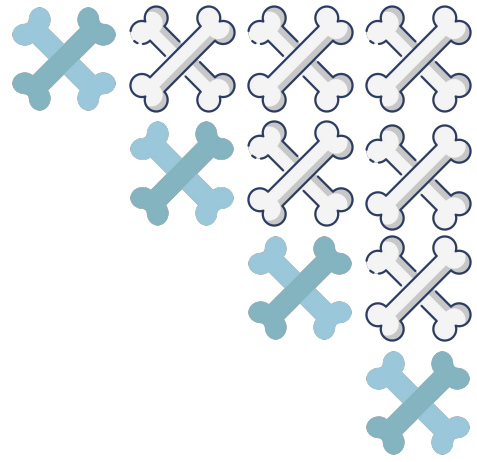
*Dr. Abdulrahman Alaseem*

## Color Index:

-  Main Text
-  Important
-  441 Notes
-  Old Notes
-  Extra
-  



# Objectives



No objectives were provided for this lecture.



# Resources



**Upper Extremity Nerve Injuries**

By Dirty Medicine



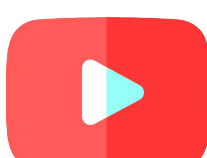
**Nerve Damage and Regeneration**

By Armando Hasudungan



**Lower Extremity Nerve Injuries**

By Dirty Medicine  
Our topics starts at (12:50)



**Nerve Injury | Nerve Damage**

By The Young Orthopod



**Peripheral Nerve Injury & Repair**

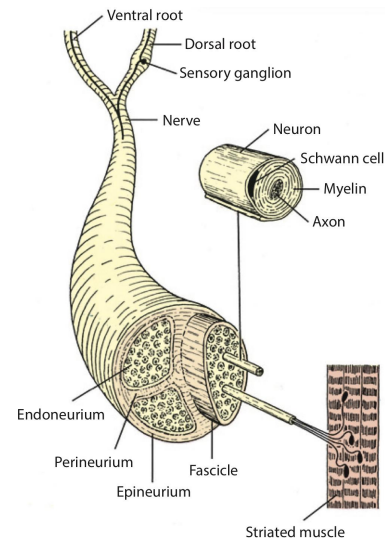
By Orthobullets

# Peripheral Nerve Injuries



## Nerve Structure and Function

- All motor **axons** (main conducting component) and the large sensory axons serving touch, pain and proprioception are coated with **myelin** (lipoprotein derived from the accompanying Schwann cells<sup>1</sup>).
- Neuron is made up by axon covered by myelin and schwann cells.
- Outside the Schwann cell membrane, the axon is covered by a connective tissue stocking, known as the **endoneurium** (between neurons).
- The axons that make up a nerve are separated into bundles (fascicles) by fairly dense membranous tissue, known as the **perineurium** (between fascicles).
- In a transected nerve, these fascicles are seen, their perineurial sheaths are well defined and strong enough to be grasped by fine instruments during nerve repair.
- The groups of fascicles that make up a nerve trunk are enclosed in an even thicker connective tissue coat, known as the **epineurium** (what we see in OR).
- The epineurium varies in thickness according to the area of the nerve and is particularly strong where the nerve is subjected to movement and traction, for example near a joint.
- **Richly supplied by blood vessels** that run longitudinally in the epineurium.



## Pathology

- Very commonly to be missed and no body will check it due to trauma, unconscious or comatose patients, all needs ATLS and the nerve injury not a priority in these situations.
- Nerves can be injured by ischemia<sup>2</sup>, compression<sup>3</sup>, traction<sup>4</sup>, laceration<sup>5</sup> or burning<sup>6</sup>.
- Damage varies in severity from transient and recoverable loss of function to complete interruption.

### 1 Transient Ischemia

IMPORTANT

- **Caused by:** Acute nerve compression.
- For a short period of time (no oxygen), without any damage (myelin is intact), least type of peripheral nerve injury.
- Starts with **numbness** and tingling within **15** minutes.
- Then **loss of pain** sensibility after **30** minutes.
- Followed by muscle **weakness** after **45** minutes.
- Relief of compression is followed by intense **paresthesia** (قرمات) for 5 minutes ('pins and needles' after a limb 'goes to sleep'), feeling is restored within 30 seconds and full muscle power after about **10** minutes.
- Due to transient endoneurial anoxia and **no nerve damage**.
- It could happen with fracture but once you reduce the fracture the compression relief.

1- Schwann cells are responsible for the myelination of the axons in the PNS, while the oligodendrocytes are responsible for that task in the CNS.

2- E.g. Acute limb ischemia (vascular patients), iatrogenic (tourniquet use in long procedures).

3- E.g. Dislocated joint, fracture compress it or carpal tunnel syndrome (very common classic injury).

4- In delivery when pull one hand of baby it might cause traction injury to brachial plexus (Erb's palsy), or when clutching a tree, or iatrogenic (excessive stretch in surgery).

5- Could be iatrogenic in OR, gunshot or stabbing.

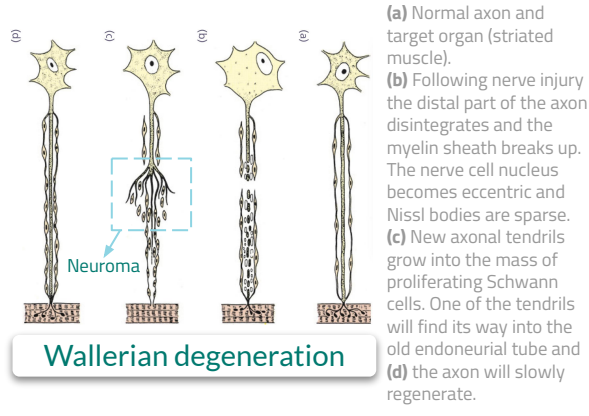
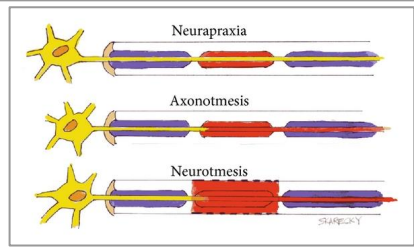
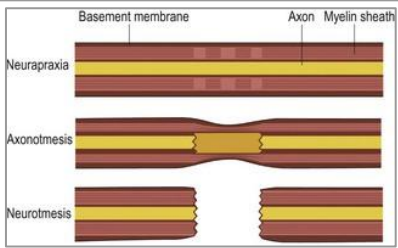
6- Regular burn or affect of radiation, e.g. Burn around elbow → Ulnar nerve injury.



# Classification of Peripheral Nerve Injury

Seddon's Classification	
<p><b>2</b></p> <p><b>Neurapraxia</b></p>	<ul style="list-style-type: none"> <li>• <b>Reversible</b> physiological nerve conduction block (loss of sensation and muscle power) followed by spontaneous recovery after a few days or weeks, up to 6-8 months or a year (not like transient ischemia which is seconds to minutes).</li> <li>• Due to mechanical <b>pressure</b> causing <b>segmental demyelination</b><sup>1</sup> (The axon itself is still <b>intact</b>, myelin is the problem)</li> <li>• <b>Examples:</b> Crutch palsy (brachial plexus), saturday night palsy (alcoholic), tourniquet palsy (iatrogenic)<sup>2</sup>, compartment syndrome, carpal tunnel syndrome, distal humerus fracture (holstein-lewis fracture) → Radial nerve injury, posterior hip dislocation (dashboard injury) → Sciatic nerve injury.</li> </ul>
<p><b>3</b></p> <p><b>Axonotmesis</b> (tmesis = cut)</p>	<ul style="list-style-type: none"> <li>• More severe form of nerve injury.</li> <li>• <b>Closed fractures and dislocations and open fractures.</b></li> <li>• Literally means <b>axonal interruption</b>.</li> <li>• <b>Loss of conduction but the nerve is in continuity</b> (so there is chance for recovery), and the <b>neural tubes (nerve sheath) are intact</b> (the axon within is cut)</li> <li>• <b>Wallerian degeneration</b> distal to the lesion.</li> <li>• Axonal regeneration starts (at the same time) within hours of nerve at a speed of 1-2 mm per day.</li> <li>• Eventually, they join to end-organs (motor end-plates and sensory receptors), and function is regained again.</li> </ul>
<p><b>4</b></p> <p><b>Neurotmesis<sup>3</sup></b></p>	<ul style="list-style-type: none"> <li>• Division of the nerve trunk as in <b>open fracture (high energy trauma)</b>.</li> <li>• There is healing at the injury site but usually the regenerating axons cannot reach the end organ, and the patient will have anomaly.</li> <li>• If the injury is more severe, whether the nerve is in continuity or not, recovery will not occur (not suspect to heal without surgical intervention "nerve repair").</li> <li>• <b>Rapid wallerian degeneration.</b></li> <li>• The <b>endoneurial tubes are destroyed</b> "whole nerve/fascicle".</li> <li>• Regenerating axons does not reach the distal segment.</li> <li>• <b>Neuroma</b> formation <b>كثرة النثر</b> (very painful fibrous tissue around the nerve ending, if you touch the skin → SEVERE PAIN → OR!) at the site of injury (regenerating axons, schwann cells and fibroblasts).</li> <li>• Function is <b>never</b> normal.</li> </ul>

Seddon Classification				
Seddon Type	Myelin intact	Endoneurium intact	Wallerian Degeneration	Reversible
Neuropraxia	No	Yes	No	Reversible
Axonotmesis	No	Variable	Yes	Variable
Neurotmesis	No	No	Yes	Irreversible



1- Axons are still intact however, dent in myelin sheath/schwann cells (no damage to the nerve).  
 2- Don't apply a tourniquet for more than 2-2:30 hours, if you need it, remove it each 2 hours and then after 1 hour apply it again.  
 3- Just know it's the most severe form, involving the whole tissue and there's axonal disruption e.g. knife cut of the forearm leading to drop rest.

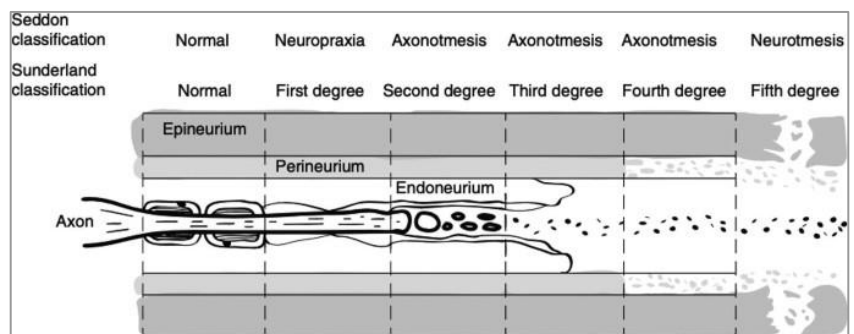
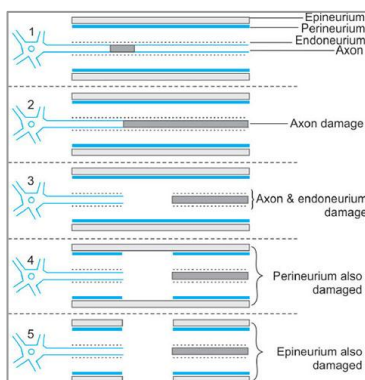


# Sunderland's Classification

No MCQs, it's for academic & researches purposes

- More practical classification, not for your level.
- Not important, just try to understand the idea, Seddon's classification is the important one.

<p><b>First Degree Injury</b> (Neurapraxia)</p>	<ul style="list-style-type: none"> <li>• Transient ischemia and neurapraxia.</li> <li>• Reversible.</li> </ul>
<p><b>Second Degree Injury</b> (Axonotmesis)</p>	<ul style="list-style-type: none"> <li>• Axonotmesis.</li> <li>• Axonal degeneration, but because the <b>endoneurium</b> is preserved, regeneration can lead to complete, or near complete, recovery without the need for intervention.</li> </ul>
<p><b>Third Degree Injury</b> (Axonotmesis)</p>	<ul style="list-style-type: none"> <li>• Worse than axonotmesis (but still not neurotmesis).</li> <li>• The endoneurium is disrupted but the <b>perineurium</b> is intact.</li> <li>• Chances of the regenerating axons to reach their targets are good.</li> <li>• Fibrosis and crossed connections will limit recovery (when axon heals in wrong direction).</li> </ul>
<p><b>Fourth Degree Injury</b> (Neurotmesis<sup>1</sup>)</p>	<ul style="list-style-type: none"> <li>• Only the <b>epineurium</b> is intact.</li> <li>• The nerve trunk is still in continuity, but internal damage is severe.</li> <li>• Recovery is <b>unlikely</b>.</li> <li>• The injured segment should be excised, and the nerve <b>repaired or grafted</b>.</li> </ul>
<p><b>Fifth Degree Injury</b> (Neurotmesis)</p>	<ul style="list-style-type: none"> <li>• The nerve is divided and will have to be repaired.</li> <li>• Epineurium is injured.</li> </ul>



## Clinical Features

- Acute nerve injuries are easily missed, especially if associated with fractures or dislocations.
- Ask for numbness, paresthesia or muscle weakness in the related area.
- Examine for signs of abnormal posture (Wrist/foot drop, claw hand, high-stepping gait), weakness and changes in sensibility.

1- This classification is not important to our level as the doctor said, but **in case of clarity**, I found this as an old note, and when I searched for it, all the references said it's equal to axonotmesis **not** neurotmesis (when we compare between the two classifications), so I will leave it, but pay attention to it if you're interested in orthopedics.



## Assessment of Nerve Recovery

- Motor recovery is slower (will come last) than sensory recovery.
- **Pain is the first sensation to return.**
- Clinical tests of muscle power and sensitivity to light touch and pin-prick to follow up nerve recovery.
- Low energy injury (high chance of recovery) v.s. High energy injury (like MVA or fall from height, not a good sign for the patient).

### Tinel's Sign<sup>1</sup>

- Most accurate and reliable test.
- Positive if patient has peripheral tingling (paresthesia) or dysesthesia upon percussing over the nerve.
- In a **neurapraxia**, Tinel's sign is **negative** (good indication).
- In **axonotmesis**, it's **positive** and advance with the regenerating axons.

### Two-Point Discrimination

- Measure of innervation density.

### Monofilament Assessment

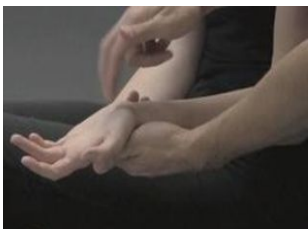
- Small filament used to check if patient has good degree of nerve sensitivity.

## Electromyography (EMG) & Nerve Conduction Studies (NCS)

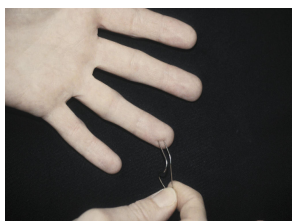
IMPORTANT

IMPORTANT

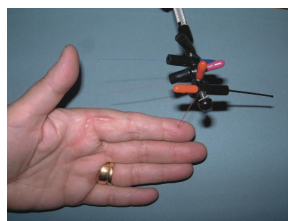
- Denervation potentials by the third week, in the initial stages not helpful to check the nerve so we don't do them before 3 weeks, usually after 6 weeks, then at 3 months, then at 6 months, then at 12 months.
- Distal humeral fracture & nerve injury → Surgery → No improvement → Electronic conductive study after 6 weeks.
- It excludes neurapraxia, and doesn't distinguish between axonotmesis and neurotmesis.
- **MRI** confirms the diagnosis of nerve injury.
- It's helpful to determine if there's a sign of nerve recovery or complete loss of function, because it will dictate the treatment plan.



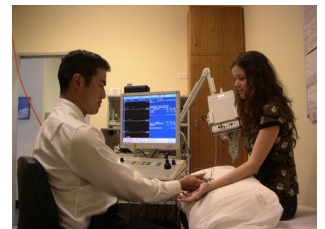
Tinel's sign



Two-point discrimination



Monofilament assessment



EMG/NCS

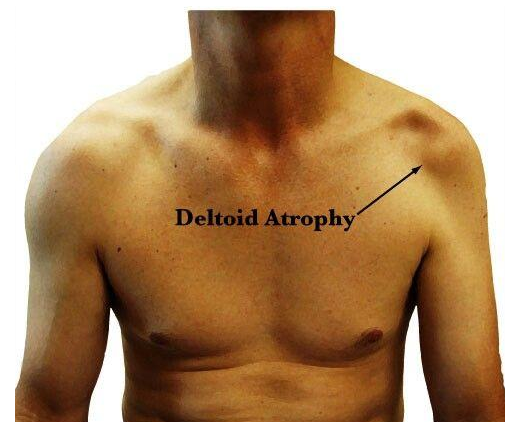
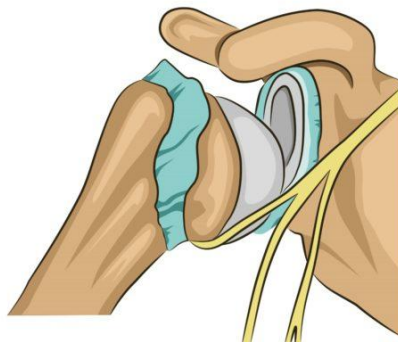
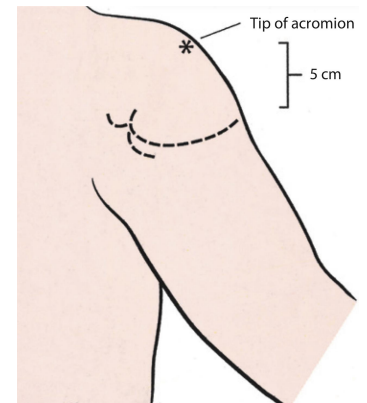
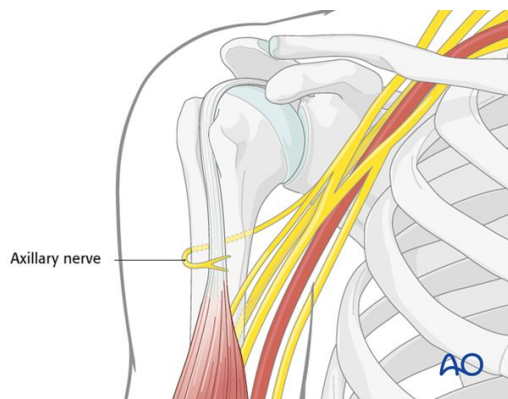
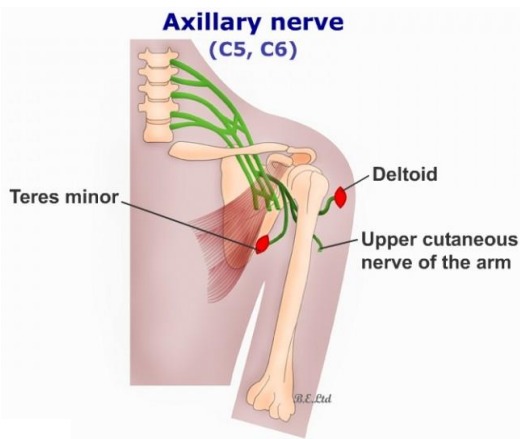
1- Tapping on the nerve pathway.

# Upper Limb Nerve Injuries



## Axillary Nerve

<p><b>Anatomy</b></p>	<ul style="list-style-type: none"> <li>• The axillary nerve (C5, 6) arises from the posterior cord of the brachial plexus.</li> <li>• Supplies:             <ul style="list-style-type: none"> <li>○ Teres minor</li> <li>○ Deltoid muscle "abduction of shoulder".</li> <li>○ And a patch of skin over the muscle at proximal lateral arm.</li> </ul> </li> <li>• Has an anterior branch that curls round the surgical neck of the humerus at 5 cm below the tip of the acromion (it's important to avoid injury during deltoid splitting approach).</li> </ul>
<p><b>Injuries</b></p>	<ul style="list-style-type: none"> <li>• Shoulder dislocation or fractures of the humeral neck.</li> <li>• Lateral deltoid-splitting incisions.</li> </ul>
<p><b>Clinical Features</b></p>	<ul style="list-style-type: none"> <li>• Shoulder weakness, and the deltoid is rapidly wasted<sup>1</sup>.</li> <li>• Numbness over the deltoid.</li> <li>• High recovery rate, 80% of cases recover spontaneously.</li> <li>• Compare shoulder contour of both sides.</li> </ul>

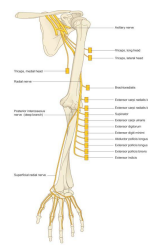


<sup>1</sup>- Deltoid wasting occurs only in chronic injuries.

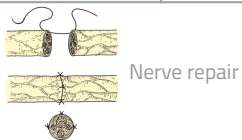
# Radial Nerve

**IMPORTANT**

Most commonly injured nerve



	Low Lesions	High Lesions	Very High Lesion
Level	Elbow or upper forearm.	<b>Humerus</b> (around spiral groove).	<b>Axilla or shoulder.</b>
Injuries	<ul style="list-style-type: none"> <li>• <b>Fractures</b> or <b>dislocations</b> at the elbow.</li> <li>• Iatrogenic lesions of the posterior interosseous nerve where it winds through the supinator muscle.</li> </ul>	<ul style="list-style-type: none"> <li>• Fractures of the humerus or after prolonged tourniquet pressure.</li> </ul>	<ul style="list-style-type: none"> <li>• Trauma or operations around the shoulder.</li> <li>• More often, chronic compression in the axilla (Saturday night palsy) or (crutch palsy).</li> </ul>
Clinical Features	<ul style="list-style-type: none"> <li>• Cannot extend the <b>metacarpophalangeal joint (MCP joints)</b> of the hand with weakness of thumb extension.</li> <li>• <b>Wrist extension is preserved</b> (very imp) because the branch to the extensor carpi radialis longus arises proximal to the elbow.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Wrist drop.</b></li> <li>• Inability to extend the Metacarpophalangeal (MCP) joints or elevate the thumb.</li> <li>• Sensory loss at the dorsal first web space.</li> <li>• Reduce the fracture and apply a U-slab and wrist splint and consider nerve exploration in 3 months if no signs of nerve recovery (X-ray pic).</li> </ul>	<ul style="list-style-type: none"> <li>• In addition to weakness of the wrist and hand, the <b>triceps</b> is paralysed (loss of elbow extension) and the triceps <b>reflex is absent.</b></li> <li>• For the triceps, test elbow extension <b>AGAINST</b> gravity.</li> </ul>
Pictures	<p>Posterior interosseous nerve Supinator</p>	<p>Holstein-Lewis fracture</p>	<p><b>Radial nerve</b> Compression of nerve in axilla or upper arm in patient sleeping with arm over chair back, edge of bed, etc., or compression by crutch.</p> <p>Wristdrop</p> <p>Saturday night palsy</p>



## Treatment

Wrist dynamic splint



### Open Injuries

- Nerve exploration and
- Primary repair<sup>1</sup> or
  - Grafting<sup>2</sup>
- as soon as possible

E.g. Traumatic amputation, stab wound, gunshot wound and iatrogenic.

### Closed Injuries

- Usually **neurapraxia**, eventually recovers so
- 1- **Observe**
  - 2- Splinting (occupational therapy)<sup>3</sup>
  - 3- Physiotherapy (passive exercises to prevent contractures), then send the patient for EMG/NCS.

### If No Recovery

- Tendon transfer**<sup>4</sup>
- If not available → Arthodesis (which is joints fusion with a plate or K-wire "old method").

1- Approximate edges and suturing nerve ending, in clean wound and complete transection like in open fractures.  
 2- In big burn area or big crush injury "big segment", graft is taken from sural nerve "because it has small sensory area in lateral foot without any motor function".  
 3- Keep the limb at functional position, otherwise he'll have muscle stiffness and deformity so we splint and keep the fingers extended, if can't splinting → Casting.  
 4- Current literature states that for injury in this nerve specifically it's better to wait, don't do anything, nerve repair or graft, regardless of the injury wait for 6 months and most of the patients will recover.





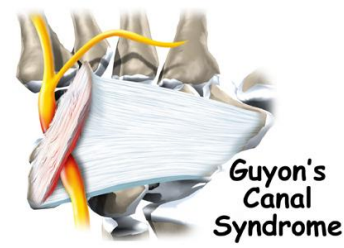
# Ulnar Nerve

## Signs + symptoms

	Low Lesions	High Lesions
Level	Near the wrist, e.g. Cuts on shattered glass or injury at level of forearm due to compression.	Near the elbow, e.g. Elbow fractures or dislocations.
Clinical Features	<ul style="list-style-type: none"> <li>• Numbness of the ulnar one and a half fingers.</li> <li>• <b>Claw hand deformity</b>, with hyperextension of the MCP joints and flexion of distal IP joints of the ring and little fingers due to weakness of the intrinsic muscles.</li> <li>• Weak finger abduction (because of loss of intrinsic muscles) and <b>thumb adduction</b>, makes <b>pinch</b> difficult.</li> <li>• <b>Hypothenar</b> and interosseous <b>wasting</b>.</li> <li>• Ask the patient to hold a paper by the side, he won't be able to do it using the thumb, and will compensate by using flexor pollicis longus (which is supplied by median nerve) for loss of thumb adductor pollicis (<b>positive Froment's sign</b>).</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Hand:</b> Not markedly deformed because the ulnar half of FDP (Flexor Digitorum Profundus) is paralysed and the fingers are therefore <b>less 'clawed' (high ulnar paradox)</b>.</li> <li>• <b>Explanation:</b> In low lesions there is claw hand because the flexor digitorum profundus is working and causes flexion supplied by median nerve BUT if it is high both muscles are affected so there isn't much clawing.</li> <li>• <b>Ulnar neuritis (cubital tunnel syndrome):</b> Compression or entrapment of the nerve in the medial epicondylar (cubital) tunnel.</li> <li>• Severe valgus deformity of the elbow or prolonged pressure on the elbows in anaesthetized or bed-ridden patients.</li> </ul>
Pictures		

# Guyon's Canal Syndrome

- Also known as (ulnar tunnel syndrome) or (handlebar palsy).
- Entrapment of the ulnar nerve as it passes through Guyon's canal at the ulnar border of the wrist "**compression neuropathy of ulnar nerve in the guyon's canal**".
- Caused by ganglion (most commonly) or ulnar artery aneurysm (rare).
- **MRI will diagnose** the ganglion (which is **the most common cause**).

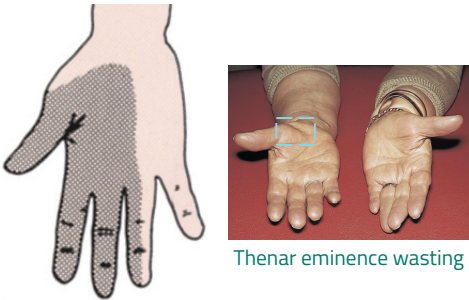
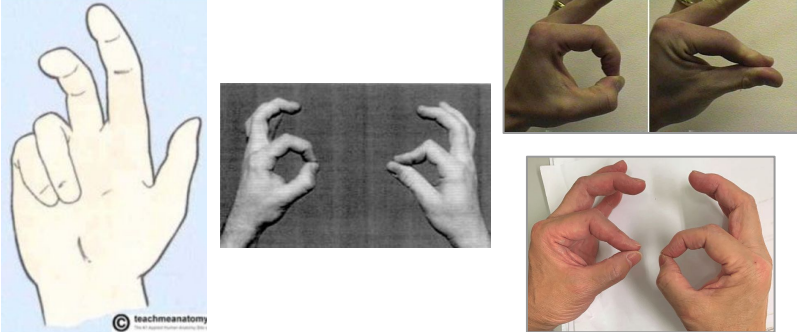


1- Why is the morphology of claw hand like that? Because from your anatomy it is the opposite of the muscles that were paralyzed which are the two medial lumbricals, these muscles flex the fingers at the metacarpophalangeal joints, and extend them at the interphalangeal joints.



# Median Nerve

## Signs + symptoms

	Low Lesions (most commonly injured)	High Lesions
<b>Level</b>	Near the wrist.	High up in the forearm.
<b>Injury</b>	Cuts in front of the wrist or by carpal, <b>lunate</b> dislocations.	Forearm fractures or elbow dislocation.
<b>Clinical Features</b>	<ul style="list-style-type: none"> <li>• Unable to <b>abduct the thumb</b>.</li> <li>• <b>Loss of thumb opposition</b>.</li> <li>• Sensation is lost over the radial three and a half digits.</li> <li>• <b>Thenar eminence</b> is wasted and trophic changes (chronic injury).</li> <li>• <b>Carpal tunnel syndrome</b> (distal within wrist).</li> </ul>	<ul style="list-style-type: none"> <li>• Same as low lesions, but in addition, all these muscles are paralysed:             <ul style="list-style-type: none"> <li>○ The long flexors to the thumb, index and middle fingers.</li> <li>○ The radial wrist flexors.</li> <li>○ <b>The forearm pronator muscles.</b></li> </ul> </li> <li>• Typically, the hand is held with the ulnar fingers flexed and the index straight (the 'pointing index sign').</li> <li>• <b>Positive "OK" sign.</b></li> <li>• Thumb and index flexors are deficient, there is a characteristic pinch defect with the distal joints in full extension.</li> <li>• <b>Positive Pucker sign.</b></li> </ul>
<b>Pictures</b>	 <p>Thenar eminence wasting</p>	

## Isolated Anterior Interosseous Nerve Lesions

- Anterior interosseous nerve syndrome.
- Extremely rare.
- Similar to those of a high lesion but **without any sensory loss** (this is a purely motor nerve).
- The usual cause is brachial neuritis (Parsonage–Turner syndrome) which is associated with shoulder girdle pain after immunization or a viral illness

1- What is the most sensitive median nerve clinical test? **Durkan test** (also called carpal compression test), examiner press with thumb over carpal tunnel for 30 seconds, an onset of pain or paresthesia in median nerve distribution within 30 seconds is positive result.

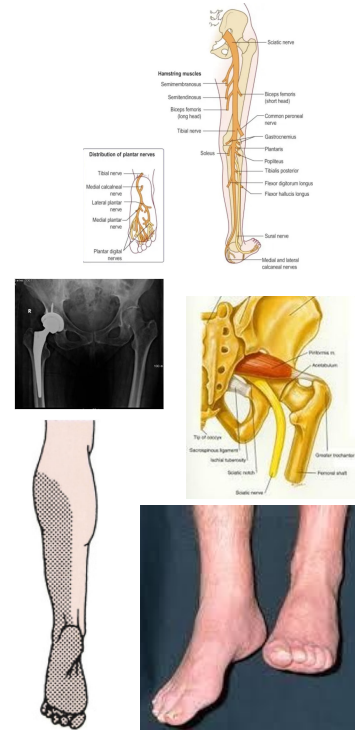
# Lower Limb Nerve Injuries



Not important, focus on upper extremity only.

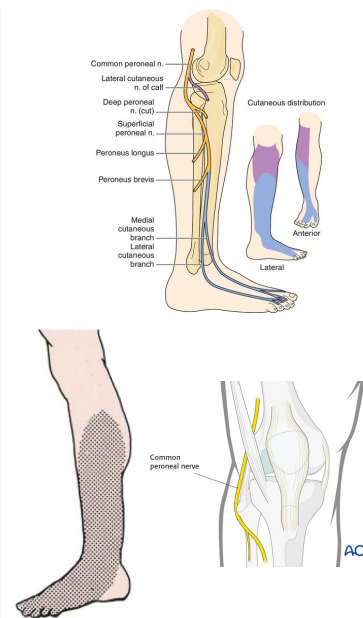
## Sciatic Nerve

<p><b>Injury</b></p>	<ul style="list-style-type: none"> <li>• Division (<b>cut</b>) of the main sciatic nerve is rare.</li> <li>• Traction lesions (<b>traumatic hip dislocations</b> and with pelvic fractures).</li> <li>• Iatrogenic lesions (<b>posterior approach in total hip replacement</b>).</li> </ul>
<p><b>Clinical Features</b></p>	<ul style="list-style-type: none"> <li>• In a <b>complete lesion (rare) at the hip</b>: The hamstrings and all muscles below the knee are paralysed and the <b>ankle jerk is absent</b>.</li> <li>• <b>Very debilitating injury affects patient's quality of life</b>.</li> <li>• Sensation is lost below the knee, except on the medial side of the leg (<b>supplied by saphenous branch of femoral</b>).</li> <li>• <b>Foot-drop</b> "<b>weakness in ankle dorsiflexion</b>" and a <b>high-stepping gait</b>.</li> <li>• Sometimes <b>only the deep part of the nerve</b> is affected (common peroneal nerve lesion), <b>which can happen</b> after hip replacement (<b>more common</b>).</li> </ul>



## Peroneal Nerve

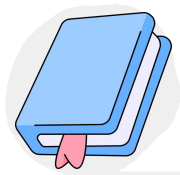
<p><b>Level</b></p>	<ul style="list-style-type: none"> <li>• <b>Common peroneal nerve</b> or one of its branches.</li> <li>• Often damaged at the level of the <b>fibular neck</b>.</li> </ul>
<p><b>Injury</b></p>	<ul style="list-style-type: none"> <li>• Severe traction when the knee is forced into varus (e.g. in lateral ligament injuries).</li> <li>• Fractures around the knee.</li> <li>• During operative correction of gross valgus deformities.</li> <li>• Pressure from a splint or a plaster cast.</li> <li>• From lying with the leg externally rotated (<b>e.g. ICU patients</b>).</li> </ul>
<p><b>Clinical Features</b></p>	<ul style="list-style-type: none"> <li>• <b>Foot-drop</b>: Can neither <b>dorsiflex</b> (deep branch) nor <b>evert the foot</b> (superficial branch).</li> <li>• High-stepping gait.</li> <li>• Sensation is lost over the front and outer half of the leg and the dorsum of the foot.</li> </ul>



## Tibial Nerve

<p><b>Injury</b></p>	<ul style="list-style-type: none"> <li>• Rarely injured except in open wounds.</li> </ul>
<p><b>Clinical Features</b></p>	<ul style="list-style-type: none"> <li>• <b>Unable to plantar-flex</b> the ankle or the toes.</li> <li>• <b>Sensation</b> is absent over the <b>sole of the foot</b> and part of the calf.</li> <li>• Because both the long flexors and the intrinsic muscles are involved, there is not much clawing.</li> </ul>





## Peripheral Nerves

• see [Neurology, N38](#)

### Classification

**Table 20. Seddon's Classification of Peripheral Nerve Injury**

Nerve Injury	Description	Recovery
<b>Neurapraxia (class I)</b>	Axon structurally intact but fails to function	Within h to mo (average 6-8 wk)
<b>Axonotmesis (class II)</b>	Axon and myelin sheath disrupted but endoneurium and supporting structures intact → Wallerian degeneration of axon segment distal to injury	Spontaneous axonal recovery at 1 mm/d, max at 1-2 yr
<b>Neurotmesis (class III)</b>	Nerve completely transected	Need surgical repair for possibility of recovery

### Etiology

- ischemia
- nerve entrapment nerve compressed by nearby anatomic structures, often secondary to localized, repetitive mechanical trauma with additional vascular injury to nerve
- direct trauma (e.g. transection)
- iatrogenic

### Investigations

- clinical exam: muscle bulk and tone, power, sensation, reflexes, localization via Tinel's sign (paresthesias elicited by tapping along the course of a nerve)
- electrophysiological studies: EMG/nerve conduction study (assess nerve integrity and monitoring recovery after 2-3 wk post-injury)
- labs: blood work (e.g. CBC, TSH, vitamin B12), CSF
- imaging: C-spine, chest/bone x-rays, myelogram, CT, magnetic resonance neurography, angiogram if vascular damage is suspected

### Treatment

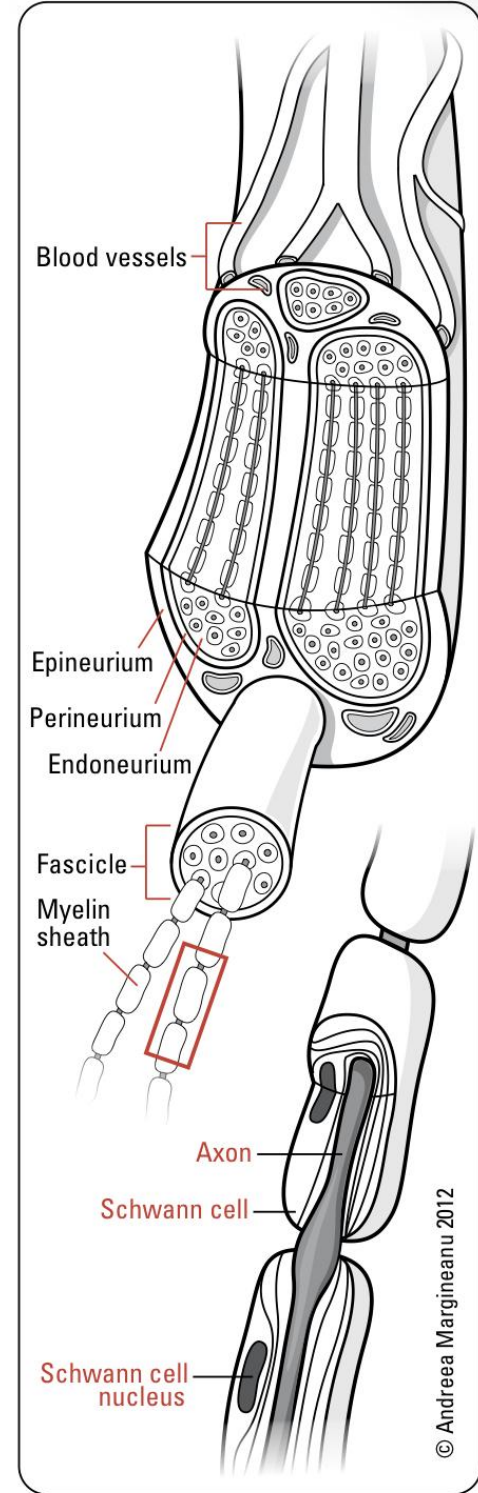
- early neurosurgical consultation if injury is suspected

**Table 21. Treatment by Injury Type**

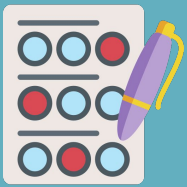
Injury	Treatment
<b>Entrapment</b>	Conservative: Prevent repeated stress/injury, physiotherapy, NSAIDs, local anesthesia/steroid injection Surgical: Nerve decompression ± transposition for progressive deficits, muscle weakness/atrophy, failure of medical management
<b>Stretch/Contusion</b>	Follow-up clinically for recovery; exploration if no recovery in 3 mo
<b>Axonotmesis</b>	If no evidence of recovery, resect damaged segment Prompt physical therapy and rehabilitation to increase muscle function, maintain joint ROM, maximize return of useful function Recovery usually incomplete
<b>Neurotmesis</b>	Surgical repair of nerve sheath unless known to be intact (suture nerve sheaths directly if ends approximate or nerve graft (usually sural nerve)) Clean laceration: early exploration and repair Contamination or associated injuries: tag initially with nonabsorbable suture, reapproach within 10 d

### Complications

- loss of function (temporarily or permanently)
- neuropathic pain: with neuroma formation
- complex regional pain syndrome: with sympathetic nervous system involvement



**Figure 27. Peripheral nerve structure**



# Quiz

**Q1: After close fracture reduction the pulse was normal but the patient couldn't feel and was unable to dorsiflex, what would you do next?**

**A**

Go to the OR and do nerve exploration

**B**

Nothing it will return by itself

**C**

Tell the patient that he has it before the reduction

**D**

Tell the patient that he will have a permanent damage

**Q2: 11 years old boy sustained left supracondylar humeral trauma following a fall, which of the following statements is correct if the median nerve or its branches are injured as a result of this injury?**

**A**

Positive OK sign

**B**

Clawing of the hand

**C**

Loss of thumb adduction

**D**

Loss of sensation of little finger

**Q3: Loss of forearm pronation is a motor effect of?**

**A**

Median nerve injury in elbow

**B**

Median nerve injury at the wrist

**C**

Axillary nerve injury

**D**

Ulnar nerve injury

**Q4: As a result of injury of the ulnar nerve at the wrist?**

**A**

Marked atrophy of the thenar eminence

**B**

Wasting of hypothenar eminence

**C**

Loss of sensation over the thumb

**D**

Unable to abduct the thumb.

**Q5: A 32-year-old man comes to the physician because of episodic tingling and numbness in his right hand for the past 3 months, his symptoms are worse in the evening, there is no history of trauma, he is employed as a carpenter, physical examination shows decreased pinch strength in the right hand, sensations are decreased over the little finger and both the dorsal and palmar surfaces of the medial aspect of the right hand, which of the following is the most likely site of nerve compression?**

**A**

Cubital tunnel

**B**

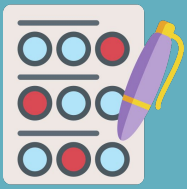
Carpal tunnel

**C**

Radial groove

**D**

Surgical neck of humerus

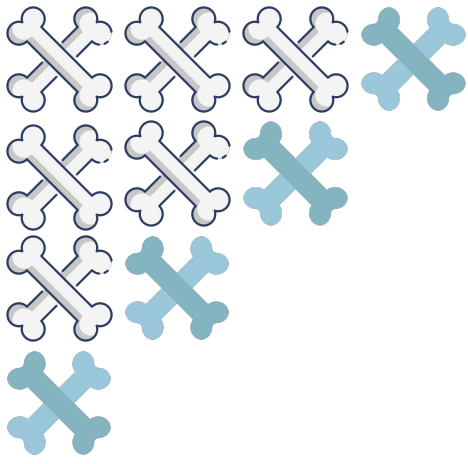


# Quiz

## SAQs

441 & 439 & 438:

1. Name 3 common classes/types of peripheral nerve injury?
  - 1- Neurapraxia
  - 2- Axonotmesis
  - 3- Neurotmesis
  
2. Name 3 treatment options for closed non-iatrogenic peripheral nerve injury?
  - 1- Observation
  - 2- Splinting (occupational therapy)
  - 3- Physiotherapy (passive exercises)



# Team Leader

## Abdulrahman Alroqi

Done by                      Organized by  
Alkaseem Binobaid      Abdulrahman Alroqi

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This work was originally done by team 438 & 439

