



432 Surgery Team

11 Peripheral Nerve Injuries



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Objectives

1. Brachial plexus injuries.

2. Peripheral nerve injuries:

- Axillary nerve.
- Musculocutaneous nerve.
- Radial nerve.
- Median nerve.
- Ulnar nerve.

Peripheral Nerve Injuries (PNI):

Sunderland-Classification of Peripheral Nerve Injury:

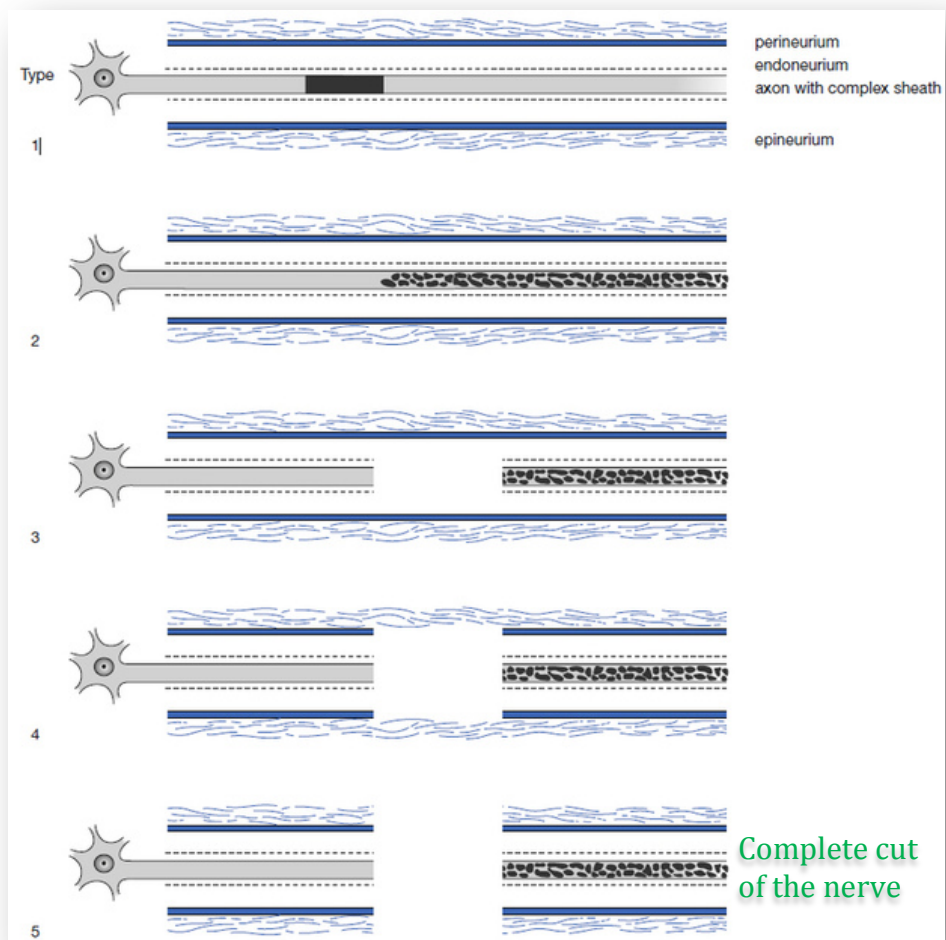
Type1: Conduction block (neurapraxia) “Only myelin sheath”.

Type2: Axonal injury (axonotmesis).

Type3: Type2 + Endoneurium injury.

Type4: Type3 + Perineurium injury.

Type5: Type4 + Epineurium injury (neurotmesis).



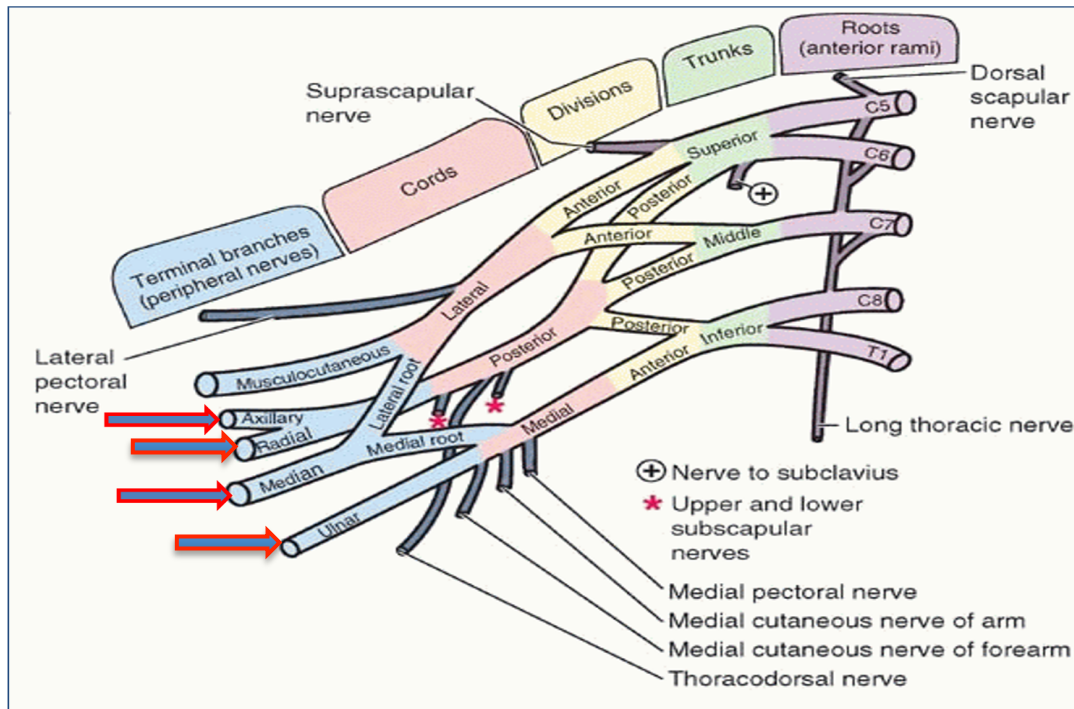
General Approach to a Patient with PNI or Hand Injury:

History	Physical Examination	Investigation	Consultation	Treatment
<ul style="list-style-type: none"> • 1. Hand dominance. • 2. Occupation (it will affect the Tx). • 3. Hobbies. • Main Complaint: <ol style="list-style-type: none"> 1. Sensory. 2. Motor. 3. -/+ Pain. • HPI: <ul style="list-style-type: none"> - Site. - Onset. - Duration. - Mechanism of injury. - Progression of symptoms. • Risk Factors: The physician should make sure if it is injury or not (compressive): <ul style="list-style-type: none"> - Trauma. - Previous surgery. 	<ul style="list-style-type: none"> • Sensory. • Motor. • Specific tests. 	<ul style="list-style-type: none"> • Nerve conduction study (NCS). • MRI (in space-occupying lesion). 	<ul style="list-style-type: none"> • Physiotherapy. • Occupational therapy. • Splint / Range of motion. 	<ul style="list-style-type: none"> • Compression: splint, give NSAIDs, & modify lifestyle. If no improvement within 3 months--> surgical (decompression, nerve transposition, & tendon transfer). • Trauma or laceration (emergency): nerve repair, nerve graft, nerve transfer and tendon transfer.

Brachial Plexus Injuries:

Basic Anatomy:

- It is formed from the union of the anterior rami of the 5th, 6th, 7th, 8th cervical and 1st thoracic nerves (C5, C6, C7, C8, and T1).
- The plexus is divided into Roots, Trunks, Divisions, Cords and terminal Branches.

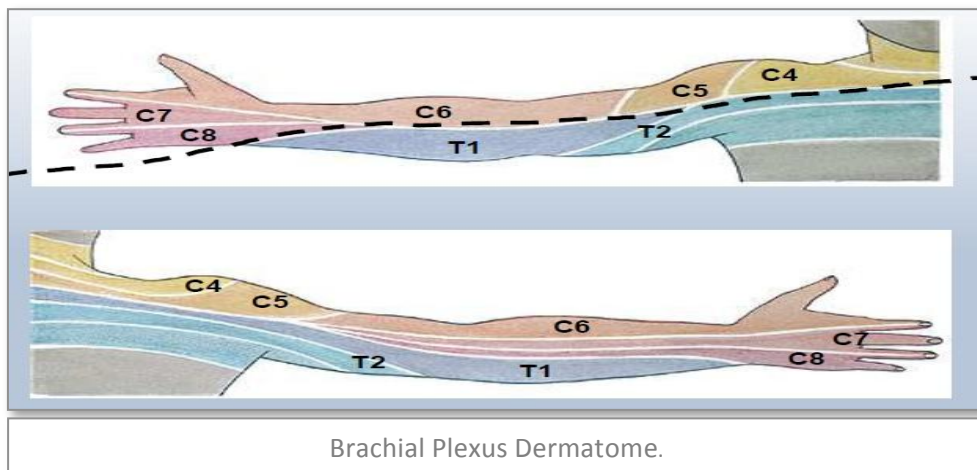


Classification of Brachial Plexus Injuries:

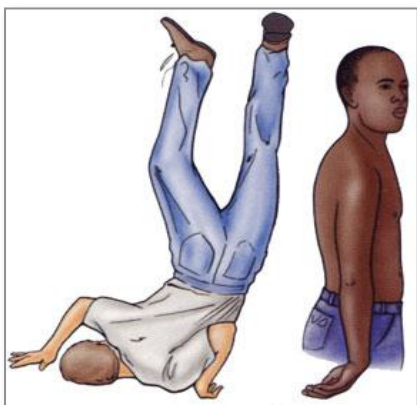
- **Open injuries** (stab wounds or gunshot wounds):
 - Can be at any level (roots, trunks, divisions, etc.).
 - Classified into:
 - Supraclavicular (roots, trunks, divisions).
 - Infraclavicular (divisions, cords, terminal branches).
- **Closed injuries:**
 - More common than open injuries.
 - **Injury is most commonly at the roots level.**
 - Caused by car accidents, outstretching of the shoulder like when playing sports or during difficult deliveries where the baby is pulled in emergency situations.

- Examination of closed injuries: Nerves are not examined; **Roots are examined** by examining **dermatomes** (sensation) and **myotomes** (movement).

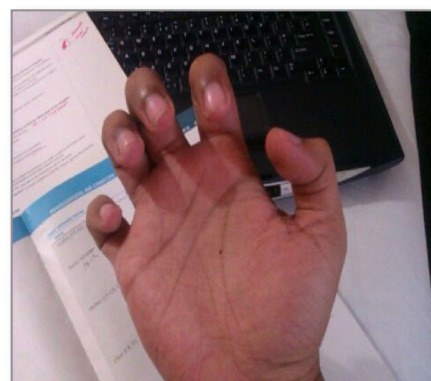
Root	Dermatome	Myotome
C5	Shoulder tip + lateral arm.	Shoulder abduction + external rotation.
C6	Lateral forearm + thumb and index finger.	Elbow flexion.
C7	Middle finger.	Wrist extension.
C8	Ring and little fingers + lower aspect of medial forearm.	Making a fist.
T1	Upper aspect of medial forearm + medial arm.	Finger crossing.



Types of Closed Brachial Plexus Injuries:



Upper brachial plexus lesion:
Erb's palsy



Lower brachial plexus lesion:
Klumpke's palsy

Types of Closed Brachial Plexus Injuries:

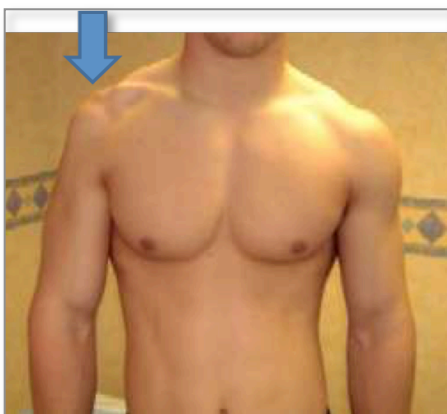
Closed Brachial Plexus Injuries	Roots Injured	Movements Lost (review the previous table).	Clinically (the patient will have opposite to the normal function of the damaged nerves).	Associated Injuries
<p>Upper Brachial Plexus Lesion</p> <p>Called: Erb's palsy (Erb-Duchenne Palsy)</p>	C5, C6, +/- C7.	<p>C5: loses the ability to <u>abduct</u> the shoulder and external rotation.</p> <p>C6: loses the ability to flex elbow.</p> <p>C7: loses the ability to extend the wrist.</p>	<ul style="list-style-type: none"> - Shoulder <u>adduction</u>. - Internal rotation. - Elbow extension. - Wrist flexion. <p>* This is called waiter's tip posture.</p>	<ul style="list-style-type: none"> - Injury to the phrenic nerve that arises from the 3rd, 4th, and 5th cervical roots, so half of the diaphragm will be paralyzed. - Adult X-ray: it will show elevated hemi diaphragm. - In children the intercostals are not strong enough to compensate, so the baby will have breathing problems (obstetric palsy).
<p>Lower Brachial Plexus Lesion</p> <p>Called: Klumpke's palsy</p>	C8 & T1.	<p>C8: loses the ability to make a fist.</p> <p>T1: loses the ability to cross fingers.</p> <p>"It's about hand".</p>	<p>The patient will have simian hand and clawing of all fingers.</p>	<ul style="list-style-type: none"> - Sympathetic nerves to the face come from a branch of the 1st thoracic nerve T1. - If T1 is injured → loss of sympathetic supply to the face on one side → Horner's syndrome. - Horner's syndrome: <ol style="list-style-type: none"> 1. Ptosis (drooping of upper eye lid). 2. Miosis (constricted pupil). 3. Anhydrosis (inability to sweat).
Total Palsy	All roots C5, C6, C7, C8, & T1.	--	The patient is unable to move entire limb; flail limb.	--

Quick Clinical Hints:

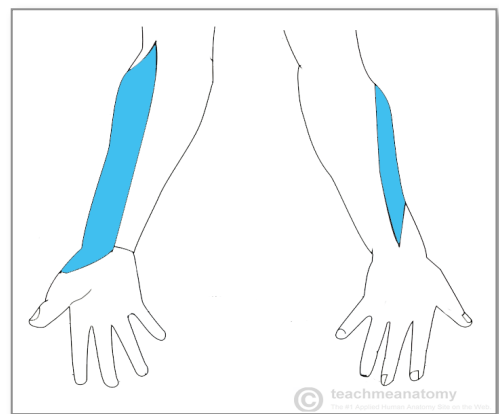
1. **Upper** lesion (C5, C6, C7) → Erb's palsy and phrenic nerve symptoms.
2. **Lower** lesion (C8, T1) → Klumpke's palsy and sympathetic symptoms.
3. **Total** lesion (C5, C6, C7, C8, T1) → flail limb and both phrenic and sympathetic symptoms.

Peripheral Nerve Injuries:

Nerve	Cause of injury/nerve innervation	Clinical Features		Summary
		Motor	Sensory	
Axillary Nerve	<ul style="list-style-type: none"> - Isolated injuries most commonly happen with shoulder dislocation and compression of the nerve by crutches. - Supplies the deltoid and teres minor muscles. 	<ul style="list-style-type: none"> - To the deltoid muscle so the patient will not be able to <u>abduct</u> his shoulder (30-90°). - The patient can still initiate abduction (action of supraspinatus). - It also supplies teres minor that does external rotation, which is the same action of infraspinatus, so the patient can still externally rotate his arm. 	<ul style="list-style-type: none"> - Loss of sensation over the skin of the lateral arm on lower half of the deltoid. 	<ul style="list-style-type: none"> - Loss of <u>abduction</u> and sensation over the lateral arm.
Musculocutaneous Nerve	<ul style="list-style-type: none"> - Isolated injuries usually happen with stab wounds or gunshots. - Supplies coracobrachialis, brachialis, and biceps muscles. 	<ul style="list-style-type: none"> - Coracobrachialis and brachialis are not important clinically. - Biceps: <ul style="list-style-type: none"> * Weak supination (because the supinator muscle can compensate). * Loss of flexion of elbow joint. 	<ul style="list-style-type: none"> - Loss of sensation over the lateral forearm and the thumb. 	<ul style="list-style-type: none"> - Loss of elbow flexion, weak supination, and loss of sensation over the lateral forearm.



Deltoid atrophy and loss of rounded contour in axillary nerve injury



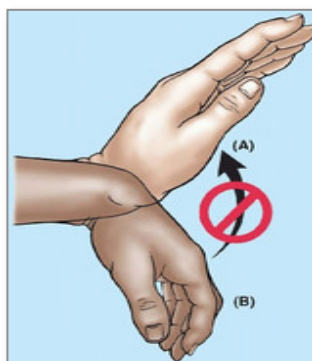
Cutaneous innervation: Loss of sensation over the lateral forearm in musculocutaneous nerve injury

Peripheral Nerve Injuries (Cont.):

Nerve	Cause of injury/nerve innervation	Clinical Features		Summary	
		Motor	Sensory		
Radial Nerve (All roots C5, C6, C7, C8, & T1).	<p>- Runs in the spiral groove so injuries happen in humerus bone fractures.</p> <p>- Distribution:</p> <p>High radial n. injury:</p> <p>* <u>Upper arm (axilla):</u> supplies the triceps → strong extensor of the elbow.</p> <p>* <u>Lower arm above elbow:</u></p> <p>~ Brachioradialis.</p> <p>~ Extensor carpi radialis longus (wrist extensor).</p> <p>Lower radial n. injury:</p> <p>* <u>Forearm:</u></p> <p>1. Sensory branch: sensation over the lateral three and a half fingers dorsally.</p> <p>2. Motor branch (posterior interosseous nerve): thumb and finger extension.</p>	Saturday night palsy:		<p>Injury to the radial n. in the axilla:</p> <p>All motor and sensory functions are lost.</p>	
		<p>- Very high radial n. injury due to compression of the nerve in the axilla.</p> <p>- It's called like this because drunk people sleep with an arm behind the chair that causes the compression.</p> <p>- Everything is affected: elbow, wrist, fingers, and thumb (no extension).</p>	<p>- Loss of sensation along the radial n. distribution.</p>		
		Humerus fracture in spiral groove with radial nerve injury:		<p>- Numbness or loss of sensation over the lateral three and a half fingers to the base of proximal phalanges dorsally.</p>	<p>Injury to the radial n. in the spiral groove:</p> <p>Triceps is spared and everything else is lost.</p>
		<p>- Normal elbow (triceps is supplied higher; spared).</p> <p>- No wrist extension (wrist drop).</p> <p>- No thumb and finger extension (digits drop).</p>			
Posterior interosseous nerve injury:		<p>- Stab wound in the forearm.</p> <p>- Elbow and wrist are normal (no wrist drop).</p> <p>- Thumb and finger extension are lost.</p>	<p>- No sensory loss; pure motor injury.</p>	<p>Injury to the radial n. in the forearm to the posterior interosseous nerve:</p> <p>Elbow, wrist, and sensation are normal.</p>	



Sensory distribution of the radial nerve in the hand



Wrist drop in radial nerve injury

Note(s):

- Most of **radial n.** branches are in **the arm (EXTENSORS)**.
- Most of **median n.** branches are in **the forearm (FLEXORS)**.
- Most of **ulnar n.** branches are in **the hand**.

Forearm:

MUSCLES

• *5 Superficial muscles:*

- Pronator teres → pronation of the forearm.
- Flexor carpi radialis → wrist flexion.
- Palmaris longus → wrist flexion.
- Flexor carpi ulnaris → wrist flexion.
- Flexor digitorum superficialis → flexion of the proximal interphalangeal joints (PIP) so flexes the middle phalynx.

• *3 Deep muscles:*

- Flexor digitorum profundus (FDP) → flexion of the distal interphalangeal joints.
- Flexor pollicis longus (FPL).
- Pronator quadratus (PQ).

NERVE SUPPLY

• All of these muscles are supplied by **the median nerve** except 1 and a half are supplied by the ulnar nerve:

- Flexor carpi ulnaris.
- Half of flexor digitorum profundus to the little and ring finger.
- The median nerve has 2 branches:
 - **Superficial** which supplies the superficial group.
 - **Deep** (anterior interosseous nerve) which supplies the deep 2 and a half muscles; **the lateral half of FDP, FPL, and PQ (PURE MOTOR).**

Hand:

MUSCLES (intrinsic muscles)

- **Hypothenar: opposition** of the little finger.
- **Thenar: opposition** of thumb + adduction of the thumb (adductor pollicis).
- Interossei: abduction and adduction of the fingers + MP flexion + IP extension.
- Lumbricals: metacarpophalangeal (MP) flexion + interphalangeal (IP) extension.

NERVE SUPPLY

The hand has 20 muscles:

- **15** supplied by **the ulnar nerve**: 3 hypothenar + 8 interossei (dorsal and palmar) + 2 medial lumbricals (3rd & 4th) + adductor pollicis + palmaris brevis.
- **5** by **the median nerve**: 3 thenar + 2 lateral lumbricals (1st and 2nd).
- **All the actions are from the ulnar nerve** except 2 are from the median nerve:
1. Opposition of the thumb. 2. Index (1st) and middle (2nd) lumbricals.

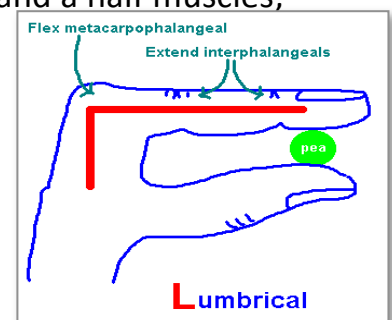
Hypothenar muscles (Ulnar n.)

1. **Abductor** digiti minimi.
2. **Flexor** digiti minimi.
3. **Opponens** digiti minimi.

Thenar muscles (Median n.)

1. **Abductor** pollicis brevis.
2. **Flexor** pollicis brevis.
3. **Opponens** pollicis.

To remember them easily



Peripheral Nerve Injuries (Cont.):

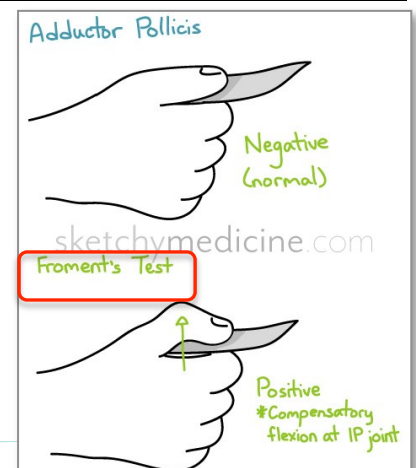
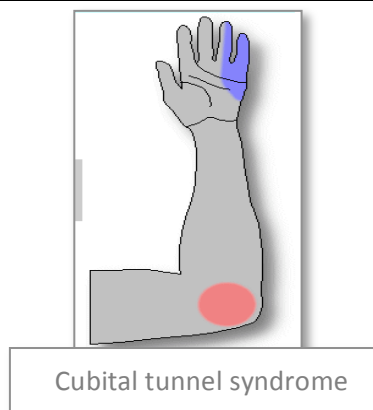
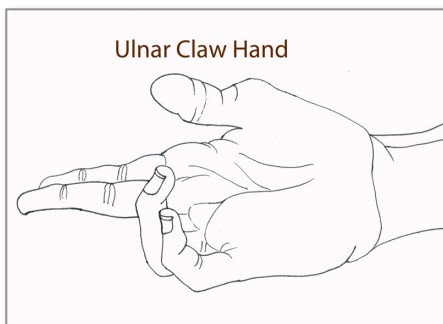
Nerve	Cause of injury/nerve innervation	Clinical Features		Summary
		Motor	Sensory	
Median Nerve (All roots C5, C6, C7, C8, & T1).	<p>Motor:</p> <ul style="list-style-type: none"> - Superficial flexors except half of flexor digitorum profundus to little and ring fingers. - Thenar muscles. - Index and middle lumbricals. <p>Sensory:</p> <ul style="list-style-type: none"> - Lateral 3 and half fingers on the palmer side. 	Anterior interosseous nerve injury (high n. injury):		Injury to anterior interosseous branch of median nerve: patient cannot make an O + normal sensation.
		<ul style="list-style-type: none"> ▪ Affects the deep 2 and half muscles: <ul style="list-style-type: none"> - Half of Flexor digitorum profundus. - Flexor pollicis longus. - Pronator quadratus (pronation is not lost because of pronator teres). ▪ Sign: the patient “cannot make a perfect O” with the thumb, index and middle fingers because he can’t flex the tips of the index and middle finger [distal interphalangeal (DIP) joint: this is the action of the flexor digitorum profundus muscle]. 	<ul style="list-style-type: none"> - No sensory loss; pure motor injury. 	
		Median nerve injury at wrist level (low n. injury):		Loss of opposition and loss of sensation on the lateral 3 and half fingers on the palmer side.
		<ul style="list-style-type: none"> - Common in patients who attempt suicide. - Loss of opposition of the thumb. - Lumbricals are lost but interossei do the job. - They still can make an “OK”, bend the wrist and flex the PIP. 	<ul style="list-style-type: none"> - Loss of sensation on the lateral 3 and half fingers on the palmer side. 	
Carpal tunnel syndrome:		--		
<ul style="list-style-type: none"> - Compression of the median nerve in the carpal tunnel at the wrist level (low nerve injury). - Weakness of opposition if left untreated. 	<ul style="list-style-type: none"> - Loss of sensation (pin and needles sensation or burning pain) is the first symptom. 			



Demonstration of normal anterior interosseous nerve (AIN) and abnormal AIN function (right). In the right, when the AIN is injured the flexor pollicis longus and flexor digitorum profundus don't work. The IP joint of the thumb and the DIP joint of the index finger will not flex normally thus the patient cannot make an "OK" sign.

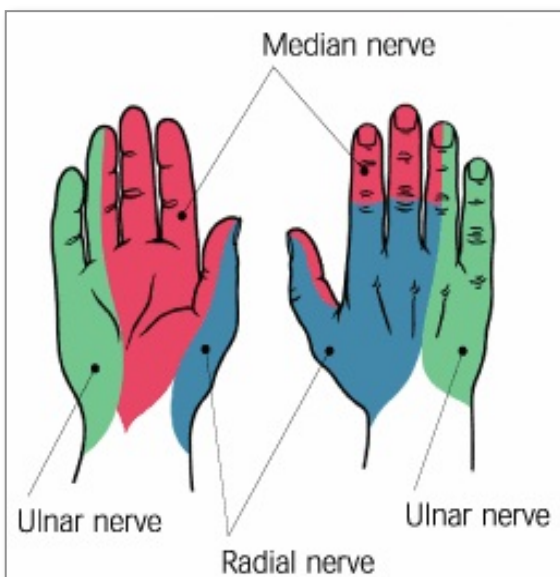
Peripheral Nerve Injuries (Cont.):

Nerve	Cause of injury/nerve innervation	Clinical Features		Summary
		Motor	Sensory	
Ulnar Nerve (C8 & T1).	<p>Motor:</p> <ul style="list-style-type: none"> - Flexor carpi ulnaris. - Medial half of flexor digitorum profundus. - Hypothenar muscles. - 3rd and 4th lumbricals. - 8 interossei. - Adductor pollicis. <p>Sensory:</p> <ul style="list-style-type: none"> - Medial 1 and half fingers on front and back of the hand. 	Ulnar nerve injury at elbow (high n. injury):		<ul style="list-style-type: none"> - Ulnar claw hand. - Loss of sensation in ulnar n. sensory distribution. - Hypothenar atrophy. - Positive froment's sign. - Cannot adduct or abduct the fingers.
		<ul style="list-style-type: none"> - Loss of flexor carpi ulnaris and medial half of flexor digitorum profundus. - All of the hand muscles: <ul style="list-style-type: none"> * Cannot oppose the little finger. * Atrophy of hypothenar muscles. * Cannot adduct or abduct the fingers. - Ends up with ulnar claw hand (partial because the 1st and 2nd lumbricals are supplied by the median n.). 	<ul style="list-style-type: none"> - Loss of sensation on the medial 1 and half fingers on front and back of the hand. 	
		Ulnar nerve injury at the wrist (low n. injury):		
		<ul style="list-style-type: none"> - All of the hand muscles: <ul style="list-style-type: none"> * Cannot oppose the little finger. * Atrophy of hypothenar muscles. * Cannot adduct or abduct the fingers. * Loss of thumb <u>adduction</u> resulting in froment's sign. * Froment's sign: you ask the patient to hold a piece of paper with his thumb but he cannot so he contracts the flexor pollicis longus because the adductor pollicis is lost. * Atrophy of interossei. 	<ul style="list-style-type: none"> - Loss of sensation on the medial 1 and half fingers on front and back of the hand. 	
Cubital tunnel syndrome (high n. injury):		<ul style="list-style-type: none"> - Compression of the ulnar nerve in the cubital tunnel. - Tx: decompress the nerve. 		

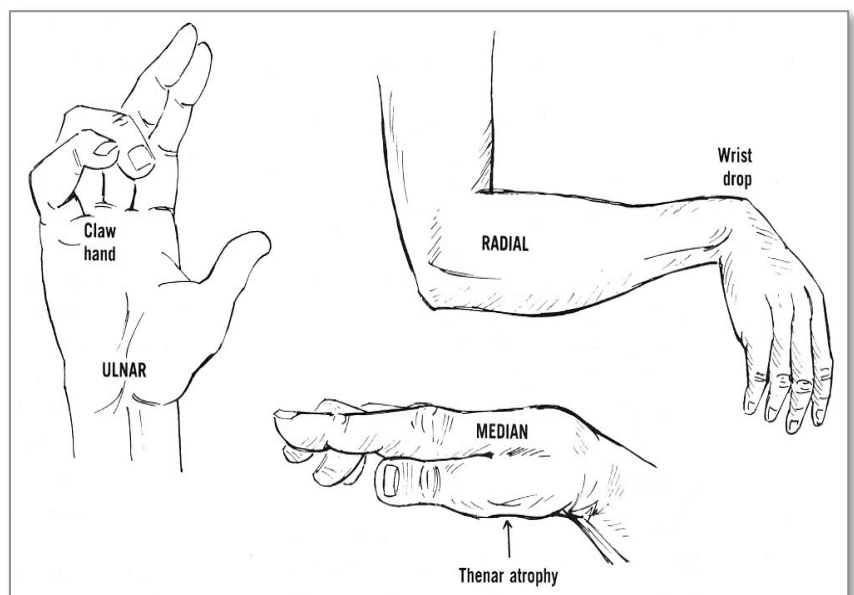


SUMMARY

1. General approach to a patient with PNI or hand injury should be applied in all PNI cases.
2. Closed injuries of brachial plexus most commonly affect the roots and we examine the roots by dermatomes and myotomes.
3. Upper brachial plexus lesion (C5, C6, C7) → Erb's palsy and phrenic nerve symptoms.
4. Lower brachial plexus lesion (C8, T1) → Klumpke's palsy and sympathetic symptoms.
5. Total lesion (C5, C6, C7, C8, T1) → flail limb and both phrenic and sympathetic symptoms.
6. **MEDIAN AND ULNAR NERVE INJURY AT THE WRIST:**
 - Loss of intrinsic muscles.
 - Loss of sensation.
 - Clawing of all the fingers = ape hand (semian hand).
7. Treatment options:
 - a. Observation and physiotherapy → if no recovery within 3 months →
 - b. Exploration within 4 months.
8. **Finger Muscles:**
 - a. Metacarpophalangeal (MP) joints:
 - Extension is by the radial nerve.
 - Flexion is by the ulnar nerve by the interossei and lumbricals.
 - b. Interphalangeal (IP) joints:
 - Extension is by the ulnar nerve by the interossei and lumbricals.
 - Flexion is by the long flexors of the forearm.



Radial, median, and ulnar nerves sensory distribution in the hand.



Summary of the main motor symptoms of radial, median, and ulnar nerves injury.

Questions

- 1) Erb's palsy:
 - a. C5 and C6.
 - b. C7 alone.
 - c. C8 and T1.
 - d. Lower brachial plexus injury.

- 2) The abductor pollicis longus muscle is supplied by:
 - a. Median nerve.
 - b. Ulnar nerve.
 - c. Anterior interosseous nerve.
 - d. Radial nerve.
 - e. Axillary nerve.

- 3) The main action of the C6 root of the brachial plexus is:
 - a. Making a fist.
 - b. Crossing the fingers.
 - c. Elbow flexion.
 - d. Wrist extension.
 - e. Elbow extension.

- 4) The intrinsic muscles of the hand are supplied by:
 - a. C5.
 - b. C6.
 - c. C7.
 - d. C8.
 - e. T1.

- 5) Klumpke's palsy has all the following characteristics except:
 - a. Can result from motorcycle injury.
 - b. Anhydrosis.
 - c. Loss of dermatomes.
 - d. Phrenic nerve palsy.
 - e. Miosis.

- 6) A patient with posterior interosseous nerve palsy:
 - a. Unable to extend his wrist.
 - b. Can extend the IPJs of the fingers.
 - c. Can extend the MPJs of the fingers.
 - d. The sensation over the radial half of the hand is lost.

- 7) Lateral cutaneous nerve of the forearm is a branch of which nerve?
- a. Axillary.
 - b. Radial.
 - c. Musculocutaneous.
 - d. Ulnar.
 - e. None of the above.
- 8) In a patient with anterior interosseous nerve palsy, what's false?
- a. Can pronate the forearm.
 - b. Can flex the PIP of the index.
 - c. Have +ve "O" sign.
 - d. Can flex the IPJ of the thumb.
 - e. All of the above are true.
- 9) After nerve injury, nerve recovery is at rate of:
- a. 1 mm/day.
 - b. 2 mm/day.
 - c. 3 mm/day.
 - d. 4 mm/day.
 - e. 5 mm/day.

Answers:

1st Question: a

2nd Question: d

3rd Question: c

4th Question: e

5th Question: d

6th Question: b

7th Question: c

8th Question: d

9th Question: a

Answer Yes or No:

1. A patient cut his median nerve at the wrist:
 - a. Has he lost opposition of the thumb?
 - b. Has he lost any sensation?
 - c. Can he flex the tip of the index finger?

2. A patient is known to have "Saturday night palsy" is there loss of supination?
3. Can a patient with Erb's palsy also have phrenic nerve palsy?

4. A patient has klumpke's palsy:
 5.
 - a. C5, C6, and C7 are completely intact?
 - b. Only C8 or T1 are injured?
 - c. Can move his shoulder, the elbow and the wrist?
 - d. Can't make a fist?
 - e. Can use his intrinsic muscles of the hand?
 - f. Will have clawing of all fingers "simian hand"?
 - g. Can have phrenic nerve palsy?
 - h. Can have Horner's syndrome?

5. A patient has cut his median nerve at the level of his arm:
 - a. Can he flex his wrist?
 - b. The patient will flex more in the radial deviation?
 - c. Is the FDS completely paralyzed?
 - d. Is the FDP completely paralyzed?
 - e. Is there sensory loss?
 - f. Can he still oppose his thumb?
 - g. Can he flex the tip of the thumb?
 - h. Can he flex the tip of the index finger?
 - i. Can he flex the tip of the little finger?
 - i. Can he flex the PIP of the little finger?
 - k. Does he have sensation of the volar (palmer) aspect of the little finger?
 - l. Does he have sensation of the volar aspect of the thumb?
 - m. Can he flex the tip of the ring finger?
 - n. Can he flex the PIP joint of the ring finger?
 - o. Can he flex the PIP joint of the index finger?
6. Can a patient with erb's palsy also have Horner's syndrome?

Answers:

Q1: a = yes. b = yes. c = yes.
Q2: no. **Q3:** yes.
Q4: a = yes. b = no. c = yes. d = yes.
e = no. f = yes. g = no. h = yes.

Answers:

Q5: a = yes. b = no. c = yes. d = no. e = yes.
f = no. g = no. h = no. i = yes. j = yes.
k = yes. l = no. m = yes. n = yes. o = no.
Q6: no.

7. Patient comes with a stab wound to the axilla which cut his radial nerve:
 - a. He's unable to extend his elbow.
 - b. He can extend the wrist.
 - c. He's unable to extend and radially abduct the thumb.
 - d. He's unable to extend the MP joints of the finger.
 - e. He will have wrist drop.
 - f. Can he extend the IP joints of the fingers?

8. Patient presents with superficial radial nerve injury (cut in the mid forearm) will only have sensory loss?

9. Patient presents with posterior interosseous nerve injury:
 - a. His triceps is paralyzed.
 - b. He lost sensation over the dorsum of the thumb.
 - c. He is unable to extend the elbow.
 - d. Can he extend the wrist?
 - e. Can he extend the thumb?
 - f. His supinator muscle is paralyzed.
 - g. Can he supinate the forearm?
 - h. Will thumb radial abduction be lost?
 - i. Will MP joint extension be lost?
 - j. Will IP joint extension be lost?
 - k. Can he extend the IP joint of the little finger?
 - l. Is there loss of sensation?
10. Can a patient with Erb's palsy make a good fist?
11. A patient comes to the clinic with isolated axillary nerve injury.
 - a. Clinical examination is mainly the teres minor.
 - b. He will not be able to initiate abduction.
 - c. He will not be able to externally rotate.
12. Patient has paralysis of the extensor digitorum:
 - a. Can he extend the IP joint of the thumb?
 - b. Can he extend the IP joint of the index?
13. Clinically, only two things are important when it comes to musculocutaneous nerve injury: biceps and lateral cutaneous nerve of the forearm.
14. A patient with injury to roots C5, C6, and C7:
 - a. Can't abduct or external rotate, so he will go into adduction and internal rotation.
 - b. Can't flex the elbow, so he will go into elbow extension.
 - c. Can extend the wrist.
 - d. Will have complete claw hand.

Answers:

Q7: a = yes. b = no. c = yes. d = no. e = yes. f = yes. **Q8:** yes.

Q9: a = no. b = no. c = no. d = yes. e = no. f = yes. g = yes. h = yes. i = yes. j = no. k = yes. l = no.

Q10: yes. **Q11:** a = no. b = no, he will be able to initiate abduction. c = no, he will be able to externally rotate the arm. **Q12:** a = yes. b = yes. **Q13:** yes.

Q14: a = yes. b = yes. c = no. d = no.

True or false:

1. Patient presents with injury to the anterior interosseous nerve:

- a. Patient lost sensation at the tip of the thumb.
- b. Patient lost sensation in the palm of the thumb.
- c. Patient's sensation is normal.
- d. Patient's pronation is normal.
- e. Patient cannot flex his wrist.
- f. Patient cannot oppose the thumb.
- g. Patient can flex the MP joint of the thumb.
- h. Patient can flex the IP joint of the thumb
- i. Patient can flex the tip of the index.
- j. Patient can adduct the thumb.
- k. Patient can flex the PIP joint of the index.
- l. Patient can flex the tip of the thumb.
- m. Patient can pronate the forearm.
- n. Patient cannot make a perfect O.
- o. Patient has no sensory loss in the hand.
- p. Patient cannot flex the little finger.
- q. Patient can flex the MP joint of the index finger.
- r. Patient cannot flex the PIP joint of the index finger.
- s. Patient can flex the tips of the index and middle fingers.

a: F
b: F
c: T
d: T
e: F
f: F
g: T
h: F
i: F
j: T
k: T
l: F
m: T
n: T
o: T
p: F
q: T
r: F
s: F

2. Patient who has cut his posterior interosseous nerve cannot supinate?

2: F

3. Patient cut his ulnar nerve at the wrist:

- a. He can feel the back of his little finger.
- b. He can flex his wrist.
- c. He can flex the wrist in ulnar and radial deviation.
- d. He cannot flex the tip of the index finger.
- e. He can flex the tip of the little finger.
- f. He can flex the PIP joint of the little finger.
- g. He can feel the palmar surface of the little finger.
- h. He can feel the dorsal surface of the little finger.

a: T
b: T
c: T
d: F
e: T
f: T
g: F
h: T

4. Patient cut his median nerve at the level of his elbow:

- a. He had lost the ability to oppose the thumb.
- b. He has sensory loss.
- c. He is still able to flex his wrist.
- d. Thumb tip flexion is normal.
- e. Pronation is lost.

a:	T
b:	T
c:	T
d:	F
e:	T

5. Complete loss of the ulnar nerve:

- a. It's caused by cutting the ulnar nerve at the wrist.
- b. Is caused by cutting the ulnar nerve in the arm.
- c. Loss of wrist flexion.
- d. Can't flex the wrist in ulnar deviation.
- e. Can flex the tips of the fingers.
- f. Inability to flex the tips of the ring and little fingers.
- g. Able to flex the IP joints of the fingers.
- h. There's no sensory loss.
- i. Can feel the back of the hand.
- j. Can't feel the front of the hand.
- k. Able to oppose the thumb and the little finger.
- l. Is able to adduct and oppose the little finger.
- m. Will have Froment's sign.
- n. Is able to adduct and abduct the fingers.
- o. Is able to flex the PIP joints of the little finger.

a:	F
b:	T
c:	F
d:	T
e:	F
f:	T
g:	F
h:	F
i:	F
j:	T
k:	F
l:	F
m:	T
n:	F
o:	T

6. A patient cut his ulnar nerve in the mid-forearm:

- a. He can feel the back of his hand.
- b. He can feel the front of his hand.
- c. He can adduct and abduct the fingers.
- d. He can adduct the thumb,
- e. He has Froment's sign.
- f. He cannot oppose the little finger.
- g. He cannot oppose the thumb.

a:	F
b:	F
c:	F
d:	F
e:	T
f:	T
g:	F

