Axillary & Median Nerves

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Objectives

❖ At the end of the lecture, students should be able to:

✓ Describe the origin, course, relations, branches and distribution of the axillary & median nerves
✓ Describe the common causes and effects of injury to the axillary and median nerves

Color Index

- Red: Important.
- Violet: Explanation.
- Gray: Additional Notes.

Other colors are for Coordination

Say "bsm Allah" then start
Mind Map

Axillary nerve

- Origin
- Axillary Nerve Lesion
  - causes
  - Manifestations
- Course
- Branches
  - sensory
  - motor: deltoid and teres minor

Median nerve

- Origin
- Median Nerve Lesion
  - Elbow Region
  - at the Wrist
  - Carpal Tunnel Syndrome
- Course:
  - in the Arm
  - in the Forearm
  - in the Hand
- Branches
  - sensory
  - motor: deltoid and teres minor
Brachial plexus subunits
"Randy Travis Drinks Cold Beer":
Roots
Trunks
Divisions
Cords
Branches
· Alternatively: "Read The Damn Cadaver Book!"
· Alternatively: "Real Texans Drink Coors Beer".

Brachial plexus: branches of posterior cord
STAR:
Subscapular [upper and lower]
Thoracodorsal
Axillary
Radial

Median nerve: hand muscles innervated
"The LOAF muscles":
Lumbricals 1 and 2
Opponenspollicis
Abductor pollicisbrevis
Flexor pollicisbrevis
· Alternatively: LLOAF, with 2 L's, to recall there's 2 lumbricals.
· To remember that these are the Median nerve muscles, think "Meat LOAF".
Axillary nerve:

• **Origin:** Posterior cord of brachial plexus

• **Branches:**
  - Motor: to the deltoid and teres minor muscles.
  - Sensory: Superior lateral cutaneous nerve of arm

**Course:** It passes inferiorly and laterally along the posterior wall of the axilla

**Axillary Nerve Lesion:** (fracture – dislocation – Compression)
Median Nerve in arm:

In proximal of the arm: median nerve is lateral to the **brachial** artery.

In distal of the arm: median nerve is medial to **brachial** artery.

**NO major branches of median nerve in the arm.**
Median Nerve in forearm:

- Most of the branches of median nerve is in the forearm
- Branches of the nerve in the forearm are only motor except one muscle and half is not supplied by median nerve.

All the front muscles in forearm are flexors and in the back of forearm are extensors.
Median Nerve in the Hand:

- **It innervates:**

  (Three thenar muscles + Lateral 2 lumbrical muscles + Skin over the palmar surface)

- The most serious disability of median nerve injuries is the:
  - **Loss of opposition of the thumb:** (can’t pick up food)
  - **Loss of sensation** happen to (thump + 2 and half) or (3 and half fingers)

- **Carpal Tunnel Syndrome:** at the beginning person will feel burning pain then it will develop to loss of function.
### SUMMARY

Both axillary & median nerves are branches of the **brachial plexus**

<table>
<thead>
<tr>
<th></th>
<th>Axillary Nerve</th>
<th>Median Nerve</th>
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<tbody>
<tr>
<td><strong>Origin</strong></td>
<td>✓ Posterior cord .&lt;br&gt; ✓ Spinal segment : C5,C6 .</td>
<td>✓ Median &amp; lateral cords .&lt;br&gt; ✓ Spinal segment : C5,C6,C7,C8,T1 .</td>
</tr>
<tr>
<td><strong>Course &amp; Relations</strong></td>
<td>✓ It passes inferiorly and laterally along the posterior wall of the axilla&lt;br&gt; ✓ Then, it passes posteriorly (through a quadrangular space) and passes around the surgical neck of the humerus.&lt;br&gt; ✓ It is accompanied by the posterior circumflex humeral artery.</td>
<td><strong>Anterior compartment of arm</strong>&lt;br&gt; ✓ Anterior compartment (anteromedial to humerus)&lt;br&gt; ✓ Runs with <strong>brachial artery</strong> (lateral inproximal region/ in more distal region, it crosses to the medial side of the brachial artery and lies anterior to the elbow joint.&lt;br&gt; ✓ <strong>No branches in the arm 😊</strong>&lt;br&gt; <strong>Forearm</strong>&lt;br&gt; ✓ Passes into the forearm anterior to elbow joint.&lt;br&gt; ✓ <strong>Median nerve enters the forearm from the cubital fossa between the 2 heads of pronator teres (</strong>&lt;br&gt; ✓ Branch to one of the muscles of the forearm, the (pronator teres) muscle.&lt;br&gt; ✓ Branches innervate most of the muscles in the anterior compartment of the forearm (except for the flexor carpi ulnaris muscle and the medial half of the flexor digitorumprofundus, which are innervated by the ulnar nerve).&lt;br&gt; ✓ <strong>Hand</strong>&lt;br&gt; ✓ The nerve then enters the hand by passing deep to the <strong>flexor retinaculum</strong>.&lt;br&gt; ✓ <strong>It innervates :</strong>&lt;br&gt;   - Three thenar muscles associated with the thumb.&lt;br&gt;   - Lateral 2 lumbrical muscles associated with movement of the index and middle fingers.&lt;br&gt;   - Skin over the palmar surface of the lateral three and one-half fingers and over the lateral 2/3rd of the palm of the hand .</td>
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### Branches and Distribution

- **Motor:**
  - To **Deltoid** and **teres minor** muscles.
- **Sensory:**
  - Superior lateral cutaneous nerve of arm which innervate the skin in that region.

Has **NO major branches in the arm**, but a branch to one of the muscles of the **forearm**, the (pronator teres) muscle, may originate from the nerve immediately proximal to the elbow joint.

### Common causes and effects of injury

#### The causes of injury of axillary nerve:
- Fracture of surgical neck of the humerus.
- Downward dislocation of the shoulder joint.
- Compression of the nerve from the incorrect use of crutches.

#### The effects of Axillary Nerve Lesion:
- **Motor:**
  - Paralysis of the **deltoid** and **teres minor** muscles.
- **Impaired abduction of the shoulder (30-90°).**
- The paralyzed **deltoid wastes rapidly.**
- As the deltid atrophies, the **rounded contour of the shoulder is flattened** compared to the uninjured side.

- **Sensory:**
  - **Loss of sensation** over the lateral side of the proximal part of the arm.

- **Loss of opposition of the thumb** (The delicate pincer-like action is not possible)
- **Loss of sensation** from the thumb and lateral 2½ fingers & lateral ⅔ of the palm

#### Sites of Median nerve damage:
- The affected lesion median nerve at the **carpal tunnel**:
  - Motor affected:
    1) Burning pain along the distribution of median nerve to lateral 3½ fingers.
    2) No sensory changes over the palm as the **palmer cutaneous branch** is given before the median nerve enters the carpal tunnel.
- The affected lesion median nerve in the **wrist**:
  - Motor affected:
    1) Thenar muscles are paralyzed
    2) Opposition and abduction of thumb are lost, and thumb and lateral two fingers are arrested in adduction and hyperextension position "Apelike hand"
- **Sensory & thoracic affected:** changes are the same as in the elbow region injuries.

- **Injury of median nerve at different levels cause different syndromes.**
- In the arm and forearm the median nerve is usually not injured by trauma because of its relatively deep position.

- **The most serious disability of median nerve injuries is the:**

- **Motor affected:**
  - Weak motor function of thumb, index & middle finger.

- **Sensory affected:**
  1) Burning pain along the distribution of median nerve to lateral 3½ fingers
  2) No sensory changes over the palm as the **palmer cutaneous branch** is given before the median nerve enters the carpal tunnel.

- The affected lesion median nerve at the
<table>
<thead>
<tr>
<th>Elbow Region:</th>
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<tbody>
<tr>
<td>Damaged in supracondylar fracture of the humerus.</td>
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<tr>
<td>The affected lesion median nerve in elbow region:</td>
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<tr>
<td><strong>Muscles affected:</strong></td>
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<tr>
<td>1) Pronator muscles of the forearm.</td>
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<tr>
<td>2) All long flexors of the wrist and fingers except Flexor carpi ulnaris and Medial half of flexor digitorum profundus.</td>
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<tr>
<td><strong>Motor affected:</strong></td>
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<tr>
<td>1) Loss of pronation. Hand is kept in supine position.</td>
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<tr>
<td>2) Wrist shows weak flexion, and ulnar deviation</td>
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<td>3) No flexion possible on the interphalangeal joints of the index and middle fingers</td>
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<tr>
<td>4) Weak flexion of ring and little finger.</td>
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<tr>
<td>5) Thumb is adducted and laterally rotated, with loss of flexion of terminal phalanx and loss of opposition.</td>
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<tr>
<td>6) Hand looks flattened and &quot;apelike&quot;, and presents an inability to flex the three most radial digits when asked to make a fist.</td>
</tr>
<tr>
<td><strong>Sensory affected:</strong></td>
</tr>
<tr>
<td>Loss of sensation from:</td>
</tr>
<tr>
<td>1) The radial side of the palm.</td>
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<tr>
<td>2) Palmer aspect of the lateral 3½ fingers.</td>
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<tr>
<td>3) Distal part of the dorsal surface of the lateral 3½ fingers.</td>
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<tr>
<td><strong>Thoracic affected:</strong></td>
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<tr>
<td>1) Dry and scaly skin</td>
</tr>
<tr>
<td>2) Easily cracking nails</td>
</tr>
<tr>
<td>3) Atrophy of the pulp of the fingers</td>
</tr>
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</table>
Remember That:

- Lateral root from lateral cord
  Medial root from medial cord
- **Opponuns muscle**: take muscles supply from median nerve.
- **Apclike hand**: injury of median nerve "important"
- **Dislocation**: head leave the glenoid cavity.
- **Branches**: in **Axillary Nerve** will supply 2 muscles and skin.
- Teres minor is responsible for lateral rotation if it injured the body is not affected due to the presence of another muscle which do the same job.
- superior lateral cutaneous nerve of the arm if it affected the sensation of the skin will be lost.
- **Median Nerve Lesion at the Elbow Region** (Hand cannot do flexion) + **Median Nerve Lesion at the Wrist** (Here I can do supination and flexion of the wrist)
Axillary Nerve:

Video name: Funky Anatomy - EXAM ANSWER - The Axillary Nerve
Duration: 3:04
[Link to video]

Median Nerve:

Video name: Funky Anatomy EXAM ANSWERS Median Nerve
Duration: 7:30
[Link to video]

Video name: Anatomy Of The Median Nerve - Everything You Need To Know - Dr. Nabil Ebraheim
Duration: 7:25
[Link to video]
Multiple Choice Questions

Q1: Where is the spinal segment of axillary nerve?
A) Root value; (C 5 & 6) B) Root value; (C5,6,7, 8, T1). C) Root value (C7)

Q2: How many branches of the median nerve in arm?
A) 0 B) 1 C) 2

Q3: When the median nerve damaged at elbow region will lose:
A) Opposition of thumb B) Pronation C) Abduction

Q4: Where in the Median Nerve usually not injured by trauma:
A) Wrist B) Arm C) Arm and forearm

Q5: What is sensory of the Carpal Tunnel when Median nerve damaged:
A) Burning pain B) No sensory C) Feeling cold

Q6: The most serious disability of median nerve injuries is:
A) Loss of opposition of the thumb B) Loss of abduction of the thumb C) Loss of pronation

Q Ans.:
1- A  2- A  3- B  4- C  5- A6-A
Q7\ in proximal region of the arm, median nerve lie:
   a-Distal to brachial artery  b- lateral to brachial artery  c- medial to brachial artery

Q8\ lateral half of the flexor digitorum profundus is supplied by ulnar nerve
   a-True   b- False

Q9\ A person injured his median nerve at the site of wrist, which of the following will happen:
   a-Loss sensation of thump and 2 ½ fingers  b- loss sensation of 3½ fingers
   c-Opposition and abduction of thumb are lost  d- all the above

Q10\ There is a specific site of fracture in humerus can affect the median nerve, which is:
   a-Supracondyl  b- epicondyl  c- condyl

Q Ans. :
   7-b  8-B  9-d  10-a