PECTORAL REGION & AXILLA

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OBJECTIVES

- Identify and describe the muscles of the pectoral region.
  - Pectoralis major
  - Pectoralis minor
  - Subclavius
  - Serratus anterior
- Describe and demonstrate the boundaries and contents of the axilla.
- Blood Supply
- Brachial Plexus
- Clinical Significances
RESOURCES

Essential of Human Anatomy & Physiology
By Elaine Marieb and Suzanne Keller

Atlas of Human Anatomy
By Frank Netter

Gray’s Anatomy
By Richard Drake, Wayne Vogl & Adam Mitchell
PECTORAL REGION
INTRODUCTION

• The pectoral region is located on the anterior aspect of the thorax.
• It contains muscles that belong to the upper limb.
PECTORALIS MAJOR

- It is the most superficial muscle in the pectoral region.
- It is large and fan shaped and is composed of a sternal head and a clavicular head.
- **Origin**: 2 heads
  - **Clavicular head**: From medial ½ of the front of the clavicle.
  - **Sternocostal head**: From Sternum, Upper 6 costal cartilages and Aponeurosis of external oblique muscle.
- **Insertion**: Lateral lip of bicipital groove.
- **Nerve supply**: Medial & lateral pectoral nerves.
- **Action**: Adduction and medial rotation of the arm. Clavicular head helps in flexion of arm (shoulder).
PECOTORALIS MINOR

- It lies underneath pectoralis major.
- Both of these muscles form part of the anterior wall of the axilla region.
- **Origin:**
  - From 3rd, 4th & 5th ribs close to their costal cartilages.
- **Insertion:**
  - Coracoid process.
- **Nerve supply:**
  - Medial pectoral nerve.
- **Action:**
  - Depression of shoulder.
  - Draw the ribs upward and outwards during deep inspiration.
**SUBCLAVIUS**

- The subclavius is a small muscle which is located directly underneath the clavicle running horizontally.

- **Origin:**
  - From 1st rib at its junction with the 1st costal cartilage.

- **Insertion:**
  - Subclavian groove at the middle $1/3$ of the inferior surface of clavicle.

- **Nerve supply:**
  - Nerve to subclavius from upper trunk of brachial plexus.

- **Action:**
  - Fixes the clavicle during movement of shoulder joint.
SERRATUS ANTERIOR

- The serratus anterior is located more laterally in the chest wall and forms the medial border of the axilla region.

**Origin:**
- Upper eight ribs.

**Insertion:**
- Anterior aspect of the medial border and inferior angle of scapula.

**Nerve supply:**
- Long thoracic nerve.

**Action:**
- Draws the scapula forward (protrusion, in boxing).
- Rotates scapula outwards in raising the arm above 90 degree.
A fascia is a fibrous connective tissue that can be found throughout the body.

They wrap around neurovascular structures, organs and muscles in order to protect them.

**Clavipectoral Fascia:**

- A thick, bilateral connective tissue structure deep to pectoralis major.
- It extends superiorly from the clavicle, medially from the costochondral joints, and superolaterally from the coracoid process.
- The fascia converges in the axilla, where it acts as a protective structure over the neurovascular structure of the axilla.
- It is pierced by:
  - Lateral pectoral nerve.
  - Thoraco- acromial artery.
  - Cephalic vein.
  - Few lymph vessels.
WINGING OF THE SCAPULA

- One of the actions of the serratus anterior is to hold the scapula against the ribcage.
- If the long thoracic nerve is damaged (and the serratus anterior therefore paralysed), a specific clinical sign is produced.
- In cases such as this, the scapula is no longer held against the ribcage – and protrudes out of the back.
- It is said to have a winged appearance.
- Long thoracic nerve palsy is thought to most commonly occur from traction injuries, where the upper limb is stretched violently.
AXILLA
INTRODUCTION

- The axilla is the name given to an area that lies underneath the glenohumeral joint at the junction of the upper limb and the thorax.
- It is a passageway by which neurovascular and muscular structures can enter and leave the upper limb.
- Axilla has an apex, a base and four walls.
**BOUNDARIES**

- **Apex:**
  - Directed upwards into the root of the neck.
  - Bounded by 3 bones:
    - Clavicle anteriorly.
    - Upper border of the scapula posteriorly.
    - Outer border of the first rib medially.
    - It is called cervico-axillary canal.
      - The passageway that extends between the neck and the upper extremities through which the long thoracic nerve and other structures pass.

- **Base:**
  - Formed by skin stretching between the anterior and posterior walls.
  - Bounded:
    - In front by the anterior axillary fold (formed by the lower border of the pectoralis major muscle).
    - Behind by the posterior axillary fold (formed by the tendons of latissimus dorsi and teres major muscle).
    - Medially by upper 4 to 5 ribs & the chest wall.
WALLS OF AXILLA

- **Anterior:**
  - Pectoralis major
  - Pectoralis minor
  - Subclavius
  - Clavipectoral fascia

- **Posterior:**
  - Subscapularis.
  - Latissimus dorsi.
  - Teres major muscles.

- **Medial:**
  - Serratus anterior
  - Upper 4-5 ribs & Intercostal muscles.

- **Lateral:**
  - Coracobrachialis.
  - Biceps brachii.
  - Intertubercular groove of the humerus.
- **Axillary artery**: It is the main artery supplying the upper limb.
- **Axillary vein**: The main vein draining the upper limb, its two largest tributaries are the cephalic and basilic veins.
- **Brachial plexus**: A collection of spinal nerves that form the peripheral nerves of the upper limb.
- **Biceps brachii and coracobrachialis**: These muscle tendons move through the axilla, where they attach to the coracoid process of the scapula.
- **Axillary Lymph nodes**: The axillary lymph nodes filter lymph that has drained from the upper limb and pectoral region. In women, axillary lymph node enlargement is a non-specific indicator of breast cancer.
BRACHIAL PLEXUS
INTRODUCTION

- The brachial plexus is a network of nerve fibers that supplies the skin and musculature of the upper limb.
- It begins in the root of the neck, passes through the axilla, and enters the upper arm.
- The plexus is formed by the anterior rami (divisions) of the cervical spinal nerves C5, C6, C7 and C8, and the first thoracic spinal nerve, T1.
- At each vertebral level, paired spinal nerves arise.
- They leave the spinal cord via the intervertebral foramina of the vertebral column.
- Each nerve then divides into anterior and posterior nerve fibers.
- The roots of the brachial plexus are formed by the anterior divisions of spinal nerves C5-T1.
- The posterior divisions go on to innervate the skin and musculature of the trunk.
DIVISIONS

- The Plexus can be divided into 5 stages:
  - The first 2 stages lie in the posterior triangle, while the last 2 stages lie in the axilla.
    - **Roots**: in the posterior
    - **Trunks**: in the posterior
    - **Divisions**: behind the clavicle (in cervico-axillary canal)
    - **Cords**: in the axilla
    - **Branches**: in the axilla
DIVISIONS

- The **anterior divisions** of the **upper and middle trunks** unite to form the Lateral cord.
- The **anterior division** of the **lower trunk** continues as the Medial cord.
- All the **posterior divisions** of **three trunks** join to form the Posterior cord.

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## DIVISION

<table>
<thead>
<tr>
<th>Roots</th>
<th>Trunks</th>
<th>Divisions</th>
<th>Cords</th>
<th>Branches</th>
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<tbody>
<tr>
<td>C5</td>
<td>Superior</td>
<td>Anterior</td>
<td>Lateral, Posterior</td>
<td>Musculocutaneous, Axillary, Radial, Median</td>
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<tr>
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<tr>
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<td>Inferior</td>
<td>Anterior</td>
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<td>Axillary, Median, Radial, Ulnar</td>
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<tr>
<td>T1</td>
<td>Inferior</td>
<td>Anterior</td>
<td>Posterior, Medial</td>
<td>Axillary, Median, Radial, Ulnar</td>
</tr>
</tbody>
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MUSCULOCUTANEOUS NERVE

- **Roots:** C5, C6, C7.
- **Motor Functions:** Innervates the following muscles:
  - Brachialis
  - Biceps brachii
  - Coracobrachialis
- **Sensory Functions:** Gives off the lateral cutaneous branch of the forearm, which innervates the lateral half of the anterior forearm, and a small lateral portion of the posterior forearm.
AXILLARY NERVE

- **Roots**: C5 and C6.
- **Motor Functions**: Innervates the following muscles:
  - Teres minor
  - Deltoid
- **Sensory Functions**: Gives off the superior lateral cutaneous nerve of arm, which innervates the inferior region of the deltoid (“regimental badge area”).

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MEDIAN NERVE

- **Roots:** C6 – T1.

- **Motor Functions:** Innervates the following muscles:
  - Most of the flexor muscles in the forearm.
  - The thenar muscles.
  - The two lateral lumbricals that move the index and middle fingers.

- **Sensory Functions:** Gives off the palmar cutaneous branch, which innervates the lateral part of the palm, and the digital cutaneous branch, which innervates the lateral three and a half fingers on the anterior (palmar) surface of the hand.
**RADIAL NERVE**

- **Roots:** C5-C8 and T1.
- **Motor Functions:** Innervates the following muscles:
  - The triceps brachii
  - The extensor muscles in the posterior compartment of the forearm
- **Sensory Functions:** Gives off the palmar cutaneous branch, which innervates the lateral part of the palm, and the digital cutaneous branch, which innervates the lateral three and a half fingers on the anterior (palmar) surface of the hand.
ULNAR NERVE

- **Roots**: C8 and T1.
- **Motor Functions**: Innervates the following muscles:
  - The muscles of the hand (apart from the thenar muscles and two lateral lumbricals)
  - Flexor carpi ulnaris
  - Medial half of flexor digitorum profundus
- **Sensory Functions**: Innervates the anterior and posterior surfaces of the medial one and half fingers, and associated palm area.
Minor damage often occurs during contact sports such as football or wrestling when the brachial plexus nerves get stretched or compressed.

These are called stingers or burners, and can produce the following symptoms:
- A feeling like an electric shock or a burning sensation shooting down your arm.
- Numbness and weakness in your arm.

More severe symptoms result from injuries that seriously injure or even tear or rupture the nerves.

The most serious brachial plexus injury (avulsion) occurs when the nerve root is torn from the spinal cord.

Signs and symptoms of more severe injuries can include:
- Weakness or inability to use certain muscles in your hand, arm or shoulder.
- Complete lack of movement and feeling in your arm, including your shoulder and hand.
- Severe pain.
BRACHIAL PLEXUS

The Brachial Plexus

- Axillary nerve
- Musculocutaneous nerve
- Radial nerve
- Median nerve

MUSCULOCUTANOUS NERVE

RADIAL NERVE

AXILLARY NERVE

ULNAR NERVE

MEDIAN NERVE

BRACHIAL PLEXUS INJURY
QUESTIONS?
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