

MED439
KING SAUD UNIVERSITY

Pectoral region and axilla

Musculoskeletal Block - Lecture 5

Objective:

By the end of the lecture the students should be able to :

- 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.
- Describe the formation of the brachial plexus and its branches.

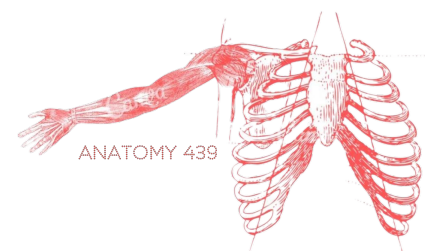
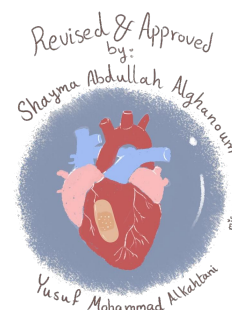
Color index:

Important

In male's slides only

In female's slides only

Extra information, explanation



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Pectoralis major

most superficial muscle in the pectoral region ,Large and fan shaped

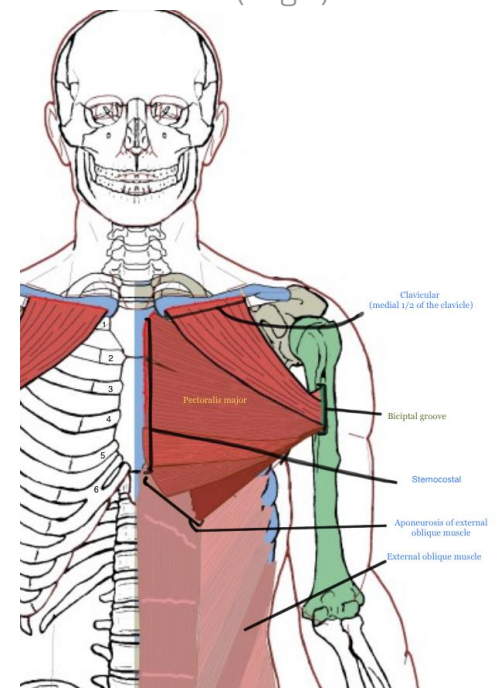
Generally the direction of the muscles contraction : (insertion) pulled toward the (origin)

- Origin** : 2 heads;
- Clavicular head:** From;
 - Medial 1/2 of the front of the clavicle.
 - Sternocostal head:** From;
 - Sternum.
 - Upper 6 costal cartilages.
- **Aponeurosis** of the external oblique muscle. "Thickened fascia"

- Nerve supply** :
- Medial (C8&T1) & lateral pectoral nerves (C5,6,7).

- Insertion** :
- Lateral lip of bicipital groove
 - Intertubercular groove (In the humerus).

- Action** :
- Adduction and medial rotation of the arm. For the two origins
 - Special for clavicular head helps in flexion of arm (shoulder).



Pectoralis minor

- The pectoralis minor lies underneath pectoralis major.
- Both of these muscles form part of the anterior wall of the axilla region.

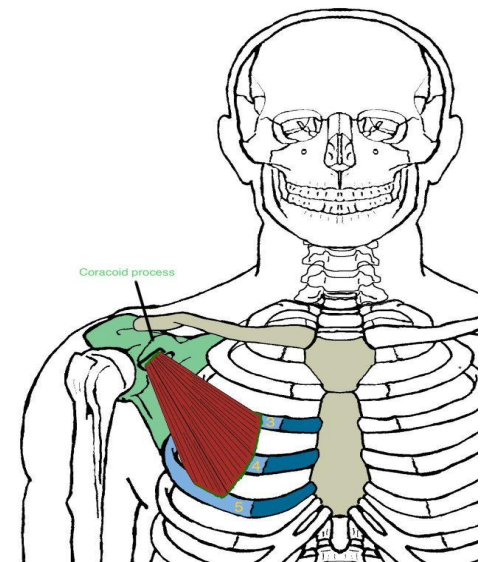


- Origin:**
- From **3rd, 4th, & 5th** ribs close to their costal cartilages.

- Nerve supply:**
- Medial pectoral nerve (C8,T1).

- Insertion:**
- Coracoid process (scapula).

- Action:**
- Depression of the shoulder. "حركة عكسية" Draw the ribs **upward** and **outwards** during deep inspiration. "fix the insertion"



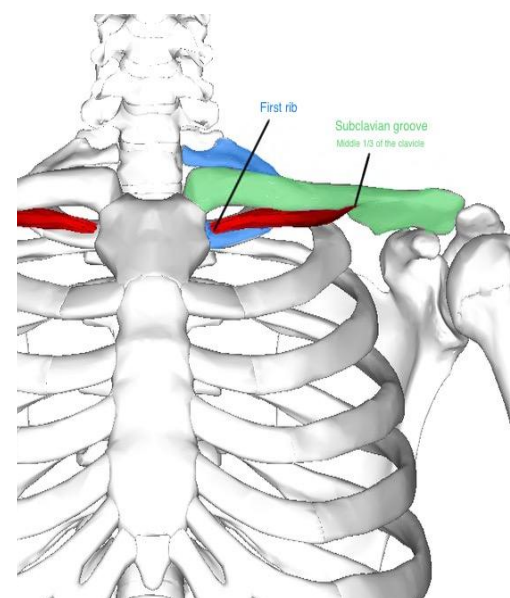
Subclavius

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

- Nerve supply:**
- Nerve to Subclavius (C5,6) from upper trunk of brachial plexus.

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

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



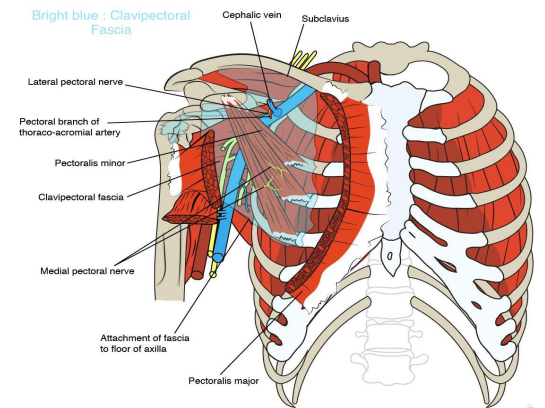
Clavipectoral Fascia

the reason behind the naming that it extends from the Subclavius to Pectoralis minor

- 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.

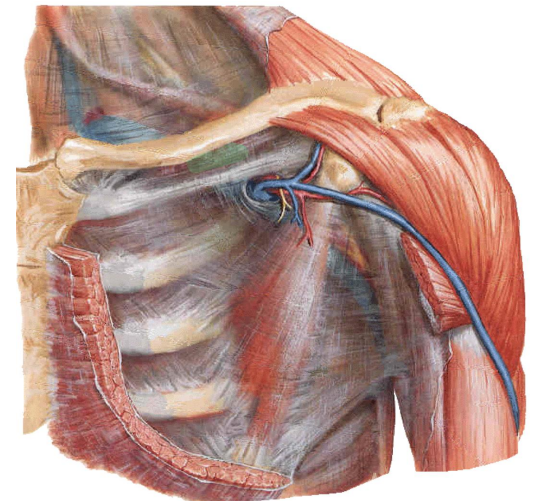
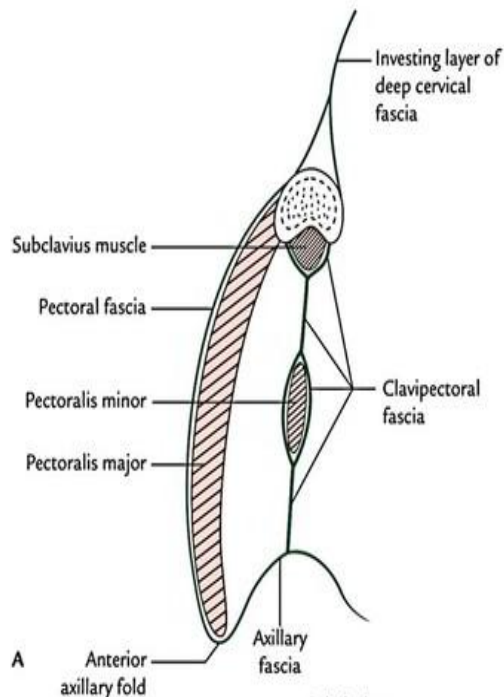
It is pierced by :

- Lateral pectoral nerve.
- Thoraco-acromial artery
- Cephalic vein.
- Few lymph vessels.



Clavipectoral fascia:
It is a **thickened** membrane of deep fascia between the **subclavius** and **pectoralis minor**.
or its 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.



Serratus anterior

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

Action:

- Draws the scapula forward in **boxing**, (**protrusion or protraction**). "**boxer's muscle**"
- Rotates scapula outwards in raising the arm **above 90 degree** (**Abduction above 90**)

Origin:

- Upper eight ribs.

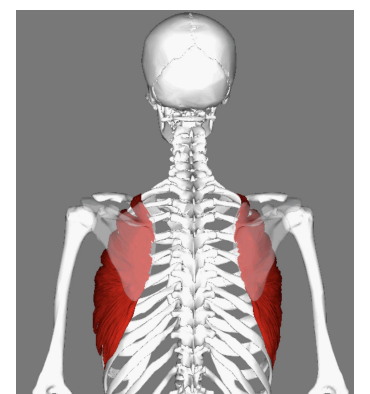
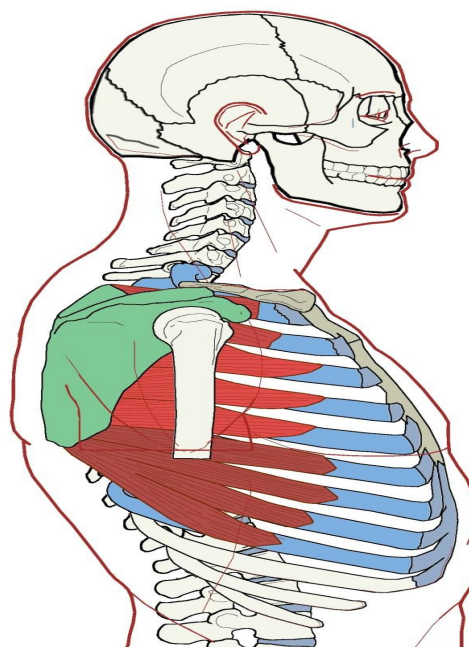
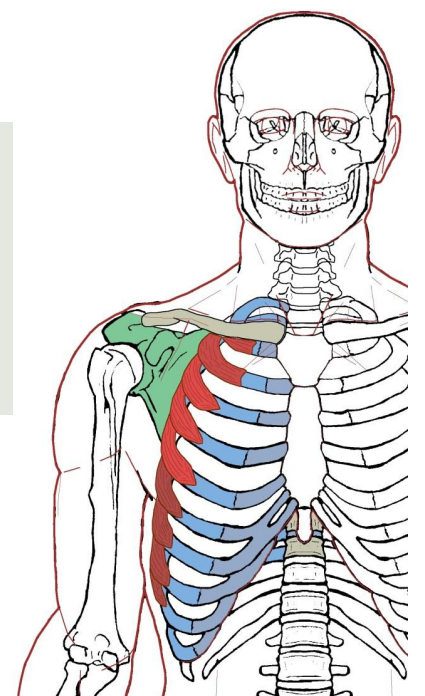
Insertion:

- anterior aspect of the medial border and inferior angle of scapula.

Nerve supply:

- Long thoracic nerve (from roots of **brachial plexus, (C5,6,7)**).

Any Problem in this nerve causes backward projection of medial border of scapula (Winging of scapula). **See slide 9**



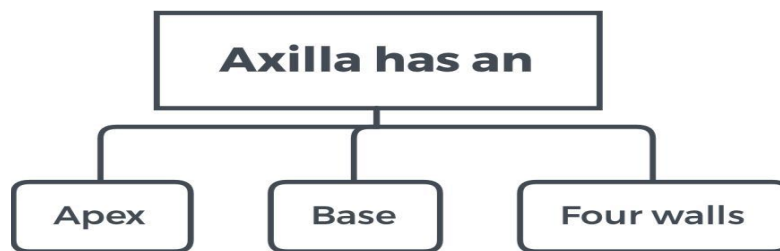
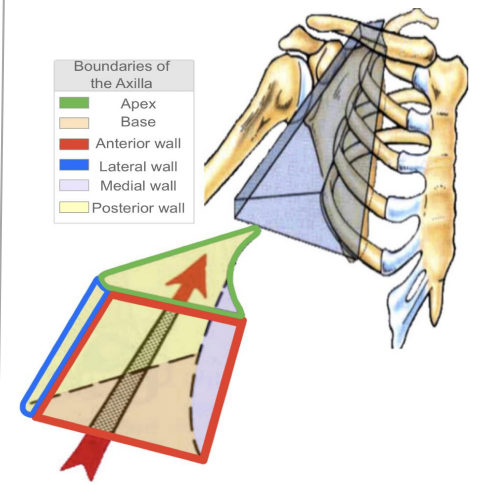
Axilla

 [Helpful video](#)

 [Helpful video](#)

Axilla: is the name given to an area that lies underneath the glenohumeral joint at the junction of the upper limb and the thorax and it is a passageway by which **neurovascular** and **muscular** structures can enter and leave the upper limb.

A pyramid-shaped space between the upper part of the arm and the side of the chest through which major **neurovascular structures** pass between neck and thorax and upper limbs

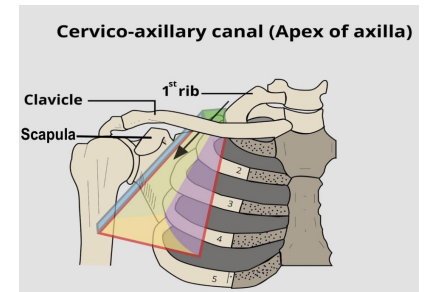


Boundaries of the Axilla

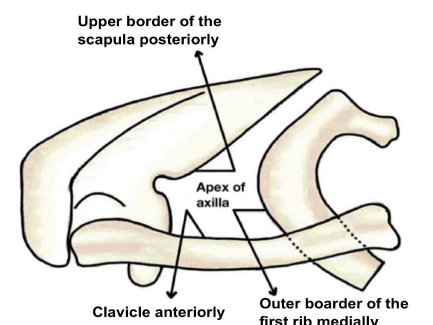
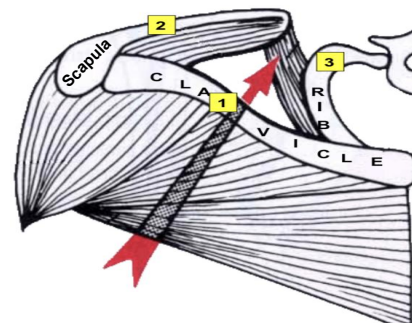
1- Apex

It is called **cervicoaxillary canal = apex**
cervico= neck

It is bounded by 3 bones:
-**Clavicle** anteriorly
-Upper border of the **scapula** posteriorly
-Outer border of the **first rib** medially

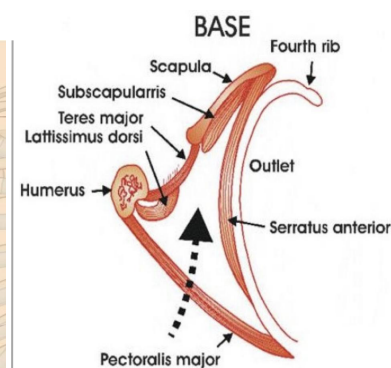
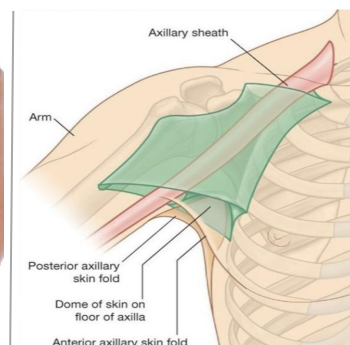
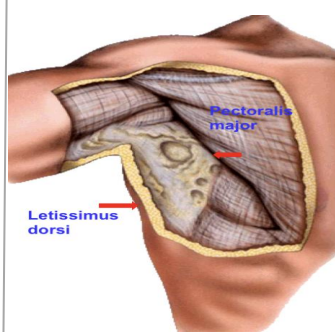
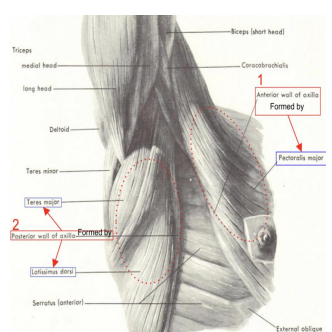


Is directed **upwards and medially** to the root of the neck
the passageway that extends between the neck and the upper extremities through which the long thoracic nerve and other structures pass



2- Base

Formed by skin stretching between the anterior and posterior walls.



Is Bounded by:

In front by the **anterior axillary fold** (formed by the **lower border of pectoralis major**).

Behind by the **posterior axillary fold** (formed by tendons of **latissimus dorsi** and **teres major**)

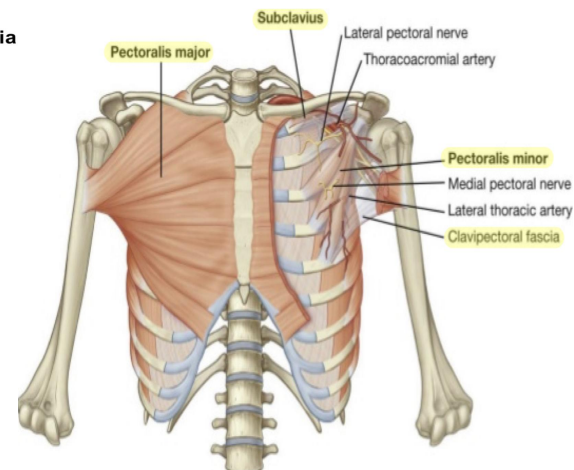
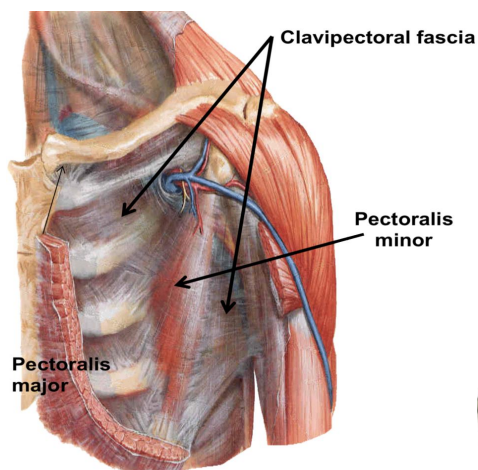
Medially by upper **4 to 5 ribs** and the **chest wall**

3- Walls

Anterior wall

Is formed by:

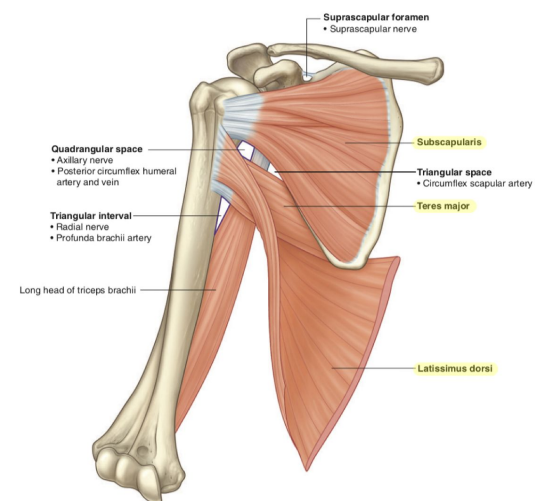
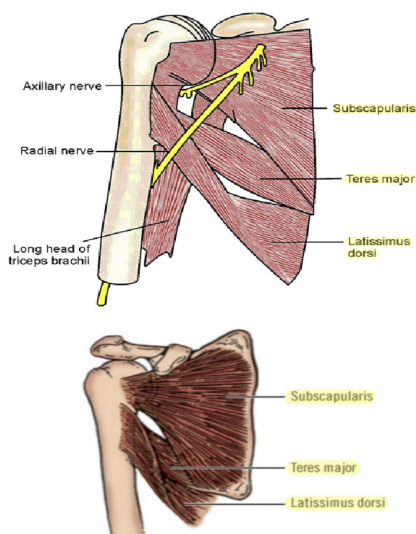
- Pectoralis major
- Pectoralis minor
- Subclavius
- Clavipectoral fascia



Posterior wall

Is formed by:

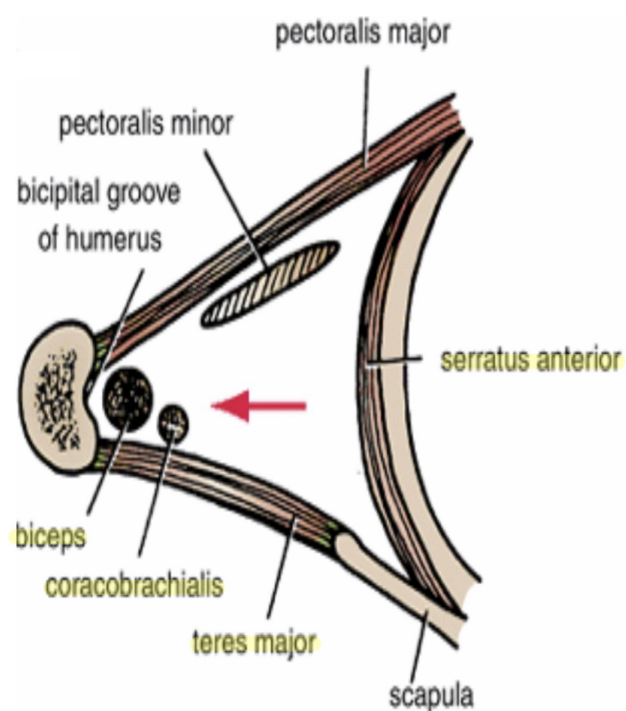
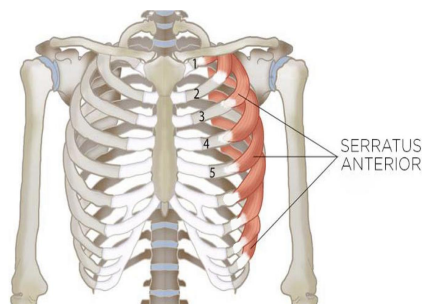
- Subscapularis
- Latissimus dorsi
- Teres major muscles



Medial wall

It is wide and formed by:

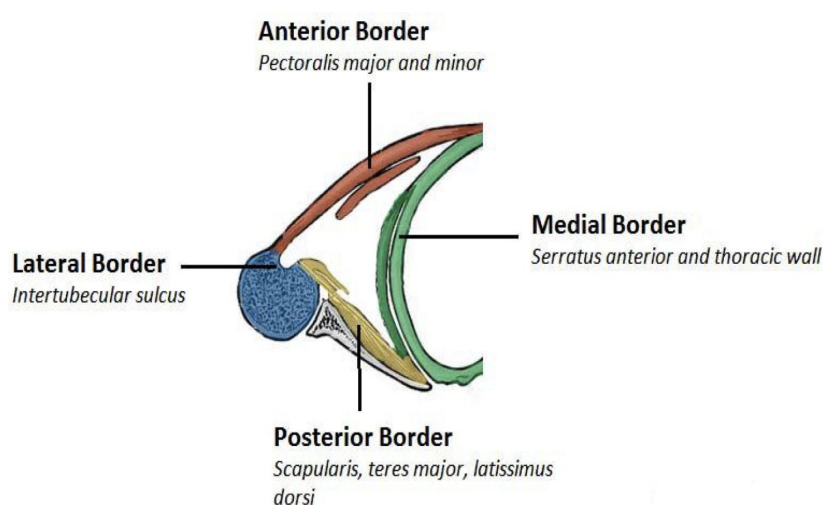
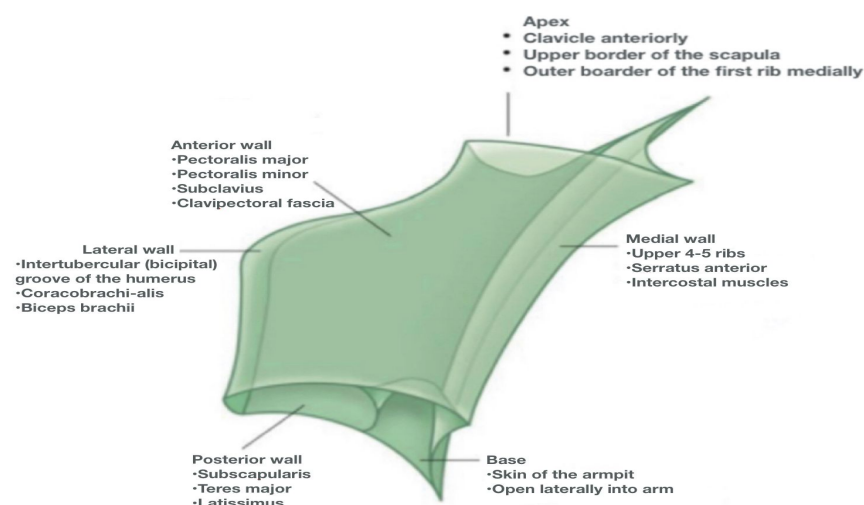
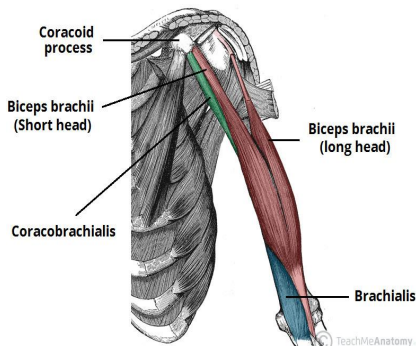
- Serratus anterior
- Upper 4-5 ribs
- intercostal muscles "small muscles between ribs"



Lateral wall

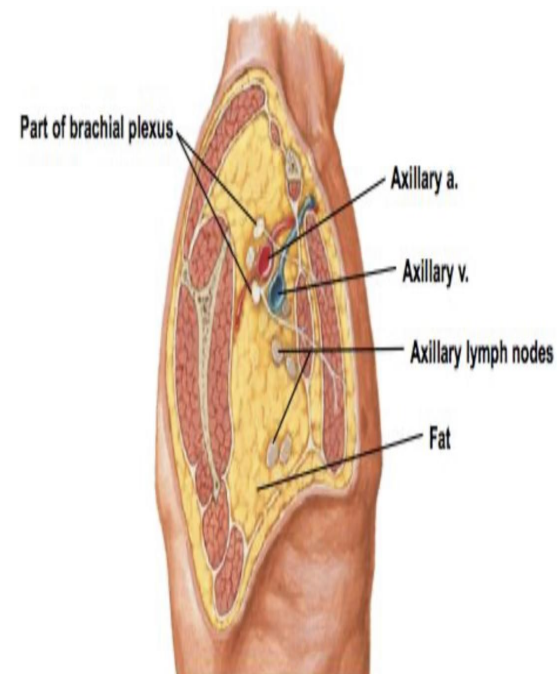
It is narrow and formed by:

- Coracobrachialis
- Biceps brachii
- Bicipital groove of the humerus

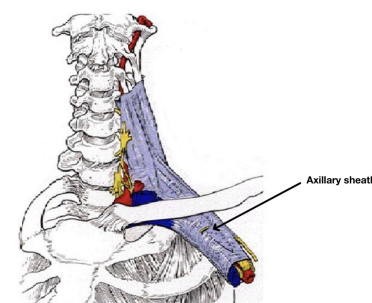


Contents of The Axilla:

- Cords and branches of the brachial plexus.
- Axillary artery and its branches and It is the main artery supplying the upper limb.
- Axillary vein and its tributaries, The main vein draining the upper limb, its two largest tributaries are the cephalic and basilic veins.
- 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: 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 fat.
- Loose connective tissue.



The neurovascular bundle is enclosed in connective tissue sheath, called 'axillary sheath'



Neurovascular : neuro = from brachial plexus nerves , vascular = from axillary artery & vein.

What is Brachial Plexus?

Brachial Plexus is a network of nerves that is **formed at** the root of the neck to enter the upper limb.

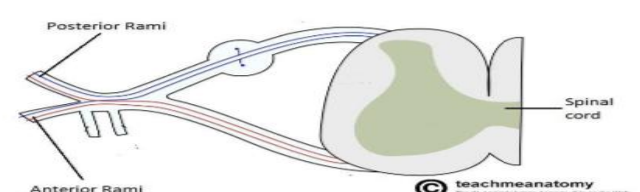
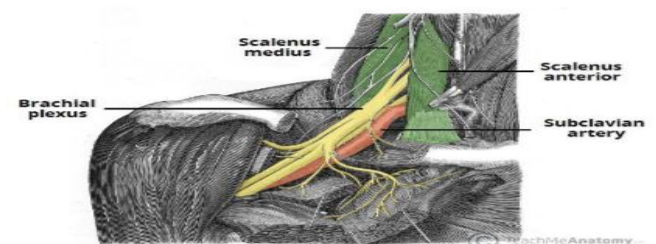
The brachial plexus is a network of nerve fibers that supplies the skin and musculature of the upper limb.

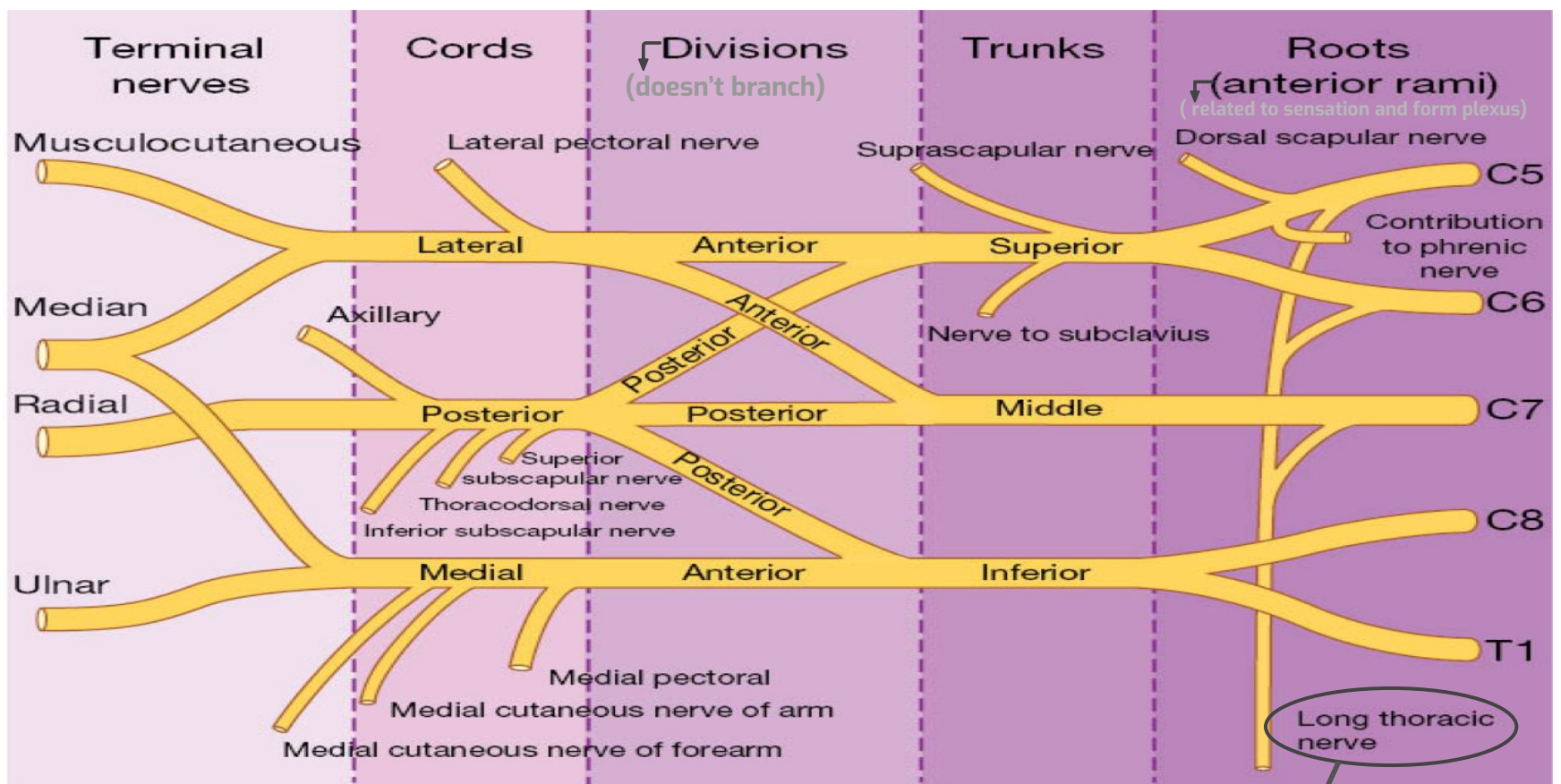
Location & Formation

Location : Brachial Plexus is present in the **posterior triangle** of the neck & **axilla**. It begins in the root of the neck, passes through the axilla, and enters the upper arm.

It is formed by the union of the anterior Rami of the **C5th, 6th, 7th, 8th and the 1st thoracic spinal nerve**.

- 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.



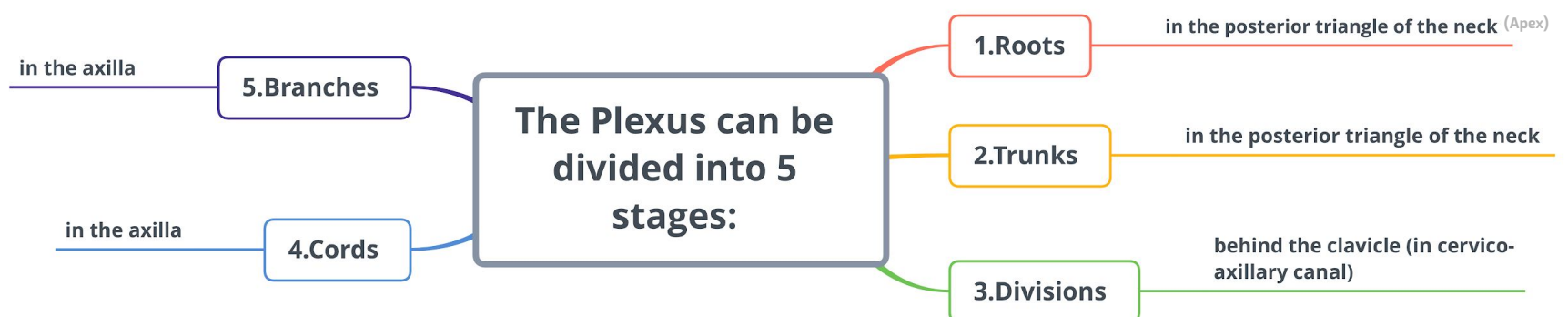


(Pay attention that it originates from the roots of the brachial plexus C5,6,7)

★Important

- Roots of C5 & C6 unite to form → Upper trunk (superior trunk).
- Root of C7 continuous as the → Middle trunk.
- Roots of C8 & T1 unite to form → Lower trunk (inferior trunk).

Remember in the spine we only have 7 cervical vertebra BUT there are 8 cervical spinal nerves.



The first 2 stages lie in the **posterior triangle**, while the last 2 stages lie in **the axilla**.

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

★Very important

Memorize each branch originates from which cord

**B
R
A
N
C
H
E
S**

Three Lateral cords	Five medial cords	Five posterior cords
1. Lateral pectoral nerve.	1. Medial pectoral nerve.	1. Axillary nerve.
2. Musculocutaneous nerve	2. Ulnar nerve.	2. Radial nerve.
3. Median nerve (lateral root)	3. Median nerve (medial root).	3. Upper subscapular nerves.
	4. Medial cutaneous nerve of arm	4. lower subscapular nerves.
	5. Medial cutaneous nerve of forearm.	5. Thoracodorsal (N. to latissimus dorsi).

Mnemonic (Team 433):

- **Lateral Cord Branches: LLM** "Lucy Loves Me"

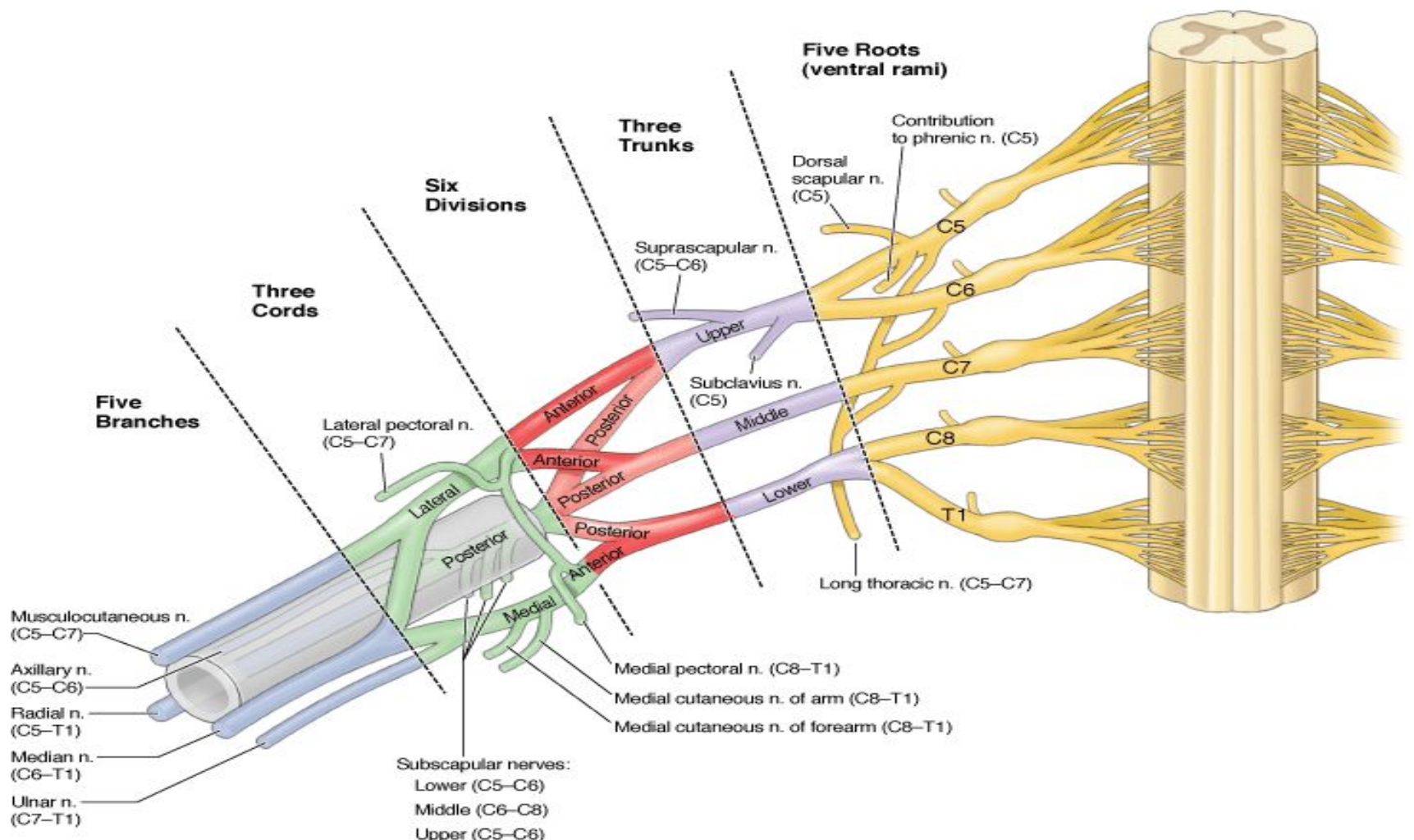
Lateral pectoral, Lateral root of the median nerve, Musculocutaneous.

□ - **Medial Cord Branches: MMUM** "Most Men Use Morphine"

Medial pectoral, Medial cutaneous nerve of arm and forearm, Ulnar, Medial root of the median nerve.

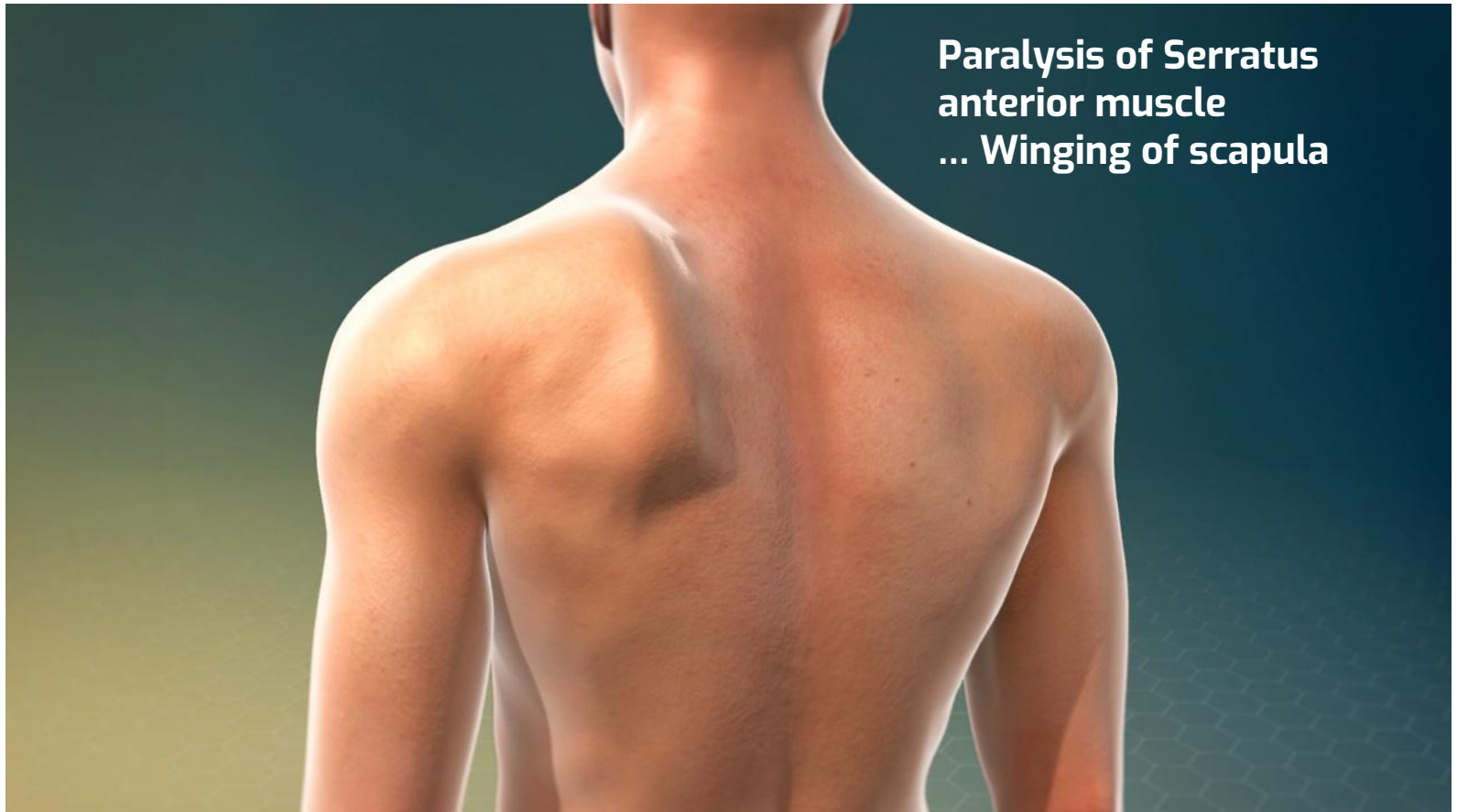
- **Posterior cord branches STAR**

Subscapular (upper and lower), Thoracodorsal, Axillary, Radial



Applied Anatomy

- Lesion of long thoracic nerve (C5,6,7) causes backward projection of medial border of scapula.
- This deformity is called Winging of Scapula.

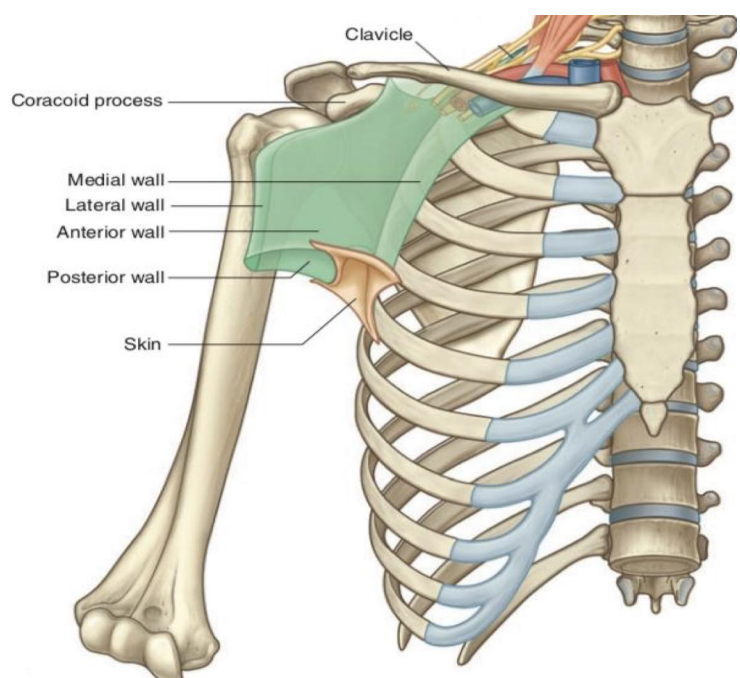
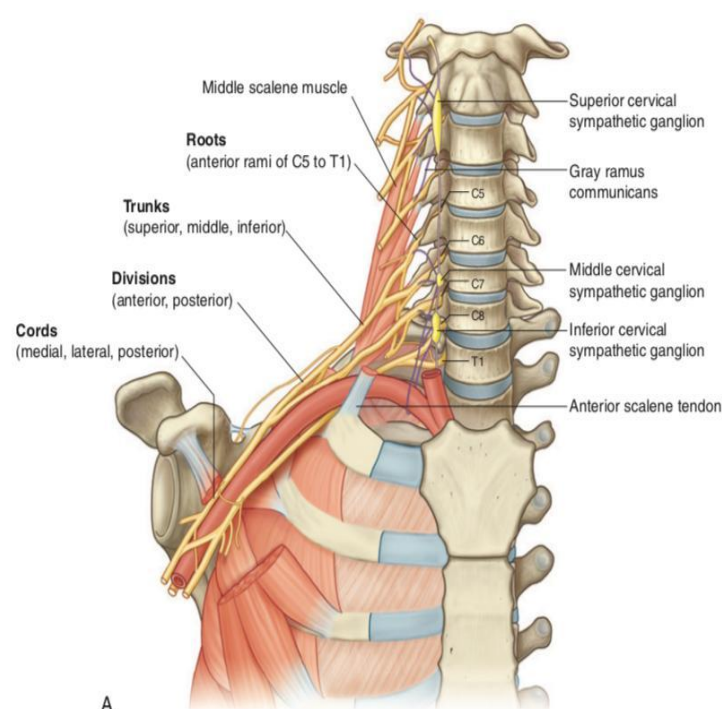


Summary

Muscle	Origin	Insertion	Innervation	Function
Pectoralis major	Clavicular head—anterior surface of medial half of clavicle; sternocostal head—anterior surface of sternum; first seven costal cartilages; sternal end of sixth rib; aponeurosis of external oblique	Lateral lip of intertubercular sulcus of humerus	Medial and lateral pectoral nerves; clavicular head (C5, C6); sternocostal head (C6, C7, C8, T1)	Flexion, adduction, and medial rotation of arm at glenohumeral joint; clavicular head—flexion of extended arm; sternocostal head—extension of flexed arm
Subclavius	First rib at junction between rib and costal cartilage	Groove on inferior surface of middle one-third of clavicle	Nerve to subclavius (C5, C6)	Pulls tip of shoulder down; pulls clavicle medially to stabilize sternoclavicular joint
Pectoralis minor	Anterior surfaces and superior borders of ribs III to V; and from deep fascia overlying the related intercostal spaces	Coracoid process of scapula (medial border and upper surface)	Medial pectoral nerve (C5, C6, C7, C8, T1)	Pulls tip of shoulder down; protracts scapula
Serratus anterior	Lateral surfaces of upper 8–9 ribs and deep fascia overlying the related intercostal spaces	Costal surface of medial border of scapula	Long thoracic nerve (C5, C6, C7)	Protraction and rotation of the scapula; keeps medial border and inferior angle of scapula opposed to thoracic wall

TABLE 9.4 Summary of the Branches of the Brachial Plexus and their Distribution

Branches	Distribution
Roots	
Dorsal scapular nerve (C5)	Rhomboid minor, rhomboid major, levator scapulae muscles
Long thoracic nerve (C5, 6, 7)	Serratus anterior muscle
Upper Trunk	
Suprascapular nerve (C5, 6)	Supraspinatus and infraspinatus muscles
Nerve to subclavius (C5, 6)	Subclavius
Lateral Cord	
Lateral pectoral nerve (C5, 6, 7)	Pectoralis major muscle
Musculocutaneous nerve (C5, 6, 7)	Coracobrachialis, biceps brachii, brachialis muscles; supplies skin along lateral border of forearm when it becomes the lateral cutaneous nerve of forearm
Lateral root of median nerve (C5, 6, 7)	See medial root of median nerve
Posterior Cord	
Upper subscapular nerve (C5, 6)	Subscapularis muscle
Thoracodorsal nerve (C6, 7, 8)	Latissimus dorsi muscle
Lower subscapular nerve (C5, 6)	Subscapularis and teres major muscles
Axillary nerve (C5, 6)	Deltoid and teres minor muscles; upper lateral cutaneous nerve of arm supplies skin over lower half of deltoid muscle
Radial nerve (C5, 6, 7, 8; T1)	Triceps, anconeus, part of brachialis, extensor carpi radialis longus; via deep radial nerve branch supplies extensor muscles of forearm: supinator, extensor carpi radialis brevis, extensor carpi ulnaris, extensor digitorum, extensor digiti minimi, extensor indicis, abductor pollicis longus, extensor pollicis longus, extensor pollicis brevis; skin, lower lateral cutaneous nerve of arm, posterior cutaneous nerve of arm, and posterior cutaneous nerve of forearm; skin on lateral side of dorsum of hand and dorsal surface of lateral three and a half fingers; articular branches to elbow, wrist, and hand
Medial Cord	
Medial pectoral nerve (C8; T1)	Pectoralis major and minor muscles
Medial cutaneous nerve of arm joined by intercostal brachial nerve from second intercostal nerve (C8; T1, 2)	Skin of medial side of arm
Medial cutaneous nerve of forearm (C8; T1)	Skin of medial side of forearm
Ulnar nerve (C8; T1)	Flexor carpi ulnaris and medial half of flexor digitorum profundus, flexor digiti minimi, opponens digiti minimi, abductor digiti minimi, adductor pollicis, third and fourth lumbricals, interossei, palmaris brevis, skin of medial half of dorsum of hand and palm, skin of palmar and dorsal surfaces of medial one and a half fingers
Medial root of median nerve (with lateral root) forms median nerve (C5, 6, 7, 8; T1)	Pronator teres, flexor carpi radialis, palmaris longus, flexor digitorum superficialis, abductor pollicis brevis, flexor pollicis brevis, opponens pollicis, first two lumbricals (by way of anterior interosseous branch), flexor pollicis longus, flexor digitorum profundus (lateral half), pronator quadratus; palmar cutaneous branch to lateral half of palm and digital branches to palmar surface of lateral three and a half fingers; articular branches to elbow, wrist, and carpal joints



MCOs

Q1: Special action for clavicular head in Pectoralis major is of arm:

- A. Adduction
- B. Abduction
- C. Flexion
- D. extension

Q2: Which one of these sentences about the axillary walls is/are correct

- A. the medial wall is wide, the lateral wall is narrow
- B. the anterior wall is narrow, the posterior wall is Wide
- C. both A and B
- D. None of the above

Q3: The neurovascular bundle is enclosed in connective tissue sheath, called:

- A. Fat sheath
- B. lymph nodes
- C. axillary sheath
- D. cervical sheath

Q4: In brachial plexus the roots of C8 & T1 unite to form.....?

- A. Upper Trunk
- B. Middle Trunk
- C. Lower Trunk
- D. Lateral cord

Q5: The insertion of Pectoralis minor is :

- A. coracoid process
- B. clavicle
- C. ribs
- D. bicipital groove

Q6: Which one of the following muscles forms the lateral wall of axilla:

- A. Pectoralis major.
- B. Pectoralis minor.
- C. Serratus anterior.
- D. Biceps brachii.

Q7: Which one of the following is nerve for Pectoralis Major :

- A. Medial & lateral pectoral nerves
- B. Nerve to subclavius from upper trunk of brachial plexus.
- C. Long thoracic nerve.
- D. Bell nerve.

Q8: Apex of axilla is bounded by:

- A. 4 bones
- B. 2 bones
- C. 3 bones
- D. 5 bones

Q9: What's the muscle that called " boxer's muscle "

- A. Pectoralis major
- B. Pectoralis minor
- C. Serratus anterior
- D. Subclavius

Q10: The claviopectoral fascia extended from subclavius muscle to :

- A. Pectoralis major
- B. Serratus anterior
- C. Latissimus Dorsi
- D. Pectoralis minor

Q11: Which one of the following plays a role in climbing:

- A. Pectoralis Major
- B. Pectoralis Minor
- C. Subclavius
- D. Serratus anterior

Q12: AXILLA is :

- A. Circular shaped
- B. Triangular shaped
- C. pyramid-shaped
- D. square shaped

Answers:

- | | |
|------|-----|
| 12.C | 6.D |
| 11.A | 5.A |
| 10.D | 4.C |
| 9.C | 3.C |
| 8.C | 2.A |
| 7.A | 1.C |




Q1. What is the median nerve made of?

Q2: What are the contents of the axilla?

Q3: A Soldier was shot on the chest and the shot has affected the long thoracic nerve , what might happen to him?

Answers:
Q1: It's made of lateral root from lateral cord , and medial root from medial cord.
Q2: 1) Cords and branches of brachial plexus
2) Axillary artery and its branches
3) Axillary vein and its tributaries
4) Axillary lymph nodes
5) Axillary fat
6) Loose connective tissue
Q3: Winging of scapula

This lecture is done by:

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