

Pectoral region

Curricular Objectives: By the end of this session students are expected to:

Theory

1. Define the pectoral region and acknowledge its relation to thoracic wall
2. Describe the main markings of the bones related to pectoral region
3. Outline the attachment, and relations of the muscles of the pectoral region
4. Discuss the actions of the muscles of the pectoral region and their nerve supply
5. Describe the clavi-pectoral fascia and suspensory ligament of axilla
6. Define the delto-pectoral groove, its boundaries and content
7. Describe the sternoclavicular and acromioclavicular joints
8. Outline the applied anatomy of pectoral muscles
9. Summarize the surface landmarks of the pectoral region

Practical

1. Label the main markings of the bones forming the shoulder girdle
2. Identify the sites of muscle attachment on the bones
3. Distinguish muscles within the pectoral region and recall their nerve supply
4. Trace the nerves and vessels within the pectoral region
5. Follow the attachment of the clavi-pectoral fascia and the structures piercing it
6. Label the sternoclavicular and acromioclavicular joints
7. Identify the surface markings and label the midclavicular and axillary lines

Selected references and suggested resources

- ✦ Clinical Anatomy by Regions, Richard S. Snell, 10th edition
- ✦ Grant's Atlas of Anatomy, 13th Edition
- ✦ McMinn's Clinical Atlas of Human Anatomy, 7th Edition
- ✦ [Anatomy for Babylon medical students](#) (Facebook page)
- ✦ [Anatomy for Babylon medical students](#) (YouTube channel)
- ✦ [Human Anatomy Education](#) (Facebook page)
- ✦ [Human anatomy education](#) (YouTube channel)

Feedback and suggestions

- ✦ <http://goo.gl/forms/SjyjGeUpvH>

Session check list

❖ **Clinical highlights:**

- The pectoral region abuts the female breasts and the axilla and both are commonly examined for suspected masses or accessed during surgical operations
- Pectoral muscles act to move the shoulder girdle and thus are of great functional importance
- Knowledge of the anatomy of this region help medical students mastering clinical and surgical skills needed to approach the structures in this area

❖ **Key landmarks:**

- ✦ Sternum
- ✦ Clavicle
- ✦ Ribs and costal cartilages

❖ Pectoral region

- This region is located on the anterior aspect of the chest. Although it may be considered as part of the anterior thoracic wall, it contains structures are functionally related to upper limb
- It can be divided into superficial and deep compartments
- The superficial compartment contains skin, superficial fascia, and breasts
- The deep compartment contains 4 muscles (pectoralis major, pectoralis minor, subclavius and serratus anterior) and associated structures

❖ Pectoralis major muscle

- It is the largest and most superficial muscle at the front of the chest
- It has a lower border which forms the anterior axillary fold
- It is invested by deep fascia (pectoral fascia)
- It is a powerful adductor and medial rotator of the arm.
- Its clavicular head flex the arm, while sterno-costal head extend a flexed arm
- It is supplied by medial and lateral pectoral nerves

❖ Pectoralis minor muscle

- It lies deep to pectoralis major muscle
- It is considered as the key muscle of the axilla for anatomists and surgeons
- It crosses anterior to the axillary artery dividing the artery into three parts
- It extends between the ribs and the coracoid process of the scapula

❖ Subclavius muscle

- It is a small muscle extending between the subclavian groove under the clavicle and the 1st costochondral junction
- It act to stabilize the clavicle during movements of the shoulder joint

❖ Serratus anterior muscle

- It is a flat muscle overlying the lateral thoracic wall
- It is not a muscle of pectoral region but described here for convenience
- It passes anterior to scapula to be inserted to the anterior aspect of its medial border

🚩 **Note:** all the four muscles listed above can act as accessory muscles of respiration in patients with severe shortness of breath

❖ Clavipectoral fascia

- It is a strong fascial sheet deep to the clavicular head of the pectoralis major muscle
- It extends between the clavicle and the pectoralis minor muscle
- Its splits into two layers to enclose the subclavius and pectoralis minor
- Below the lower border of pectoralis minor it extends as the suspensory ligament of axilla
- The suspensory ligament is attached to the dome of axillary fascia and it keeps the dome pulled up, thus maintaining the concavity of the axilla
- It is pierced by 4 structures lateral pectoral nerve, thoraco-acromial artery, lymphatics, and cephalic vein

❖ Delto-pectoral triangle

- Lies just below the clavicle between the pectoralis major medially and the deltoid muscle laterally
- The cephalic vein from the upper limb traverse the groove to enter the axilla after piercing the clavi-pectoral fascia

❖ Sternoclavicular joint (Synovial saddle type)

- Between the sternal end of the clavicle, the manubrium, and the first costal cartilage
- The articular surfaces are covered with fibrocartilage
- Flat fibrocartilaginous disc divides the joint's interior into medial and lateral compartments
- Its stability depends on the strength of the anterior and posterior sternoclavicular ligaments

❖ Acromioclavicular joint (synovial plane type)

- Between the acromion of the scapula and the lateral end of the clavicle
- Coracoclavicular ligament (strongest ligament of upper limb) extending between the coracoid process and the clavicle is largely responsible for integrity of the joint

❖ Surface anatomy

- The suprasternal notch (upper border of manubrium of sternum) can be palpated at the upper border of the manubrium of the sternum
- The sternal angle (angle of Louis) serves as a useful landmark to identify the 2nd rib and thus can be used to countdown other ribs which is an important skill needed when examining the anterior chest wall
- The infra-clavicular fossa is a depression below the junction of middle and lateral third of the clavicle. It overlies the delto-pectoral triangle
- The tip of coracoid process can be felt within the infraclavicular fossa
- There are 5 important imaginary lines on the anterolateral chest wall, mid-sternal, midclavicular, anterior axillary, mid-axillary, and posterior axillary lines

Lab activity list

For each task below, identify the listed structures then answer the related questions

❖ Task 1 (Bone markings)

- ✓ Sternum: manubrium/ body/ xiphoid process/ manubrio-sternal joint (sternal angle)
- ✓ Clavicle: superior surface/ inferior surface (subclavian groove)/ anterior border
- ✓ Ribs/ Costal cartilages
- ✓ Humerus: intertubercular groove/ medial and lateral lips
- ⊕ The upper surface of the clavicle gives attachment to _____, _____ muscles
- ⊕ The anterior surface of the sternum gives attachment to _____ muscle of the pectoral region

❖ Task 2 (Muscles)

- ✓ Pectoralis major/ Pectoralis minor
- ✓ Subclavius
- ✓ Serratus anterior
- ⊕ Describe the attachment of pectoralis major muscle to the humerus
- ⊕ Which pectoral muscle attached to the coracoid process of the scapula
- ⊕ The subclavius muscle act to adduct the arm (True/False)
- ⊕ Name the nerve supplying the subclavius muscle

❖ Task 3 (Structures within pectoral region)

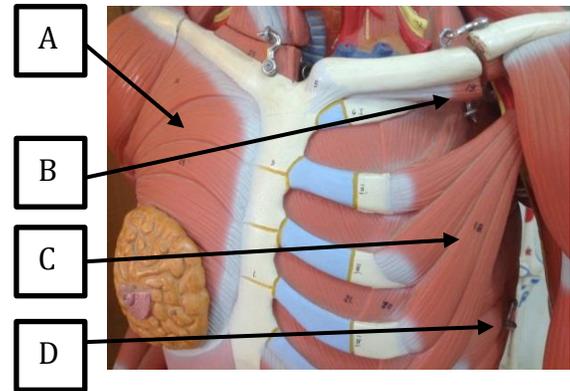
- ✓ Deep fascia: Clavipectoral Fascia/ Suspensory ligament of axilla
- ✓ Delto-pectoral (clavi-pectoral) groove
- ✓ Long thoracic nerve
- ✓ Cephalic Vein
- ✓ Joints: sternoclavicular/ acromioclavicular
- ⊕ The cephalic vein is a tributary of which vein?
- ⊕ The long thoracic nerve supplies which muscle?

❖ Task 4 (Surface markings)

- ✓ Clavicle/ Sternum
- ✓ Suprasternal (jugular) notch/ Sternal angle
- ✓ Nipple/ Infra-clavicular fossa
- ✓ Midline (Mid-sternal line)
- ✓ Midclavicular line
- ✓ Anterior axillary line (marked by anterior axillary fold)
- ✓ Posterior axillary line (marked posterior axillary fold)
- ✓ Midaxillary line
- ⊕ Which of the surface markings listed above:
 - A. Is palpable between the medial ends of two clavicles?
 - B. May be located on the fourth intercostal space?
 - C. Ends below at the midinguinal point?

Review questions:

1. Identify the labeled structures in the image?
2. Outline the attachments of the muscle labeled with C
3. What is the action of the muscle labeled with D?
4. What lies superficial to the muscle labeled with A?
5. The space between B and C labels is closed by which of the following structures?
 - a) Suspensory ligament of axilla
 - b) Cephalic vein
 - c) Axillary fat and lymph nodes
 - d) Clavi-pectoral fascia
 - e) Axillary tail of the breast

**Homework**

While shopping in the mall, the 70 years old lady ignored the sign (caution slippery floor). She fell on the ground with an outstretched hand. After falling, she felt severe pain in her collar bone. X-Ray film showed complete fracture of the clavicle with displacement of the medial and lateral fragments. After healing of the fractured bone the lady continued to complain of pain in the front of the upper chest

- A. What is the expected direction of displacement of each fragment?
- B. What muscle is acting on each fragment to produce the expected displacement?
- C. What nerves supply the front of the upper part of the chest wall? Why they may cause pain after fracture of clavicle?