

## Scapular region and axilla

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

### Theory

1. Define the scapular region and acknowledge its relation to the back and thoracic wall
2. Outline the attachment of the superficial muscles of the back and scapular region
3. Discuss the actions of the superficial muscles of the back and scapular region
4. Describe the subacromial bursa and its functional and clinical importance
5. Define the axilla and name its boundaries and content
6. Describe the distribution of axillary lymph nodes and the regions drained by each group
7. Summarize the surface landmarks of the scapular region and axilla

### Practical

1. Identify the muscles of the scapular and shoulder region and related bursa
2. Label the boundaries of the axilla
3. Distinguish the brachial plexus, axillary artery and axillary vein
4. Identify the various groups of the axillary lymph nodes and their area of drainage
5. Distinguish the boundaries of the quadrangular space
6. Identify the surface markings of the scapular region and axilla

### Selected references and suggested resources

- ✦ Clinical Anatomy by Regions, Richard S. Snell, 10<sup>th</sup> edition
- ✦ Grant's Atlas of Anatomy, 13<sup>th</sup> Edition
- ✦ McMinn's Clinical Atlas of Human Anatomy, 7<sup>th</sup> 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 scapular region contain muscles that are important to proper functioning of shoulder joint
- The axilla contains structures that are vital for the proper functioning of the upper limb. Ex: Brachial plexus, axillary vessels and axillary lymph nodes
- Enlarged axillary lymph nodes and abscess of the axilla are common clinical problems encountered in clinical practice

#### ❖ **Key landmarks:**

- ✦ Scapula
- ✦ First rib
- ✦ Deltoid
- ✦ Trapezius
- ✦ Pectoralis minor

**❖ Scapular region**

- It is the posterior aspect of the shoulder region and may be considered as part of the back and/or posterior thoracic wall
- It include the structures around the scapula like muscles, intermuscular spaces, nerves, vessels and arterial anastomosis
- Muscles in this region either attach the scapula to the vertebral column (axial skeleton) or to the humerus (appendicular skeleton), and thus they act on the shoulder joint
- Muscles attaching the scapula to axial skeleton include trapezius, latissimus dorsi, levator scapula, rhomboid minor and rhomboid major muscles. They are classified as superficial muscles of the back but they all (except trapezius) supplied by branches from brachial plexus
- Muscles attaching the scapula to the humerus include deltoid, supraspinatus, infraspinatus, teres minor, teres major and subscapularis
- Note that there are other muscles attached to the scapula like the pectoralis minor and serratus anterior, etc., but their main body lies outside the scapular region

**❖ Trapezius muscle**

- It is a superficial muscle with flat triangular shape on the back of neck and the upper thorax
- It extends from the vertebral column medially to the clavicle and to the acromion and spine of the scapula laterally
- The muscles of two sides lie side by side in the midline and together form a diamond/trapezoid shape, hence the name trapezius
- Being a large muscle with extensive attachment make it capable of providing wide range of actions. It act with other muscles to elevate (shrug the shoulder), retract, depress and rotate the scapula
- It is supplied by a cranial (accessory) nerve and is described in details with muscles of the neck

**❖ Latissimus dorsi muscle**

- It is a superficial, flat, triangular muscle of the back
- It extends from the iliac crest, vertebral column, and the inferior angle of the scapula, to the floor of the bicipital (intertubercular) groove of the humerus
- It act to adduct, extend and medially rotate the arm
- It can also elevate the trunk and the pelvis if the arms are stabilized on crutch-handles

**❖ Levator Scapulae**

- This is a muscle of the neck. Attached to the upper part of the medial border of the scapula
- It acts to elevate the scapula
- Further details are to be covered when studying head and neck region

**❖ Rhomboid minor and major**

- They extends between the vertebral column and the medial border of the scapula
- They lie deep to trapezius muscle
- They act to retract the scapula

**❖ Deltoid muscle**

- Extends from the lateral third of the clavicle, acromion and spine of the scapula to the deltoid tuberosity on the middle of the shaft of the humerus
- It has three parts (anterior, middle and posterior) that act together or separately. Therefore it can flex, abduct and extend the arm
- Note that the deltoid cannot initiate abduction but only after the arm is abducted for 15°
- It covers the shoulder joint, axillary nerve and some other important structures
- Its lower half can be used for injections of small volume medications like vaccines

**❖ Supraspinatus muscle**

- Extends from the supraspinous fossa of the scapula to the greater tuberosity of the humerus
- It passes over the shoulder under the acromion process of the scapula
- It initiates shoulder abduction (responsible for first 15° of abduction)
- It may be injured by friction against acromion process causing tendinitis and/or rupture. The friction is usually reduced by the presence of sub-acromial bursa

**❖ Infraspinatus muscle**

- Extends from the infraspinous fossa to the greater tuberosity of the humerus
- It passes across the posterior aspect of the shoulder joint
- It act as lateral rotator of the arm

**❖ Teres Minor muscle**

- Extends from the lateral border of the scapula to the greater tuberosity of the humerus
- It acts as a lateral rotator and weak adductor of the humerus

**❖ Teres Major muscle**

- Extends from the inferior angle and lateral border of the scapula to the medial lip of the intertubercular sulcus of the humerus
- It acts as a medial rotator of the arm

**❖ Subscapularis muscle**

- Extends from the subscapular fossa to the lesser tuberosity of the humerus
- It passes in front of the capsule of shoulder joint.
- It is separated from the neck of the scapula by subscapular bursa
- It acts as medial rotator of the humerus

**❖ Rotator cuff**

- It is a term used to refer to the tendons of 4 muscles (supraspinatus, infraspinatus, teres minor and subscapularis) because they form a musculotendinous cuff around the glenohumeral joint
- The tone of these muscles assists in holding the head of the humerus in the glenoid cavity of the scapula during movements at the shoulder joint
- The tendons are fused to the anterior, superior, and posterior aspects of the joint capsule
- Note that the cuff is deficient inferiorly predisposing for dislocation of the head of the humerus

**❖ The axilla (armpit)**

- It is a pyramid-shaped space between the upper part of the arm and the side of the chest wall
- It acts as a tunnel that transmit structures (nerves, blood vessels, lymph vessels) between the root of the neck and the upper limb
- It extends from the outer border of the first rib to the lower border of teres major muscle
- It has an apex, base, in addition to anterior, posterior, medial and lateral walls
- Apex (upper end) is bounded by clavicle, upper border of scapula, and outer border of first rib
- Base (lower end) is formed by the skin stretching between anterior and posterior axillary folds
- Anterior wall is formed by structures of pectoral region
- Posterior wall is formed by the subscapularis, latissimus dorsi, and teres major muscles
- Medial wall is formed by serratus anterior muscle over the upper 4 ribs and intercostal spaces
- Lateral wall is formed by the coracobrachialis and biceps brachii muscles
- It contains the brachial plexus, axillary vessels, surrounded by the axillary sheath, in addition to axillary lymph nodes and axillary tail of the breast
- The axillary lymph nodes are divided into six groups
  1. The anterior (pectoral) group lies along the lower border of the pectoralis minor, they drain lymph from the lateral quadrants of breast and anterolateral abdominal wall above the level of the umbilicus. They can be palpated by pressing against the posterior surface of the pectoralis major muscle
  2. The posterior (subscapular) group lies in front of subscapularis muscle, they drain lymph from the back down to iliac crests
  3. The lateral group lies along the axillary vein, they drain lymph from most of upper limb
  4. The central group lie in the center of the axilla, deep to pectoralis minor, they drain lymph from the above three groups
  5. Infraclavicular (deltopectoral) group is located outside the axilla (in the deltopectoral groove), they drain lymph from the lateral side of the hand, forearm, and arm
  6. The apical group lies at the lateral border of 1<sup>st</sup> rib (apex of axilla), they drain lymph from all the other axillary nodes
- The quadrangular space is an intermuscular space located between the shoulder joint and the subscapularis muscle above, the teres major muscle below, long head of the triceps medially and the surgical neck of the humerus laterally

**❖ Surface anatomy**

- The inferior angle of the scapula lies at the level of T7 vertebra
- The root of the spine of the scapula lies at the level of T3 vertebra
- The posterior axillary fold is formed by latissimus dorsi and teres major
- The posterior axillary line is an imaginary line drawn from the lower end of the posterior axillary fold vertically downward
- The middle axillary line is drawn from the point midway between the anterior and posterior axillary fold

**Lab activity list**

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

**❖ Task 1 (bones)**

- ✓ Scapula: Supra-glenoid tubercle/ Infra-glenoid tubercle
- ✓ Humerus: Greater and lesser tuberosities/ Bicipital groove/ Deltoid tuberosity
- ⊕ Which muscle is attached to the supra-glenoid tubercle?

**❖ Task 2 (muscles of the back)**

- ✓ Trapezius/ Latissimus dorsi
- ✓ Levator scapulae/ Rhomboid major/ Rhomboid minor
- ⊕ Which of the above muscles can be considered as a prime mover of the shoulder joint?
- ⊕ From the above muscles name those which can elevate the scapula

**❖ Task 3 (muscles of scapular region)**

- ✓ Subscapularis
- ✓ Supraspinatus
- ✓ Infraspinatus
- ✓ Teres minor
- ✓ Teres major
- ✓ Long head of the triceps
- ⊕ The teres major take its origin from \_\_\_\_\_ .
- ⊕ Which of the rotator cuff muscles lie above the spine of the scapula?
- ⊕ Teres minor can be seen from anterior view of axilla (True/False)
- ⊕ The subscapular fossa gives attachment to which muscle?

**❖ Task 4 (Axilla)**

- ✓ Anterior wall: pectoralis major and minor
- ✓ Posterior wall: subscapularis/ latissimus dorsi/ teres major
- ✓ Medial wall: serratus anterior
- ✓ Lateral wall: surgical neck of humerus
- ✓ Quadrangular space
- ⊕ What are the structures forming the anterior wall of the axilla and not mentioned above?
- ⊕ The lower limit of the axilla is opposite to which rib?

**❖ Task 5 (Axilla content)**

- ✓ Axillary lymph nodes (anterior, posterior, lateral, central, apical, infraclavicular)
- ✓ Vessels: axillary artery/ axillary vein/ cephalic vein
- ✓ Brachial plexus
- ✓ Axillary tail of the breast
- ⊕ The infraclavicular group of axillary lymph nodes can be seen in the axilla. (True/False?)
- ⊕ What parts of the brachial plexus lie within the axilla?

**Review questions:**

1. List the muscles attached to the medial border of the scapula
2. The axillary artery ends below as brachial artery at the level of \_\_\_\_\_
3. What are the main landmarks in the course of lymphatic vessels passing from the infraclavicular nodes to the apical axillary lymph nodes?
4. The apex of the axilla is bounded by \_\_\_\_\_
5. The image on the right is showing a pullup training
  - a) Which of the muscles of the back can lift the hip up?
  - b) What muscle is needed to initiate abduction of the shoulder?

**Homework:**

1. The base of the axilla is made by skin extending from the anterior to the posterior axillary folds, but the structures passing through the apex of the axilla from the root of the neck can still reach the arm. How they can reach the arm if the base of the axilla is as described above?
2. A 50 years old female present with a lump in the outer side of her left breast
  - A. Neoplasm involving the outer side of the breast will spread through lymphatic vessels to which group of axillary lymph nodes?
  - B. Where do you expect to find the affected group of lymph nodes during palpation of the axilla of the patient?
    - a) Deep inside the axilla
    - b) Against the posterior wall of pectoralis major
    - c) Against the medial side of axillary vein
    - d) Just below the axillary lymph nodes
    - e) Against the posterior wall of the axilla