AXILLA

The axilla (armpit) is a four-sided pyramid-shaped region representing a passageway from the neck to the arm, where all major structures passing into and out of the upper limb pass through the axilla.

Boundaries: the axilla has the following six boundaries:

- **Base (floor)**: formed by the axillary fascia and skin of the armpit.
- **Apex (inlet)**: bounded by the first rib, the clavicle, and the superior part of the scapula.
- **Anterior wall**: formed by pectoralis major and minor muscles and clavipectoral fascia.
- **Posterior wall**: formed by subscapularis, teres major, latissimus dorsi, long head of triceps.
- **Medial wall**: formed by the upper ribs and intercostal spaces and the serratus anterior.
- **Lateral wall**: formed by the intertubercular sulcus of the humerus.

Contents: Important structures in the axilla include the following:

1. **Axillary artery**: divided into three parts for descriptive purposes.
2. **Axillary vein(s)**: usually multiple veins paralleling the axillary artery.
3. **Axillary lymph nodes**: five major collections of nodes embedded in axillary fat.
4. **Brachial plexus of nerves**: anterior rami of C5-T1.
5. **Biceps and coracobrachialis muscle**: proximal portions of these muscles.
6. **Axillary tail** (of Spence): an extension of the upper outer quadrant of the female breast.

Axillary fasciae include the following:

- **Pectoral fascia**: invests the pectoralis major muscle; attaches to the sternum and clavicle.
- **Clavipectoral fascia** invests the subclavius and pectoralis minor muscles.
- **Axillary fascia**: forms the base (floor) of the axilla.
- **Axillary sheath:** invests the axillary neurovascular structures. It is derived from the prevertebral fascia of the neck.

Axillary inlet (apex): is oriented in the horizontal plane and is triangular in shape, with its apex directed laterally. The margins of the inlet are completely formed by bone:

- The medial margin is the lateral border of the first rib.
- The anterior margin is the posterior surface of the clavicle.
- The posterior margin is the superior border of the scapula up to the coracoid process.

Major vessels and nerves pass between the neck and the axilla by crossing over the lateral border of the first rib and through the axillary inlet. The inferior trunk (lower trunk) of the brachial plexus lies directly on the first rib in the neck, as does the subclavian artery and vein. As they pass over the first rib, the vein and artery are separated by the insertion of the anterior scalene muscle.

Assistant Professor Dr. Mohammed Hussein
MBChB–MSc–PhD–MRCPCH–DCH (UK)

Anterior Wall of Axilla

The anterior wall is formed by the lateral part of the pectoralis major, the underlying pectoralis minor and subclavius muscles, and the clavipectoral fascia.

- *The pectoralis major* is the largest and most superficial muscle of the anterior wall. Its inferior margin underlies the anterior axillary fold, which marks the anteroinferior border of the axilla.
- *The subclavius muscle* is a small muscle that lies deep to the pectoralis major muscle and passes between the clavicle and the first rib.
- *The pectoralis minor* muscle is a small triangular-shaped muscle that lies deep to the pectoralis major muscle and passes from the thoracic wall to the coracoid process of the scapula.
- *The clavipectoral fascia* is a thick sheet of connective tissue that connects the clavicle to the floor of the axilla. It encloses the subclavius and pectoralis minor muscles and spans the gap between them.

➢ Structures travel between the axilla and the anterior wall of the axilla by passing through the clavipectoral fascia:

- The cephalic vein, the thoraco-acromial artery, and the lateral pectoral nerve pass between the subclavius and pectoralis minor muscles.
- The lateral thoracic artery leaves the axilla by passing through the fascia inferior to the pectoralis minor muscle.
- The medial pectoral nerve leaves the axilla by penetrating directly through the pectoralis minor muscle to supply this muscle and to reach the pectoralis major muscle.
- Occasionally, branches of the medial pectoral nerve pass around the lower margin of the pectoralis minor to reach and innervate the overlying pectoralis major muscle.

Table 1 Muscles of the anterior wall of the axilla (spinal segments in bold are the major segments innervating the muscle)

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

Medial Wall of Axilla

The medial wall of the axilla consists of the upper thoracic wall (the ribs and related intercostal tissues) and the serratus anterior muscle.

Muscle	Origin	Insertion	Innervation	Function
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

- **Intercostobrachial nerve:** The only major structure that passes directly through the medial wall and into the axilla is the intercostobrachial nerve. This nerve is the lateral cutaneous branch of the second intercostal nerve (anterior ramus of T2). It communicates with a branch of the brachial plexus (the medial cutaneous nerve of the arm) in the axilla and supplies skin on the upper posteromedial side of the arm, which is part of the T2 dermatome.

Lateral Wall of Axilla

The lateral wall is narrow and formed by the intertubercular sulcus of the humerus. The pectoralis major attaches to the lateral lip of the intertubercular sulcus. The latissimus dorsi and teres major attach to the floor and medial lip of the sulcus, respectively.

Posterior Wall of Axilla

The posterior wall of the axilla is complex. Its bone framework is formed by the costal surface of the scapula. Muscles of the wall are:

- The subscapularis muscle.
- The distal parts of the latissimus dorsi and teres major muscles.
- The proximal part of the long head of the triceps brachii muscle.

- Gaps between the muscles of the posterior wall form apertures through which structures pass between the axilla, posterior scapular region, and posterior compartment of the arm.

Muscle	Origin	Insertion	Innervation	Function
Subscapularis	Medial two-thirds of subscapular fossa	Lesser tubercle of humerus	Upper and lower subscapular nerves (C5, **C6**, (C7))	**Rotator cuff muscle**; medial rotation of the arm at the glenohumeral joint
Teres major	Elongate oval area on the posterior surface of the inferior angle of the scapula	Medial lip of the intertubercular sulcus on the anterior surface of the humerus	Lower subscapular nerve (**C5, C6, C7**)	Medial rotation and extension of the arm at the glenohumeral joint
Latissimus dorsi	Spinous processes of lower six thoracic vertebrae and related interspinous ligaments; via the thoracolumbar fascia to the spinous processes of the lumbar vertebrae, related interspinous ligaments, and iliac crest; lower 3–4 ribs	Floor of intertubercular sulcus	Thoracodorsal nerve (C6, **C7**, C8)	Adduction, medial rotation, and extension of the arm at the glenohumeral joint
Long head of triceps brachii	Infraglenoid tubercle on scapula	Common tendon of insertion with medial and lateral heads on the olecranon process of ulna	Radial nerve (C6, **C7**, C8)	Extension of the forearm at the elbow joint; accessory adductor and extensor of the arm at the glenohumeral joint

Floor of Axilla

The floor of the axilla is formed by fascia and a dome of skin that spans the distance between the inferior margins of the walls. It is supported by clavipectoral fascia.
On a patient, the anterior axillary fold is more superior in position than the posterior fold.
Inferiorly, structures pass into and out of the axilla immediately lateral to the floor where the anterior and posterior walls of the axilla converge and where the axilla is continuous with the anterior compartment of the arm.

Axillary Artery

The axillary artery begins at the lateral border of the first rib as a continuation of the subclavian artery and ends at the lower border of the teres major, where it continues as the brachial artery.
Throughout its course, the artery is closely related to the cords of the brachial plexus and its branches and is enclosed with them in the axillary sheath.
The pectoralis minor muscle crosses in front of the artery and divides it into three parts:

- The first part is proximal to the pectoralis minor.
- The second part is posterior to the pectoralis minor.
- The third part is distal to the pectoralis minor.

Generally, six branches arise from the axillary artery:

- ✓ One branch (superior thoracic artery) originates from the first part.
- ✓ Two branches (thoraco-acromial and lateral thoracic arteries) from the second part.
- ✓ Three branches (subscapular artery, anterior circumflex humeral artery, and posterior circumflex humeral arteries) originate from the third part.

- **Superior thoracic artery** supplies the upper regions of the medial and anterior axillary walls.

- **Thoraco-acromial artery** curves around the superior margin of the pectoralis minor, penetrates the clavipectoral fascia and immediately divides into four branches (the pectoral, deltoid, clavicular, and acromial branches) which supply the anterior axillary wall and related regions.
  Additionally, the pectoral branch contributes vascular supply to the breast, and the deltoid branch passes into the clavipectoral triangle where it accompanies the cephalic vein and supplies adjacent structures.

- **Lateral thoracic artery** follows the inferior margin of the pectoralis minor to the thoracic wall and supplies the medial and anterior walls of the axilla.
  In women, branches emerge from around the inferior margin of the pectoralis major muscle and contribute to the vascular supply of the breast.

- **Subscapular artery** is the largest branch of the axillary artery and is the major blood supply to the posterior wall of the axilla. It also contributes to the blood supply of the posterior scapular region.
  The artery follows the inferior margin of the subscapularis muscle for a short distance and then divides into its two terminal branches (circumflex scapular and thoracodorsal arteries).
  - The circumflex scapular artery passes through the triangular space to enter the infraspinous fossa. It anastomoses with the suprascapular artery and the deep branch (dorsal scapular artery) of the transverse cervical artery, thereby contributing to an anastomotic network of vessels around the scapula.
  - The thoracodorsal artery follows the lateral border of the scapula to the inferior angle. It contributes to the vascular supply of the posterior and medial walls of the axilla.

- **Anterior circumflex humeral artery** is small compared to the posterior circumflex humeral artery. It passes anterior to the surgical neck of the humerus and anastomoses with the posterior circumflex humeral artery. It supplies branches to surrounding tissues, which include the glenohumeral joint and the head of the humerus.

- **Posterior circumflex humeral artery** leaves the axilla by passing through the quadrangular space accompanied by the axillary nerve. It curves around the surgical neck of the humerus and supplies the surrounding muscles and the glenohumeral joint.

Axillary vein

The axillary vein begins at the lower margin of the teres major as a continuation of the basilic vein, which is a superficial vein that drains the posteromedial surface of the hand and forearm and penetrates the deep fascia in the middle of the arm.
The axillary vein passes through the axilla medial and anterior to the axillary artery and becomes the subclavian vein as the vessel crosses the lateral border of the first rib at the axillary inlet. Tributaries of the axillary vein generally follow the branches of the axillary artery. Other tributaries include brachial veins that follow the brachial artery and the cephalic vein.

Axillary process (tail) of the mammary gland

Although the mammary gland is in superficial fascia overlying the thoracic wall, its superolateral region extends along the inferior margin of the pectoralis major muscle toward the axilla. In some cases, this may pass around the margin of the muscle to penetrate deep fascia and enter the axilla. This axillary process rarely reaches as high as the apex of the axilla.

References:
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