Unit 4: Pectoral region and axilla

Dissection Instructions:

**Both sides are to be dissected.**

There are several important landmarks (*Plates 178; 1.1, 1.8*) on the anterior chest wall. The **clavicles** separate the neck from the thorax. Between the medial ends of the clavicles is the **suprasternal or jugular notch**. The **sternum** is divided into three parts, **manubrium, body and xiphoid process**. The **manubrium** and **body** are set at an angle from each other and this is a landmark called the **sternal angle**. It marks the point of articulation of the second rib with the sternum. **Ribs are counted from the second one since the first is covered by the clavicle.** The spaces between ribs are called **intercostal spaces.** Heart sounds are best heard over spaces rather than ribs (*Plate 1.39*). The **xiphoid process** is depressed compared to the body of the sternum. The **seventh rib** articulates at the junction of body and xiphoid process. The costal margin is the landmark separating the thoracic wall from the abdominal wall. The **nipple usually lies in the fourth intercostal space.** This is a better landmark in males and preadolescent females than in women.

*Make the following incisions which are illustrated in Figure 4 - 1*

* ! Make an incision 2 mm deep through the skin from the jugular notch (A) to the xiphoid process (B), then follow the costal margin to the mid-axillary line on both sides of the body (C): A to B to C.

* ! Make another incision from the xiphoid process (B) to the areola (D), circle the areola with an incision, continue to the uppermost part of the axilla (E), then down to the deltoid insertion (F): B to D to E to F.*

![Figure 4 - 1](image-url)
Reflect the skin from the anterior thoracic region, except from the areola and nipple. If you have a female cadaver, carefully dissect under the areola and nipple and attempt to demonstrate the lactiferous ducts and glandular tissue on one side and on the other side, bisect the nipple parallel to the ducts (Plates 175; 1.3, 1.6). The suspensory ligaments separating lobules of the mammary gland and attached to the skin were cut when the skin was removed. Around the periphery of the mammary gland, try to locate the arteries and veins which serve the mammary gland (Plates 176, 177; 1.4). Lymph nodes may be encountered. The perforating vessels just lateral to the sternum between the costal cartilages of the ribs are branches of the internal thoracic vessels and should be accompanied by the anterior cutaneous branches of the intercostal nerves. Try to preserve two or three of these.

Reflect the superficial fascia, including the mammary gland and deep fascia covering the pectoralis major muscle, from the area just skinned, but keep the nerves and vessels intact on the chest wall. The mammary gland is located entirely within the superficial fascia. In a living woman, it should be movable in respect to the pectoralis major muscle.

Clean the pectoralis major muscles so that its borders and fibers can be clearly seen (Plates 182; 1.2, Table 6.1-p. 479). This muscle takes origin from the medial portion of the clavicle, the sternum, costal cartilages of the upper ribs and from the rectus sheath. Note that there is a crossing of fibers so that the lowest fibers pass deep to the clavicular fibers as they approach the humerus. The insertion of the pectoralis major is on the greater tubercular ridge of the humerus. It is a medial rotator and adductor of the arm. In cleaning the upper border of the muscle, be careful of the cephalic vein and deltoid artery which lie adjacent to the muscle in the deltopectoral triangle (Plates 182; 1.2). This triangle is bounded by the clavicle, pectoralis major and deltoid muscles. There are some small lymph nodes in this triangle, but unless they have been stimulated to enlarge, they will be difficult to find.

Detach the pectoralis major muscle from its origin on both sides of the body. As it is being elevated, look for the nerves and blood vessels which reach the deep surface of the muscle (Plates 182; 6.11, 6.13). These nerves and vessels pass through a sheet of fascia, the clavipectoral fascia, which encloses the pectoralis minor and the subclavius muscle. The nerves which reach the pectoralis major through the pectoralis minor are called the medial pectoral nerves because they are branches of the medial cord of the brachial plexus. The nerve fibers which innervate the pectoralis major by passing through the fascia above the pectoralis minor are called the lateral pectoral nerves because they are branches of the lateral cord of the brachial plexus. The blood vessels supplying the pectoralis major include pectoral branches of the thoracoacromial trunk of the axillary vessels, lateral thoracic branches from the axillary vessels, deltoid branch of the thoracoacromial trunk and perforating branches from the intercostal vessels.

The portion of the clavipectoral fascia below the pectoralis minor extends down to the axillary fascia and is called the suspensory ligament of the axilla (Plates 182, 411; 6.14, 6.15). The portion of the clavipectoral fascia above the pectoralis minor is called the costocoracoid membrane and is perforated by the cephalic vein, lateral pectoral nerves, branches of the thoracoacromial trunk and lymphatic vessels. The portion of the costocoracoid membrane between the costal cartilage of the first rib and the coracoid process is thickened and is called the costocoracoid ligament. It tends to overlie the subclavius muscle.

Clean and study the pectoralis minor muscle, noting its origin from 3 or 4 ribs and insertion on the coracoid process of the scapula (Plates 183; 6.13, Table 6.1-p. 479. It protracts the shoulder. While it can move the shoulder, it can not act on the shoulder joint, since it doesn't cross that joint.

Study the structures found in the intercostal spaces (Plates 183; 1.15, 1.16, Table 1.1-p.21). The fibers of the external intercostal muscle extend from the rib above to the rib below. Fleshy fibers of
these muscles extend from the neck of the ribs posteriorly to near the anterior end of the ribs where the fleshy fibers are replaced by the external intercostal membrane. In the back, the fibers extend downward and laterally. At the sides of the thorax, they extend downward and forward, and in front they extend downward and medially. The **external intercostal membrane** is usually transparent and the **internal intercostal muscle** can be seen through it. This muscle has its fibers running almost perpendicular to those of the external intercostal muscles. The **intercostal nerves and vessels** run immediately below or behind the lower border of the ribs and are arranged in order from above downwards vein, artery, nerve. These neurovascular bundles travel in the internal intercostal muscle, splitting it. The muscle fibers deep or internal to the bundle are called the **innermost intercostal muscles**. Using different intercostal spaces, clean for demonstration a segment of external intercostal muscle, a segment of internal intercostal muscle and a segment of the neurovascular bundle.

**Detach the pectoralis minor muscle** from its origin and reflect it upward and laterally. Detach the subclavius from its origin from the clavicle and reflect it medially.

Review the plan of the **brachial** and relate it to the axilla so you can anticipate the smaller branches as they are approached in the dissection **plexus** (*Plates 413; 6.20, 6.21, Table 6.3 and pictures-p.486 & 487)*.

Locate the neurovascular that leaves the axilla and enters the arm at the level of the neck of the **humerus bundle** (*Plates 412; 6.13, 6.32A*). Several large and small nerves, arteries and veins should be found. In this vicinity, the medial and lateral cords of the brachial plexus are ending by dividing into two branches each. The **lateral cord** divides into the **musculocutaneous nerve** and the **lateral head of the median nerve**. The **medial cord** divides into the **ulnar nerve** and the **medial head of the median nerve**. The **lateral** and **medial heads of the median nerve** join to form the **median nerve**. The musculocutaneous nerve, the two heads of the median nerve and the ulnar nerve form a letter "M". Locate this configuration without destroying other nerves or vessels. These structures tend to surround the **distal end of the axillary artery** and the beginning of the **brachial artery**. Nearby medially should be the **medial antebrachial** and **medial brachial cutaneous nerves**. Joining the latter nerve will be the intercostobrachial nerve coming from the second intercostal space.

**Without damaging the axillary artery or its branches, follow the anterior components of the brachial plexus back into the axilla**. The **lateral cord** will give off the **lateral pectoral nerve** to the pectoralis major. The **medial cord** will give off the **medial pectoral nerve** to both pectoral muscles, **medial antebrachial** and medial brachial cutaneous nerves. The **lateral cord** is formed by the **anterior divisions of the upper and middle trunks of the plexus**, while the **medial cord** is the continuation of the **anterior division of the lower trunk**. The divisions have no branches.

**Identify and clean all the parts of the brachial plexus thus far identified**. The **anterior primary rami from C5 to T1** should have been cleaned for Unit 3. Recall that the **anterior primary ramus of C5** gave off the **dorsal scapular nerve** to supply the rhomboid muscles and lower portion of the levator scapulae muscle. The **long thoracic nerve** received fibers from the **anterior primary rami of C5, 6 & 7**. The **phrenic nerve** receives fibers from C5 as well as C3 and C4. The **upper trunk** is formed from C5, 6, the **middle trunk from C7** and the **lower trunk from C8 and T1**. Locate the **suprascapular nerve** and **nerve to the subclavius muscle** branching from the **upper trunk**. All of the trunks divide into anterior and posterior divisions. Follow the anterior divisions of the upper and middle trunks to the lateral cord and the anterior division of the lower trunk to the medial cord. **Locate again the branches of the lateral and medial cords**.

**Return to the trunks and locate each of the posterior divisions** and follow them until they join each other to form the **posterior cord**. The **posterior cord** gives off three small branches before dividing...
into the **axillary and radial nerves**. The small branches are the upper, middle and lower subscapular nerves which innervate the posterior wall of the axilla. The **middle subscapular nerve** is more properly called the **thoracodorsal nerve**. Clean the **upper subscapular nerve** to the subscapularis muscle. Follow and clean the **thoracodorsal nerve** to the latissimus dorsi muscle without destroying the accompanying artery and vein of the same name. Follow the **lower subscapular nerve** and its branches to the subscapularis and teres major muscles. The three muscles innervated by the subscapular nerves form the posterior wall of the axilla.

**Review:** The skeleton of the brachial plexus consists of five rami, three trunks, six divisions and three cords. The rami have two nerves, the dorsal scapular and long thoracic. The trunks have two nerves, the suprascapular and nerve to the subclavius muscle. The divisions have no nerves. The cords have seven branches before terminating. They are medial and lateral pectoral, upper, middle and lower subscapular, and medial brachial and antebrachial nerves. The five terminal branches are the musculocutaneous, median, ulnar, axillary and radial nerves.

The **axillary vein** lies anterior to the **axillary artery**, is sometimes duplicated, and has similar, but more variable, branching to the artery. **If the vein is too large to work around to study the artery, it may be removed.**

The **pectoralis minor muscle** lies in front of the axillary artery and is used to divide the axillary artery into three parts(Plates 183, 410; 6.13, Table 6.2-p. 484). The **first part** extends from the lateral border of the first rib (where the subclavian artery ends by changing its name to axillary) and extends to the upper border of the pectoralis minor. The **second part** lies deep to the pectoralis minor. The **third part** extends from the lower border of the pectoralis minor and extends to the lower border of the teres major where it extends by changing its name to brachial. Locate and clean the branches of the axillary artery. As the arteries are dissected observe their relationship to previously dissected nerves. The **first part** has one branch, the **superior thoracic artery**, which is small and supplies the tissue in the vicinity of the first intercostal space. The **second part** of the axillary artery has two branches. The **thoracoacromial trunk** arises behind the upper margin of the pectoralis minor and quickly divides into four branches. The **clavicular branch** is small and goes to the region of the subclavius muscle. The **acromial branch** supplies the region of the acromion process of the scapula. The **deltoid branch**, enters the deltoid muscle of the axillary muscle and travels distally in company with the cephalic vein. It supplies the deltoid and pectoralis major muscles. The **pectoral branches** pierce the costocoracoid membrane and supply the pectoralis major and minor muscles. The **lateral thoracic artery** a branch of the axillary artery arises behind the lower border of the pectoralis minor and supplies the serratus anterior and pectoral muscles. It supplies the lateral part of the mammary gland in women. Its accompanying vein is important in cases of blockage of the superior or inferior venae cavae because it anastomoses with the superficial epigastric vein to form the **thoracoepigastric vein** and provides an alternate route for blood.

The **third part** of the axillary artery has three branches arising fairly close together. The **subscapular artery** is the largest branch of the axillary artery and frequently there is a noticeable narrowing at the point of branching. It is therefore a place where emboli may lodge, blocking the circulation beyond that point. The subscapular artery has two named branches, the **circumflex scapular and thoracodorsal arteries**. The **circumflex scapular artery** goes between the scapula and the teres muscles, gives branches which pass through the triangular space, and ends deep to the infraspinatus muscle where it is joined by branches from the suprascapular artery. This forms a collateral route for blood from the first part of the subclavian artery to the third part of the axillary artery. The thoracodorsal artery supplies the latissimus dorsi muscle.

The **anterior and posterior humeral circumflex arteries** arise near the end of the axillary artery and pass anterior or posterior, respectively, to the humerus. The **posterior humeral circumflex artery** is
larger and travels with the axillary nerve, supplying the muscles near the shoulder joint, especially the deltoid.

Now clean the walls of the axilla (Plates 185, 407, 411, 414; 6.13, 6.15, 6.21, 6.30). The anterior wall has been cleaned and reflected. The posterior wall consists of the subscapularis, teres major and latissimus dorsi muscles. Clean the axillary surface of these muscles, preserving their nerve and blood supply. The subscapularis muscle completely fills the subscapular fossa of the scapula, where it takes origin. It passes directly in front of the shoulder joint, fusing with its capsule, and inserts on the lesser tubercle of the humerus. It is a medial rotator of the arm. The teres major muscle arises from the inferior angle and adjacent axillary border of the scapula and passes anterior to the long head of the triceps brachii muscle and anatomical neck of the humerus to insert on the lesser tubercular ridge. The latissimus dorsi muscle was seen arising from the back. It crosses the inferior angle of the scapula and origin of the teres major, then turns under the teres major to reach its anterior surface before inserting on the lesser tubercular ridge and floor of the intertubercular sulcus. In the process of turning under the teres major, the fibers of the latissimus dorsi muscle rotate so that the most superior fibers at its origin are the most inferior fibers at its insertion.

The medial wall of the axilla is formed by the serratus anterior muscle covering the thoracic wall (Plates 185: 6.15). Find its nerve supply, the long thoracic nerve, and then clean its entire surface. The serratus anterior muscle takes origin from the upper eight ribs and inserts on the vertebral border of the scapula. When its lower fibers contract, it can assist the trapezius muscle in rotating the scapula. When all of its fibers contract, they prevent retraction of the scapula or shoulder. Loss of its nerve supply can result in winged scapula, since the vertebral border of the scapula will no longer be held to the chest wall.

The lateral wall of the axilla is very narrow, since the anterior and posterior walls converge on each other to meet in the vicinity of the intertubercular sulcus. The long and short heads of the biceps brachii muscle and the coracobrachialis muscle form the lateral wall of the axilla.
Be sure to identify all of the following in this unit:

sternum
deltoid branch
jugular notch
pectoralis major muscle
manubrium
lateral thoracic artery
body
subscapular artery
xiphoid process
circumflex scapular artery
sternal angle
thoracodorsal artery
jugular notch
anterior humeral circumflex artery
manubrium
posterior humeral circumflex artery
body
thoracodorsal nerve
xiphoid process
subscapularis muscle
sternal angle
teres major muscle
mammary gland
lateral pectoral nerves
suspensory ligament
deltoid artery
pectoralis minor muscle
deltoid artery
deltoid vessels
proclavipectoral fascia
pectoral vessels
clavipectoral fascia
pectoral vessels
medial pectoral nerves
lateral thoracic vessels
deltopectoral triangle
clavipectoral fascia
pectoral vessels
medial pectoral nerves
pectoral vessels
deltoid vessels
lateral pectoral nerves
pectoralis minor muscle
pectoral vessels
deltopectoral triangle
external intercostal muscle
cleavage plane
external intercostal membrane
lateral thoracic vessels
internal costal muscle
medial pectoral nerves
intercostal vessels and nerves
medial pectoral nerves
clavicular branch
lateral pectoral nerves
deltoid branch
deltoid vessels
pectoral branches
pectoral vessels
lateral thoracic artery
subscapular artery
circumflex scapular artery
deltoid branch
thoracodorsal artery
anterior humeral circumflex artery
latissimus dorsi muscle
lateral pectoral nerve
serratus anterior muscle
medial pectoral nerves
long thoracic nerve
pectoral vessels
gluteus maximus muscle
lateral pectoral nerve
long head biceps brachii muscle
pectoral vessels
short head biceps brachii muscle
coracobrachialis muscle
pectoral vessels
pectoralis minor muscle
lateral thoracic vessels
lateral pectoral nerves
lateral cord
subscapularis muscle
deltoid vessels
deltopectoral triangle
pectoral vessels
deltoid vessels
lateral thoracic vessels
pectoral vessels
lateral pectoral nerves
pectoral vessels
lateral thoracic vessels
pectoral vessels