

Superficial Back and Posterior Axilla

Refer to DVD Disc 1



1

PROCEDURE: Place the cadaver prone.

This section describes dissection of the superficial back muscles and the posterior axilla. The deeper layers of the back muscles and the posterior neck are presented in Chapter 13.

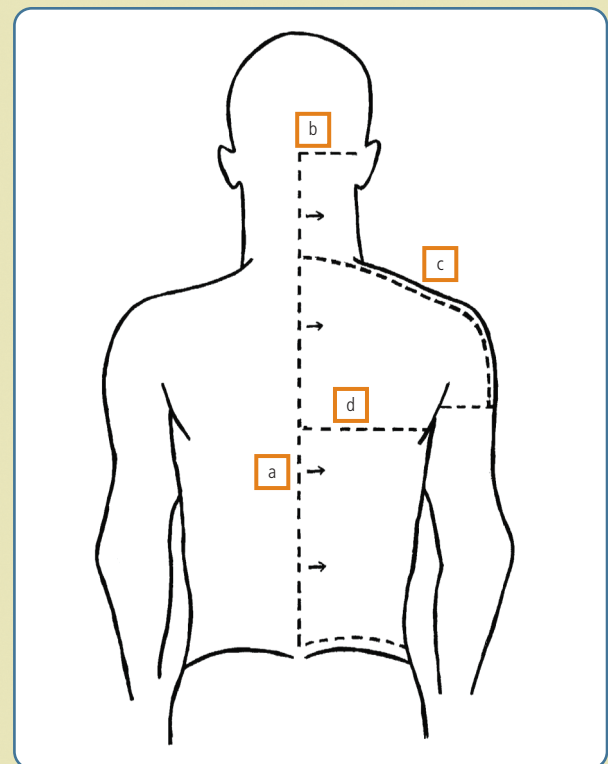
1. Prior to beginning dissection, place a block under the chest of the cadaver so that the head falls into flexion. This will allow you access to the posterior neck region.

Palpate the following on the cadaver:

- a. external occipital protuberance (inion)
 - b. mastoid process of the temporal bone
 - c. acromion
 - d. spine of the scapulamedial border of the scapula
 - e. inferior angle of the scapula
 - f. spinous processes of thoracic vertebrae
 - g. crest of the ilium
2. Make a skin incision superficial to the spinous processes of the vertebrae from the external occipital protuberance (inion) to the level of the crest of the ilium **Figure 1.1a**. Continue the incision laterally along the iliac crest to the midaxillary line.
 3. A second incision should be made from the external occipital protuberance to the mastoid process of the temporal bone **Figure 1.1b**.
 4. Beginning at the spinous process of the seventh cervical vertebra, make an incision to the acromion and then along the lateral border of the shoulder and arm to the level of the axilla. Continue the incision medially until the axilla is encountered **Figure 1.1c**.
 5. A fourth incision should be made from the spinous processes in the midthoracic area to the midaxillary line. This will facilitate handling of the skin flaps **Figure 1.1d**.
 6. Using hemostat forceps, lift a corner at a site where two of these incision lines meet. Pull the skin so it is taut. With a scalpel held at an angle, slowly work through the superficial fascia until muscle fibers are encountered. This step will aid in judging the depth of dissection necessary for skin removal.

Figure 1.1

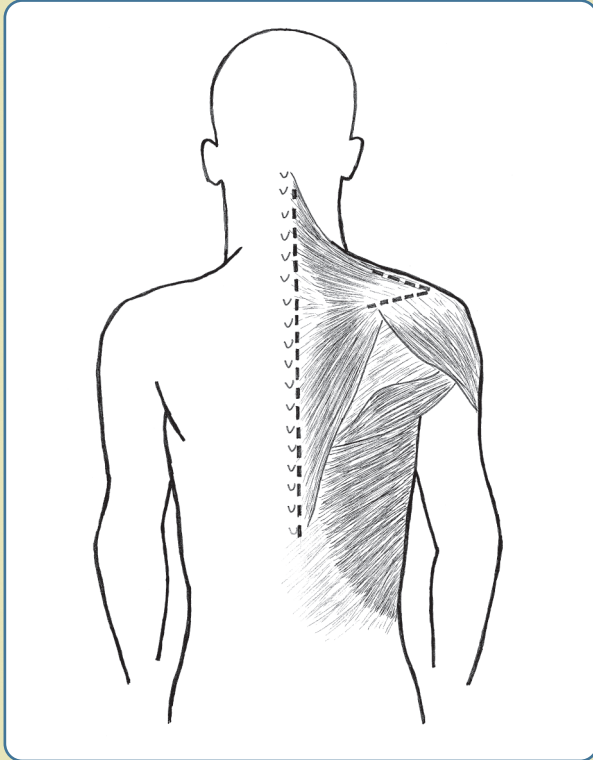
Skin incision lines on the back.



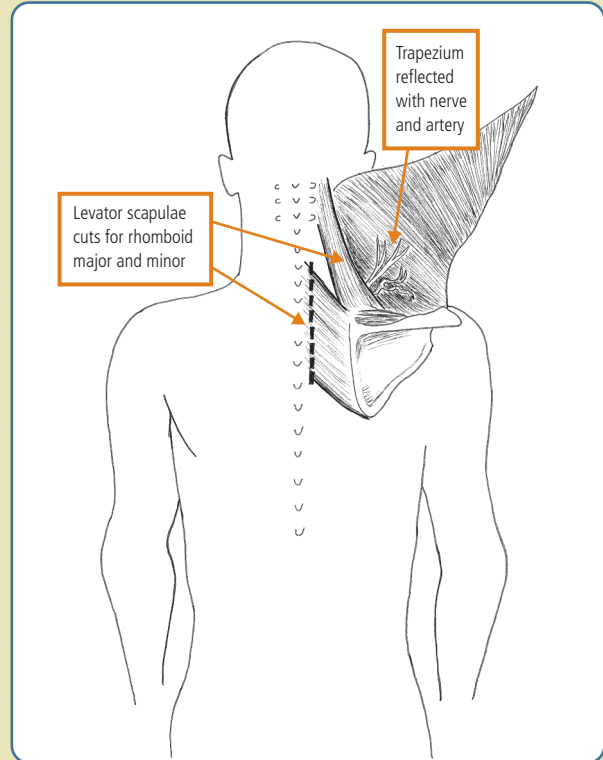
7. Remove the skin from the back laterally to the midaxillary line. The skin on the lateral side of the trunk should be left **connected** to the skin from the ventral surface of the trunk. The entire skin flap can then be used to cover the dissected area when work is completed. This will help retain moisture.
8. Remove remaining superficial fascia until the muscles can be viewed clearly. Clean fat off the muscles in the direction the muscle fibers travel. Cleaning off fat dulls the blade quickly; it may be necessary to change your blade multiple times while cleaning the superficial back. Preserve several cutaneous branches of dorsal rami of spinal nerves as they emerge through the superficial fascia and muscle. **Refer to the DVD for identification.** Be sure to keep the thoracolumbar fascia intact; it will appear white and shiny in the lumbar region.
9. Identify:
 - a. trapezius
 - b. latissimus dorsi
 - c. deltoid
 - d. teres major
 - e. thoracolumbar fascia
 - f. ligamentum nuchae
10. Study the direction of muscle fibers of the upper, middle, and lower trapezius. Review the actions accomplished by each portion of this muscle as well as the muscle acting as a whole.
11. Make an incision through the trapezius from the external occipital protuberance to the level of the 12th thoracic vertebra. The incision line should be approximately $\frac{1}{2}$ inch lateral to the spinous processes of the vertebrae **Figure 1.2**. This cut allows for the trapezius to be turned back on each side of the cadaver.
12. Continue to release the trapezius by cutting along its attachments on the spine of the scapula, the acromion, and the clavicle (Figure 1.2).
13. **Turn the trapezius toward the head** to view the structures deep to this muscle. The spinal accessory nerve and transverse cervical (colli) artery enter the trapezius on its anterior border. First, locate several of the branches of this nerve and artery on the costal surface of the trapezius; using a probe, trace these branches to the major nerve and artery as they enter the muscle. **Refer to the DVD for the proper technique to use in this area. DO NOT** use your scalpel in this area. Once the nerve and artery have been identified, remove the veins in the area for clearer study of these structures.
14. Identify rhomboid major and minor and levator scapulae.
15. Study the insertion of the levator scapulae on the superior angle of the scapula, and study the scapular movements accomplished when this muscle contracts.
16. Study the direction of the muscle fibers of the rhomboid major and minor. Review the actions of these muscles upon the scapula by pulling gently on the muscle fibers.
17. Release the rhomboid major and minor from their vertebral attachments staying close to the spinous processes **Figure 1.3**. Avoid cutting the muscle deep to the rhomboids.
18. Reflect the rhomboids laterally to find the dorsal scapular nerve. This nerve emerges from the costal surface of the levator scapulae and enters the superior border of rhomboid minor near the superior angle of the scapula. The dorsal scapular nerve then courses through fascia on the costal surface of the rhomboids. Locate this nerve

Figure 1.2

Trapezius incisions, superficial back.

**Figure 1.3**

Rhomboid major and minor cut.



as it passes through fascia at the superior angle of the scapula between levator scapulae and rhomboid minor. **Refer to the DVD for its location.**

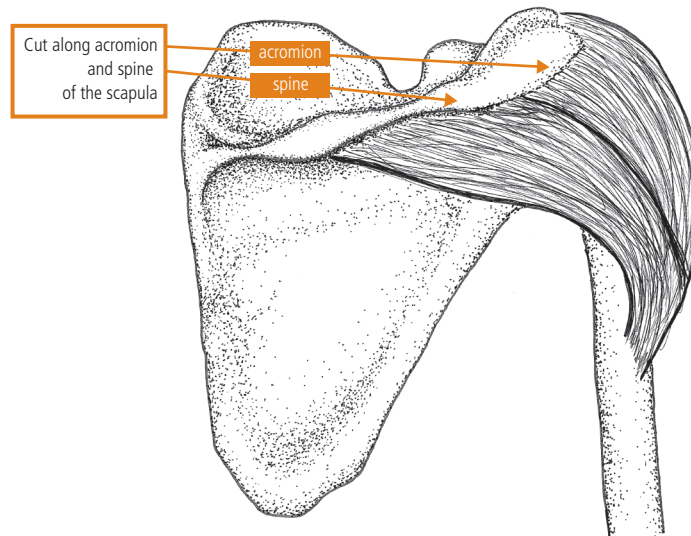
NOTE TO THE DISSECTOR

The serratus posterior superior muscle may adhere to the costal surface of the rhomboids and will need to be separated from them. This muscle is very thin and is easily overlooked.

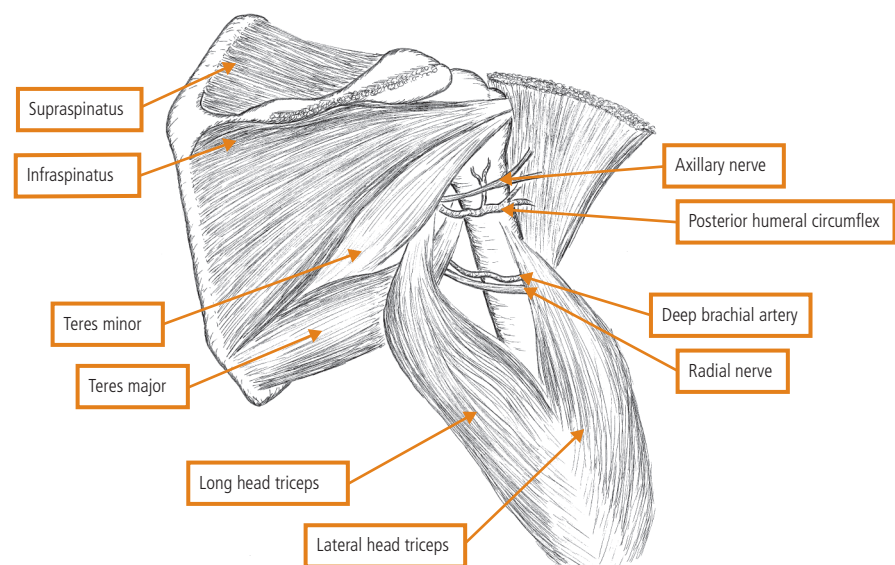
19. Continue to remove skin and fascia in the posterior axilla until the teres major and minor, the posterior deltoid, and the proximal portions of the long and lateral heads of the triceps brachii are in view. Cutaneous branches of the axillary nerve to the skin are superficial to the deltoid and may be found emerging at the posterior border of the deltoid.
20. Study the direction of the muscle fibers of the posterior and middle portions of the deltoid. Demonstrate on the cadaver the movements of the humerus accomplished by the posterior portion of the deltoid and by the middle portion of the deltoid.
21. Release the deltoid from its proximal attachment to the spine of the scapula and the acromion **Figure 1.4** and reflect the deltoid distally.
22. Find the axillary nerve and posterior humeral circumflex artery **Figure 1.5**. These structures course around the surgical neck of the humerus between the deltoid and

Figure 1.4

Posterior deltoid.

**Figure 1.5**

Posterior aspect of the scapula and arm.



the humerus. The proximal long head and lateral head of the triceps brachii may need to be separated with a probe to make viewing of these structures easier.

23. Identify branches of the axillary nerve innervating the teres minor and deltoid. Note in Figure 1.5 the location of the branch to the teres minor. It is found in the fascia at the inferior border of this muscle.
24. Locate the supraspinatus and infraspinatus muscles.
25. A thick layer of fascia covers the superficial surface of the infraspinatus. Remove this fascia to view the muscle. Lift the fascia with your forceps (away from the underlying muscle) and open it with your scalpel to remove it from the muscle.
26. The muscle attachments of the supraspinatus, infraspinatus, and teres minor can now be studied. Study the direction of muscle fibers and how this relates to their actions.
27. Starting medially, move a finger along the superior border of the scapula toward the base of the coracoid process until a sharp ligament is encountered. This is the transverse scapular ligament that bridges the suprascapular notch. The suprascapular nerve passes below and the suprascapular artery above the transverse scapular ligament through the opening of the suprascapular notch before entering the supraspinous fossa. The suprascapular artery and nerve will be viewed in step 28 and step 29 when the infraspinatus is dissected.

NOTE TO THE DISSECTOR The suprascapular artery, transverse cervical artery, and circumflex scapular branch of the subscapular artery form an extensive arterial anastomosis in the posterior scapular region.

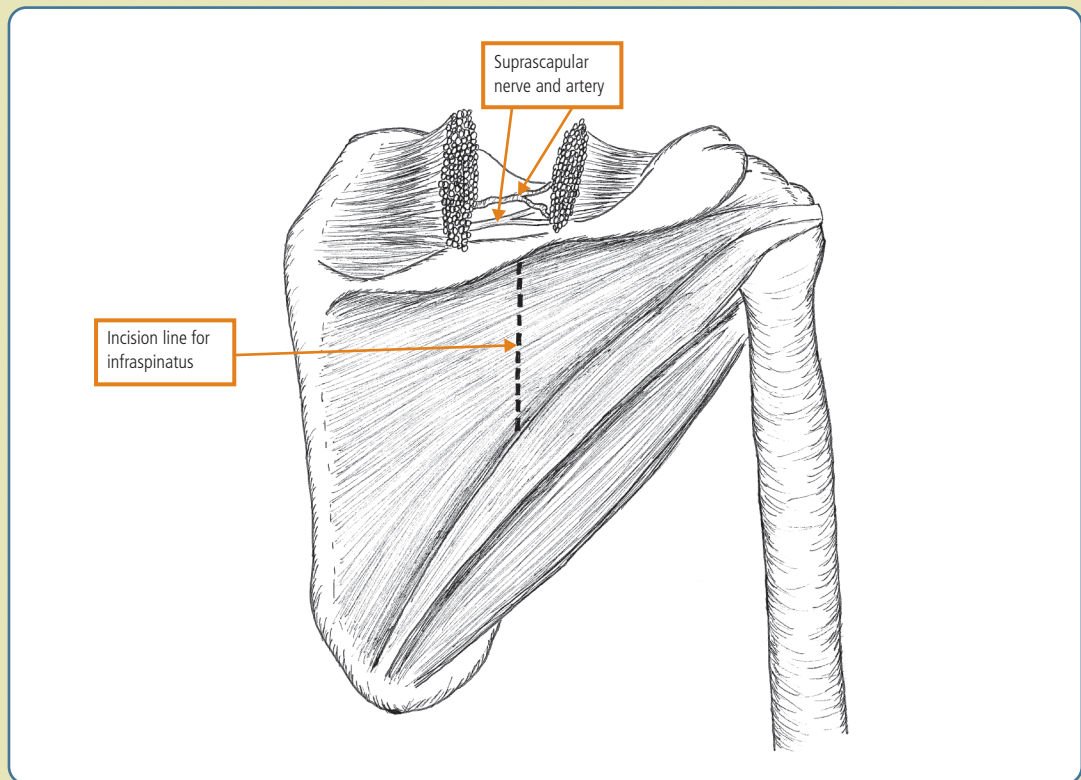
28. An incision should be made through the muscle belly of the infraspinatus as shown in **Figure 1.6**. This muscle is thick and should be cut lateral to the suprascapular notch. Use your probe to lift the muscle as you cut through it so as not to cut the structures below. Reflect the cut portions of this muscle to locate the continuation of the suprascapular artery and nerve as they enter the infraspinous fossa deep to the infraspinatus.

NOTE TO THE DISSECTOR The supraspinatus may also be reflected back to expose the suprascapular notch, transverse ligament, nerve, and artery. Remove fascia overlying the muscle to view the supraspinatus. Lift the fascia with your forceps (away from the underlying muscle) and open it with your scalpel to remove it from the muscle.

29. Make an incision just lateral to the suprascapular notch. Use your probe to lift the muscle as you cut through it so as not to cut the structures below. Lift the cut portions of this muscle to locate the nerve and artery as they course through the opening in the scapula to enter the infraspinous fossa (Figure 1.6).
30. Review and carefully observe the attachments of the following muscles:
 - a. trapezius
 - b. latissimus dorsi (humeral attachment to be viewed later)
 - c. deltoid (posterior portion)
 - d. teres major (humeral attachment to be viewed later)
 - e. rhomboid major and minor
 - f. levator scapulae (vertebral attachments to be viewed later)
 - g. supraspinatus

Figure 1.6

Posterior view of the scapula.



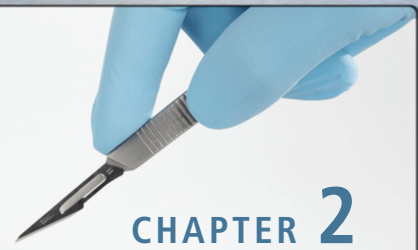
h. infraspinatus

i. serratus anterior (costal attachments to be viewed later)

31. Review innervation for each of the following muscles by tracing each nerve to the muscle(s) innervated:
 - a. trapezius: spinal accessory nerve
 - b. deltoid: axillary nerve
 - c. rhomboid major and minor: dorsal scapular nerve
 - d. supraspinatus: suprascapular nerve (If dissected, this nerve will lie in the suprascapular fossa. Study a picture in the atlas; this muscle lies under the suprascapular fascia in the suprascapular fossa.)
 - e. infraspinatus: suprascapular nerve
 - f. teres minor: axillary nerve
32. Nerve supply to other muscles already studied on the cadaver will be viewed after further dissection.

Pectoral Region

Refer to DVD Disc 1



PROCEDURE: Place the cadaver supine.

The upper extremity should be moved into abduction gently and progressively so that muscle tissue is not torn and the humerus not broken. It may take **several days** to get the extremity out sufficiently. **Do not apply excessive force.** Rope should be furnished by the instructor for holding the extremity in abduction. (The rope should be at least 5 feet in length.) See

Figure 2.1

1. Prior to beginning dissection, palpate on the cadaver:
 - a. jugular notch
 - b. clavicle
 - c. manubrium sterni
 - d. body of the sternum
 - e. xiphoid process of the sternum
 - f. ribs 1 through 8

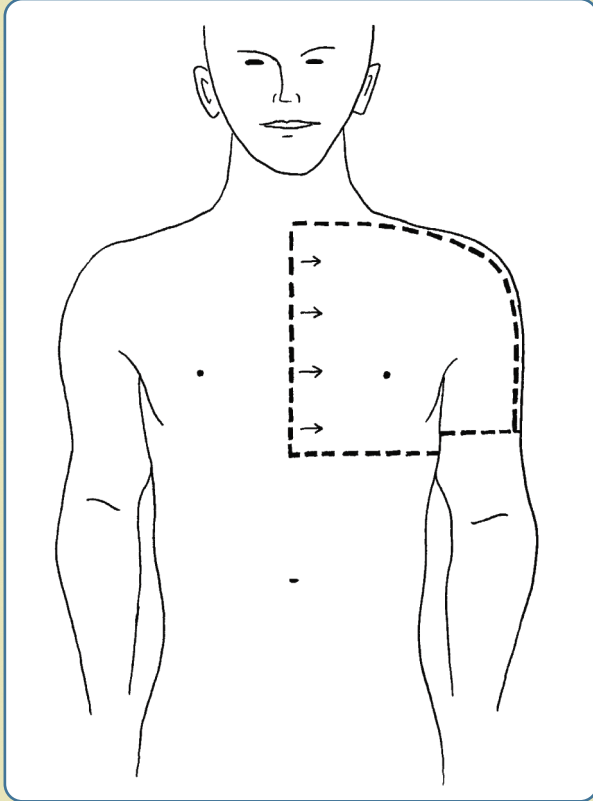
Figure 2.1

Arm abducted with rope to access axilla and anterior surface of arm. Rope is looped around the wrist and passed through the first web space. This rope is then tied to the table to maintain the arm in abduction while dissection proceeds.



Figure 2.2

Skin incision lines on the anterior thorax. Skin incision lines should meet up with the posterior incision lines.



2. Remove skin as shown in **Figure 2.2**. Make an incision from the jugular notch to the xiphoid process of the sternum. Beginning with the incision at the jugular notch, follow laterally along the clavicle to meet up with the posterior incision made previously for the superficial back and posterior axilla. This should leave one skin flap for the superficial back and one for the anterior chest. A third incision will be made following down the arm to the level below the axilla meeting up with the posterior incision made for the posterior axilla. An incision will be made along the lower rib cage to the midaxillary line meeting up with the posterior incision in the midthoracic area for the superficial back. This will leave an anterior skin flap to cover the tissue of the anterior chest and shoulder cap area.
3. Locate the cephalic vein between the anterior deltoid and the clavicular head of the pectoralis major. It lies in the cleft between these two muscles.
4. Identify:
 - a. pectoralis major
 - b. serratus anterior
5. Preserve several of the anterior and lateral cutaneous nerves, which are branches of the intercostal nerves and often referred to as ventral rami. **Refer to the DVD for identification.**
6. The anterior portion of the deltoid can be seen. Review the actions of this portion of the deltoid.
7. Observe the direction of the muscle fibers of the pectoralis major, noting the differences in fiber direction in the clavicular and sternal portions. Locate the insertion of this muscle on the humerus. Study the actions accomplished by each portion of this muscle as well as the muscle acting as a whole.
8. Make an incision through both the clavicular attachment and the humeral attachment of the clavicular portion of the pectoralis major **Figure 2.3a**.
9. The thoracoacromial artery and lateral pectoral nerve pierce through the clavipectoral fascia just deep to the clavicular portion of the pectoralis major. Much fascia will be encountered in this area surrounding the major nerves and blood vessels. Work carefully to identify branches of this artery and nerve using your probe. Leave the lateral pectoral nerve and thoracoacromial artery intact entering the deep surface of the clavicular head of the pectoralis major. **These structures alone will keep this muscle attached to the cadaver; therefore, handle gently.**
10. Release the sternal portion of the pectoralis major from its attachment on the sternum **Figure 2.3b**. With your fingers, probe under this muscle to locate branches of the medial and lateral pectoral nerves. The medial pectoral nerve can be felt piercing

Figure 2.3

Pectoralis major: (a) clavicular cut, (b) sternal cut, (c) humeral cut.

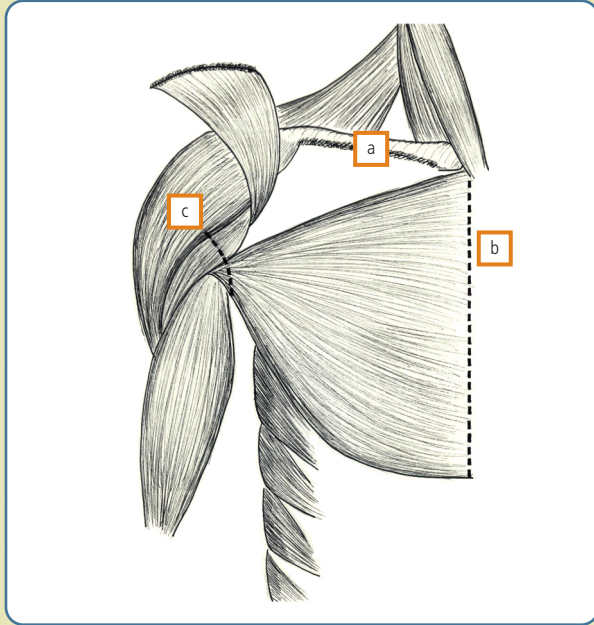
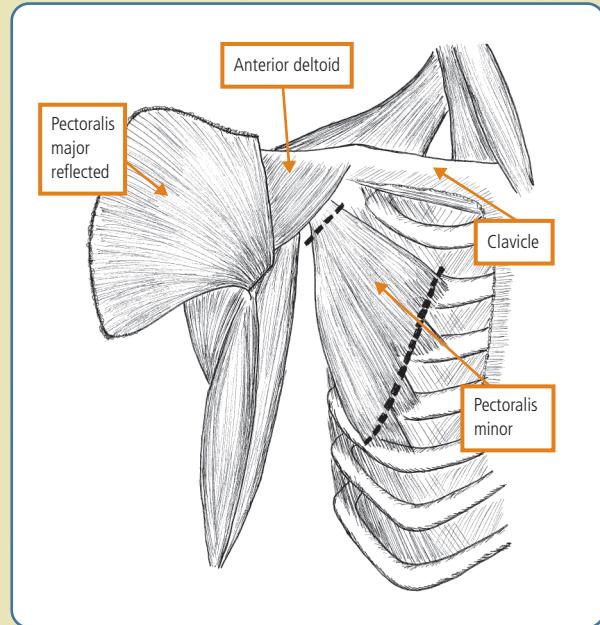


Figure 2.4

Pectoralis minor.



through the pectoralis minor located just deep to the pectoralis major. This nerve then enters the deep (costal) surface of the sternal portion of pectoralis major. The lateral pectoral nerve is located at the upper border of the sternal portion of the pectoralis major. Leave these nerves intact entering the pectoralis major because following step 10, these structures alone will hold the muscle attached to the cadaver. The medial and lateral pectoral nerves are named for the trunks on the brachial plexus off which they come and **NOT** their location on the chest wall.

11. Release the sternal portion of the pectoralis major at its humeral attachment **Figure 2.3c**.
12. The pectoralis major can now be shifted around gently in order to view underlying structures.
13. Identify:
 - a. pectoralis minor
 - b. medial pectoral nerve
 - c. lateral pectoral nerve
 - d. thoracoacromial artery—found at the upper border of the pectoralis minor
14. Note the insertion of the pectoralis minor at the coracoid process of the scapula. Review the actions of this muscle.
15. Release the costal attachment of the pectoralis minor **Figure 2.4**. Cut the attachment of the pectoralis minor on the coracoid process also. This muscle may now be shifted in order to identify the axillary sheath. Be careful to preserve the medial pectoral nerve piercing through this muscle.

Brachial Plexus

Refer to DVD Disc 1

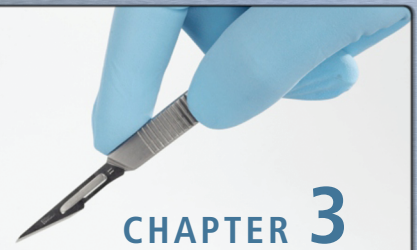
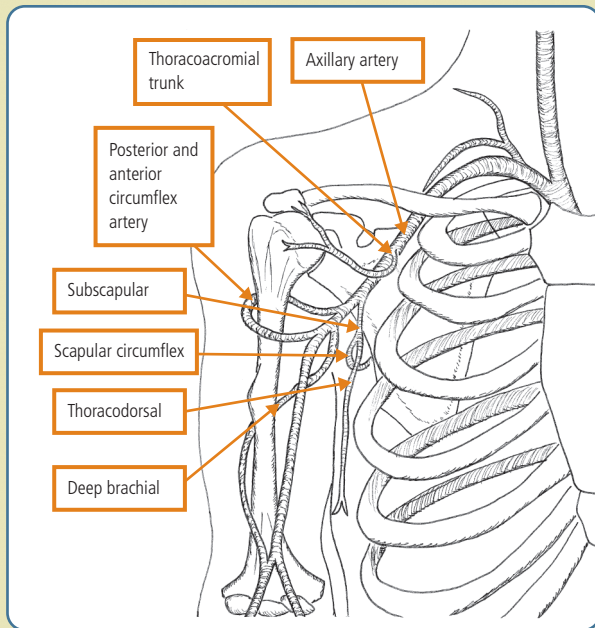


Figure 3.1

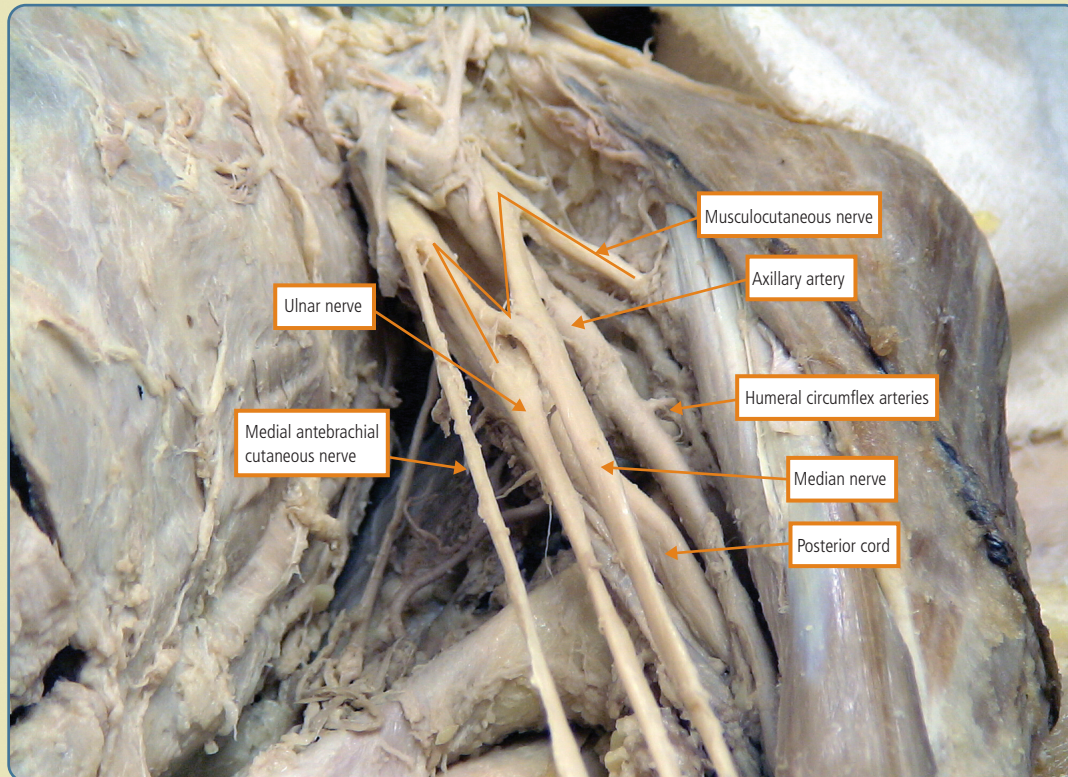
Arteries in the pectoral region.



1. A considerable amount of fascia is located in the area of the axillary sheath. **Proceed very cautiously**, removing with forceps only those tissues that are easily grasped. Open the axillary sheath and locate the brachial plexus and axillary artery and vein. Note the relationship of the brachial plexus to the axillary artery. Find in your atlas where the cephalic vein enters the axillary vein.
2. Identify the lateral, medial, and posterior cords of the brachial plexus.
3. The axillary sheath may be removed from around the brachial plexus and axillary artery and vein. The axillary vein and its tributaries should be removed also for better visualization of structures. However, preserve the cephalic vein and the area of the axillary vein where it enters.
4. Find where the following arteries branch from the axillary artery **Figure 3.1** :
 - a. thoracoacromial
 - b. subscapular (arises at the distal border of the subscapularis)
 - c. posterior humeral circumflex (arises at the lower border of the subscapularis)
 - d. anterior humeral circumflex (arises just opposite the posterior humeral circumflex artery on the lateral side of the axillary artery; passes anteriorly around the surgical neck of the humerus to join branches from the posterior humeral circumflex artery)
5. To dissect the axilla, first pull the skin in the axilla taut and release it from the underlying fascia. This will leave a large amount of fat in the axilla. **Using a probe or your fingers**, gently stroke through the fat in a distal direction toward the hand, slowly removing small pieces. This avoids tearing of nerve fibers. Continue until the nerves of the brachial plexus and the arterial system can be viewed clearly. Lymph nodes should also be removed at this time. Additional nerve branches piercing the ribs and entering the axillary fat may also be encountered. These branches may be removed.
6. Find the median nerve. Trace this nerve proximally to where it emerges from the medial and lateral cords of the brachial plexus **Figure 3.2** .
7. With a probe under the medial cord, identify:
 - a. ulnar nerve
 - b. medial pectoral nerve from the medial cord
 - c. medial antebrachial cutaneous nerve

Figure 3.2

Brachial plexus.



- d. **medial brachial cutaneous nerve** (This nerve is often removed when dissecting the axilla. It does not need to be saved.)

NOTE TO THE DISSECTOR If a nerve cannot be located, it is recommended that dissection be continued into the arm, as this will facilitate identification. To spend large amounts of time searching an area will frequently result in destruction of structures and frustration of the dissector.

8. With the lateral cord well in view, identify:
 - a. **musculocutaneous nerve** (This nerve pierces through the belly of the coracobrachialis.)
 - b. **lateral pectoral nerve** (This nerve comes from the lateral cord.)
9. Move the medial and lateral cords and the axillary artery aside to locate the posterior cord, which is deep to these structures.
10. Identify from the posterior cord:
 - a. **radial nerve** (This nerve may be located as it passes posteriorly through the axilla and then winds around the posterior aspect of the humerus to innervate the triceps brachii. The radial nerve is accompanied by the deep brachial artery [Figure 3.1].)

- b. **axillary nerve** (This nerve may be found as it passes across the subscapularis and turns posteriorly at the lateral border of this muscle. It is accompanied by the posterior humeral circumflex artery [Figure 3.1].)
11. Study the muscle attachments of the subscapularis. Review the actions accomplished by this muscle.
 12. The subscapular artery branches into the circumflex scapular artery and thoracodorsal artery (Figure 3.1). The circumflex scapular artery passes around the lateral border of the subscapularis into the posterior axilla, accompanied by the lower subscapular nerve. The thoracodorsal artery accompanies the thoracodorsal nerve to the latissimus dorsi. It can be seen piercing the anterior border of the latissimus dorsi.
 13. Three nerves emerge from the posterior cord of the brachial plexus. Identify:
 - a. **lower subscapular nerve** (This nerve can be located as it enters the subscapularis on the anterior surface of this muscle. A branch of the lower subscapular nerve passes posteriorly around the lateral border of the subscapularis to innervate the teres major. It is accompanied by the **circumflex scapular artery** before entering the substance of the teres major.)
 - b. **thoracodorsal nerve**—or middle subscapular nerve (This nerve is found crossing the belly of the subscapularis before entering the anterior border of the latissimus dorsi. It is accompanied by the thoracodorsal artery.)
 - c. **upper subscapular nerve** (This nerve may be located entering the upper medial portion of the subscapularis on its anterior surface.)
 14. Study the muscle attachments of the serratus anterior and the scapular movement produced when this muscle contracts.
 15. Identify the **long thoracic nerve** as it enters the lateral surface of the serratus anterior.
 16. The **suprascapular nerve** and **dorsal scapular nerve** will be traced further after dissection of the neck has been completed.
 17. Review the spinal cord segments for each nerve of the brachial plexus.
 18. Review the muscle attachments and actions of each of these muscles:
 - a. pectoralis major
 - b. pectoralis minor
 - c. subscapularis
 - d. latissimus dorsi
 - e. teres major
 - f. serratus anterior
 19. Trace the nerves of the brachial plexus to the muscles, which have been dissected.
 20. Trace the following branches of the axillary artery to the area each supplies:
 - a. thoracoacromial
 - b. subscapular
 - c. thoracodorsal
 - d. circumflex scapular
 - e. posterior humeral circumflex
 - f. anterior humeral circumflex