Unit 3. Posterior Triangle of the Neck, Root of Neck

Dissection Instructions:

Both sides are to be dissected. The triangles of the neck are shown in Plates 23, 24; 8.2, Table 8.2 and figures-p. 724).

The upper limit of the neck anteriorly is the lower border of the mandible (Plates 12; 8.2). Feel it from its angle posteriorly to the mental symphysis anteriorly. One or two centimeters above the laryngeal prominence (Adams apple) is the hyoid bone. Locate this on yourself. The laryngeal prominence belongs to the thyroid cartilage of the larynx. The thyroid cartilage and hyoid bone are connected by the thyrohyoid membrane. Follow the thyroid cartilage from the prominence downward in the mid-line until you reach its lower border. A few millimeters below the thyroid cartilage is the cricoid cartilage. The cricothyroid membrane connects the two cartilages. The trachea is attached to the lower border of the cricoid cartilage. Feel for the tracheal rings. The sternocleidomastoid muscle separates the anterior and posterior triangles and serves as a landmark. The clavicles are at the lower limit of the neck. They are subcutaneous throughout their length. Between the clavicles is the suprasternal or jugular notch.

Because the cutaneous nerves which supply the skin of the anterior neck come out of the posterior triangle, the skin and superficial fascia of the entire neck will be studied now. However, deep dissection should be limited to the posterior triangle.

Make the following incisions which are illustrated in Figure 3-1.

Carefully remove the skin from the neck. There are important structures in the superficial fascia of the neck, so only skin should be removed.

- The skin of the neck is very thin, so make incisions only one millimeter deep.
- 1st incision should begin at the point of the chin (mental protuberance) (A) and extend inferiorly in the mid-line to just below the jugular notch (B): A to B
- 2nd incision should be made along the inferior edge of the mandible from the mental protuberance (A) to the angle (C): A to C.
- 3rd incision should begin 1 inch below the jugular notch (B) and follow below the clavicle to the medial border of the deltoid muscle (D): B to D
- follow the deltoid margin to the mid-arm where it will join the incision from Unit 1. This will create a flap of skin which is attached to the face along the mandible.
Embedded in the superficial fascia is the **platysma muscle** a muscle of facial expression (*Plates 21; Table 8.1 and figures-p. 722*). At the mid-point of the anterior border of the sternocleidomastoid muscle, carefully pick away fat and connective tissue to locate fibers of the platysma muscle. Once the muscle has been located, clean its entire surface. Beginning at its inferior extent, carefully reflect the muscle upward. Locate its nerve supply coming out of the lower pole of the parotid gland. All the muscles of facial expression are innervated by the facial nerve, including the platysma. The main trunks of the nerves and veins which supply the skin and superficial fascia are located deep to the platysma muscle, as well as its nerve supply from the facial nerve.

Locate the **external jugular vein** (*Plates 27; 8.3A, 8.4*), which carries blood from just below the ear obliquely downward across the sternocleidomastoid muscle to just above the clavicle. Note that it starts anterior to the sternocleidomastoid muscle and ends posterior to it. **Be careful not to cut cutaneous nerves which cross over it or accompany it**.

The **cutaneous nerves** (*Plates 20; 8.3A&B*) to be located and cleaned are the **lesser occipital, great auricular, transverse cervical and supraclavicular nerves**. All pierce the deep fascia to enter the superficial fascia near the mid-point of the posterior border of the sternocleidomastoid muscle. The **lesser occipital nerve** receives fibers from C2 and parallels the posterior border of the sternocleidomastoid muscle up to the occipital region. The **great auricular nerve** has fibers from C2 and C3 and parallels the external jugular vein. It runs nearly vertical to the region of the parotid gland and ear. The **transverse cervical nerve** also receives fibers from C2 and C3 and crosses the sternocleidomastoid muscle horizontally to innervate the anterior triangle of the neck. It usually divides into superior and inferior branches. The superior branch joins the cervical branch of the facial nerve and their fibers are distributed together. The fibers of the transverse cervical nerve are sensory nerves and thus are carrying impulses to the central nervous system while the fibers of the cervical branch of the facial nerve are motor fibers carrying impulses to the platysma muscle. The **supraclavicular nerves** descend over the clavicle, dividing into anterior, middle and posterior branches. The most anterior branches reach the mid-line and the most posterior fibers cross the anterior border of the trapezius to innervate the skin over the shoulder.

To understand the posterior triangle and its contents, a brief description of the fascia of the neck and the student should attempt to understand their relationships prior to the dissection.

There are several **layers of fascia** related to the neck (*Plates 31 8.1*). The trapezius and sternocleidomastoid muscles are enclosed in a fascia which circles the neck. It is called the **investing layer of deep cervical fascia** (*anterior layer*). It forms the roof of the anterior and posterior triangles of the neck. The vertebral column and the muscles surrounding it are enclosed in the **prevertebral fascia**
The posterior layer of deep cervical fascia. The visceral structures, pharynx, esophagus, larynx, trachea and thyroid gland are surrounded by the visceral fascia. The main neurovascular structures, carotid artery, internal jugular vein and vagus nerve are in the carotid sheath. The infrahyoid (strap) muscles are in their own fascia, the middle cervical fascia.

The posterior triangle of the neck is a three dimensional space bounded anteriorly by the posterior border of the sternocleidomastoid muscle, posteriorly by the anterior border of the trapezius muscle and inferiorly by the clavicle (Plates 23, 27; 8.3 A-D). Its floor is muscular and its roof is the investing layer of deep cervical fascia. The posterior triangle of the neck is continuous inferiorly with the axilla by way of the cervicoaxillary canal. The muscular floor consists of the splenius, levator scapulae and scalene muscles, all of which are covered by the prevertebral layer of deep fascia (Plates 23, 27; 8.3 A-D). Between the outer investing and prevertebral layers of deep fascia are located the accessory nerve, omohyoid muscle, transverse cervical vessels, suprascapular vessels and suprascapular nerve. Between the prevertebral fascia and the muscular floor are the dorsal scapular nerve, long thoracic nerve, proximal portion of the brachial plexus of nerves, the third portion of the subclavian vessels and the phrenic nerve.

A very important motor nerve, the eleventh cranial nerve (CN-XI) or accessory nerve, crosses the posterior triangle of the neck immediately deep to the investing layer of deep cervical fascia (Plates 28; 8.4 A-C). It supplies the sternocleidomastoid and trapezius muscles. It can be found in the posterior triangle of the neck at about the mid-point of the posterior border of the sternocleidomastoid muscle and travels inferiorly and posteriorly to reach the deep surface of the trapezius muscle where it should have been seen in Unit 1. In cases of cancer of the neck, lymph nodes are frequently biopsied and it should be kept in mind that two or three lymph nodes are frequently located adjacent to the accessory nerve. The nodes, but not the nerve, should be biopsied.

In the lower part of the posterior triangle of the neck, locate and clean the inferior belly of the omohyoid muscle (Plates 23 & 25; 8.3C, 8.9).

Locate and clean the transverse cervical vessels (Plates 28, 29; 8.3C & D.8.7A 8.20). They typically appear from under the sternocleidomastoid muscle and pass posteriorly to join the accessory nerve deep to the trapezius muscle. Behind and below the clavicle, locate and clean the suprascapular vessels. They will cross the superior border of the scapula in company with the suprascapular nerve, a branch of the upper trunk of the brachial plexus. Clean the surface of the splenius and levator scapulae muscles. The dorsal scapular nerve and vessels should be found passing from the posterior triangle to the deep surface of the levator scapulae to supply it and the rhomboid muscles. Trace the nerve up to where it exits the scalenus medius muscle. Clean the posterior, middle and anterior scalene muscles. The scalene muscles take origin from transverse processes of cervical vertebrae and insert on the first or second rib. The scalenus anterior has origin from CV3-CV6, the scalenus medius from CV2-CV7, and the scalenus posterior from CV5-CV7. The scalenus anterior and medius insert on the first rib and the posterior inserts on the second rib. They can elevate the ribs or turn the head. The scalenus anterior muscle is one of the key landmark muscles in the neck. On its anterior surface, locate and clean the phrenic nerve and subclavian vein. The subclavian vein crosses the first rib, where it is protected by the clavicle. The transverse cervical and suprascapular vessels pass between the scalenus anterior and sternocleidomastoid muscles. Between the scalenus anterior and scalenus medius muscles are the subclavian artery and the anterior primary rami of the nerves which form the brachial plexus. The artery is anterior to the nerves. The long thoracic nerve comes out of the scalenus medius muscle and courses downwards to supply the serratus anterior muscle.

Clean the suprascapular nerve up to the upper trunk of the brachial plexus (Plates 412; 6.24, 8.3D). Clean the upper trunk and follow it medially to verify that it is formed by the anterior primary...
rami of cervical nerves 5 and 6 (Plates 181, 412; Table 6.3 and figures-pp. 486 & 487). Immediately inferior to the upper trunk is the middle trunk, a continuation of the anterior primary ramus of C7. Clean it laterally until it sends fibers to join upper and lower trunk fibers. Clean it medially as far as possible. Lying on the first rib below the middle trunk is the lower trunk. Clean it medially to identify the anterior primary rami of C8 and T1. Carefully clean the subclavian artery as it lies on the first rib. It may have branches which supply the neck region. They should be identified. The most common branch is the dorsal scapular artery, which follows the nerve of the same name (Plate 6.27B). This replaces the deep branch of the transverse cervical artery when it is present.

Detach the sternal origin of the sternocleidomastoid muscle without detaching the clavicular origin. Clean the sternoclavicular joint (Plates 395; I.12). This is a synovial joint which contains a fibrocartilaginous disc which separates the synovial cavity into two. The joint capsule surrounds the medial end of the clavicle, the disc and the articular surface of the manubrium. The interclavicular ligament extends from one clavicle to the other, strengthening the superior surface of the joint capsule. The anterior and posterior surfaces of the capsule are also strengthened and these areas of the capsule are called the anterior and posterior sternoclavicular ligaments. Close to the capsule of the joint, a strong accessory ligament of the joint joins the clavicle to the first rib. This is called the costoclavicular ligament.

Cut through the clavicle at the medial border of the deltoid muscle. Carefully cut through the capsule of the sternoclavicular joint and the costoclavicular ligament. Cut the subclavius muscle. With the clavicular origin of the sternocleidomastoid muscle still attached to the clavicle, lift the medial end of the clavicle and sternocleidomastoid muscle from the lower part of the neck. Carefully continue to free the deep surface of the sternoclavidiomastoid muscle from the underlying structures until it is freed to its insertion on the mastoid process, retaining only its blood and nerve supply.

Locate the infrahyoid or strap muscles (Plates 23 - 25; 8.16). They are named by their origins and insertions. The sternohyoid arises within the thorax behind the manubrium and inserts on the hyoid bone. The omohyoid (omo = shoulder) was seen in the posterior triangle of the neck. It arises from near the suprascapular notch and inserts on the hyoid bone. It has superior and inferior bellies and an intermediate tendon. The sternothyroid and thyrohyoid are deep and similar to the sternohyoid except they are attached to the oblique line of the thyroid cartilage. These muscles pull down or depress the larynx and hyoid bone. The nerve supply to the strap muscles comes from above and laterally and usually is fused to the anterior surface of the internal jugular vein in the carotid sheath. The nerve supply to the infrahyoid muscles is through the ansa cervicalis, which is a nerve loop with one end from the second and third cervical nerves and the other end from the hypoglossal nerve. These muscles are small and so the nerve branches supplying them are also small, so be careful in cleaning them. Do not cut any of the infrahyoid muscles. Locate the carotid sheath. Separate and clean the internal jugular vein, common carotid artery and vagus nerve contained in the carotid sheath (Plates 24, 27, 28; 8.16, 8.21).

Locate the phrenic nerve coming from C3, C4 and C5, descending on the anterior surface of the scalenus anterior to enter the thorax by passing between the subclavian artery and vein (Plates 28, 29; 8.3C&D, 8.20, 8.24). The ascending cervical artery lies on the anterior surface of the scalenus anterior muscle, paralleling the phrenic nerve. Clean the muscle, nerve and artery. Locate and clean the subclavian vein as it crosses the first rib. On the left side, preserve the terminal end of the thoracic duct where it empties into the subclavian vein at its junction with the internal jugular vein (Plates 68; 8.22A&B). It will look like a small vein coming from the posterior thorax arching over the subclavian artery.

Place a block under the head of your cadaver to take some of the tension off the scalenus anterior muscle, then clean the subclavian artery and its branches. In doing so, be aware that the sympathetic
trunk forms a loop around the artery and the phrenic and vagus nerves pass between the subclavian vessels. All of the structures medial to the first rib are related to the parietal pleura covering the pleural cavity and lungs. Needles intended for the subclavian vein or artery can readily cause a pneumothorax if they are inserted too far. The subclavian artery usually has four or five branches (Plates 29; 8.7, 8.20). The internal thoracic artery comes off early from the anterior inferior aspect of the subclavian artery and enters the thorax by passing deep to the first rib. The vertebral artery branches from the superior posterior aspect of the subclavian artery and enters the transverse foramen of the sixth cervical vertebra. The thyrocervical trunk arises from the superior surface of the subclavian artery and quickly gives off transverse cervical, inferior thyroid and suprascapular branches, which should be cleaned. The last branch of the subclavian artery, the costocervical trunk, comes off the posterior surface of the artery close to or behind the scalenus anterior muscle and divides into the highest intercostal artery and deep cervical artery. The highest intercostal artery descends in front of the neck of the first rib and gives off the first two intercostal arteries. The deep cervical artery passes to the back of the neck to ascend between the semispinalis capitis and cervicis muscles.

Clean the cervical sympathetic trunk (Plates 124; 8.25B) lying on the transverse processes of the cervical vertebrae. It has three or four ganglia, the superior cervical ganglion being the largest. These ganglia send gray communicating rami to the cervical nerves. The superior cervical ganglion has four gray communicating rami for the first four cervical nerves. The middle and inferior ganglia each have two for the remaining cervical nerves. Each ganglion also gives a branch which will descend into the thorax to reach the cardiac plexus of nerves. The most superior of these is the superior cervical cardiac nerve and the others are named accordingly. The sympathetic trunk will also communicate with some of the cranial nerves, give branches to some of the viscera of the neck and to the carotid arteries.

Be sure to identify all of the following in this unit:

- platysma muscle
- external jugular vein
- sternocleidomastoid muscle
- lesser occipital nerve
- great auricular nerve
- transverse cervical nerve
- supraclavicular nerves
- posterior triangle of the neck
- trapezius muscle
- investing layer of deep cervical fascia
- prevertebral layer of deep cervical fascia
- accessory nerve
- omohyoid muscle
- transverse cervical vessels
- suprascapular vessels & nerve
- anterior scalenus muscle
- scalenus medius muscle
- posterior scalenus muscle
- levator scapulae muscle
- dorsal scapular nerve and vessels
- phrenic nerve
- subclavian vein
- subclavian artery
- long thoracic nerve
- brachial plexus
- upper, middle and lower trunks
- anterior primary rami C5 - C7
- anterior primary rami of C8 & T1
- carotid sheath
- internal jugular vein
- common carotid artery
- vagus nerve
- phrenic nerve
- ascending cervical artery
- subclavian vein
- thoracic duct
- sympathetic trunk
- subclavian artery
- internal thoracic artery
- vertebral artery
- thyrocervical trunk
- transverse cervical artery
- inferior thyroid artery
- suprascapular artery
- costocervical trunk
- highest intercostal artery
- deep cervical artery