Unit 20: Prevertebral Region, Pharynx and Soft Palate

Dissection Instructions:

Step 1: Insert your fingers posterior to the sternocleidomastoid muscle, vagus nerve, internal jugular vein, carotid arteries and pharynx, and anterior to the prevertebral muscles and vertebral column. If the sympathetic trunk has gray communicating rami to the cervical nerves on one side, leave the trunk on the vertebral column, but on the other side, take the sympathetic trunk with the carotid arteries. The separation of structures must be done from each side so the retropharyngeal space is totally open (Plates 31, 56, 59; 8.1, 8.18, 8.39, 8.41A). Now push your fingers superiorly and extend the separation to the base of the skull. Palpate the pharyngeal tubercle of the occipital bone and the anterior tubercle of the atlas.

Step 2: Using a chisel and mallet, cut through the clivus from the cranial cavity to come out below between the tubercles palpated above. Sometimes the chisel can be pushed through the bone without the use of the mallet. The chisel must be felt in the retropharyngeal cleft before extending the cut laterally and posteriorly. The chisel cut should pass between the jugular foramen and the foramen magnum. The cut should pass just posterior to the mastoid process. The lateral parts of the cut can be made using the electric saw. Move the anterior and posterior portions of the skull to verify that the bone is completely cut.

Carefully cut the muscles and ligaments attaching the vertebral column to that part of the skull anterior to the cut. When this is completed, the visceral structures can be pulled anteriorly away from the vertebral column and occipital bone.

On the anterior surface of the vertebral column, identify the longus capitis and longus coli muscles. More inferiorly, review the scalene muscles. The rectus capitis anterior and rectus capitis lateralis muscles are probably cut and difficult to identify (Plates 26; 8.22, 8.24, Table 8.6 and figure-p.760).
The **prevertebral fascia** covers the **prevertebral muscles** and scalene muscles, and continues on the floor of the posterior triangle of the neck. It extends superiorly to the base of the skull and inferiorly into the upper posterior part of the thorax, there becoming endothoracic fascia. As the **subclavian artery** and **brachial plexus** pass between the scalenus anterior and scalenus medius muscles, they pick up a layer of prevertebral fascia to form the **axillary sheath**.

The neurovascular structures lying on the lateral wall of the pharynx should now be studied (*Plates 65-67, 69; 8.28A&B*). In cleaning the vessels, do not destroy the nerves that are related to them. The **internal jugular vein** begins at the **jugular foramen** and descends through the neck, receiving tributaries along the way. At the base of the skull, it is medial to the **styloid process** and posterior to the **internal carotid artery**. At the base of the neck, it lies anterior and lateral to the common carotid artery. The internal jugular vein is the most lateral structure in the **carotid sheath**.

The **internal carotid artery** begins at or above the upper border of the thyroid cartilage (*Plates 65, 67; 8.9*). It has no branches in the neck. It enters the carotid canal of the petrous portion of the temporal bone medial and anterior to the styloid process and anterior to the jugular foramen. The **external carotid artery** begins at the same level, but anterior to the internal carotid artery. It usually gives off six branches in the neck before ending between the styloid process and neck of the mandible by dividing into the **maxillary and superficial temporal arteries**. Anteriorly, it gives off the **superior thyroid, lingual and facial arteries**. Medially it gives off the **ascending pharyngeal artery** and posteriorly the **occipital and posterior auricular arteries**.

The **hypoglossal nerve** exits the **hypoglossal canal**, passes lateral to both carotid arteries, is joined by nerve fibers from C1 and 2, and passes behind, under and lateral to the **occipital artery** on its way to the tongue (*Plates 65, 67; 8.9, 8.10*). It gives off the **descendens hypoglossi and nerve to the thyrohyoid muscle** before passing between the hyoglossus and mylohyoid muscles just above the hyoid bone (*Plates 28, 67, 123; 8.12B, 8.13*).

Clean nerves as they go through the jugular foramen and look for their sensory ganglia. Open the jugular foramen but leave the nerves attached to some dura.

Follow the **vagus nerve** superiorly and locate its **pharyngeal and laryngeal branches** (*Plates 71, 72, 76; 8.20, 8.25A*). The pharyngeal branches pass between the two carotid arteries and help form the pharyngeal plexus on the wall of the pharynx. The **superior laryngeal nerve** passes medial to both carotid arteries and divides into internal and external branches (*Plates 76, 8.28, pictures p. 766 & 767*). The **internal laryngeal nerve** is sensory to the laryngeal mucosa above the true vocal fold and the **external laryngeal nerve** is motor to the cricothyroid muscle and portions of the inferior pharyngeal constrictor muscle. The vagus exits the cranial cavity through the jugular foramen. Below the foramen, the enlargement of the vagus nerve is the **inferior vagal (nodose) ganglion** (sensory).

The **accessory nerve** exits the jugular foramen with the vagus nerve, then passes the jugular vein (usually anteriorly) to reach the deep surface of the sternocleidomastoid muscle (*Plates 28, 30; 8.3A-C, 8.28A&B*). After supplying this muscle, it crosses the posterior triangle of the neck to supply the trapezius muscle.

The **glossopharyngeal nerve** exits the jugular foramen through a separate compartment of dura, then passes lateral to the internal carotid artery and medial to the external carotid artery on its way to the tongue (*Plates 65, 67; 8.28A&B*). Between the two carotid arteries, it gives off the nerve to the carotid sinus and the pharyngeal nerves which join those from the vagus to form the pharyngeal plexus. The glossopharyngeal nerve lies on the superficial surface of the **stylopharyngeus muscle**, supplies it, then enters the posterior third of the tongue by passing deep to the hyoglossus muscle (*Plates 8.54, 8.55*).
The **superior cervical ganglion** supplies gray communicating rami to the first four cervical nerves, communicating nerves to the IX, X and XII cranial nerves, branches to the heart and cervical organs, and vascular branches to the external carotid artery. The sympathetic trunk continues into the head as the internal carotid nerve, which enters the carotid canal and forms a plexus around the internal carotid artery to be distributed by its branches (Plates 124, 222; 8.24, 8.28A&B).

Clean the **pharyngeal constrictor muscles** without destroying the nerves and vessels which supply them (Plates 63, 64, 67, 69; 8.28A&B, 8.29A&B, 8.32; Table 8.7 and figures-pp. 766 & 767). Covering the muscles is the **buccopharyngeal fascia**, which continues anteriorly on the surface of the buccinator muscle in the cheek. Remove remnants of rectus capitis muscles and connective tissue so that the wall of the pharynx can be cleaned all the way to the base of the skull. It will be seen that the superior border of the **superior pharyngeal constrictor** does not follow the base of the skull from posterior to anterior. Above the superior pharyngeal constrictor, the **levator veli palatini and auditory tube** pass through the wall. The remaining space above the superior constrictor is filled by the **pharyngobasilar membrane** (Plates 63; 8.28A&B), an upward continuation of the submucosa. The **superior pharyngeal constrictor** arises from the lower portion of the medial pterygoid plate, pterygoid hamulus, pterygomandibular raphe, mandible and lateral surface of the tongue. It is overlapped on its outside by the **middle pharyngeal constrictor** posteriorly and laterally, but anteriorly there is a gap through which the **stylopharyngeus muscle and glossopharyngeal nerve** enter the wall of the pharynx. The **middle pharyngeal constrictor** arises from the greater and lesser cornu of the hyoid bone and is overlapped on its outside by the inferior pharyngeal constrictor. The gap between the middle and inferior pharyngeal constrictors is filled by the **thyrohyoid membrane**, which is pierced by the internal laryngeal nerve and vessels. The **inferior pharyngeal constrictor** arises from the oblique line of the thyroid cartilage, the cricoid cartilage, and a fibrous arch between the two cartilages. All three of the pharyngeal constrictors insert into a **mid-line raphe**.

Internal to the muscle layer of the pharynx is the submucosa and mucosa. The wall of the pharynx therefore consists of four layers. From outside in, they are the **buccopharyngeal fascia, tunica muscularis, submucosa and mucosa**. It is innervated by the pharyngeal plexus for both sensory and motor functions. It continues inferiorly as the esophagus at the level of the cricoid cartilage and CV6.

Make a mid-line incision through the posterior wall of the pharynx from the base of the skull to the beginning of the esophagus. Make a second incision horizontally about 1 cm below the base of the skull. Now open the pharynx and study its interior (Plates 62; 8.29A&B).

The nasal, oral and laryngeal cavities can be seen opening into the pharynx. Accordingly, the pharynx is divided into three parts, the nasopharynx, oropharynx and laryngopharynx. The **oropharynx** extends from the lower border of the soft palate to the upper margin of the epiglottis. Opening into the lateral aspect of the **nasopharynx** is the auditory tube. Its prominence is called the **torus tubarius**. A vertical fold of tissue extends inferiorly from the torus. It is the **salpingopharyngeal fold**. The posterior wall of the nasopharynx contains the **pharyngeal tonsils or adenoids**. The **soft palate** continues laterally and inferiorly as the **palatopharyngeal folds**. In the mid-line, the **uvula** hangs down from the soft palate (Plates 59, 62, 63; 8.28B, 8.31, 8.32A-D). The dorsal surface of the tongue can be seen in the mouth cavity. Pull the epiglottis posteriorly and locate the **median glossoepiglottic fold** (Plate 54; 7.54). On each side of this fold is a depression, the **vallecula**. Extending laterally from the epiglottis is the **lateral glossoepiglottic fold** which is sometimes called the **pharyngoepiglottic fold**. Continuing from the lateral aspect of the epiglottis to the posterior aspect of the larynx is the **aryepiglottic folds**. The epiglottis and the aryepiglottic folds bound the opening of the larynx leading into the vestibule of the larynx. On each side of the larynx within the laryngopharynx are the **piriform recesses or fossae** (Plates 62, 63; 7.54).
On one side of the pharynx, remove the mucosa (Plates 59, 60, 62; 8.32A). Appearing to enter the soft palate from the auditory tube is the levator veli palatini muscle (Plates 60, 61; 8.32C). This muscle arises from the base of the temporal bone and auditory tube and inserts into the soft palate. The palatopharyngeal fold contains the palatopharyngeus muscle. It is split into two portions by the levator veli palatini at its origin and inserts into the wall of the pharynx (Plate 60, 63; 8.32E). Some of its fibers cross the mid-line of the posterior pharyngeal wall and thus can act as a sphincter, separating the oropharynx from the nasopharynx during swallowing. The salpingopharyngeal fold contains a muscle of the same name. With a probe, locate the medial pterygoid plate and its hamulus. The tensor veli palatini muscle is immediately lateral to the medial pterygoid plate and parallel to it (Plates 60, 61, 64; 8.32C, D & F). Inferiorly it becomes tendinous before hooking under the hamulus and ascending to the soft palate. The hamulus is about 5 mm below the hard palate (Plates 6, 61).

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

- longus capitis muscle
- longus colli muscle
- scalene muscles
- internal jugular vein
- carotid artery
- carotid sheath
- internal carotid artery
- external carotid artery
- superior thyroid artery
- lingual artery
- facial artery
- ascending pharyngeal artery
- occipital artery
- posterior auricular artery
- hypoglossal nerve
- descendens hypoglossi
- nerve to thyrohyoid muscle
- vagus nerve
  - superior laryngeal nerve
  - internal laryngeal nerve
  - external laryngeal nerve
- inferior vagal ganglion (nodose)
- accessory nerve
- glossopharyngeal nerve
- stylopharyngeus muscle
- sympathetic trunk
- superior cervical ganglion
- grey communicating rami
- superior pharyngeal constrictor muscle
- middle pharyngeal constrictor muscle
- inferior pharyngeal constrictor muscle

buccopharyngeal fascia
pharyngobasilar membrane
levator veli palatini muscle
auditory tube
stylopharyngeus muscle
thyrohyoid membrane
nasopharynx
oropharynx
laryngopharynx
torus tubarius
salpingopharyngeal fold
pharyngeal tonsils
soft palate
palatopharyngeal fold
uvula
median glossoepiglottic fold
lateral glossoepiglottic fold
pharyngoepiglottic fold
aryepiglottic fold
piriform recess