Human Anatomy

Lec.12

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The neck

Overview

The neck is the area of the body between the base of the cranium **superiorly** and the suprasternal notch and the clavicles **inferiorly**. The neck joins the head to the trunk and limbs, serving as a major conduit for structures passing between them. Many important structures are crowded together in the neck, such as muscles, arteries, veins, nerves, lymphatics, thyroid and parathyroid glands, trachea, larynx, esophagus, and vertebrae.

Carotid/jugular blood vessels are the major structures commonly injured in penetrating wounds of the neck. The **brachial plexuses of nerves** originate in the neck and pass inferolaterally to enter the axillae and continue to supply the upper limbs. Lymph from structures in the head and neck drains into cervical lymph nodes.

Skin of the Neck

The natural lines of cleavage of the skin (Wrinkle lines) are constant and run almost horizontally around the neck. This is important clinically because an incision along a cleavage line will heal as a narrow scar, whereas one that crosses the lines will heal as a wide or heaped-up scar.

Fasciae of the Neck

The neck is surrounded by a **superficial cervical fascia** that lies deep to the skin and invests the platysma muscle (a muscle of facial expression). A second **deep cervical fascia** tightly invests the neck structures and is divided into three layers.

- ## Superficial Cervical Fascia

The superficial fascia of the neck forms a thin layer that encloses the **platysma muscle**. Also embedded in it are the **cutaneous nerves**, the **superficial veins**, and the **superficial lymph nodes**.

➢ Platysma

The platysma muscle is a thin but clinically important muscular sheet embedded in the superficial fascia. It is described in **Table 1**.

➢ Cutaneous Nerves

The skin overlying the trapezius muscle on the back of the neck and the scalp as high as the vertex is supplied segmentally by posterior rami of cervical nerves C2-C5 (**Fig. 1**).

The **greater occipital nerve** is a branch of the posterior ramus of the 2nd cervical nerve (C2). The 1st cervical nerve has no cutaneous branch. The skin of the front and sides of the neck is supplied by anterior rami of cervical nerves (C2-C4) through branches of the cervical plexus. The branches emerge from beneath the posterior border of the sternocleidomastoid (SCM) muscle (**Fig. 1**).

The **lesser occipital nerve** (C2) hooks around the accessory nerve and ascends along the posterior border of the sternocleidomastoid muscle to supply the skin over the lateral part of the occipital region and the medial surface of the auricle (**Fig. 1**).

The **great auricular nerve** (C2, 3) ascends across the sternocleidomastoid muscle and divides into branches that supply the skin over the angle of the mandible, the parotid gland, and on both surfaces of the auricle (**Fig. 1**).

The **transverse cutaneous nerve** (C2, 3) emerges from behind the middle of the posterior border of the sternocleidomastoid muscle. It passes forward across that muscle and divides into branches that supply the skin on the anterior and lateral surfaces of the neck, from the body of the mandible to the sternum (**Fig. 1**).

The **supraclavicular nerves** (C3, 4) emerge from beneath the posterior border of the sternocleidomastoid muscle and descend across the side of the neck. They pass onto the chest wall and shoulder region, down to the level of the second rib (**Fig. 1**).

- ✓ The **medial supraclavicular nerve** crosses the medial end of the clavicle and supplies the skin as far as the median plane.
- ✓ The **intermediate supraclavicular nerve** crosses the middle of the clavicle and supplies the skin of the chest wall.
- ✓ The **lateral supraclavicular nerve** crosses the lateral end of the clavicle and supplies the skin over the shoulder and the upper half of the deltoid muscle; this nerve also supplies the posterior aspect of the shoulder as far down as the spine of the scapula.

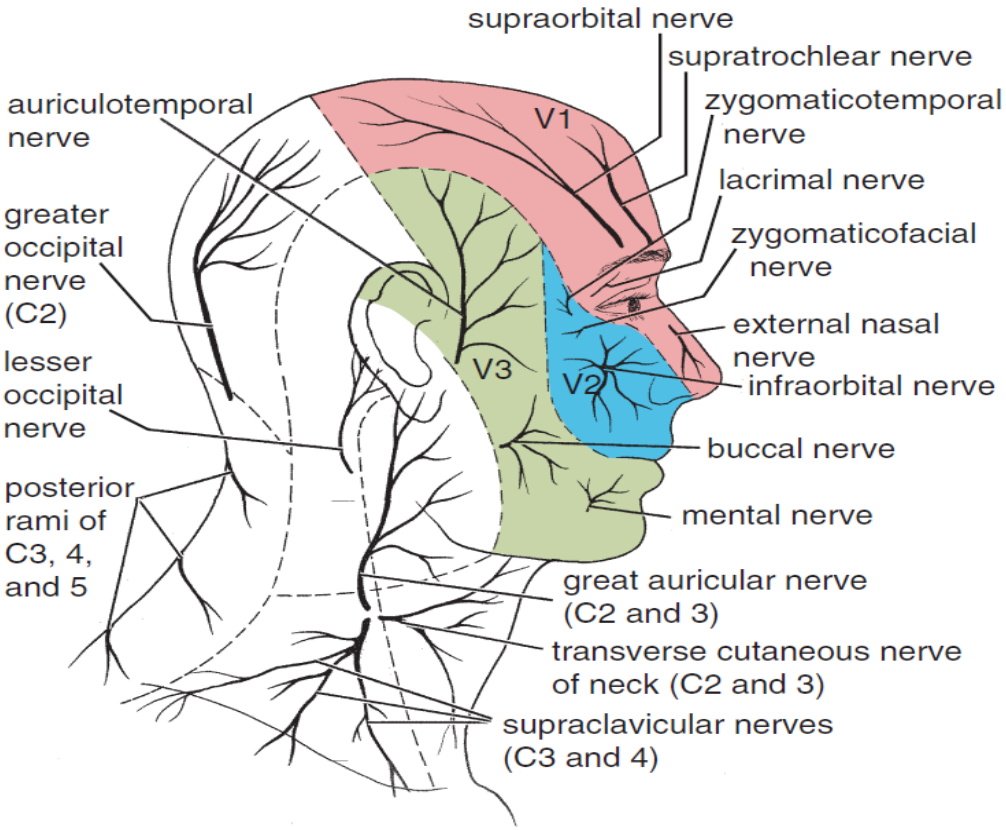


FIGURE 1: Sensory nerve supply to skin of the head and neck.

➢ Superficial Veins

External Jugular Vein

The external jugular vein begins just behind the angle of the mandible by the union of the posterior auricular vein with the posterior division of the retromandibular vein (**Fig. 2**). It descends obliquely across the sternocleidomastoid muscle and, just above the clavicle in the posterior triangle, pierces the deep fascia and drains into the subclavian vein. It varies considerably in size, and its course extends from the angle of the mandible to the middle of the clavicle.

Tributaries:

The external jugular vein (**Fig. 2**) has the following tributaries:

- ✓ **Posterior auricular vein**.
- ✓ **Posterior division of the retromandibular vein**.
- ✓ **Posterior external jugular vein**, a small vein that drains the posterior part of the scalp and neck and joins the external jugular vein about halfway along its course.
- ✓ **Transverse cervical vein**.
- ✓ **Suprascapular vein**.
- ✓ **Anterior jugular vein**.

Anterior Jugular Vein

The anterior jugular vein begins just below the chin, by the union of several small veins (**Fig. 2**). It runs down the neck close to the midline. Just above the suprasternal notch, the veins of the two sides are united by a transverse trunk called the jugular arch. The vein then turns sharply laterally and passes deep to the sternocleidomastoid muscle to drain into the external jugular vein.

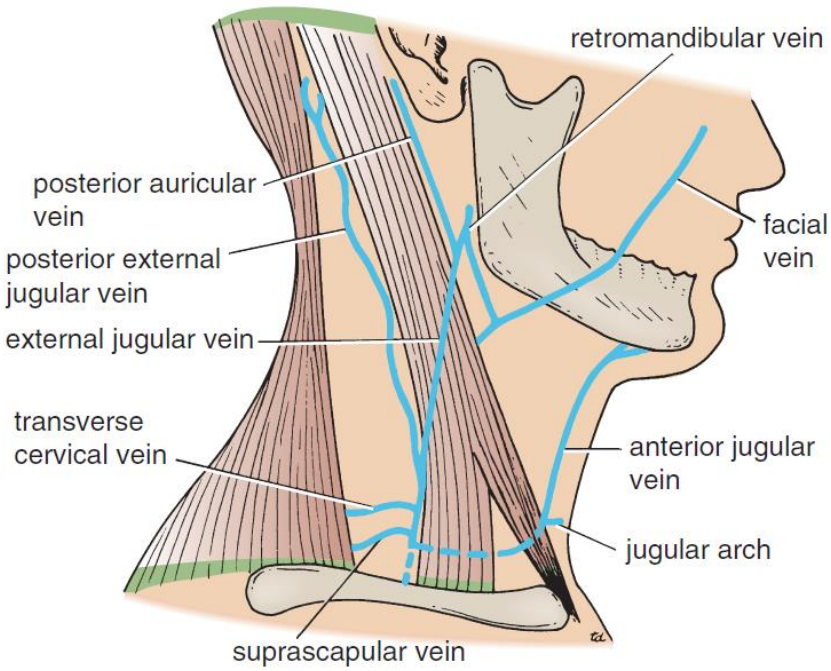


FIGURE 2: Major superficial veins of the face and neck.

➢ Superficial Lymph Nodes

The superficial cervical lymph nodes lie along the external jugular vein superficial to the sternocleidomastoid muscle. They receive lymph vessels from the occipital and mastoid lymph nodes and drain into the deep cervical lymph nodes.

• Deep Cervical Fascia

The deep cervical fascia supports the muscles, the vessels, and the viscera of the neck. In certain areas, it is condensed to form well-defined, fibrous sheets called the **investing layer,** the **pretracheal layer,** and the **prevertebral layer.**

✓ Investing Layer

The investing layer is a thick layer that encircles the neck. It splits to enclose the trapezius and the sternocleidomastoid muscles (**Fig. 3**; ***red*** **fascia**, **Fig. 4**).

✓ **Pretracheal (visceral) Layer**

The pretracheal layer is a thin layer that is attached above to the laryngeal cartilages (**Fig. 3**). It surrounds the thyroid, the parathyroid glands, trachea, esophagus, and the infrahyoid muscles. Posteriorly called the **buccopharyngeal fascia** because it covers the buccinator and pharyngeal constrictor muscles (***purple*, *blue*, and *green* fasciae, Fig. 4**).

✓ **Prevertebral Layer**

The prevertebral layer is a thick tubular sheath, passes behind the pharynx and the esophagus (**Fig. 3**), which invests the prevertebral muscles and vertebral column; including the **alar fascia** anteriorly (***orange* fascia, Fig. 4**). It extends laterally over the first rib into the axilla to form the important **axillary sheath**.

❖ **Carotid Sheath**

The carotid sheath is a local condensation of the three layers (investing, pretracheal and prevertebral) of the deep fascia that surround the **common carotid arteries**, the **internal jugular vein**, the **vagus nerve**, and the **deep cervical lymph nodes** (**Fig. 3**).

❖ **Axillary Sheath**

As the subclavian artery and the brachial plexus emerge in the interval between the scalenus anterior and the scalenus medius muscles, they carry with them a sheath of the fascia, which extends into the axilla and is called the **axillary sheath.**

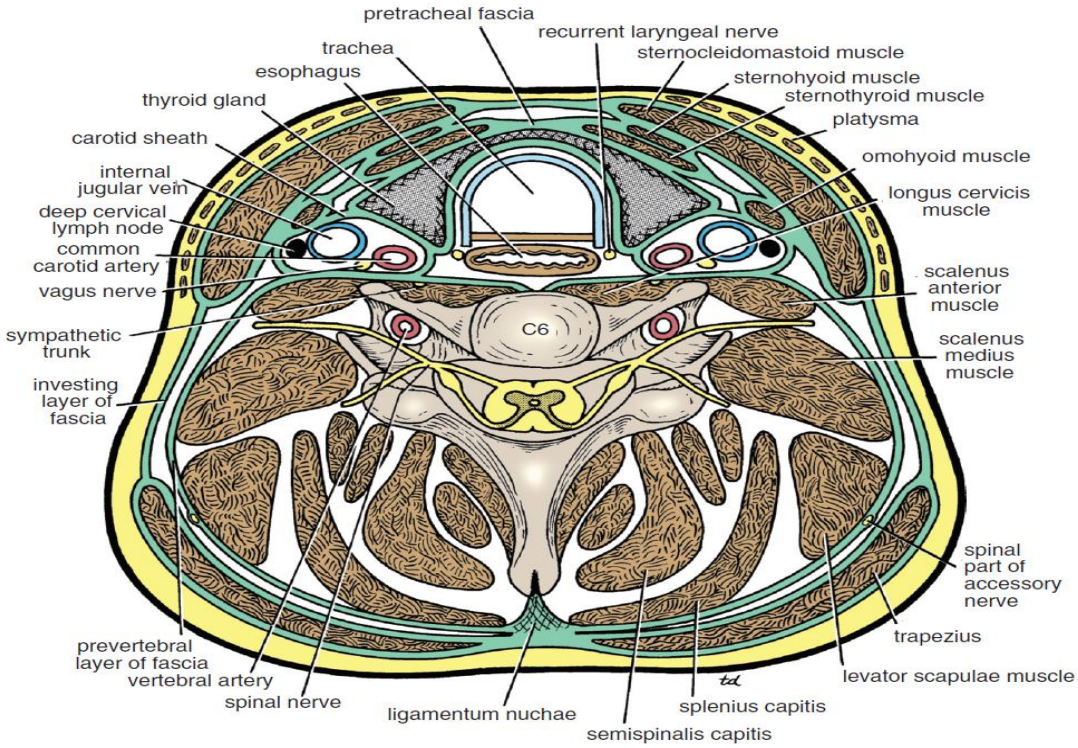


FIGURE 3: Cross section of the neck at the level of the 6th cervical vertebra.

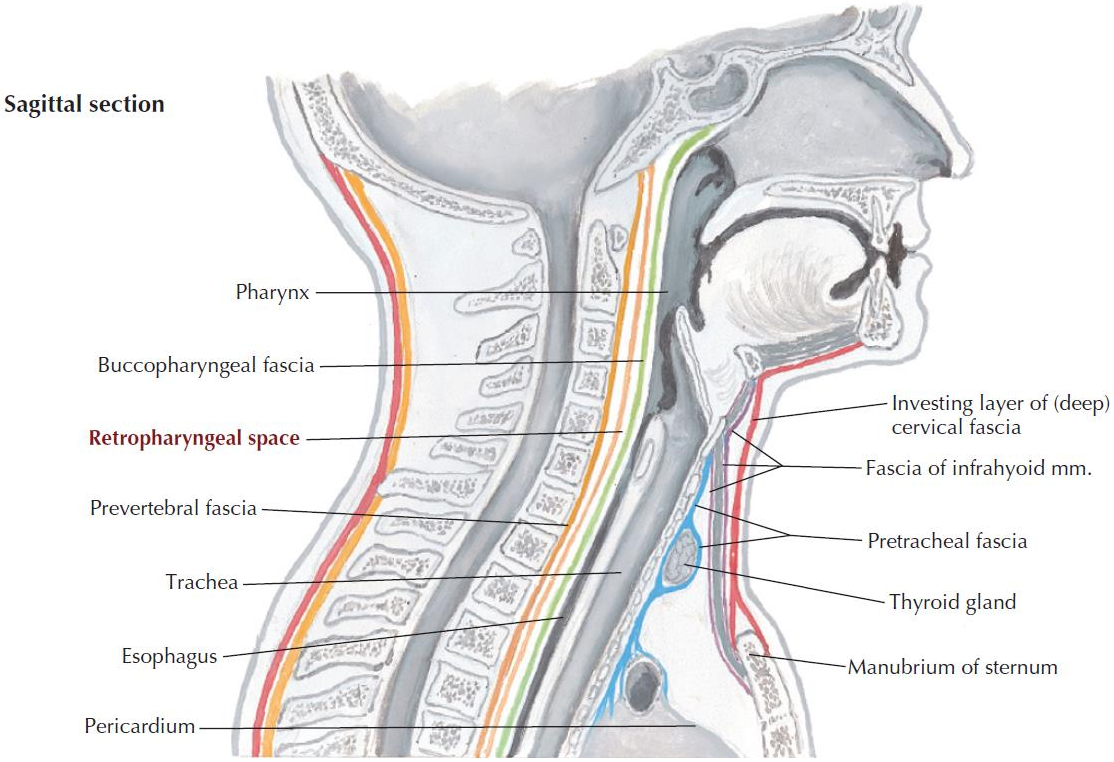


FIGURE 4: Cervical fascial layers and spaces.

Cervical Ligaments

- ✓ **Stylohyoid ligament:** Connects the styloid process to the lesser cornu of the hyoid bone.
- ✓ **Stylomandibular ligament:** Connects the styloid process to the angle of the mandible.
- ✓ **Sphenomandibular ligament:** Connects the spine of the sphenoid bone to the lingula of the mandible.
- ✓ **Pterygomandibular ligament:** Connects the hamular process of the medial pterygoid plate to the posterior end of the mylohyoid line of the mandible. It gives attachment to the superior constrictor and the buccinator muscles.

Muscles of the Neck

The superficial muscles of the side of the neck are described in **Table 1** (**Fig. 5**). The **suprahyoid muscles** raise the hyoid bone toward a stabilized mandible during swallowing. The **infrahyoid muscles** depress the hyoid bone and larynx during swallowing and vocalization. The suprahyoid, infrahyoid, anterior and lateral vertebral muscles are also described in **Table 1**.

TABLE 1: Muscles of the neck.

Muscle	Origin	Insertion	Nerve Supply	Action
Platysma	Deep fascia over pectoralis major and deltoid	Body of mandible and angle of mouth	Facial nerve cervical branch	Depresses mandible and angle of mouth
Sternocleidomastoid	Manubrium sterni and medial third of clavicle	Mastoid process of temporal bone and occipital bone	Spinal part of accessory nerve and C2 and 3	Two muscles acting together extend head and flex neck; one muscle rotates head to opposite side
Digastric				
Posterior belly	Mastoid process of temporal bone	Intermediate tendon is held to hyoid by fascial sling	Facial nerve	Depresses mandible or elevates hyoid bone
Anterior belly	Body of mandible		Nerve to mylohyoid	
Stylohyoid	Styloid process	Body of hyoid bone	Facial nerve	Elevates hyoid bone
Mylohyoid	Mylohyoid line of body of mandible	Body of hyoid bone and fibrous raphe	Inferior alveolar nerve	Elevates floor of mouth and hyoid bone or depresses mandible
Geniohyoid	Inferior mental spine of mandible	Body of hyoid bone	1st cervical nerve	Elevates hyoid bone or depresses mandible
Sternohyoid	Manubrium sterni and clavicle	Body of hyoid bone	Ansa cervicalis; C1, 2, and 3	Depresses hyoid bone
Sternothyroid	Manubrium sterni	Oblique line on lamina of thyroid cartilage	Ansa cervicalis; C1, 2, and 3	Depresses larynx
Thyrohyoid	Oblique line on lamina of thyroid cartilage	Lower border of body of hyoid bone	1st cervical nerve	Depresses hyoid bone or elevates larynx
Omohyoid				
Inferior belly	Upper margin of scapula and suprascapular ligament	Intermediate tendon is held to clavicle and first rib by fascial sling	Ansa cervicalis; C1, 2, and 3	Depresses hyoid bone
Superior belly	Lower border of body of hyoid bone			
Scalenus anterior	Transverse processes of 3rd, 4th, 5th, and 6th cervical vertebrae	1st rib	C4, 5, and 6	Elevates 1st rib; laterally flexes and rotates cervical part of vertebral column
Scalenus medius	Transverse processes of upper six cervical vertebrae	1st rib	Anterior rami of cervical nerves	Elevates 1st rib; laterally flexes and rotates cervical part of vertebral column
Scalenus posterior	Transverse processes of lower cervical vertebrae	2nd rib	Anterior rami of cervical nerves	Elevates 2nd rib; laterally flexes and rotates cervical part of vertebral column

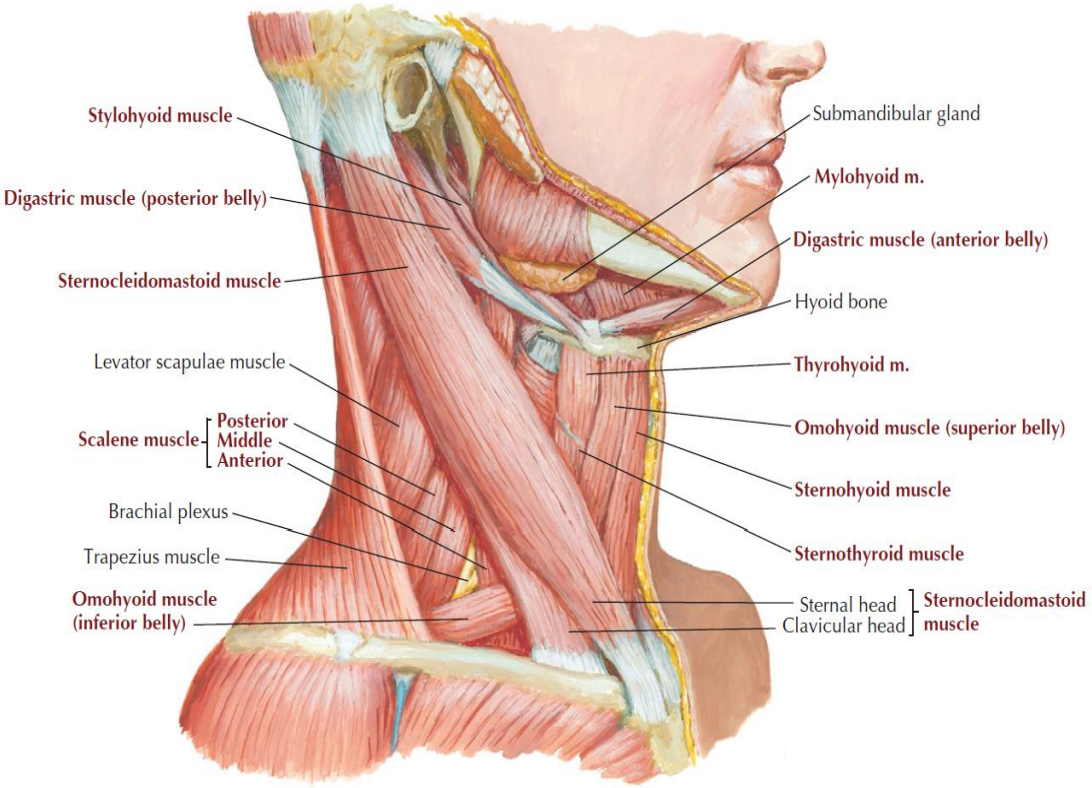


FIGURE 5: Muscles of the neck.

❖ Cervical Plexus

The (spinal) accessory nerve (CN XI) exits the jugular foramen and crosses the posterior triangle, innervating the SCM and trapezius muscles (**Fig. 6**). However, the **cervical plexus**, composed of the **ventral rami of C1-C4,** innervates most of the neck muscles and provides sensory innervation to the anterior and lateral neck (**Table 2**).

Additional innervation includes:

- The **mylohyoid nerve** (CN V3) innervates the mylohyoid muscle and anterior belly of the digastric muscle beneath the chin.
- The **facial nerve** (CN VII) innervates the platysma muscle through its cervical branch.
- The **glossopharyngeal nerve** (CN IX) supplies the carotid body and sinus (visceral sensory).
- The **vagus nerve** (CN X) supplies the larynx through its superior and recurrent (inferior) laryngeal nerves.
- The **hypoglossal nerve** (CN XII) loops through the neck to innervate the tongue.

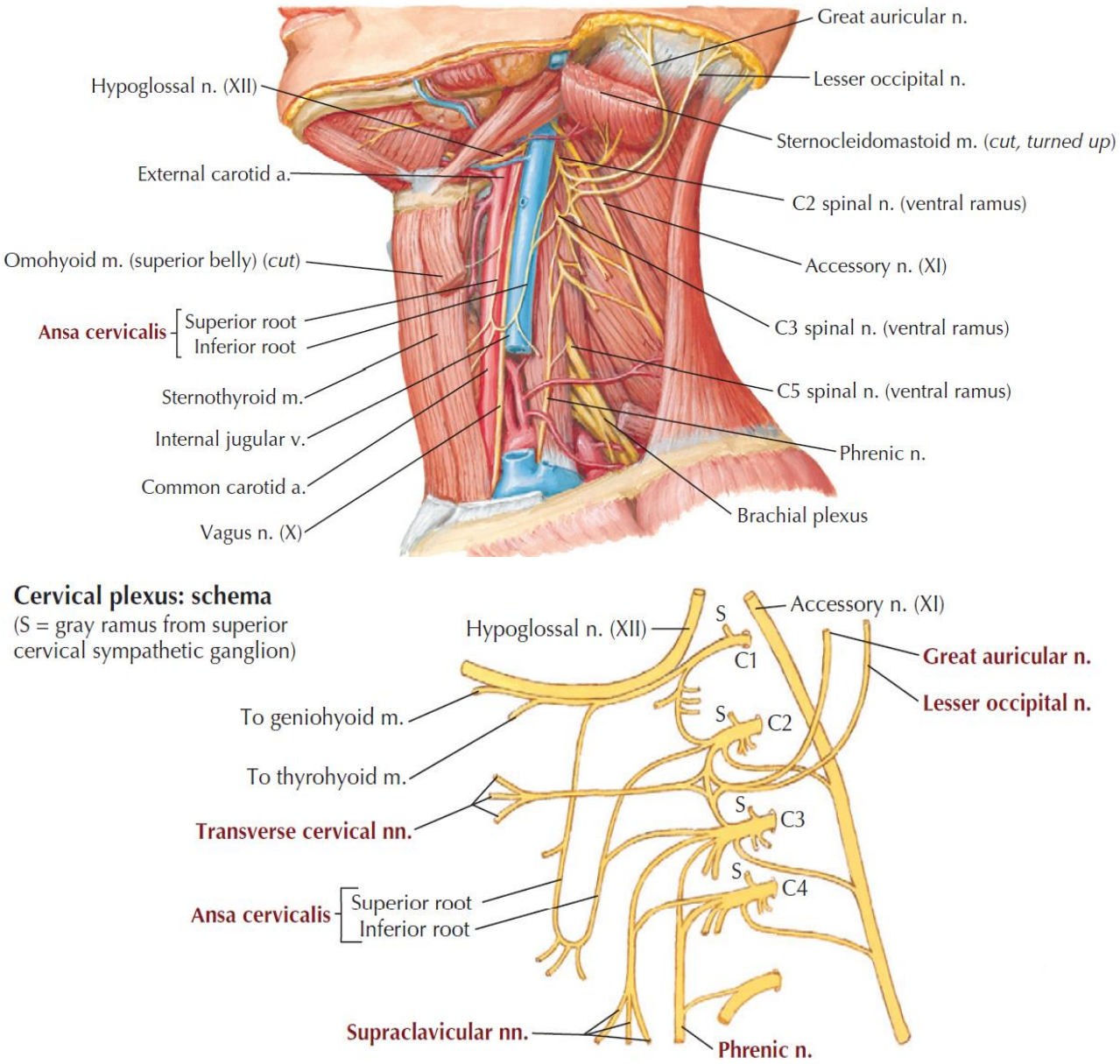


FIGURE 6: Cervical plexus.

TABLE 2: Cervical plexus.

NERVE	INNERVATION	NERVE	INNERVATION
C1	Travels with cranial nerve CN XII to innervate geniohyoid and thyrohyoid muscles	Supraclavicular	From C3 to C4, are anterior, middle, and posterior sensory branches to skin over clavicle and shoulder region
Ansa cervicalis	Is C1-C3 loop that sends motor branches to infrahyoid muscles	Phrenic	From C3 to C5, is motor and sensory nerve to diaphragm
Lesser occipital	From C2, is sensory to neck and scalp posterior to ear	Motor branches	Are small twigs that supply scalene muscles, levator scapulae, and prevertebral muscles
Great auricular	From C2 to C3, is sensory over parotid gland and posterior ear		
Transverse cervical	From C2 to C3, is sensory to anterior triangle of neck		

Bones of Neck

The skeleton of the neck is formed by the cervical vertebrae, hyoid bone, manubrium of the sternum, and clavicles. These bones are parts of the axial skeleton except the clavicles, which are part of the appendicular skeleton.

Blood Supply

The arterial supply to the neck is by the **subclavian artery** and some of the branches of the **external carotid artery,** a branch of the common carotid artery.

Key Neck Muscles

The sternocleidomastoid muscle (**Fig. 5**) divides the neck into two major triangles, the anterior and posterior triangles. The anterior border covers the carotid arteries, the internal jugular vein, and the deep cervical lymph nodes; it also overlaps the thyroid gland. The muscle is covered superficially by skin, fascia, the platysma muscle, and the external jugular vein. The deep surface of the posterior border is related to the cervical plexus of nerves, the phrenic nerve, and the upper part of the brachial plexus. The origin, insertion, nerve supply, and action of the sternocleidomastoid muscle are summarized in **Table 1**.