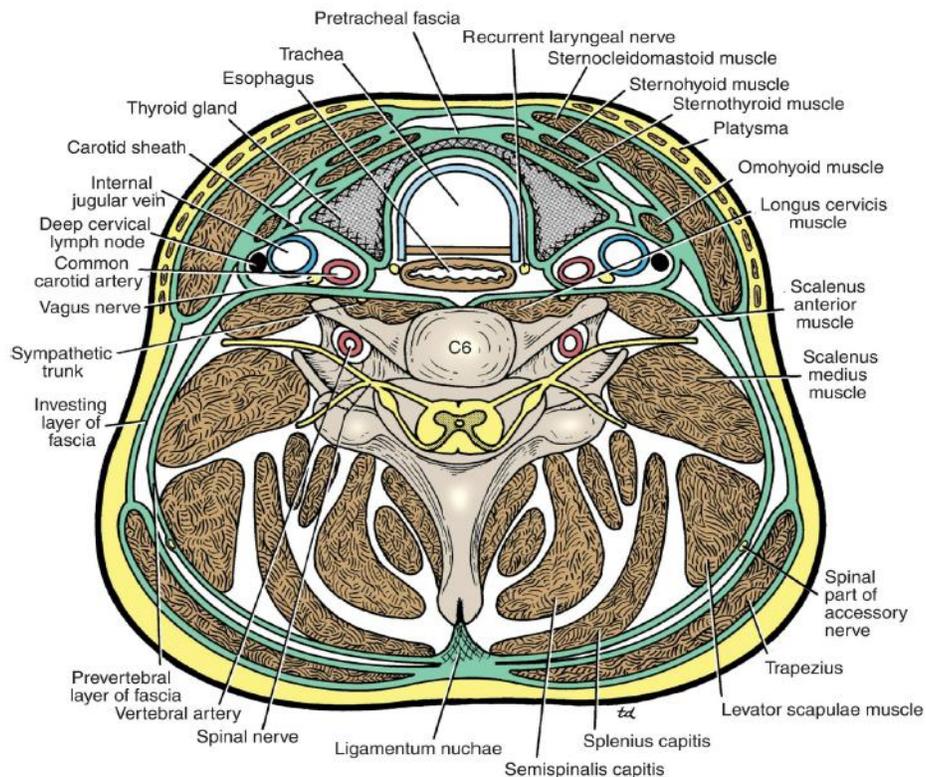


The Neck

Introduction

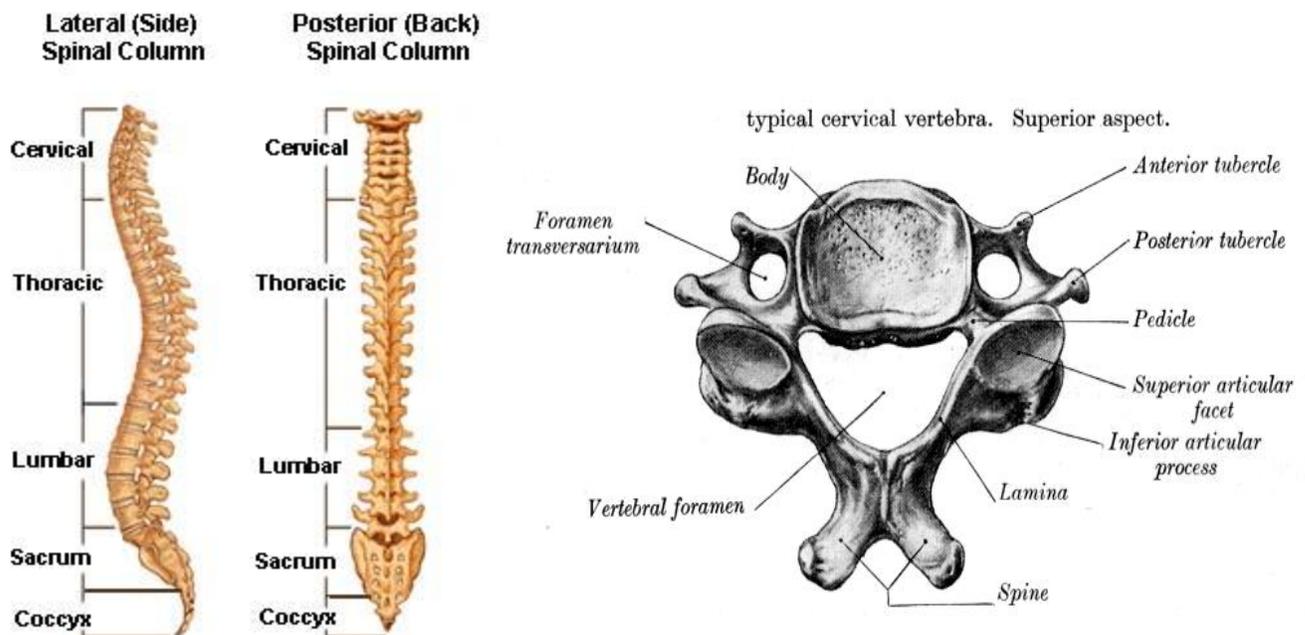
- The neck is the region of the body that lies between the lower margin of the mandible above and the suprasternal notch and the upper border of the clavicle below.
- It is strengthened by the cervical part of the vertebral column, which is convex forward and supports the skull.
- Behind the vertebrae is a mass of extensor muscles and in front is a smaller group of flexor muscles.
- In the central region of the neck are parts of the respiratory system (the larynx and the trachea) and behind are parts of the alimentary system (the pharynx and the esophagus).
- At the sides of these structures are the vertically running carotid arteries, internal jugular veins, the vagus nerve, and the deep cervical lymph nodes.



Cross section of the neck at the level of C6

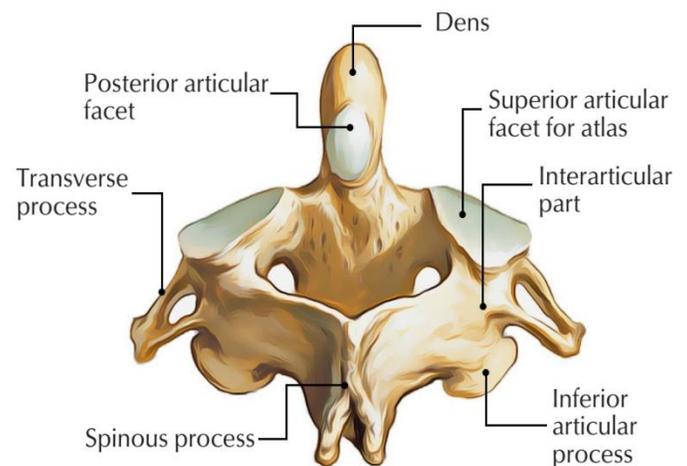
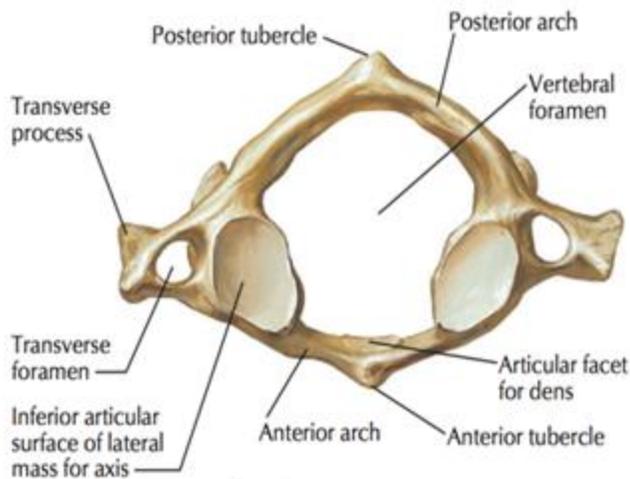
Cervical Vertebrae

- Cervical vertebrae are part of the vertebral column; the vertebral column is composed of 33 vertebrae organized in five regions—7 cervical, 12 thoracic, 5 lumbar, 5 sacral (fused to form the sacrum), and 4 coccygeal.
- A **typical** vertebra consists of a rounded body anteriorly and a vertebral arch posteriorly. These enclose a space termed the vertebral foramen, the vertebral foramina forms the spinal canal for the passage of the spinal cord.
- The vertebral arch gives rise to seven processes: one spinous, two transverse, and four articular (two superior and two inferior)



- The two superior articular processes of one vertebral arch articulate with the two inferior articular processes of the arch above, forming two synovial joints. Likewise, the two inferior articular processes of the vertebral arch articulate with the two superior articular processes of the arch below, forming two additional synovial joints. Thus, each vertebra possesses a total of four synovial articular joints.

- **Atypical** cervical vertebrae (C1, C2 and C7): The **first cervical vertebra**, or **atlas**, does not possess a body or a spinous process. Instead, it has anterior and posterior arches. It has a lateral mass on each side with articular surfaces on its upper surface for articulation with the occipital condyles of the skull (atlando-occipital joints) and articular surfaces on its inferior surface for articulation with the C2 vertebra (atlantoaxial joints).
- The second cervical vertebra, or axis, has a peglike odontoid process (dens) that projects upward from the superior surface of the body.



C1



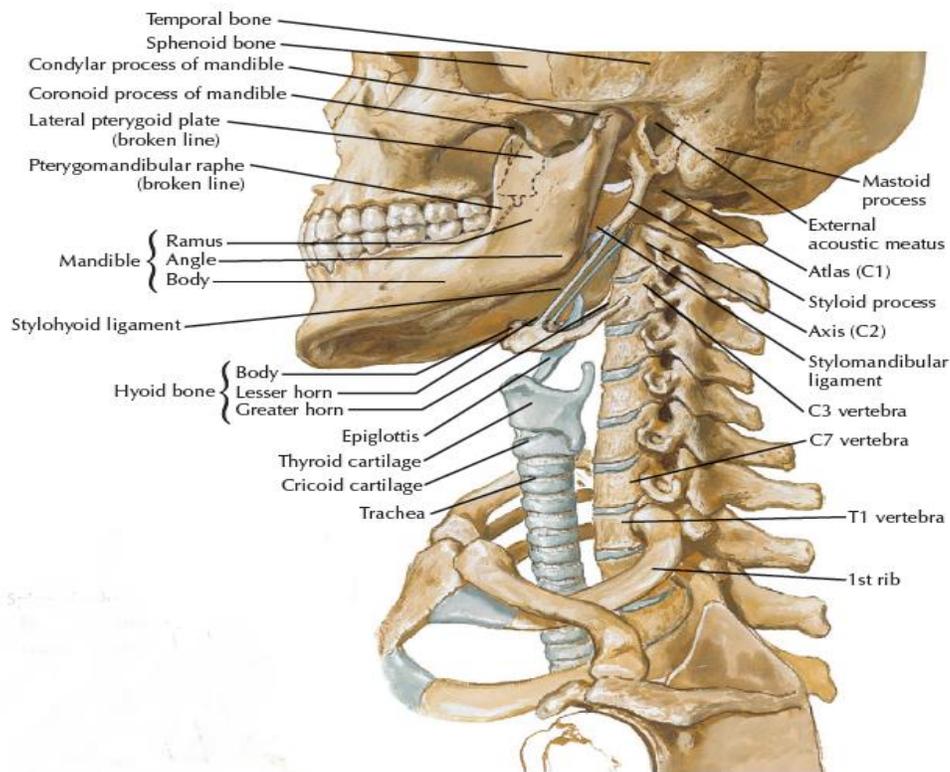
C2



- The seventh cervical vertebra, or vertebra prominens, is so named because it has the longest spinous process, and the process is not bifid.

Neck Structures in Relation to the Cervical Vertebrae

- The **hard palate** lies on the level of C₁ (first cervical vertebra- atlas-)
- The **mandible** lies on the level between C₂ and C₃
- The **Hyoid bone** lies on the level of C₃
- The **Thyroid Cartilage** (forms Adams apple in male) lies on the level of C₄
- The **Cricoid Cartilage** lies on the level of C₆
- The **Cricothyroid Membrane** (punctured in emergency airway obstruction) extend between thyroid and cricoids cartilages
- The **Bifurcation of Common Carotid Artery** lies on the level C₃ or C₄
- The **Pharynx** (Nasopharynx, Oropharynx and Laryngopharynx) extend from the base of the skull to the level of C₆ the continues as eosophagus
- The **larynx** lies anterior to the pharynx, begin with thyroid cartilage (C₄) and ends in the trachea (C₆) which lies anterior to the eosophagus.

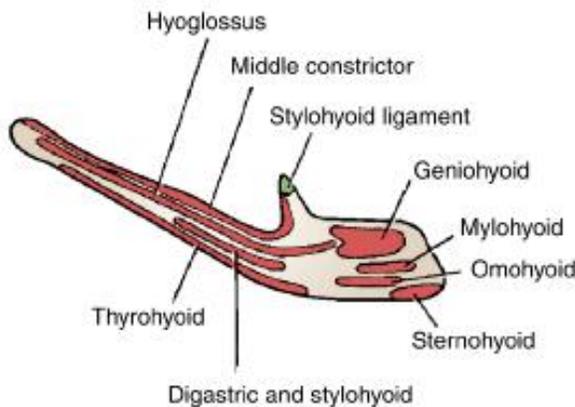
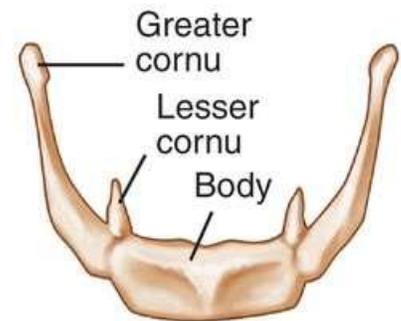
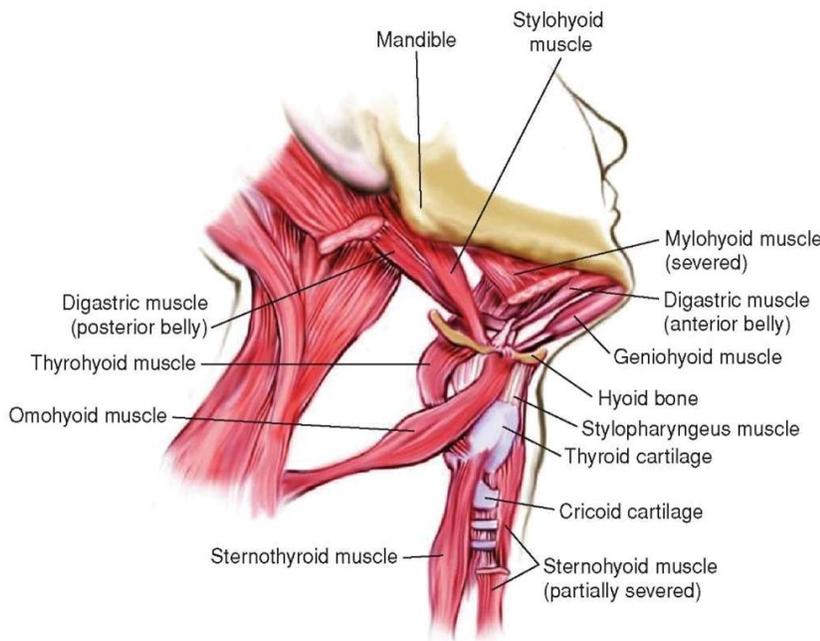


Hyoid Bone

The hyoid bone is a U shaped mobile single bone found in the midline of the neck below the mandible.

It does not articulate with any other bones. The hyoid bone is U shaped and consists of a body and two greater and two lesser horns (cornu).

The hyoid bone forms a base for the tongue and is suspended in position by muscles that connect it to the mandible, to the styloid process of the temporal bone, to the thyroid cartilage, to the sternum, and to the scapula.



The Hyoid bone with the muscles attached to it

Key Neck Muscles

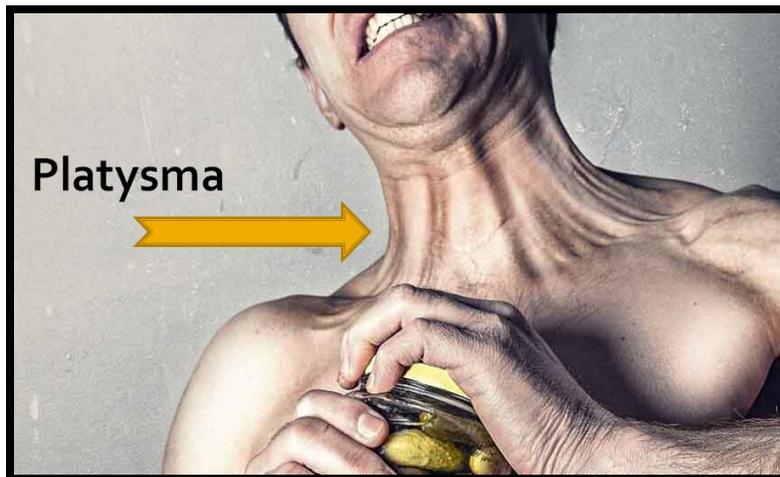
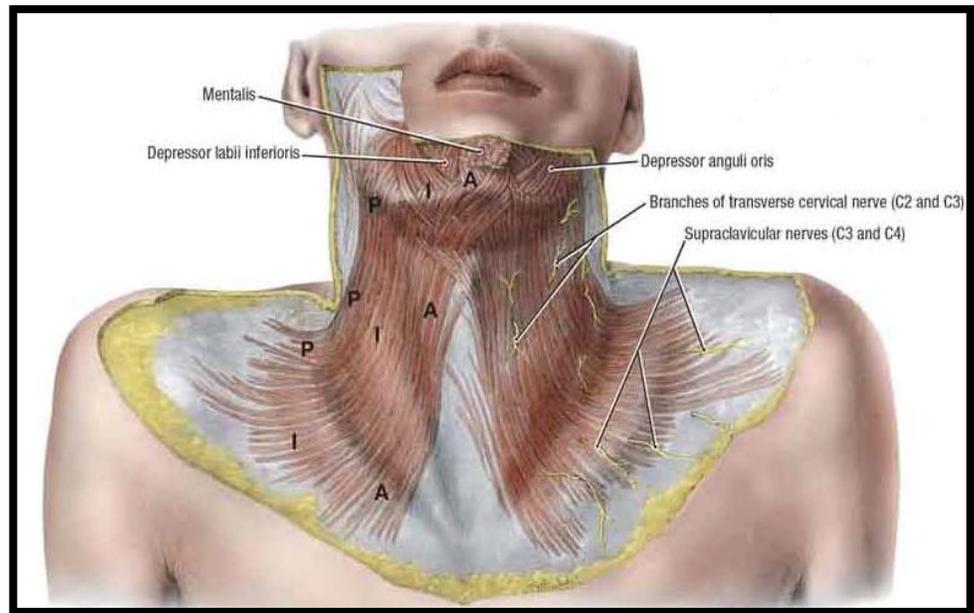
Muscle	Origin	Insertion	Nerve Supply	Action
Platysma	From the chest (Deep fascia over pectoralis major and deltoid)	Body of mandible angle of mouth	cervical branch of Facial nerve (CN7)	Depresses mandible and angle of mouth
Sternocleidomastoid	Manubrium sterni And medial third of The clavicle	Mastoid process of temporal bone	Spinal part of accessory nerve (CN11)	1- extend the head 2- flex the neck 3- rotates the head to opposite side (single muscle)
Digastric: - Posterior belly - Anterior belly	Mastoid process of temporal bone Body of mandible	Intermediate tendon held to hyoid by Fascial sling	N. to Stylohyoid Branch of Facial nerve N. to Mylohyoid branch of Mandibular N	1-Depresses the mandible or 2- elevates the hyoid bone
Mylohyoid	Mylohyoid line of body of mandible	Body of hyoid bone And fibrous raphe	N. to Mylohyoid branch of Mandibular N	1-Elevates floor of Mouth and hyoid bone or 2-depresses the mandible
Omohyoid: - Inferior belly - Superior belly	Upper margin of Scapula Lower border of body of hyoid bone	intermediate tendon held to clavicle and first rib by fascial sling	Ansa cervicalis; C1,2 and 3	Depresses hyoid bone

Platysma

The platysma muscle is a thin but clinically important muscular sheet embedded in the superficial fascia, the muscle extends like a collar surround the neck from the body of the mandible downward over the clavicle onto the anterior chest wall.

The muscle can be seen as a thin sheet of muscle just beneath the skin by having the patient clench his or her jaws firmly.

The platysma muscle is innervated by the cervical branch of the facial nerve. This nerve emerges from the lower end of the parotid gland and travels forward to the supply the muscle.



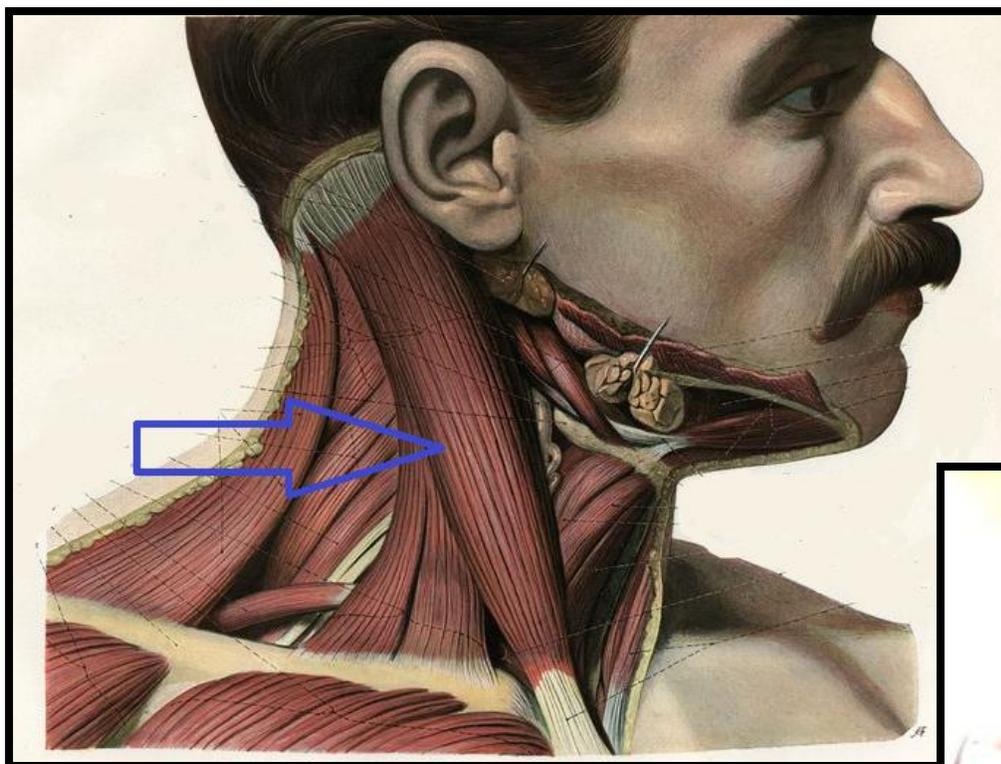
Platysma muscle contraction on clenching

Sternocleidomastoid Muscle

On contraction; the muscle appears as an oblique band crossing the side of the neck from the sternum and medial third of the clavicle to the mastoid process of the skull. It divides the neck into anterior and posterior triangles.

The muscle is covered superficially by skin, fascia, the platysma muscle, and the external jugular vein.

Deep to the muscle (covered by the anterior border of the muscle): the carotid arteries, the internal jugular vein, and the deep cervical lymph nodes.



Clinical Notes

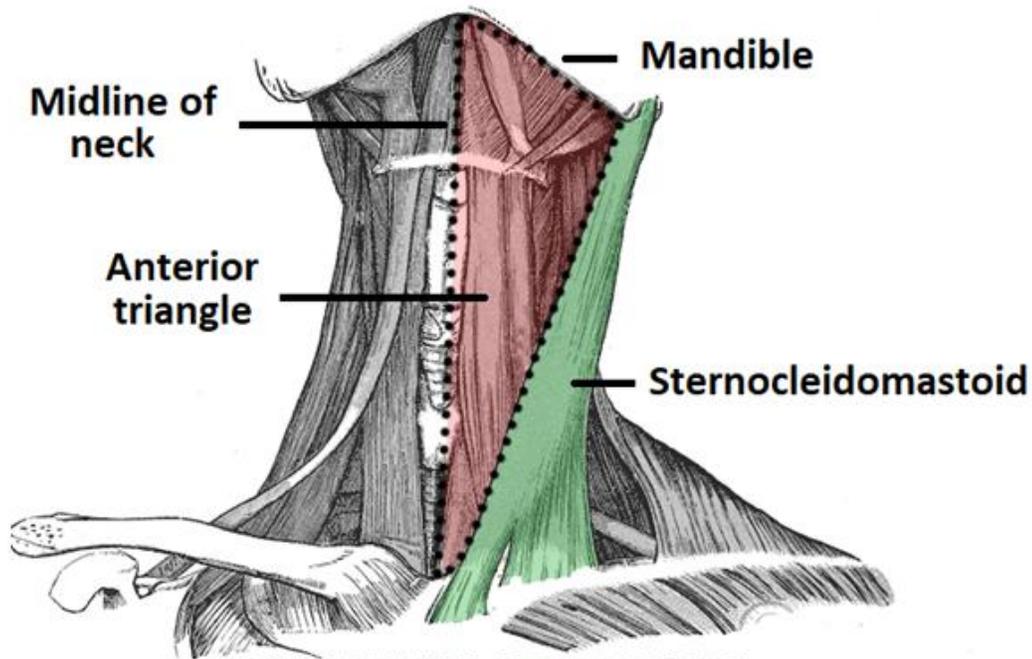
- ❖ Torticollis or cervical dystonia (twisted neck): is limitation of neck movement with fixation to one direction laterally due to dysfunction of sternocleidomastoid muscle, it could be spasmodic (painful and associated with infection or abnormal neck movement and posture), or it could be congenital associated with shortening of the muscle itself.
- ❖ Between the two sternal heads of the muscle a triangular space is formed, known as space of BURN'S in which the end of internal jugular vein exist and can be entered by needle or canula.

NECK TRIANGLES

The sternocleidomastoid muscle divides the neck into large anterior and posterior triangles, Each of these contains smaller triangular spaces:

Anterior Triangle

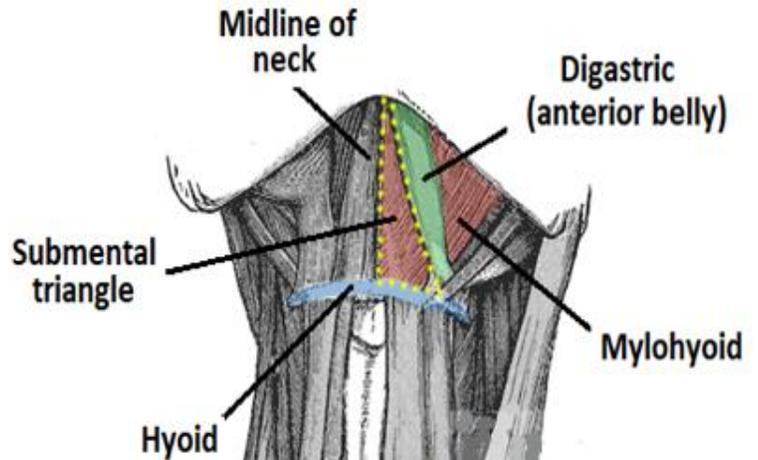
- The boundaries are the sternocleidomastoid muscle, the midline of the neck, and the lower margin of the body of the mandible.
- Roof (lateral relation) Skin, superficial fascia, Platysma muscle and Investing layer of deep cervical fascia.



- Subdivisions are:
 - **Submental triangle:**
 - ✓ Boundaries: Anterior midline, hyoid bone, anterior belly of digastric.
 - ✓ Floor: Mylohyoid muscle.
 - ✓ Contents: Submental lymph nodes, anterior jugular vein.

- **Clinical Notes**

Submental space abscess: is one of the orofacial space infection, caused by infection of the Submental lymph nodes (drain the tip of the tongue, anterior floor of the mouth and lower incisors), or directly from the lower incisor

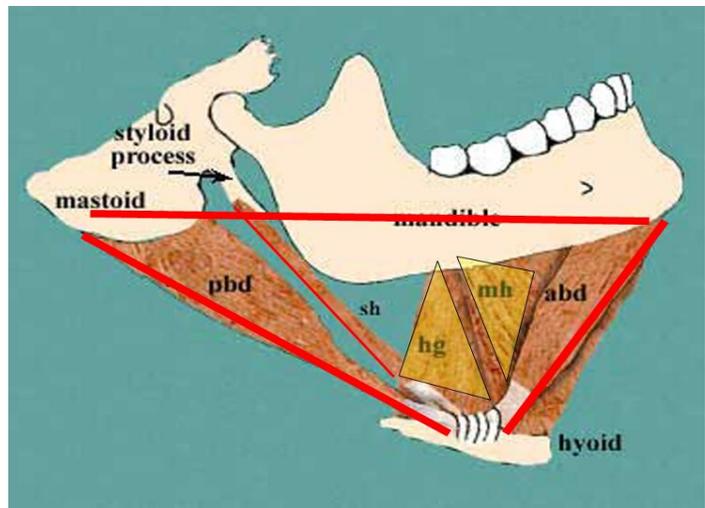


- **Submandibular (digastric) triangle:**

- ✓ Boundaries: Lower margin of body of the mandible, anterior belly of digastric, posterior belly of digastric.
- ✓ Floor: Mylohyoid and Hyoglossus muscles
- ✓ Contents: submandibular gland, submandibular lymph nodes, Facial artery, facial vein, Hypoglossal nerve.

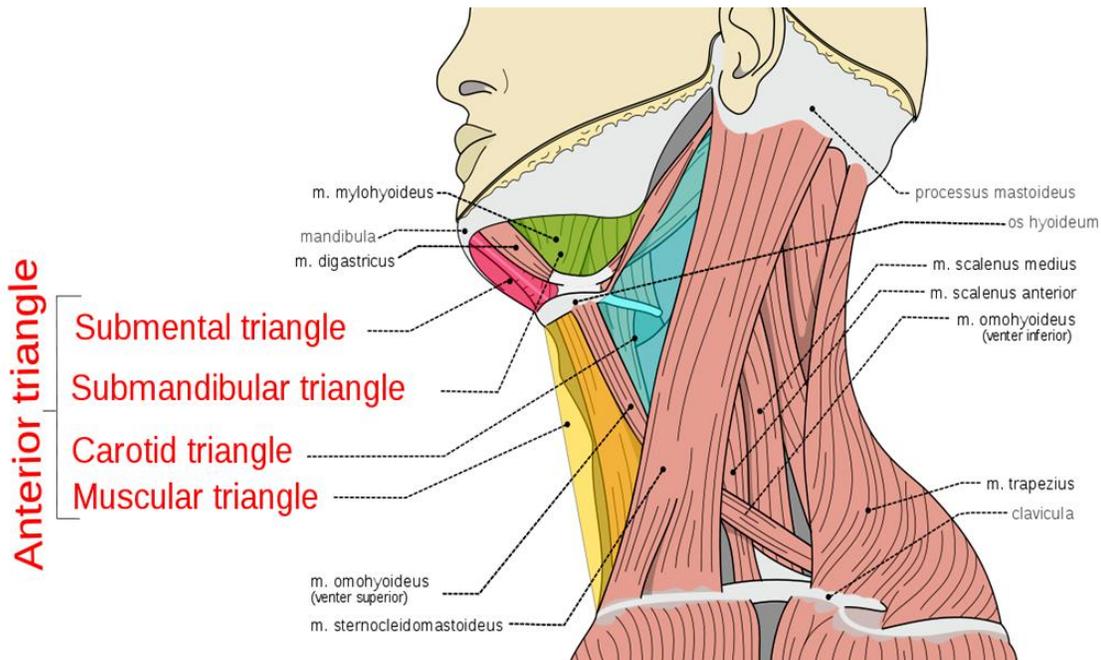
- **Clinical Notes**

Submandibular space abscess: is very common space infection, caused by infection of the Submandibular lymph nodes, directly from the lower posterior teeth or from other spaces as sublingual space



- Muscular triangle:

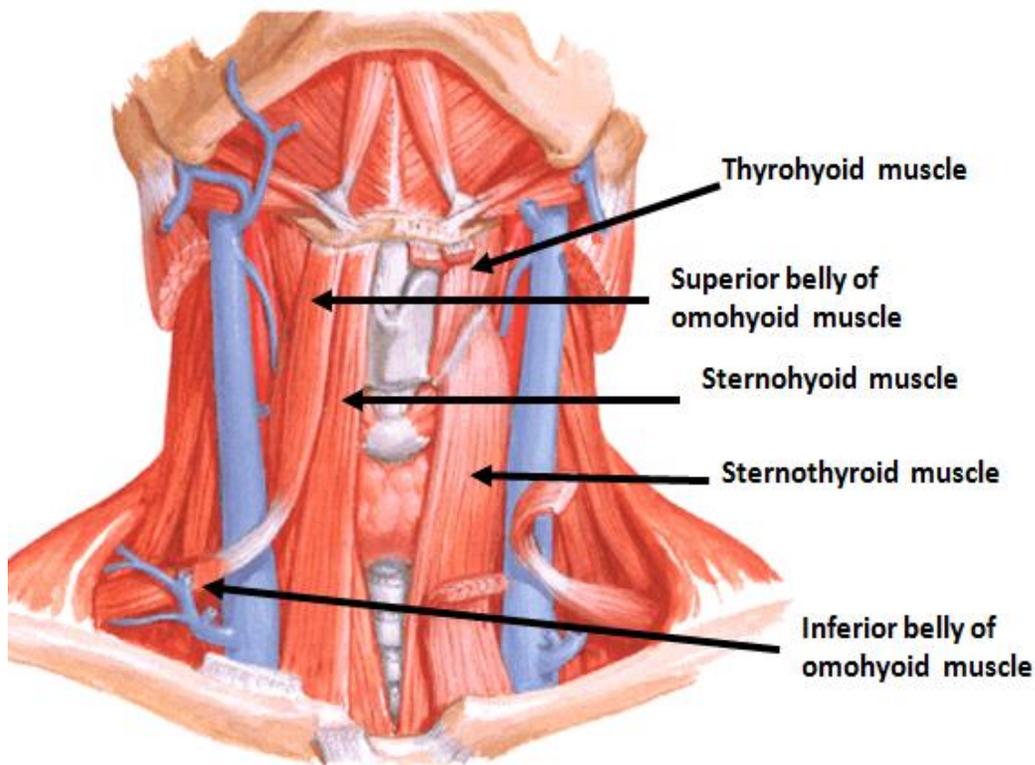
- ✓ Boundaries: Anteriorly: midline
Posteriorly: anterior edge of sternocleidomastoid
Superiorly: superior belly of the omohyoid.
- ✓ Contents: - Infrahyoid muscles or Strap muscles (sternohyoid, sternothyroid and thyrohyoid)
- Thyroid and parathyroid glands.



- Carotid triangle:

- ✓ Boundaries: Anteriorly: posterior belly of digastric
Posteriorly: anterior edge of sternocleidomastoid
Inferiorly: Superior belly of the omohyoid
- ✓ Contents: - carotid sheath (common carotid artery, Internal Jugular vein and Vagus nerve)
- Hypoglossal nerve
- Deep cervical lymph nodes (jugulodigastric)

Supra and Infra Hyoid Muscles



- **Supra Hyoid Muscles**

Digastric, Mylohyoid (both of them are mentioned before) Geniohyoid and Stylohyoid

- **Infra Hyoid Muscles (Strap muscles)**

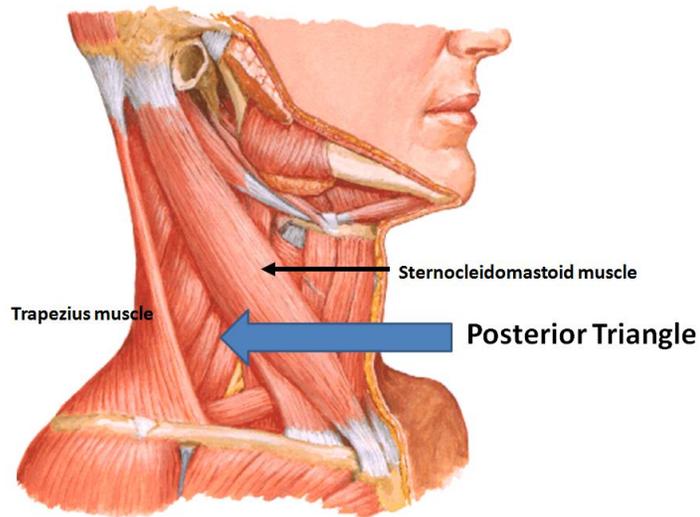
Omohyoid (mentioned before), Sternohyoid, sternothyroid and thyrohyoid

Muscle	Origin	Insertion	Nerve supply	Action
Geniohyoid	Inferior mental spine of mand.	Body of hyoid bone	First cervical Nerve (C1)	Elevates hyoid Bone or depress The mand.
Stylohyoid	Styloid process	Body of hyoid bone	Facial nerve	Elevates hyoid bone

Sternohyoid	Manubrium sterni And clavicle	Body of hyoid bone	Ansa Cervicalis (C1, C2 and C3)	Depresses hyoid bone
Sternothyroid	Manubrium sterni	Oblique line of thyroid cartilage	Ansa Cervicalis (C1, C2 and C3)	Depresses The larynx
Thyrohyoid	Oblique line of thyroid cartilage	Lower border of Body of hyoid bone	First cervical nerve	depresses hyoid Bone or elevates the larynx

Posterior Triangle

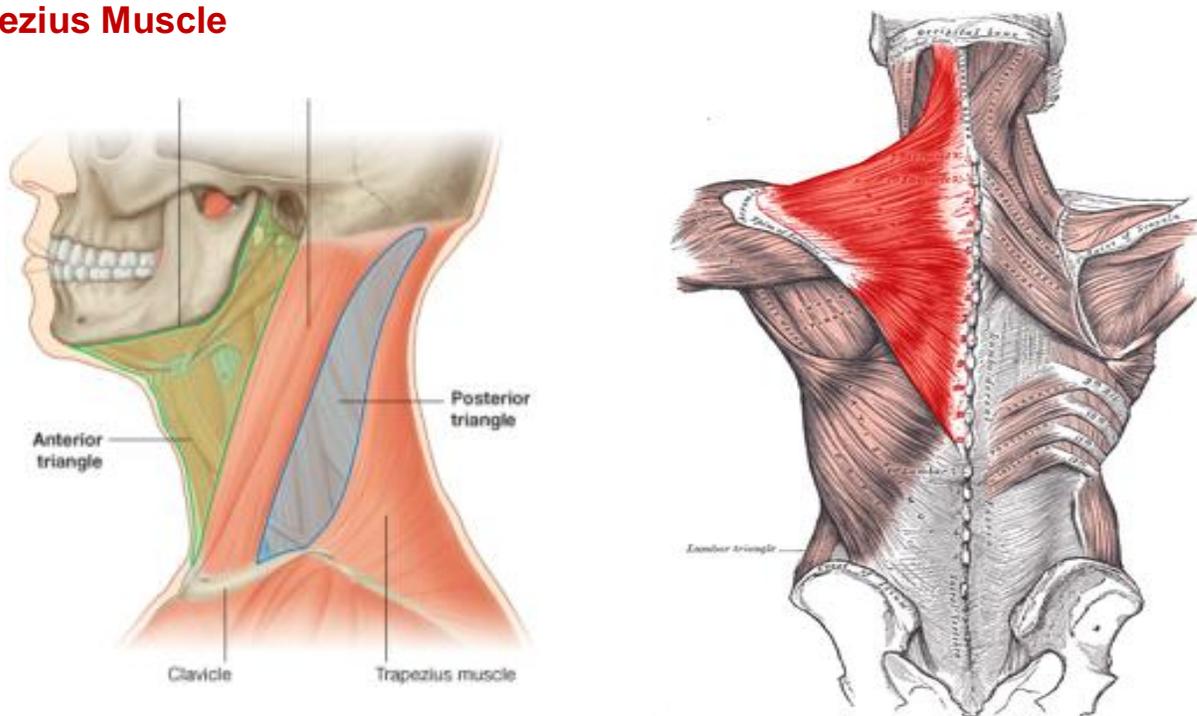
This is an area enclosed between sternomastoid anteriorly and trapezius muscle posteriorly; its apex lies high up at the back of the skull on the superior nuchal line where both muscles meet.



- **The boundaries are:**
 - Anteriorly : the posterior border of sternocleidomastoid muscle
 - Posteriorly : the anterior border of trapezius muscle
 - Inferiorly: the middle third of the clavicle.
- **Roof is formed by:** investing layer of deep cervical fascia

- **Floor is formed by:** the prevertebral fascia and prevertebral muscles (Scalenus anterior, Scalenus medius, Levator Scapulae, Splenius capitis and Semispinalis Capitis)
- **Subdivisions:** formed by the inferior belly of Omohyoid muscle.
 - **Occipital triangle:**
 - ✓ Boundaries: Sternocleidomastoid, trapezius, inferior belly of omohyoid
 - ✓ Contents: Occipital artery, spinal accessory nerve (CN XI), brachial plexus (trunks) and occipital lymph nodes.
 - **Omoclavicular (subclavian) triangle:**
 - ✓ Boundaries: Sternocleidomastoid, inferior belly of omohyoid, clavicle.
 - ✓ Contents: Subclavian artery (third part) and supraclavicular lymph nodes

Trapezius Muscle



Is one of the superficial group of back muscles:

- Origin: from (occipital bone, ligamentum nuchae and spines of all thoracic vertebrae)
- Insertion: Lateral third of the clavicle and spine of the scapula
- Nerve supply: Spinal Accessory nerve
- Action: elevation of the scapula, pulling of the scapula medially

Deep Cervical Fascia

The deep cervical fascia supports the muscles, the vessels, and the viscera of the neck, areas, it is a well defined fibrous sheet, and it includes multiple layers; the investing layer of deep cervical fascia, the pretracheal layer, the prevertebral layer and carotid sheath.

- **Investing Layer (Investing Deep Fascia)**

The investing layer is a thick layer that encircles the neck. It splits to enclose the trapezius and the sternocleidomastoid muscles.

- **Pretracheal Layer (Pretracheal Fascia; Thyroid Capsule)**

The pretracheal layer is a thin layer that is attached above to the laryngeal cartilages. It surrounds the thyroid and the parathyroid glands, forming a sheath for them, and encloses the infrahyoid muscles.

- **Prevertebral Layer (Prevertebral Fascia)**

The prevertebral layer is a thick layer that passes in front of the prevertebral muscles and the vertebral column. It forms the fascial floor of the posterior triangle, and it extends laterally over the first rib into the axilla to form the axillary sheath.

- **Carotid Sheath**

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

Head and Neck Lymph Drainage

The lymph nodes of the head and neck are arranged in three groups:

- (1) Pericervical collar: that extends from below the chin to the back of the head
- (2) Regional cervical group located in the neck proper
- (3) Deep terminal group that is embedded in the carotid sheath in the neck

- **Pericervical Collar Node**

The pericervical collar is a series of several groups of nodes arranged roughly in a ring around approximately the junction of the head and neck. The pericervical nodes are arranged as follows:

- ❖ **Occipital nodes:**

Located over the occipital bone on the back of the skull, they receive lymph from the back of the scalp.

- **Mastoid (retroauricular) nodes:**

Located behind the ear over the mastoid process, they receive lymph from the scalp above the ear, the auricle, and the external auditory meatus.

- **Parotid (preauricular) nodes:**

Located on or within the parotid salivary gland, they receive lymph from the scalp above the parotid gland, lateral thirds of the eyelids, the parotid gland, the auricle, and the external auditory meatus.

- **Buccal (facial) nodes:**

One or two nodes lie in the cheek over the buccinator muscle. They drain lymph that ultimately passes into the submandibular nodes.

- **Submandibular nodes:**

Located superficial to the submandibular salivary gland just below the lower margin of the jaw, they receive lymph from the front of the scalp; the nose; the cheek; the upper lip and the lower lip (except the central part); the frontal, maxillary, and ethmoid sinuses; the upper and lower teeth (except the lower incisors); the anterior two thirds of the tongue (except the tip); the floor of the mouth and vestibule; and the gums.

- **Submental nodes:**

Located in the submental triangle just below the chin, they drain lymph from the tip of the tongue, the floor of the anterior part of the mouth, the incisor teeth, the center part of the lower lip, and the skin over the chin.

- **Cervical Regional Nodes**

These are regional groups of nodes located in a roughly vertical series in the neck proper. They collect lymph drainage from the pericervical collar and the superficial and deep tissues of the neck. The cervical regional nodes are as follows:

- **Anterior cervical nodes:**

These lie along the course of the anterior jugular veins in the front of the neck.

- **Superficial cervical nodes:**

These lie along the course of the external jugular vein on the side of the neck.

- **Retropharyngeal nodes:**

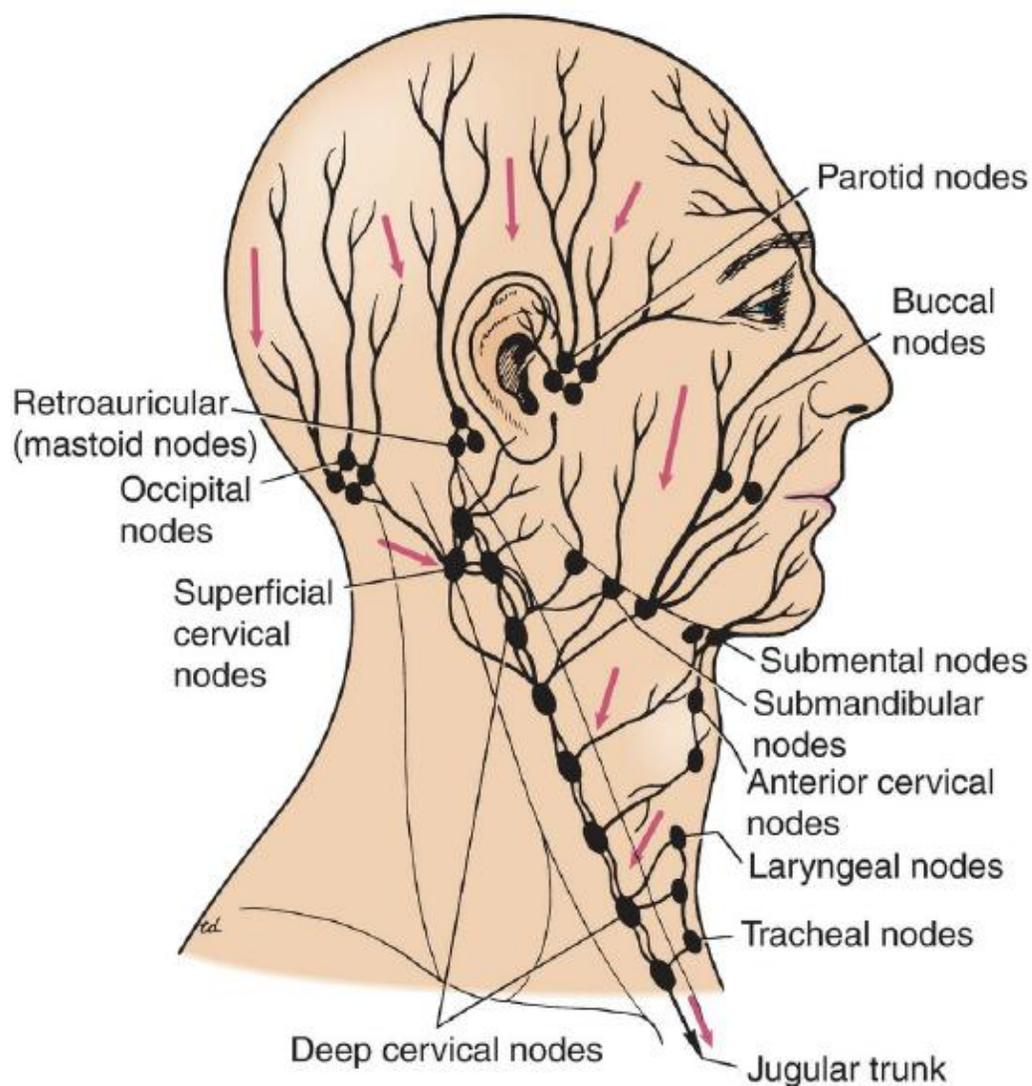
These lie behind the pharynx and in front of the vertebral column.

- **Laryngeal nodes:**

These lie in front of the larynx. They receive lymph from the larynx.

- **Tracheal (paratracheal) nodes:**

These lie alongside the trachea. They receive lymph from neighboring structures, including the thyroid gland.



- **Deep Cervical Nodes**

The deep cervical nodes form a vertical chain along the course of the internal jugular vein, within the carotid sheath, from the base of the skull to the root of the neck.

They receive lymph from all the groups of regional nodes in the neck. They are arranged in three groups according to their relation to internal jugular vein (upper jugular, midjugular and lower jugular)

- The jugulodigastric node (upper jugular), which is located below and behind the angle of the jaw, is mainly concerned with drainage of the tonsil and the tongue.
- The jugulo-omohyoid node (lower jugular), which is situated close to the omohyoid muscle, is mainly associated with drainage of the tongue.

The lymph vessels from the deep cervical nodes join to form the jugular trunks. The left jugular trunk usually empties (drains) into the thoracic duct. The right jugular trunk drains into the right lymphatic duct.