

# Human Anatomy

Lec.13,14

**Triangles of the neck and Facia**

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## **Anterior Triangle**

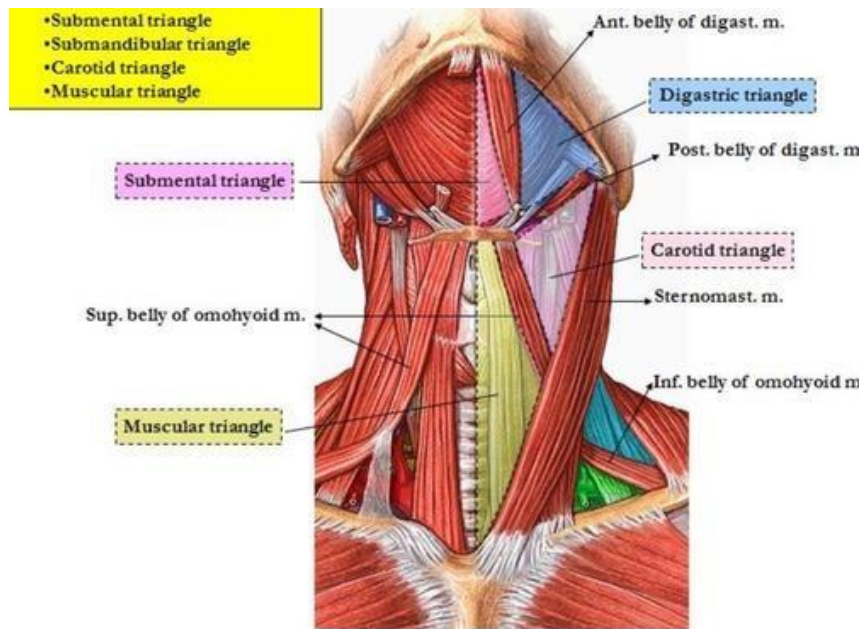
Borders of the anterior triangle

- Posteriorly: Anterior border of the sternocleidomastoid
- Superiorly: Inferior border of the mandible
- Anteriorly: Midline of the neck

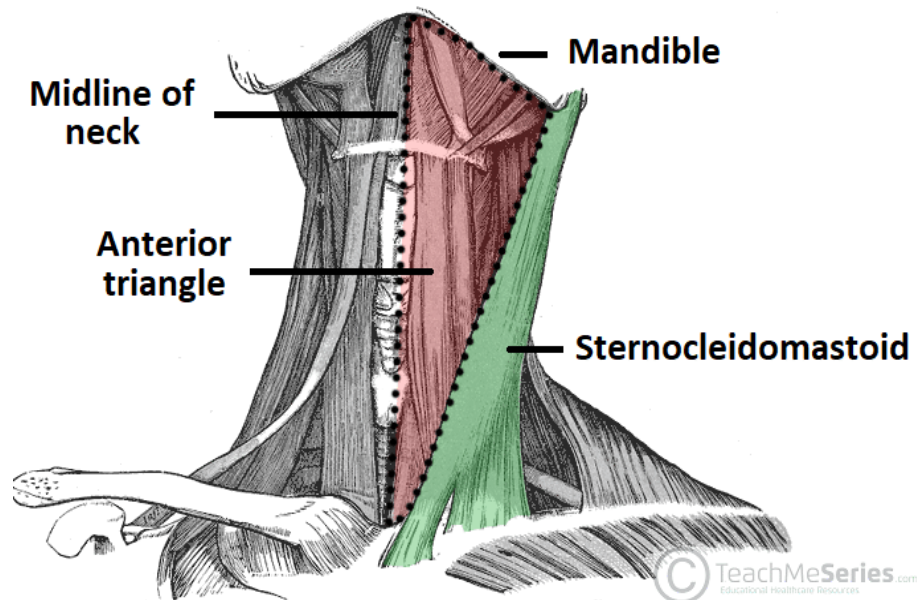
Using the hyoid as a keystone, the omohyoid and digastric muscles subdivide **the anterior triangle into 4 triangles:**

- Submental triangle.
- Submandibular triangle.
- Carotid triangle.
- Muscular triangle.

All of the triangles within the anterior triangle are paired except for the submental triangle, which spans the right and the left sides of the neck (**Figure 1**).



**Figure 1: Anterior triangle subdivisions**



## ✚ Submental Triangle

Borders of the submental triangle (**Figure 2**):

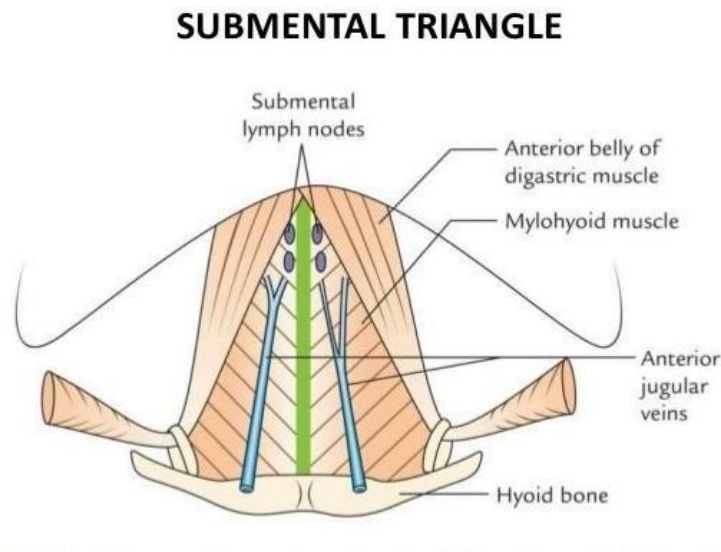
- **Inferiorly:** Body of the hyoid bone.
- **laterally:** Anterior belly of the digastric muscle on right and left side
- **Apex:** symphysis mentis of the mandibular bone.

**The floor** of the triangle is composed of the **two mylohyoid muscles** which met up at the median raphe.

**The roof** is made of the:

- Skin.
- Superficial fascia with platysma.
- Deep cervical fascia.

The contents of Submental Triangle include **anterior jugular veins and submental lymph nodes**.



**Figure 2: Boundaries and contents the Submental triangle**

## ✚ Submandibular triangle (the digastric triangle)

Borders of the submandibular triangle (**Figure 3**):

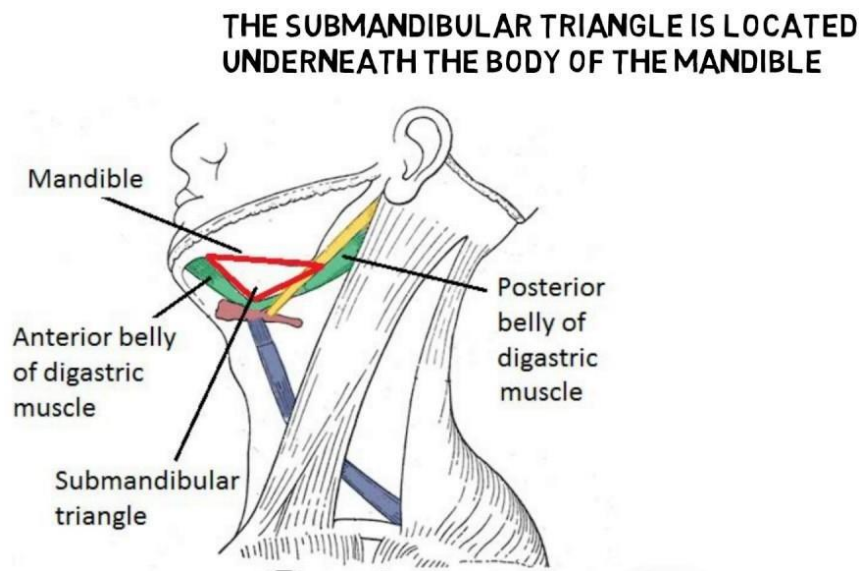
- **Superiorly:** Inferior border of the mandible
- **Posteriorly:** Posterior belly of digastric and stylohyoid muscles
- **Anteriorly:** Anterior belly of digastric

**The Floor of the triangle** is composed of

- Hyoglossus muscle.
- Mylohyoid muscle.
- Middle constrictor. muscle.

**The Roof** is made of the:

- Skin.
- Superficial fascia with platysma.
- Deep cervical fascia (**Table 1**).



**Figure 3: Boundaries and contents of the submandibular triangle**

**Table (1): Contents of the Submandibular triangle**

Arteries	Veins	Nerves	Structures
Facial (deep to the gland) submental Lingual (Small portion)	Facial (superficial to the gland) submental Lingual (Small portion)	Hypoglossal (CN XII) Mylohyoid	Submandibular gland Submandibular lymph node Inferior portion of the parotid gland

### **Carotid triangle**

It is named because parts of all the three carotid arteries are located within it.

Borders of the carotid triangle (**Figure 4**):

- **Posteriorly:** Anterior border of the sternocleidomastoid muscle.
- **Superiorly:** Posterior belly of digastric muscle.
- **Anteroinferiorly:** Superior belly of omohyoid muscle.

**The Floor** of the triangle is composed of the:

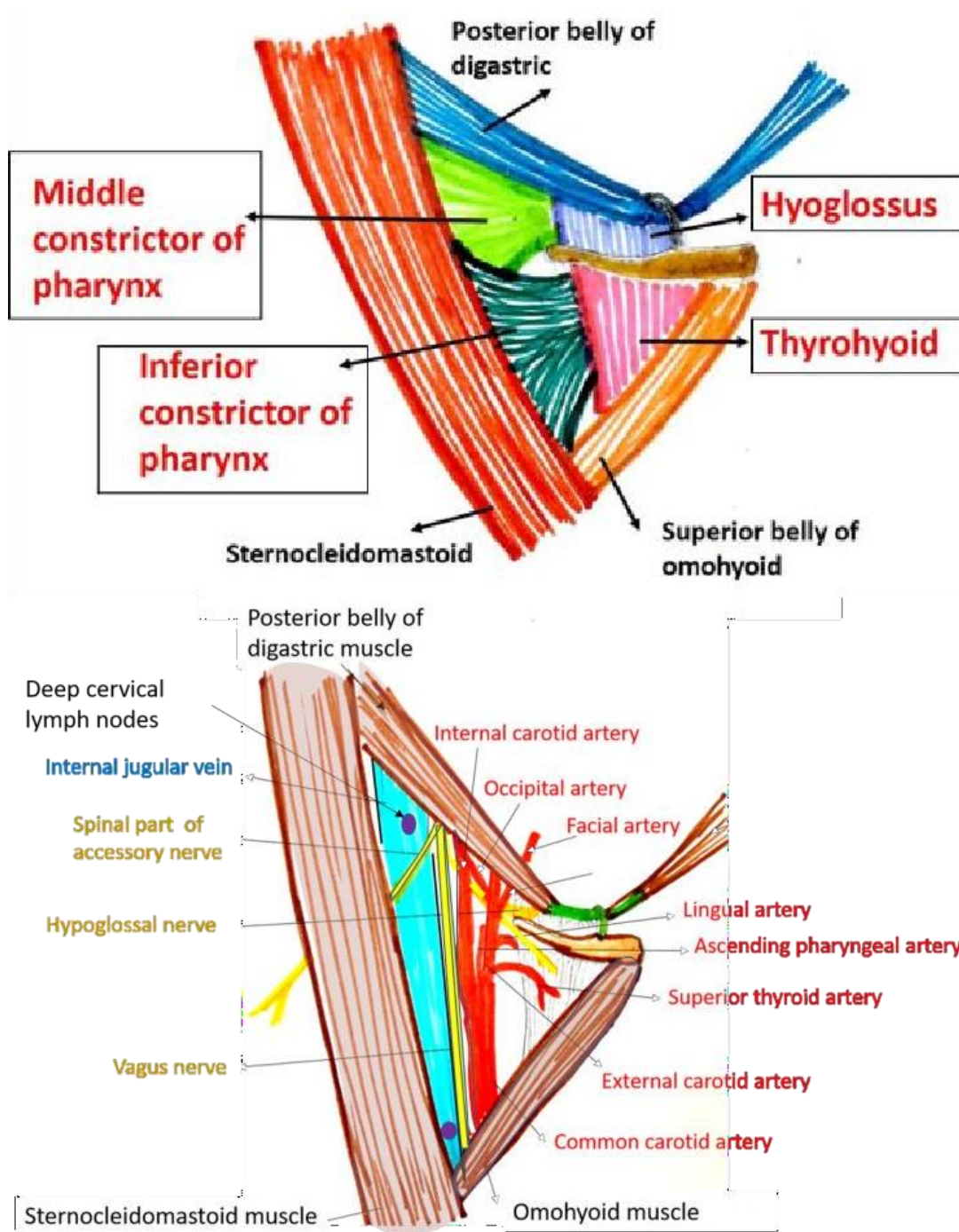
- Hyoglossus muscle.
- Thyrohyoid muscle.
- Middle constrictor muscle of pharynx.
- Inferior constrictor muscle of pharynx.

**The Roof** is made of the:

- Skin.
- Superficial fascia which contains platysma and transverse cervical nerve.
- Investing layer of deep cervical fascia (**Table 2**).

**Table (2): The contents of the carotid triangle.**

Arteries	Veins	Nerves	Structures
Common carotid(with carotid body)	Internal jugular	Vagus	Larynx (small)
Internal carotid	Common facial	External laryngeal	Thyroid
External carotid	Lingual	Internal laryngeal	(small portion)
Superior thyroid (with superior laryngeal branch)	Superior thyroid	Spinal accessory (CNXI)	Carotid sheath
Facial	Middle thyroid	(small portion)	
Lingual		Hypoglossal (CNXII)	
Ascending pharyngeal		Ansacervicalis(superior limb)	
Occipital		Sympathetic trunk	



**Figure 4: Boundaries and contents of the carotid triangles**



## ✚ Muscular triangle

### Borders of the muscular triangle (Figure 5):

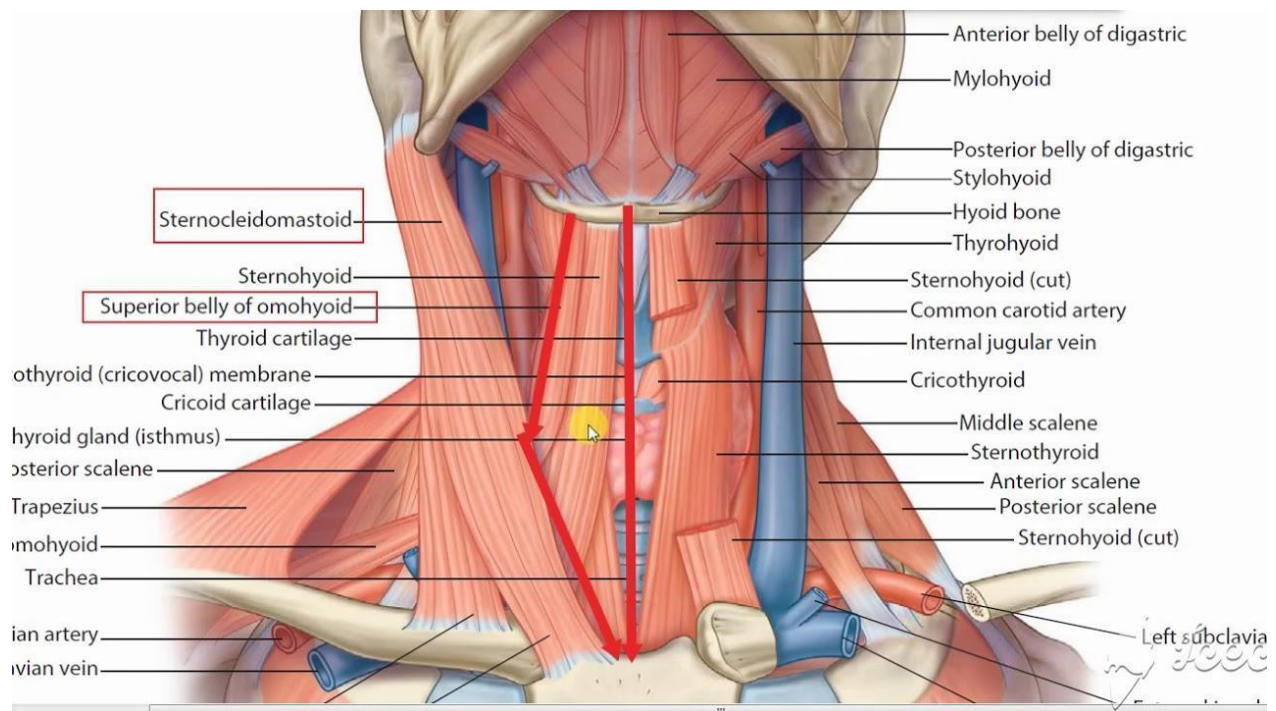
- **Inferiorly:** Anterior border of the sternocleidomastoid.
- **Superiorly:** Superior belly of omohyoid.
- **Anteriorly:** Midline.
- 

### ✚ Floor of the triangle is composed of the:

- Sternohyoid muscle.
- Sternothyroid muscle.
- Thyrohyoid muscle.

### ✚ Roof of the triangle is made of the:

- Skin.
- Superficial fascia with platysma.
- Deep cervical fascia **Table (3)**.



**Figure 5: Boundaries and contents of the muscular triangle**



**Table (3): The contents of the muscular triangle**

Arteries	Veins	Nerves	Structures
Superior thyroid	Anterior jugular Inferior thyroid	Ansa cervicalis	Larynx (small portion) Thyroid (Small portion)

### **Posterior Triangle**

Borders of the posterior triangle (**Figure 6&7**):

- **Anteriorly:** Posterior border of the sternocleidomastoid
- **Inferiorly:** Middle third of the clavicle
- **Posteriorly:** Anterior border of the trapezius

The triangle is subdivided into 2 triangles by the omohyoid muscle:

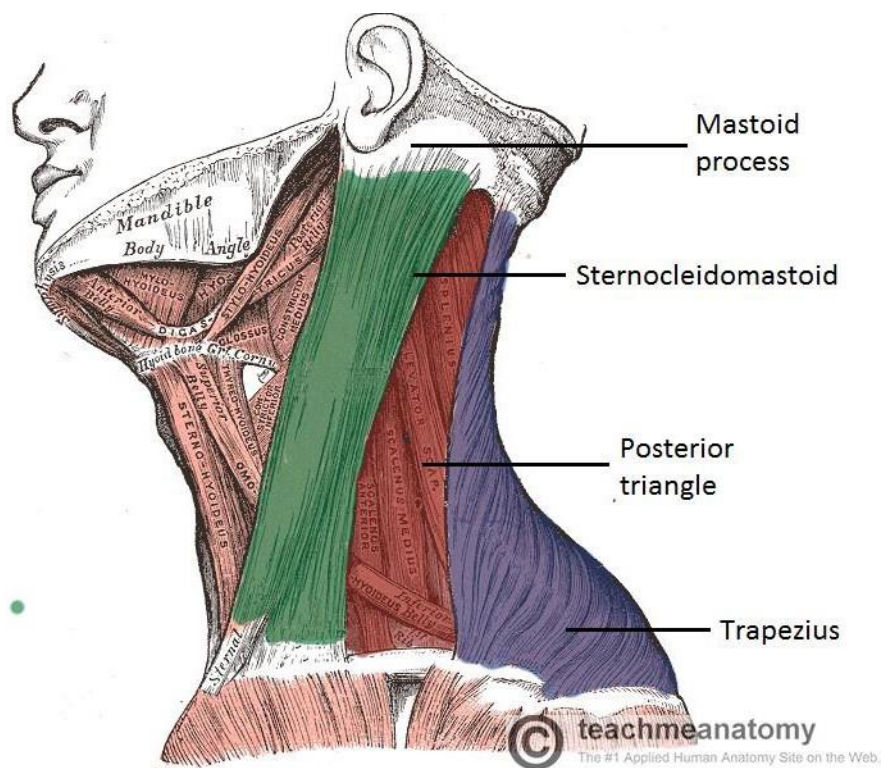
- Omoclavicular (also called the supraclavicular (subclavian) triangle).
- Occipital.

**Roof** of the posterior triangle includes:

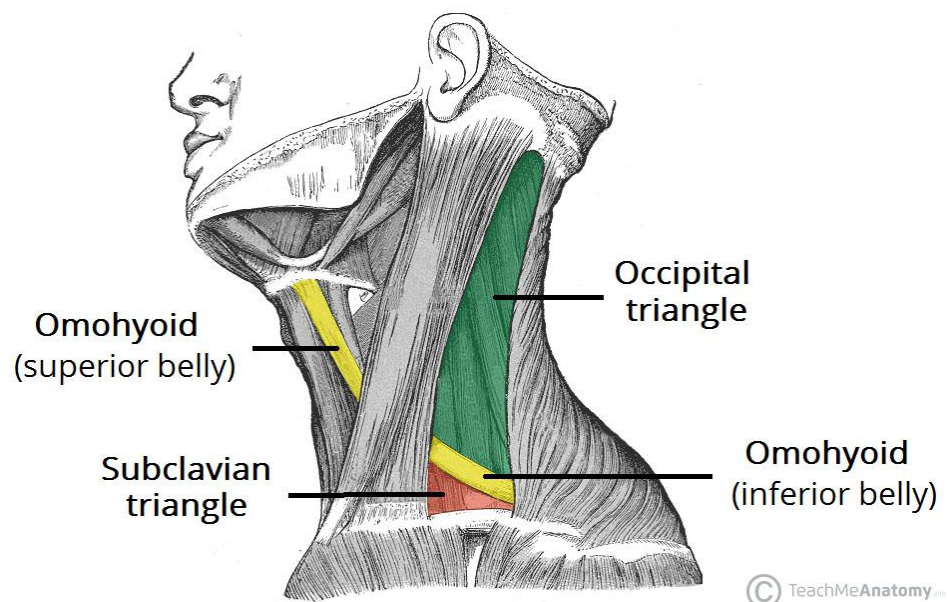
- Skin.
- Superficial fascia with platysma.
- Superficial (investing) layer of deep cervical fascia.

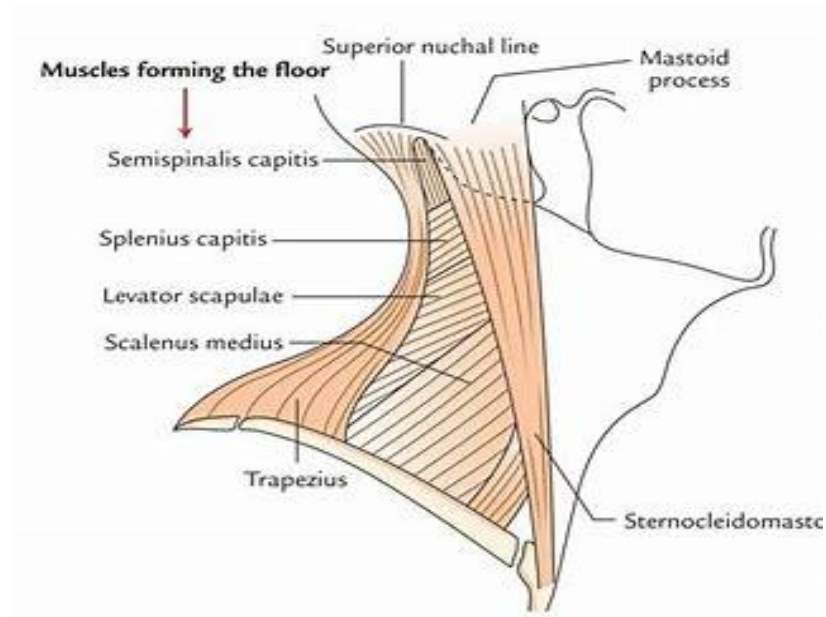
**Floor** of the posterior triangle includes the following muscles:

- Semispinalis capitis.
- Splenius capitis.
- Levator scapulae.
- Posterior scalene.
- Middle scalene.
- Anterior scalene.

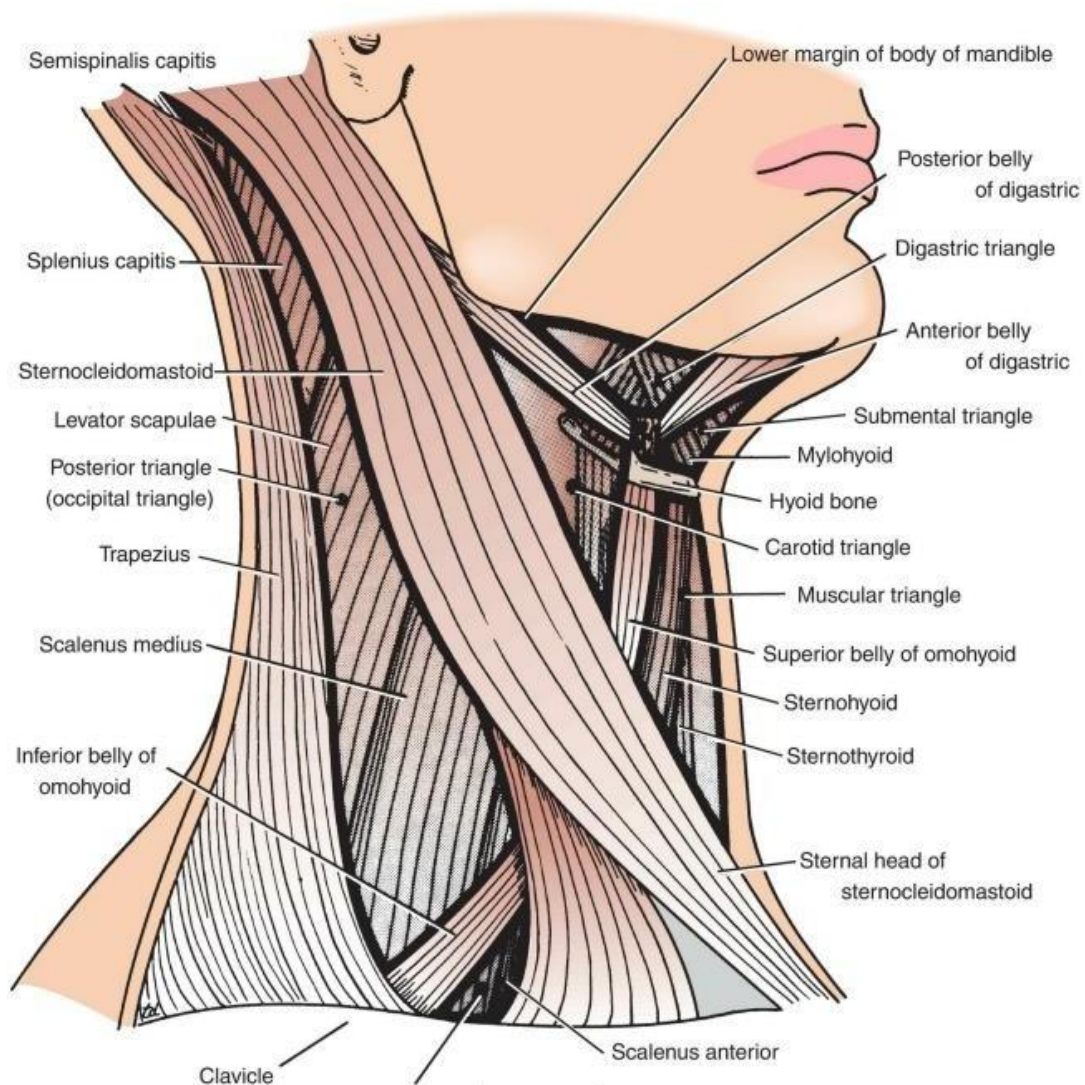


**Figure 6: Boundaries and contents of the posterior triangle.**





**Figure 7: Muscles that form the posterior triangle**



**Figure 8: Anterior and posterior triangles of the neck and the muscles of the neck**

## Neck Muscles

The muscles of the neck are illustrated in (**Figures 6, 7, and 8**). The sternocleidomastoid muscle and the muscles anterior to it, plus the inferior belly of the omohyoid, are elongated bands and are collectively referred to as the strap muscles of the neck. Those superior to the hyoid bone

are the suprahyoid muscles (**anterior and posterior bellies of the digastric, mylohyoid, geniohyoid, genioglossus, stylohyoid**); those inferior are the infrahyoid muscles (omohyoid, sternohyoid, sternothyroid, thyrohyoid). Others are the deep neck muscles (scalenus anterior, scalenus medius, scalenus posterior, longus colli, longus capitis).

## ✚ **Facia of the Neck**

In the neck, these layers of fascia not only act to support internal structures, but also help to **compartmentalize** structures of the neck. There are two fascia in the neck – the **superficial** cervical fascia and the **deep** cervical fascia.

**the various fascial planes determine how infection can extend from the region of the floor of the mouth to the larynx or from the base of the skull into the thoracic cavity.**

## ✚ **Deep Cervical Fascia**

The **deep cervical fascia** lies, as its name suggests, ‘deep’ to the superficial fascia and platysma muscle. This fascia is organised into several layers. These layers act like a **shirt collar**, supporting the structures and vessels of the neck.

**The layers of the deep cervical fascia in more detail (superficial to deep):**

### ❖ **Investing Layer**

The **investing layer** is the most superficial of the deep cervical fascia.

It surrounds all the structures in the neck. Where it meets the **trapezius** and **sternocleidomastoid** muscles, it splits into two, completely surrounding them.

The investing fascia can be thought of as a tube; with superior, inferior, anterior and posterior attachments:

- **Superiorly** – attaches to the external occipital protuberance and the superior nuchal line of the skull.
- **Inferiorly** – attaches to the spine and acromion of the scapula, the clavicle, and the

manubrium of the sternum.

- **Anteriorly** – attaches to the hyoid bone.
- **Posteriorly** – attaches along the nuchal ligament of the vertebral column.

### 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.

### **Thyroid Gland**

#### **Location and Description**

The thyroid gland consists of right and left lobes connected by a narrow isthmus. It is a vascular organ surrounded by a sheath derived from the pretracheal layer of deep fascia. The sheath attaches the gland to the larynx and the trachea. Each lobe is pear shaped, with its apex being directed upward as far as the oblique line on the lamina of the thyroid cartilage; its base lies below at the level of the fourth or fifth tracheal ring.

**The isthmus** extends across the midline in front of the second, third, and fourth tracheal rings.

A pyramidal lobe is often present, and it projects upward from the isthmus, usually to the left of the midline. A fibrous or muscular band frequently connects **the pyramidal lobe** to the hyoid bone; if it is muscular, it is referred to as **the levator glandulae thyroideae (Figure9)**.

#### ❖ **Relations of the Lobes**

**Anterolaterally:** The sternothyroid, the superior belly of the omohyoid, the sternohyoid, and the anterior border of the sternocleidomastoid

**Posterolaterally:** The carotid sheath with the common carotid artery, the internal jugular vein, and the vagus nerve.

**Medially:** The larynx, the trachea, the pharynx, and the esophagus. Associated with these structures are the cricothyroid muscle and its nerve supply, the external laryngeal nerve. In the groove between the esophagus and the trachea is the recurrent laryngeal nerve.



The rounded posterior border of each lobe is related posteriorly to the superior and inferior parathyroid glands and the anastomosis between the superior and inferior thyroid arteries.

❖ **Relations of the Isthmus:**

**Anteriorly:** The sternothyroids, sternohyoids, anterior jugular veins, fascia, and skin

**Posteriorly:** The second, third, and fourth rings of the trachea.

The terminal branches of the superior thyroid arteries anastomose along its upper border.

❖ **Blood Supply**

The **arteries** to the thyroid gland are the superior thyroid artery, the inferior thyroid artery, and sometimes the thyroidea ima. The arteries anastomose profusely with one another over the surface of the gland.

**1. The superior thyroid artery**, a branch of the external carotid artery, descends to the upper pole of each lobe, accompanied by the **external laryngeal nerve**

**2. The inferior thyroid artery**, a branch of the thyrocervical trunk, ascends behind the gland to the level of the cricoid cartilage. It then turns medially and downward to reach the posterior border

of the gland. The **recurrent laryngeal** nerve crosses either in front of or behind the artery, or it may pass between its branches.

**3. The thyroidea ima**, if present, may arise from the brachiocephalic artery or the arch of the aorta. It ascends **in front of the trachea to the isthmus**.

**The veins from the thyroid gland are the following:**

- 1. The superior thyroid**, which drains into the internal jugular vein;
- 2. The middle thyroid**, which drains into the internal jugular vein;
- 3. The inferior thyroid veins** of the two sides anastomose with one another as they descend in front of the trachea. They drain into the left brachiocephalic vein in the thorax.

#### ❖ **Lymph Drainage**

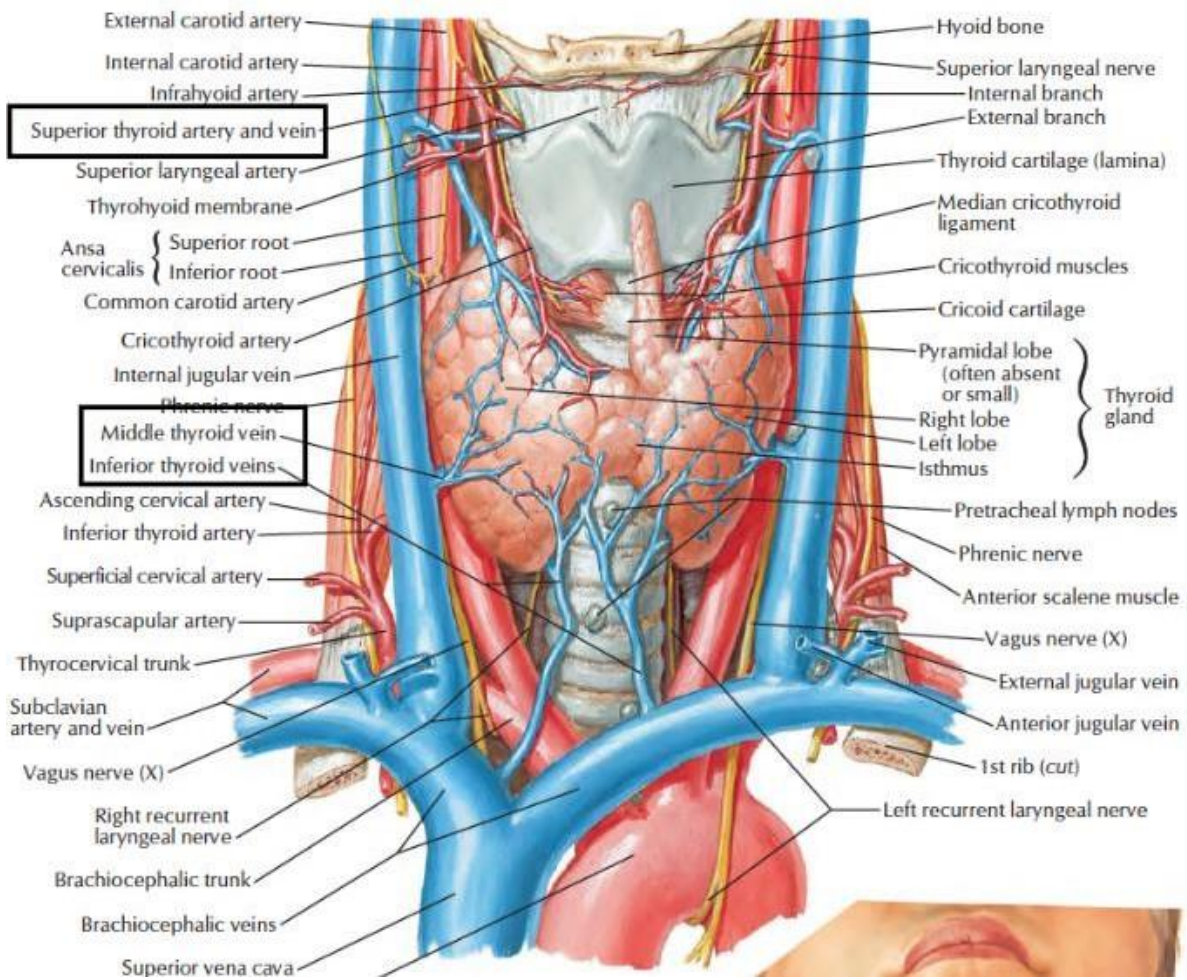
The lymph from the thyroid gland drains mainly laterally into the deep cervical lymph nodes. A few lymph vessels descend to the paratracheal nodes.

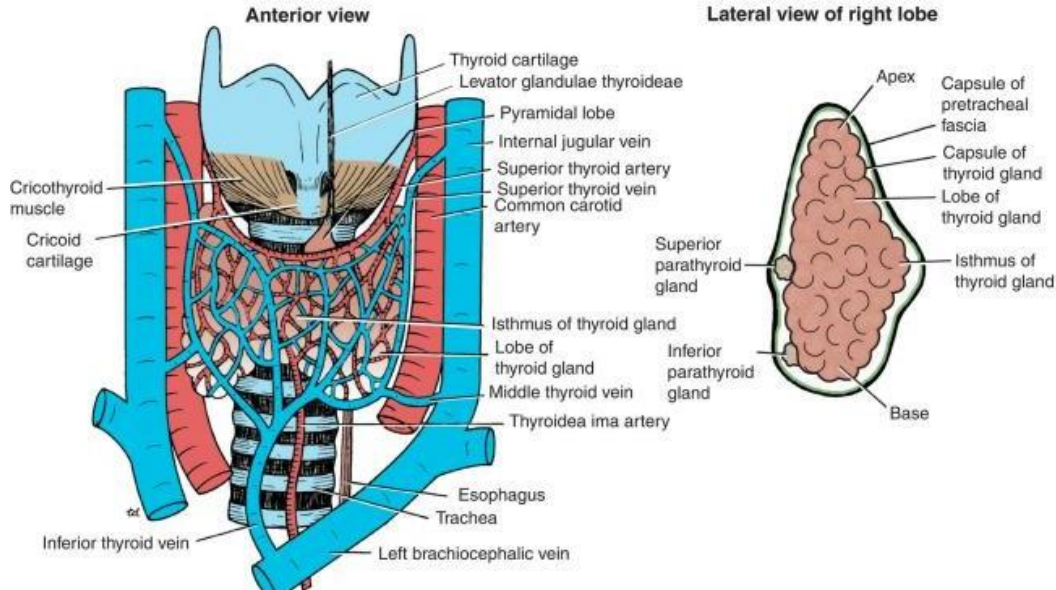
#### ❖ **Nerve Supply**

Superior, middle, and inferior cervical sympathetic ganglia.

### **Functions of the Thyroid Gland**

The thyroid hormones, thyroxine and triiodothyronine, increase the metabolic activity of most cells in the body. The parafollicular cells produce the hormone thyrocalcitonin, which lowers the level of blood calcium.





**Figure 8: The structure and vascular supply of the thyroid gland.**

## Parathyroid Glands

### Location and Description

The parathyroid glands are ovoid bodies measuring about 6 mm long in their greatest diameter. They are four in number and are closely related to the posterior border of the thyroid gland, lying within its fascial capsule.

- **The two superior parathyroid glands** are the more constant in position and lie at the level of the middle of the posterior border of the thyroid gland.
- **The two inferior parathyroid glands** usually lie close to the inferior poles of the thyroid gland. They may lie within the fascial sheath, embedded in the thyroid substance, or outside the fascial sheath. Sometimes, they are found some distance caudal to the thyroid gland, in association with the inferior thyroid veins, or they may even reside in the superior mediastinum in the thorax.

### ❖ Blood Supply

The arterial supply to the parathyroid glands is from the superior and inferior thyroid arteries. The

venous drainage is into the superior, middle, and inferior thyroid veins.

## **Lymph Drainage**

Deep cervical and paratracheal lymph nodes.

## **Nerve Supply**

Superior or middle cervical sympathetic ganglia.

## **Thyroid Gland Swellings and Movement**

The thyroid gland is invested in a sheath derived from the pretracheal fascia.

This tethers the gland to the larynx and the trachea and explains why the thyroid gland follows the movements of the larynx in swallowing. Therefore, any pathologic neck swelling that is part of the thyroid gland will move upward when the patient is asked to swallow.

The close relationship between the trachea and the lobes of the thyroid gland commonly results in pressure on the trachea in patients with pathologic enlargement of the thyroid. Retrosternal Goiter. The attachment of the sternothyroid muscles to the thyroid cartilage effectively limits upward expansion of the gland. There being no limitation to downward expansion, it is not uncommon for a pathologically enlarged thyroid gland to extend downward behind the sternum. A retrosternal goiter (any abnormal enlargement of the thyroid gland) can compress the trachea and cause dangerous dyspnea; it can also cause severe venous compression.

## **Thyroid Arteries and Important Nerves**

The two main arteries supplying the thyroid gland are closely related to important nerves that can be damaged during thyroidectomy operations. The superior thyroid artery on each side is related to the external laryngeal nerve, which supplies the cricothyroid muscle. The terminal branches of the inferior thyroid artery on each side are related to the recurrent laryngeal nerve. Damage to the external laryngeal nerve results in an inability to tense the vocal folds and in hoarseness. See the earlier discussion of the larynx for the results of damage to the recurrent laryngeal nerve. Thyroidectomy and Parathyroid Glands. The parathyroid glands are usually four in number and

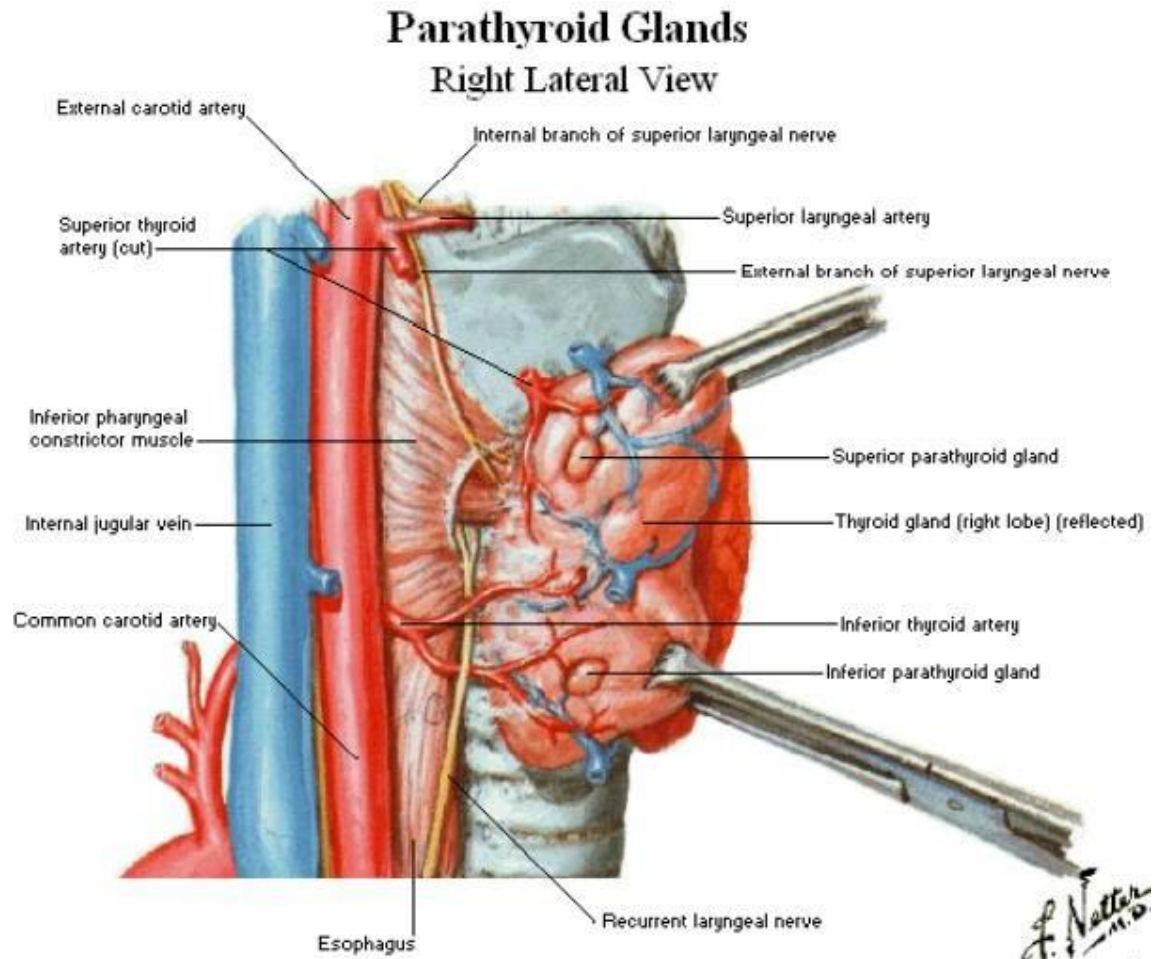


are closely related to the posterior surface of the thyroid gland. In partial thyroidectomy, the posterior part of the thyroid gland is left undisturbed so that the parathyroid glands are not damaged. The development of the inferior parathyroid glands is closely associated with the thymus. For this reason, it is not uncommon for the surgeon to find the inferior parathyroid glands in the superior mediastinum because they have been pulled down into the thorax by the thymus.

## **Functions of the Parathyroid Glands**

The chief cells produce **the parathyroid hormone**, which stimulates osteoclastic activity in bones, thus mobilizing the bone calcium and increasing the calcium levels in the blood. The parathyroid hormone also stimulates the absorption of dietary calcium from the small intestine and the reabsorption of calcium in the proximal convoluted tubules of the kidney. It also strongly

diminishes the reabsorption of phosphate in the proximal convoluted tubules of the kidney. The secretion of the parathyroid hormone is controlled by the calcium levels in the blood (Figure 10).



**Figure 9: Right lateral view of the parathyroid gland**

## **References**

- Snell RS. Clinical Anatomy by Regions. 9th edition. Philadelphia, PA: Lippincott Williams & Wilkins, 2012.
- <https://teachmeanatomy.inf>