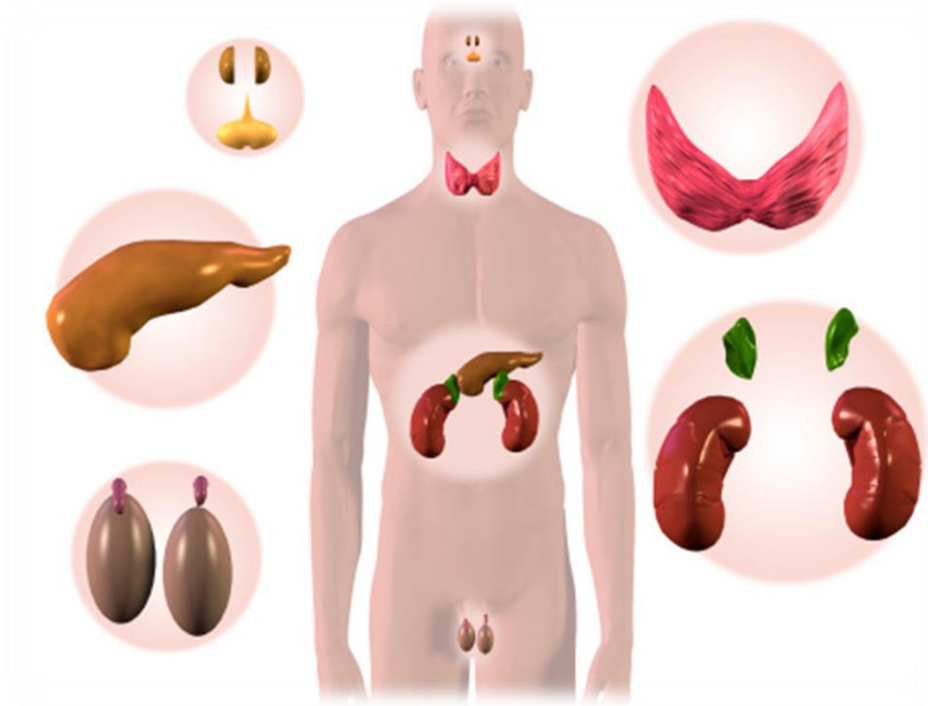




# ENDOCRINE SYSTEM



**LECTURE: THYROID AND PARATHYROID GLANDS**

**DONE BY: FAHAD ALSHAYHAN AND MOHAMMED ALWAHIBI**

**REVIEWED BY: MANAR AL-EID**

[If there is any mistake or suggestions please feel free to contact us:](#)

[Anatomyteam32@gmail.com](mailto:Anatomyteam32@gmail.com)

Both - Black

Male Notes - BLUE

Female Notes - GREEN

Explanation and additional notes - ORANGE

Very Important note - Red



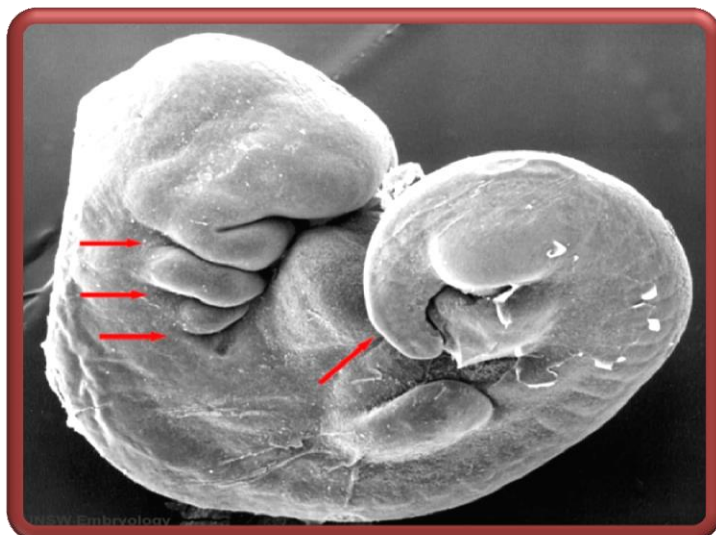
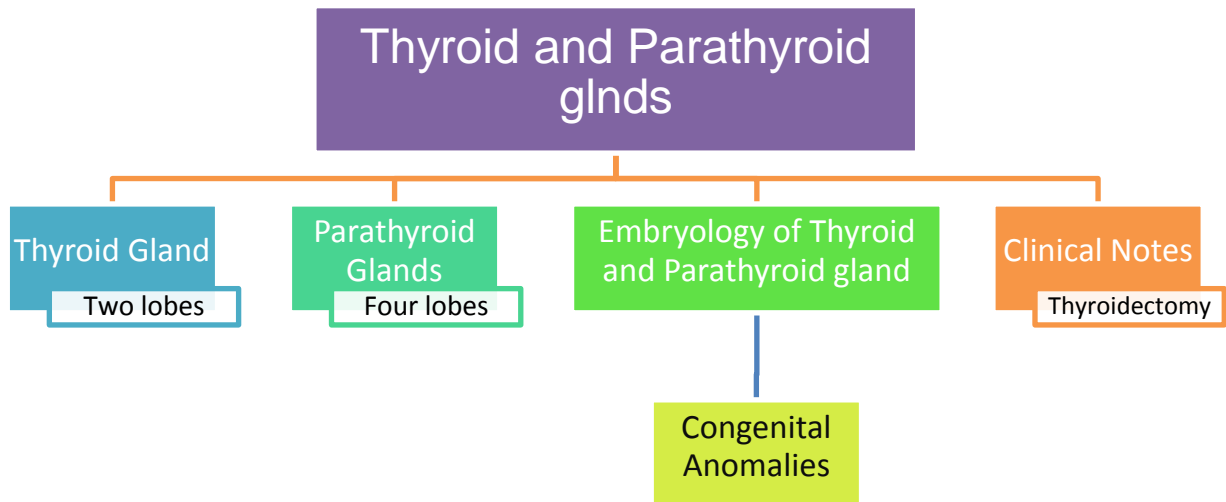
# Objectives:

*By the end of the lecture, you should be able to:*

- Describe the shape, position, relations and structure of the thyroid gland.
- List the blood supply & lymphatic drainage of the thyroid gland.
- List the nerves endanger with thyroidectomy operation.
- Describe the shape, position, blood supply & lymphatic drainage of the parathyroid glands.
- Describe the briefly development of the thyroid & parathyroid glands.
- Describe the most common congenital anomalies of the thyroid gland.



# Mind Map:



Click on the picture for amazing video about the Development of Pharyngeal arches

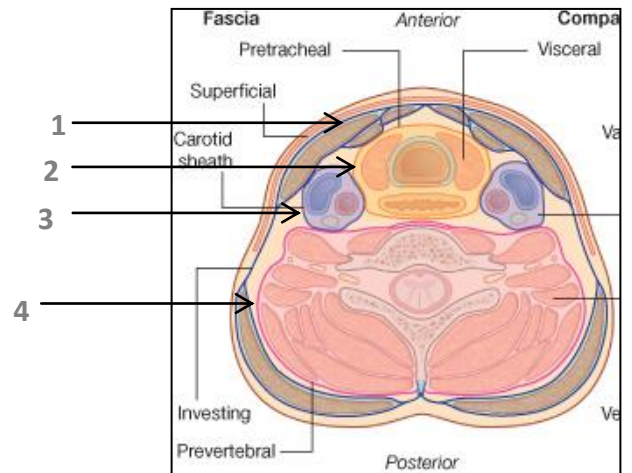


# Thyroid Gland

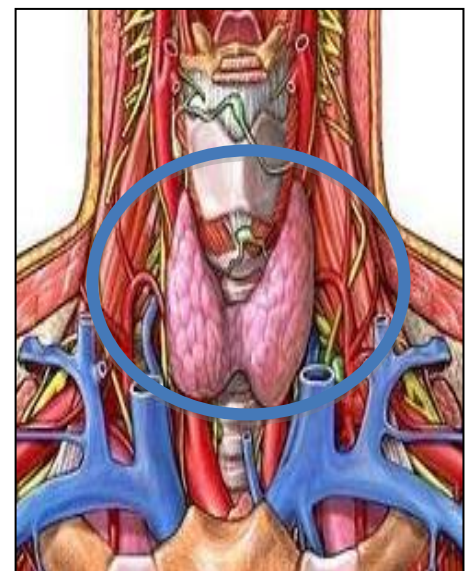
## - Parts of Cervical Fascia:

- 1- Investing layer.
- 2- Pretracheal layer
- 3- Carotid sheath
- 4- Prevertebral layer

\*investing layer at four corners split to enclose trapezius and sternocleidomastoid muscles.



- Endocrine, butterfly shaped gland.
- Consists of right & left lobes.
- The 2 lobes are connected together by a narrow isthmus.
- The isthmus overlies the 2<sup>nd</sup> 3<sup>rd</sup> & 4<sup>th</sup> tracheal rings.
- The gland is surrounded by a facial sheath derived from the **pretracheal layer** of the deep cervical fascia.



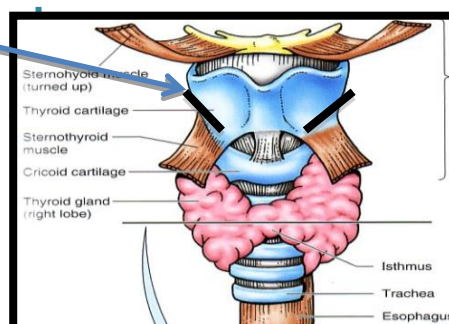
## What is the clinical importance of thyroid gland?

If there is tumor in the neck, simply ask the patient to swallow, if it rises with the gland that means it arises from thyroid gland.

\* Each lobe is pear-shaped, with its apex reaches up to the oblique line\* of the thyroid cartilage.

\*Its base lies at the level of 4<sup>th</sup> or 5<sup>th</sup>

\*Oblique line attached to sternothyroid and thyrohyoid muscles

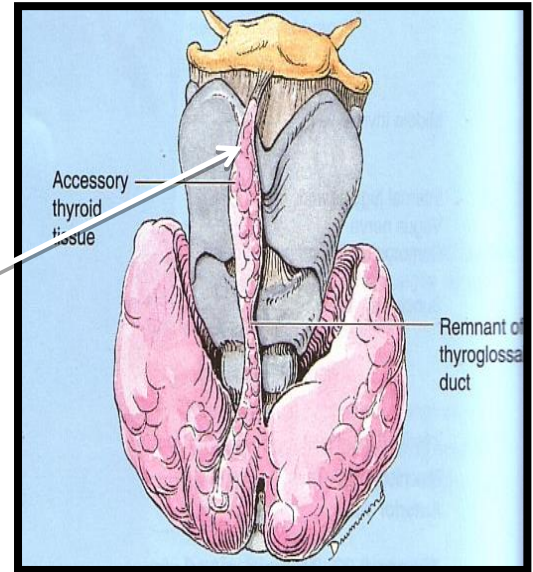


Inside the pretracheal facial sheath, there is facial capsule. So, it is surrounded by 2 membranes.



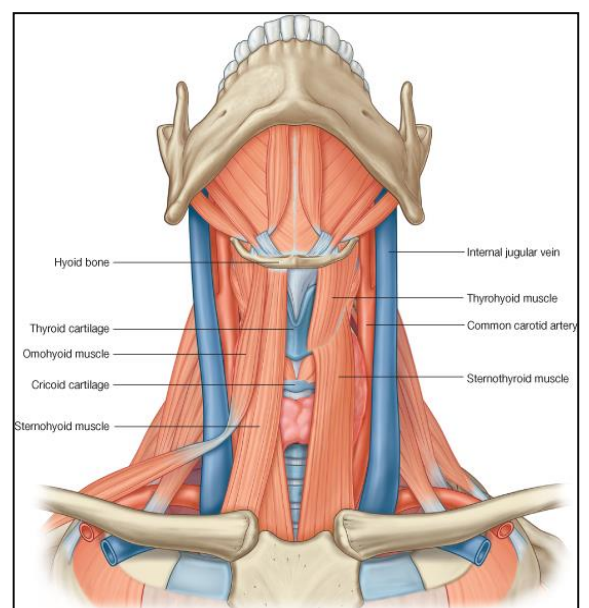
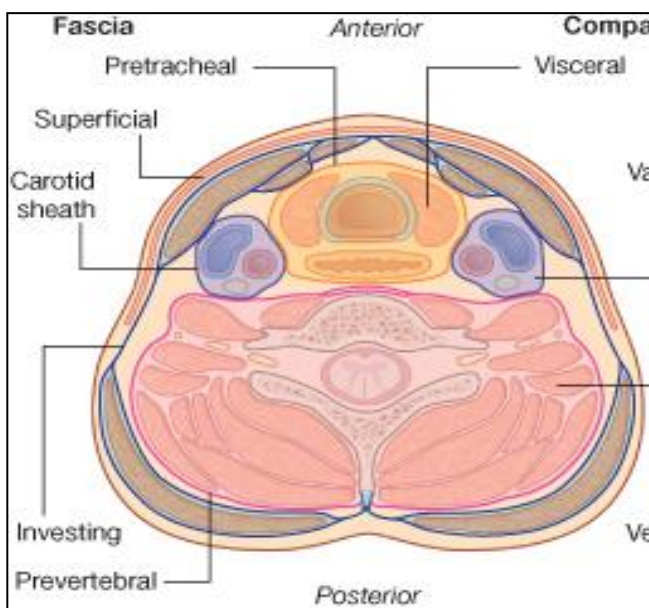
### Third lobe (Pyramidal lobe):

- ✓ Lobe is often present which projects from the upper border of the isthmus slightly to left of middle line.
- ✓ It is connected to the hyoid bone by a fibrous or muscular band called **levator glandulae thyroideae**.
- ✓ This represents the fibrosed & obliterated **thyroglossal duct**.



### Relations of Thyroid Gland

Anterolateral (4 S's)	Posterior	Medial
<ol style="list-style-type: none"> <li>1. Sternohyoid.</li> <li>2. Sternothyroid.</li> <li>3. Superior belly of omohyoid</li> <li>4. Sternomastoid</li> </ol>	<ol style="list-style-type: none"> <li>1. Carotid sheath and its content</li> <li>2. Superior and inferior parathyroid glands</li> <li>3. Anastomosis of superior and inferior thyroid arteries</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Above:</b> Larynx &amp; pharynx</li> <li>2. <b>Below:</b> Trachea &amp; esophagus.</li> <li>3. Recurrent laryngeal nerves in between.</li> <li>4. Cricothyroid muscle</li> <li>5. External laryngeal nerve.</li> </ol>





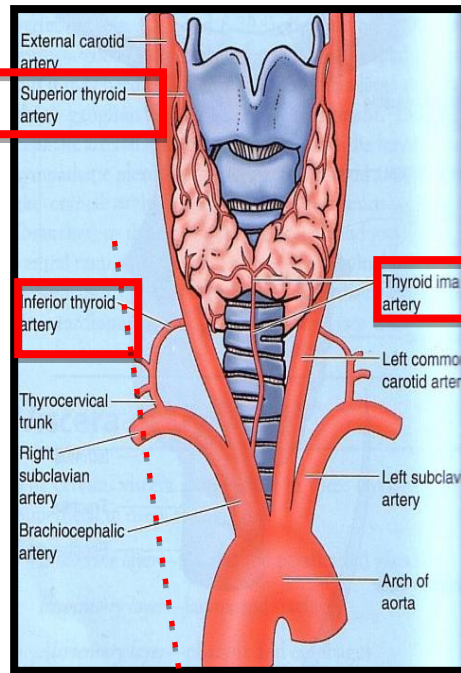


## Blood supply

-It is a branch from the external carotid artery.

-It descends to the upper pole of the lobe, with the **external laryngeal nerve**.  
(Supply cricoid muscle)

-It runs along the upper border of the isthmus to anastomosis with that of the opposite side.



If present, it arises from **aortic arch** or from the **brachiocephalic artery**.

It ascends in front of the trachea to reach the isthmus.

Only found in 3% of people

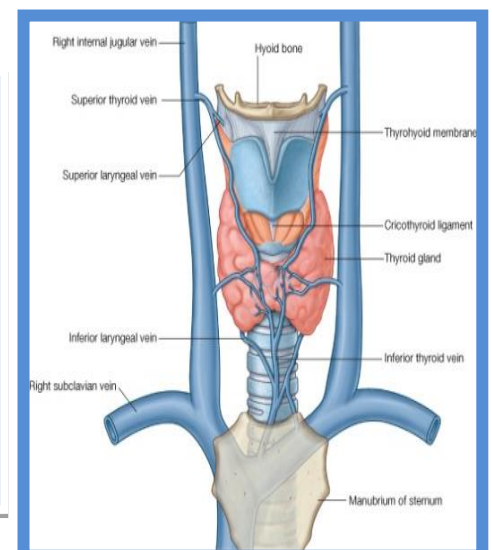
- \* From **thyrocervical trunk** of the 1<sup>st</sup> part of the **subclavian artery**, it ascends behind the gland to the level of the cricoid cartilage.
- \* Then it curves medially behind the carotid sheath. Then it reaches the posterior aspect of the gland & descends downwards.
- \* The **recurrent laryngeal nerve** crosses either in front or behind it.!

### • Venous supply:

- 1- Superior thyroid vein from internal jugular vein.
- 2- Middle thyroid vein from internal jugular vein.
- 3- Inferior thyroid vein from left brachiocephalic vein.

### • Lymph drainage :

- Deep cervical and paratracheal lymph nodes.





## Parathyroid Glands

### parathyroid

Four small ovoid bodies, about 6 mm long. They lie within the facial capsule of the gland, (between the 2 membranes).

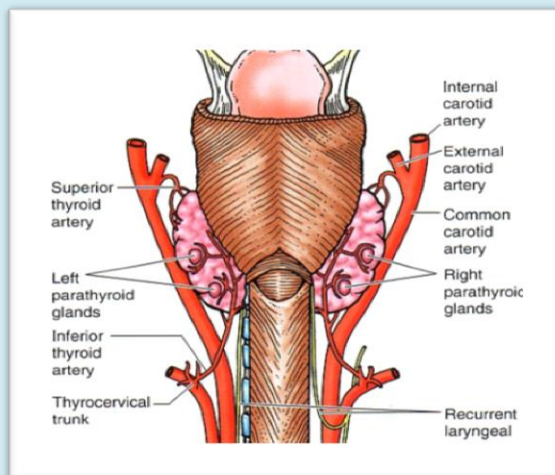
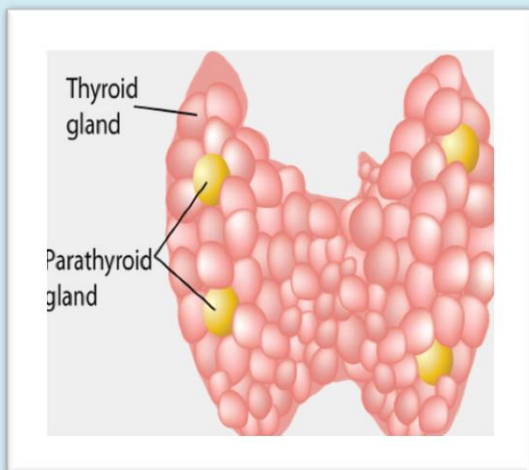
- \* **2 superior** parathyroid has a constant position at the **middle of the posterior border of the gland.**
- \* **2 inferior** parathyroid usually at the level of the inferior pole.
- \* They lie within the thyroid tissue or sometimes outside the facial capsule.

### supply Blood

They are supplied by **superior and inferior thyroid arteries.**

Their veins are drained to **superior, middle and inferior thyroid veins.**

- **Lymph nodes:**  
Deep cervical & paratracheal lymph nodes.
- **Nerve supply:**  
Superior & middle cervical sympathetic ganglia.





# Embryology

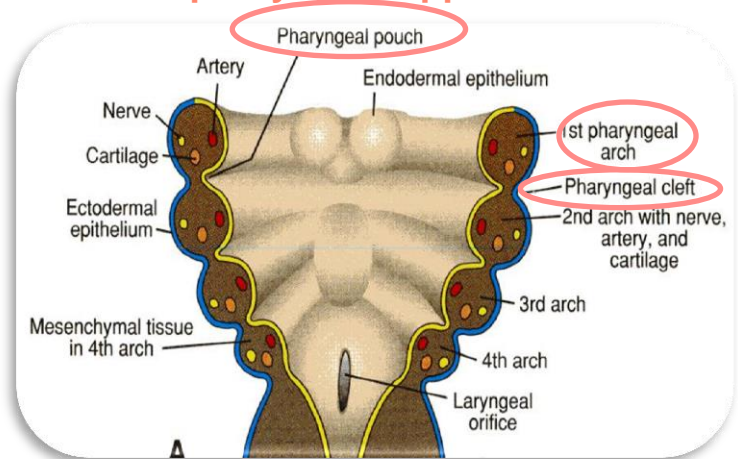
## DEVELOPMENT OF THYROID GLAND

### Pharyngeal Apparatus

The head & neck region develops from the **pharyngeal apparatus**.

It is formed of:

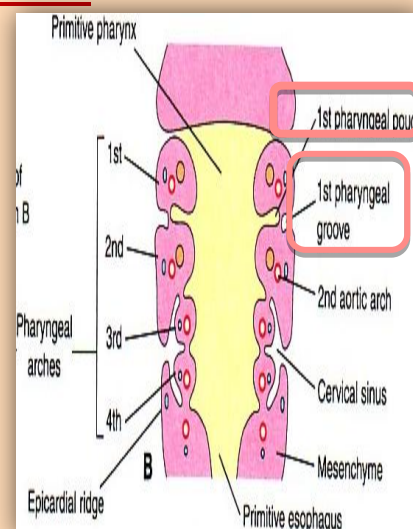
- 1- Pharyngeal arches
- 2- Pharyngeal pouches.
- 3- Pharyngeal clefts or grooves.
- 4- Pharyngeal membranes.



The mesoderm in the head & neck regions divided into **sex cubical masses called the 6 pharyngeal or branchial arches**.

Each arch is formed of a Core of mesoderm, covered by **ectoderm** and the space between 2 arches from outside is called **cleft or groove**.

Each arch is lined from inside by **endoderm** and the space between the 2 arches from inside is called **pouch**.







## Thyroid Primordium

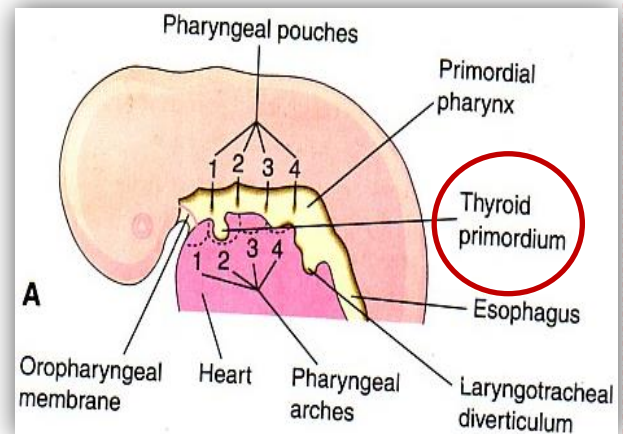
By the **24th** day after fertilization, the **thyroid gland begins to develop.**

It is the first endocrine gland to develop.

It develops from the endoderm

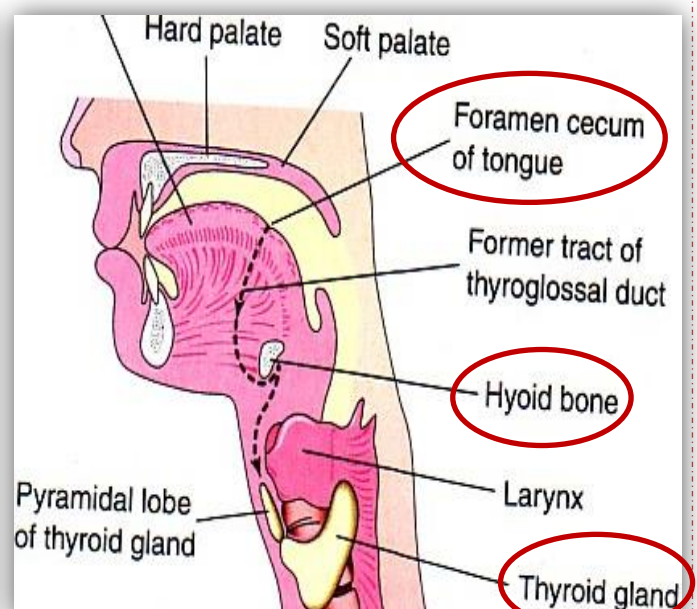
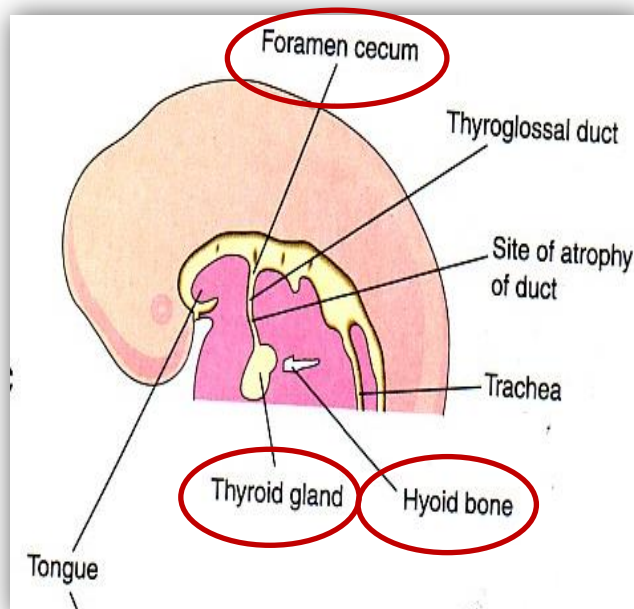
of the floor of the primitive pharynx, **at the junction of the anterior 2/3rd & posterior 1/3rd of the tongue (foramen cecum).**

It develops from the **(Thyroid primordium).**



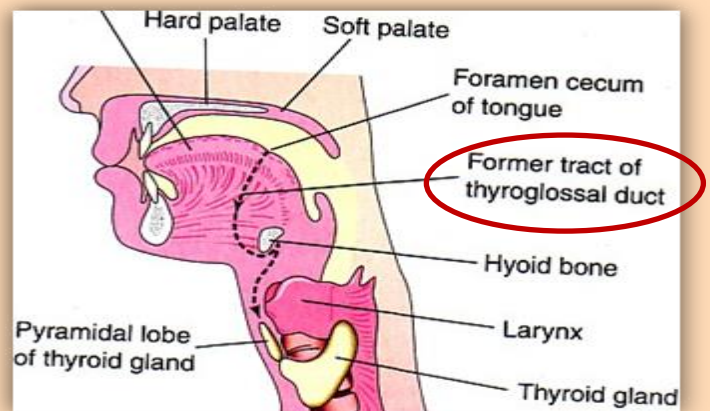
As the tongue grows, the developing thyroid gland descends downward in the neck.

It descends anterior to the developing hyoid bone & laryngeal cartilages.





-The thyroid is connected to the developing tongue by a **narrow tube**, called the **thyroglossal duct**. At first the thyroid primordium is hollow, but soon it becomes solid & divided into 2 lobes and an isthmus.



-By **7th week (50th day)** the gland takes its final shape & position, and the thyroglossal duct begins fibrosis and degeneration.

The upper end of the duct persists in the dorsum of the tongue as the foramen cecum.

The distal part of the duct may persist in 50% of people to form the pyramidal lobe.

The pyramidal lobe may be attached to the hyoid bone by fibrous or smooth muscle called **Levator glandulae thyroidae**



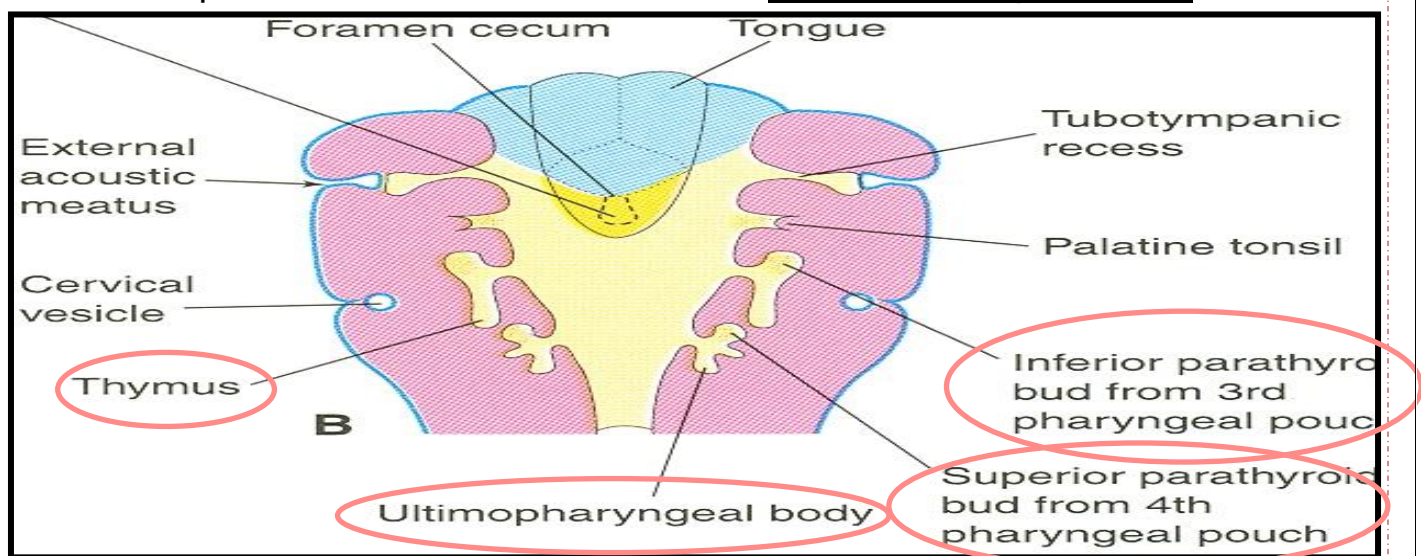


## DEVELOPMENT OF THE PARATHYROIDS

Each of the 3<sup>rd</sup> & 4<sup>th</sup> pharyngeal pouch develops into dorsal and ventral parts.

By the sixth week the Dorsal part of the 3<sup>rd</sup> pouch develops into inferior parathyroid bud, while the dorsal part of the 4<sup>th</sup> pouch develops into the superior parathyroid bud.

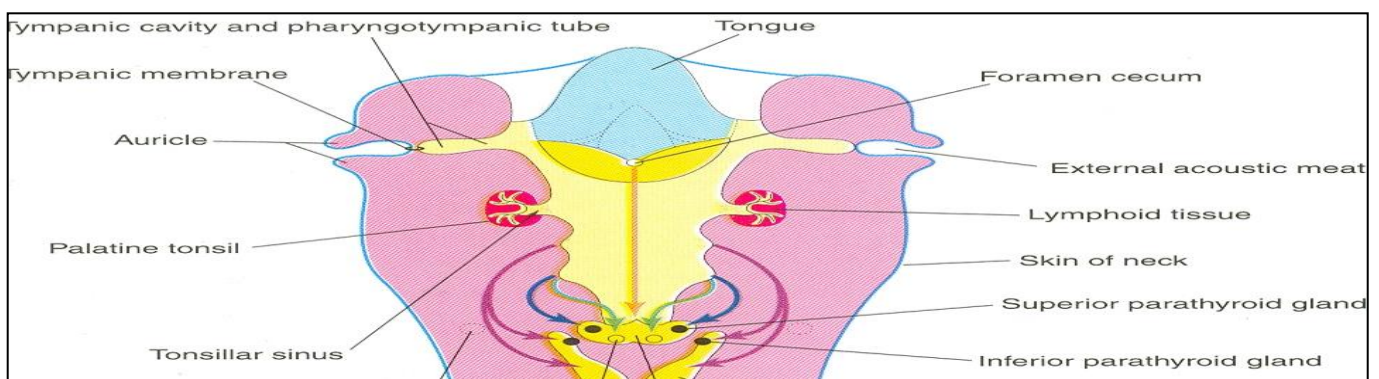
The ventral part of 3<sup>rd</sup> pouch gives the **primordium** of the **Thymus gland** while the ventral part of the 4<sup>th</sup> forms what is called Ultimopharyngeal body.



As the **thymus primordium develops**, it descends downward to the thorax, behind the sternum in superior mediastinum,

So, it draws the inferior parathyroid bud to a lower level than the superior parathyroid.

Both parathyroid glands lie behind the thyroid gland.

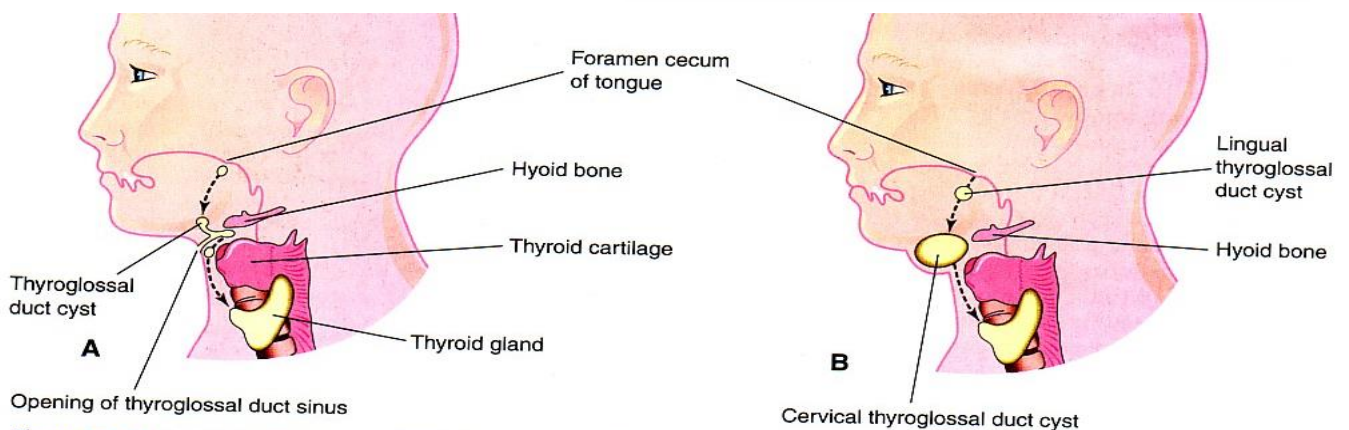
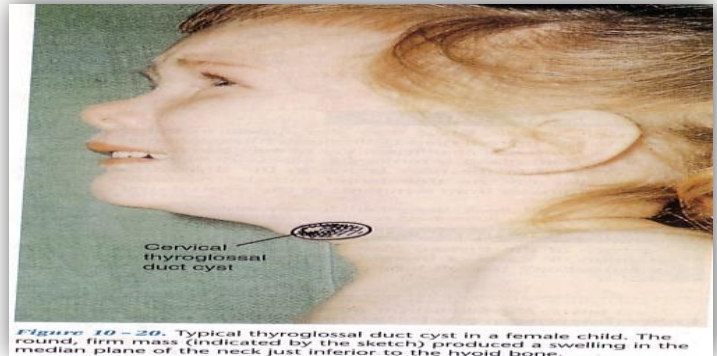






## Congenital Anomalies

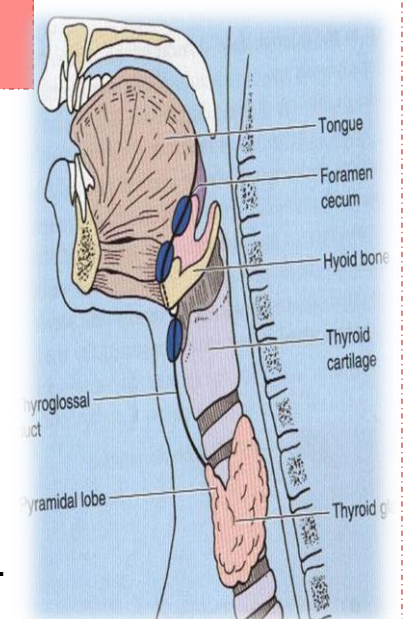
- 1) Agenesis of the thyroid gland.
- 2) Congenital Hypothyroidism.
- 3) Persistence of thyroglossal duct.
- 4) Thyroglossal cyst.
- 5) Ectopic thyroid gland.
- 6) Accessory thyroid tissue.



**Figure 10-19.** A, Sketch of the head and neck showing the possible locations of thyroglossal duct cysts. A thyroglossal duct sinus is also illustrated. The broken line indicates the course taken by the thyroglossal duct during descent of the developing thyroid gland from the foramen cecum to its final position in the anterior part of the neck. B, Similar sketch illustrating lingual and cervical thyroglossal duct cysts. Most thyroglossal duct cysts are located just inferior to the hyoid bone.

## Ectopic Thyroid tissue

- ✘ The thyroid glands develops high up close to foramen cecum of the developing tongue.
- ✘ Then it descends along the thyroglossal duct to reach its final position by the 7<sup>th</sup> week.
- ✘ Descent of the thyroid could be arrested at any point, or extends down behind the sternum in the thorax.







## Clinical notes

The **external laryngeal nerve** runs close to the **superior thyroid artery** before turning medially to supply the cricothyroid muscle. High ligation of the superior thyroid artery during thyroidectomy places this nerve at risk of injury, **so it should be ligated within the upper pole of the gland. Its lesion will cause hoarseness of voice.**

The **inferior thyroid artery is closely associated with the recurrent laryngeal nerve.** This nerve can be found, in a triangle bounded laterally by the common carotid artery, medially by the trachea, and superiorly by the thyroid lobe. The relationship of the recurrent laryngeal nerve and the inferior thyroid artery is highly variable in that the nerve can lie deep or superficial to the artery, or between the branches of the artery, and be different on either side of the neck.

Consideration of this nerve and its branches must be given during thyroidectomy.

**NB. RLN lesion may results in impaired breathing & speech**



# Summary

## Anatomy:

- 1) Thyroid gland consists of 2 lobes connected to each other by a narrow isthmus, which overlies the **2nd 3rd & 4th** tracheal rings.
- 2) Pyramidal lobe is connected to hyoid bone by a fibrous or muscular band called **levator glandulae thyroideae**.

### 3) Relations:

Anterolaterally: (4 S).

1. Sternothyroid.
2. Sternohyoid.
3. Superior belly of omohyoid
4. Sternomastoid.

Posteriorly: Carotid sheath

Medially: Larynx, pharynx ,Trachea and esophagus.

### 4) Arterial supply:

1-Superior thyroid a: It is a branch from **the external carotid** runs along with **external laryngeal nerve**.

2- Thyroidea ima artery: from aortic arch or from brachiocephalic artery.

3-Inferior thyroid artery

From the **thyrocervical trunk** of 1<sup>st</sup> part of subclavian artery runs along the **recurrent laryngeal nerve**.

5) Venous drainage: Superior middle and inferior thyroid veins.

6) Lymphatic drainage: Deep cervical & paratracheal lymph nodes.

### 7) Parathyroid glands :

**2 superior parathyroid** >> at the middle of the posterior border of the gland.

**2 inferior parathyroid** >> usually at the level of the inferior pole.

**Parathyroid glands have the same arterial, venous supply and lymphatic drainage as Thyroid gland.**



### Embryology :

- 1) Thyroid gland is **the first** endocrine gland to develop By the **24th** day after fertilization.
- 2) It develops from the **endoderm** of the floor of the **primitive pharynx**.
- 3) The thyroid is connected to the developing tongue by a narrow tube, called the **thyroglossal duct**.
- 4) By **7th** week (50<sup>th</sup> day) the gland takes its final shape & position, and the thyroglossal duct begins to fibroses and degenerates.
- 5) Thyroglossal duct :
  - Its **upper end** of duct persists in the dorsum of the tongue as **the foramen cecum**
  - The **distal part** of the duct may persists in 50% of people **to form the pyramidal lobe**



## Questions:

**1. Which of the following nerves is endangered in ligation of the superior thyroid artery:**

- A. External laryngeal
- B. Recurrent laryngeal.
- C. Internal laryngeal.
- D. Superior laryngeal.

**2. Which of the following structures lies anterior to the thyroid lobe:**

- A. Inferior belly of omohyoid.
- B. Internal jugular vein.
- C. Vagus nerve.
- D. Sternohyoid

**3. Which of the following tracheal cartilage located behind isthmus of thyroid gland:**

- A. 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> tracheal rings
- B. 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> tracheal rings
- C. 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> tracheal rings
- D. 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> tracheal rings

**4. The capsule of the thyroid gland is derived from:**

- a. Prevertebral cervical fascia.
- b. Pretracheal cervical fascia.
- c. Investing cervical fascia.
- d. Carotid sheath.





**5. The lobe of the thyroid gland is related posteriorly to:**

- a. Trachea.
- b. Carotid sheath.
- c. Sternomastoid muscle.
- d. Recurrent laryngeal nerve.

**6. Which muscle is related anterolaterally to the thyroid gland:**

- a. Inferior belly of omohyoid.
- b. Superior belly of digastric.
- c. Thyrohyoid.
- d. Sternothyroid.

**7. The common site of developing the congenital thyrocervical cyst is:**

- a. Superior to the hyoid bone.
- b. Inferior to hyoid bone.
- c. In the thorax.
- d. Sublingual.

**8. Inferior parathyroid gland develops from:**

- a. 1<sup>st</sup> pharyngeal arch.
- b. 2<sup>nd</sup> pharyngeal arch.
- c. 3<sup>rd</sup> pharyngeal pouch.
- d. 4<sup>th</sup> pharyngeal pouch

**9. Superior parathyroid gland develops from:**

- a. 2<sup>nd</sup> pharyngeal pouch.
- b. 3<sup>rd</sup> pharyngeal pouch.
- c. 4<sup>th</sup> pharyngeal pouch.
- d. 4<sup>th</sup> pharyngeal arch.



**10. During thyroidectomy operation, which nerve is damaged in relation with inferior thyroid artery:**

- a. Internal laryngeal.
- b. External laryngeal.
- c. Vagus.
- d. Recurrent laryngeal.

**11. The carotid sheath contains:**

- a. internal jugular vein,internal carotid artery and vagus
- b. Internal jugular vein,common carotid artery and recurrent laryngeal nerve.
- c. internal jugular vein,common carotid artery and vagues
- d. None of the above.

Q	Answers
1	A
2	D
3	B
4	B
5	B
6	D
7	B
8	C
9	C
10	D
11	C

**GOOD LUCK**

**Anatomy Team Leaders:**

**Fahad AlShayhan**

**&**

**Eman AL-Bediea**