



# **Development of the thyroid and parathyroid glands**

**Done By:**

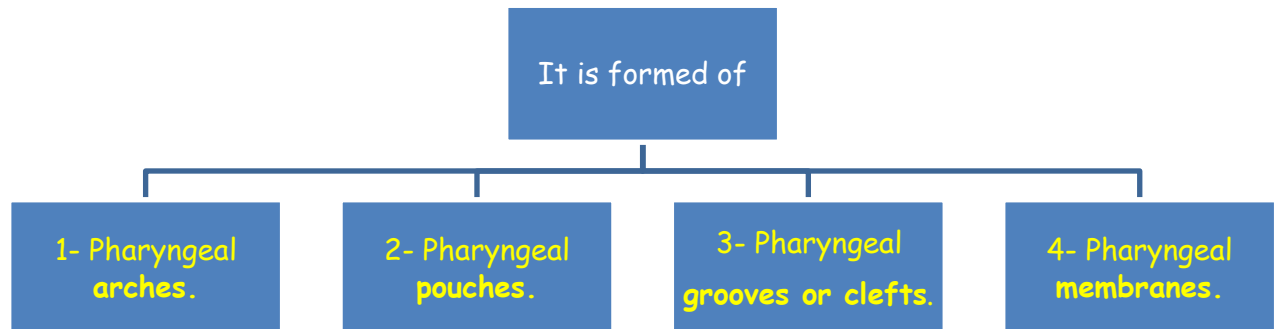
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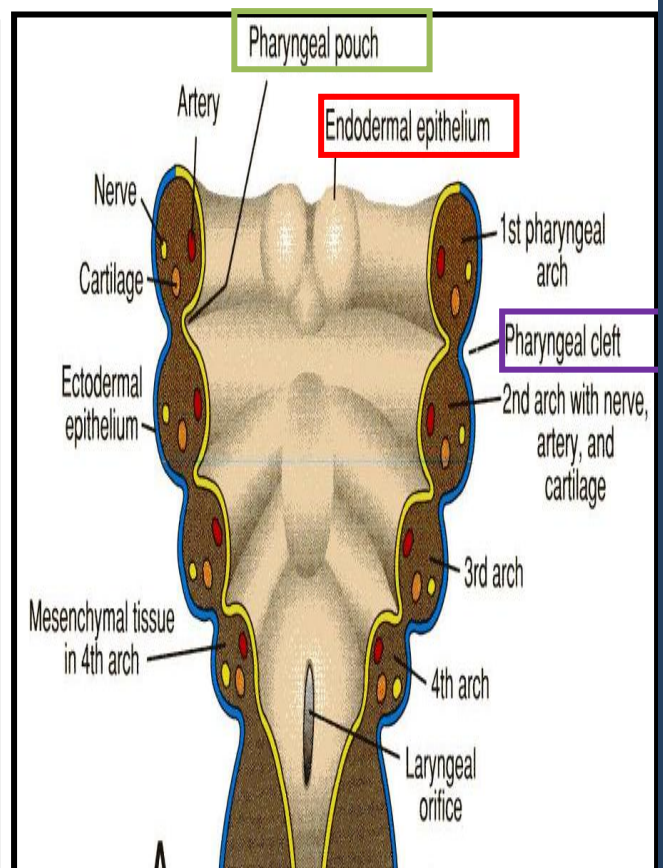
# DEVELOPMENT OF THE THYROID AND PARATHYROID GLANDS

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



## Pharyngeal Apparatus:

- ☒ The mesoderm in the head and neck regions divided into six 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.**
- ☒ By the **24<sup>th</sup> day** after fertilization, the thyroid gland begins its development.
- ☒ It is **the first endocrine gland to develop.**
- ☒ It develops from the **endoderm of the primitive pharynx** from the (Thyroid

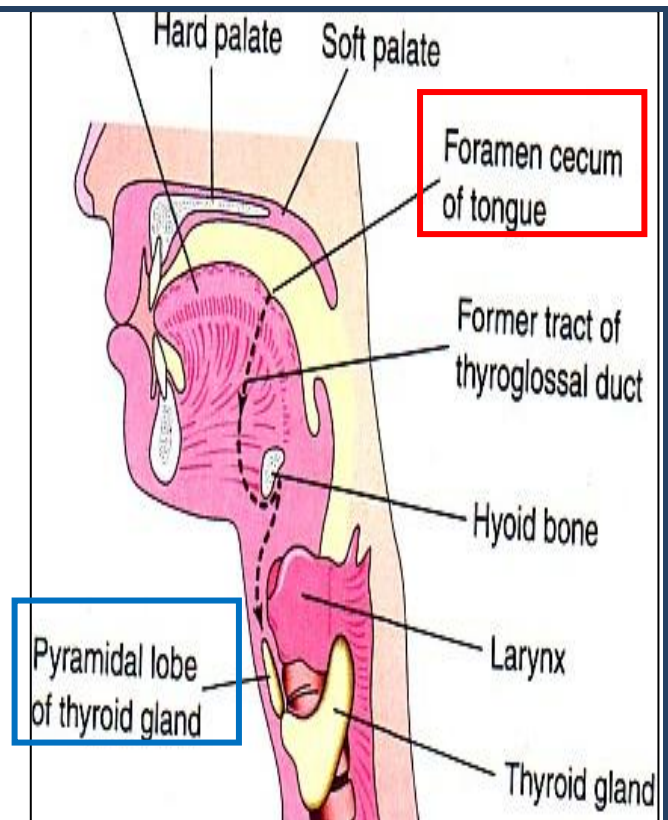


## Development of the thyroid:

The developing thyroid is connected to the developing tongue by a narrow tube called **thyroglossal duct**.

It will descend **anterior** to the developing hyoid bone and laryngeal cartilages.

**By 7th week (50 th day )** the gland takes its final shape & position, and the **thyroglossal duct** fibrosed and degenerates. However, **its upper part** persists in the dorsum of the tongue as **foramen Cecum**, and **its distal part** may persists in **50% of people** to form the **pyramidal lobe**. The pyramidal lobe may be attached to Hyoid bone by fibrous and / or smooth muscle -the **Levator glandulae thyroideae**.

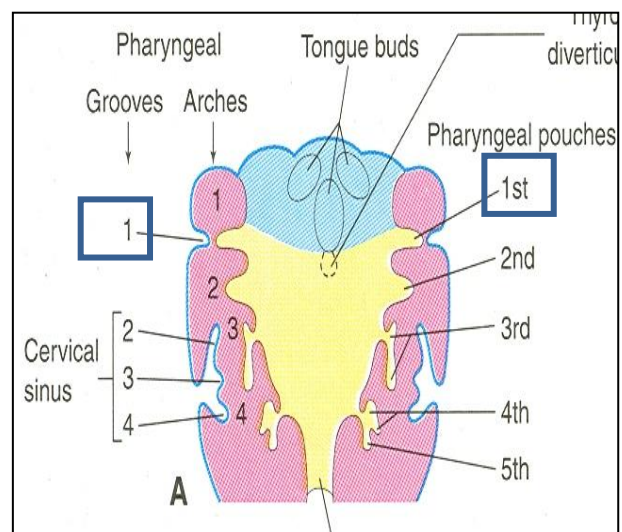


## Congenital Anomalies

- 1- Congenital hypothyroidism.
- 2- Persistence of thyroglossal duct.
- 3- Thyroglossal cyst . ( **usually presents anterior and inferior to the hyoid bone**)
- 4- Ectopic thyroid gland. (Descent of the thyroid could be arrested at any point, or extends down behind the sternum in the thorax)
- 5- Accessory thyroid tissue.
- 6- Agenesis of the thyroid gland.(failure of development)

## Pharyngeal Pouches:

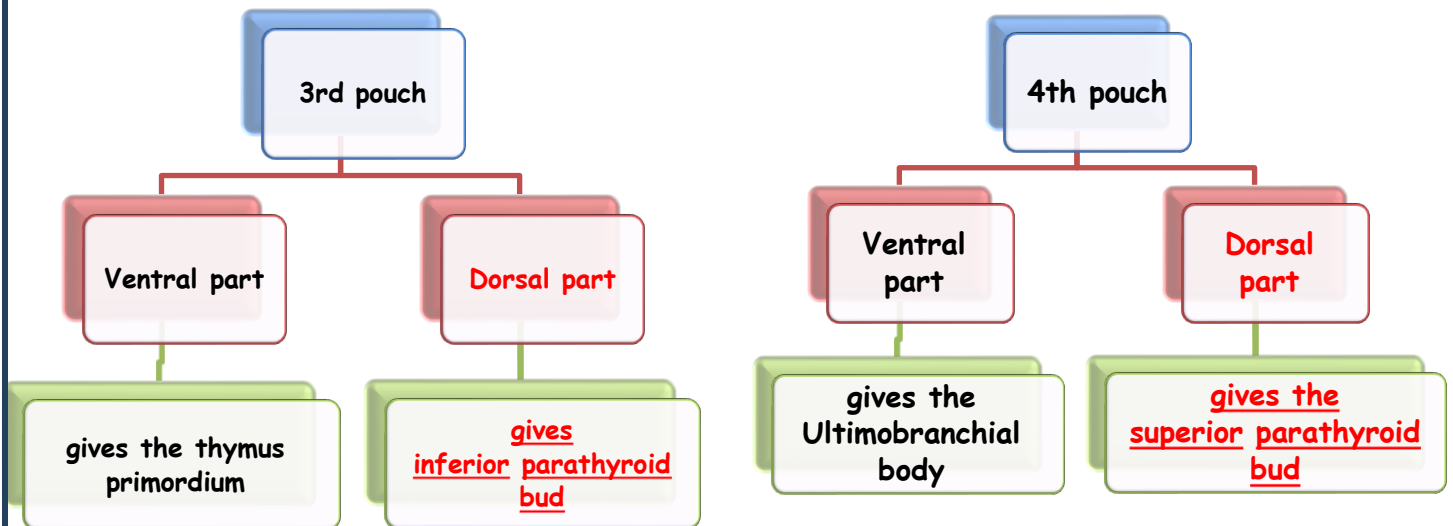
- The pairs of pouches develop in a craniocaudal sequence between the arches.
- The **first pair** of pouches lies between the first and second pharyngeal arches.
- There are four pairs of pharyngeal pouches.
- The fifth pair is absent or rudimentary.



## DEVELOPMENT OF THE PARATHYROIDS

- The **3rd & 4th pharyngeal pouch develops** into dorsal and ventral parts.

By the sixth week:



**Thymus primordium** ~>descends downward to the thorax, behind the sternum in superior mediastinum.

It draws the **inferior parathyroid bud** to a lower level than the superior parathyroid.

**\*\*Both parathyroid glands lie behind the thyroid gland.**

### Clinical Notes

**\*\*The two main arteries** supplying the thyroid gland are closely related to important nerves that may be damaged **during thyroidectomy operations**.

**\*Superior thyroid artery is related** to the **external laryngeal nerve**, which supplies the cricothyroid muscle. Damage to external laryngeal nerve results in an inability to tense the vocal folds and in hoarseness.

**\*Inferior thyroid artery** is 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 to the artery, 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 dissection and thyroidectomy or its lesion may result in impaired breathing & speech.

### **Summary:**

- The head & neck region develops from the **pharyngeal apparatus**
- The thyroid gland begins its development **by the 24<sup>th</sup> day (3<sup>rd</sup> week)**
- The thyroid gland develops from the **endoderm of the primitive pharynx**
- The developing thyroid will descend **anterior** to the developing hyoid bone.
- The gland takes its final shape & position, and the **thyroglossal duct** fibroses and degenerates **by 7th week (50th day)**
- **Ventral part of 3rd pouch** gives the **thymus** primordium
- **dorsal part of the 3rd pouch** gives **inferior parathyroid bud**
- **Ventral part of the 4th pouch** gives **Ultimobranchial body**.
- **dorsal part of the 4th pouch** develops into the **superior parathyroid bud**.
- **Superior thyroid artery** is related to the **external laryngeal nerve**

- **Inferior thyroid artery** is associated with the **recurrent laryngeal nerve**.

## Test yourself

1. **The common site of the developing congenital thyrocervical cyst is :**
  - a. Superior to the hyoid bone.
  - b. Inferior to hyoid bone.
  - c. In the thorax.
  - d. Sublingual.

(B) and anterior

2. **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.

(C)

3. **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.

(C)

4. **During thyroidectomy operation, which nerve is damaged in relation with superior thyroid artery ?**
  - a. Internal laryngeal.
  - b. External laryngeal.
  - c. Vagus.
  - d. Recurrent laryngeal.

(B)

5. During thyroidectomy operation, which nerve is damaged in relation with inferior thyroid artery ?

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

(d)