

Thyroid and Para-thyroid Glands

Objectives:

- Describe the development of the thyroid and parathyroid glands.
- Describe the most common congenital anomalies of the thyroid gland.

Done by:

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- Important
- Extra
- Notes



Pharyngeal Apparatus:



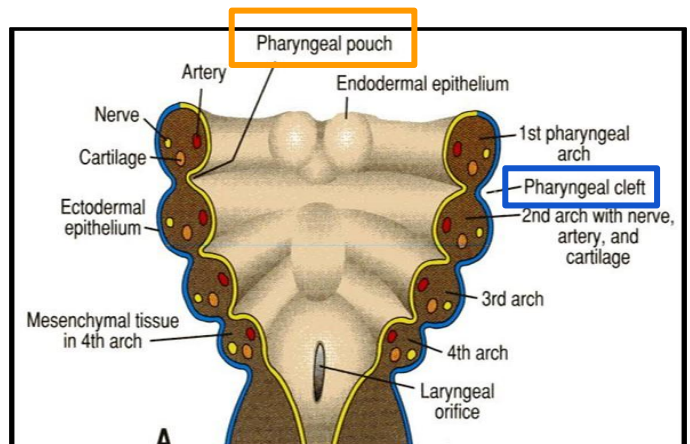
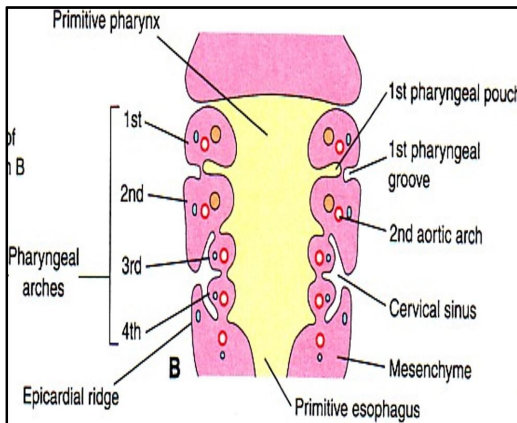
The head and neck region develops from the pharyngeal apparatus.

It is formed of:

- **Pharyngeal arches**
- **Pharyngeal clefts or grooves (externally)**
- **Pharyngeal pouches or membranes (internally).**
- **Pharyngeal membranes.**

The mesoderm in the head and neck regions divided into six cubical masses called the 6 pharyngeal or branchial arches.

- Each arch is formed of a Core of mesoderm, Covered externally 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**.
- **5th arch disappears early without giving any derivative in human embryo.**
- **Meeting of ectoderm and endoderm is called membrane.**

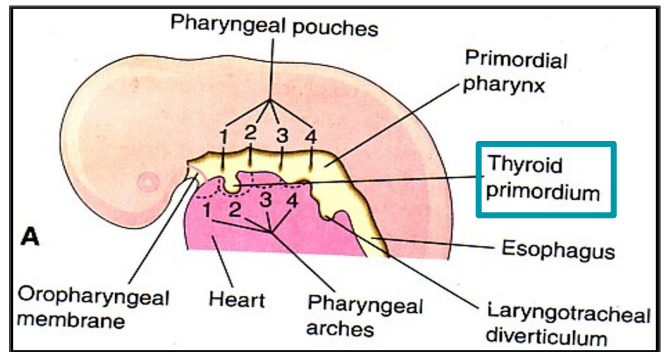
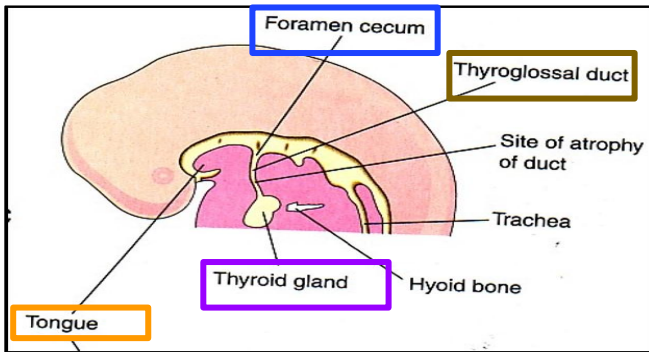


الفرنجيل اباراتس هي اللي بيتكون لي منها مستقبلًا الرأس والرقبة ، و هذي الفرنجيل اباراتس هي امتداد من الفارنكس ... الكافتي حقت الفارنكس من برا مكونة من الإكتوديرم ومن جوا الإندوديرم وبالوسط الميزوديرم ، الميزوديرم هذا ببدا يتقطع من الفارنكس لاتحت ويكون لي ست حلقات مسطحة .. طيب ايش نسميها ؟ الفرنجيل ارش اللي هي واحدة من مكونات الفرنجيل اباراتس .
الإفرنجيل اباراتس هذي لما ناخذ لها قطاع طولي بتبان الفرنجيل ارش على شكل دائرة لها سطحين داخلي وخارجي (اللي مبينة بالصورة دوائر فوق بعض) ، الداخلي يتكون من الإندوديرم والخارجي الإكتوديرم ، التجويف بين الدائرتين (فارنجيل ارش) من ناحية الإندوديرم (الداخلي) نسميه باوتش ، والتجويف بين الدائرتين من ناحية الاكتوديرم (الخارجي) نسميه كفت شوقوا الفيديو إذا ما فهمتوا

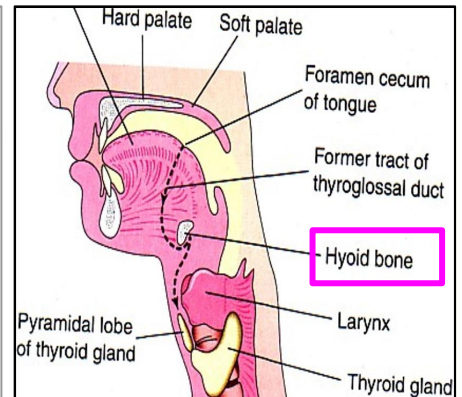
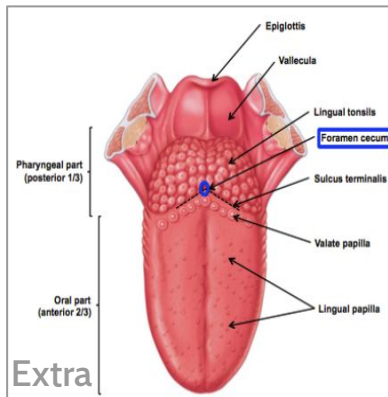
Thyroid Primordium:

Primitive thyroid

- It is the first endocrine gland to develop.
- By the **24th day after fertilization**, the thyroid gland begins its development.
- It develops from the endoderm of the floor of the primitive pharynx , at the junction of the anterior 2/3rd tongue and posterior 1/3rd of the tongue, (**foramen cecum**). (**apex of sulcus terminalis of the tongue**)
- 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 and laryngeal cartilages.**
- The thyroid is connected to the developing tongue by a narrow tube, called the **thyroglossal duct** this duct will give arise **pyramidal lobe**.
- At first, the **thyroid primordium** is hollow, but soon it becomes solid then, it's divided into 2 lobes and an isthmus.

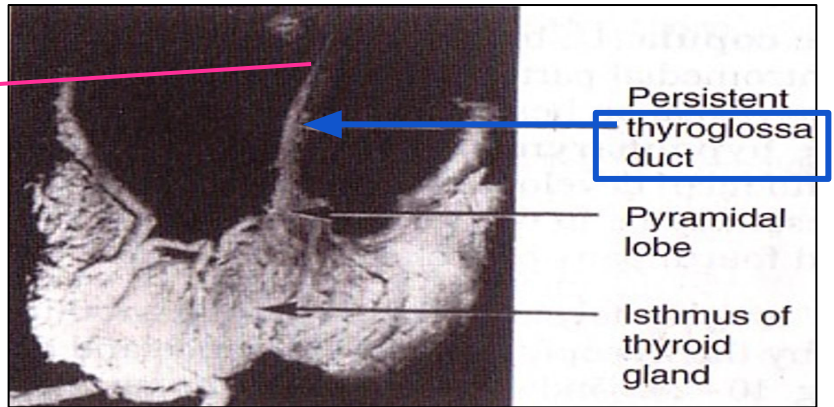
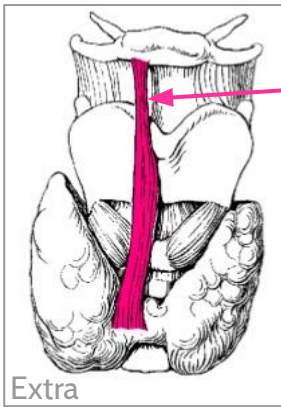


التايرويد قلاند يبدأ تكونها بحاجة نسميها (تايرويد برايمورديم) بمعنى التايرويد البدائية . طيب من وين تتكون هذه البدائية ؟ يبدأ تكونها من الفلور تبع الفارنكس في جنكشن بين 2/3 الأولى وال 1/3 الأخير للسان (الفارنكس واللسان بهذي المرحلة جنب بعض بشكل أفقي ومستقيم) . من هذه الجنكشن برضو يبدأ يطلع لنا حاجة نسميها فورمن سيكم (تشبه الجيب) وتبدأ تنمو بعد كذا لقناة نسميها تايروغلووسال دكت .. من هذه القناة تبدأ تتحرك التايرويد البدائية كل ما ينمو الجنين إلين توصل الرقبة وتكبر إلى التايرويد قلاند



Thyroid Primordium (Cont'd):

- By 7th week (50th day) the gland takes its final shape and position, and the thyroglossal duct begins to fibrosis and degeneration.
- Its upper end of duct persists (remain open) in the dorsum superior surface of the tongue as the foramen cecum which is between anterior $\frac{2}{3}$ and posterior $\frac{1}{3}$. (it was the line of attachment between duct and the tongue)
- The distal part of the duct may persists in 50% of people to form the pyramidal lobe.
- The pyramidal lobe (3rd lobe) may be attached to the hyoid bone by fibrous or smooth muscle called the Levator glandulae thyroideae.



بعد ما وصلت الثايرويد قلاند لمكانها أيش بيكون مصير الثايروكلوسال دكت ؟
أول شيء في المنتصف بيصير فيه فايبروسس وتتقفل
الجزء العلوي بيكون مفتوح وهو الفور من سيكم (اللي كان بداية الدكت)
الجزء السفلي له حالتين /
1. يصير له فايبروسس ويتقفل .. 50% من الناس
2. ما يتقفل ويكون عندي اللوب الثالث من الثايرويد .. 50% من الناس

Congenital Anomalies

1. Thyroglossal duct cyst
2. Ectopic thyroid gland
3. Accessory thyroid tissue
4. Congenital hypothyroidism
5. Agenesis of the thyroid gland (No gland)
6. Persistence of thyroglossal duct

Thyroglossal Cyst:

- A. showing the possible locations of **thyroglossal duct cysts** containing **serous fluid** at the broken line indicating the course of the duct. A thyroglossal duct sinus is illustrated.
- B. illustrating lingual & cervical thyroglossal duct cysts.

Cervical is the most common.

- Most of thyroglossal duct cysts are located just anterior & inferior to **hyoid bone**.

Cysts may form anywhere along the course of the thyroglossal duct. Usually, the thyroglossal duct atrophies and disappears, but a remnant of it may persist and form a cyst in the tongue or in the anterior part of the neck, usually just inferior to the hyoid bone.

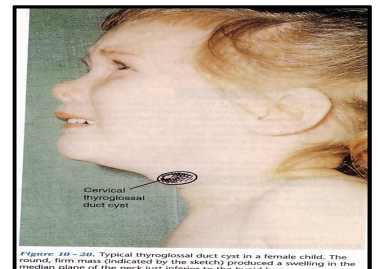
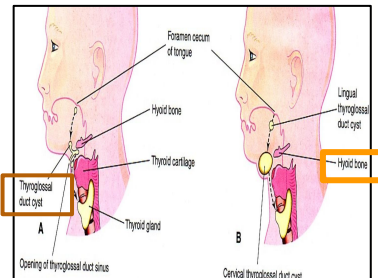
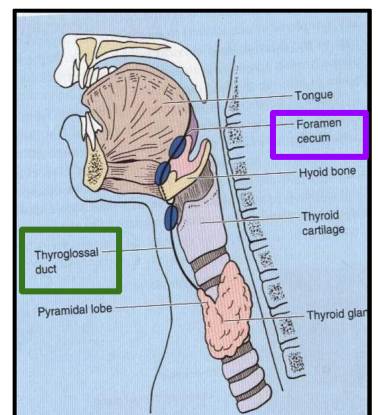


Figure: 16–26. Typical thyroglossal duct cyst in a female child. The rounded, firm mass (indicated by the sketch) produced a swelling in the median plane of the neck just anterior to the hyoid bone.



Ectopic Thyroid Tissue:

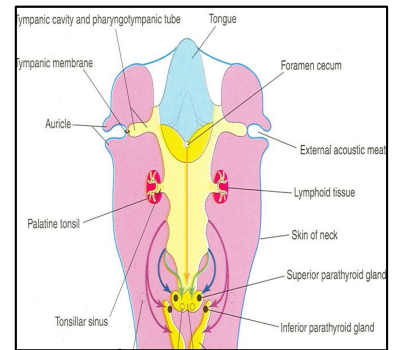
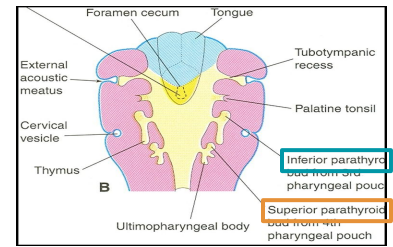
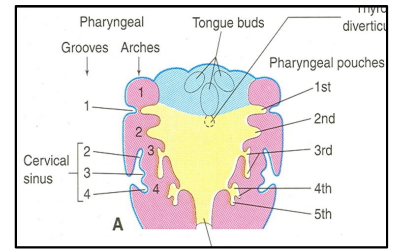
- The thyroid glands develops high up close to **foramen cecum** of the developing tongue.
- Then it descends along the **thyroglossal duct** to reach its final position by the 7th week.
- Ectopic : Descent of the thyroid could be arrested at any point, or extends down behind the sternum in the thorax.



... هنا الثايرويد ما تتكون بمكانها الأصلي
 إما توقف ما تنزل للمكان المطلوب أو تنزل بزيادة عن مكانها المطلوب

Pharyngeal Pouches:

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



Development of parathyroid:

- Each of the 3rd and 4th pharyngeal pouch develops into dorsal and ventral parts.
- By the sixth week (42 days):

أكيد تسألون أنفسكم كيف الإنفيريور جاي فوق والسويريور جاي تحت! الثيمس قلاند وهي نازلة لتحت بتأخذ معها الإنفيريور وتنزلها لتحت وبكذا بصير السويريور فوقه

	Dorsal	Ventral
3rd pouch	develops into inferior parathyroid bud	gives the thymus gland primordium
4th pouch	develops into the superior parathyroid bud	Forms what is called Ultimopharyngeal body . is an embryological structure that gives rise to parafollicular cells of thyroid that secrete calcitonin hormone that lowers the blood calcium level).

- As the thymus primordium develops, it 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.

Summary

24th day after fertilization	➤ The thyroid gland begins its development	
7th week (50th day)	➤ The gland takes its final shape and position. ➤ The thyroglossal duct begins to fibroses and degenerates	
6th week (42th day)	Dorsal 3rd pouch	Inferior parathyroid bud
	Ventral 3rd pouch	Thymus gland primordium
	Dorsal 4th pouch	Superior parathyroid bud
	Ventral 4th pouch	Ultimopharyngeal body.

Useful video :



1. the space between 2 arches from outside is called:				2. each arch is covered externally by:				
A.	pouch			A.	mesoderm			
B.	cleft			B.	endoderm			
C.	nodule			C.	ectoderm			
D.	inter-arch			D.	membrane			
3. When does the thyroid gland takes its final shape & position:				4. "If" the distal part of the thyroid duct persisted this will lead to the formation of:				
A.	day seventy			A.	Levator glandulae thyroidea			
B.	day sixty			B.	Anomaly			
C.	day fifty			C.	Fibroses of duct			
D.	day forty			D.	Pyramidal lobe			
5. Most thyroglossal duct cysts are located in:				6. Arrested descending of the thyroid gland indicates which of the following anomalies:				
A.	Inferiorly to the hyoid			A.	Ectopic thyroid gland.			
B.	Inferiorly to the styloid			B.	Congenital hypothyroidism.			
C.	Superiorly to the styloid			C.	Agenesis of the thyroid gland			
D.	Anteriorly to the styloid			D.	Persistence of thyroglossal duct.			
7. Which part of the pharyngeal pouches forms the inferior parathyroid bud:				8. Development of the parathyroid glands starts in the:				
A.	Dorsal 3rd			A.	Day fifty			
B.	Dorsal 4th			B.	6th week			
C.	Ventral 3rd			C.	Day seventy			
D.	Ventral 4th			D.	4th week			
Q	1	2	3	4	5	6	7	8
Answers	B	C	C	D	A	A	A	B