



ENDOCRINE

ANATOMY

4



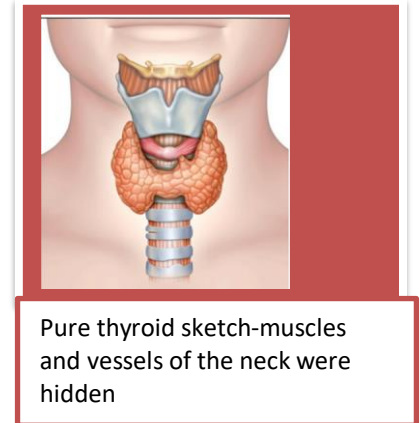
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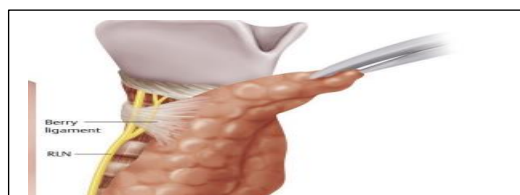
DOCTOR:
Ghada abu el-Ghanam

THYROID GLAND (TG)

- our second endocrine gland
- locates in the neck
- TG is vascularized by highly pressured blood vessels according to its anatomical position in between these big blood vessels.
- it has a wealthy blood supply and is estimated to be 10 times (google says six times) as vascular as the kidney and relatively three to four times more vascular than the brain.
- it is derived from endoderm, note: the nearby organs originate from the same embryonic layer, then they may migrate a little bit but not a big shift, for example, TG and the lungs are both derived from endoderm, then TG migrates a small distance.
- TG synthesizes T4 and T3 upon activation by TSH from the anterior PG
- it is the exclusive endocrine structure that stores its secretion till 3 months, so if your diet was deficient in iodine, you would be safe for 3 months without complications.
- it is butterfly-shaped, with 2 lobes connected by the midline isthmus.
- Highly vascular, butterfly-shaped gland surrounding the anterior surface of the trachea just below the larynx**
 - **located in the anterior neck and spans C5-T1 vertebrae**
 - **Consists of right and left lobes connected by a narrow isthmus.**
 - **Surrounded by a sheath derived from the pretracheal layer of the deep fascia (attachment to the larynx and the trachea).**
- there is a capsule covering TG, thicker anteriorly and less dense posteriorly, then the pretracheal fascia covers the capsule.
- pre tracheal fascia is connective tissue, that fills the gap between the cells for support.



- **Berry ligament!!**



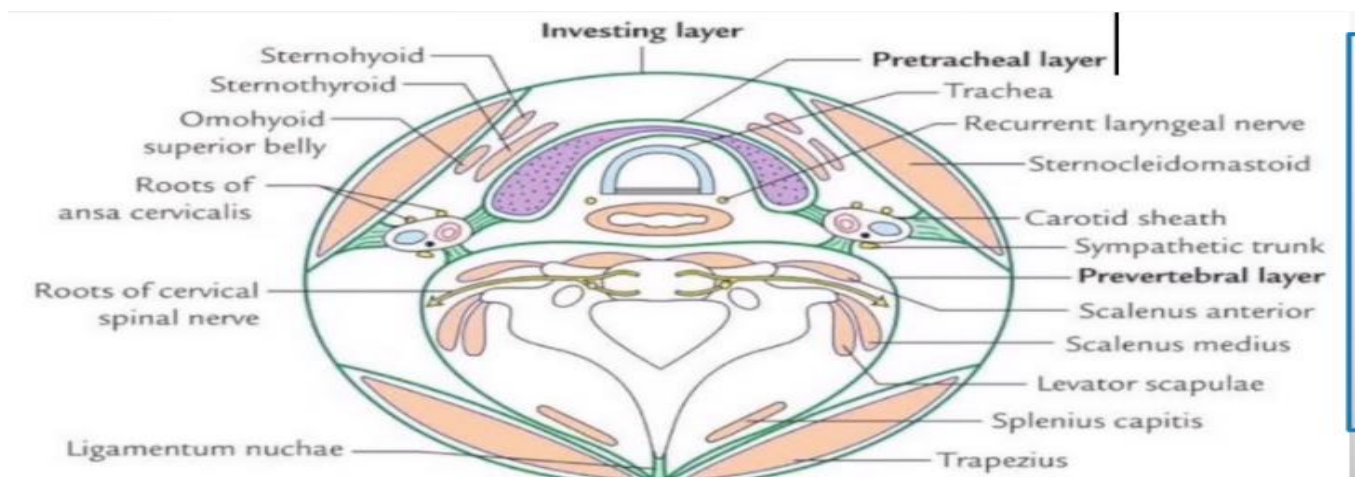
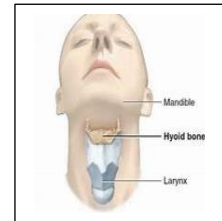
-the pre tracheal fascia thickens between the cricoid cartilage and thyroid gland to form the ligament of Berry(The suspensory ligament of the thyroid) gland (attaches the thyroid gland to the trachea)

-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 4th or 5th tracheal ring.

-The isthmus extends across the midline in front of the 2nd-4th tracheal rings.

-A pyramidal lobe!!! Is often present, and usually to the left of the midline. A fibrous or muscular band frequently connects the pyramidal lobe to the hyoid bone (HB); if it is muscular, it is referred to as the levator glandulae thyroideae.

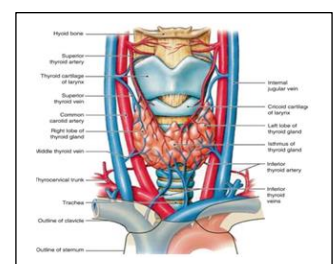


-it is important to recognize the relations of the thyroid, hence it has a critical position between major blood vessels and nerves, to avoid mistaken ligation of a nerve during surgery.

-there are 2 important cartilages superior to TG,;the first is the thyroid cartilage تفاحة ادم which is thickener in men than women, also varying between men and the second: the cricoid cartilage(locates inferiorly to the thyroid cartilage).

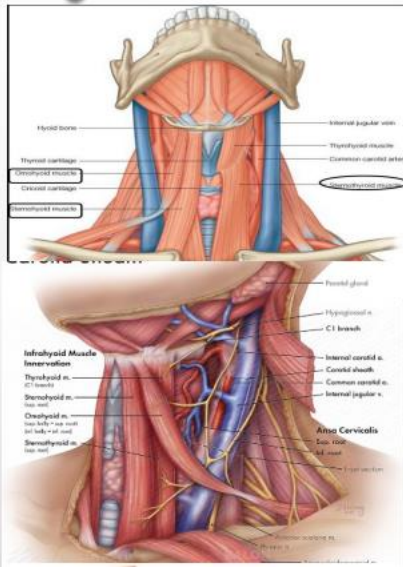
RELATIONS OF LOBES

- Medial: the larynx, the trachea, the pharynx, and the esophagus (cricothyroid muscle and its

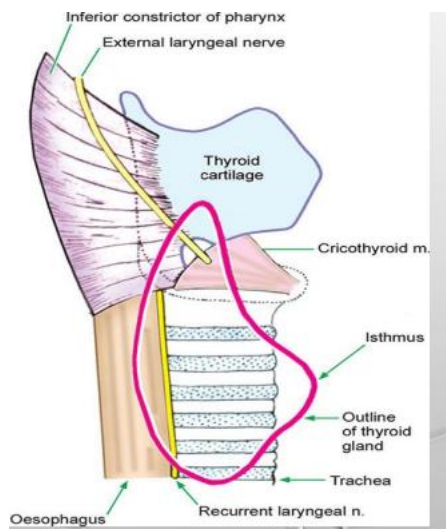


nerve supply, the external laryngeal nerve. The recurrent laryngeal nerve is in the groove between the esophagus and the trachea.)

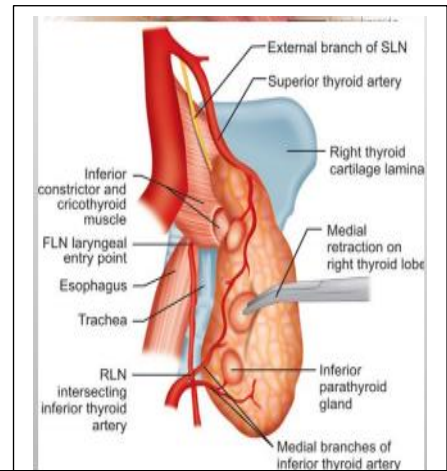
Emphasising blood vessels relations



Emphasizing muscles relations

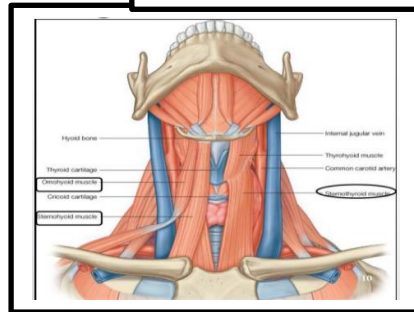


Lateral view

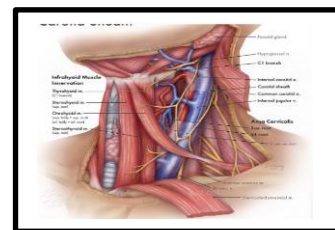


SLN: superior laryngeal nerve
 RLN: recurrent laryngeal nerve
 FLN: left recurrent laryngeal nerve
 -posterior view

- Anterolateral: sternothyroid, the superior belly of the omohyoid, the sternohyoid, and the anterior border of the sternocleidomastoid



- Posterolateral: carotid sheath with the common carotid artery, the internal jugular vein, and the Vagus nerve



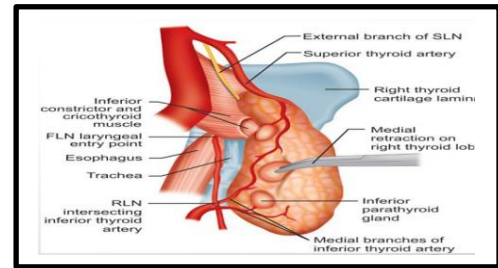
*the deep fascia forms the carotid sheath, it contains the vagus nerve

*vagus nerve is a major nerve for the thyroid, it is responsible for parasympathetic innervation for TG, it gives the recurrent and external laryngeal nerves and innervates important laryngeal muscles.

*clinical note: you have to take attention not to ligate the external and recurrent laryngeal nerves in surgery accidentally, they innervate the muscles of larynx so the patient may lose his sound

- Posterior: superior and inferior

parathyroid glands and the anastomosis between the superior and inferior thyroid arteries



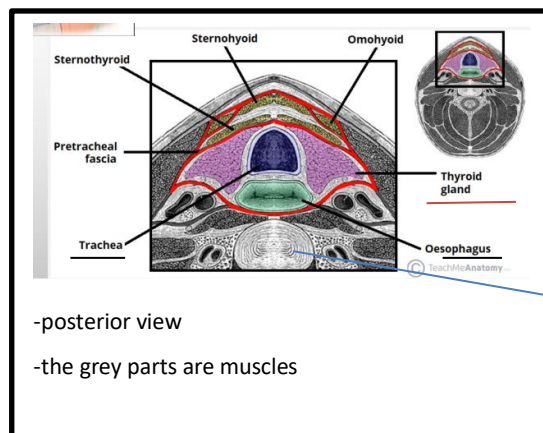
ISTHMUS RELATIONS

• **Anterior:** sternothyroid, the sternohyoid, anterior jugular veins, fascia, and skin

-note: that the skin and fascia are in relation with the isthmus rather than the lobes, since the lobes are covered by muscles

• **Superior:** terminal branches of the superior thyroid arteries anastomose along its upper border

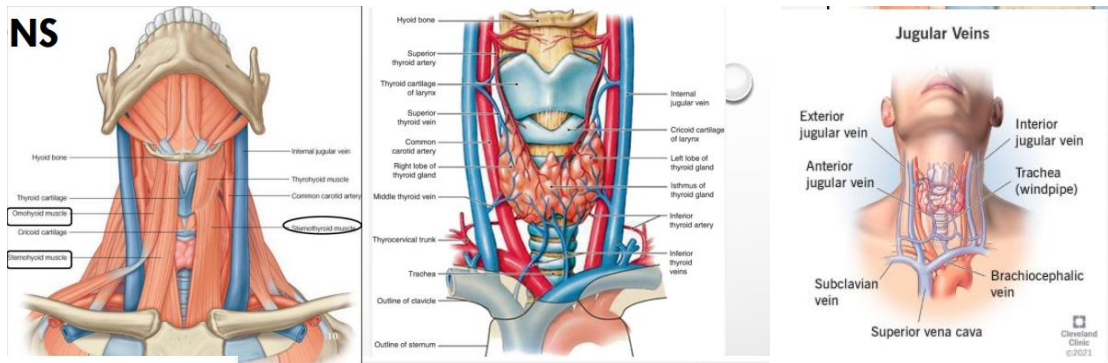
• **Posterior:** second, third, and fourth rings of the trachea



Vertebral column

-notice that the trachea is medial to the lobes while posterior to the isthmus, bcz the isthmus locates at the midline, while the lobes are directed medially to the midline hugging the trachea.

-esophagus located indirectly posterior to the isthmus.



Anterior views

BLOOD SUPPLY/VENOUS DRAINAGE

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

-**The superior thyroid artery**, a branch of the external carotid artery(ECA comes from the common carotid artery of the brachiocephalic from the right, and the common carotid artery directly from the left), descends to **the upper pole** of each lobe, accompanied by the external laryngeal nerve.

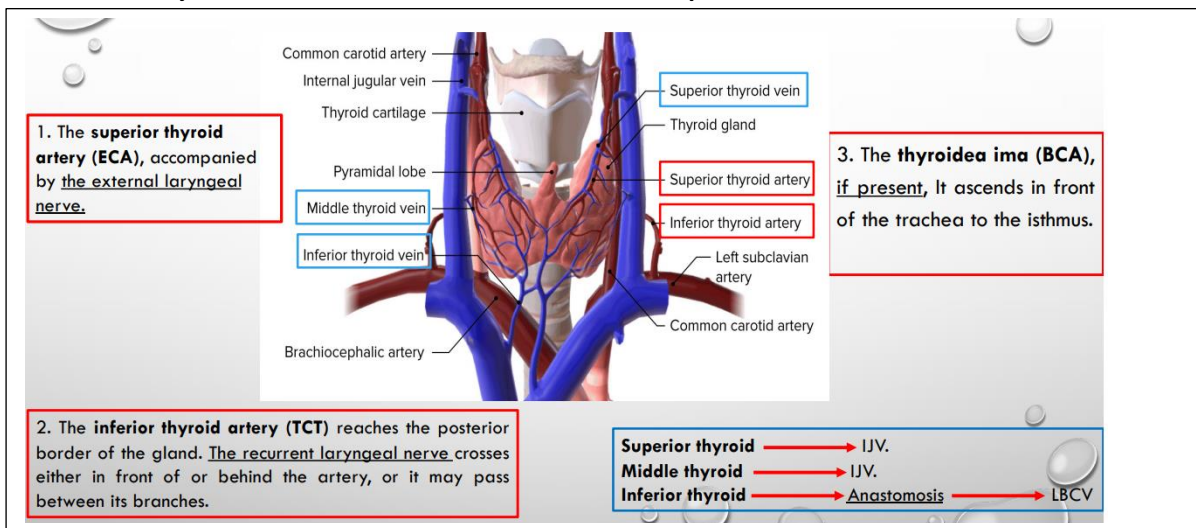
-**The inferior thyroid artery**, a branch of the thyrocervical trunk(TCT) from the subclavian, ascends behind the gland to the level of the cricoid cartilage. It then turns medially and downward to reach **the posterior border of the gland**. The recurrent laryngeal nerve crosses either in front of or behind the artery, or it may pass between its branches.

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

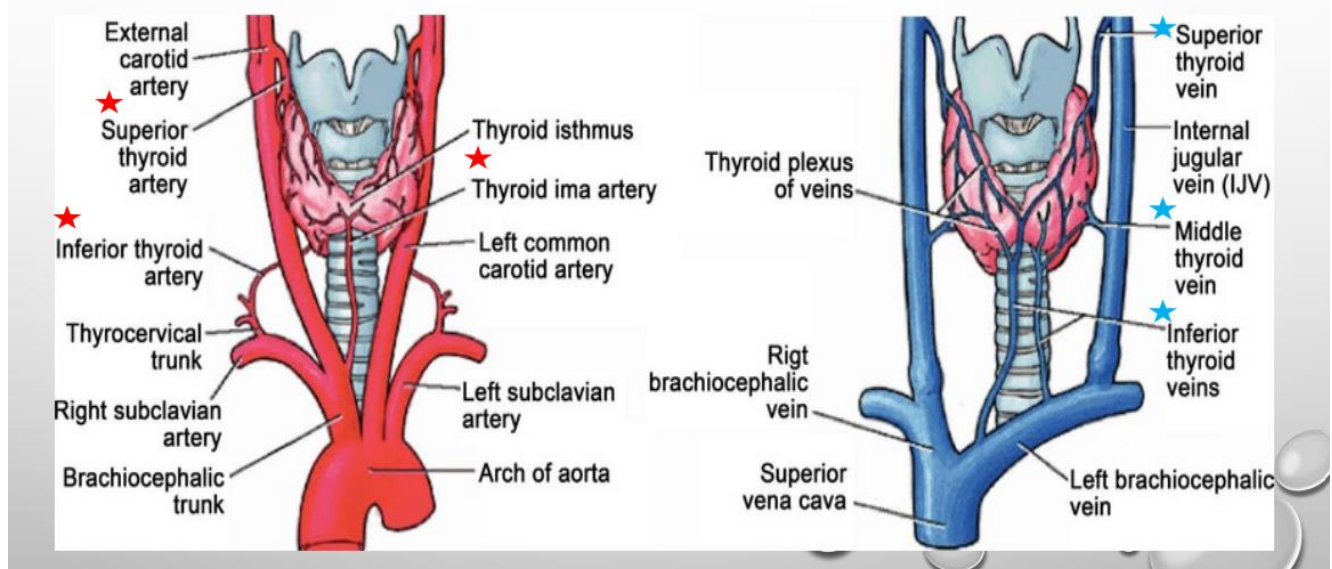
-note: since both the inferior and the superior thyroid anastomose, cutting one of them accidentally in surgery won't be a life-threatening issue.

-**The veins** from the thyroid gland are the superior thyroid, which drains into the internal jugular vein; the middle thyroid, which drains into the internal jugular vein; and the inferior thyroid. 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.



BLOOD SUPPLY/VENOUS D.



LYMPH D./ NERVE SUPPLY

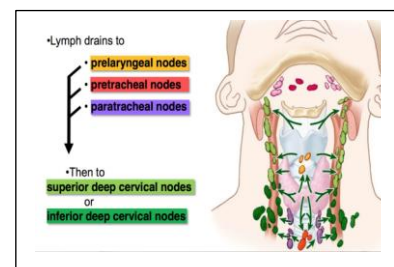
***Lymph drainage:**

- Drains mainly laterally into the deep cervical lymph nodes. A few lymph vessels to the paratracheal nodes (prelaryngeal, pretracheal!!!)

(have been discovered recently)

-determining the exact locations for lymph drainage is extremely important for thyroid carcinoma detection and determining the metastatic stages.

***Nerve supply:**



-Superior, middle, and inferior cervical sympathetic ganglia.

-The Vagus nerve provides the main parasympathetic fibers

THYROID GLAND FUNCTIONS

-TG has 2 distinctive cell subpopulations,

-The thyroid hormones, thyroxine, and triiodothyronine, increase the metabolic activity of most cells in the body.

-The parafollicular cells (c-cells) produce the hormone thyrocalcitonin, which lowers the level of blood calcium.-->new thoughts that C-CELLS origin is the endoderm NOT neural crest

EMBRYOLOGY

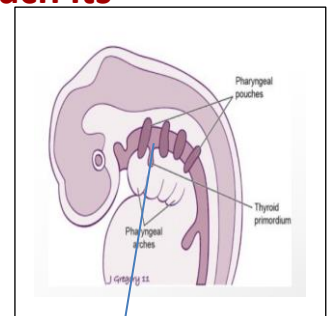
-Development begins as a diverticular outgrowth from the primitive pharynx.

• The diverticulum then descends inferiorly(caudally) to reach its final destination in the neck.

-forming tube-like structure(synonymous to the Infundibulum In PG, but here it will disappear)

• The thyroid is located inferior to the thyroid cartilage (C5-T1).

• During its descent, the thyroid connects to the tongue by the thyroglossal duct



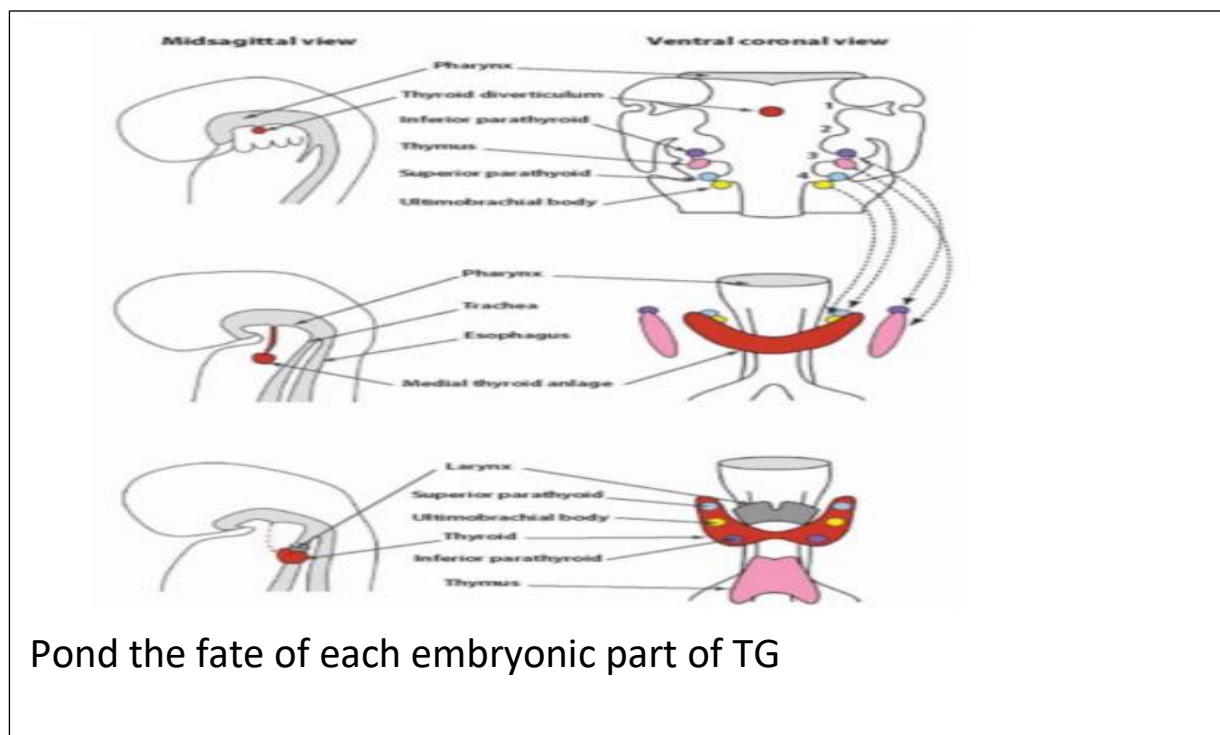
-TG is originated from the first 2 pouches

Originates between the first and second pharyngeal pouches near the base of the tongue.

• Around day 20-24(3rd-4th week), endodermal cells of the primitive pharynx proliferate forming the thyroid diverticulum.(TG and PG formation starts early to control other organs forming by their secretions)

-In the fifth week :

- The thyroid diverticulum migrates caudally(away from the head) along the midline---- remains attached to the tongue via the thyroglossal duct.
 - In early descent, the thyroid is hollow but then solidifies during migration forming the follicular elements of the thyroid.
 - Division of the thyroid into right and left lobes.
 - Ultimobranchial bodies arise from the fourth/fifth pharyngeal pouches - --parafollicular c-cells.
- By the seventh week:
- The thyroid has reached its final destination in the neck
- By the tenth week :
- The thyroglossal duct degenerates
- incomplete obliteration of the duct can lead to abnormalities, including thyroglossal duct cysts, or a pyramidal lobe. lingual thyroid!!!!
- By the twelfth week(3rd month)
- Functionally mature(TG is ready:))



INCOMPLETE DEGENERATION OF

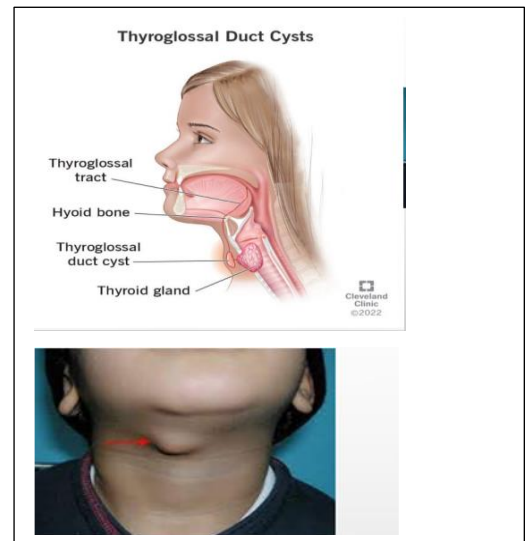
THYROGLOSSAL DUCT

-since the fate of the thyroglossal duct is to disappear, its incomplete degeneration will result in anomalies:

1)thyroglossal duct cyst:

cysts may occur at any point along the thyroglossal tract.

They occur most commonly in the region below the hyoid bone. Such a cyst occupies the midline and develops as a result of persistence of a small amount of epithelium that continues to secrete mucus.



As the cyst enlarges, it is prone to infection, and so, it should be removed surgically. Because remnants of the duct often traverse the body of the hyoid bone, this may have to be excised also to prevent a recurrence.

2)



the descent of the thyroid may be arrested at any point between the base of the tongue and the trachea. Lingual thyroid is the most common form of incomplete descent. The mass of tissue found just beneath the foramen cecum may be sufficiently large to obstruct swallowing in the infant.

3)

The pyramidal lobe is a remnant of the thyroglossal duct and is considered a normal component of the thyroid gland.



PAST PAPER:

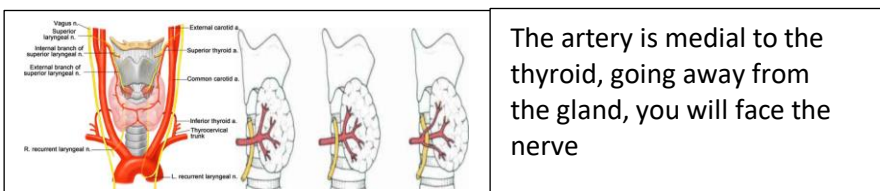
1. Anterior Midline Masses:

- A. Thyroglossal duct cyst
- B. lateral cervical cyst
- C. hyoid cyst

2. The superior thyroid artery is initially associated with the _____ and must be ligated _____ during thyroidectomy:

- A. External Laryngeal Nerve, away the gland
- B. Internal Laryngeal Nerve, away from the gland
- C. External Laryngeal Nerve, near from the gland
- D. Recurrent Laryngeal Nerve, near the gland
- E. Recurrent Laryngeal Nerve, away from the gland

-hint: pond the fig:



3. Wrong about thyroid drainage

- A. All drain into internal jugular vein
- B. Superior thyroid vein drains into the internal jugular vein
- C. The inferior thyroid veins of the two sides anastomose with one another as they descend in front of the trachea

4. Upper Limitation of thyroid gland:

- A. Pretracheal fascia
- B. The superior belly of the omohyoid
- C. The capsule of thyroid

answers:

A C A A

-NOW, you can revise the previous lecture also 😊

TRUE OR FALSE? PRVIOUS LECTURES.

- Pituitary is bounded by the optic chiasm directly.
- Adh is released from the adenohypophysis.
- Neurohypophysis is rich with thyrotrophs.
- Release of oxytocine is immediate.
- Pituicytes are abundant in the pars distalis.
- ACTH acts on adrenal medulla.
- Hypothalamic releasing hormones reach the pg by the systemic circulation directly.
- Posterior pituitray is supplied mainly by the superior hypophyseal artery.

The Answers:

- 1.F, diaphragma sellae separates it from the optic chiasm
- 2.F, it is released from the hypothalamus
- 3.F, adenohypophysis
- 4.F,needs stimulus(nerve impulse)
- 5.F, pars nervosa
- 6.F, adrenal cortex
- 7.F,portal circulation
- 8.F, inferior hypophyseal artery

BEST OF LUCK

V2:



Pyramida lobe!!



The doctor
modified this as a
thyroglossal duct
cyst