

{Anatomy/ Lec 6}

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Thyroid gland / part 2

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# Embryology

In a cross section of the embryo in the area of the head and neck

The following can be noticed

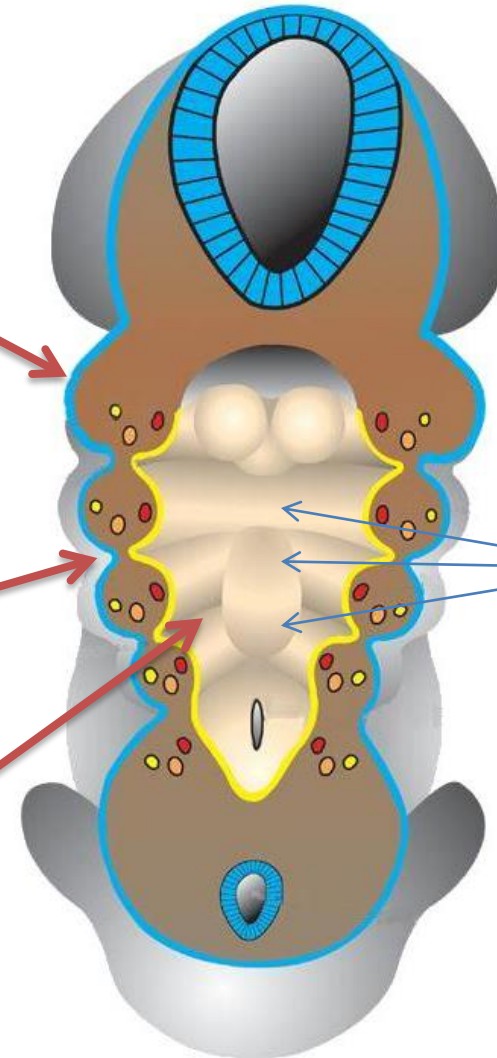
## THE PHARYNGEAL ARCHES

THE PHARYNGEAL ARCHES  
are separated  
by deep clefts known as  
**PHARYNGEAL  
CLEFTS**

with development of the arches and clefts,  
a number of outpocketings,

**The pharyngeal  
pouches appear**

\* This is an embryo in (4th-5th) weeks of  
development.



the floor of the pharynx

in the floor of the pharynx

Related to the 1st pharyngeal arch

Lateral lingual swelling

Tuberculum impar

Copula  
(hypobranchial  
eminence)

Epiglottal  
swelling

Related to 2nd,  
3rd & 4th arches

Foramen  
cecum

Terminal sulcus

Palatine  
tonsil

Root of  
tongue

Read only

\* We need to focus on the floor of the pharynx, [ that's area where the thyroid gland should arise from ].

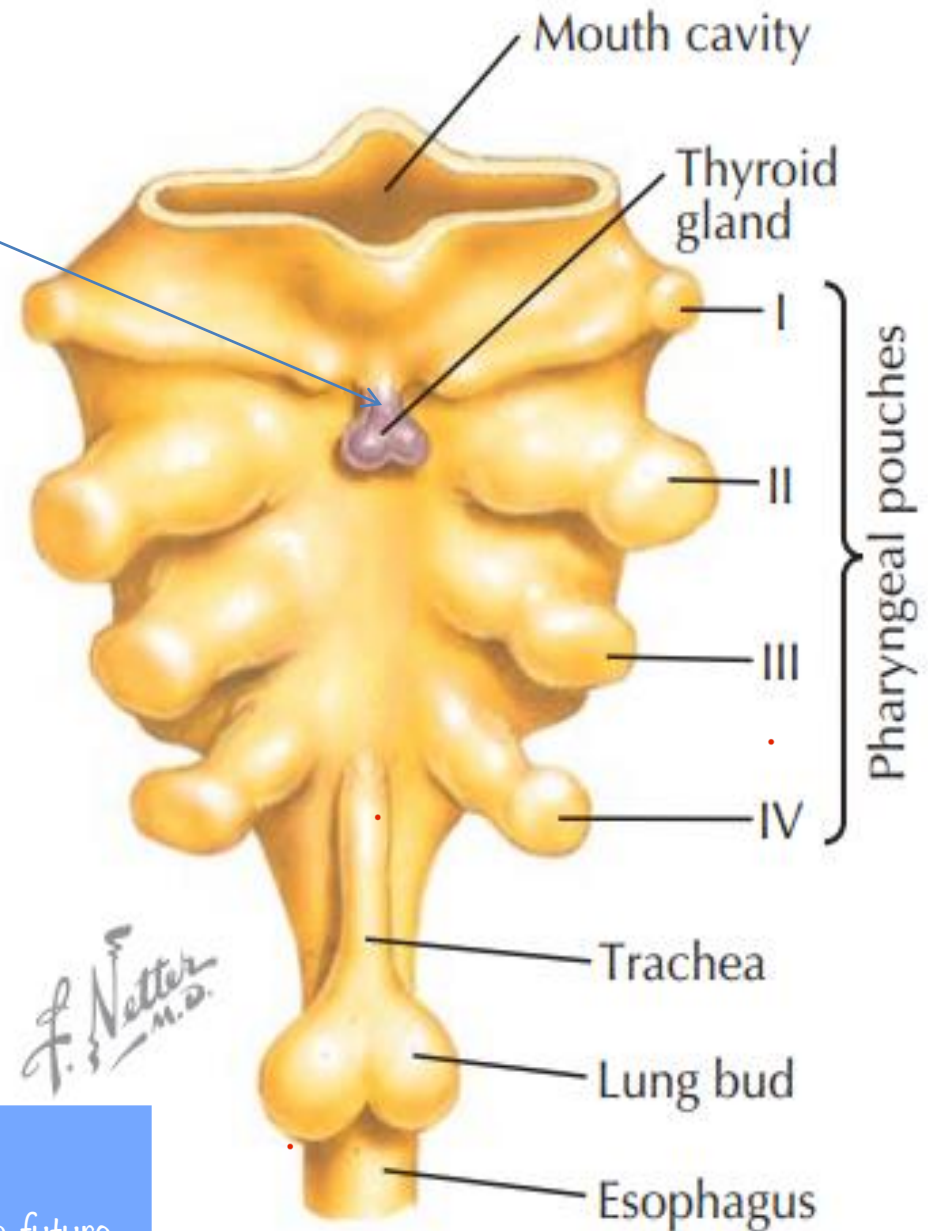
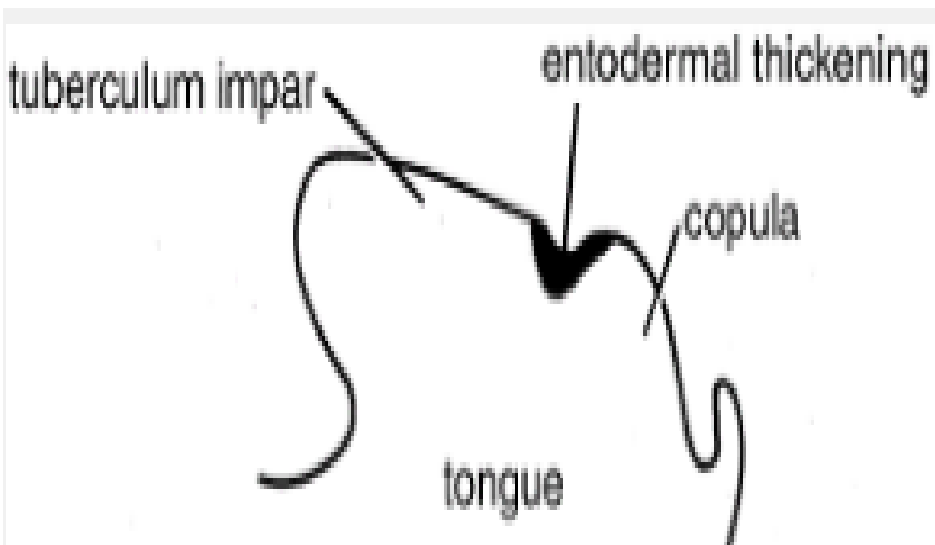
## **\*\* Read only !**

- \* Just to be familiar with some names rather than the development of the tongue .
- \* The 2 lateral swellings would unite with Tuberculum impar → forming the ant. 2/3 of tongue occupying the mouth proper.
- \* Sensory innervation : branch of mandibular nerve → lingual nerve .
- \* Also , Copula meets the Tuberculum impar & lateral swellings (the ant. 2/3 of tongue) .
- \* Mainly 3rd pharyngeal arch will form post. 1/3 of the tongue that's located in oropharynx and nearby should be palatine tonsils in lateral sides ( supplied by glossopharyngeal nerve ) .
- \* The 2nd arch will disappear and it left innervation of taste buds in tongue by facial nerve .
- \* Motor nerve supply to the tongue → Hypoglossal nerve
- \* When ant. 2/3 & post. 1/3 meet each other, it would form → Sulcus terminalis & foramen cecum .

## Thyroid Gland

1-begins to develop during the third week **as an endodermal thickening** in the floor of the pharynx

between the **tuberculum impar** and **the copula** at a point later indicated by the **foramen cecum**



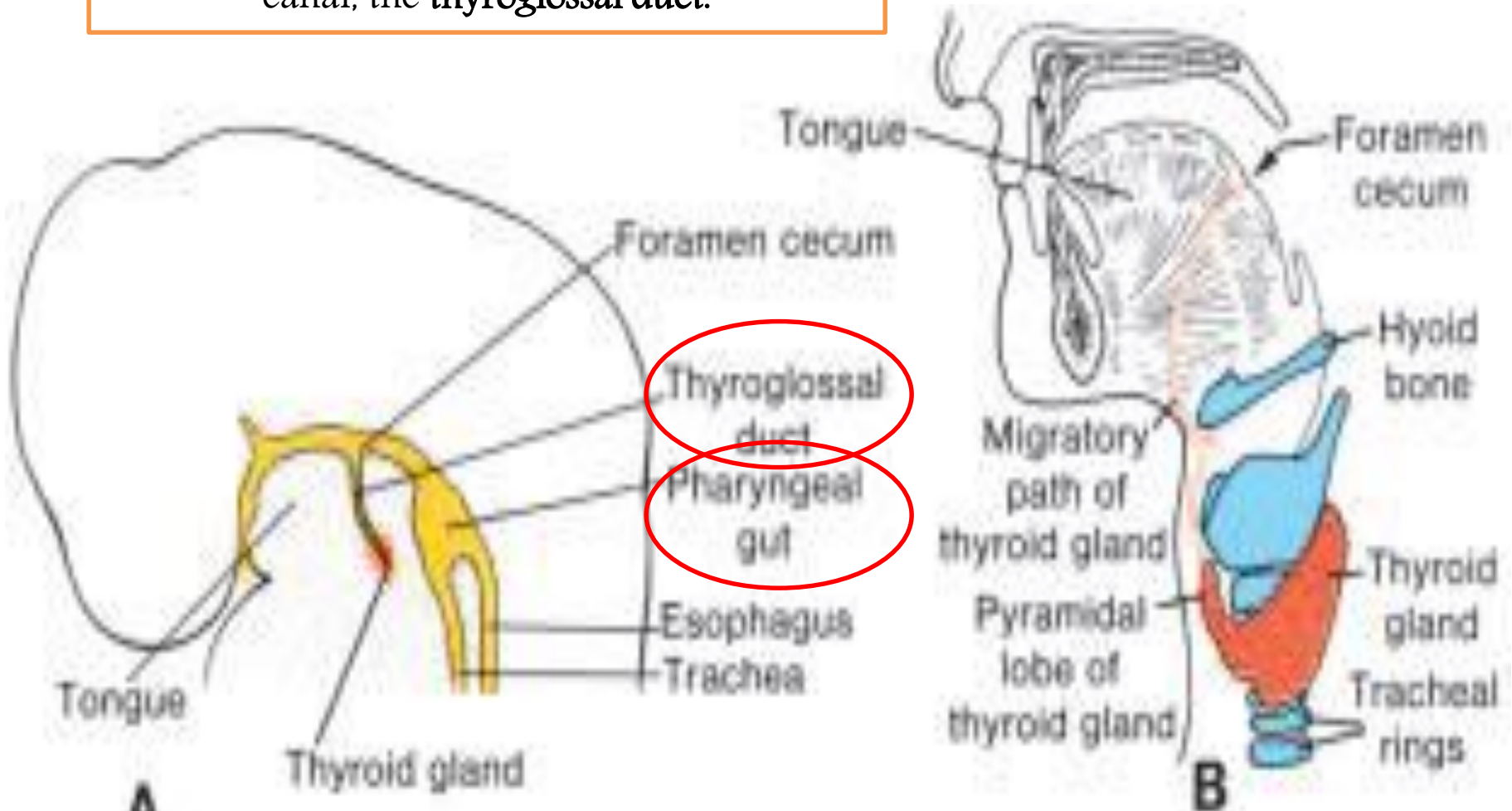
- \* The ultimate position of thyroid gland is in the neck .
- \* Thyroid gland has to migrate from site of origin [ between future parts of tongue] down to reach the lower part of the neck .

Pharynx (ventral view) 4th week



2- It descends in front of the pharyngeal gut as a bilobed diverticulum

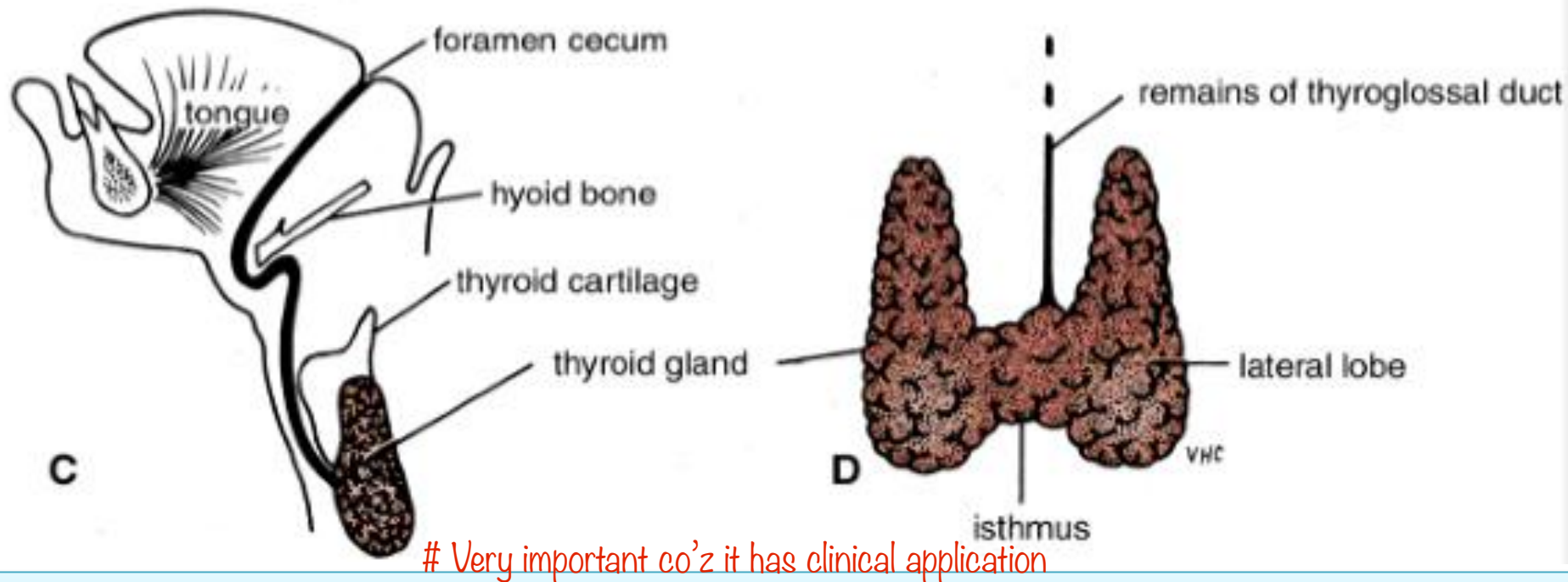
3- During this migration, the thyroid remains connected to the tongue by a narrow canal, the **thyroglossal duct**.



\* If there's migration from one area to another (to ensure that this migration would take it in a proper place at the end of this journey, so you need something to help [ a canal ] , like in migration of testis from the abdomen to scrotum . This canal has a connection between the site of origin [where the thyroid gland has appeared at the first place] until it's reaching the final position [ lower part of the neck or Trachea] .



4-As development continues, the duct elongates, and its distal end becomes bilobed. Soon, the duct becomes a solid cord of cells, and as a result of epithelial proliferation, the bilobed terminal swellings expand to form the thyroid gland



# Very important coz it has clinical application

5-The thyroid gland now migrates inferiorly in the neck and passes either anterior to, posterior to, or through the developing body of the hyoid bone.

**6-By the seventh week, it reaches its final position in relation to the larynx and trachea.**

**Meanwhile, the solid cord connecting the thyroid gland to the tongue fragments and**

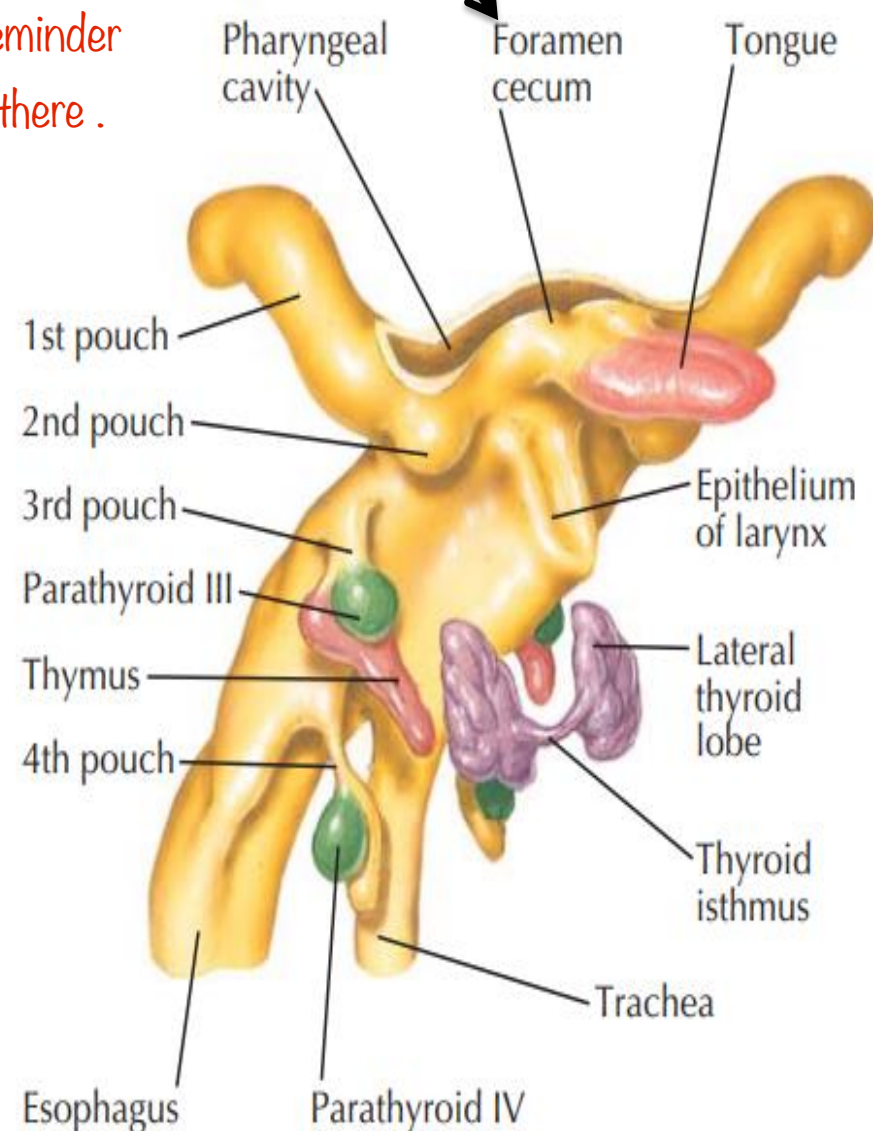
**disappears.** (The whole duct should be closed and the connection between the tongue & thyroid gland should be lost)

\* During pregnancy , if pregnant female has been exposed to many different conditions —> this migration may stop & therefore it's very important to understand the exact path of migration ; ex. Testis . So , if you know the path , you would expect where to look and it's important to know areas where thyroglossal duct passes through.

7-The site of origin of the thyroglossal duct on the tongue remains as a pit called **the foramen cecum**.

→ is closed, and this foramen should be a reminder for you to tell you that thyroid gland was there.

8-The thyroid gland may now be divided into a small median isthmus and two large lateral lobes



as we mentioned before, most glands have two different origins

### Second origin of the thyroid gland

\* this part is not endodermal in origin, rather than it's neural crest that has settled in 5th pharyngeal arch & participate in formation of thyroid gland .

**9-The ultimobranchial bodies** (from the fifth pharyngeal pouch) and **neural crest cells** are believed to be incorporated into the thyroid gland, where they form **the parafollicular cells**, which produce calcitonin.

\* The histology of thyroid gland consists of :

Follicles [ endodermal in origin ] sandwiched between them interstitial ( parafollicular cells ) . >> not inside the follicle —> co'z it's from different origin .

# Congenital Anomalies of the Thyroid Gland

## 1-Agenesis of the Thyroid

Failure of development of the thyroid gland may occur and is the commonest cause of **cretinism**

## 2-Incomplete Descent of the Thyroid

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



Lingual thyroid.

\* In this case , you wouldn't see foramen cecum since it's a reminder when the thyroid gland has left down .

**Aberrant thyroid tissue may be found anywhere along the path of descent of the thyroid gland. It is commonly found in the base of the tongue, just behind the foramen cecum, and is subject to the same diseases as the thyroid gland itself.**

\* Sometimes , of course perfectly functioning but maybe patient complains about it .

caution!!!  
A mass in the posterior midline might be the only thyroid in the patient's body





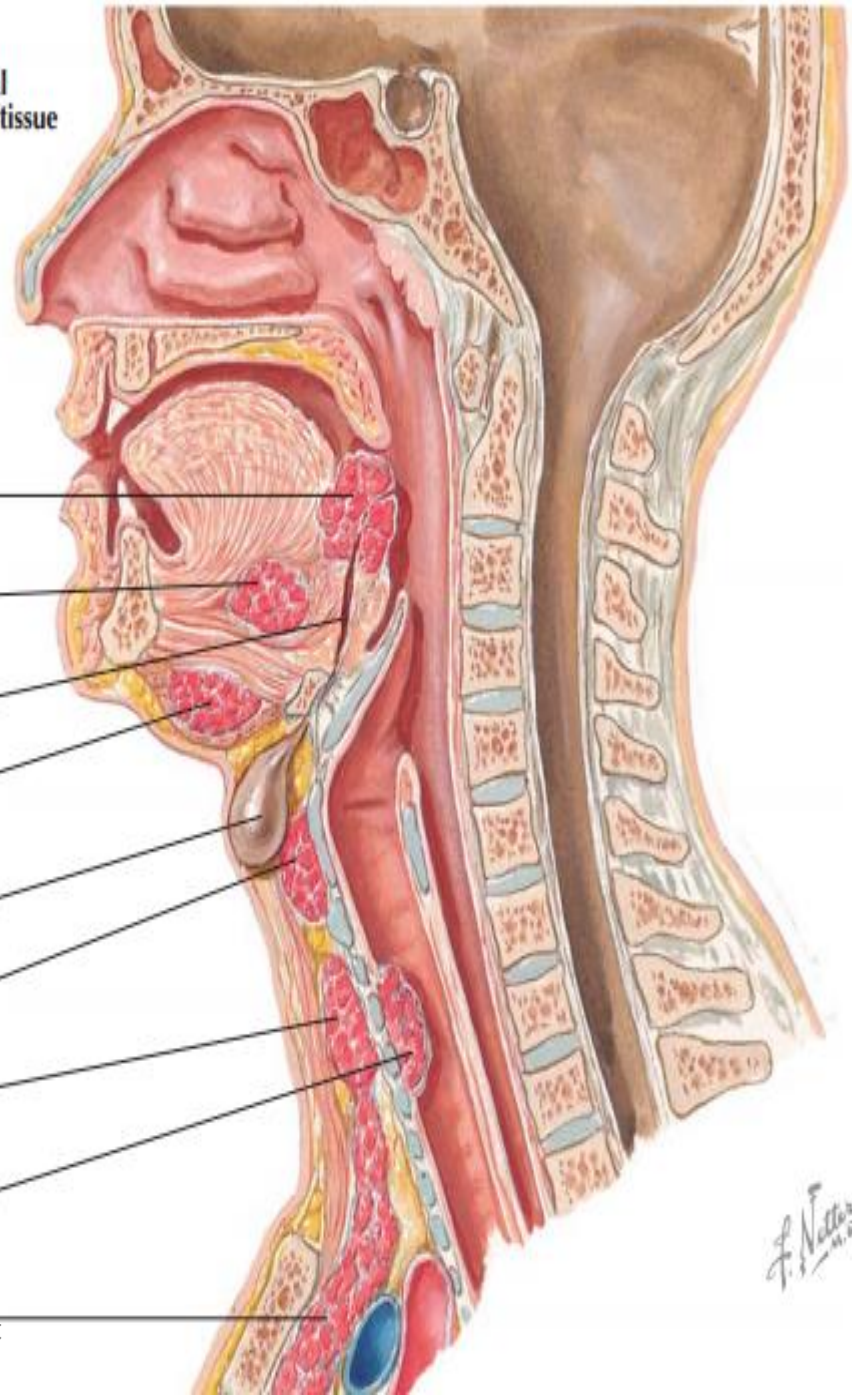
Don't memorize this ! but ,  
understand the thyroid gland  
if to be arrested in  
descending down, you need  
to look for it at these  
positions from the tongue  
until it reaches trachea .

\* most common one : Lingual

## Thyroglossal Duct and Thyroid Abnormalities

- Lingual
- Intralingual
- Thyroglossal tract
- Sublingual
- Thyroglossal cyst
- Prelaryngeal
- Normal
- Intratracheal
- Substernal

Aberrant and normal  
locations of thyroid tissue

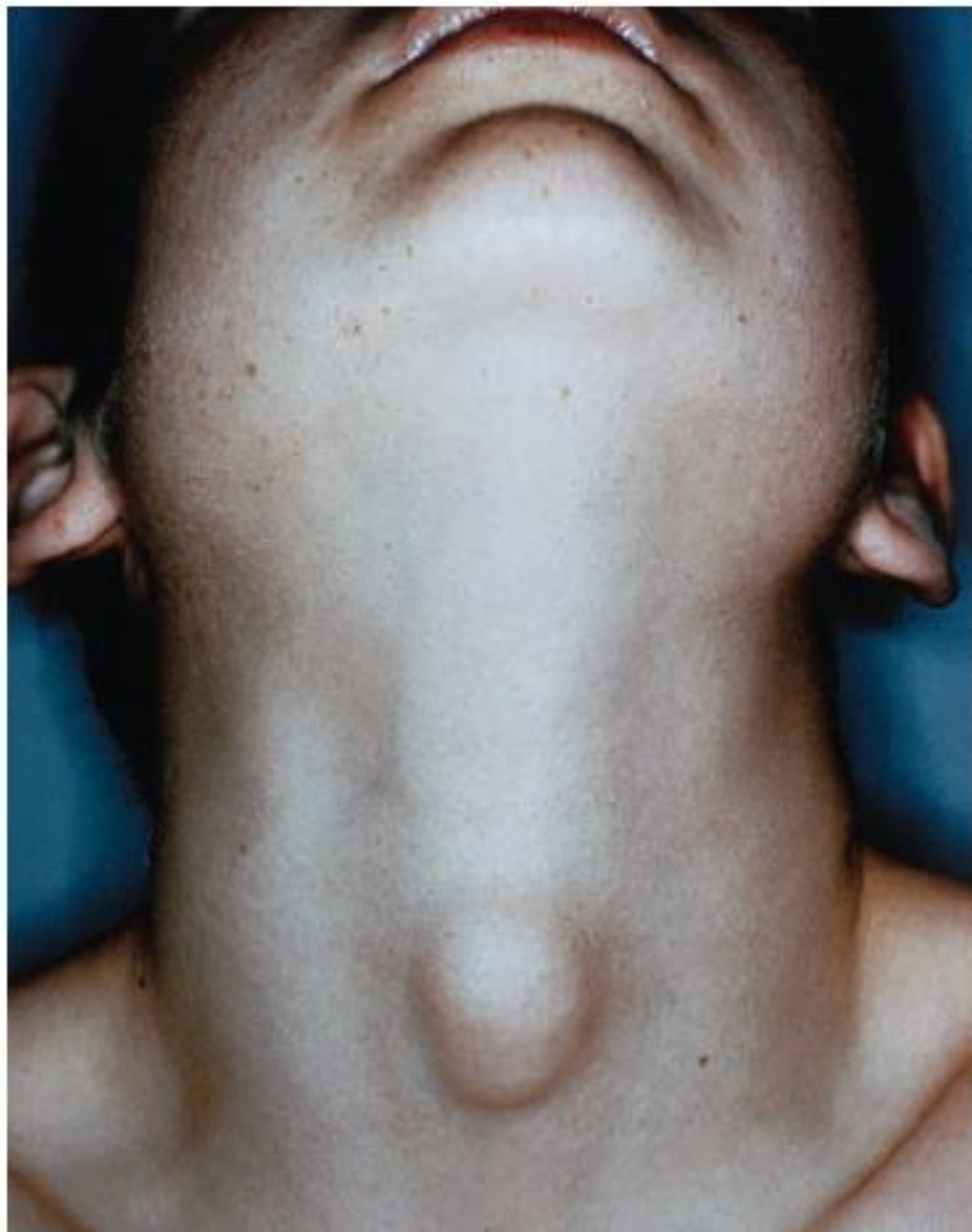




### 3-Persistent Thyroglossal Duct

Conditions related to a persistence of the thyroglossal duct usually appear in childhood, in adolescence, or in young adulthood

- \* The thyroglossal duct did not close .
- \* Always we think about thyroid gland as a midline structure.



Dr.Shatarat

A thyroglossal cyst.

## Thyroglossal Duct and Thyroid Abnormalities

A thyroglossal cyst may lie at any point along the migratory pathway of the thyroid gland but is always near or in

***the midline of the neck***

by its name, it is a cystic remnant of the thyroglossal duct. Although approximately

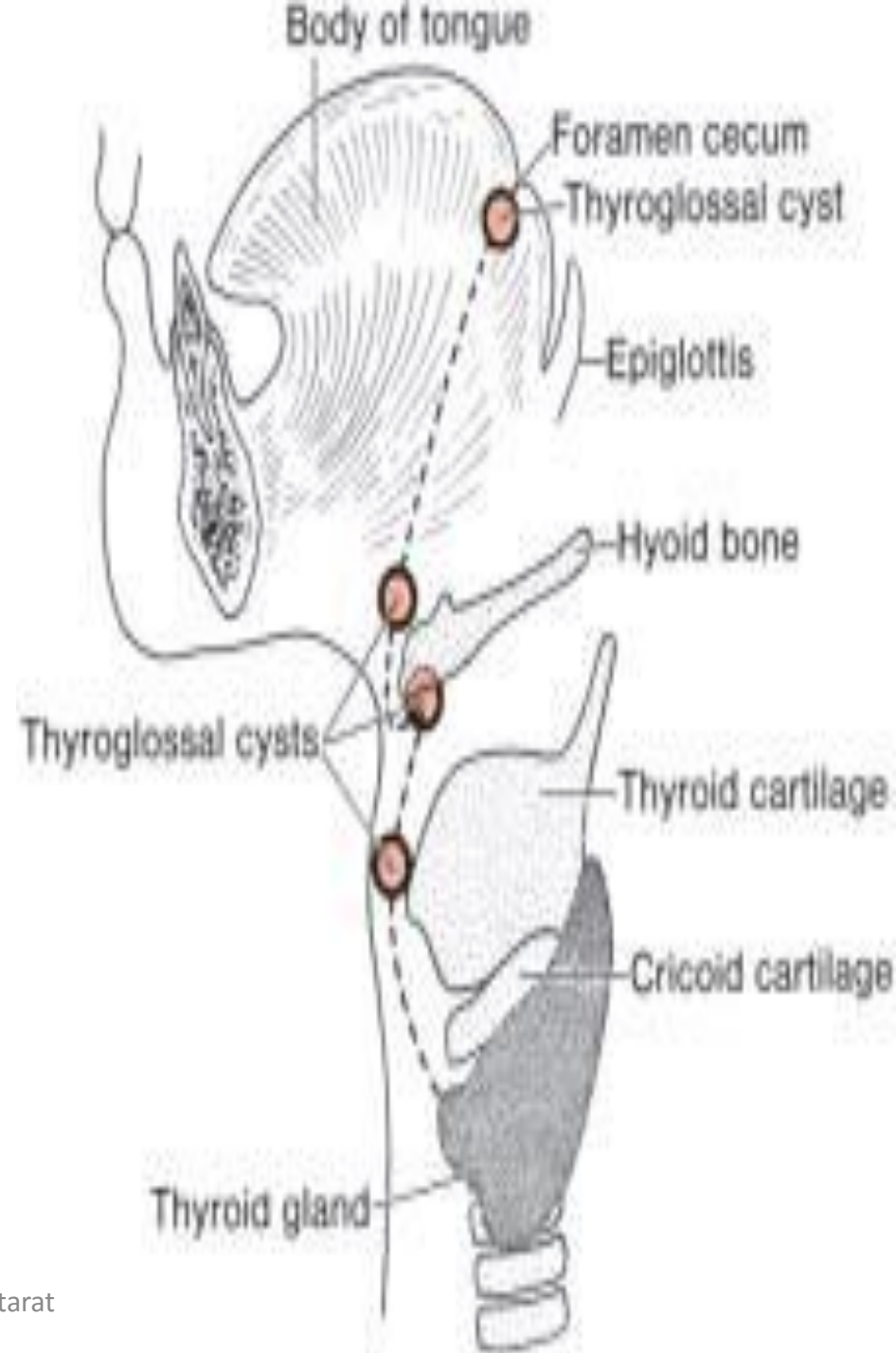
50% of these cysts are close to or just inferior to the body of the hyoid bone they may also ***be found at the base of the tongue***

or close ***to the thyroid cartilage.***

Sometimes a ***thyroglossal cyst is connected to***

***the outside by a fistulous canal, a thyroglossal fistula. Such a fistula usually***

arises secondarily after rupture of a cyst but may be present at birth.

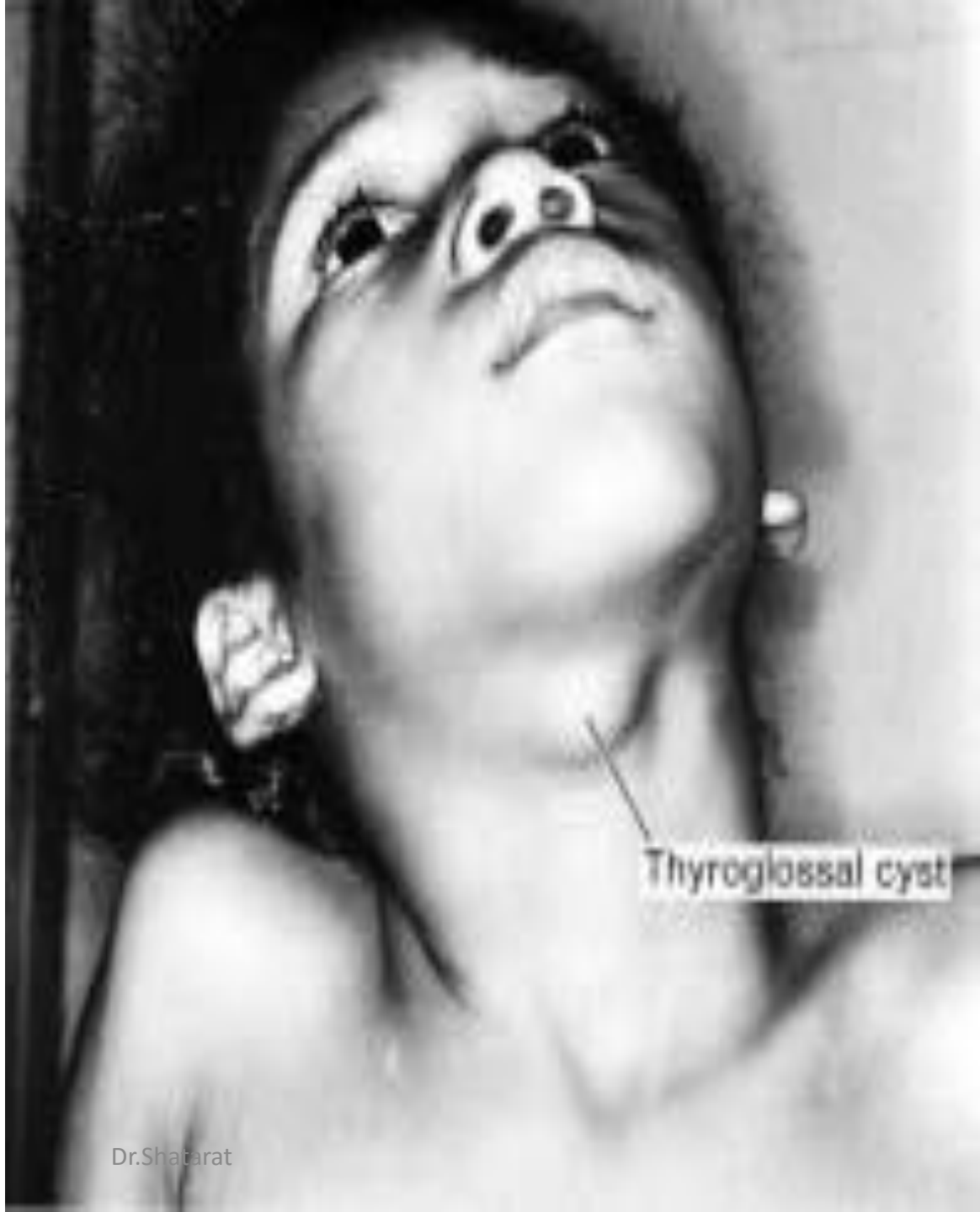


Thyroglossal cyst.  
These cysts, which are remnants of the thyroglossal duct, may be anywhere along the migration pathway of the thyroid gland.

They are commonly found behind the arch of the hyoid bone. An important diagnostic characteristic

is their **midline location.**

4/29/2020



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\* if a child with a midline mass , you need to think about thyroid gland, you should expect that it has to be in it's normal position [ lower part of the neck]

\* To examine the patient's neck , you need to pay attention to important things :

1- if the mass in the lower neck and you ask the patient to swallow and thyroid gland goes up & down with swallowing movement, it means this is a mass that related to thyroid gland .

2- if a patient complaining from midline mass in upper part of the neck, it may related to congenital anomalies of thyroid gland.

\* if Thyroid gland developed normally in its anatomical position, then we are talking about tumors, inflammation to the thyroid gland, but if it is related to it ,there will be a mass above the thyroid cartilage around the hyoid bone .

# lateral cervical cyst

## Branchial Fistulas

\* Fistula means there's communication with outside .

\* We are talking about masses of the neck, either midline or lateral



Branchial fistulas occur when the second pharyngeal arch fails to grow caudally over the third and fourth arches, leaving remnants of the second, third, and fourth clefts in contact with the surface by a narrow canal.

Such a fistula, found on the lateral aspect of the neck directly anterior to the sternocleidomastoid muscle, usually provides drainage for a lateral cervical cyst *These cysts, remnants of the cervical sinus, are most often just below the angle of the jaw*

Frequently a lateral cervical cyst is not visible at birth but becomes evident as it enlarges during childhood.

Patient with a lateral cervical cyst. These cysts are always on the **lateral** side of the neck in front of the sternocleidomastoid muscle. They commonly lie under the angle of the mandible and do not enlarge until later in life.

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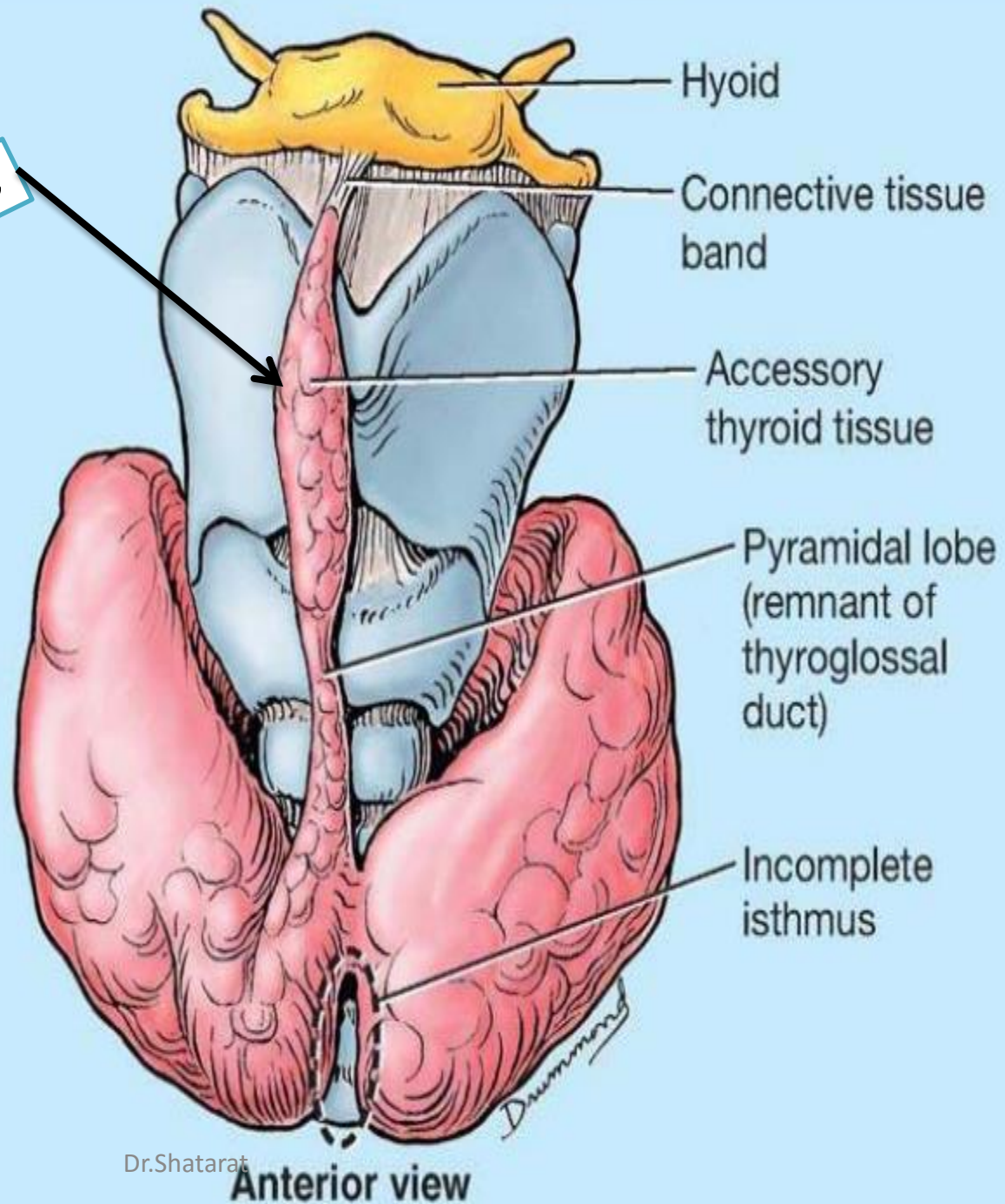
Dr. Shafarati

#### **4-Thyroglossal Sinus (Fistula)**

**Occasionally, a thyroglossal cyst ruptures spontaneously, producing a sinus). Usually, this is a result of an infection of a cyst. All remnants of the thyroglossal duct should be removed surgically**

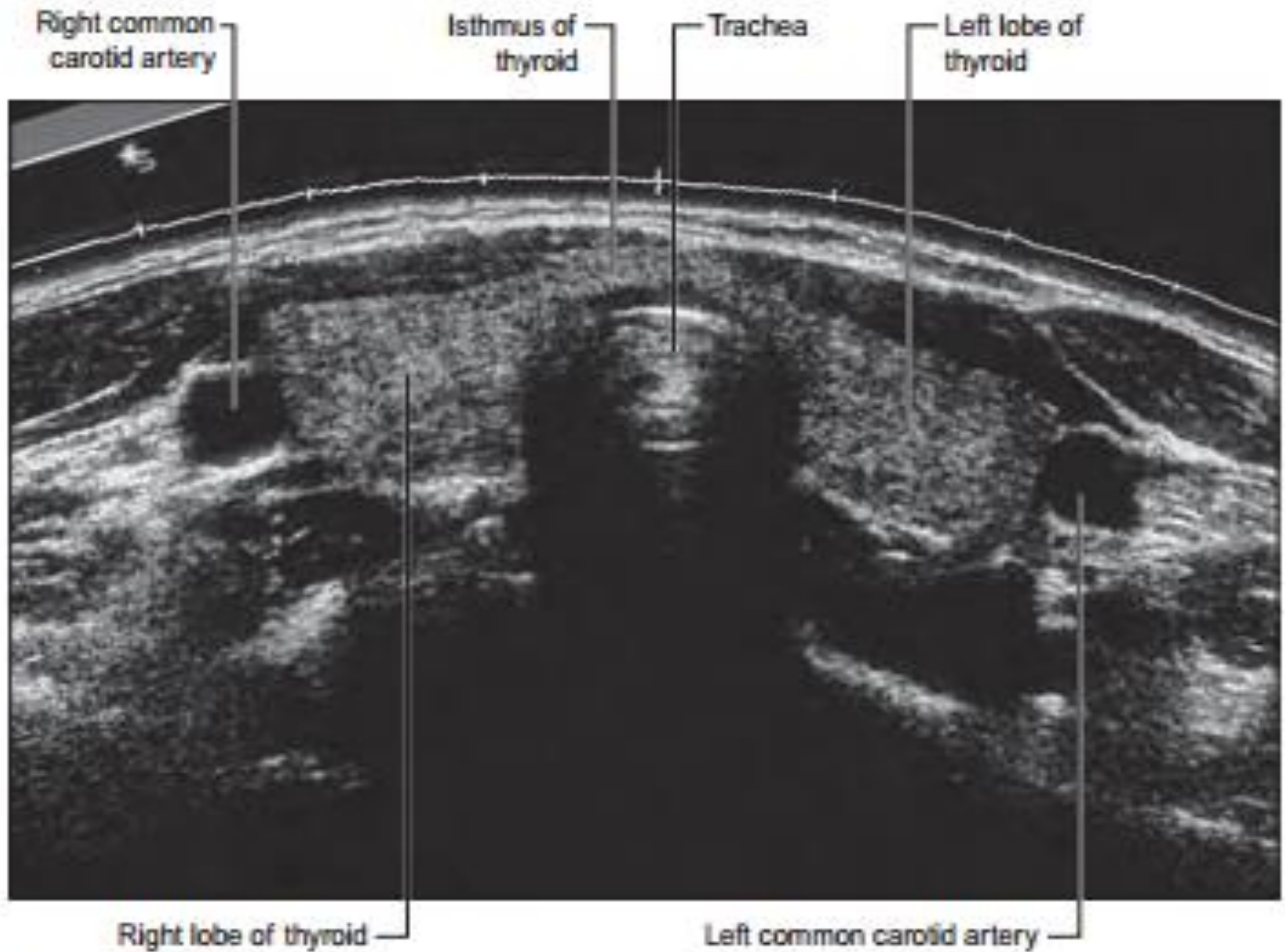


5-Accessory Thyroid Tissue



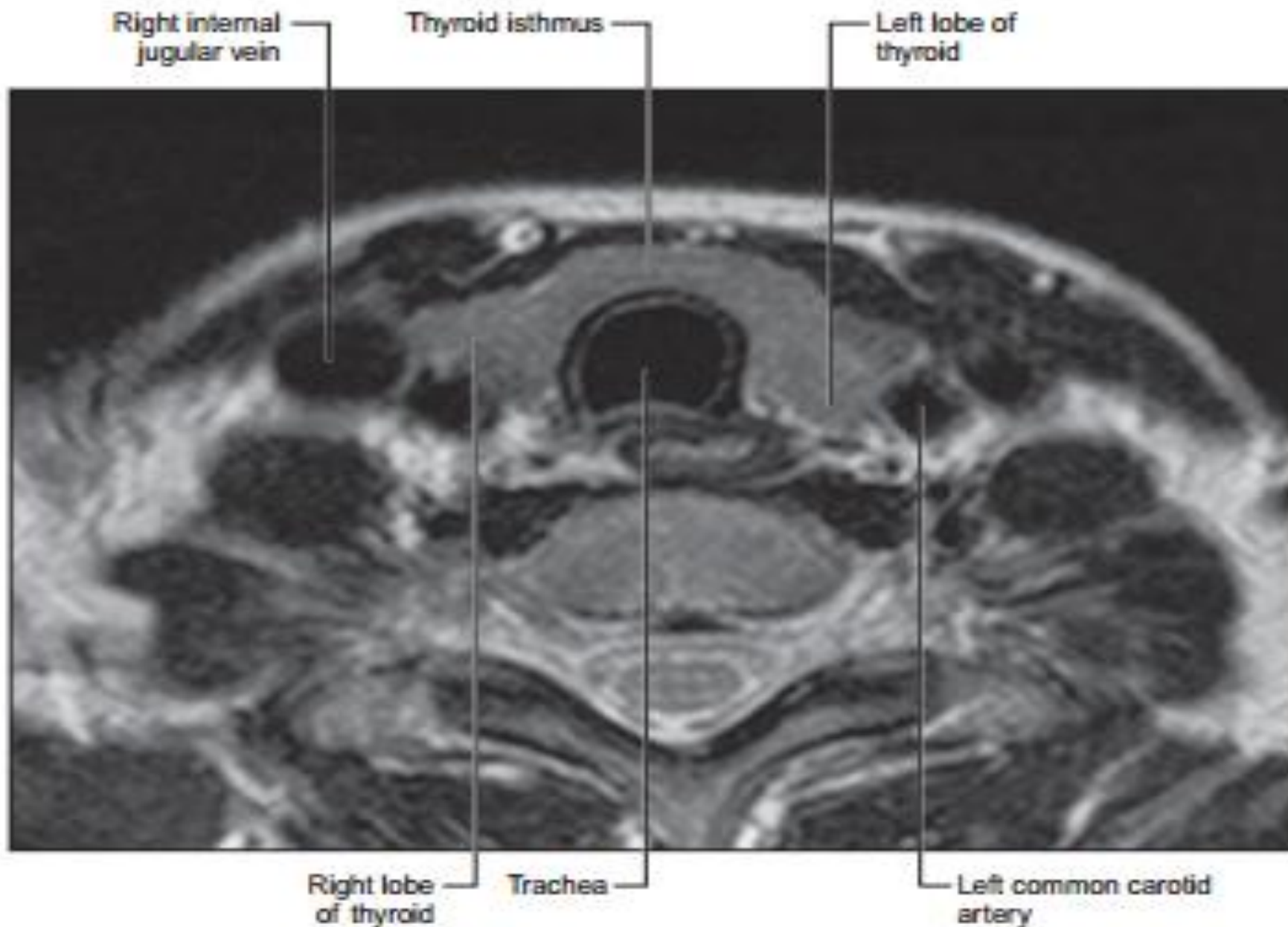


# Radiology



4/29/2020  
**Fig. 28.20 Thyroid sonogram.**

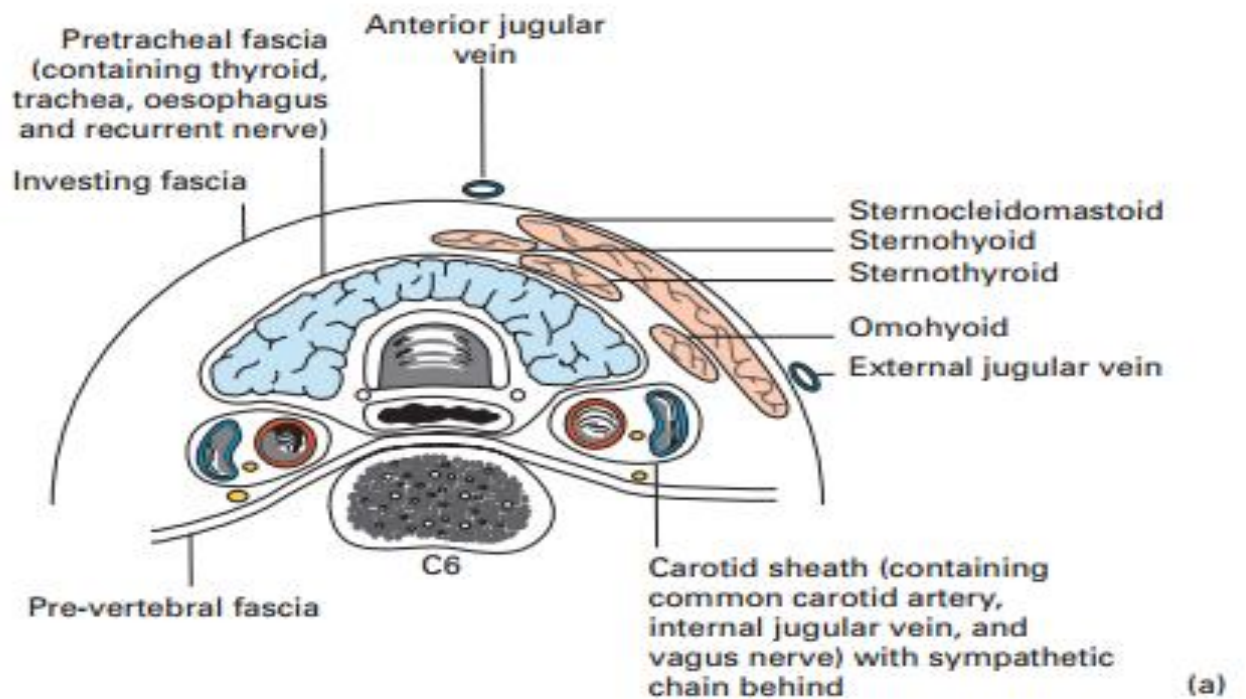
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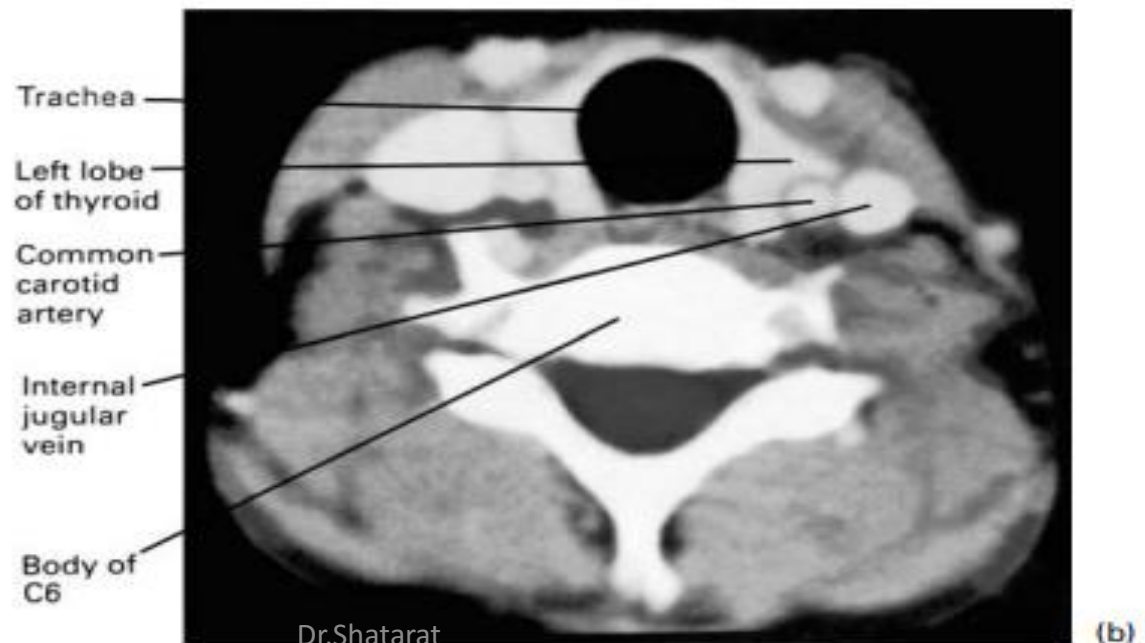
**Fig. 28.21** T<sub>2</sub>-weighted MRI at the level of the thyroid isthmus: compare with Fig. 28.20.

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**Fig. 188** (a) Transverse section of the neck through C6—showing the fascial planes and also the contents of the pretracheal fascia (or 'visceral compartment of the neck'). (b) CT scan through the C6 level; compare this with the diagram.



\* The activity ratio of the gland & metastasis that can reach this gland

Metastatic disease to the thyroid is common; it likely relates to its rich blood supply of approximately 560 mL/100 g tissue/min (a flow rate per gram of tissue that is second only to the adrenal glands)

\* The most active gland in terms of metastasis is Adrenal gland , secondly , Thyroid gland .

Good Luck :)

**The End**