

Thyroid gland

Gross anatomy

Location

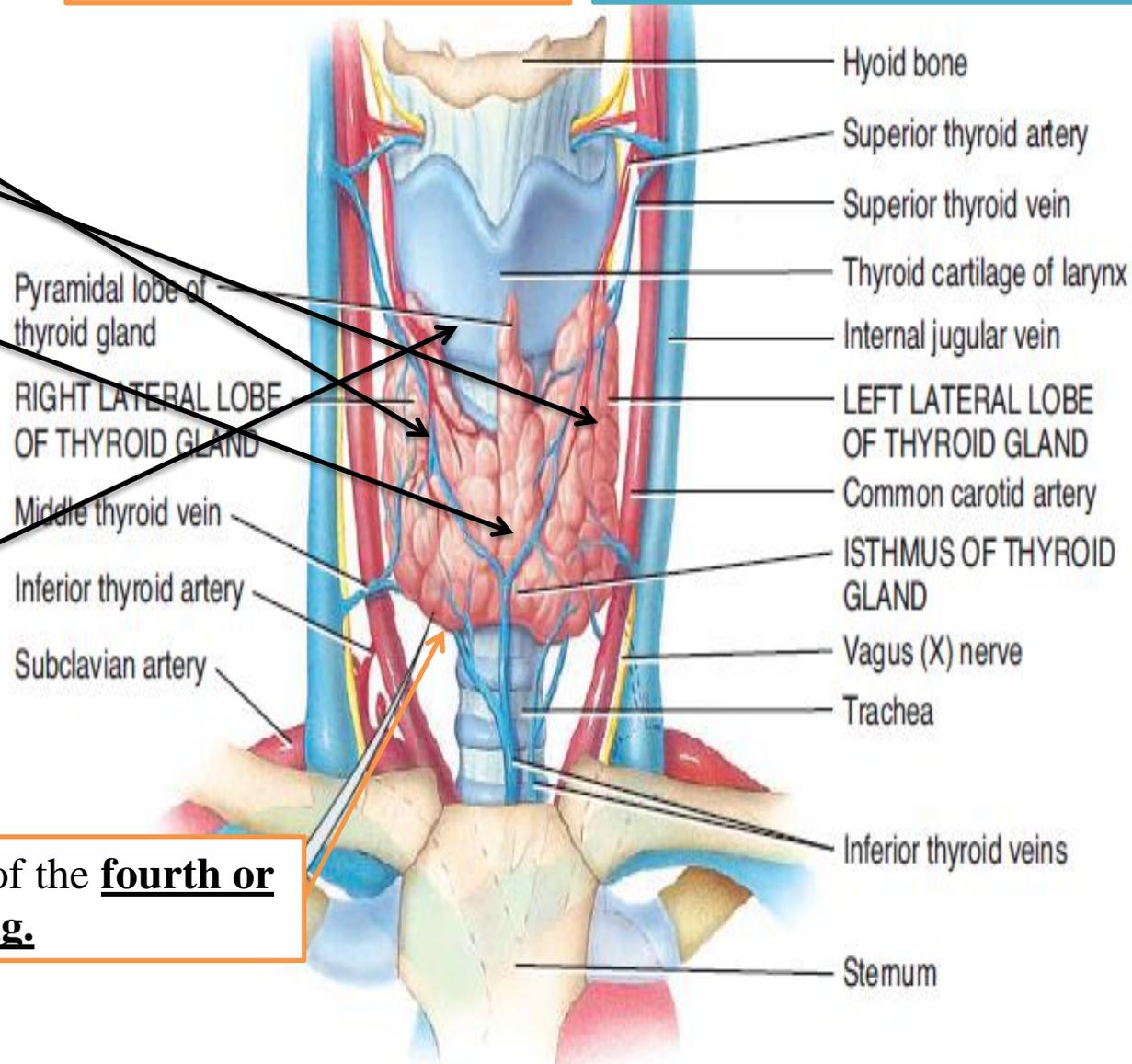
Thyroid Gland

Located at the level of the C5-T1 vertebrae

The thyroid gland consists of right and left lobes connected by a narrow isthmus.

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 **fourth or fifth tracheal ring.**



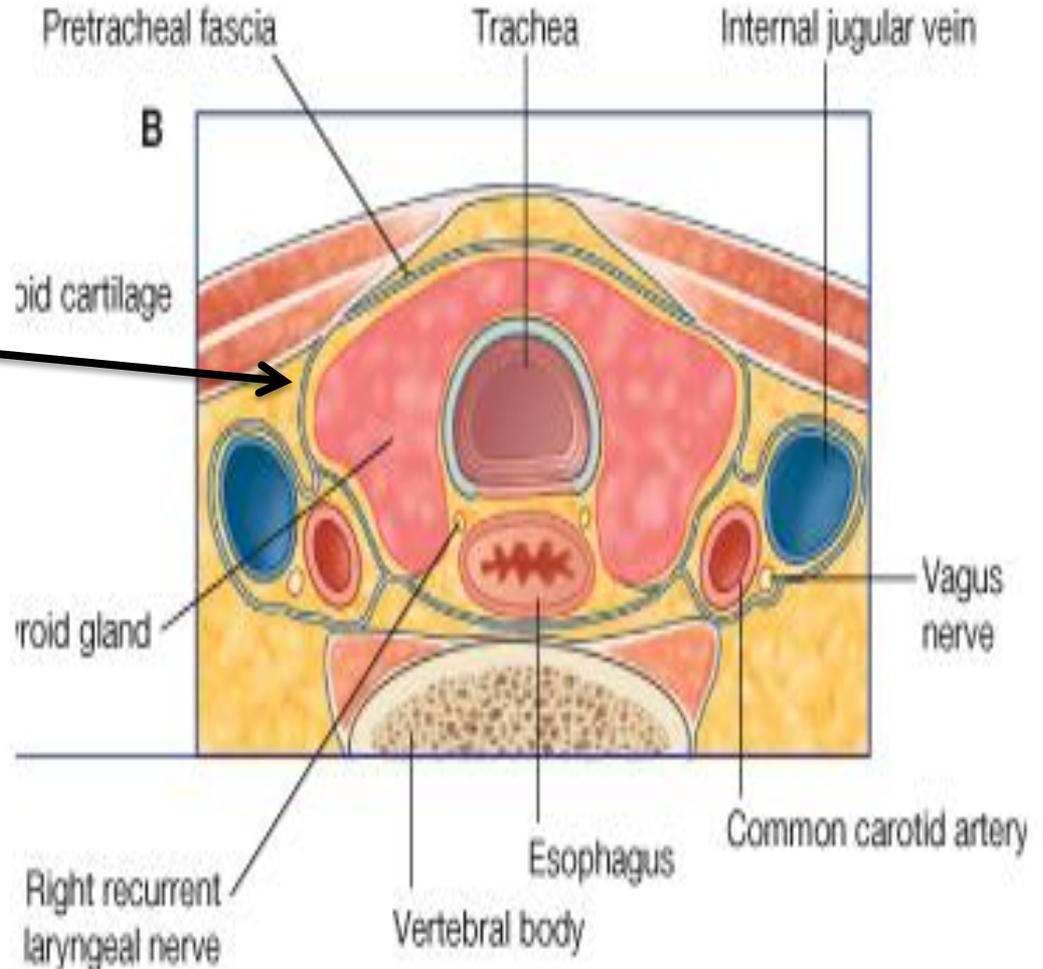
The isthmus extends across the midline in front of **the second, third, and fourth tracheal rings**. A pyramidal lobe is often present, and it projects upward from the isthmus

It is a vascular organ surrounded by a sheath derived from the **pretracheal layer of deep fascia**.

The sheath attaches the gland to the larynx and the trachea.

explains why the thyroid gland follows the movements of the larynx in swallowing.

This information is important because any pathologic neck swelling that is part of the thyroid gland will move upward when the patient is asked to swallow



Relations of the Lobes

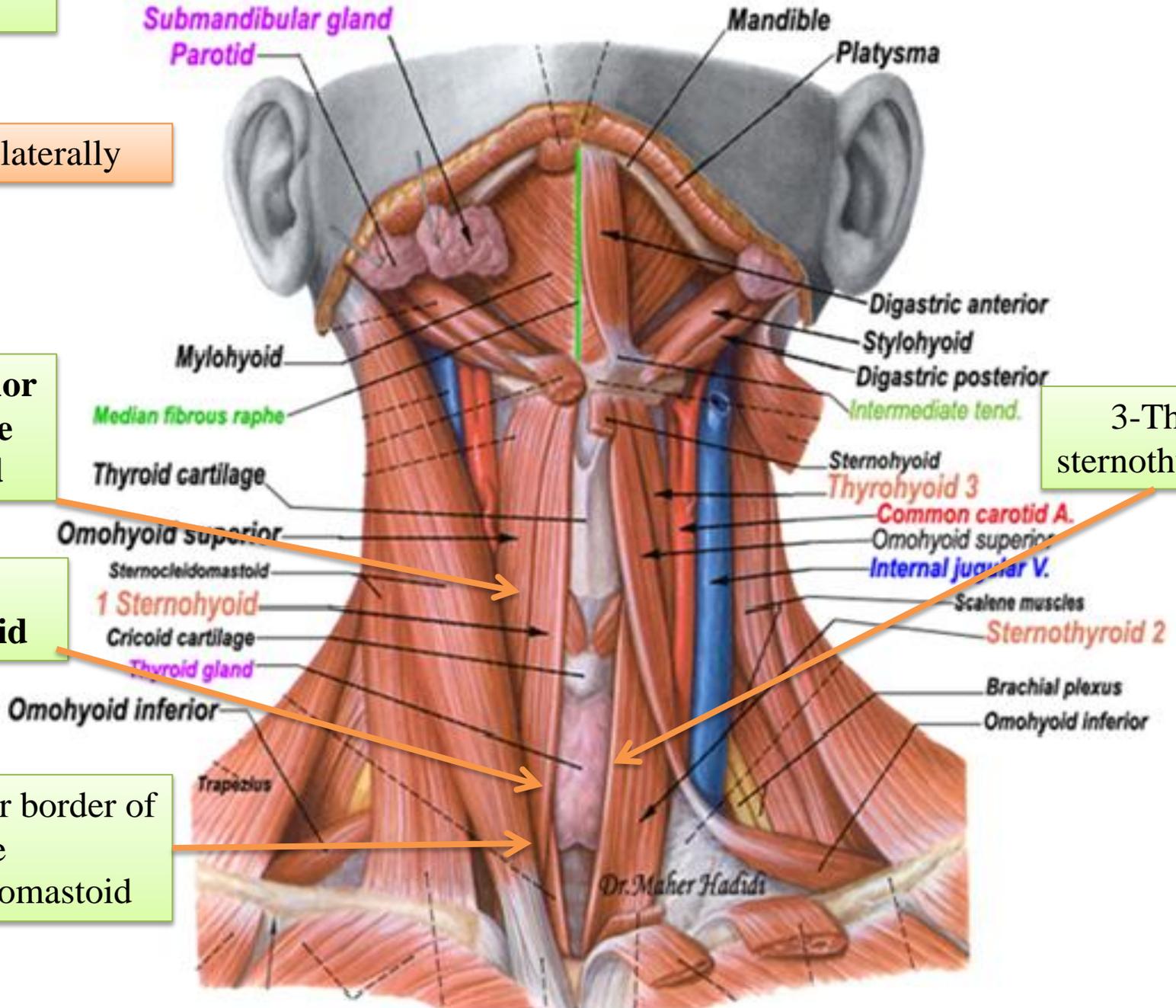
Anterolaterally

2-the superior belly of the omohyoid

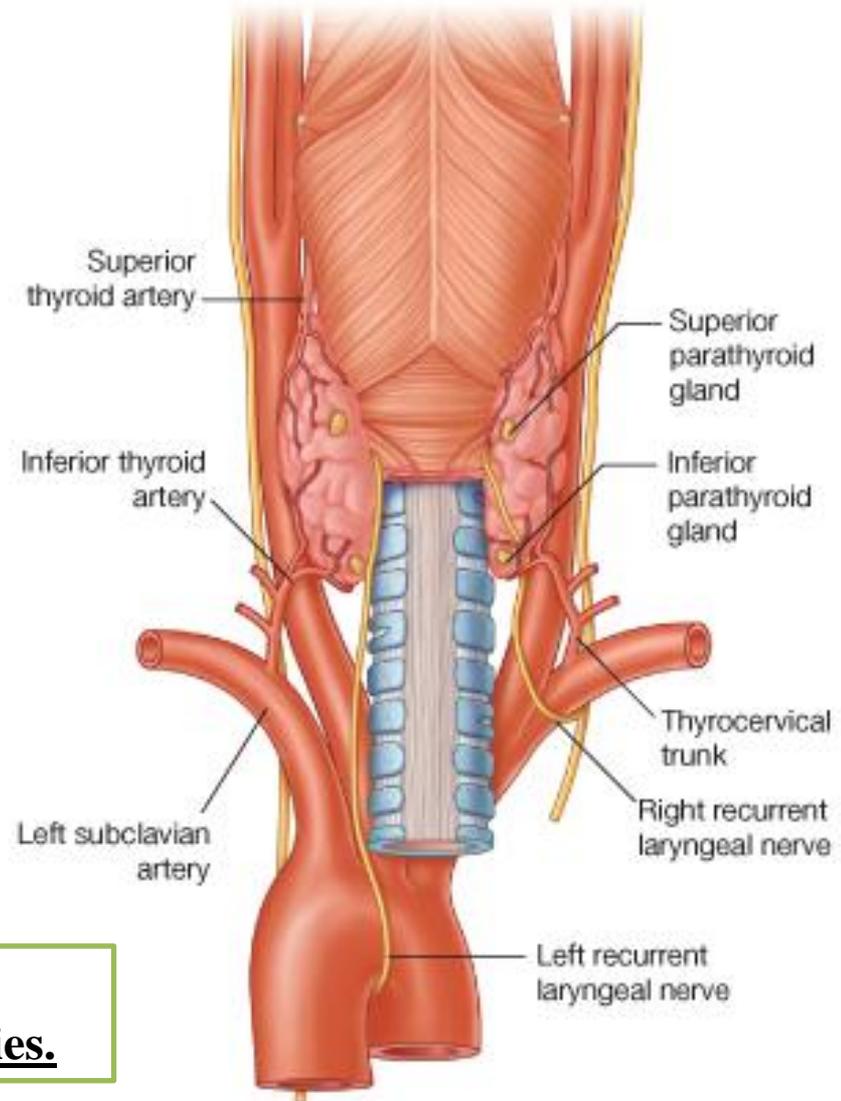
1-The sternohyoid

3-The sternothyroid

4-the anterior border of the sternocleidomastoid



The rounded posterior border of each lobe is related posteriorly to the superior and inferior parathyroid glands and



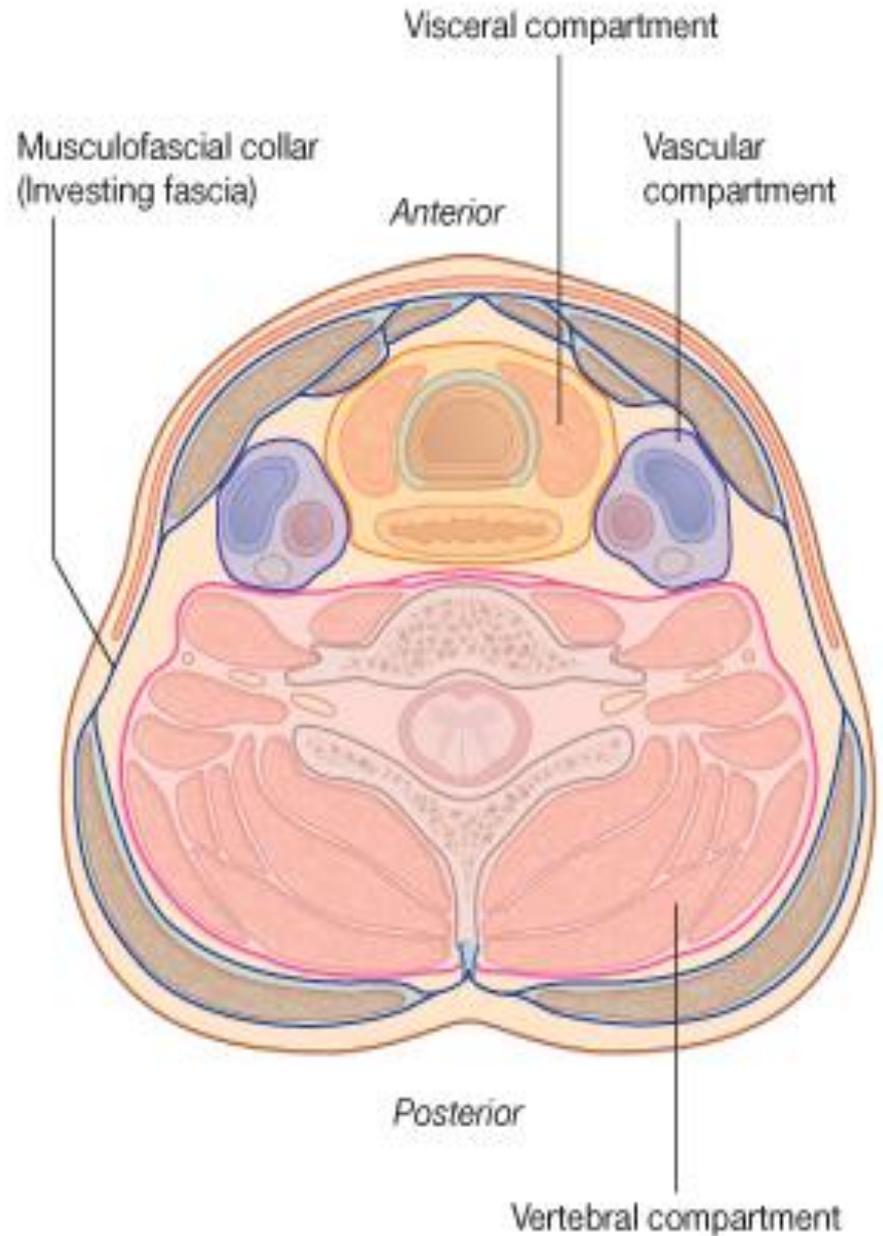
The anastomosis between the superior and inferior thyroid arteries.

Posterior view

Posterolaterally:
The carotid sheath with the common carotid artery, the internal jugular vein, and the vagus nerve

Medially:

The larynx, the trachea, the pharynx, and the esophagus. Associated with these structures are the cricothyroid muscle and its nerve supply, the external laryngeal nerve. In the groove between the esophagus and the trachea is the recurrent laryngeal nerve



Retrosternal Goiter

The attachment of the sternothyroid muscles to the thyroid cartilage effectively binds down the thyroid gland to the larynx

limits upward expansion of the gland

However, downward expansion

has no limitation

Therefore:

a pathologically enlarged thyroid gland
MAY
extend downward
behind the sternum.

A retrosternal goiter

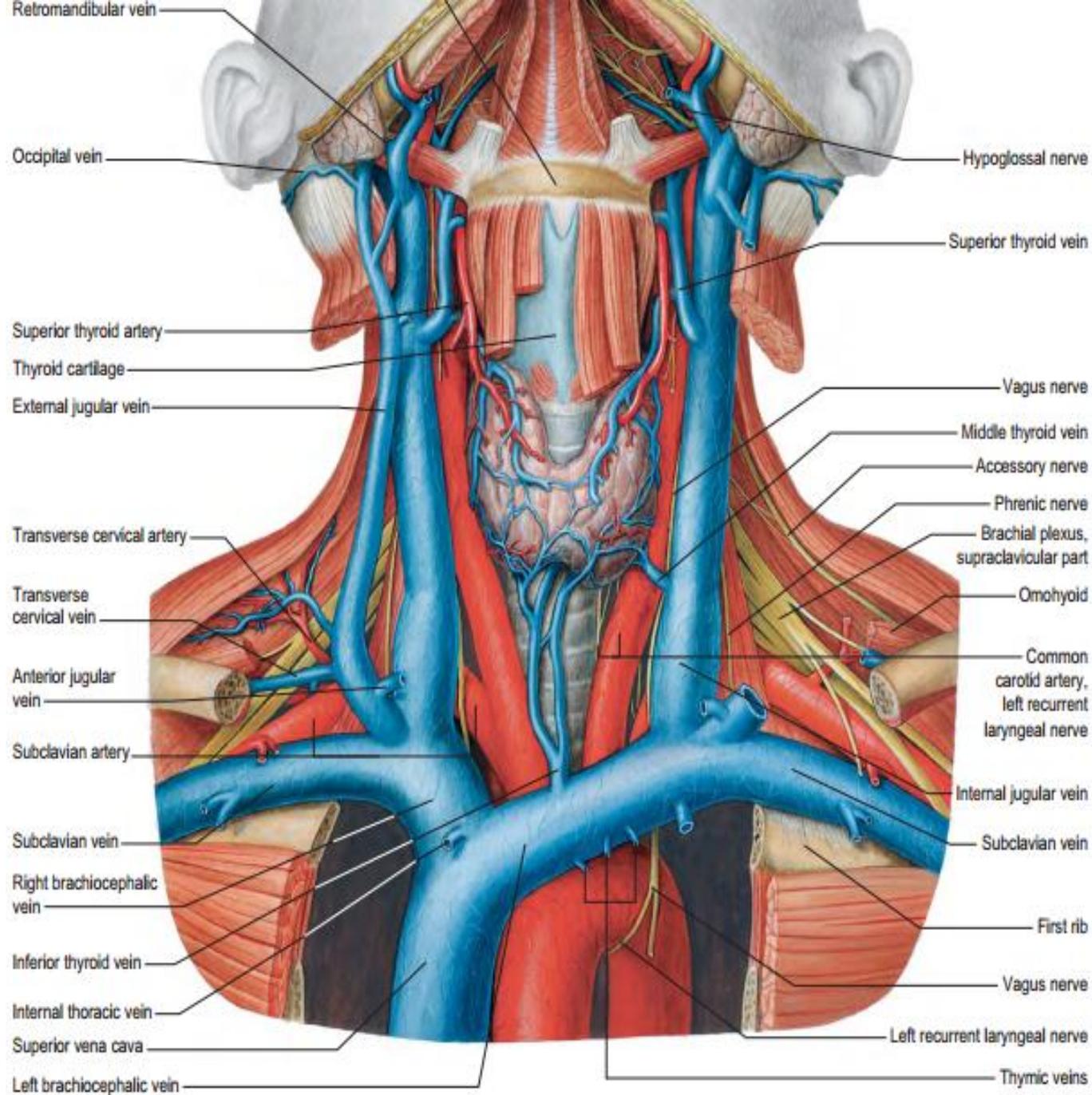
IMPORTANT

any abnormal enlargement of the thyroid gland
can compress the
trachea and cause dangerous

dyspnea;

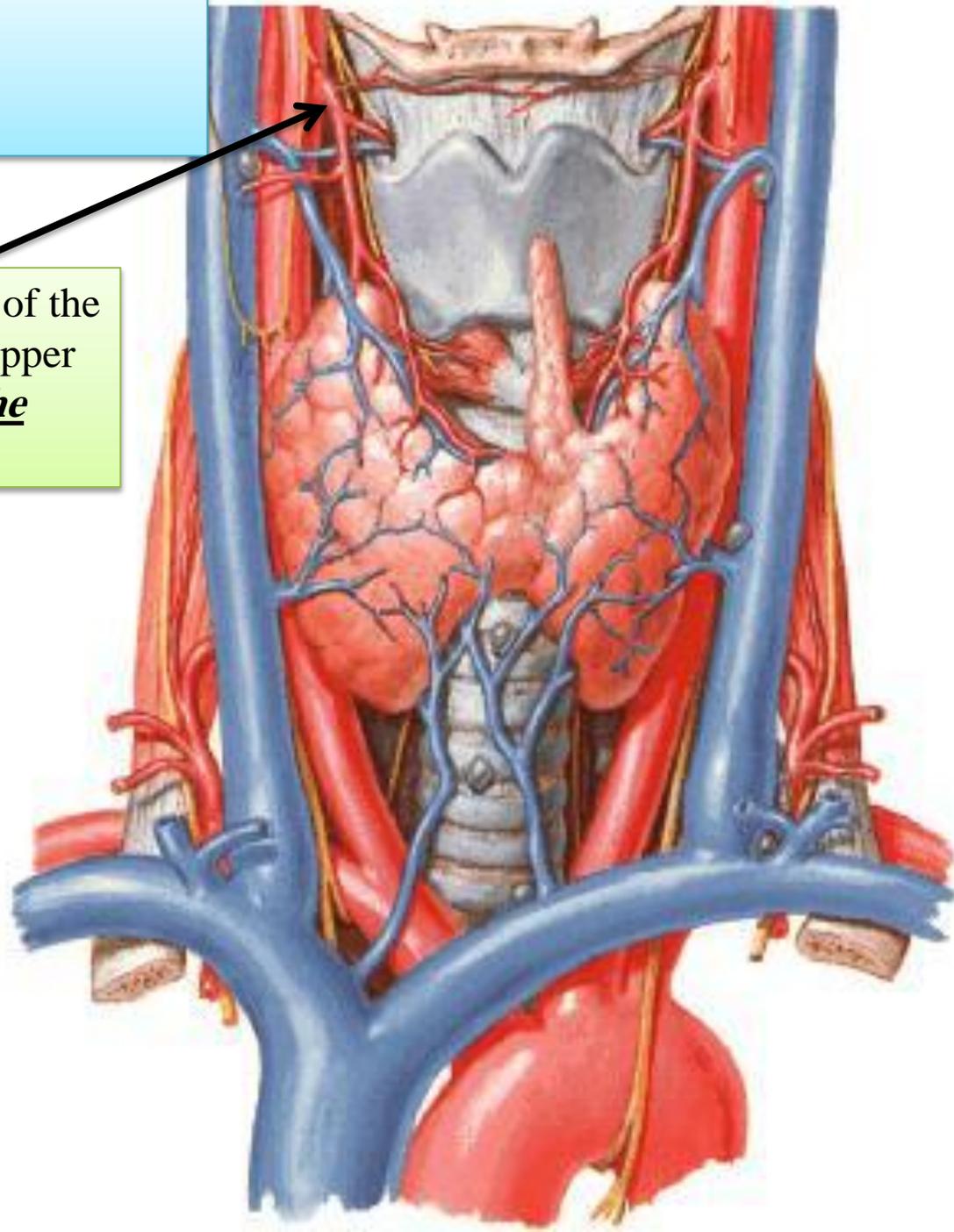
it can also cause severe
venous compression.

Blood Supply



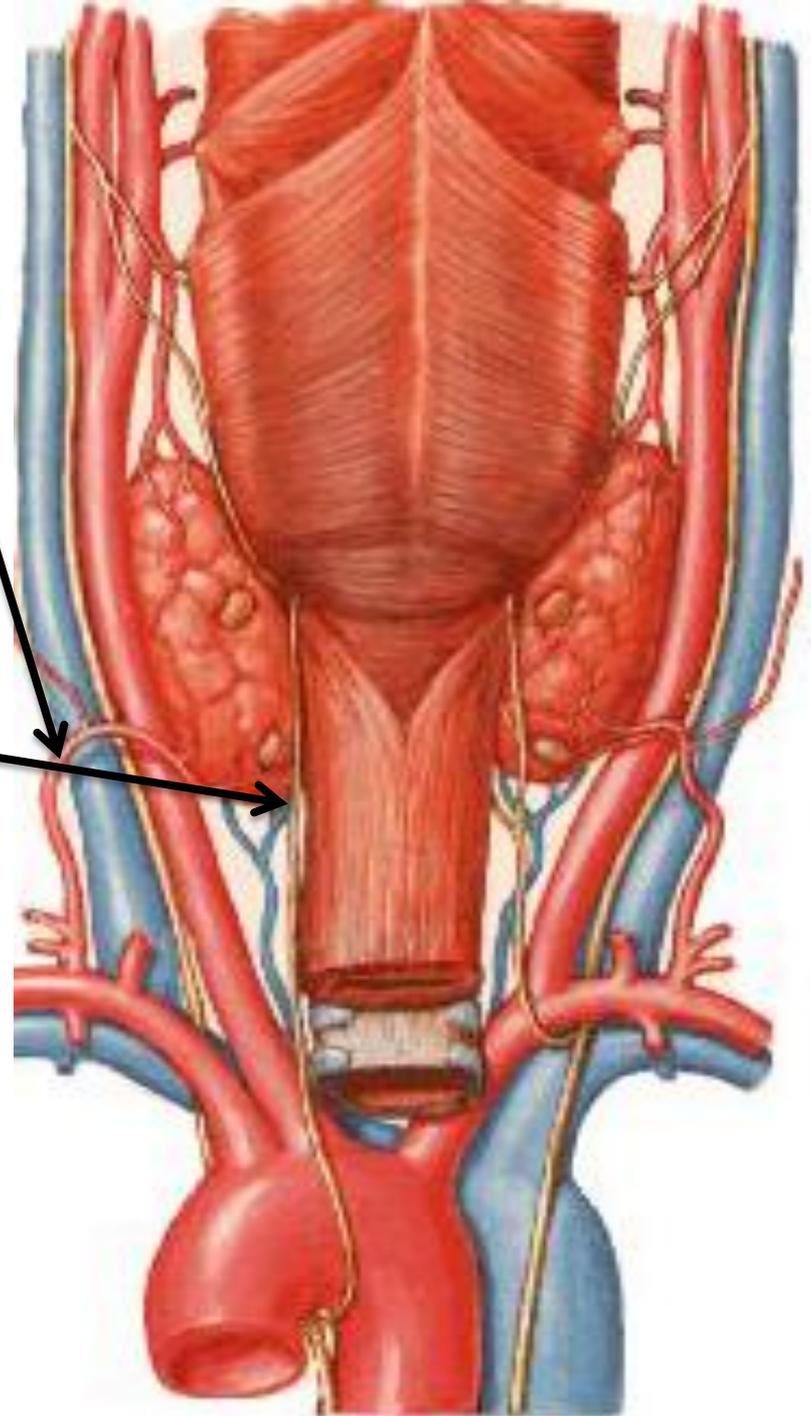
- 1-The superior thyroid artery
- 2-The inferior thyroid artery
- 3- Sometimes the thyroidea ima.

1-The superior thyroid artery, a branch of the external carotid artery, descends to the upper pole of each lobe, accompanied by the external laryngeal nerve



2-The inferior thyroid artery, a branch of the thyrocervical trunk, 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.

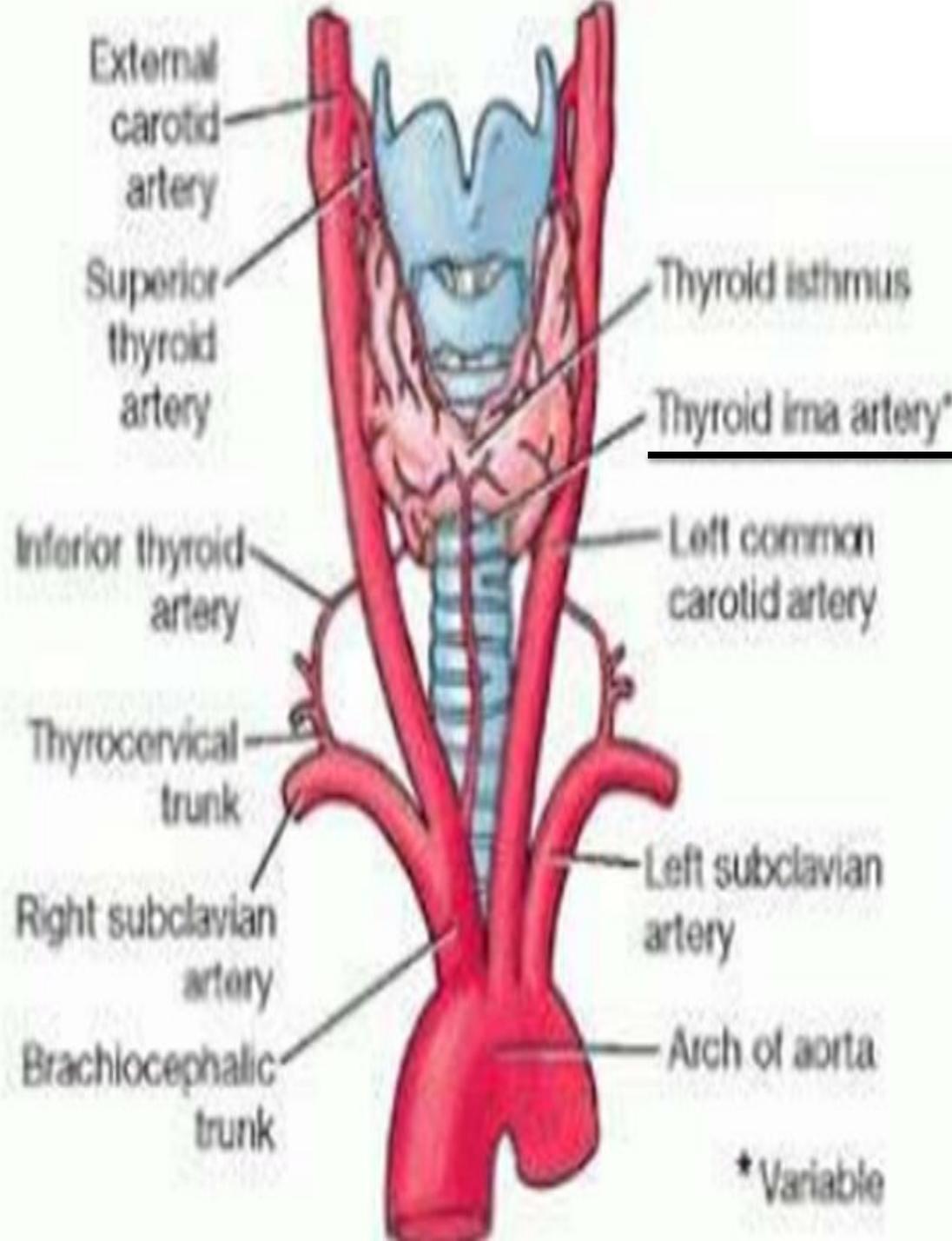


3-The thyroidea ima, In approximately 10% of people, a thyroid ima artery

arises from the brachiocephalic trunk, **the arch of the aorta,** from the right common carotid subclavian, or internal thoracic arteries

ascends on the anterior surface of the trachea, which it supplies, and continues to the isthmus of the thyroid gland.

The possible presence of this artery must be considered when performing procedures **in the midline of the neck inferior to the isthmus because it is a potential source of bleeding**



The veins from the thyroid gland are the:

1-Superior thyroid

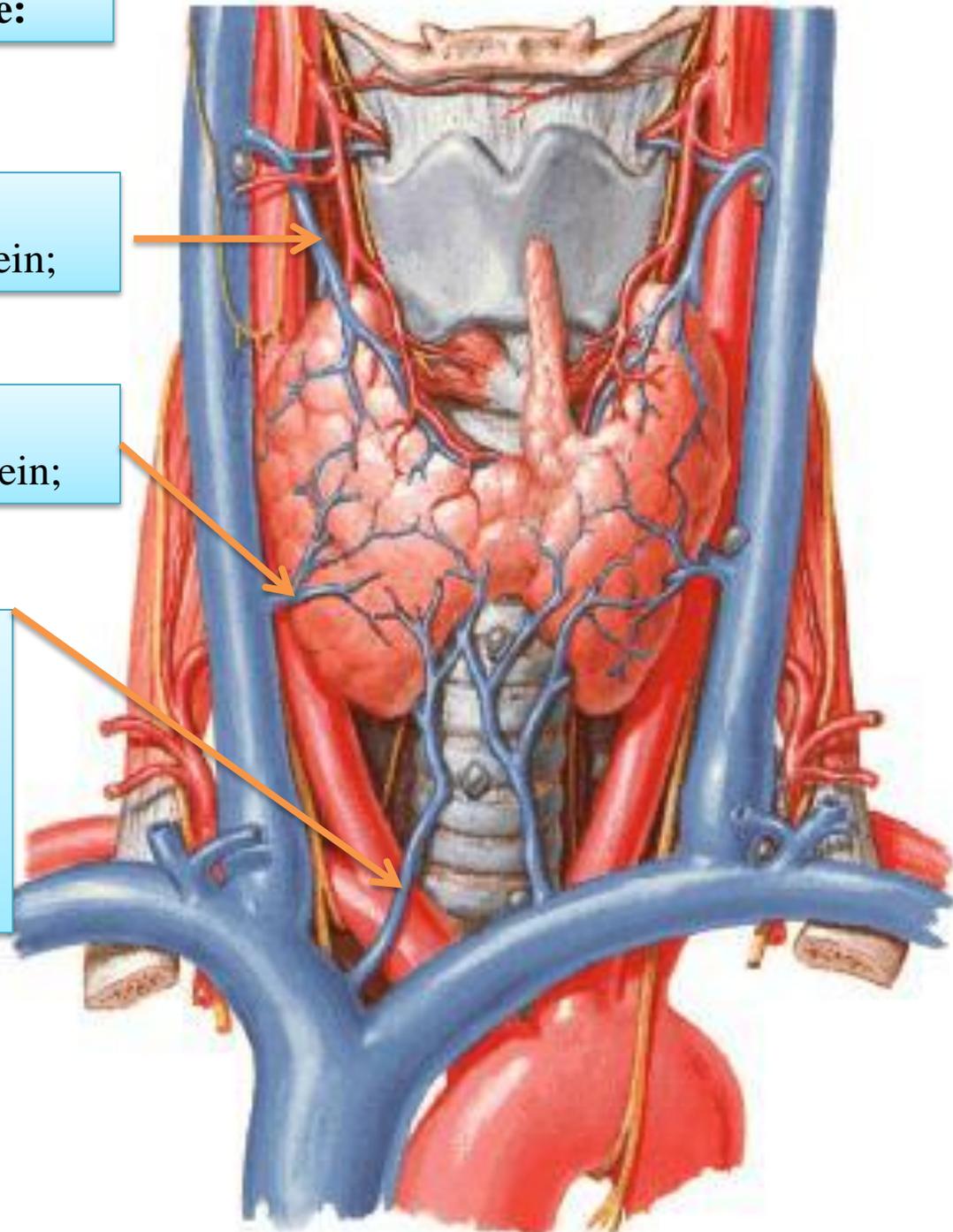
which drains into the internal jugular vein;

2-The middle thyroid

which drains into the internal jugular vein;

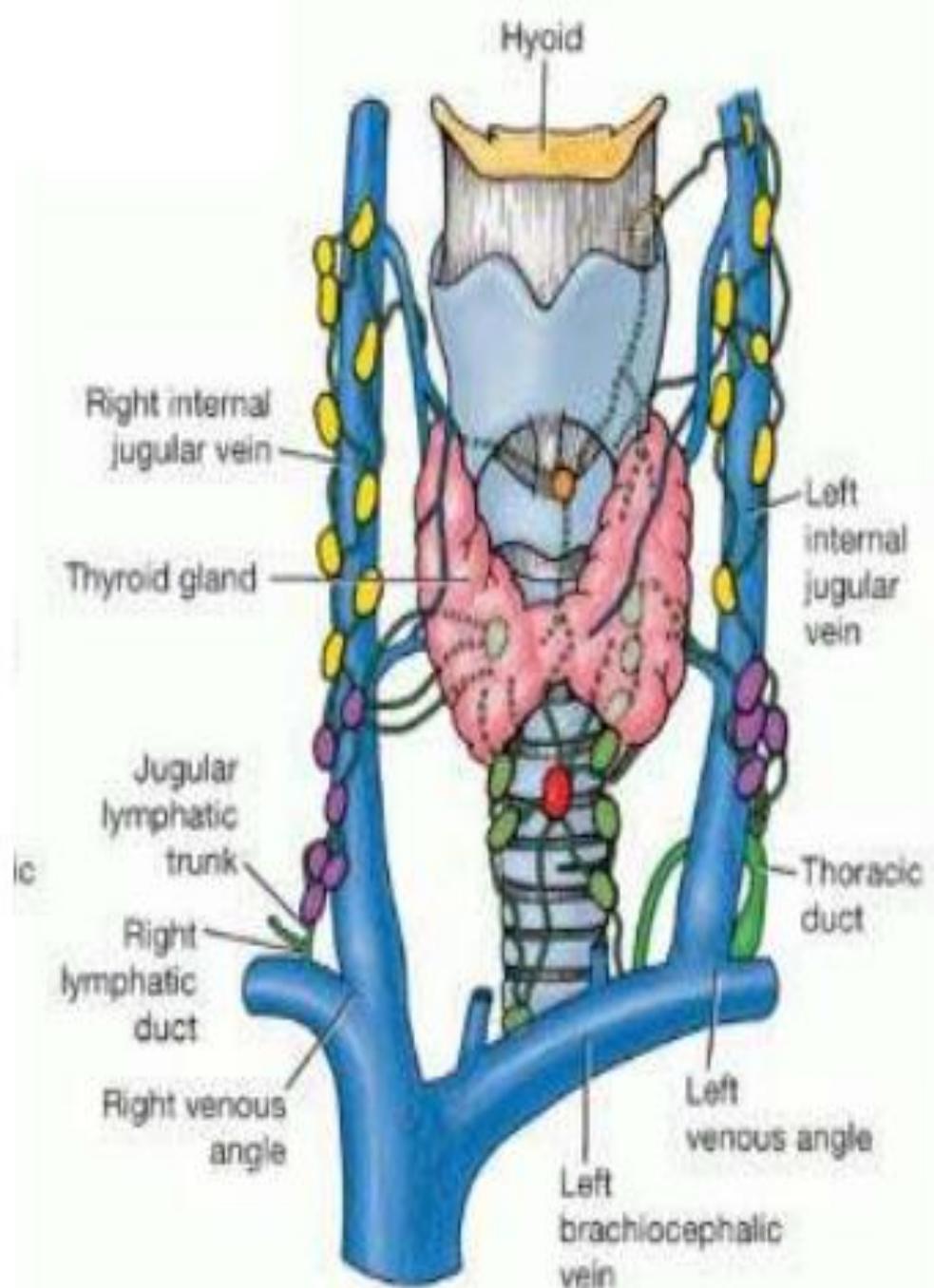
3-The inferior thyroid

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



The lymphatic vessels of the thyroid gland communicate with a capsular network of lymphatic vessels.

From this network, the vessels pass initially to prelaryngeal, pretracheal, and paratracheal lymph nodes, which drain in turn to the superior and inferior deep cervical nodes. Inferior to the thyroid gland, the lymphatic vessels pass directly to the inferior deep cervical lymph nodes. Some lymphatic vessels may drain into brachiocephalic lymph nodes or the thoracic duct.



Lesions of the Laryngeal Nerves

The muscles of the larynx are innervated by the recurrent laryngeal nerves, with the exception of the cricothyroid muscle, which is supplied by the external laryngeal nerve. Both these nerves are vulnerable during operations **on the thyroid gland because of the close relationship between them and the arteries of the gland.**

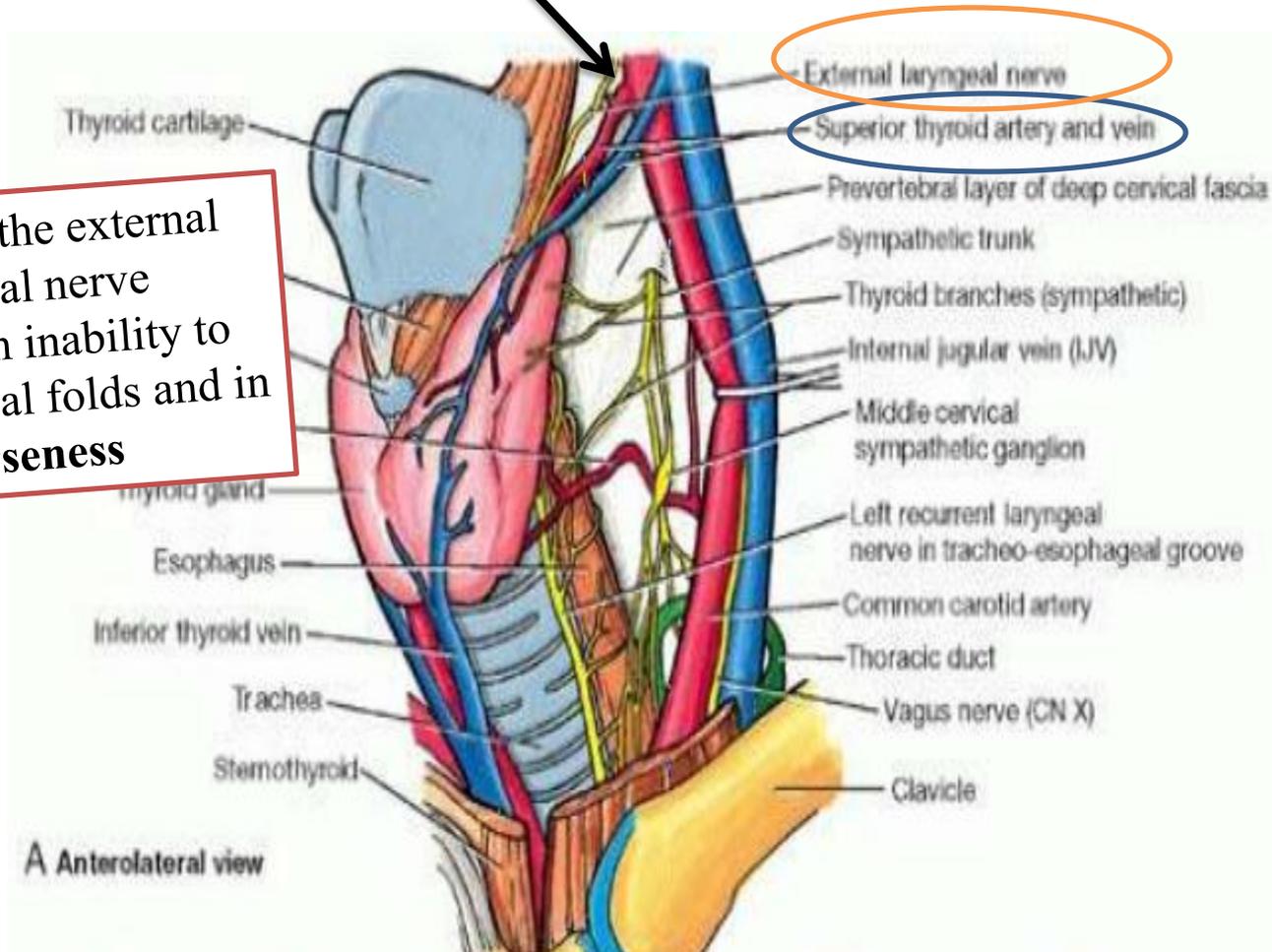
It should be remembered that the two main arteries supplying the thyroid gland are closely related to important nerves that can be damaged during thyroidectomy operations

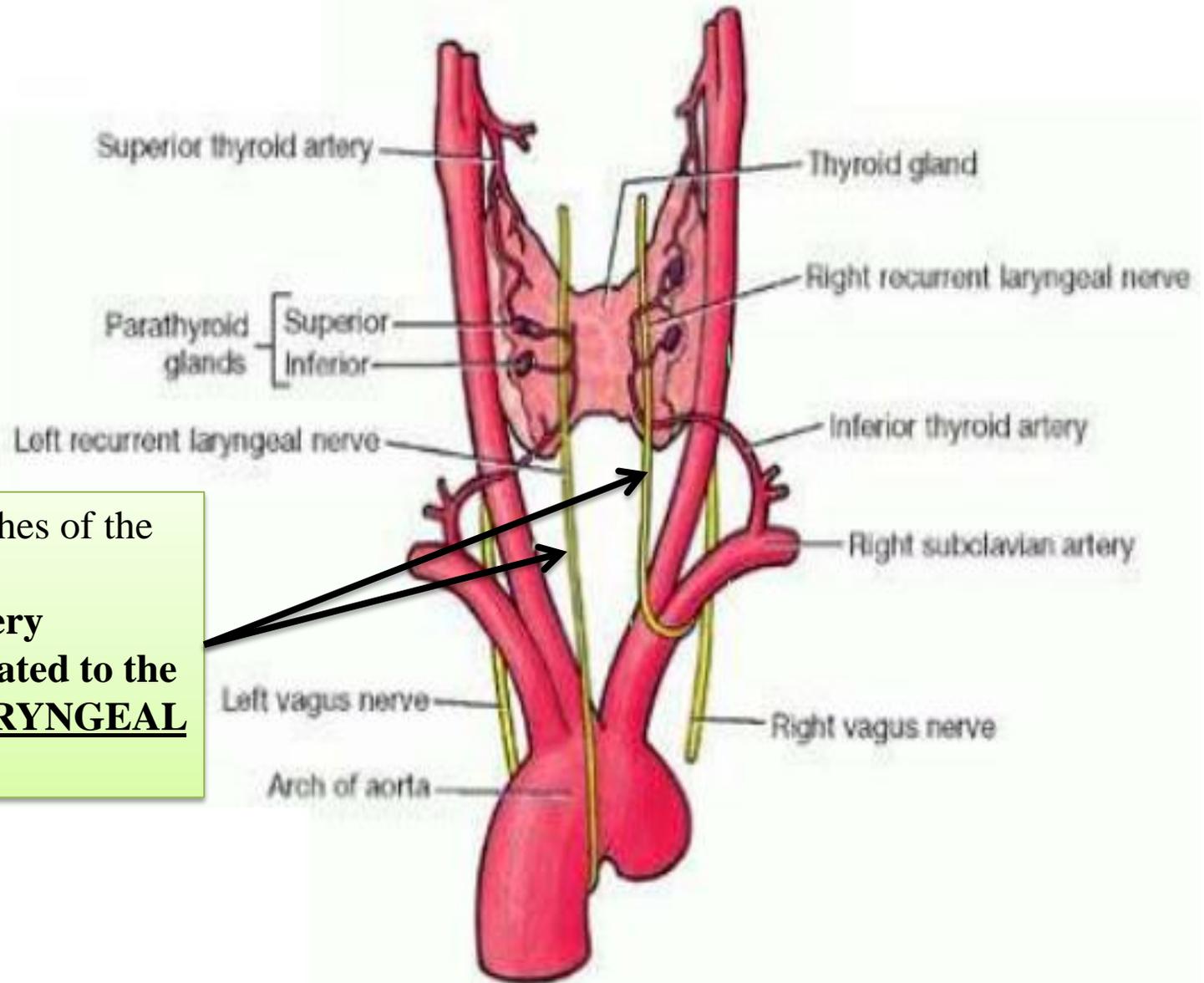


To be discussed next year

The **superior thyroid artery on each side is related** to the external laryngeal nerve, which supplies the cricothyroid muscle.

Damage to the external laryngeal nerve results in an inability to tense the vocal folds and in **hoarseness**





The terminal branches of the inferior thyroid artery on each side are related to the RECURRENT LARYNGEAL NERVE.

Embryology

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

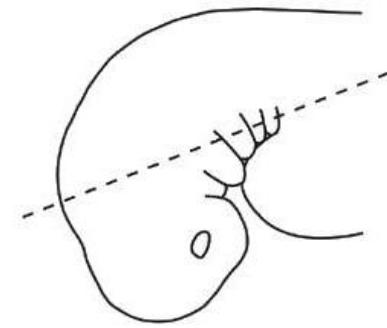
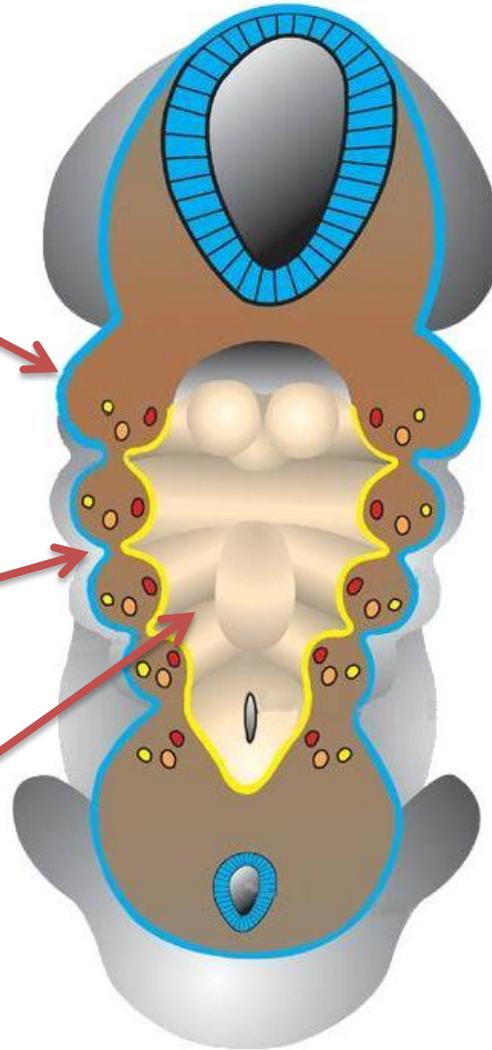
The following can be noticed

THE PHARYNGEAL ARCHES

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

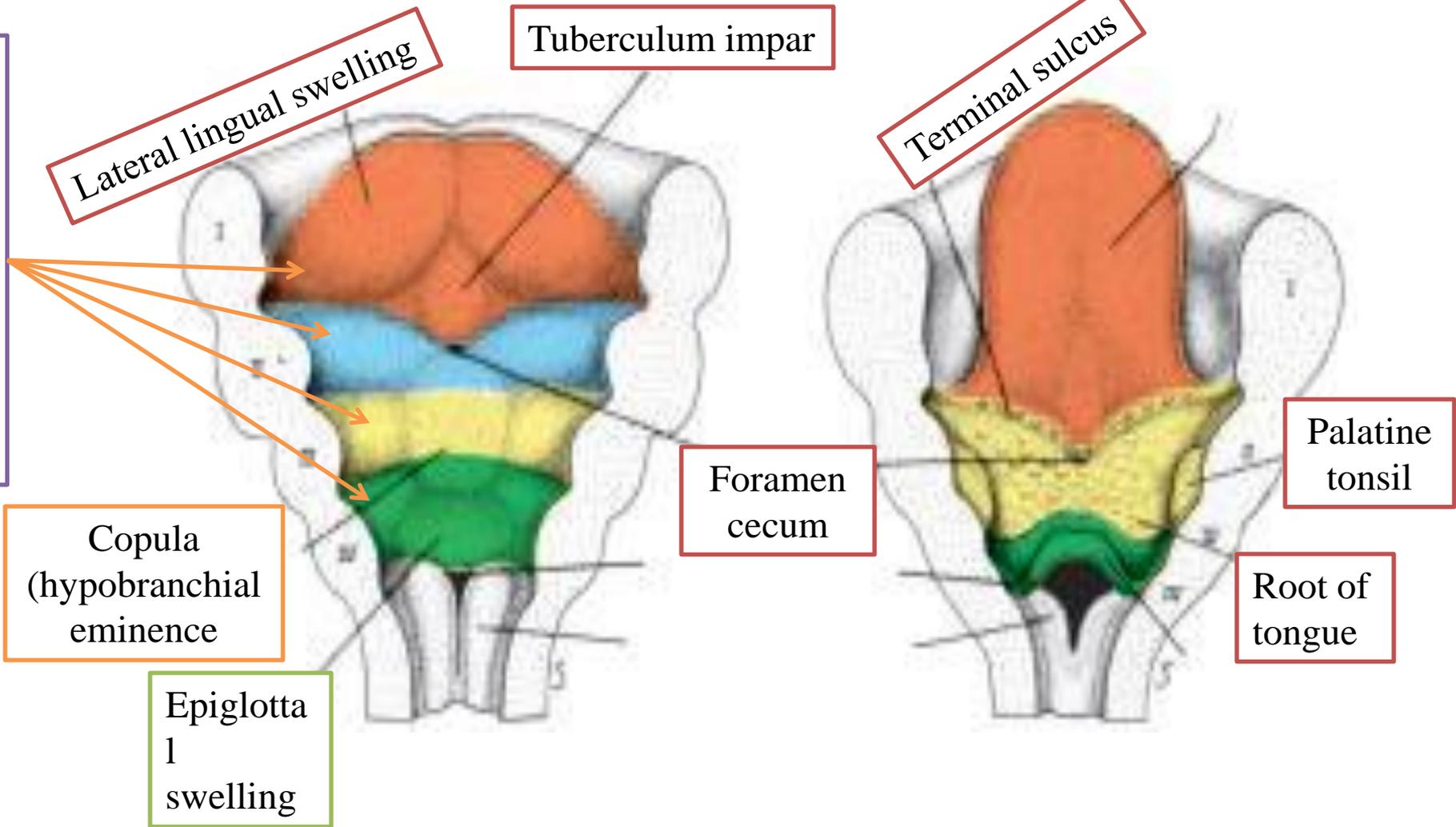
with development of the arches and clefts,
a number of outpocketings,

**The pharyngeal
pouches appear**



Read only

in the floor of the pharynx



1-As the lateral lingual swellings increase in size, they overgrow *the tuberculum impar and merge*, forming the anterior two-thirds, or body, of the tongue

Since the mucosa covering the body of the tongue originates from the first pharyngeal arch, sensory innervation to this area is by the mandibular branch of the trigeminal nerve.

The body of the tongue is separated from the posterior third by a V-shaped groove, the terminal sulcus

2-The posterior part, or root, of the tongue originates from the second, third, and part of the fourth pharyngeal arch

The fact that sensory innervation to this part of the tongue is supplied by the glossopharyngeal nerve indicates that tissue of the third arch overgrows that of the second.

Some of the tongue muscles probably differentiate in situ, but most are derived from myoblasts originating in occipital somites.

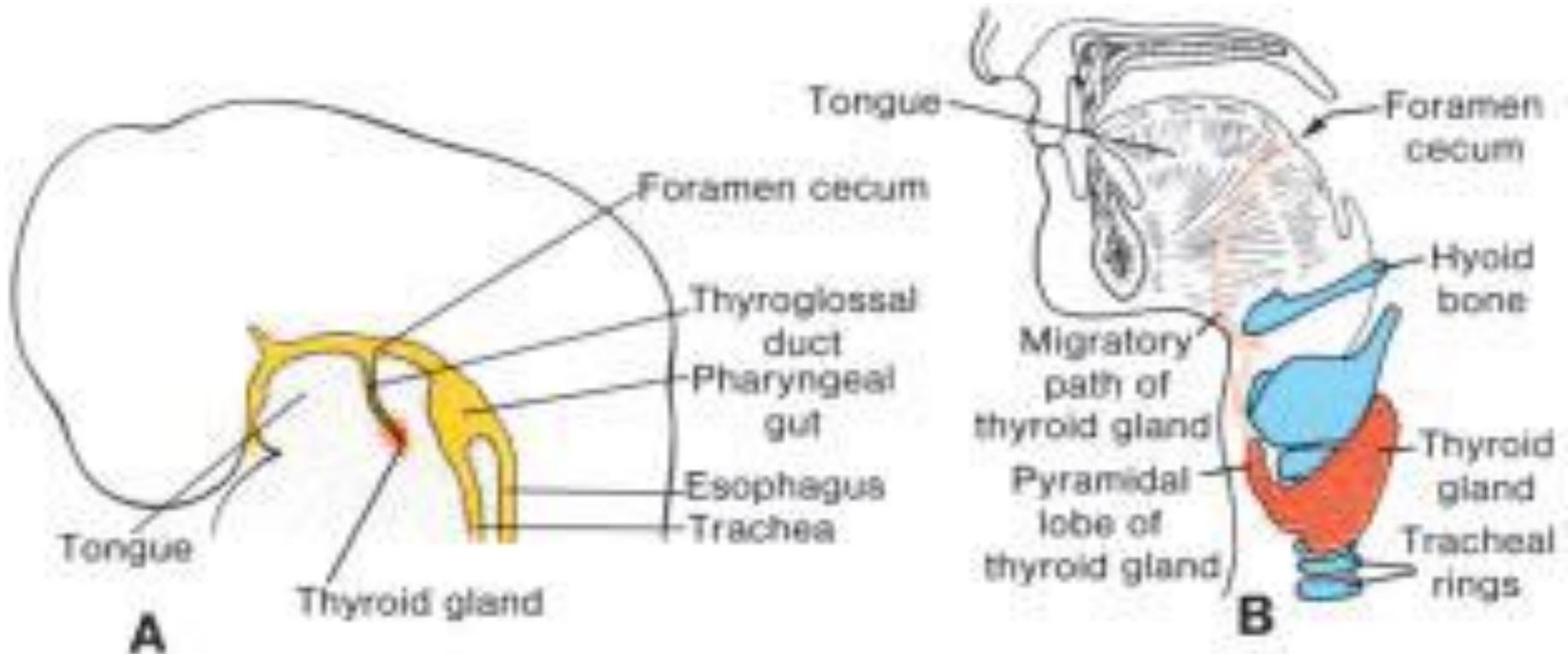
Thus, tongue musculature is innervated by the hypoglossal nerve.

Thyroid Gland

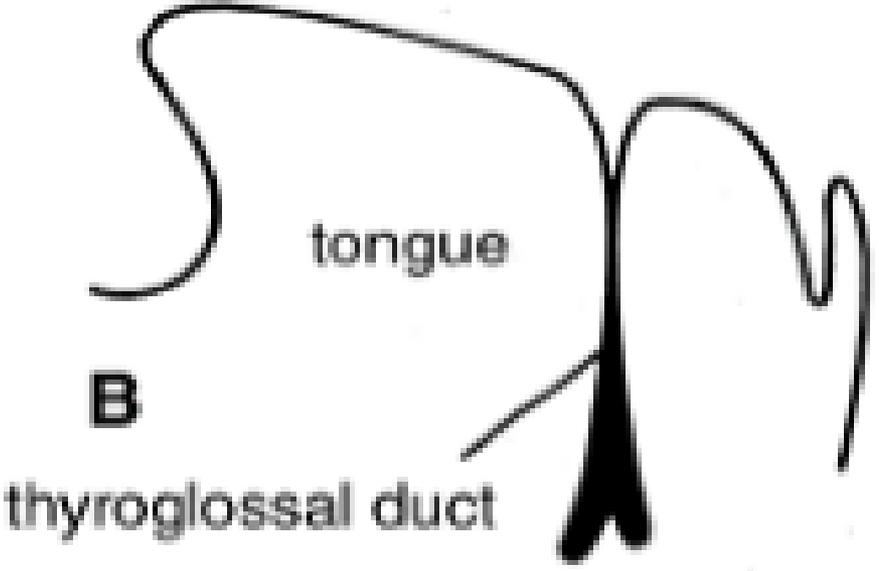
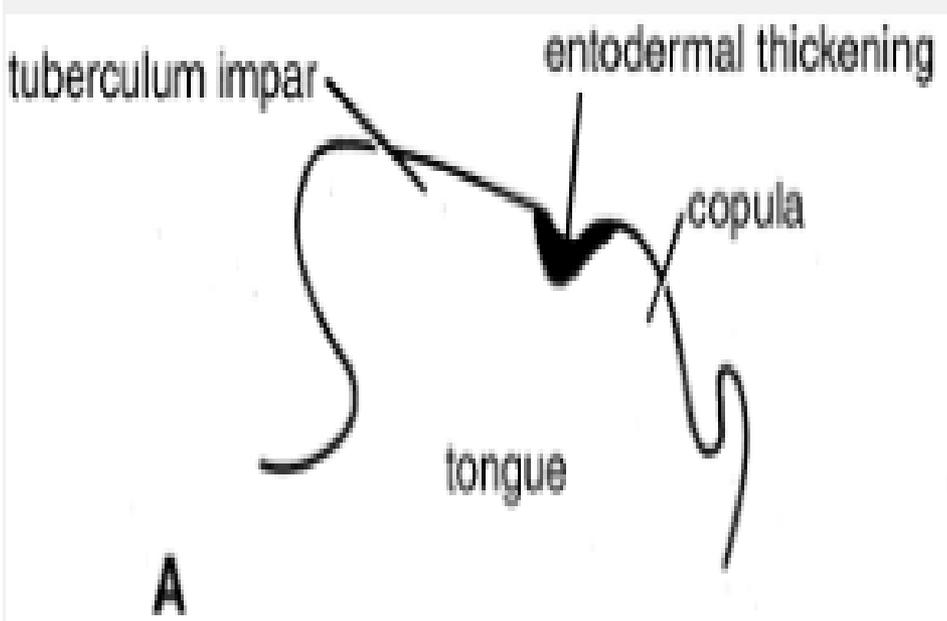
begins to develop during the third week as an endodermal thickening in the floor of the pharynx

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

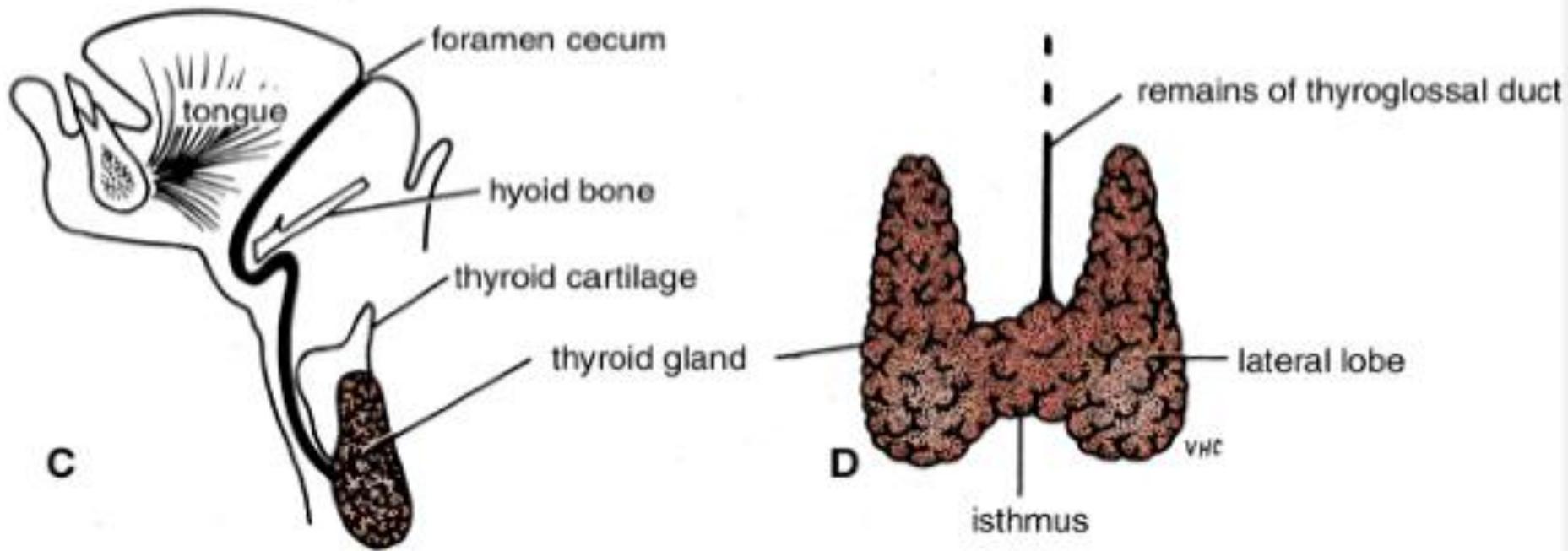
descends in front of the pharyngeal gut as a bilobed diverticulum
During this migration, the thyroid remains connected to the tongue by a narrow canal, the **thyroglossal duct**. This duct later disappears.



Later, this thickening becomes a diverticulum that grows inferiorly into the underlying mesenchyme and is called **the thyroglossal duct**



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



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. **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 site of origin of the thyroglossal duct on the tongue remains as a **pit called the foramen cecum.** The thyroid gland may now be divided into a small median isthmus and two large lateral lobes

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.

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

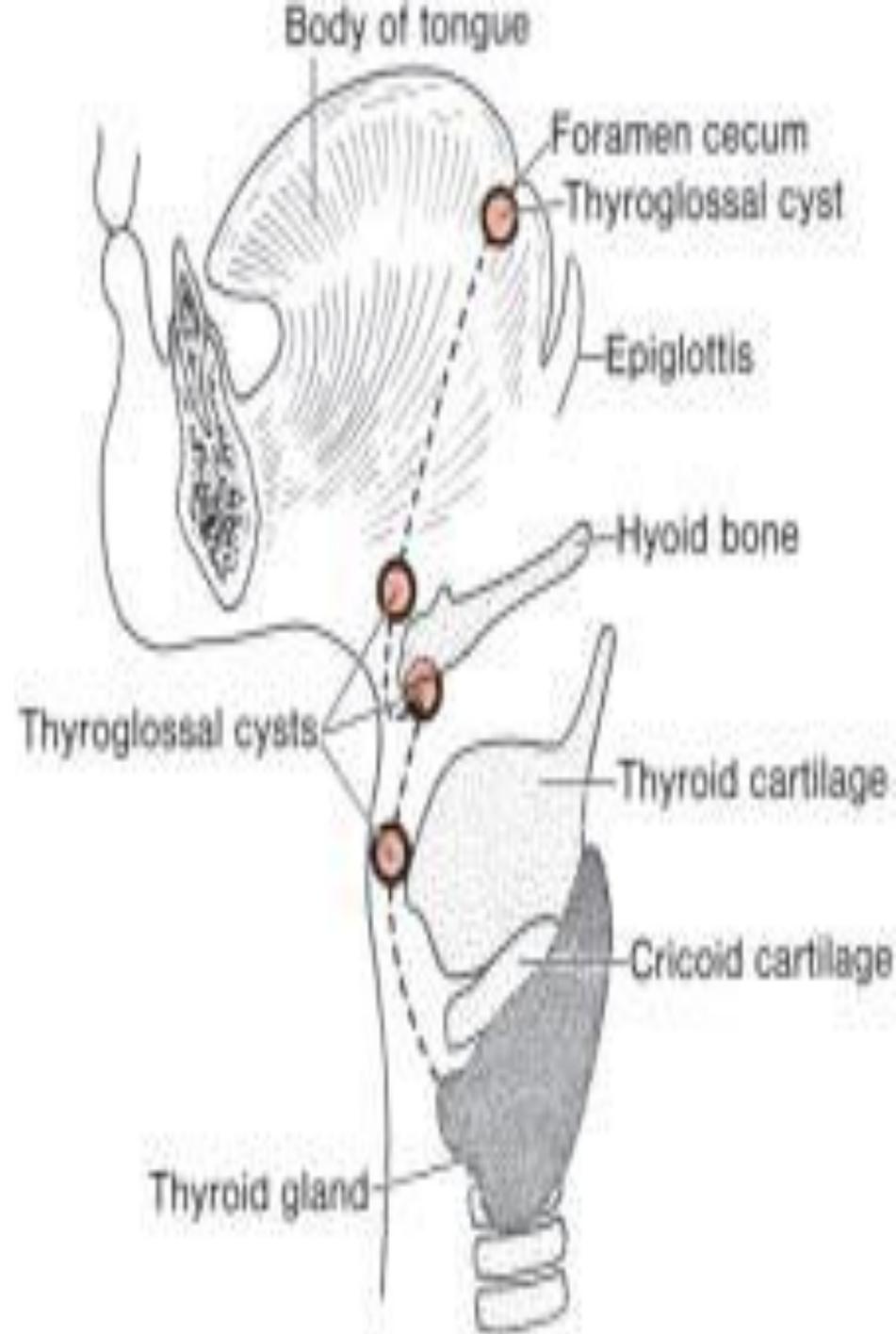
50% of these cysts are close to or just inferior to the body of the hyoid bone they may also ***be found at the base of the tongue***

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

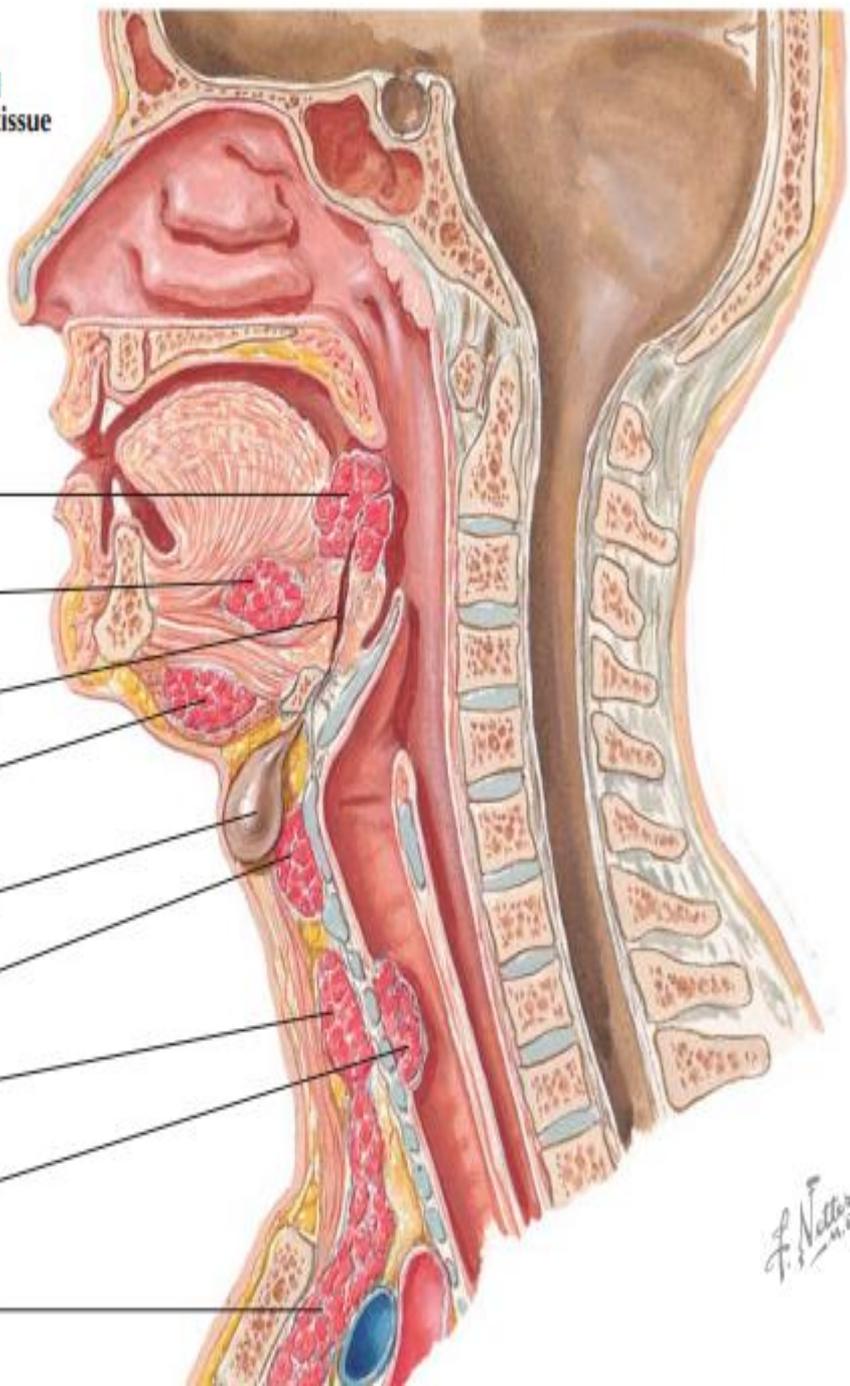
arises secondarily after rupture of a cyst but may be present at birth.



Thyroglossal Duct and Thyroid Abnormalities

Aberrant and normal locations of thyroid tissue

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



F. Netter M.D.

Congenital Anomalies of the Thyroid Gland

Agenesis of the Thyroid

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

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

Persistent Thyroglossal Duct

Conditions related to a persistence of the thyroglossal duct

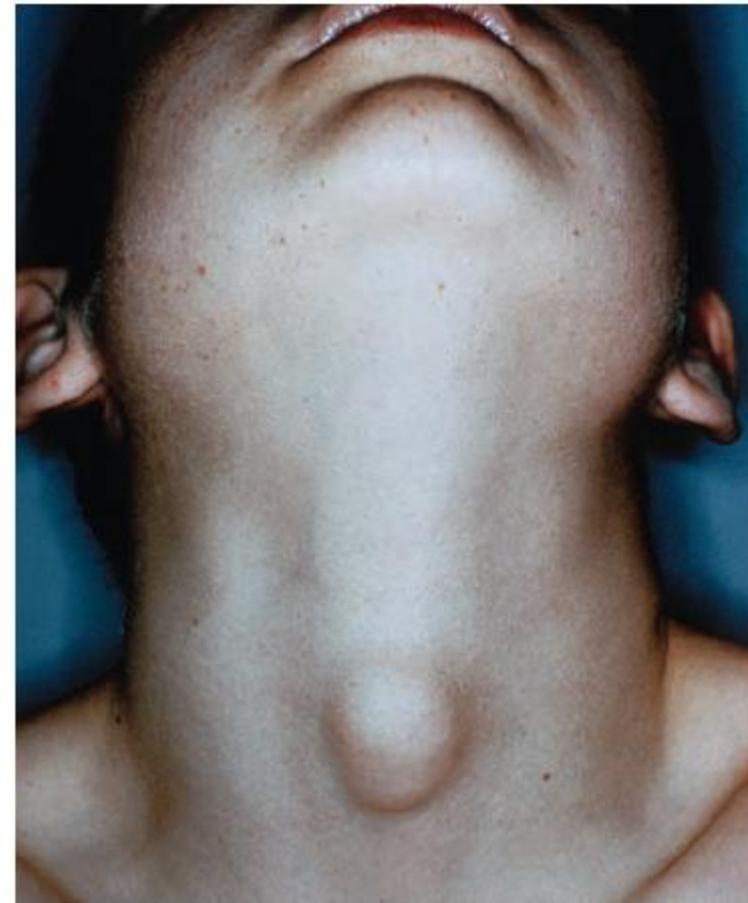
usually appear in childhood, in adolescence, or in young adulthood



Lingual thyroid.

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



A thyroglossal cyst.

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.**



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.

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



lateral

cervical
cyst

Branchial Fistulas



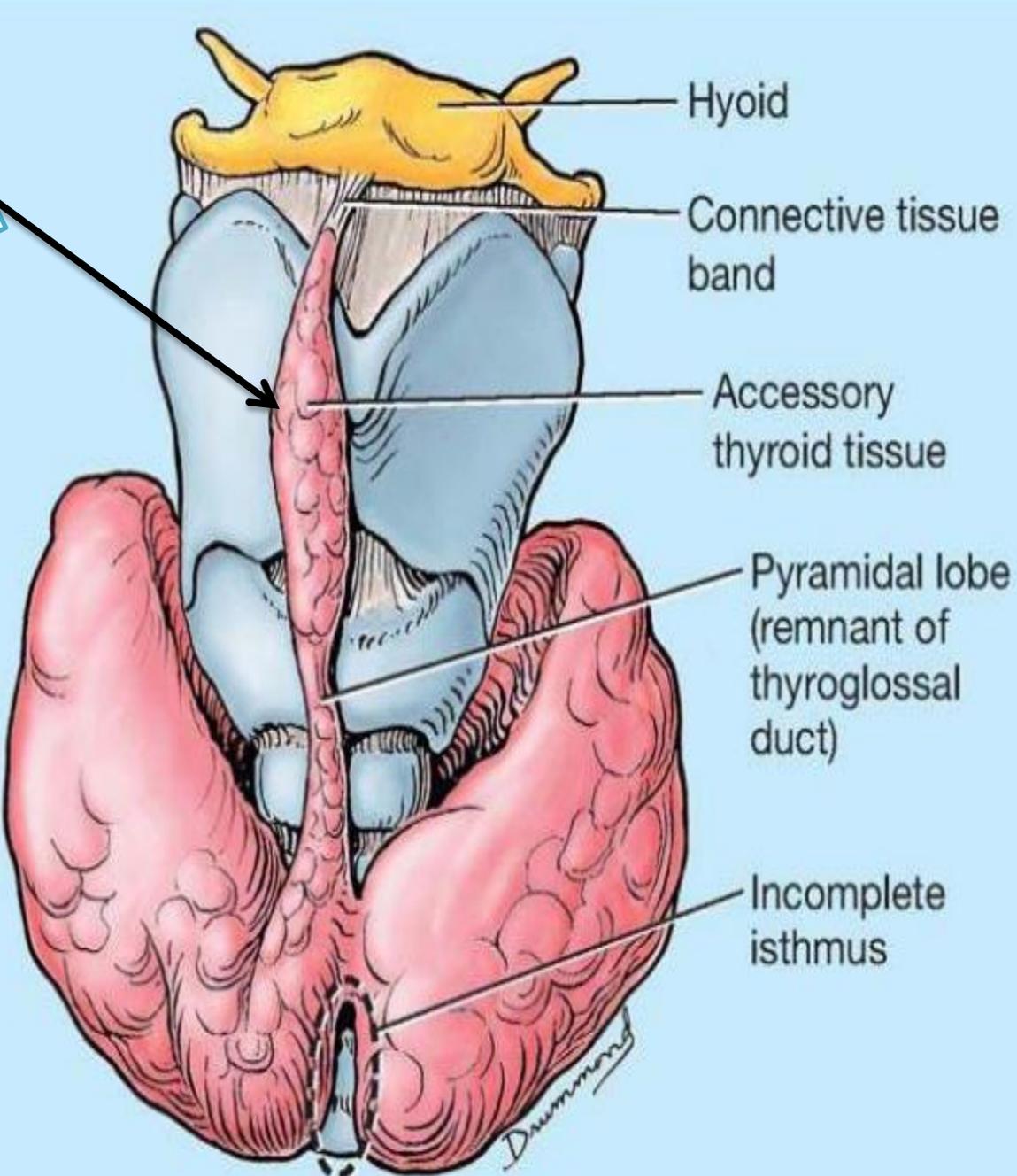
Branchial fistulas occur when the second pharyngeal arch fails to grow caudally over the third and fourth arches, leaving remnants of the second, third, and fourth clefts in contact with the surface by a narrow canal.

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.

Accessory Thyroid Tissue



Hyoid

Connective tissue band

Accessory thyroid tissue

Pyramidal lobe (remnant of thyroglossal duct)

Incomplete isthmus

Anterior view

Radiology

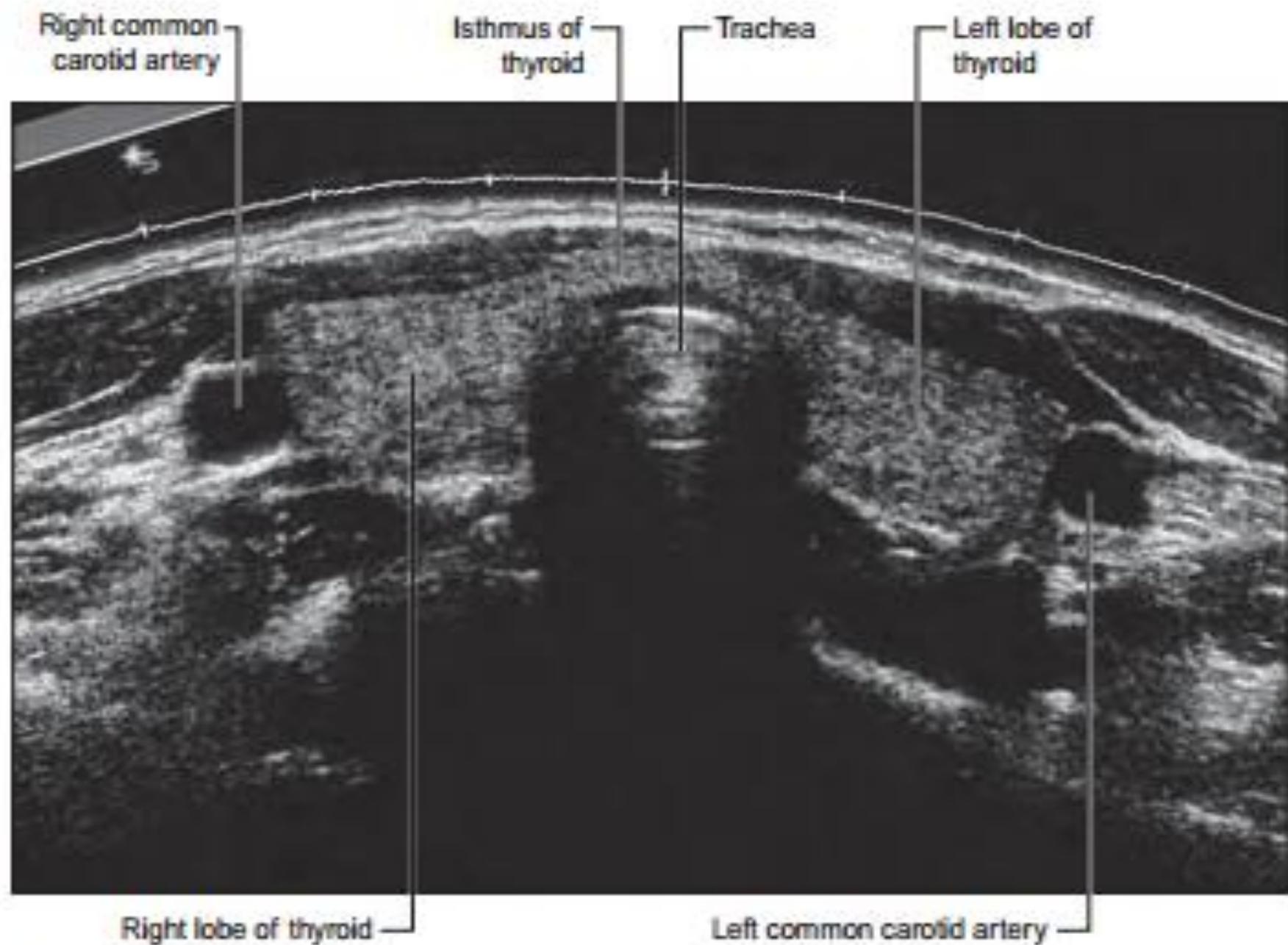


Fig. 28.20 Thyroid sonogram.

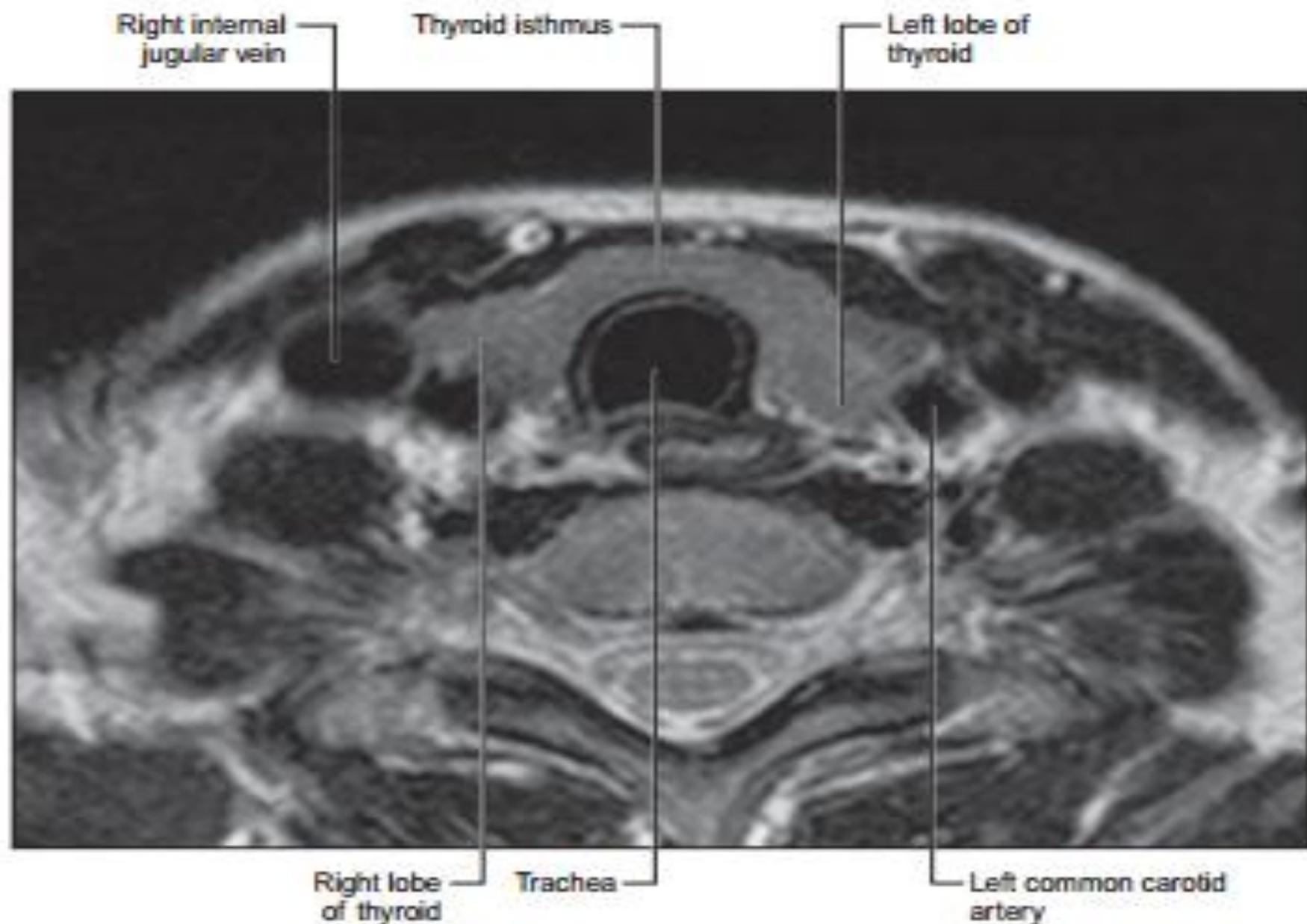


Fig. 28.21 T₂-weighted MRI at the level of the thyroid isthmus: compare with **Fig. 28.20**.

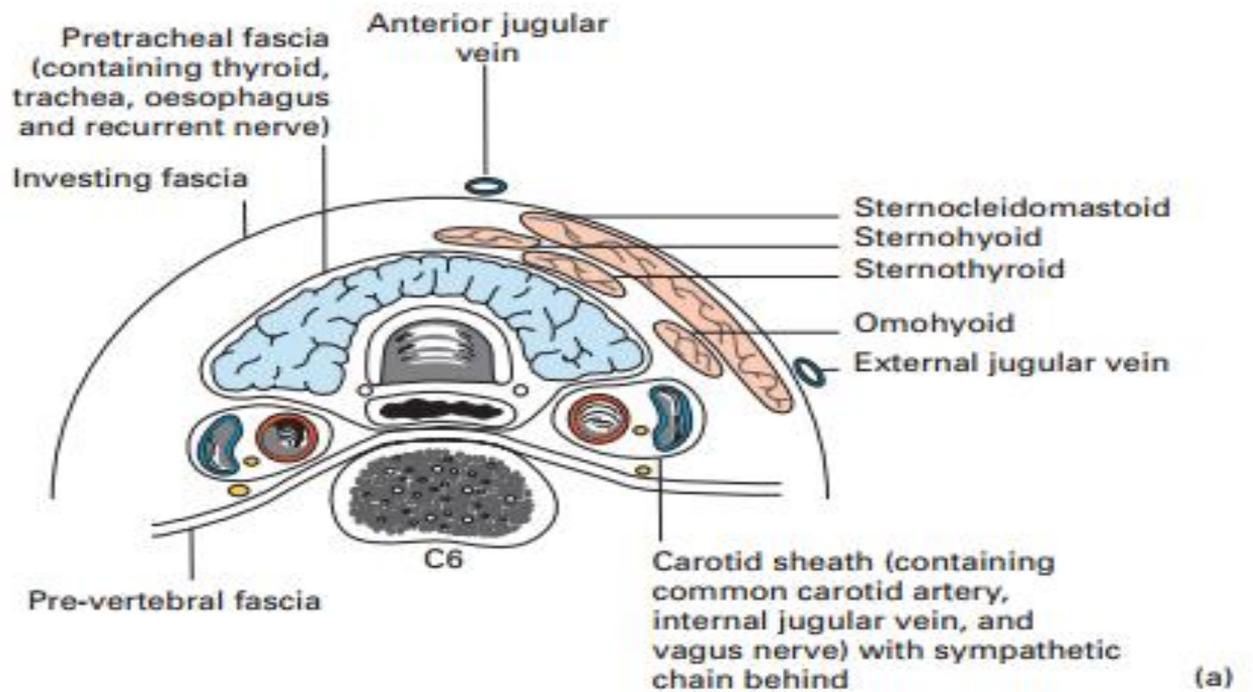


Fig. 188 (a) Transverse section of the neck through C6—showing the fascial planes and also the contents of the pretracheal fascia (or 'visceral compartment of the neck'). (b) CT scan through the C6 level; compare this with the diagram.

