Removal of Head & Pharynx
取下頭部 以及 咽喉部

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Outline:

- The structure and ligaments of the atlanto-axial joint
- The protocols of removing the head

- The muscles, blood vessels and nerves in pharynx

Removal of Head (I)

Study the **retro-pharyngeal space**,
the **cranio-vertebral joint**

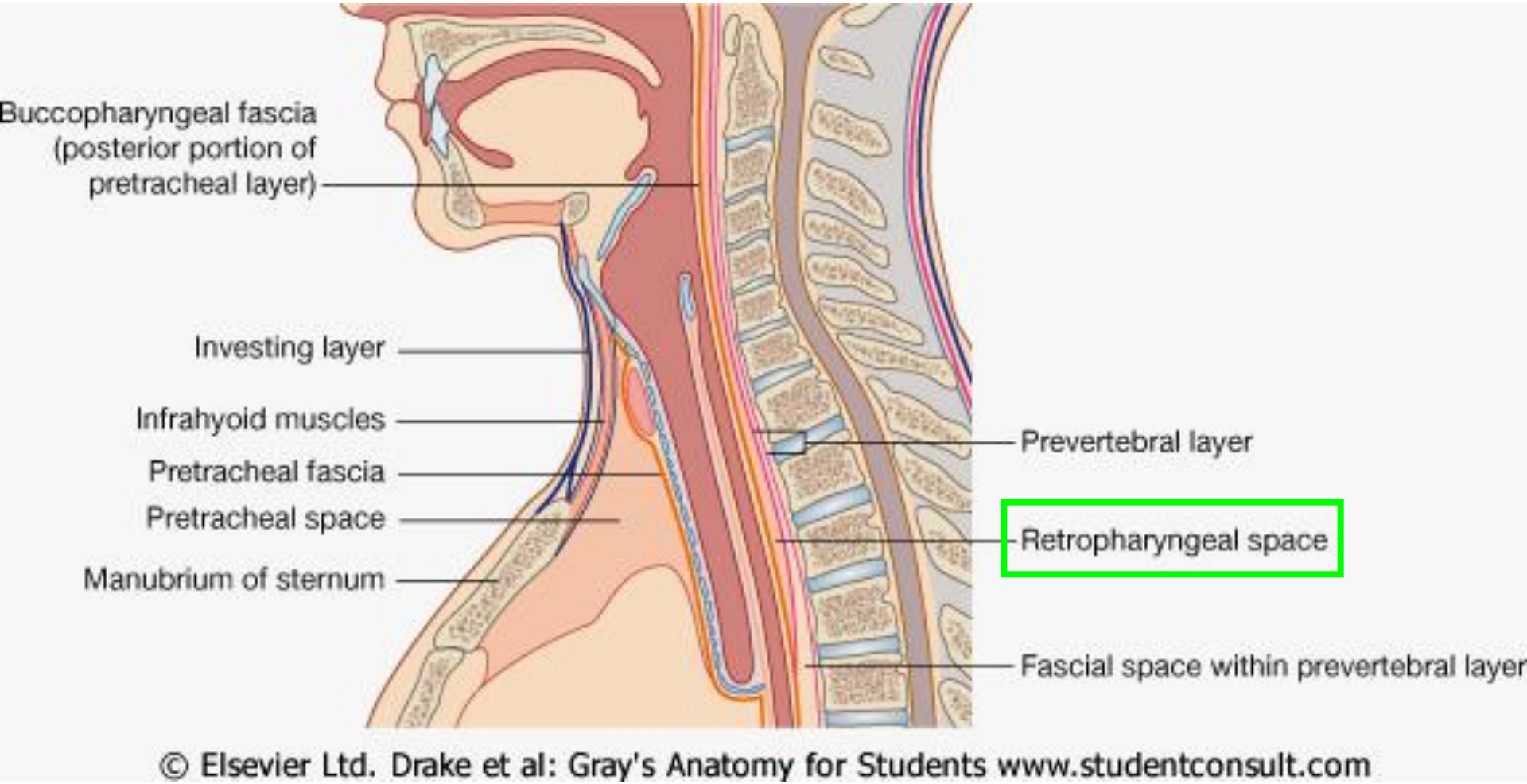
1. insert fingers posterior to **carotid sheath** into
   retro-pharyngeal space,
   superior to the base of skull and inferior to T3.
2. turn the cadaver into ***face down***
3. define the anterior border of **foramen magnum**;
   note the **dens of the axis.**

Removal of Head (II)

4. cut and reflect **dura mater** and **tectorial membrane**
5. expose **transverse ligament** of atlas and **sup. & inf. bands (cruciform ligament)**
6. identify **alar ligaments**

7. ***cut ligaments along foramen magnum to open atlanto-occipital joint***

Retro-pharyngeal space



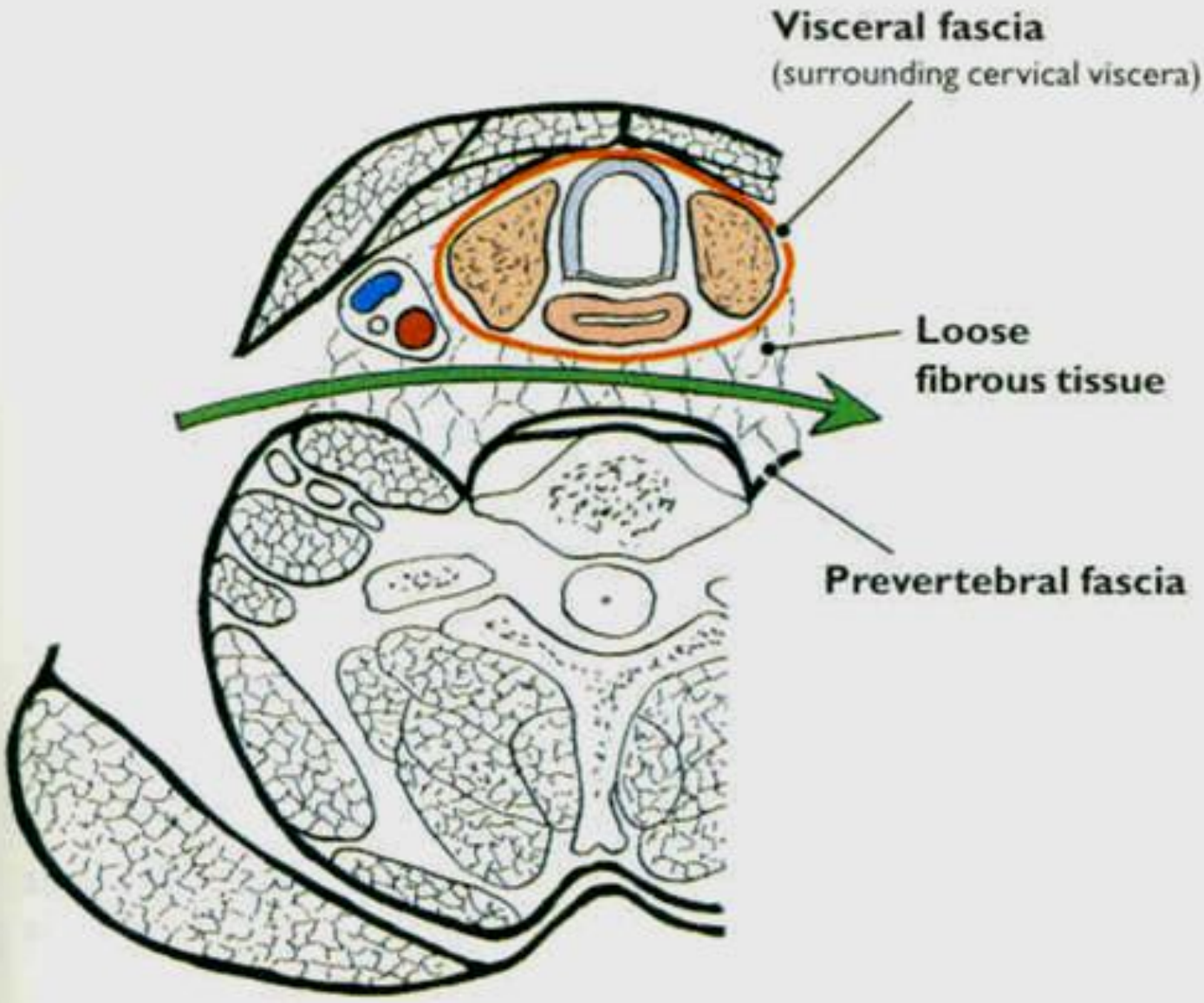
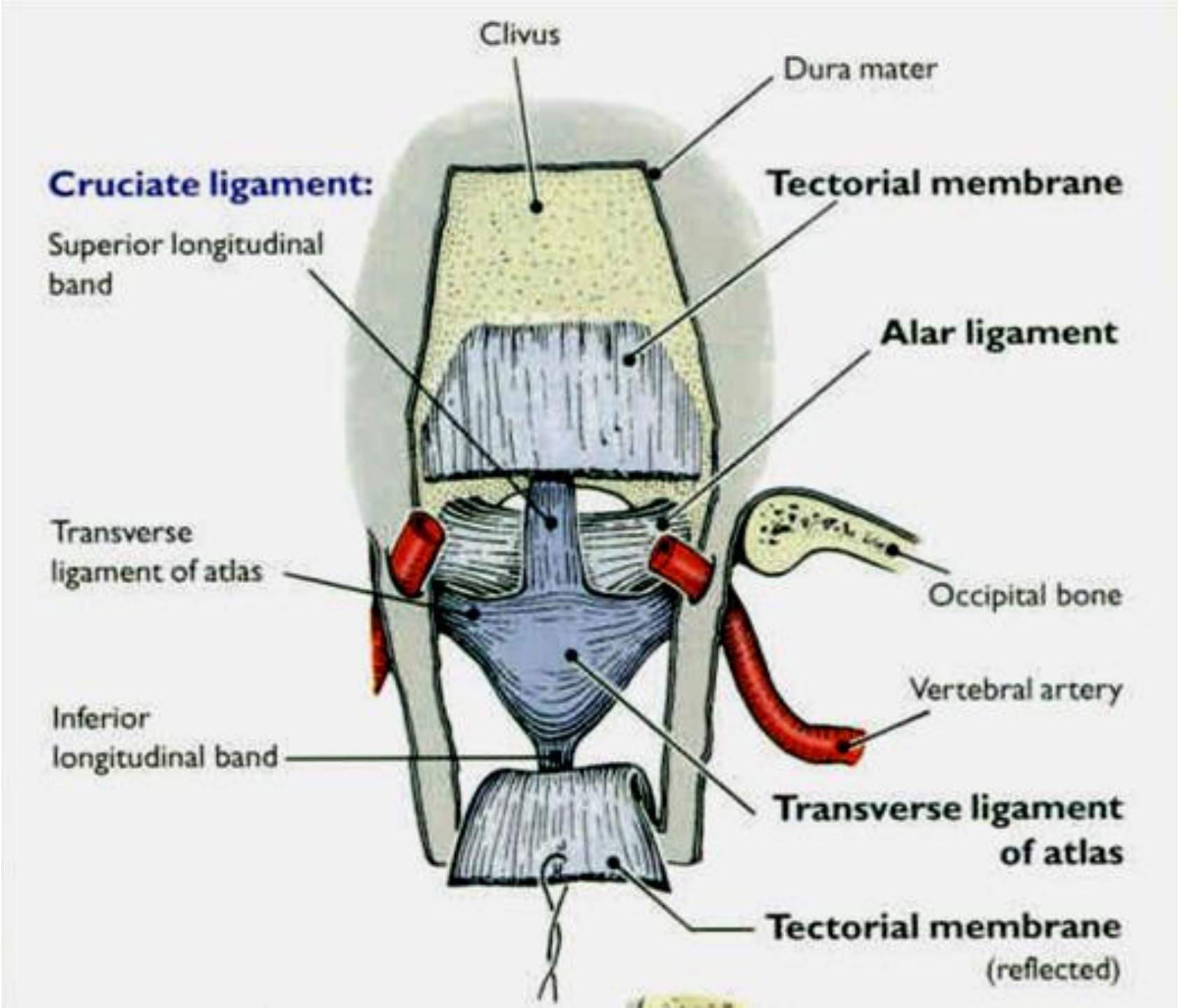
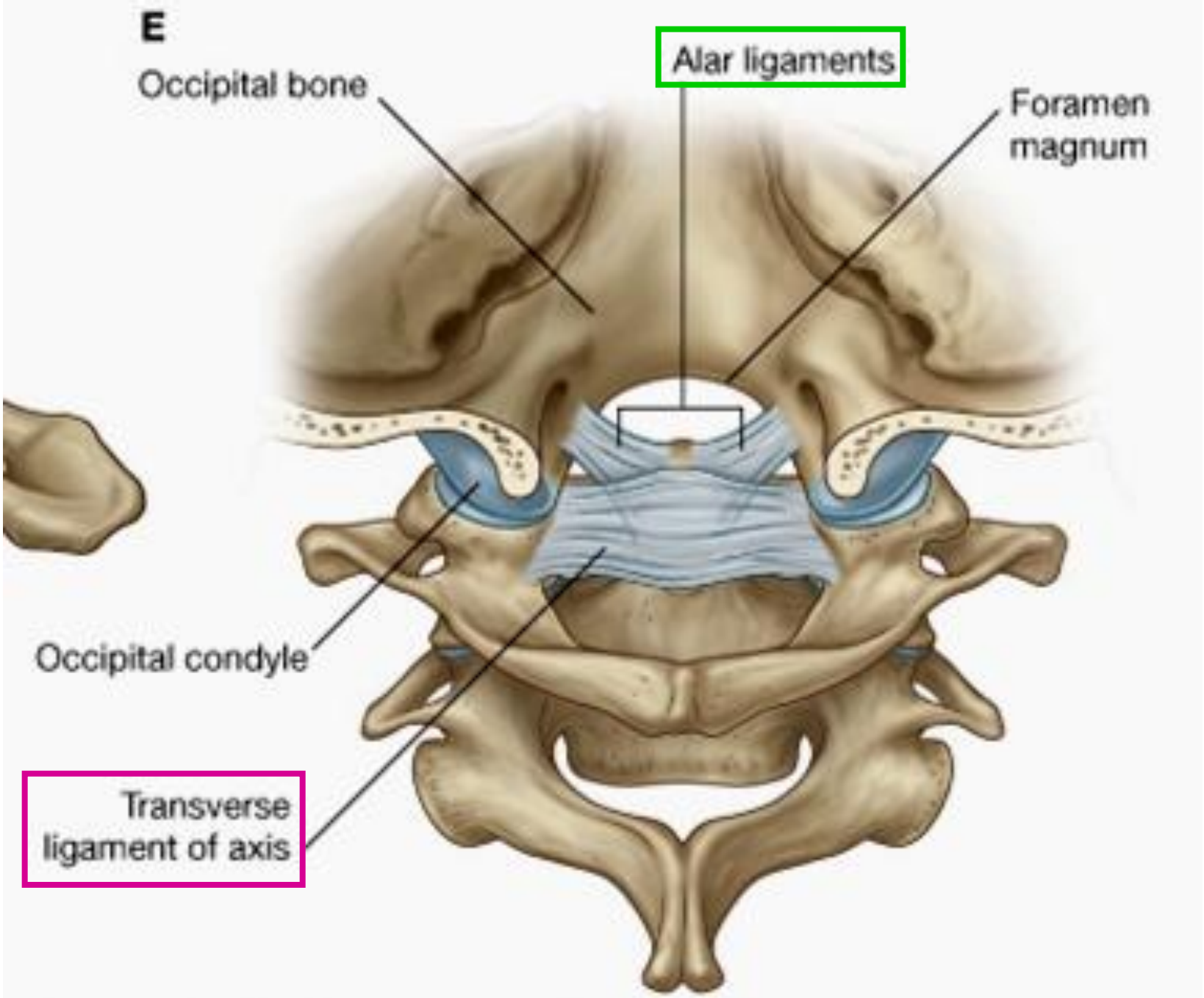


Figure 7.72. Transverse section of the neck. The arrow passes through the retropharyngeal or retrovisceral space, i.e., between visceral compartment and prevertebral fascia.


Clivus
Dura mater
Cruciate ligament:
Tectorial membrane
Superior longitudinal band
Alar ligament
Transverse ligament of atlas
Occipital bone
Vertebral artery
Inferior longitudinal band
Transverse ligament of atlas
Tectorial membrane (reflected)



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Atlanto-Axial joint

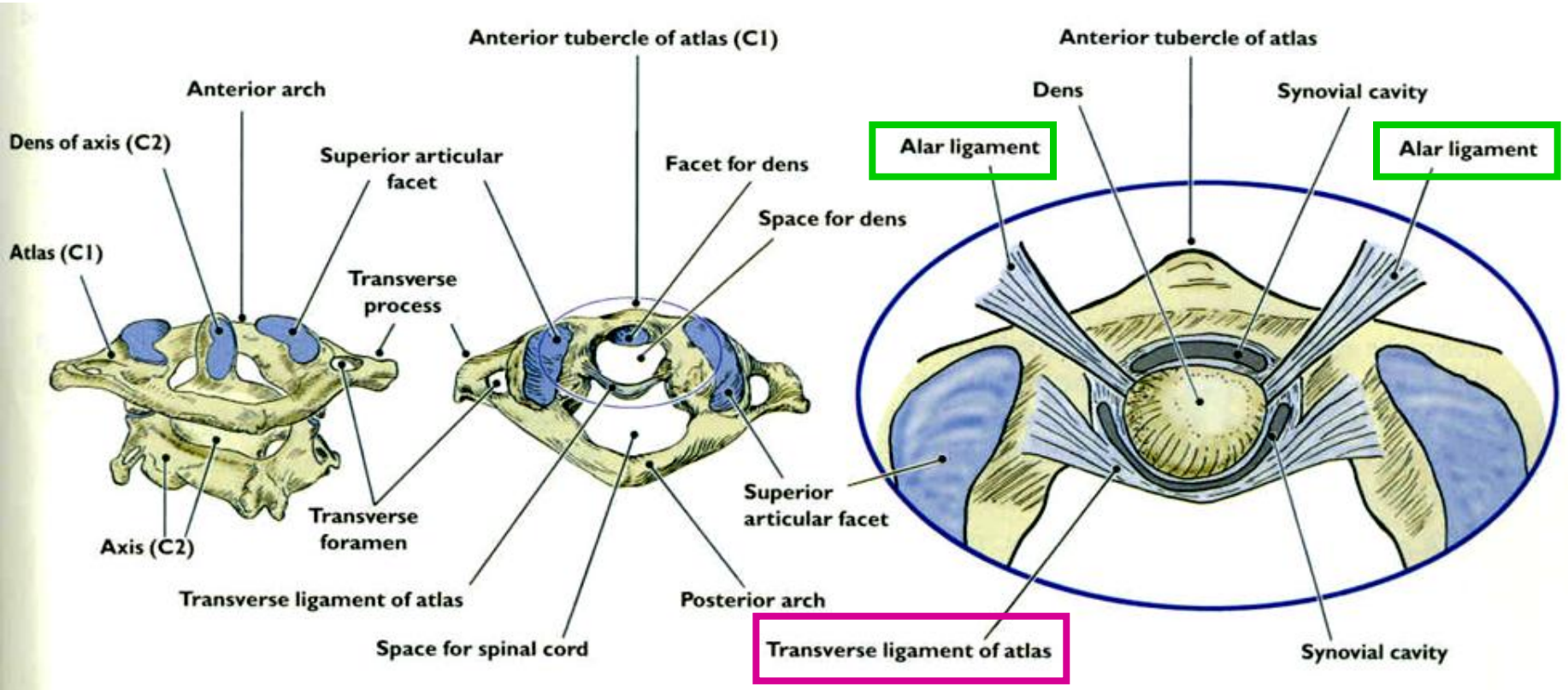


Figure 7.73. Essential bony landmarks and ligaments of the atlanto-axial joint. The enlarged inset shows a superior view of the middle atlanto-axial joint, i.e., the synovial joint between the dens of axis and anterior arch of atlas.

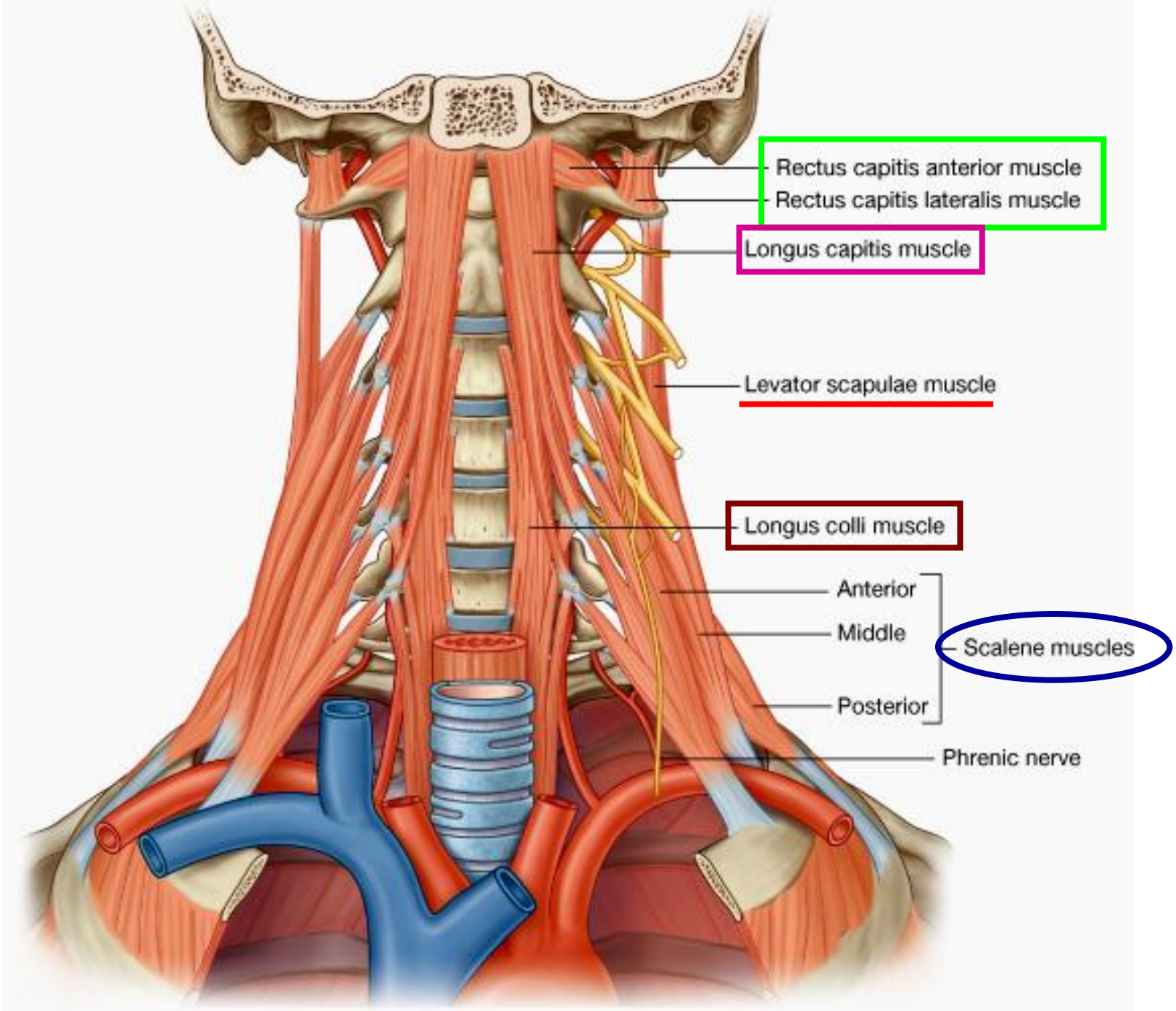
Removal of Head (III)

8. turn the cadaver into ***face up***
9. place hands into **retro-pharyngeal space**
   and pull **cervical viscera** *anteriorly & superiorly*
10. identify **vagus nerve**, **sympathetic trunk,**
    sup. cervical sympathetic ganglia, then cut one side.
11. cut **rectus capitis lateralis, rectus capitis anterior**
    and **longus capitis** between **occipital bone** and atlas

Removal of Head (IV)

12. sever **anterior atlanto-occitipal membrane**
13. cut **common carotid artery** & **IJV**,
    inferior thyroid artery &
    recurrent laryngeal nerve

14. ***remove the head together with***
    the attached cervical viscera.



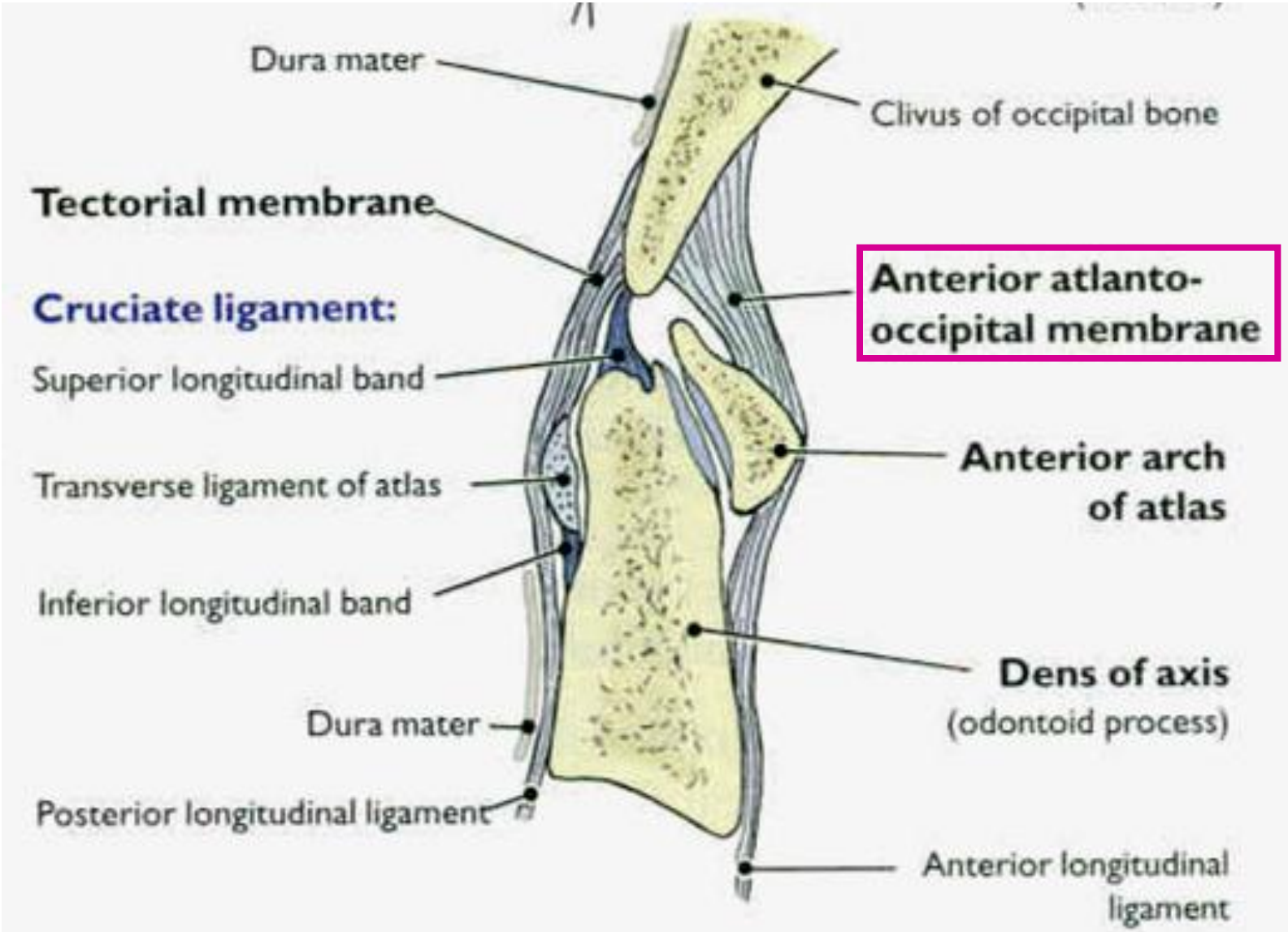


Figure 7.75. Craniovertebral joints in posterior view and sagittal section: tectorial membrane, cruciate ligament, and alar ligaments.

After head removed

1. examine **prevertebral fascia** (danger space),

   longus colli,

   longus capitis,

   scalenus anterior m.

2. trace **ventral rami C5 to C8** to brachial plexus, sympathetic trunk & ganglia & **vertebral a**.

After head removed

3. examine **glossopharyngeal nerve (IX)**
   passing between int. & ext. carotid a.,
   supplied **stylo-pharyngeus**.
4. examine **vagus nerve (X)** and its branches
   (**pharyngeal branch, superior laryngeal ns.**)
   & sup. & inf. ganglia of vagus
5. examine **accessory** **&** **hypoglossal** **nerves**

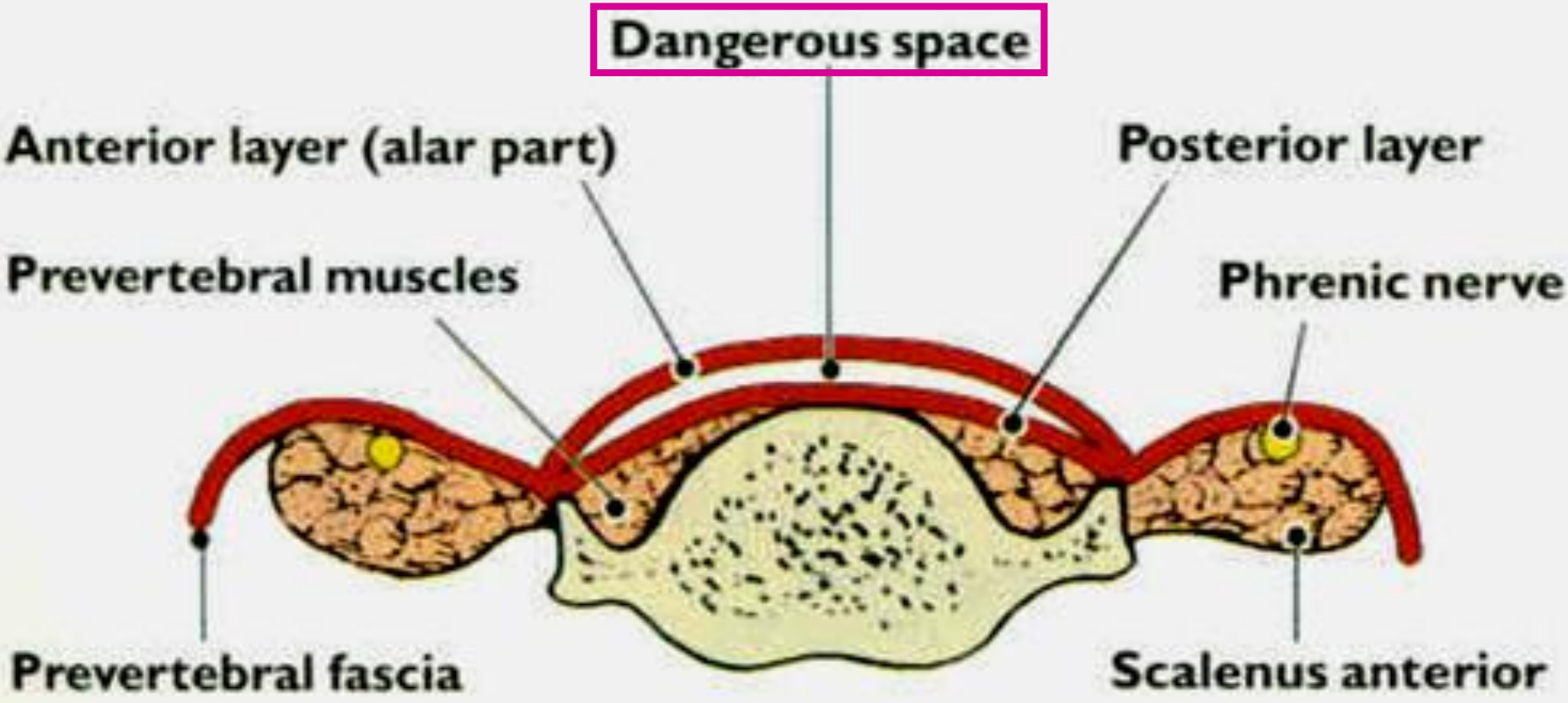
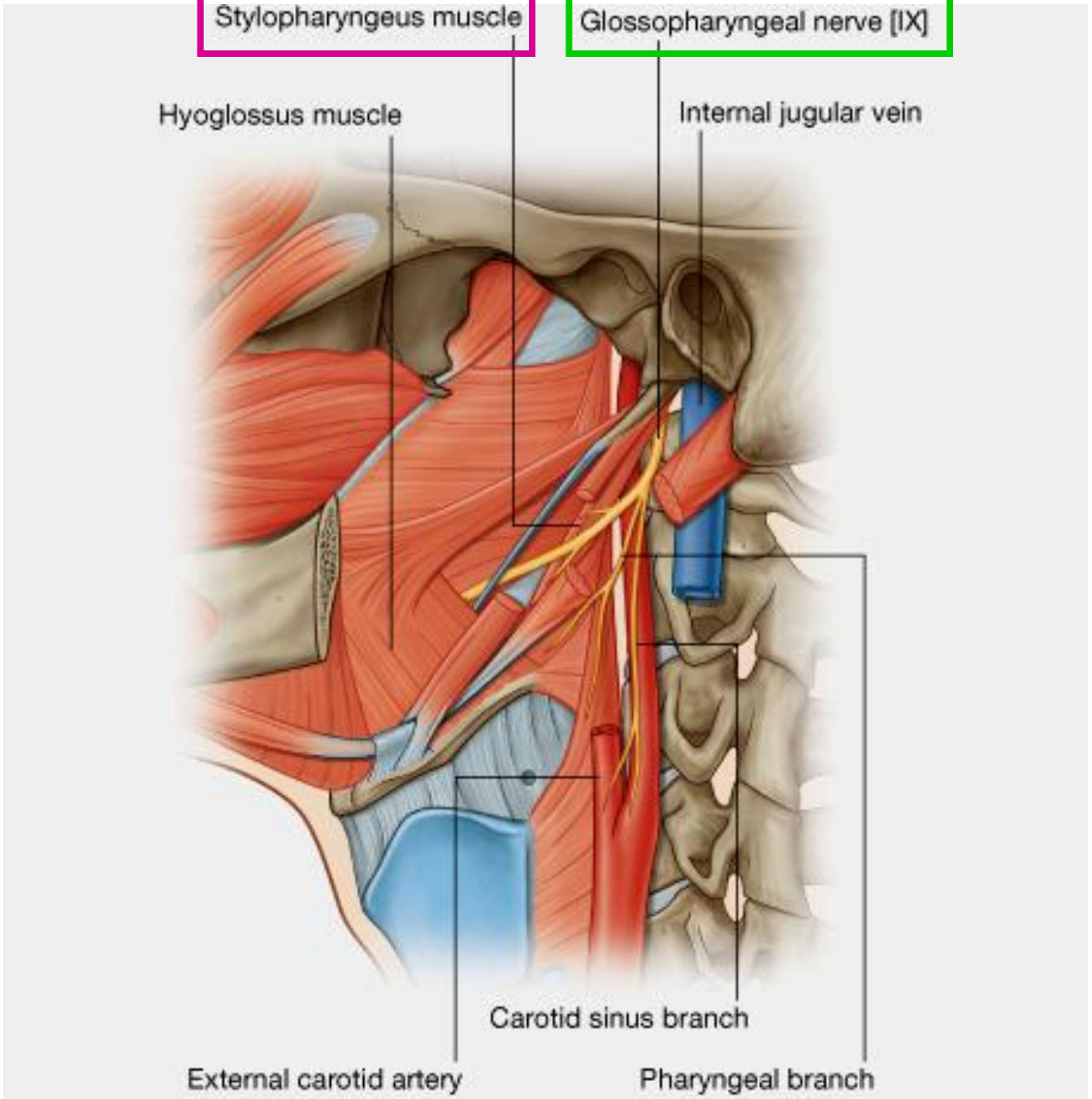
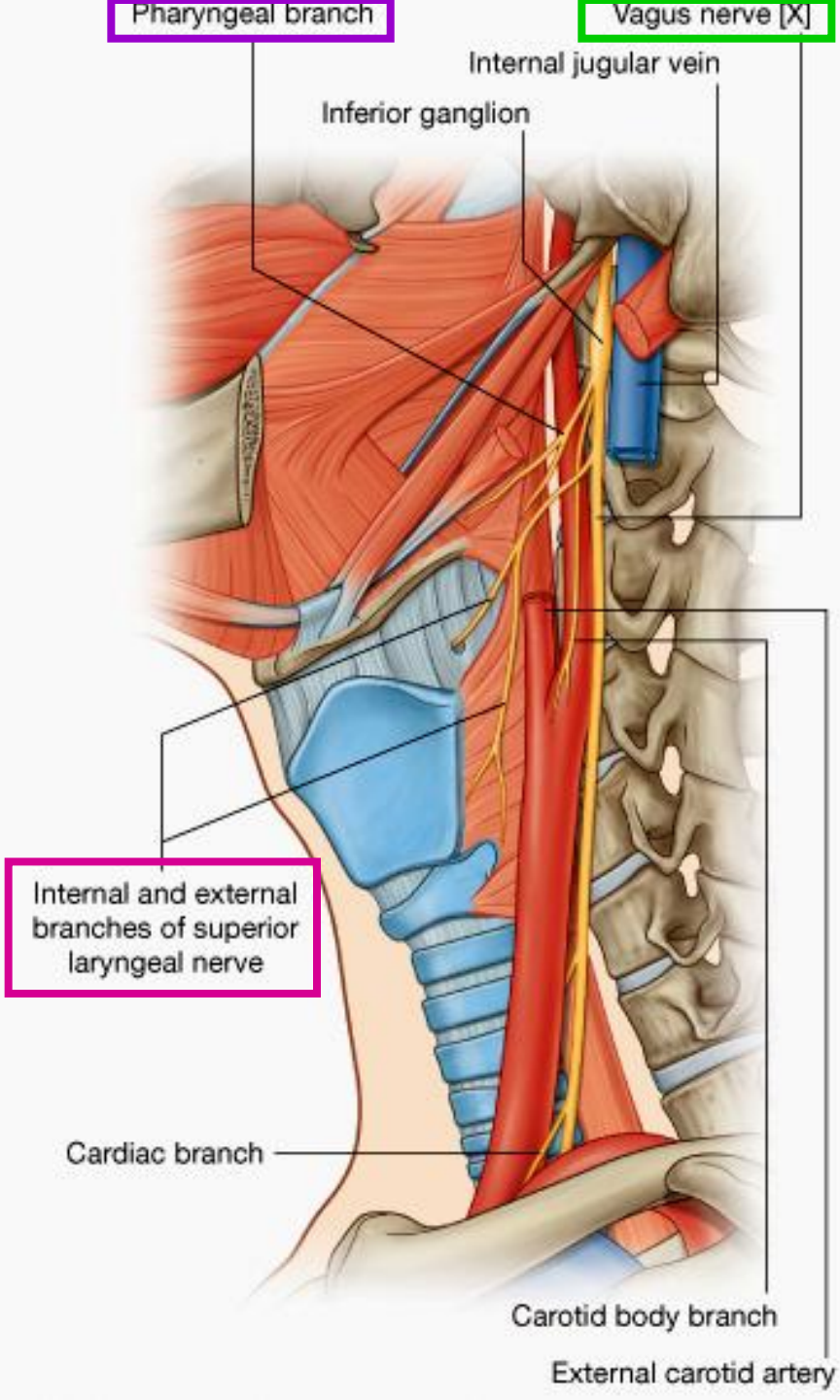
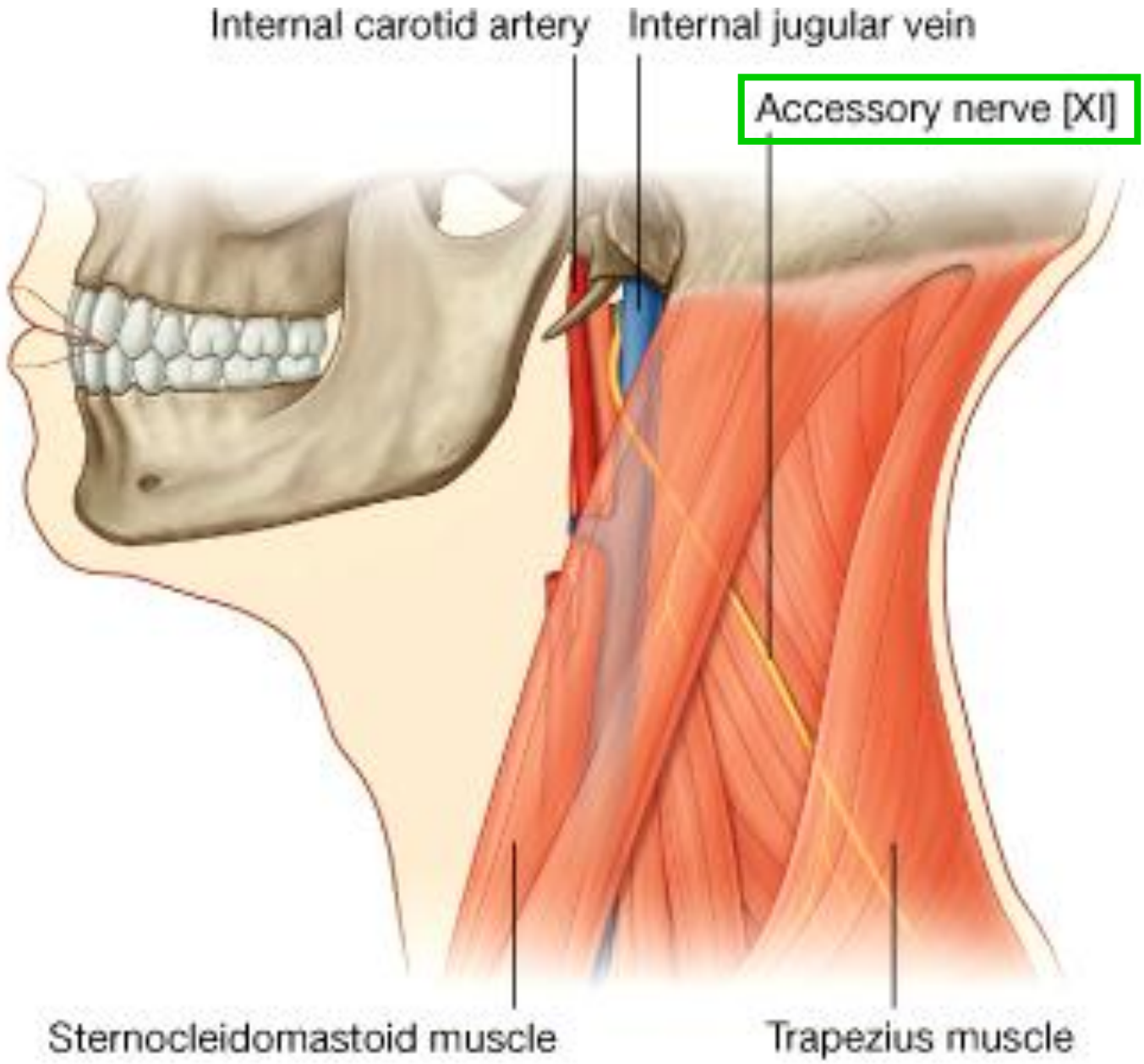
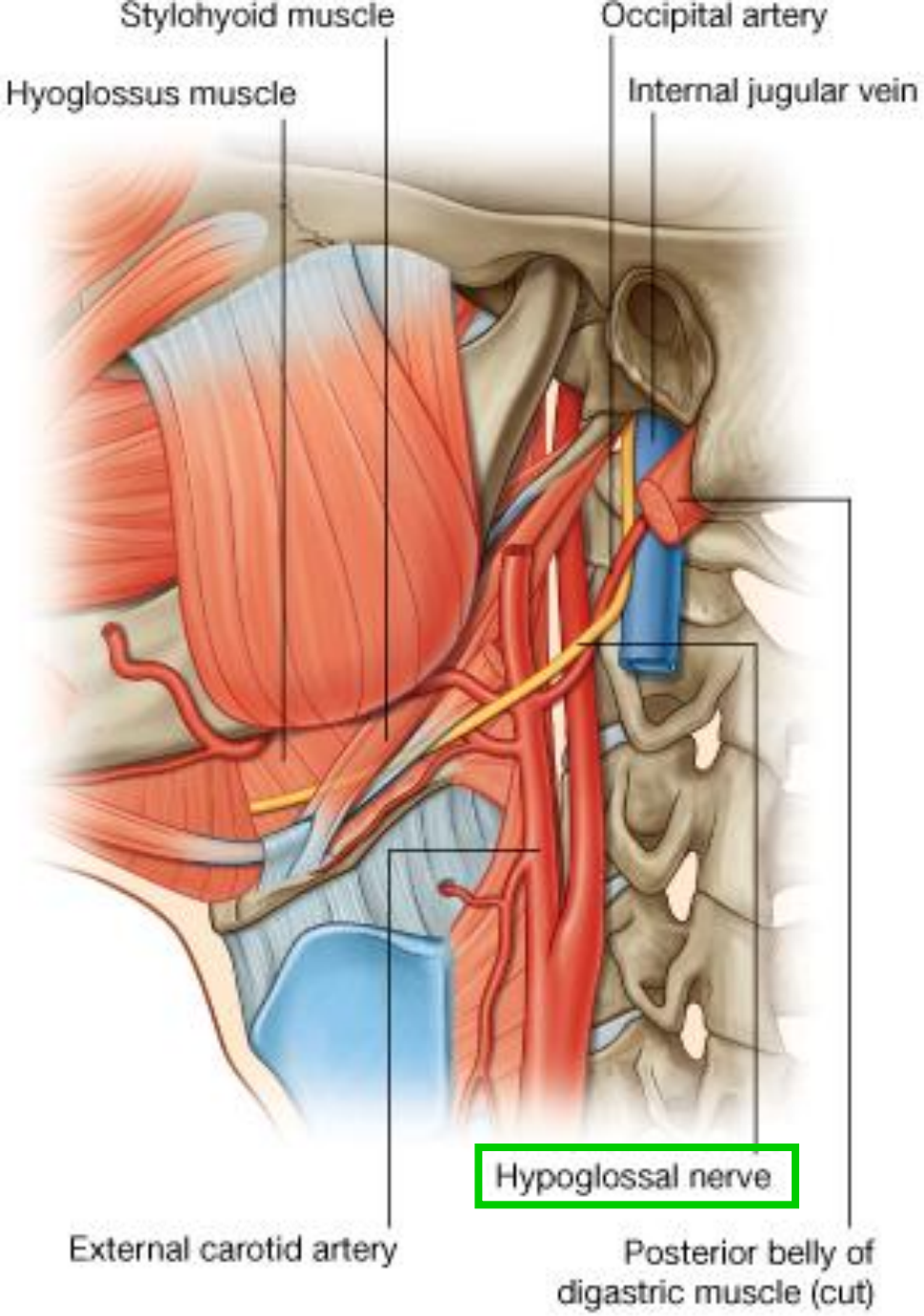


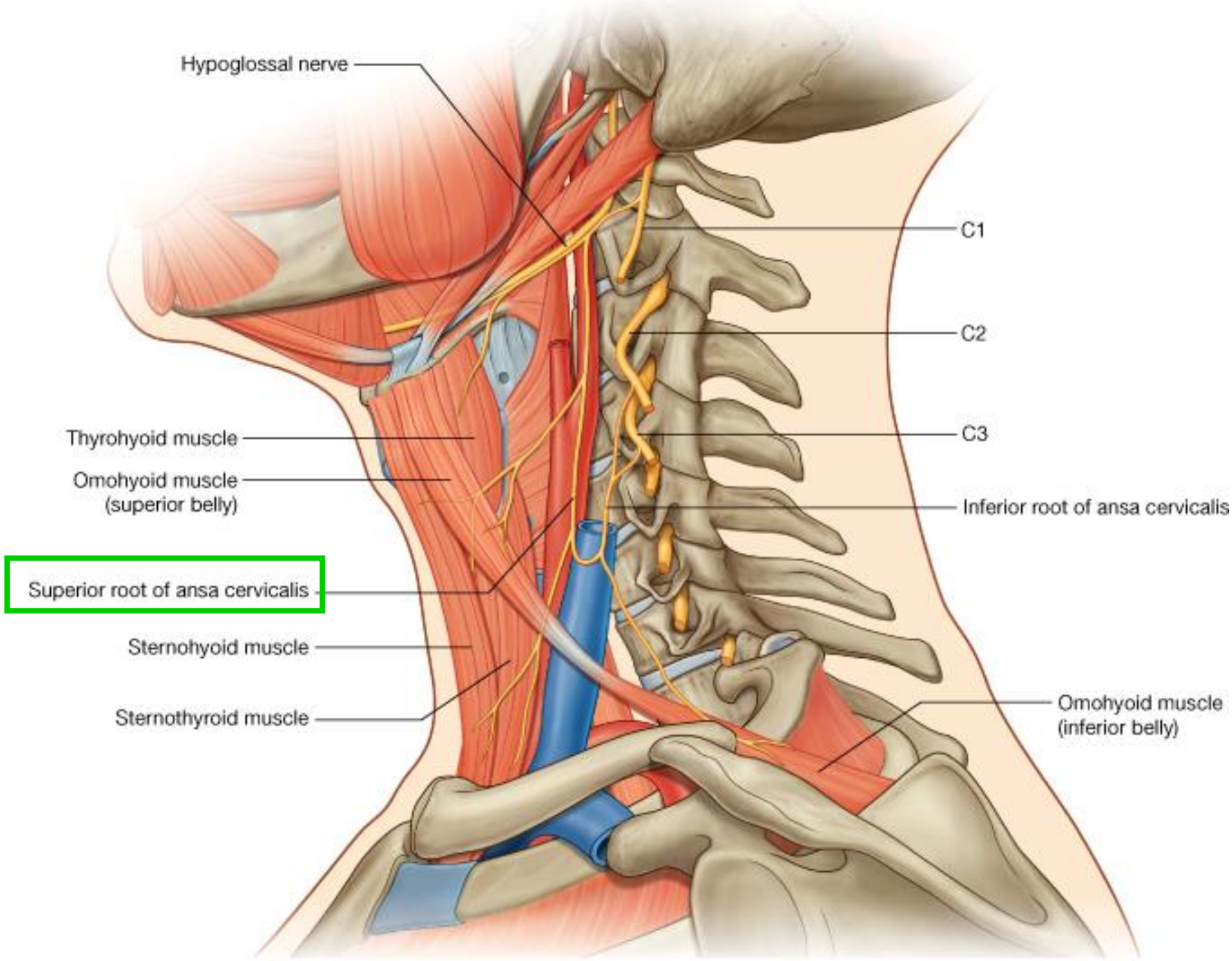
Figure 7.77. Prevertebral fascia and danger space.



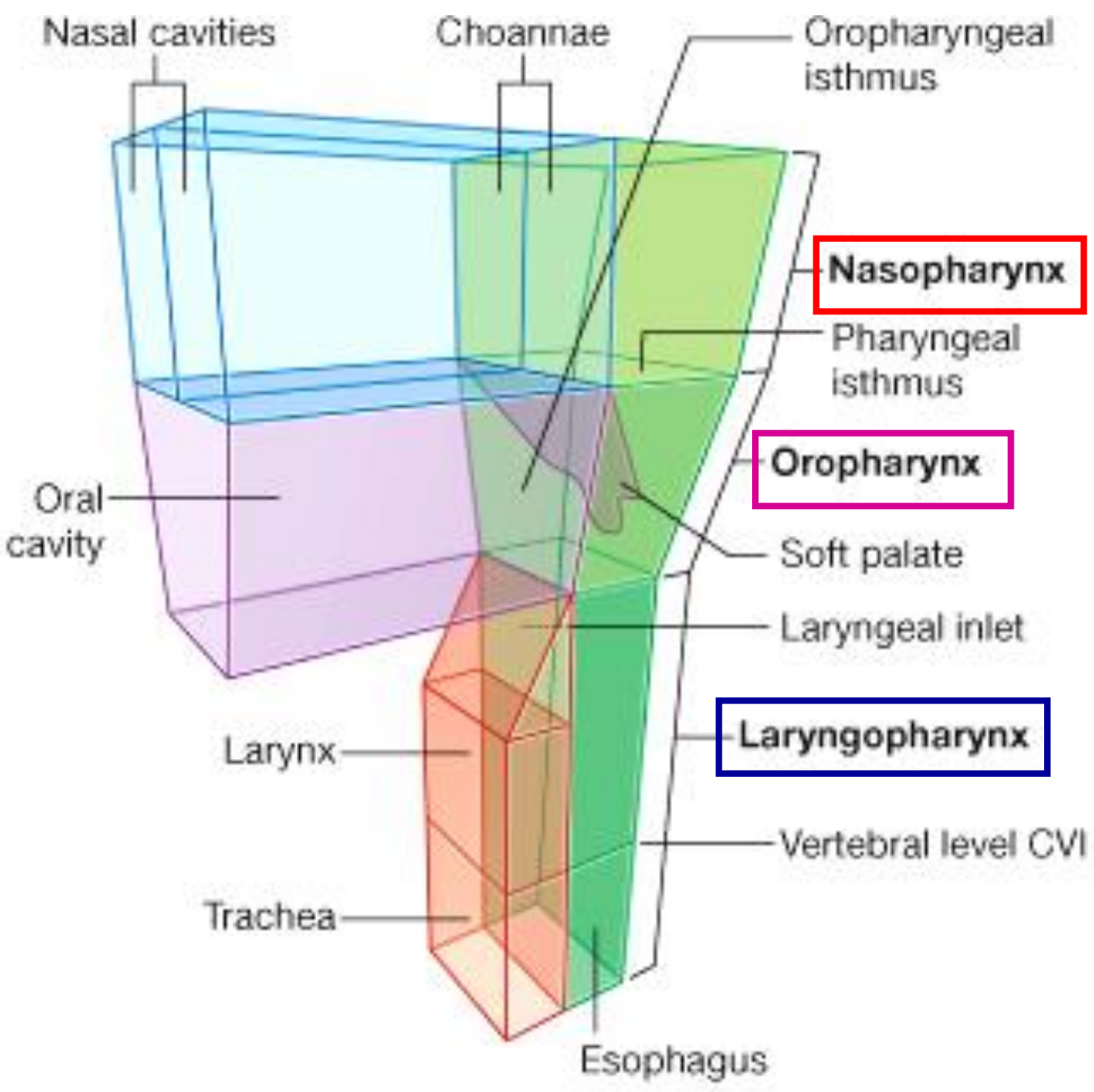

Pharyngeal branch
Vagus nerve [X]
Internal jugular vein
Inferior ganglion
Internal and external branches of superior laryngeal nerve
Cardiac branch
Carotid body branch
External carotid artery







Pharynx



Pharynx – part of the digestive system
Position: from **base of skull** to **C6**
(inf. border of cricoid cartilage)

Nasopharynx: post. to the nasal cavity
– sup. to the soft palate
(respiratory function)

pharyngeal tonsil
tubal tonsil (part of ***Waldeyer's ring***)
pharyngo-tympanic (auditory) tube,
salpingo-pharyngeal fold
pharyngeal recess

Oro-pharynx:

soft palate -- the epiglottis (digestive function)

palato-glossal and **palato-pharyngeal** muscles (arches),

palatine tonsils

tonsilar bed: superior constrictor & pharyngo-basilar fascia

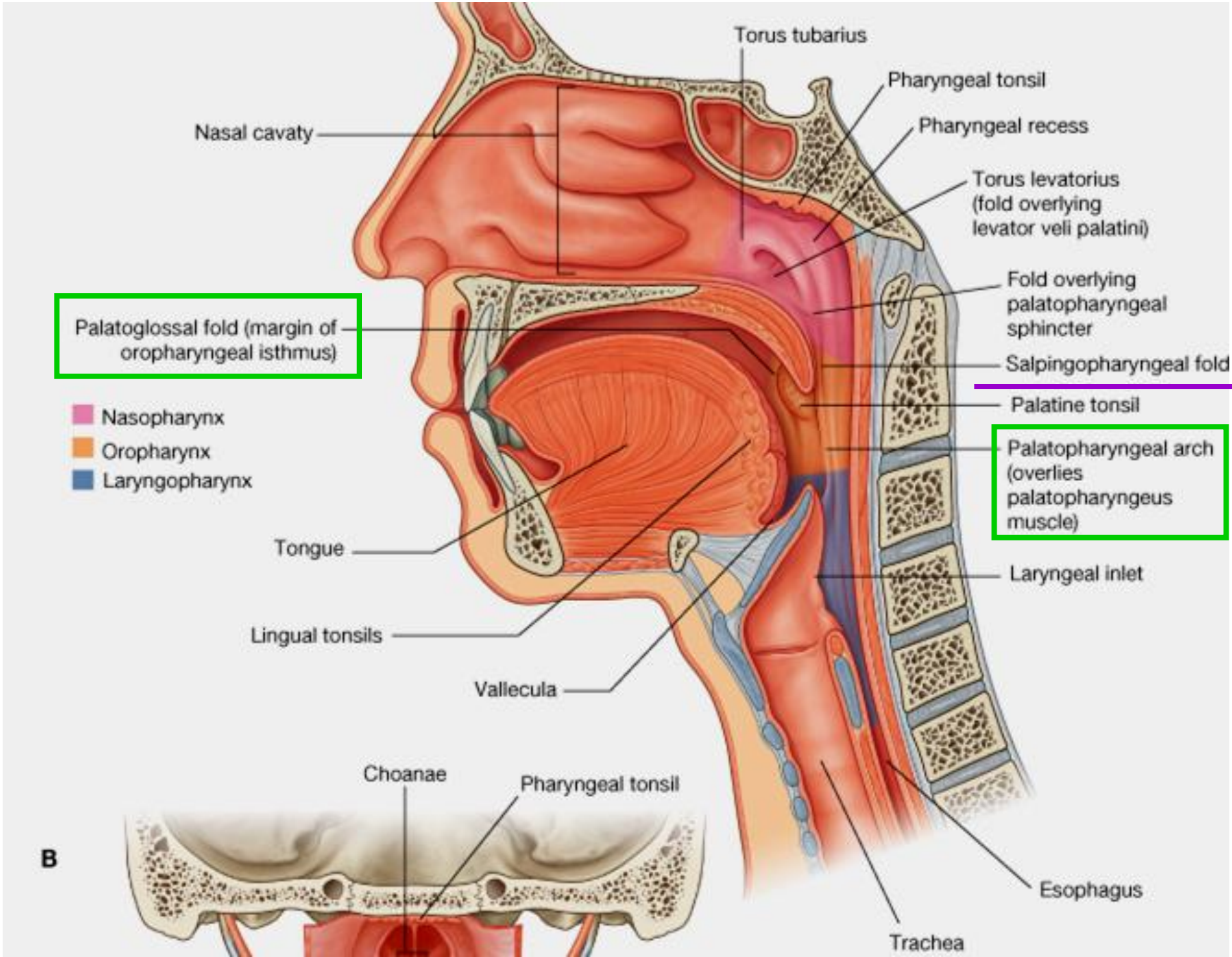
Laryngo-pharynx: sup. border of epiglottis

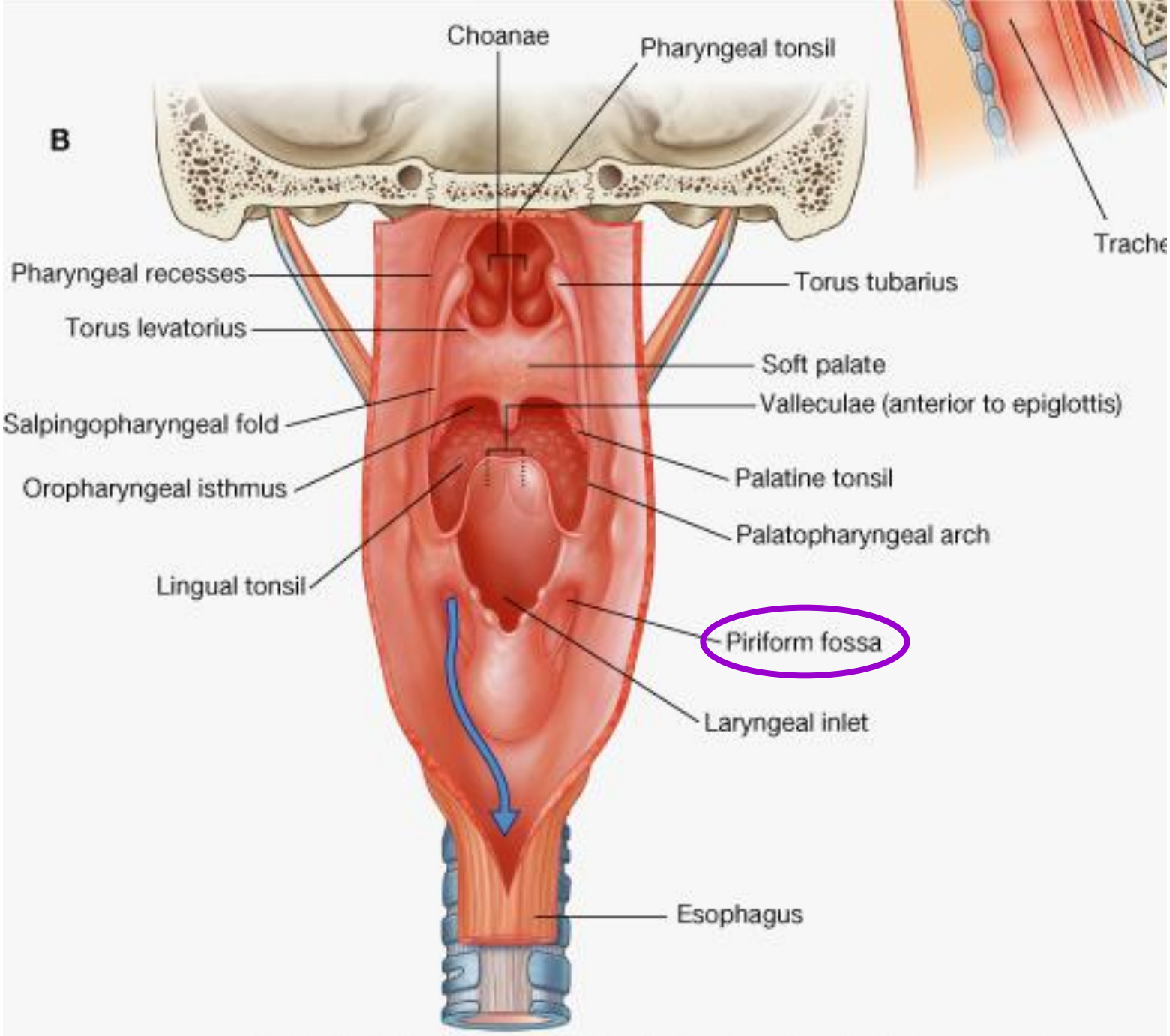
-- inf. border of cricoid cartilage (digestive function)

middle and **inferior constrictor muscles**, **palato-pharyngeus** and **stylo-pharyngeus** muscles

piriform fossa (recess):

between **ary-epiglottic fold** & **thyro-hyoid membrane**


Torus tubarius
Pharyngeal tonsil
Nasal cavaty
Pharyngeal recess
Torus levatorius
(fold overlying
levator veli palatini)
Fold overlying
palatopharyngeal
sphincter
Palatoglossal fold (margin of
oropharyngeal isthmus)
Salpingopharyngeal fold
Palatine tonsil
Nasopharynx
Oropharynx
Laryngopharynx
Palatopharyngeal arch
(overlies
palatopharyngeus
muscle)
Tongue
Laryngeal inlet
Lingual tonsils
Vallecula
Choanae
Pharyngeal tonsil
B
Esophagus
Trachea



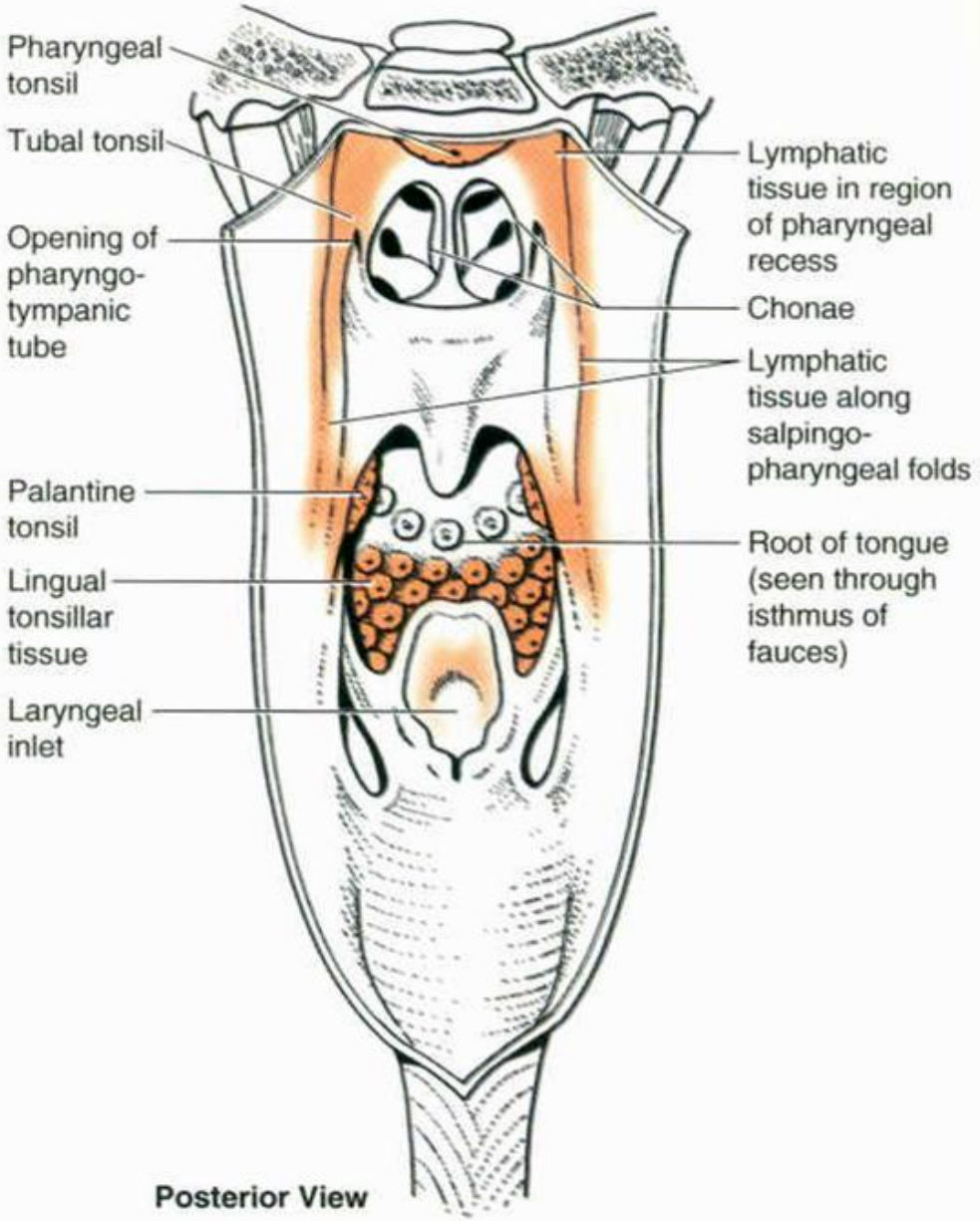


Figure 8.42. Lymphatic tissue in the tongue and pharynx. Observe the tonsillar ring about the superior pharynx, formed of pharyngeal, tubal, palatine, and lingual tonsils.

Pharyngeal muscles

External circular layer:

sup., **mid.** and **inf. constrictors**

Three constrictors are between pharyngo-basilar & bucco-pharyngeal fascia

Innervated by **pharyngeal plexuses of nerves** (CN IX, X and sup. cervical ganglion)

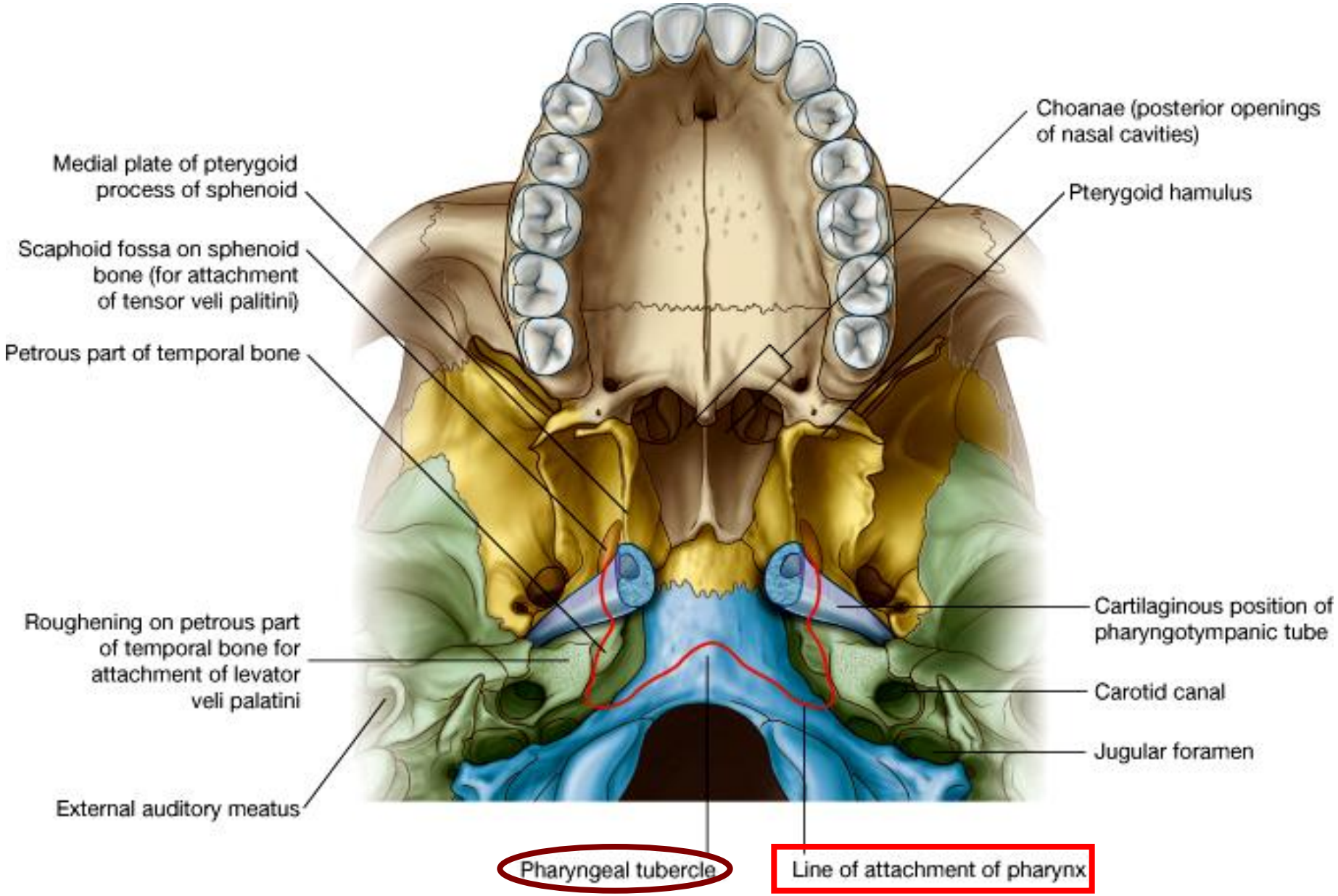
Pharyngeal muscles

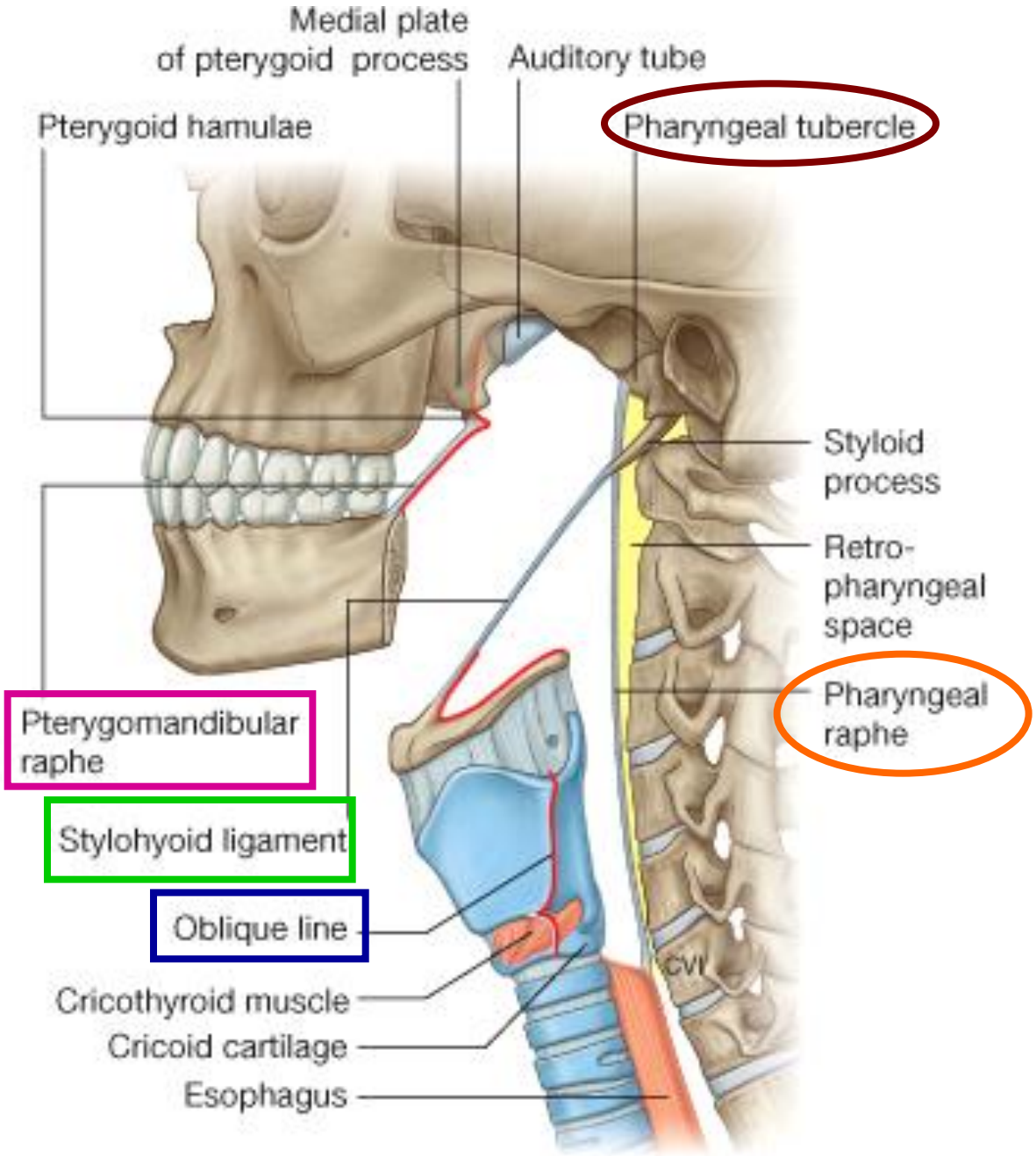
Internal longitudinal layer:

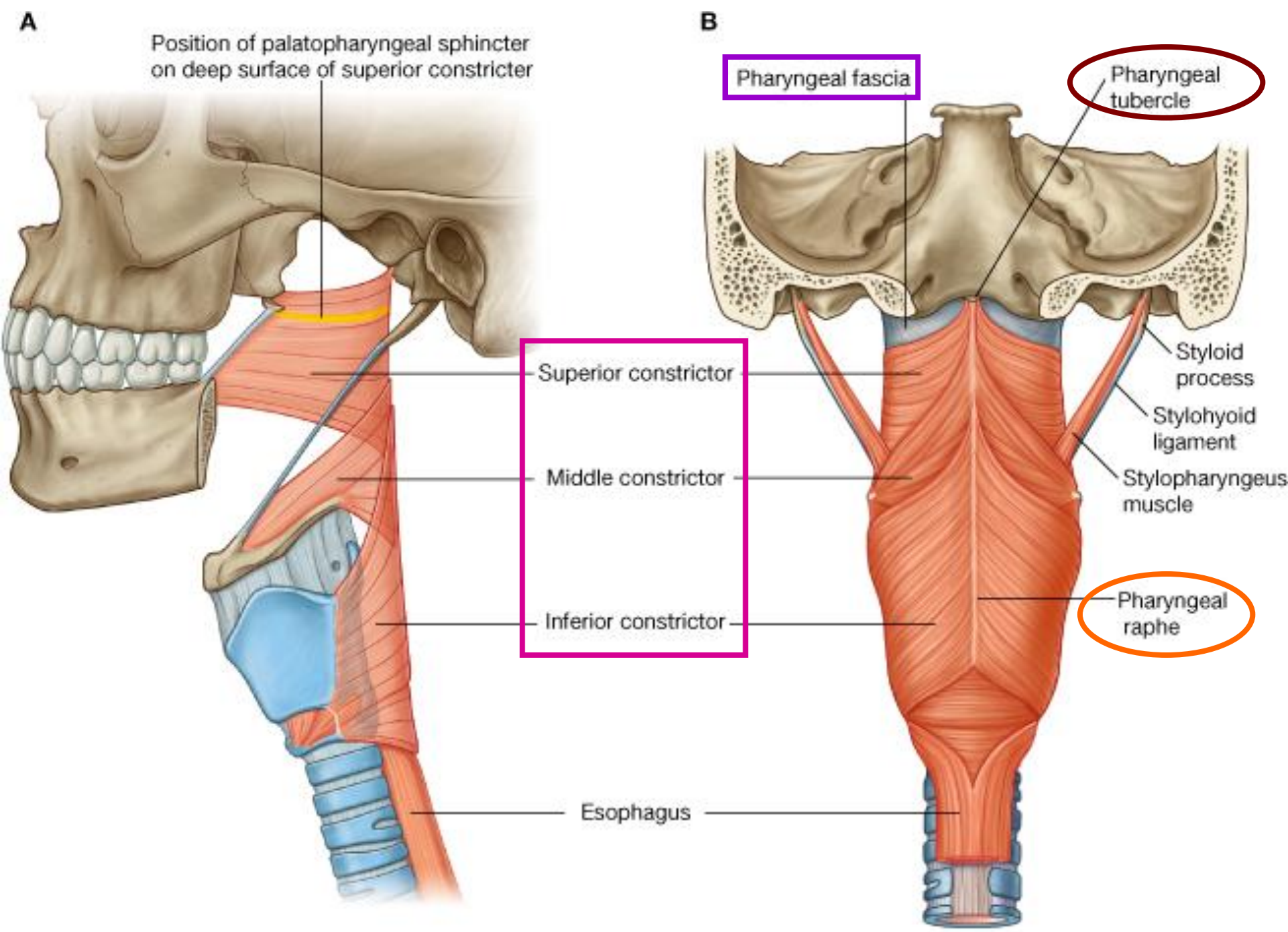
palato-pharyngeus, salpingo-pharyngeus

stylo-pharyngeus

function: (elevate larynx and shorten pharynx during ***deglu`tition***)







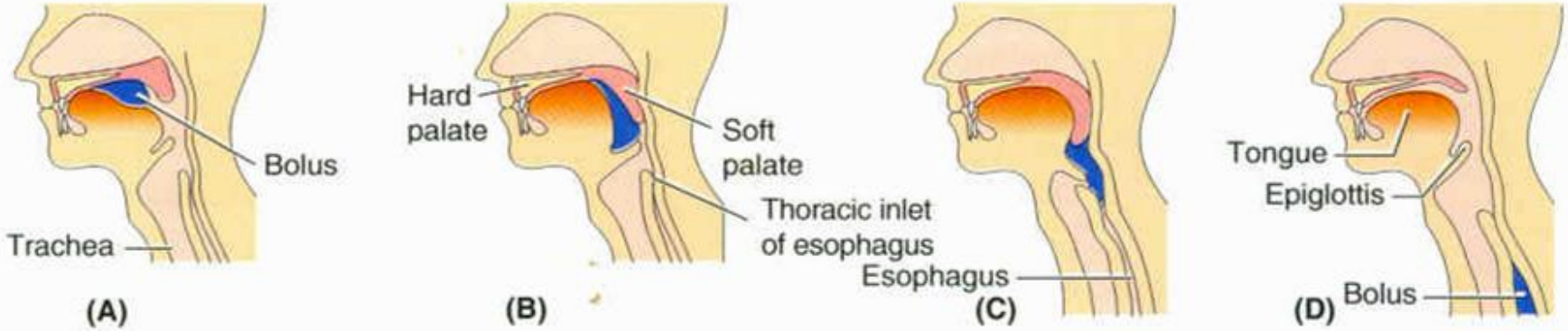
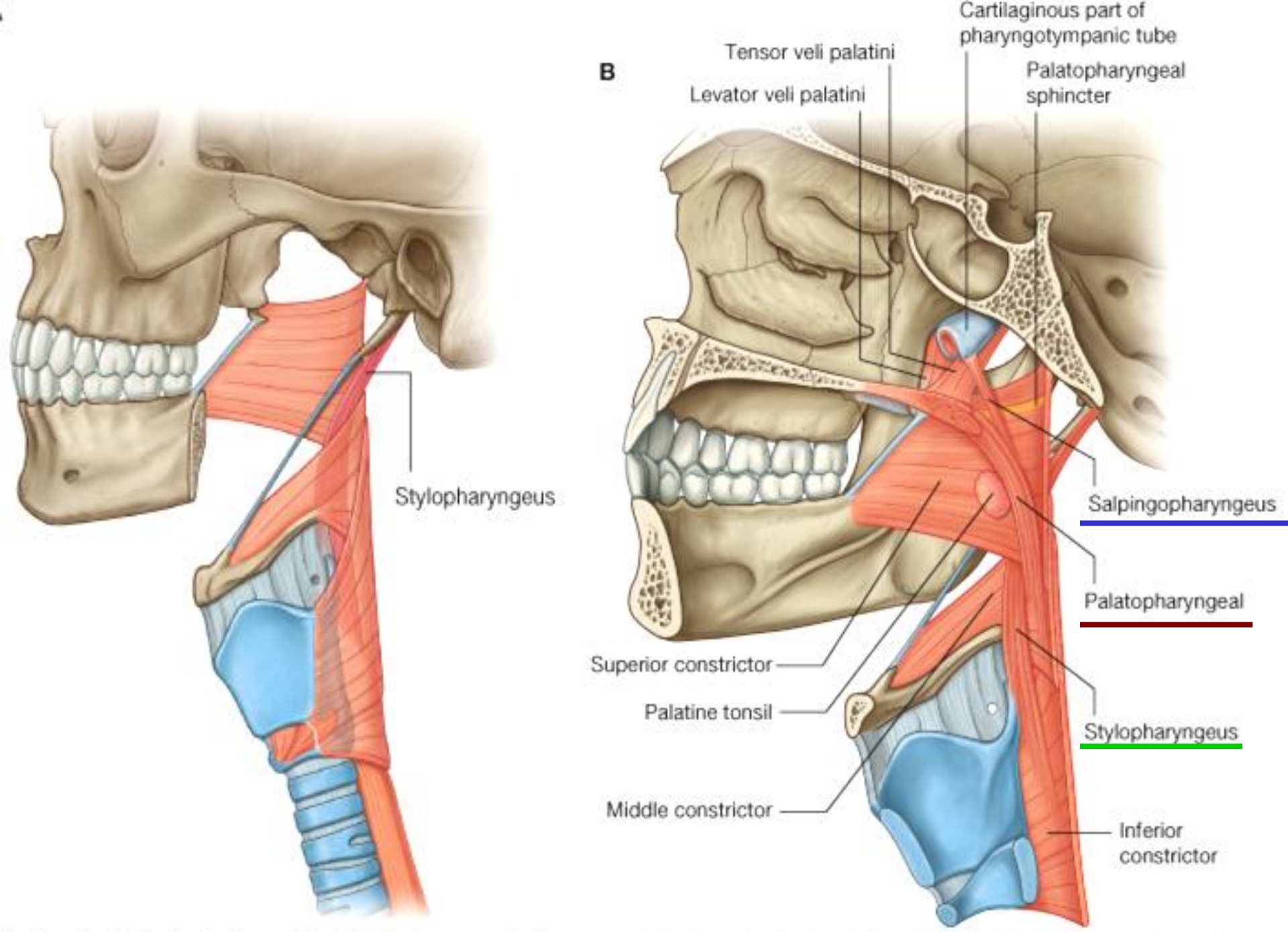


Figure 8.39. Swallowing. A. The bolus of food is pushed to the back of the mouth by pushing the tongue (L. lingua; G. glossa) against the palate. **B.** The nasopharynx is sealed off and the larynx is elevated, enlarging the pharynx to receive food. **C.** The pharyngeal sphincters contract sequentially, squeezing food into the esophagus. The epiglottis closes the trachea. **D.** The bolus of food moves down the esophagus by peristaltic contraction.



Muscle	Origin	Insertion	Innervation	Main Action
External layer				
Superior constrictor	Pterygoid hamulus, pterygomandibular raphe, posterior end of mylohyoid line of mandible, and side of tongue	Median raphe of pharynx and pharyngeal tubercle on basilar part of occipital bone	Cranial root of accessory nerve via pharyngeal branch of vagus and pharyngeal plexus	Constrict wall of pharynx during swallowing
Middle constrictor	Stylohyoid ligament and superior (greater) and inferior (lesser) horns of hyoid bone	Median raphe of pharynx	Cranial root of accessory nerve as above, plus branches of external and recurrent laryngeal nerves of vagus	
Inferior constrictor	Oblique line of thyroid cartilage and side of cricoid cartilage			
Internal layer				
Palatopharyngeus	Hard plate and palatine aponeurosis	Posterior border of lamina of thyroid cartilage and side of pharynx and esophagus	Cranial root of accessory nerve via pharyngeal branch of vagus and pharyngeal plexus	Elevate (shorten and widen) pharynx and larynx during swallowing and speaking
Salpingopharyngeus	Cartilaginous part of auditory tube	Blends with palatopharyngeus		
Stylopharyngeus	Styloid process of temporal bone	Posterior and superior borders of thyroid cartilage with palatopharyngeus	Glossopharyngeal nerve	

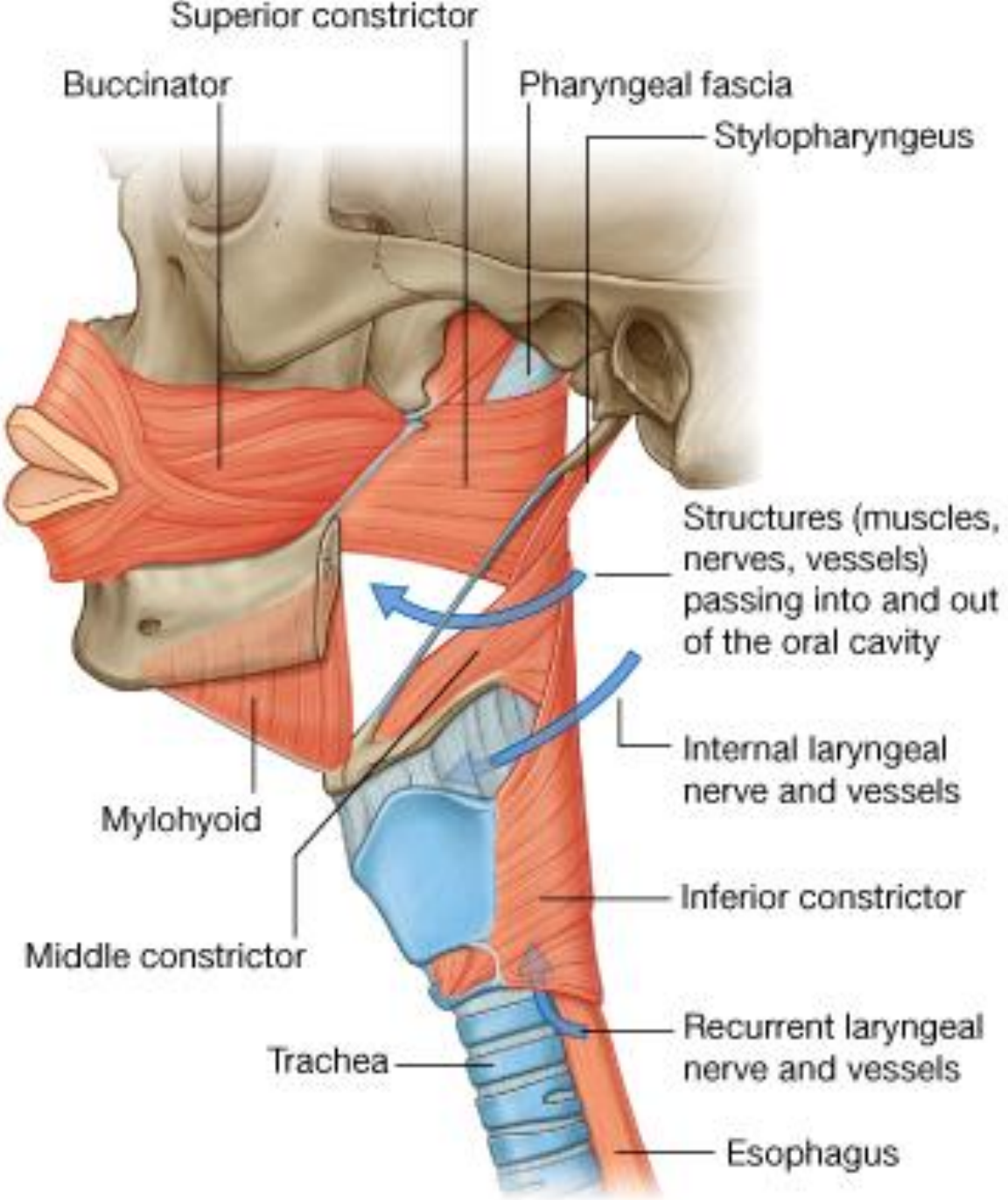
Four gaps:

1st: **levator veli palatini m.**, **auditory tube**
and **ascending pharyngeal artery**
ascending palatine artery

2nd: **stylopharyngeus m.**, **glossopharyngeal n.**
and **stylo-hyoid ligament**

3rd: **internal laryngeal nerve**
and **superior laryngeal artery** & vein

4th: **recurrent laryngeal nerve**
and **inferior laryngeal artery**

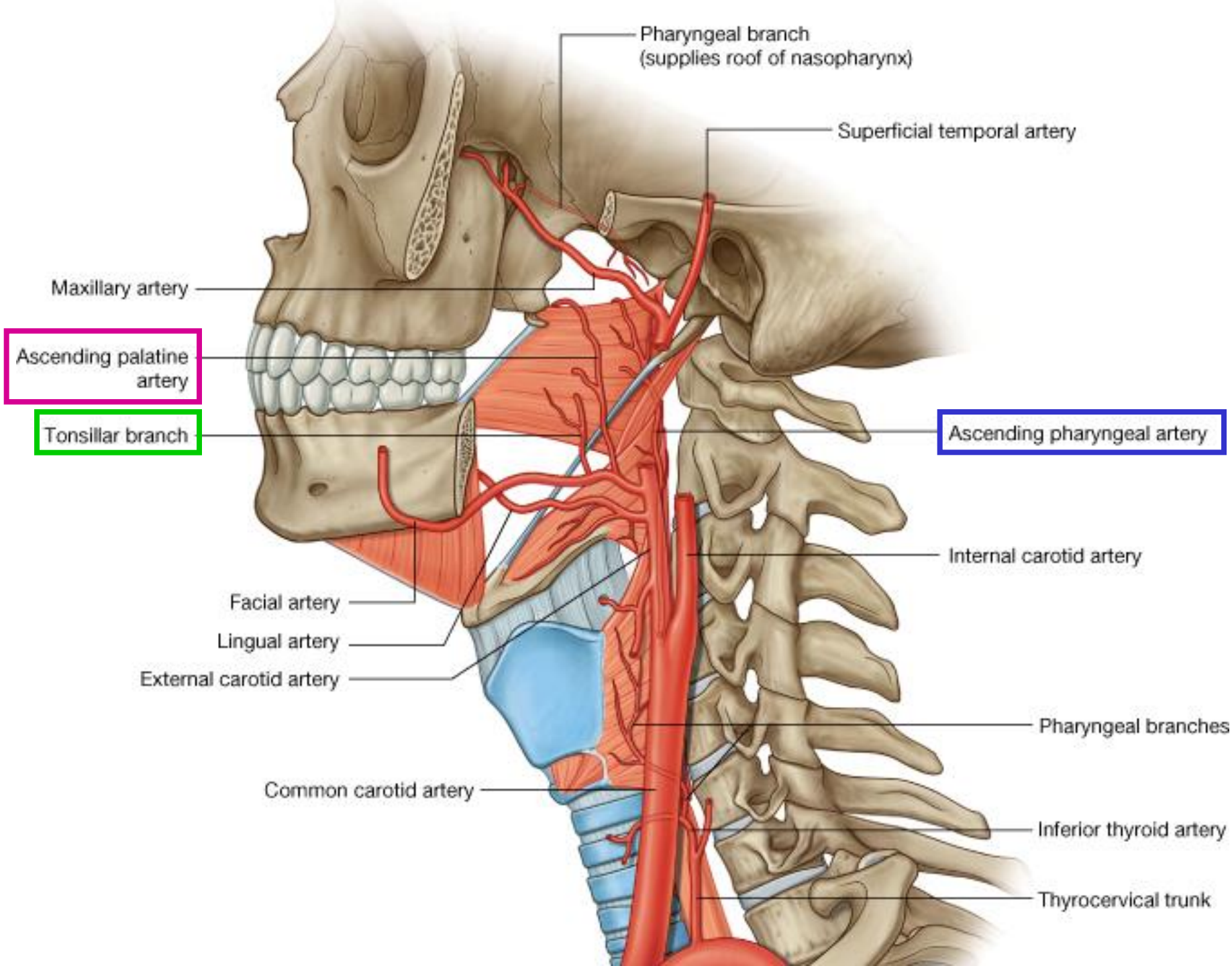


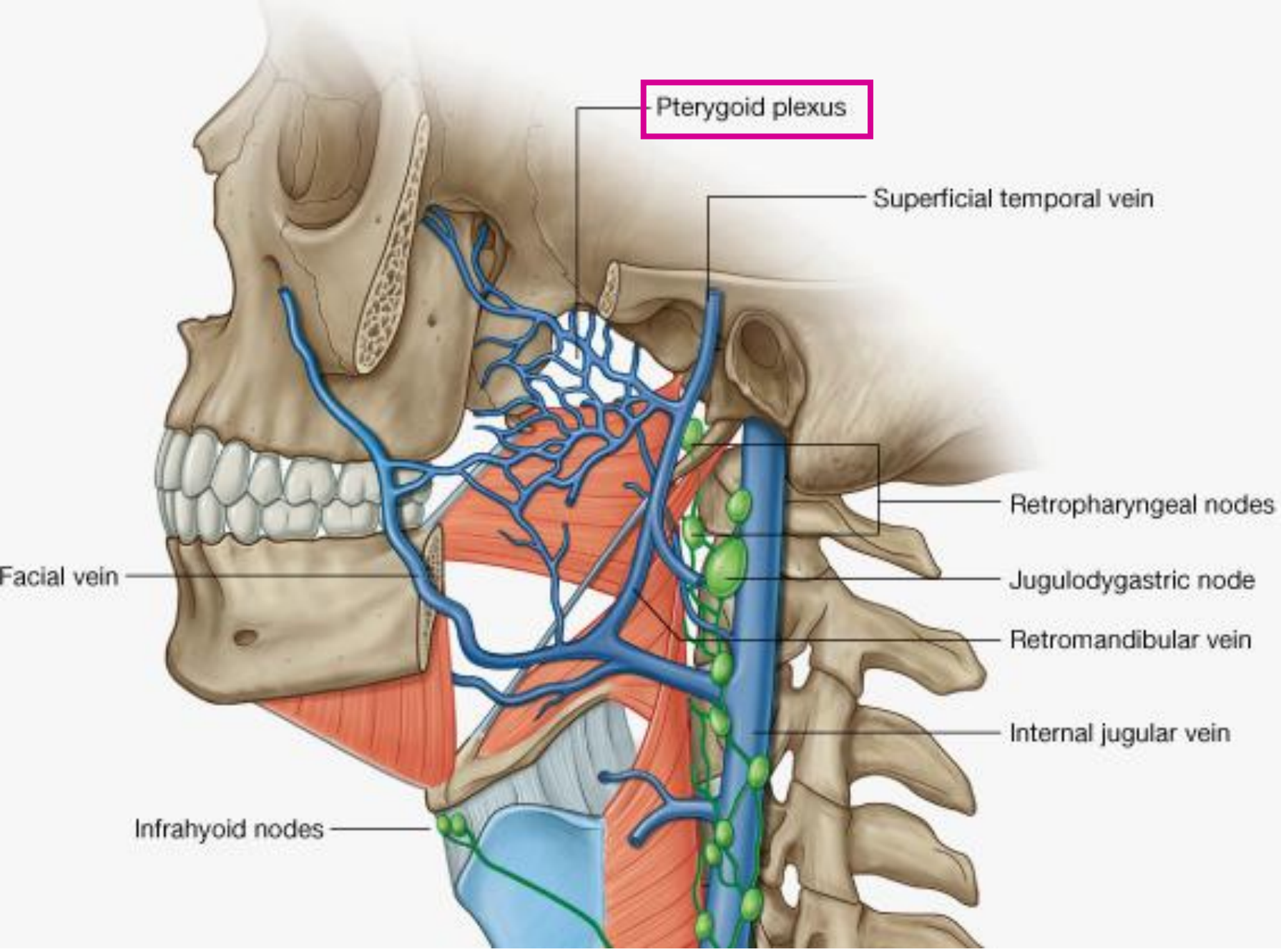
***Vessels of the pharynx*:**

Arteries: **ascending pharyngeal artery**
tonsilar artery (a branch of facial a.)
ascending palatine artery
inferior thyroid artery
lingual artery

Veins: **external palatine vein**
→ **pharyngeal venous plexus**

Lymphatics: **jugulo-digastric nodes**,
Waldeyer's ring
(pharyngeal, palatine and lingual tonsils)


Pharyngeal branch
(supplies roof of nasopharynx)
Superficial temporal artery
Maxillary artery
Ascending palatine artery
Tonsillar branch
Ascending pharyngeal artery
Internal carotid artery
Facial artery
Lingual artery
External carotid artery
Pharyngeal branches
Common carotid artery
Inferior thyroid artery
Thyrocervical trunk

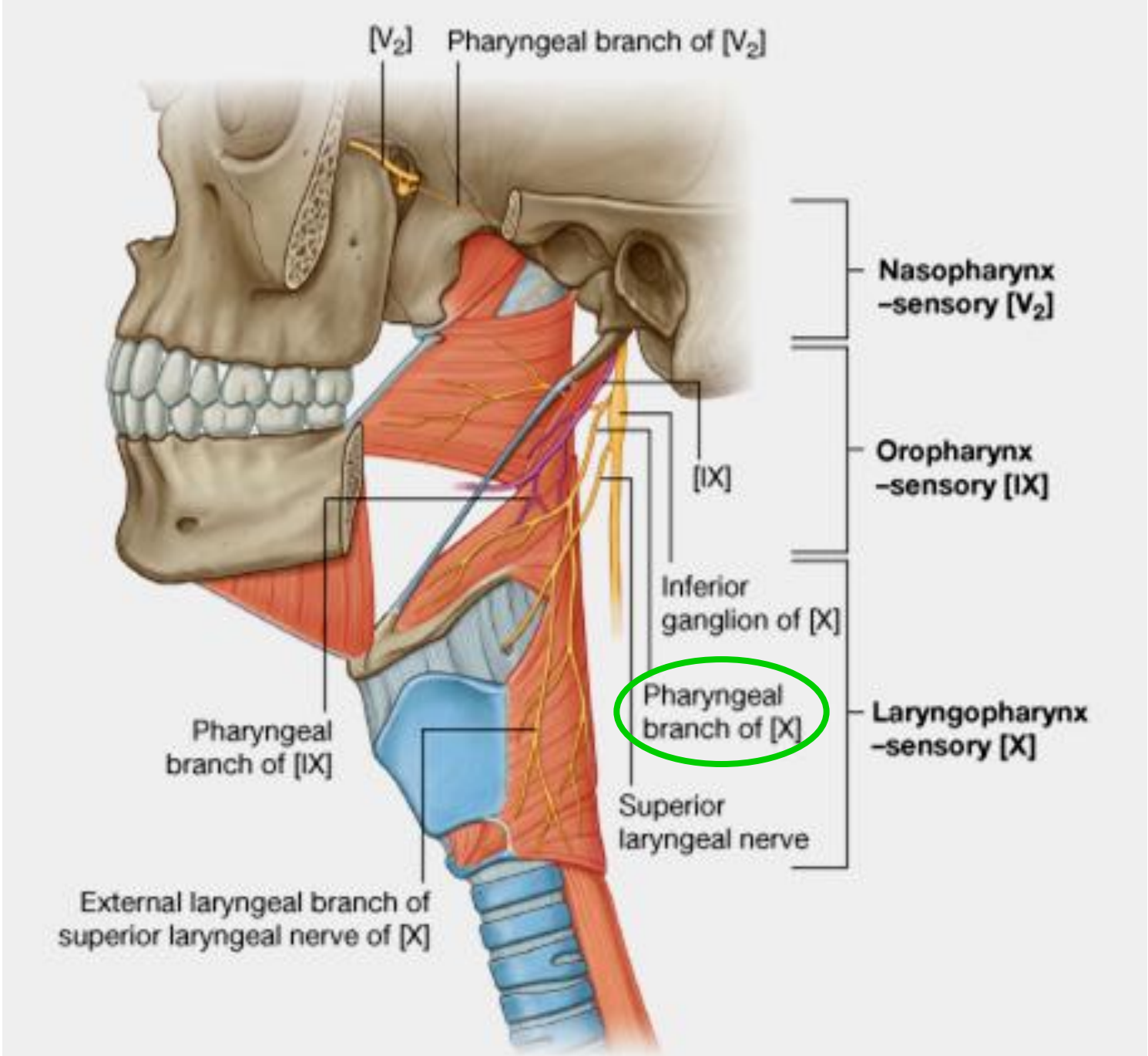

Pterygoid plexus
Superficial temporal vein
Retropharyngeal nodes
Facial vein
Jugulodygastric node
Retromandibular vein
Internal jugular vein
Infrahyoid nodes

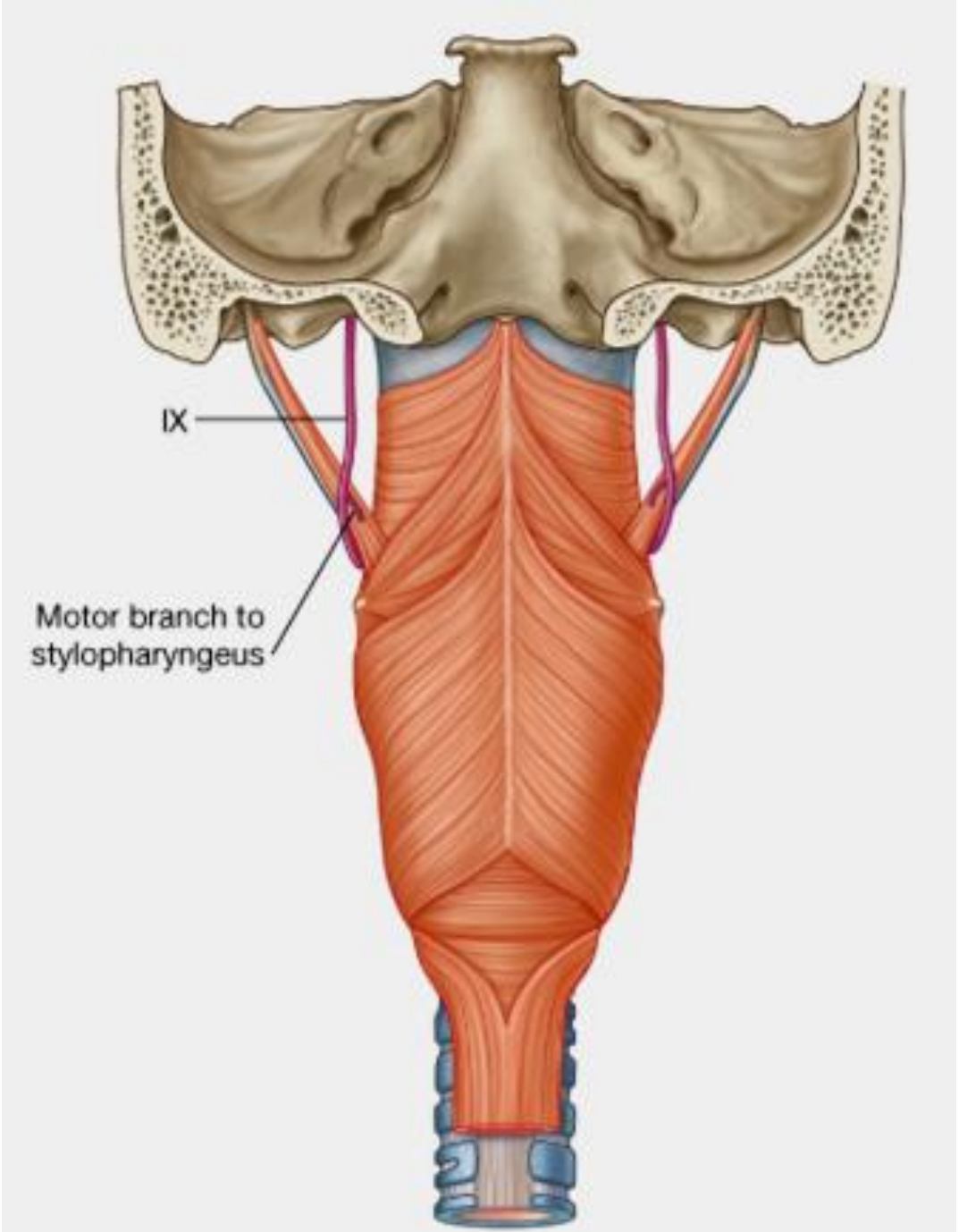
***Pharyngeal nerves*:**

Pharyngeal plexus of nerves
(**motor** fibers – cranial root of **CN XI**
which carried by **CN X**) to all the muscles

except the **stylopharyngeus m.** (**CN IX**),
~~**tensor veli palatini** (**CN V2**)~~

(**sensory** fibers –
nasopharyx – **CN V2**
oropharynx – **CN IX**
laryngopharynx – **CN X**





Dissection of Pharynx

Pharynx

1. identify **middle constrictor** – arise from the greater horn of hyoid bone
2. identify **superior & inferior constrictors**
3. find **internal laryngeal nerve** & **superior laryngeal vessels** piercing **thyrohyoid membrane**
4. find **recurrent laryngeal nerve** from the inferior border of inf. constrictor
5. identify **stylopharyngeus** **&** **glossopharyngeal nerve** between sup. & mid. constrictors
6. make the median section to open pharynx from base of skull to level of cricoid cartilage.
7. examine **nasal, oral & laryngeal pharynx**
8. identify the **palatine tonsil** between **palatoglossal & palatopharyngeal arches**

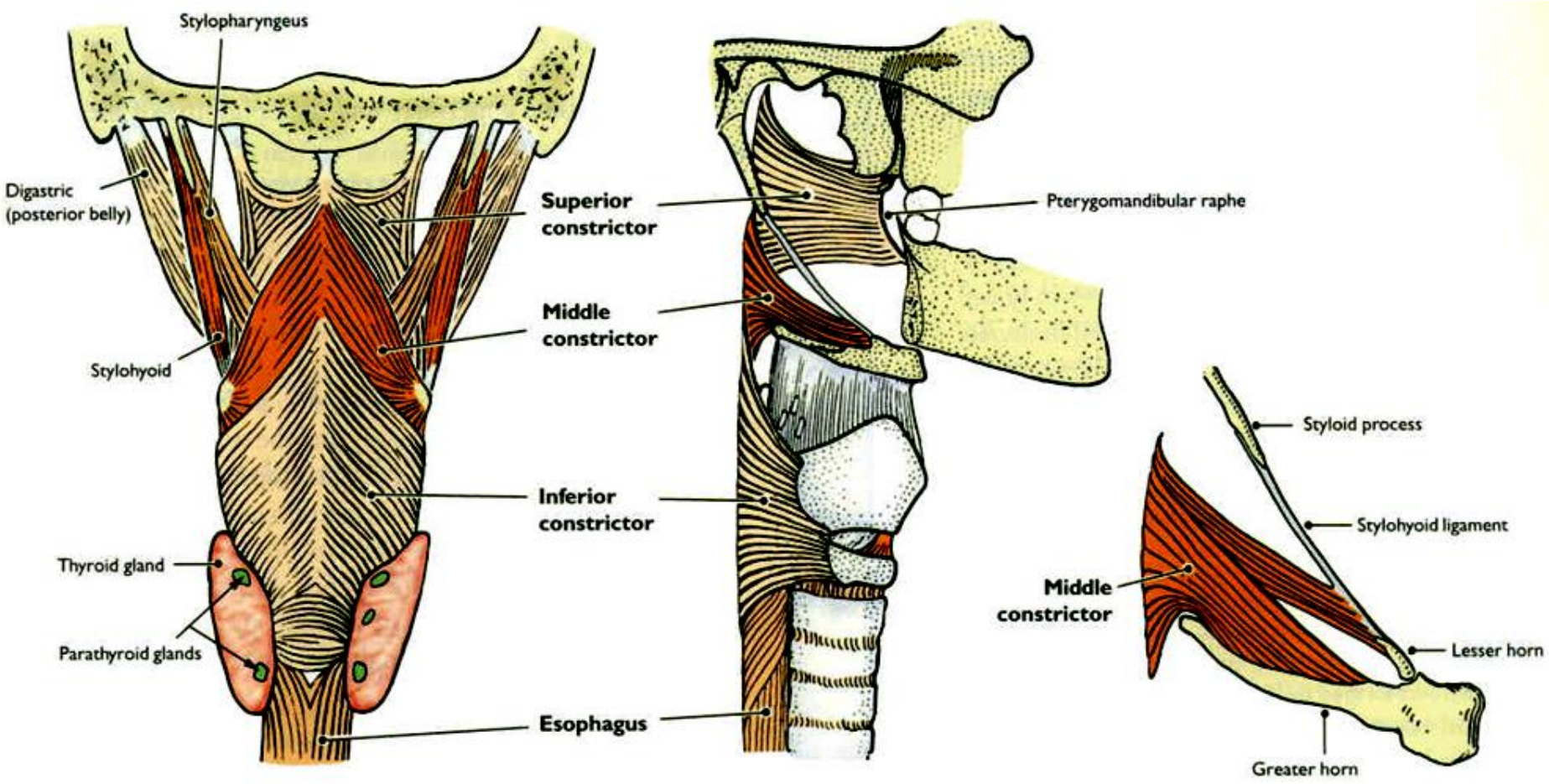
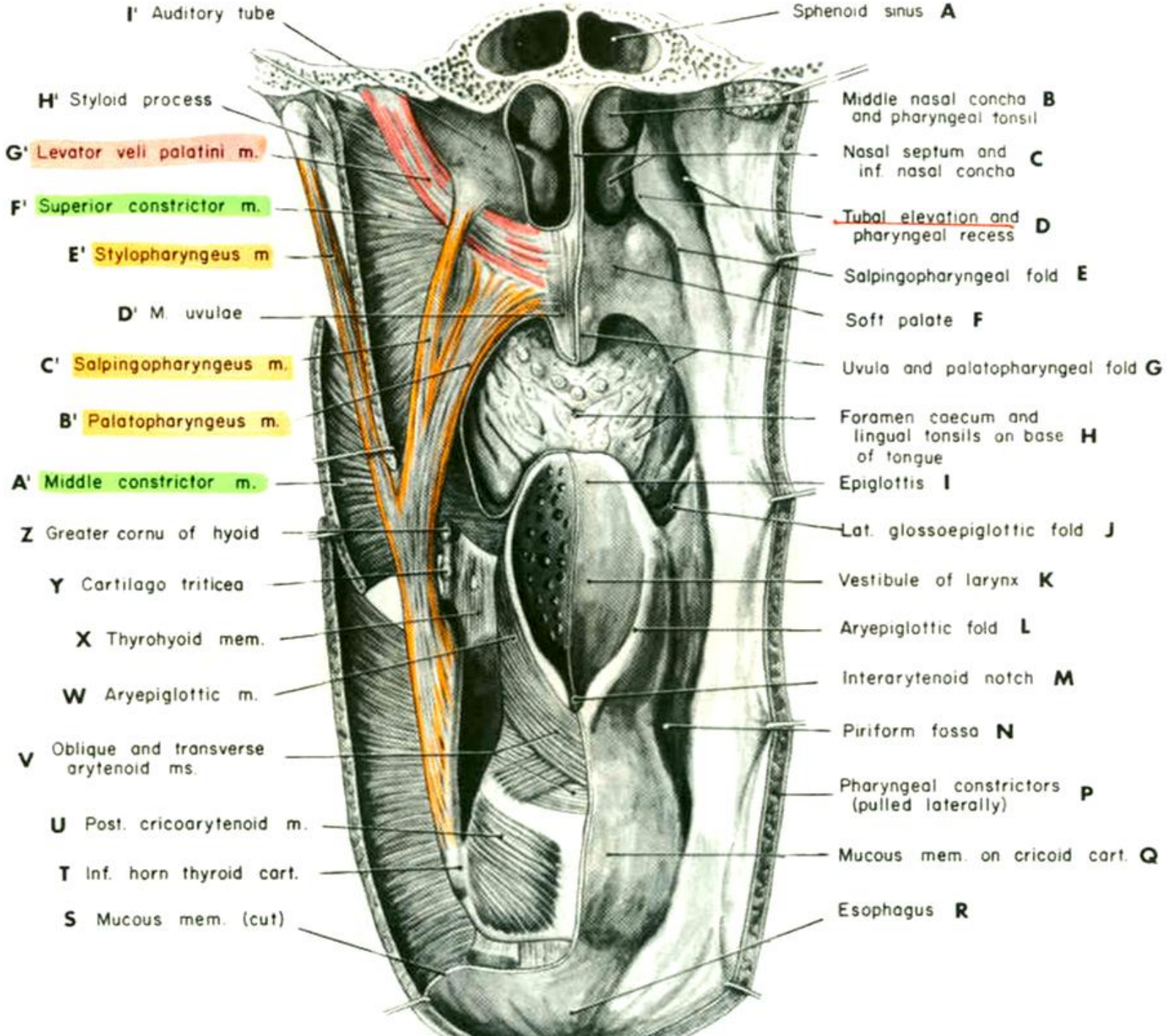
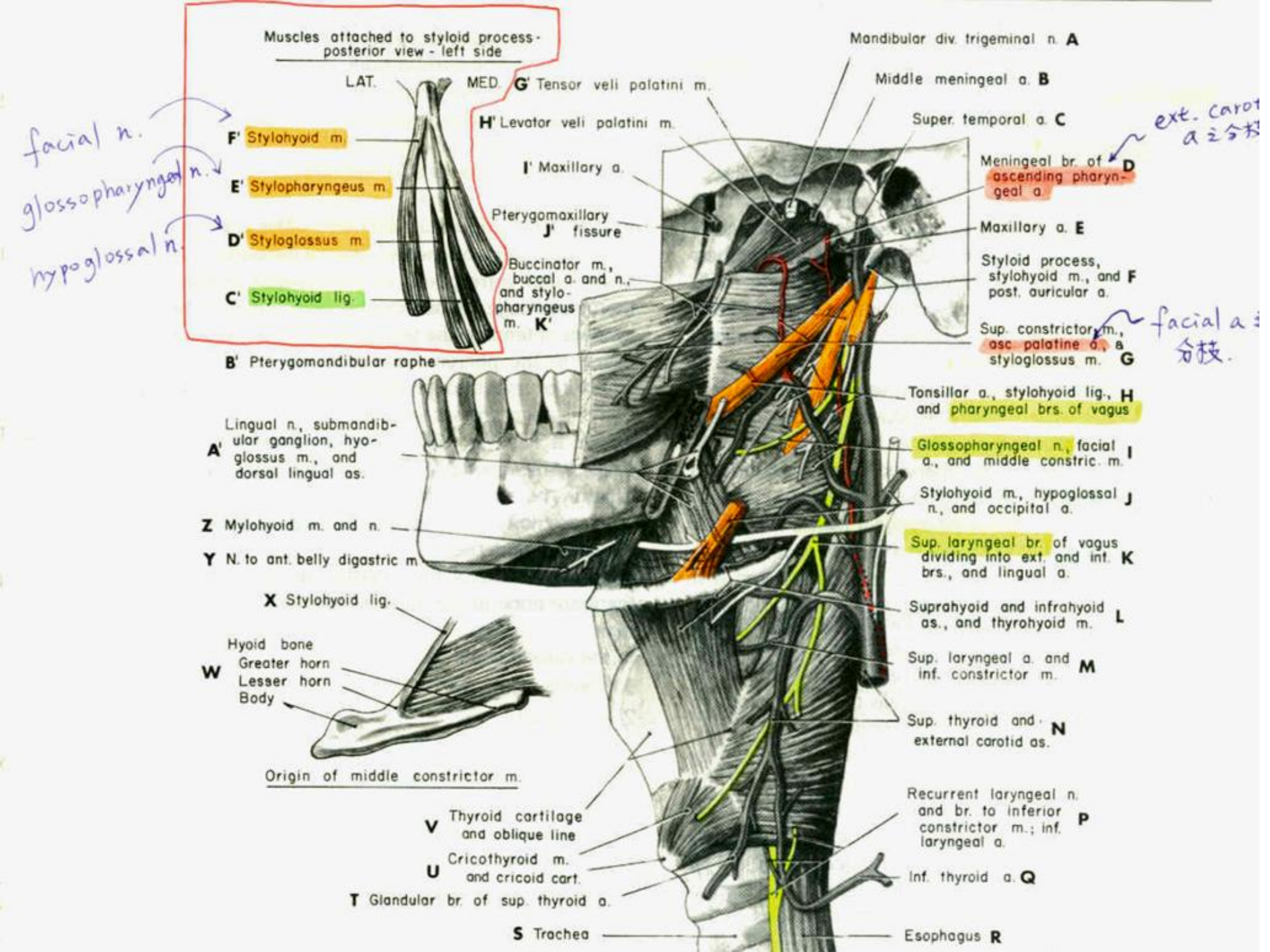


Figure 7.80. Muscles of the pharynx. ***A***, Posterior view. ***B***, Lateral view. ***C***, Origin of the middle constrictor from the hyoid bone and the stylohyoid ligament.


I' Auditory tube
H' Styloid process
G' Levator veli palatini m.
F' Superior constrictor m.
E' Stylopharyngeus m
D' M. uvulae
C' Salpingopharyngeus m.
B' Palatopharyngeus m.
A' Middle constrictor m.
Z Greater cornu of hyoid
Y Cartilago triticea
X Thyrohyoid mem.
W Aryepiglottic m.
V Oblique and transverse arytenoid ms.
U Post. cricoarytenoid m.
T Inf. horn thyroid cart.
S Mucous mem. (cut)
Sphenoid sinus A
Middle nasal concha and pharyngeal tonsil B
Nasal septum and inf. nasal concha C
Tubal elevation and pharyngeal recess D
Salpingopharyngeal fold E
Soft palate F
Uvula and palatopharyngeal fold G
Foramen caecum and lingual tonsils on base of tongue H
Epiglottis I
Lat. glossoepiglottic fold J
Vestibule of larynx K
Aryepiglottic fold L
Interarytenoid notch M
Piriform fossa N
Pharyngeal constrictors (pulled laterally) P
Mucous mem. on cricoid cart. Q
Esophagus R


Muscles attached to styloid process - posterior view - left side
LAT.
MED.
F' Stylohyoid m.
E' Stylopharyngeus m.
D' Styloglossus m.
C' Stylohyoid lig.
facial n.
glossopharyngeal n.
hypoglossal n.
G' Tensor veli palatini m.
H' Levator veli palatini m.
I' Maxillary a.
Pterygomaxillary fissure J'
Buccinator m., buccal a. and n., and stylopharyngeus m. K'
B' Pterygomandibular raphe
A' Lingual n., submandibular ganglion, hyoglossus m., and dorsal lingual as.
Z Mylohyoid m. and n.
Y N. to ant. belly digastric m
X Stylohyoid lig.
W Hyoid bone
Greater horn
Lesser horn
Body
Origin of middle constrictor m.
V Thyroid cartilage and oblique line
U Cricothyroid m. and cricoid cart.
T Glandular br. of sup. thyroid a.
S Trachea
Mandibular div. trigeminal n. A
Middle meningeal a. B
Super. temporal a. C
ext. carotid a.
Meningeal br. of ascending pharyngeal a. D
Maxillary a. E
Styloid process, stylohyoid m., and post. auricular a. F
facial a.
Sup. constrictor m., asc. palatine a., & styloglossus m. G
Tonsillar a., stylohyoid lig., and pharyngeal brs. of vagus H
Glossopharyngeal n., facial a., and middle constric. m. I
Stylohyoid m., hypoglossal n., and occipital a. J
Sup. laryngeal br. of vagus dividing into ext. and inf. brs., and lingual a. K
Suprahyoid and infrahyoid as., and thyrohyoid m. L
Sup. laryngeal a. and inf. constrictor m. M
Sup. thyroid and external carotid as. N
Recurrent laryngeal n. and br. to inferior constrictor m.; inf. laryngeal a. P
Inf. thyroid a. Q
Esophagus R

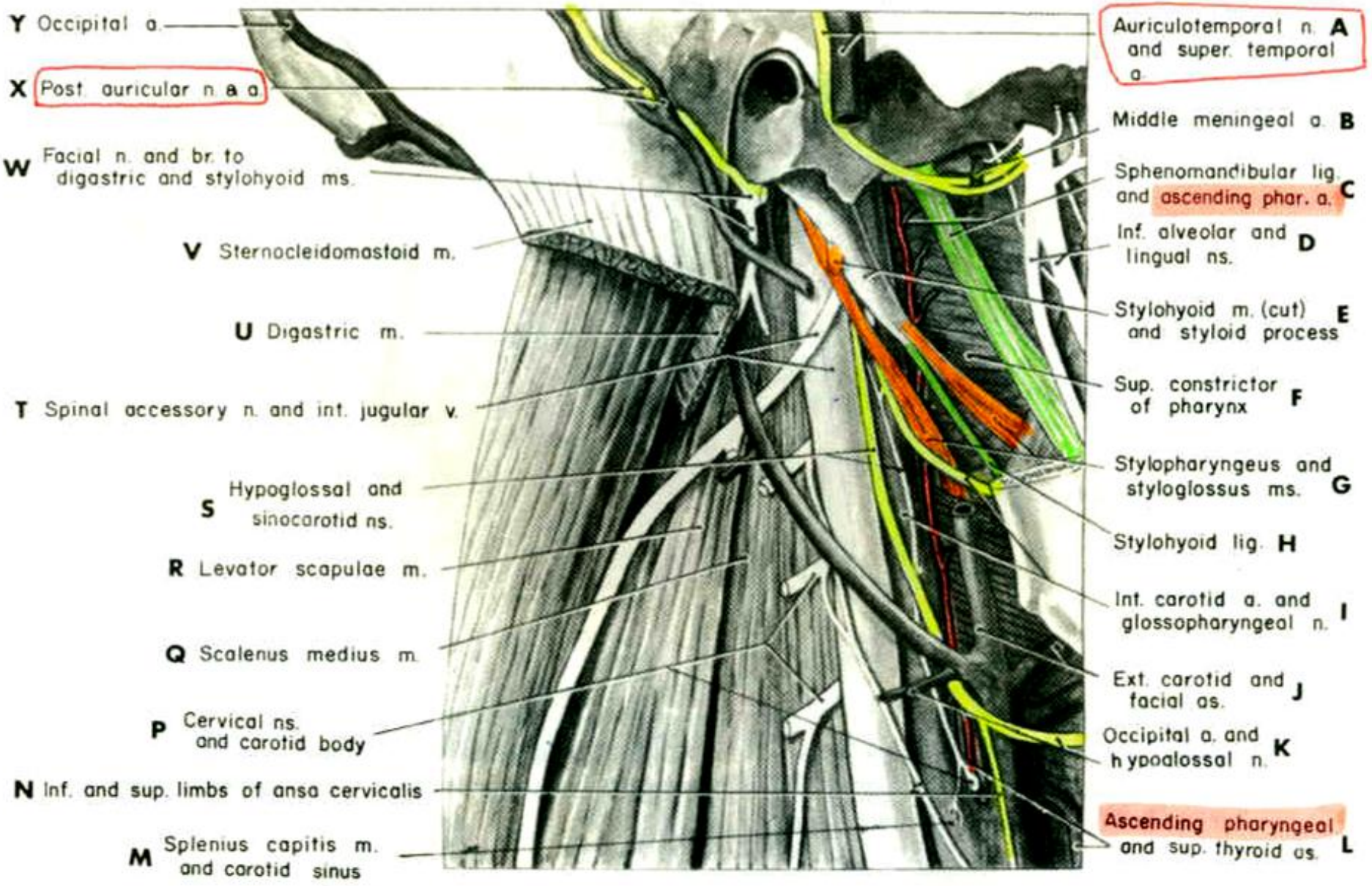


Figure 7-106. *The superior end of the carotid sheath, showing relations of the ninth, eleventh, and twelfth cranial nerves to the carotid arteries and the internal jugular vein. The vagus nerve cannot be seen, for it is deep to the large vessels. Note that these structures form the medial relations of the parotid gland. All fascia has been removed.*

Ascending cervical a. – ***prevertebral muscles***
(a branch of **thyrocervical trunk**)

Ascending pharyngeal a.
(a branch of **ext. carotid a.**)

Ascending palatine a.
(a branch of **facial a.**)

Deep cervical a. – ***back of neck***
(a branch of **costocervical a.**)

Superficial cervical a.
(variation of transverse cervical a.)

Superior laryngeal a.
(a branch of **sup. thyroid a.**)
with **internal laryngeal n.**

Inferior laryngeal a.
(a branch of **inf. thyroid a.**)
with **recurrent laryngeal n.**