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Neck

Chai Wei Tong & Belen Kornfeld

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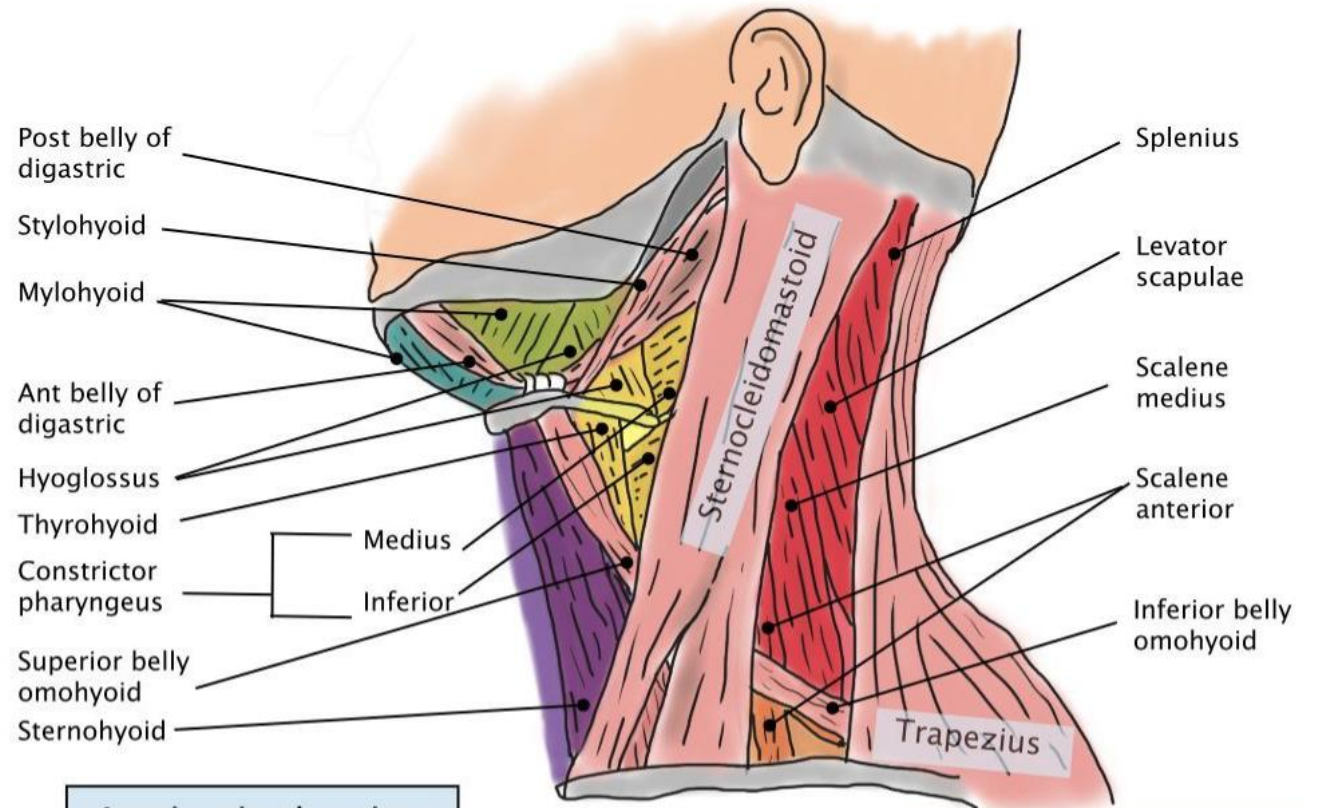
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# Learning objectives

- Anterior versus posterior triangle
- Layers of cervical fascia, and important points of separation/fusion/continuation
- Relation of nerves to the internal and external carotid artery
- Branches of the cervical plexus and Erb's point; and the course of accessory spinal nerve in the posterior triangle
- Parotid gland (with neck, as it is related to the layers of cervical fascia)
- Laryngeal anatomy, specifically muscle groups that shorten versus lengthen and abduct versus adduct
- Constrictor muscle origins and layout, and commencement of oesophagus

# Anterior triangle

- Borders
  - Superior – inferior border of the mandible
  - Lateral – anterior border of the sternocleidomastoid.
  - Medial – sagittal line down the midline of the neck.
- Subdivisions
  - Submental
  - Digastric
  - Carotid
  - Muscular

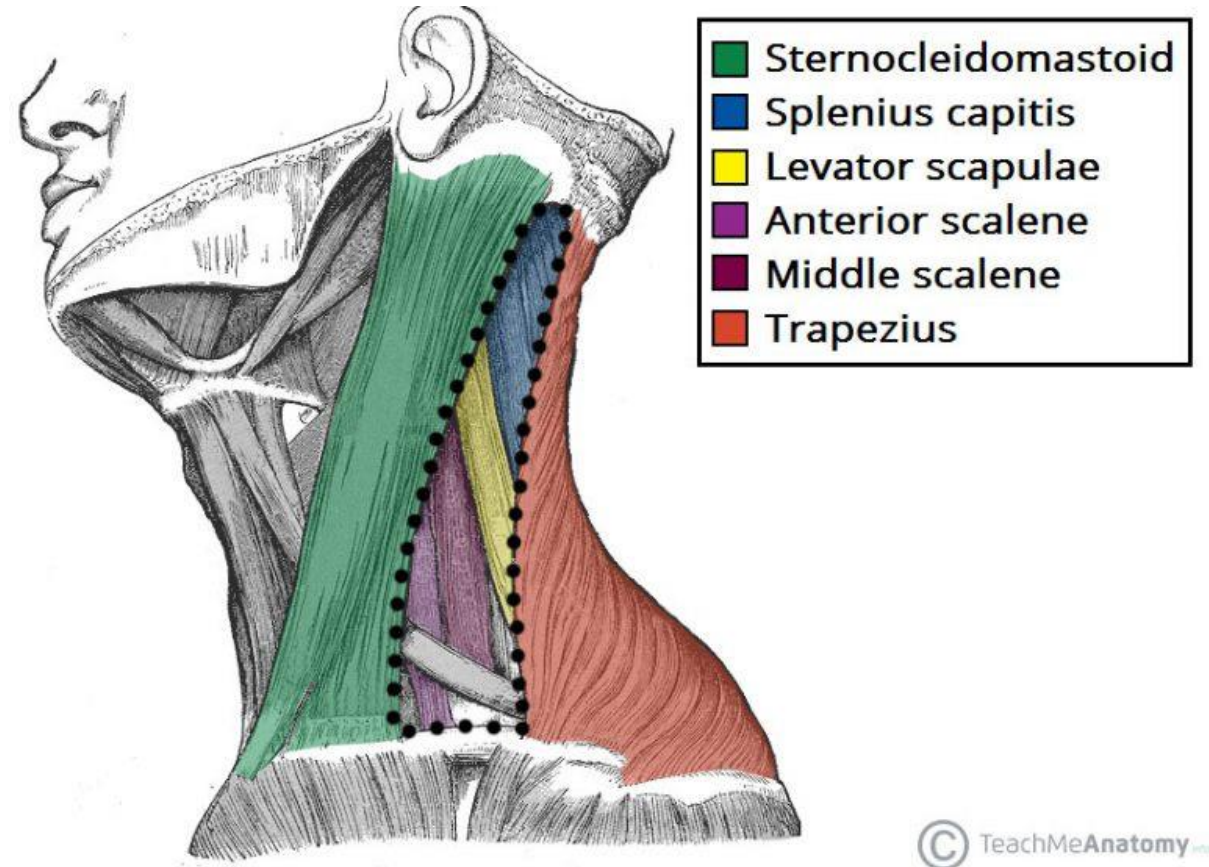


Anterior triangle regions
Submental
Submandibular
Muscular
Carotid

Posterior triangle regions
Occipital
Supraclavicular

# Posterior triangle

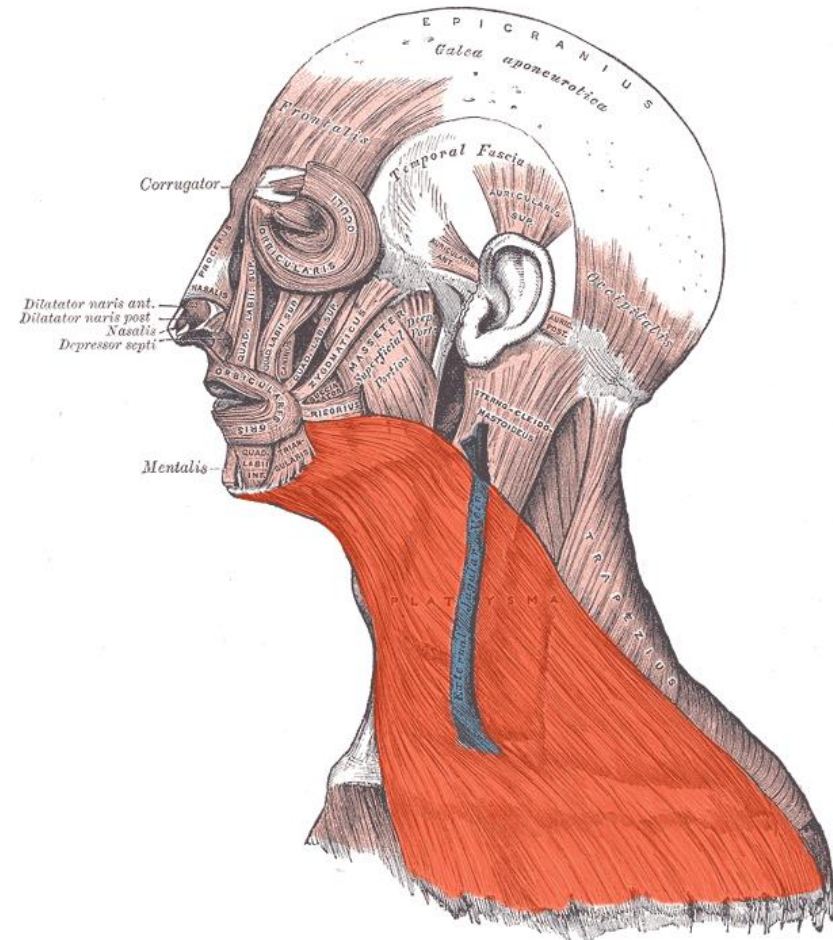
- Borders
  - Anterior – posterior border of the sternocleidomastoid.
  - Posterior – anterior border of the trapezius muscle.
  - Inferior – middle 1/3 of the clavicle.
- Contents
  - Arteries: transverse cervical, occipital, Suprascapular, subclavian (TOSS)
  - Veins: Suprascapular, external jugular, transverse cervical (SET)
  - Nerves: Accessory, cervical plexus, branchial plexus trunks (ABC)
  - Lymph nodes



# Cervical fascia- Superficial cervical fascia

## Platysma

- 2 heads, originate from fascia of pec major and deltoid to lower border of mandible
- Innervation: cervical branch of facial nerve (CN 7)



# Cervical fascia- Deep cervical fascia

## 1. Investing layer

- Surrounds neck like a collar
- Splits around SCM and Trapezius, splits to enclose parotid gland
- Encloses the suprasternal space containing lower anterior jugular vein, sternal heads of SCM +/- LNs
- Pierced by EJV

## 1. Pretracheal layer

- Deep to infrahyoid strap muscles (sternothyroid, sternohyoid, and omohyoid)
- Splits to enclose thyroid gland
- Surrounds the pharynx, oesophagus, larynx & trachea

## 3. Prevertebral layer

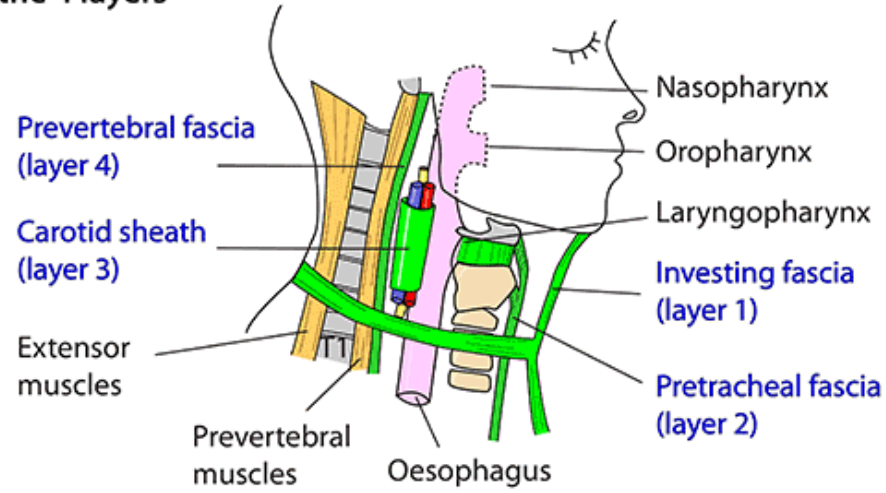
- Lies in-front of the pre-vertebral muscles
- Extends from base of skull → blend with anterior longitudinal ligament on body of T4
- Phrenic nerve lies posterior to prevertebral, vagus is anterior
- Covers muscles of floor of posterior triangle and all cervical nerve roots
- Contributes to axillary sheath
- Pierced by 4 cutaneous nerves:
  - i. Great auricular
  - ii. Lesser occipital
  - iii. Transverse cervical
  - iv. Supraclavicular

## 3. Carotid sheath

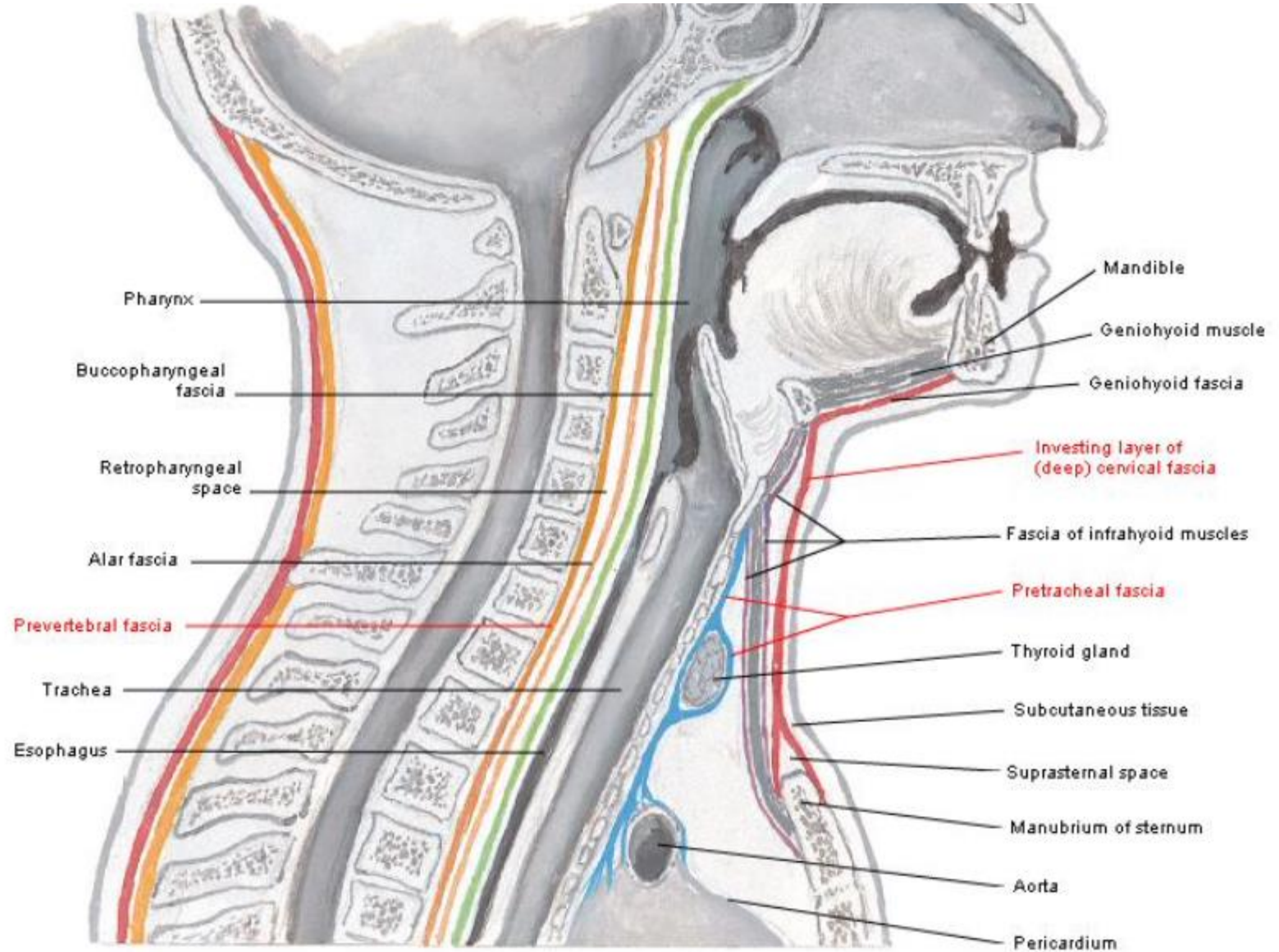
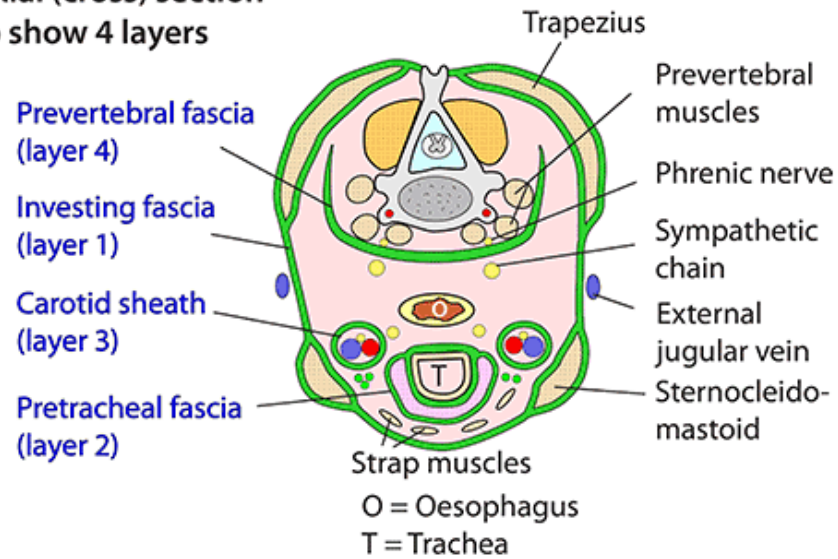
- Common and internal carotid arteries
- Internal jugular vein
- Vagus nerve
- Some deep cervical lymph nodes

# DEEP FASCIA OF NECK

Lateral view to show the 4 layers



Axial (cross) section to show 4 layers



# Question

**The following statements about the investing layer of the deep cervical fascia is True/False**

- A. splits to enclose the trapezius muscle
- B. splits to include the parotid gland
- C. is attached to the hyoid bone
- D. is attached to the superior nuchal line
- E. splits to enclose the sterno-hyoid muscle

*Last 9th. ed. PAGE: 421 splits to enclose trapezius, Sternocleidomastoid, parotid, inferior belly of omohyoid. is attached to hyoid bone, is attached to superior nuchal line. DOES not enclose sternohyoid lol*





# Question

**The prevertebral layer of cervical fascia contributes to (True/False)**

1: the carotid sheath

2: the clavipectoral fascia

3: the suprapleural membrane

4: the axillary sheath

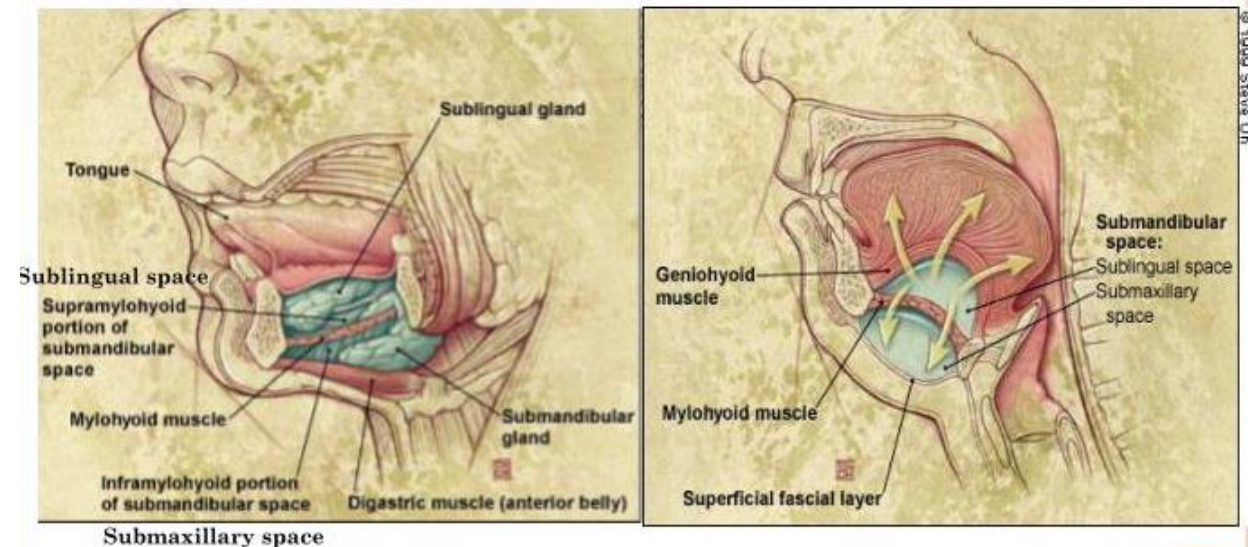
# Question

**The prevertebral layer of cervical fascia contributes to (True/False)**

- |                              |   |
|------------------------------|---|
| 1: the carotid sheath        | F |
| 2: the clavipectoral fascia  | F |
| 3: the suprapleural membrane | F |
| 4: the axillary sheath       | T |

# Spaces....

1. Prevertebral space
  - Behind prevertebral fascia
  - Pus from abscess in cervical vertebra can lift the prevertebral fascia as far down as superior mediastinum
2. Retropharyngeal space
  - Upper part In front of prevertebral fascia
3. Parapharyngeal space
  - Continues laterally from retropharyngeal space
4. Submandibular space
  - Below mylohyoid, deep to investing layer between hyoid and mandible
  - Ludwig's Angina- cellulitis of this space



# Question

**S:Pus from an abscess in a cervical vertebra tracks down into the posterior mediastinum because R:the prevertebral fascia is attached inferiorly to the body of the sixth thoracic vertebra**

- A. S is true, R is true and a valid explanation of S
- B. S is true, R is true but not a valid explanation of S
- C. S is true and R is false
- D. S is false and R is true
- E. Both S and R are false

# Question

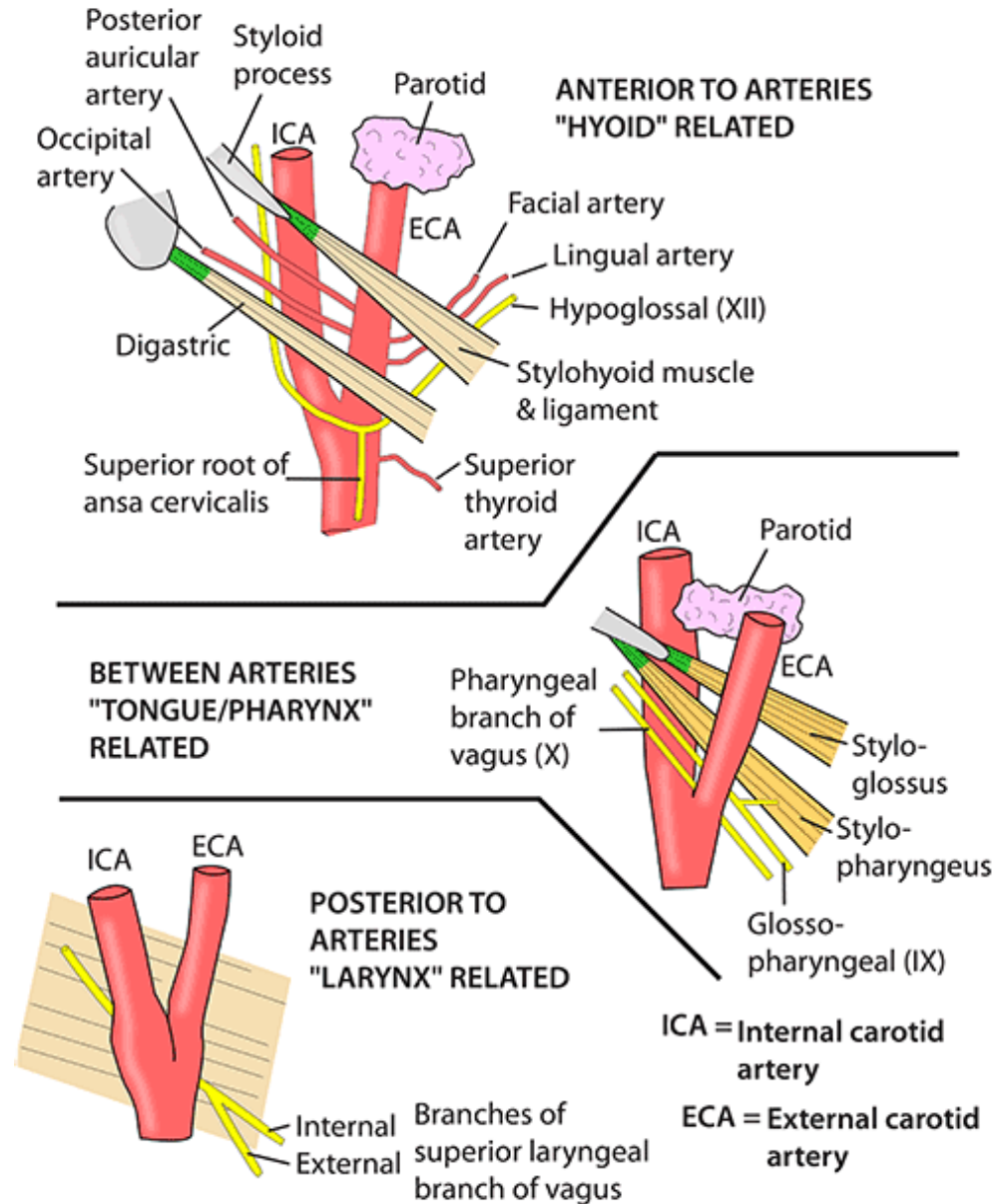
**S:Pus from an abscess in a cervical vertebra tracks down into the posterior mediastinum because R:the prevertebral fascia is attached inferiorly to the body of the sixth thoracic vertebra**

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- C. S is true and R is false
- D. S is false and R is true
- E. Both S and R are false**

*Last 9th Ed page 423. Abscess in cervical vertebra can track down into **superior** mediastinum. Prevertebral fascia extends from the base of the skull in front of the longus capitis and rectuscapitis lateralis downwards to the lower limit of the longus colli muscle (body of T3 vertebra).*

# Relation of nerves to the internal and external carotid artery

## RELATIONS OF THE BIFURCATION OF THE CAROTID ARTERIES



# Question

**Structures which pass between the external and the internal carotid arteries include**

- 1: the hypoglossal nerve
- 2: the glossopharyngeal nerve
- 3: a portion of the parotid gland
- 4: the stylopharyngeus muscle



# Question

**Structures which pass between the external and the internal carotid arteries include**

- |                                   |   |
|-----------------------------------|---|
| 1: the hypoglossal nerve          | F |
| 2: the glossopharyngeal nerve     | T |
| 3: a portion of the parotid gland | T |
| 4: the stylopharyngeus muscle     | T |

*Last 8th Edition PAGE: 462 stylopharyngeus muscle, glossopharyngeal nerve and pharyngeal branch of vagus, part of parotid gland. Hypoglossal is between IJV and ICA (9th Ed page 465)*

# Cervical plexus

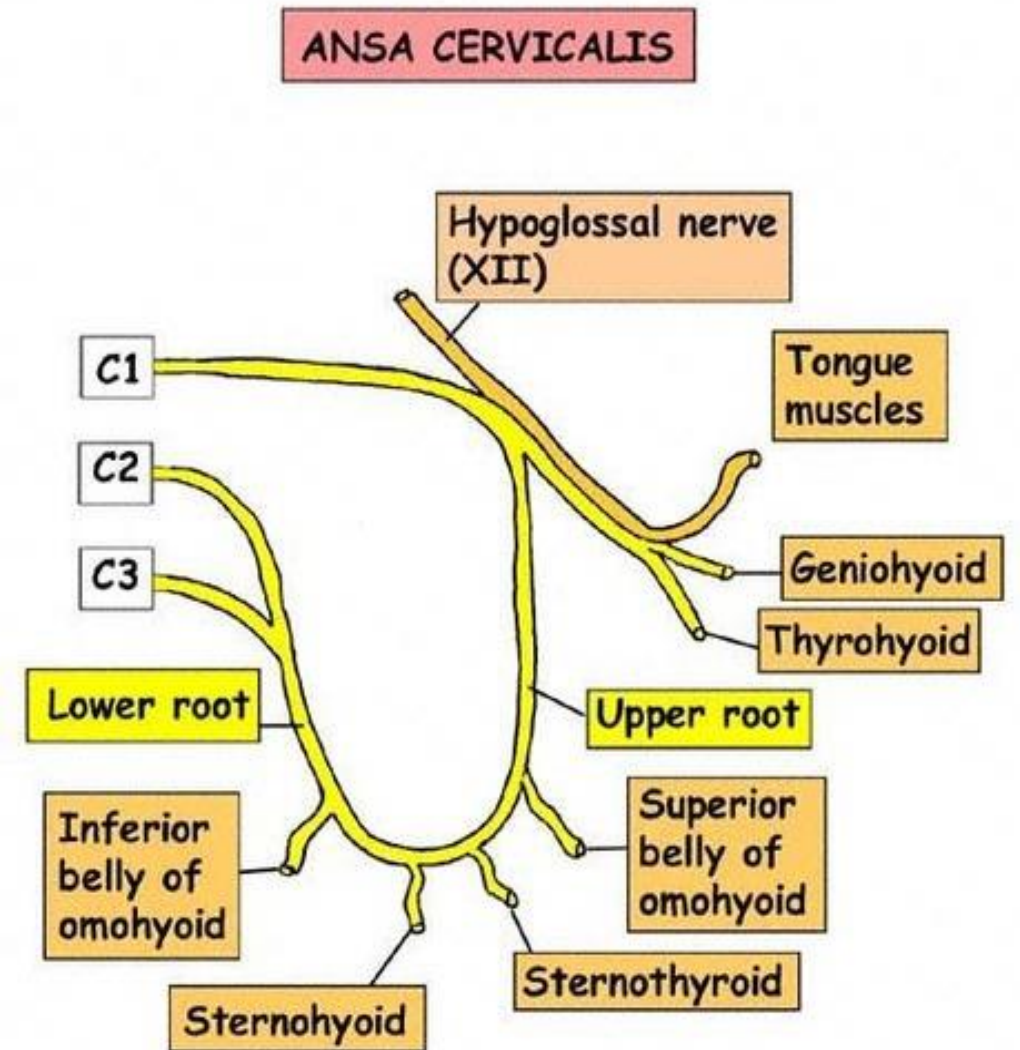
## 1. C1- C4 anterior rami

### ○ Muscular branches

- Phrenic nerve (C3-5)
- N to geniohyoid and thyrohyoid (C1)
- Ansa cervicalis (C1-3)
  - 4 muscular branches to infrahyoid muscles
- Branches to prevertebral muscles, trapezius

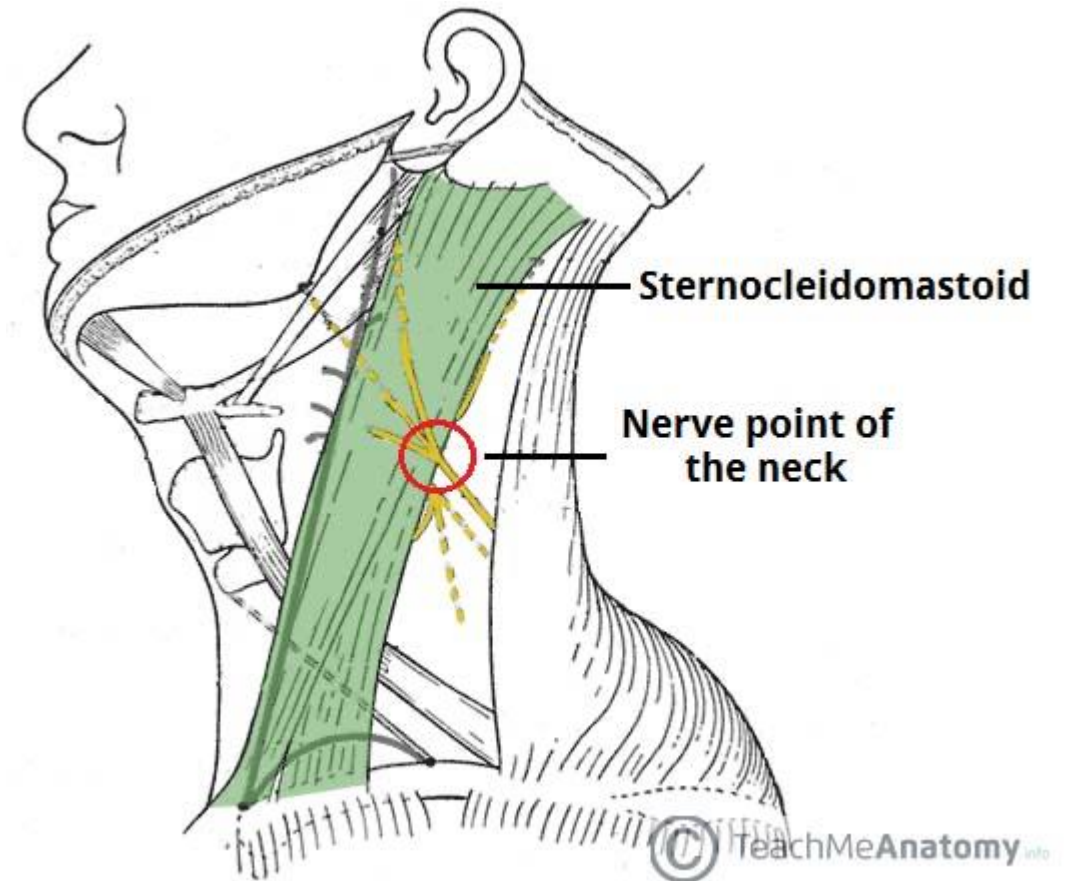
### ○ Sensory branches (*Lets Go To Sleep*)

- Lesser occipital n
- Great Auricular n
- Transverse cervical n
- Supraclavicular n



# Erb's point (nerve point of the neck)

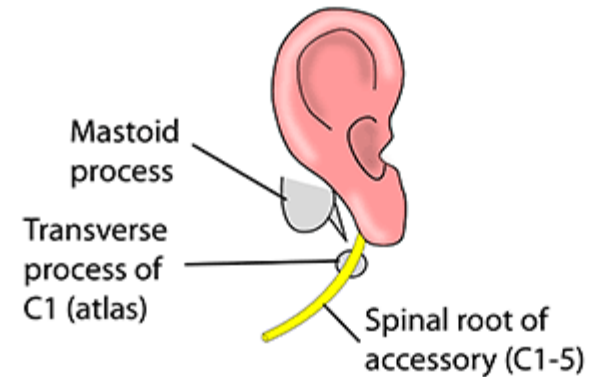
- Approximately midway along the posterior border of the sternocleidomastoid muscle
- Four superficial branches of the **cervical plexus**—the **greater auricular**, **lesser occipital**, **transverse cervical**, and **supraclavicular nerves**—emerge from behind the **muscle**.
- Spinal accessory nerve can often be found 1 cm above Erb's point - risk of injury in lymph node excision level V



# Spinal accessory nerve (course in posterior $\Delta$ )

- Emerges from SCM halfway down its posterior border, from within the substance of SCM
- Passes almost vertically downwards overlying levator scapulae
- Embedded within fascia of the roof of posterior triangle, disappear under anterior border of trapezius
- Liable to injury in operation involving lymph node excision

SPINAL ROOT OF ACCESSORY NERVE  
SURFACE MARKINGS



## Method one

1. Find transverse process of atlas just anterior mastoid process
2. Draw a line to anterior border of trapezius, 5cm above the clavicle
3. This is the line of the nerve through sternocleidomastoid and posterior triangle

## Method two

1. Draw a line from a third of the way down the posterior border of sternocleidomastoid to a point a third of the way up the anterior border of trapezius
2. This is the line of the nerve through sternocleidomastoid and posterior triangle

# Question

## **The accessory nerve (SBA)**

- A. lies on the scalenus medius muscle in the posterior triangle
- B. supplies the levator scapulae muscle
- C. passes through the substance of the sternomastoid muscle
- D. crosses anterior to the styloid process
- E. crosses anterior to the external carotid artery

# Question

## The accessory nerve

- A. lies on the scalenus medius muscle in the posterior triangle
- B. supplies the levator scapulae muscle
- C. passes through the substance of the sternomastoid muscle**
- D. crosses anterior to the styloid process
- E. crosses anterior to the external carotid artery

# Parotid gland

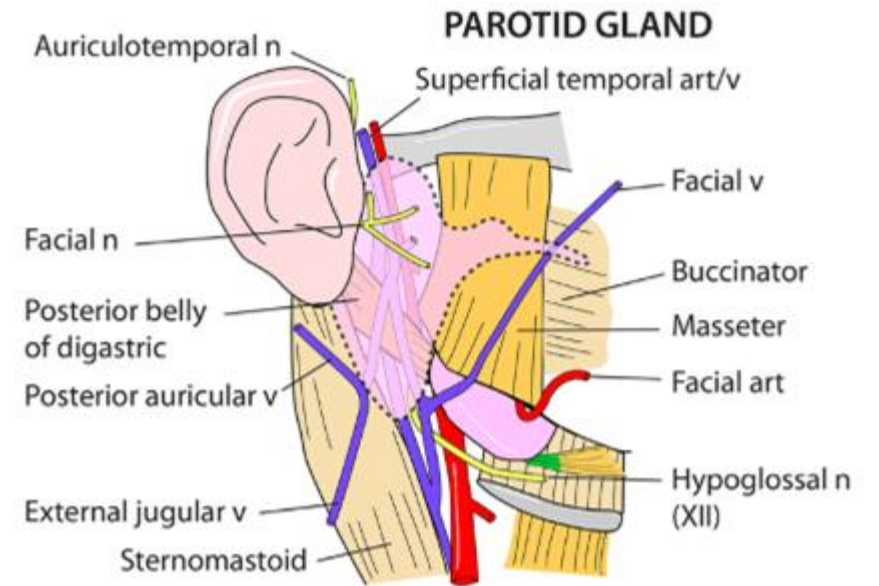
Largest of salivary glands - mostly serous saliva

Relations:

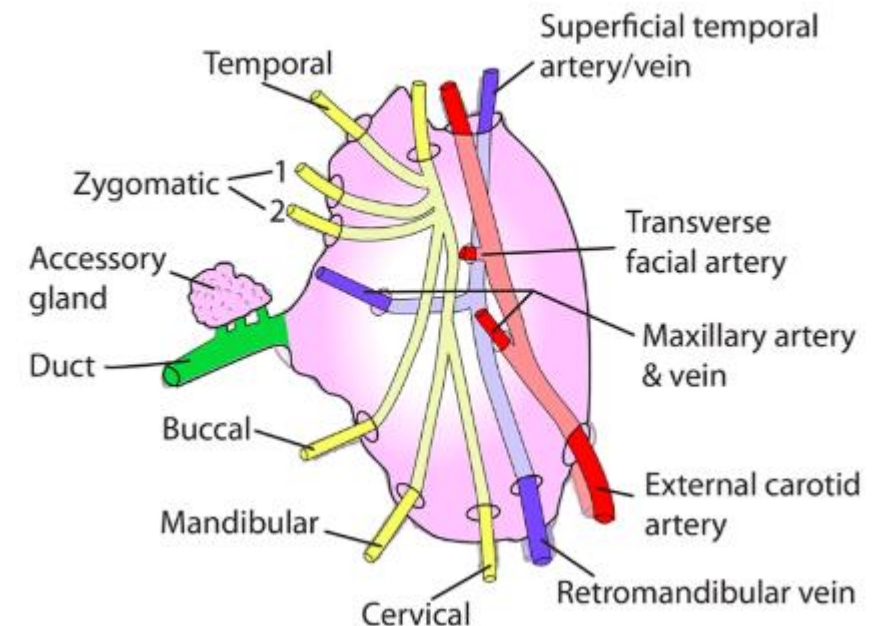
- Ant: EAC extends posteriorly on mastoid process
- Post: masseter
- Lat: skin + fascia (sup + deep -splits to enclose)
- Medial
  - Ant. medial - mandibular ramus, exit- duct , CN7
  - Post. medial - mastoid process ( SCM/PBD)
    - Styloid process + muscles separates carotid
    - ECA enters
    - Facial n. Enters between mastoid & styloid

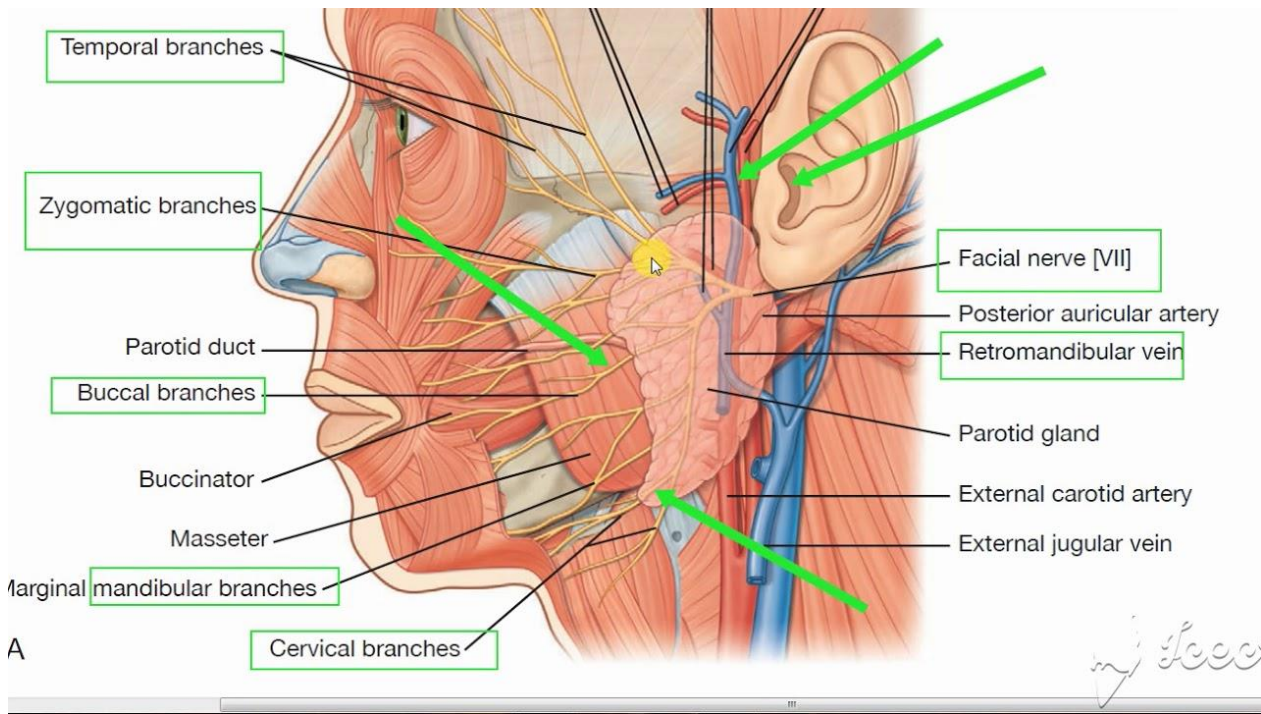
Layers:

- SMAS
- Investing layer ( parotid + SCM/traps)

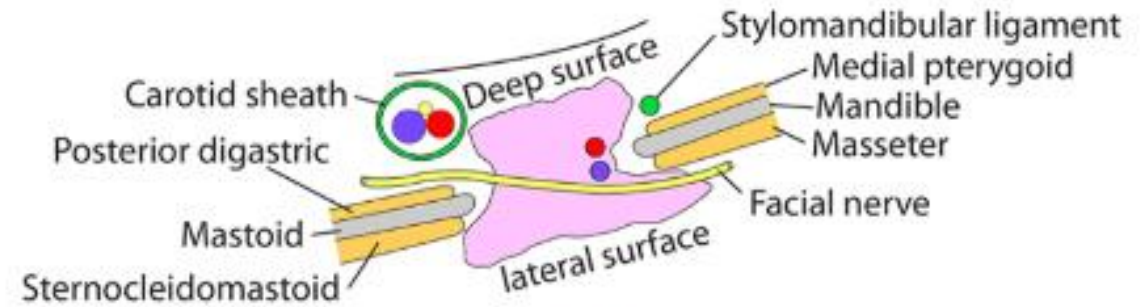


## MEDIAL SURFACE OF RIGHT PAROTID GLAND





## AXIAL SECTION OF RIGHT PAROTID GLAND

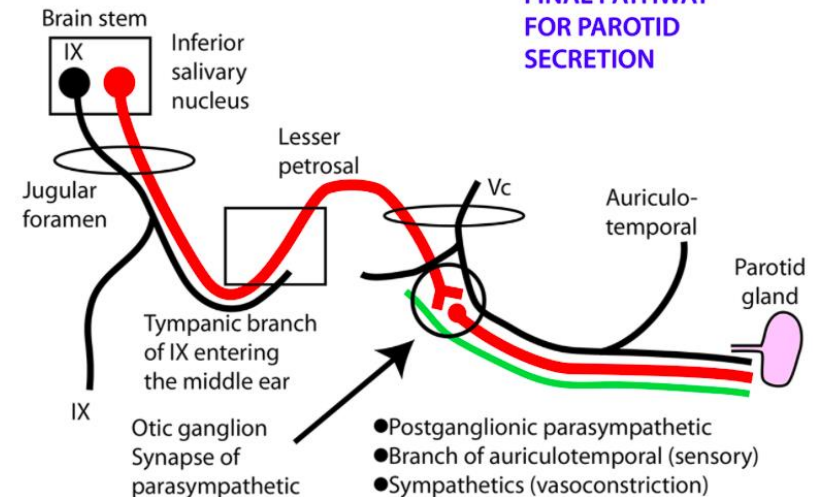


- **Artery:** branches of external carotid. **Veins:** retromandibular
- **Lymph:** Pre-auricular to deep cervical
- **Nerves:** **Secretomotor** via inferior salivary nucleus to glossopharyngeal nerve to its tympanic branch to lesser petrosal nerve to otic ganglion to auriculotemporal nerve. **Sympathetics** via superior cervical ganglion and external carotid artery. **Sensory:** auriculotemporal (Vc) & for fascia - great auricular (C2)
- **Duct:** 5cm long, crosses masseter, pierces buccinator at 3rd molar and mucosa at 2nd molar

## Within substance of the gland

- Plexiform arrangement of facial nerve: TZBMC
- RMV forms: STV + maxillary  
→ ant → facial  
→ post + post. Auricular → EJV

### PARASYMPATHETIC PATHWAY FOR PAROTID SECRETION



### FINAL PATHWAY FOR PAROTID SECRETION



# Question

**Structures which pass between the external and the internal carotid arteries include**

1: the hypoglossal nerve

2: the glossopharyngeal nerve

3: a portion of the parotid gland

4: the stylopharyngeus muscle

# Question

## **The facial nerve**

- 1: supplies the muscles of the lower lip through its cervical branch
- 2: emerges from the skull through the stylomastoid foramen
- 3: divides into upper and lower branches just before or within the substance of the parotid gland
- 4: emerges from the parotid gland in five main divisions

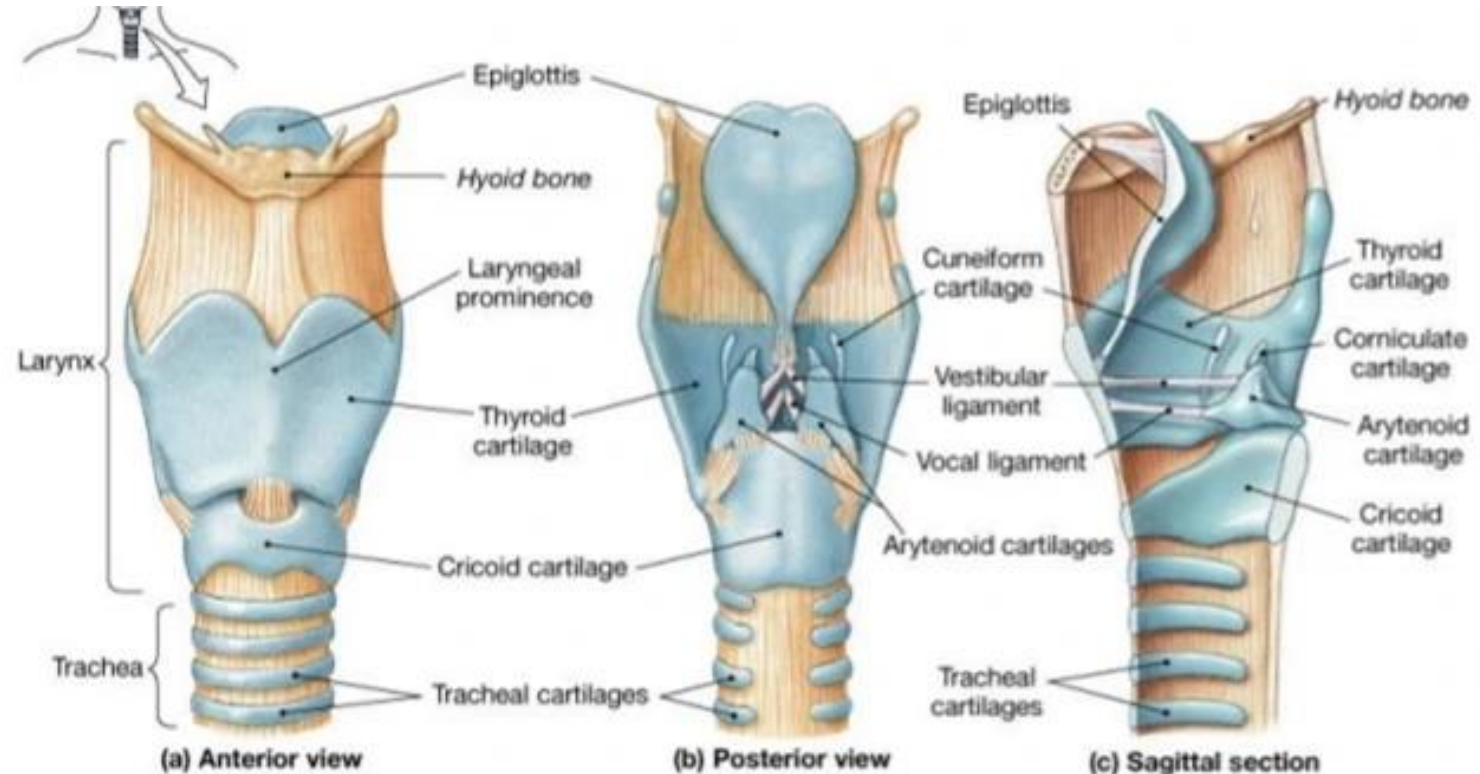
# Laryngeal Anatomy

4 basic anatomic units:

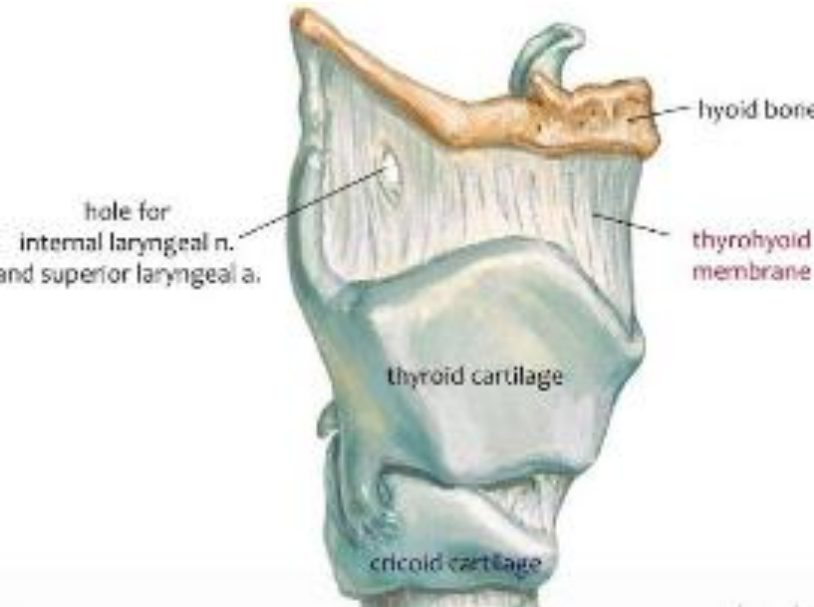
1. Skeleton
2. Intrinsic muscles
3. Extrinsic muscles
4. Mucosa

Skeleton ( mostly cartilages, hyoid attachment)

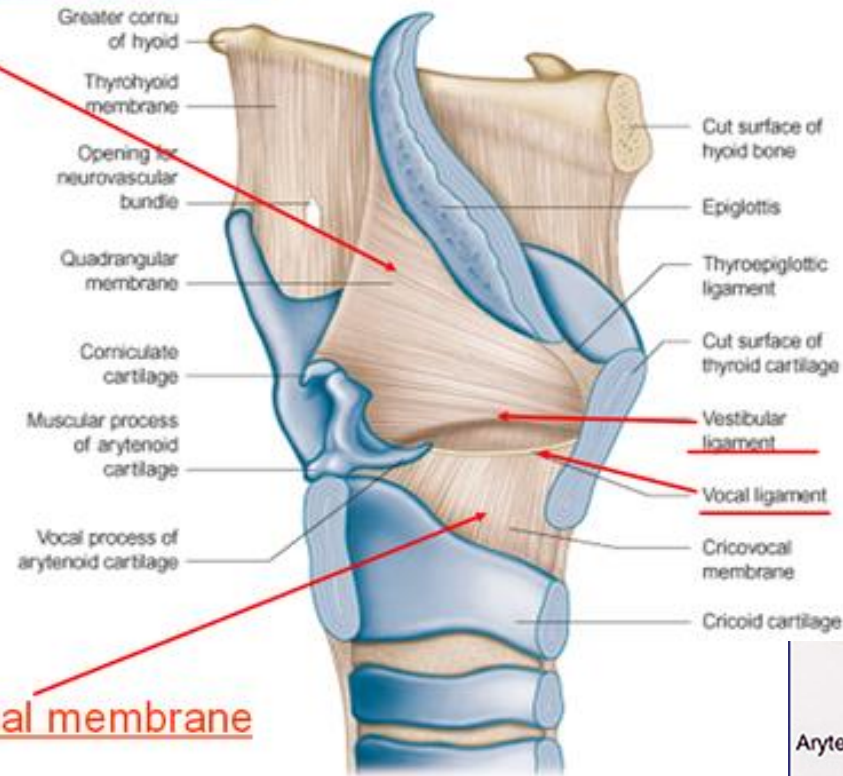
- Unpaired: thyroid, cricoid, epiglottic
- Paired: arytenoid, corniculate, cuneiform



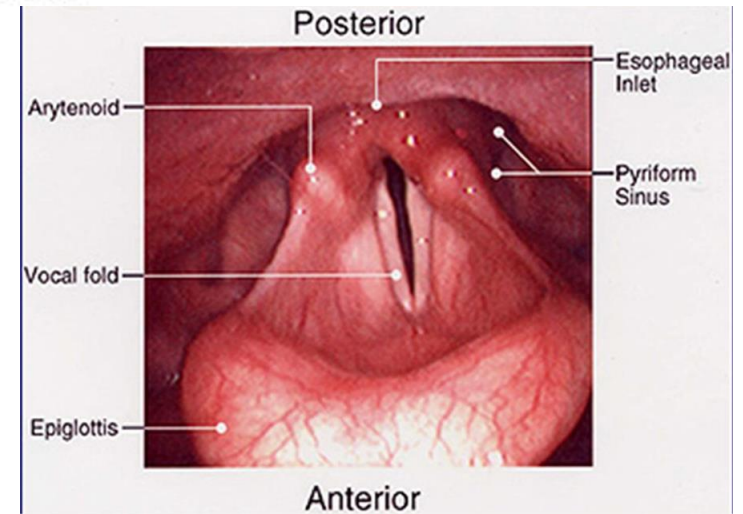
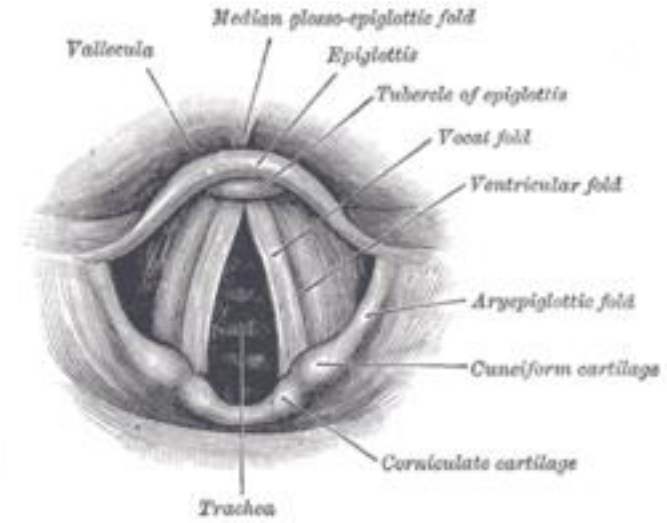
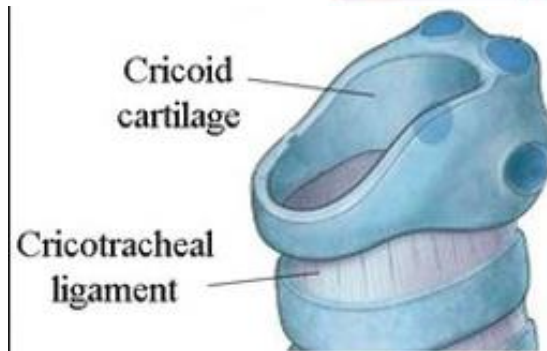
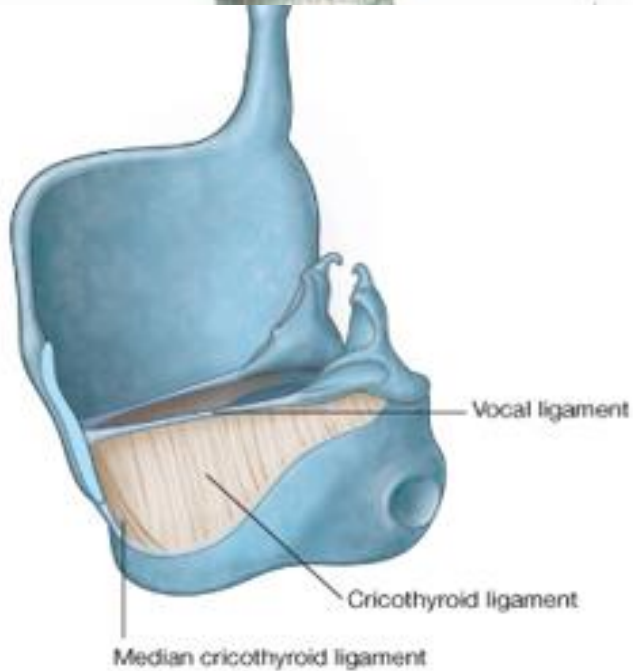
# Ligaments + membranes



## Quadrangular membrane



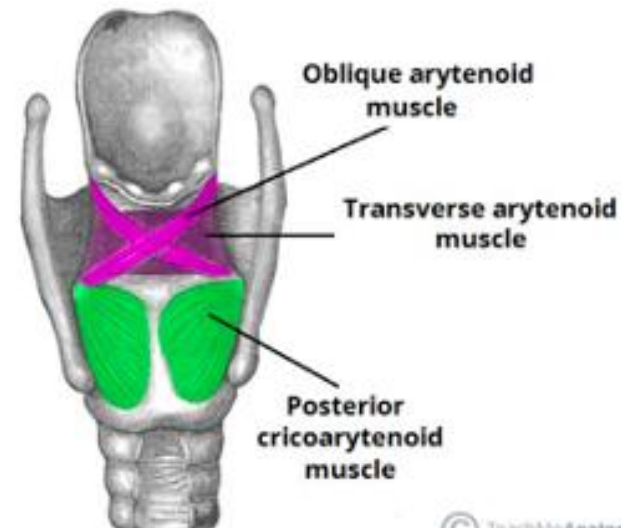
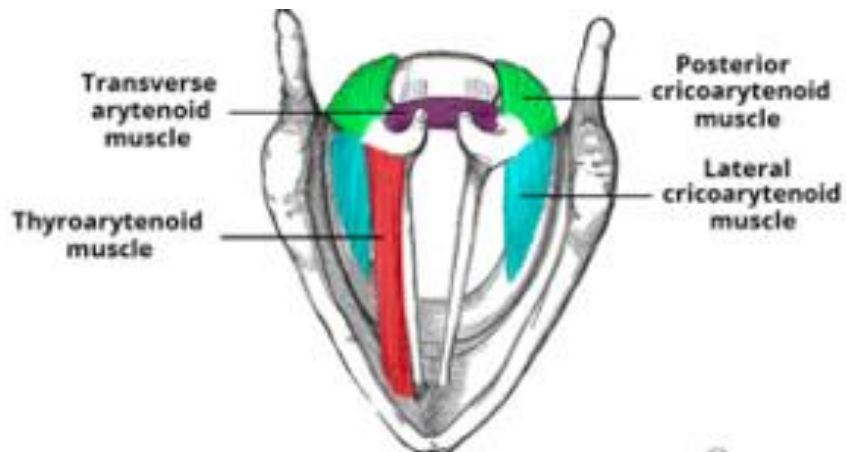
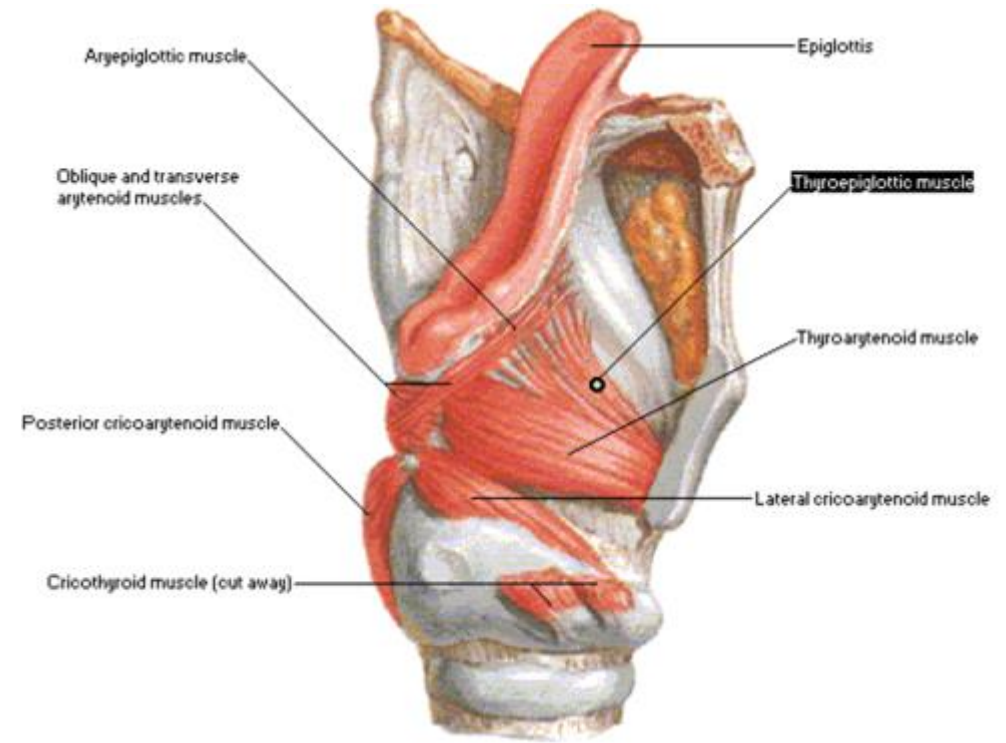
## cricovocal membrane



# Intrinsic muscles

Origin and insertion within larynx

1. Cricothyroids: LENGTHEN vocal lig - raise pitch of voice
2. Posterior cricoarytenoids: ABDUCT vocal lig → open glottis
3. Lateral cricoarytenoids: ADDUCT → close glottis
4. Transverse arytenoids: approximates arytenoids ⇒ helps close post. portion of glottis
5. Oblique arytenoids: bring arytenoids together for phonation
6. Thyroarytenoids (Vocalis): allow tight closure of glottis
  - Active in raising pitch & vocal volume during phonation



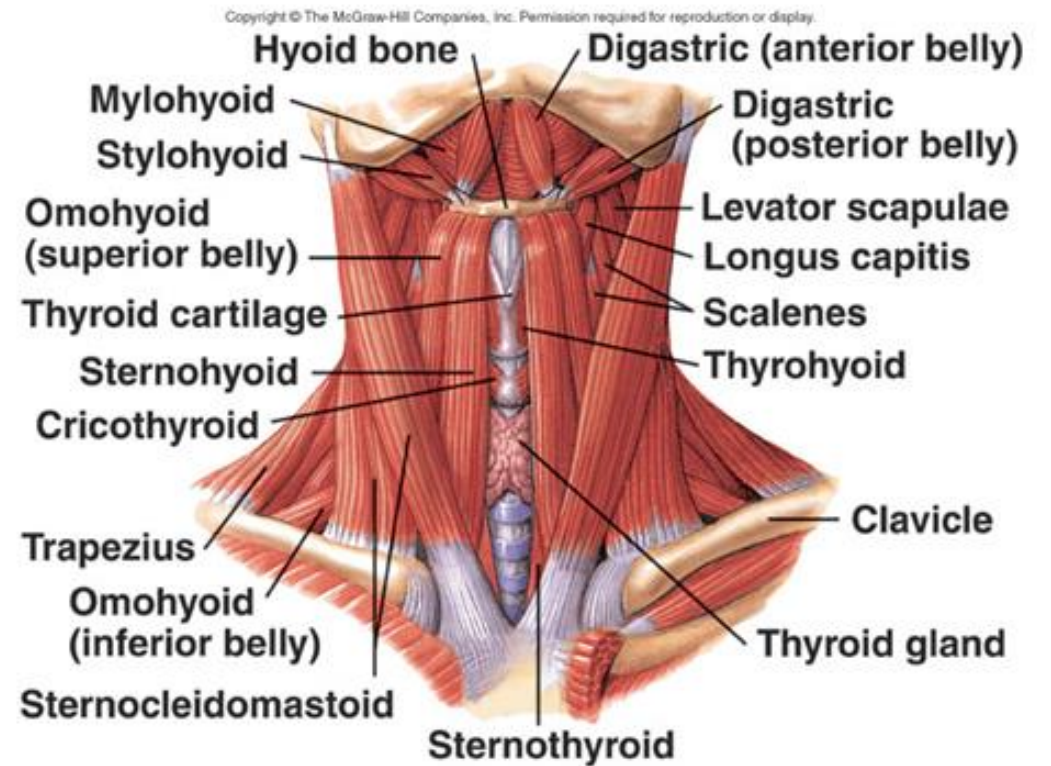
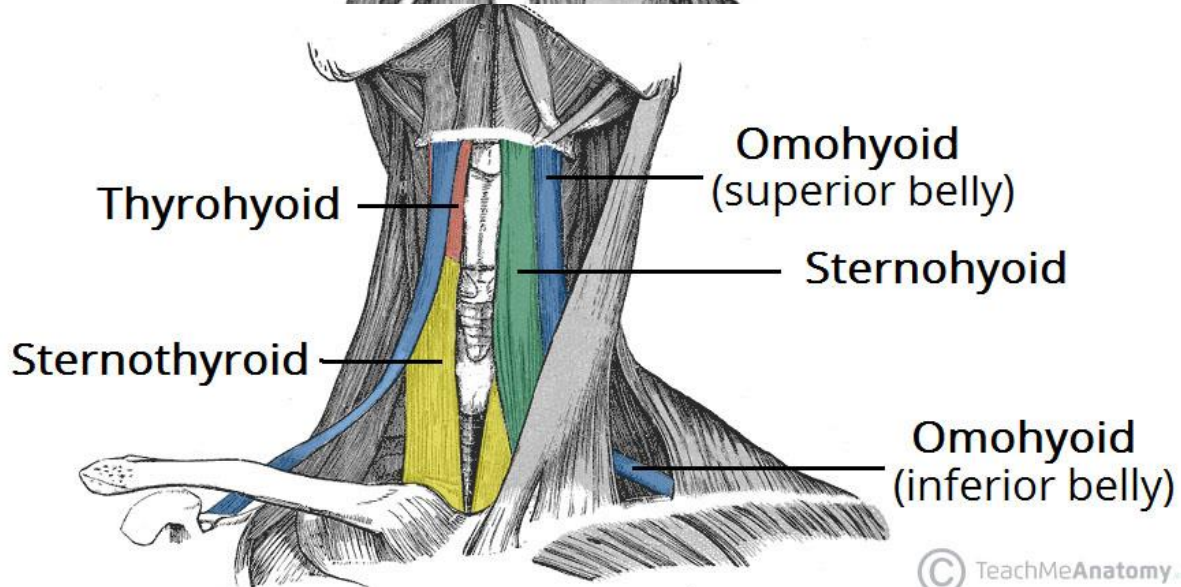
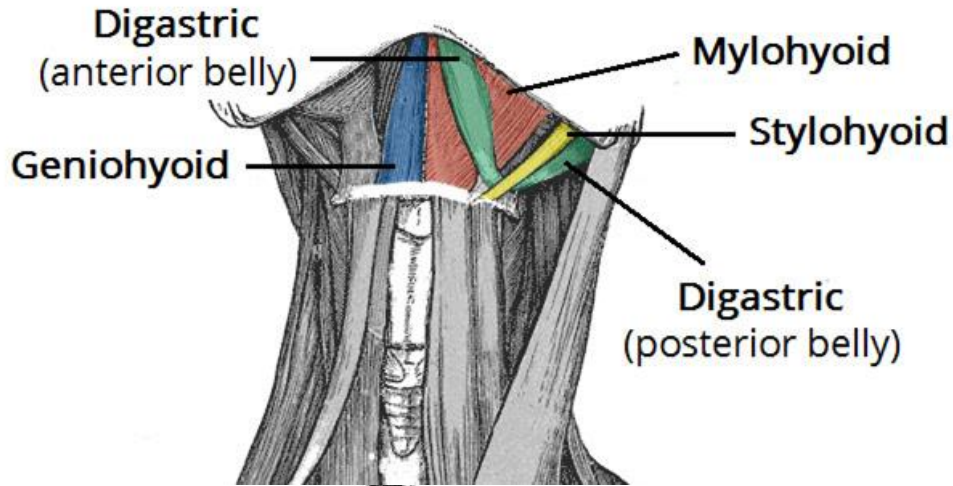
# Question

**Abduction of the vocal cords results from contraction of the**

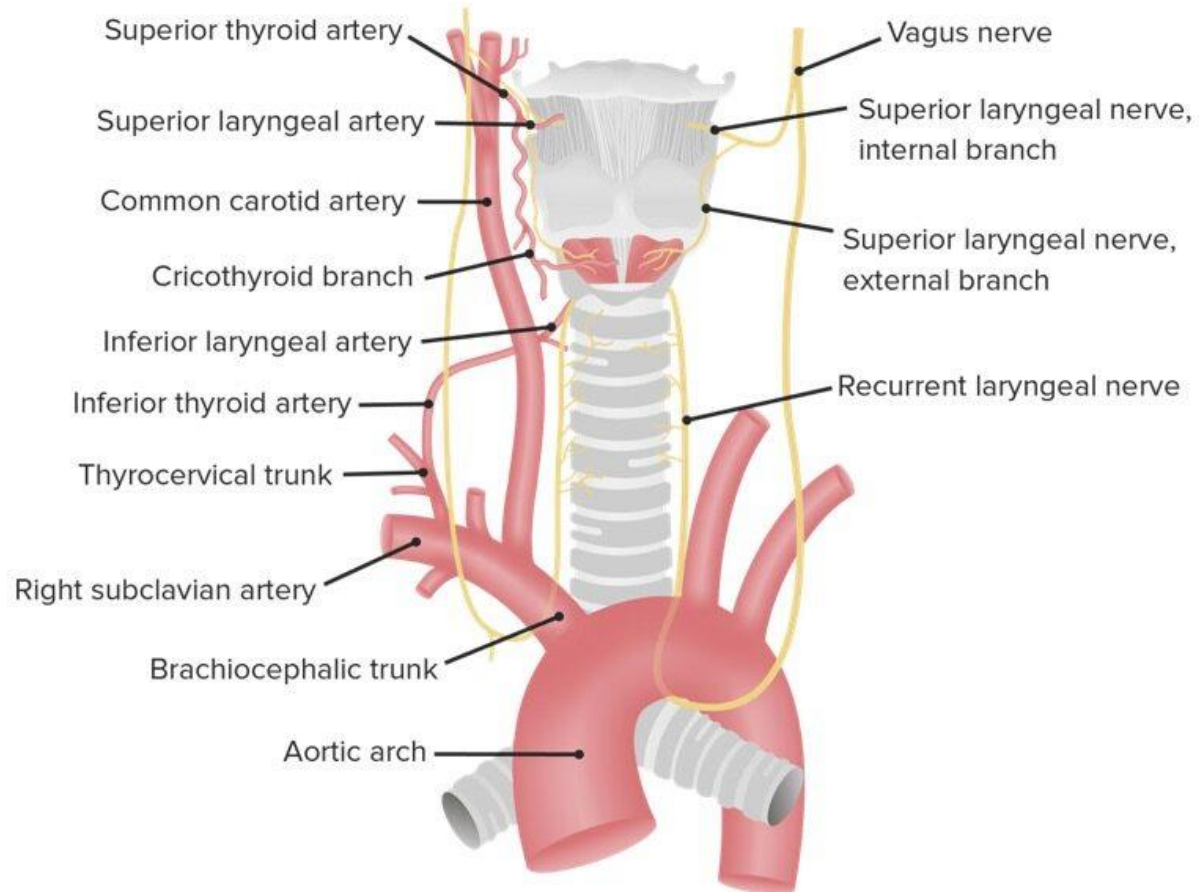
- A. cricothyroid muscles
- B. posterior cricoarytenoid muscles
- C. inter arytenoid muscle
- D. aryepiglottic muscle
- E. lateral cricoarytenoid and transverse arytenoid muscles

# Extrinsic muscles

Elevators - suprahyoid muscles ( except digastric),  
 inferior constrictors  
 Depressors- infrahyoids



# Neurovascular supply



## Blood Supply

(ECA) Superior thyroid artery → superior laryngeal a → enters larynx ( thyrohyoid membrane with SLN)

(Thyrocervical trunk) Inferior thyroid artery → enters larynx ( at inferior border of inf. Constrictors with RLN)



# Question

S. Division of the external laryngeal nerve results in flaccidity of the vocal fold BECAUSE R. the external laryngeal nerve supplies the ary-epiglottic muscle

S is true, R is true and a valid explanation of S	A
S is true, R is true but not a valid explanation of S	B
S is true and R is false	C
S is false and R is true	D
Both S and R are false	E

# Constrictor muscles

- Muscles of pharynx - anterior wall deficient
- Thin muscular wall of 3 sheets (sup/ middle/ inf)
- Supplemented by pharyngeas muscles - stylo/ palato/ salpingo
- Pharyngobasilar fascia - attachment point of muscles suspended from BOS

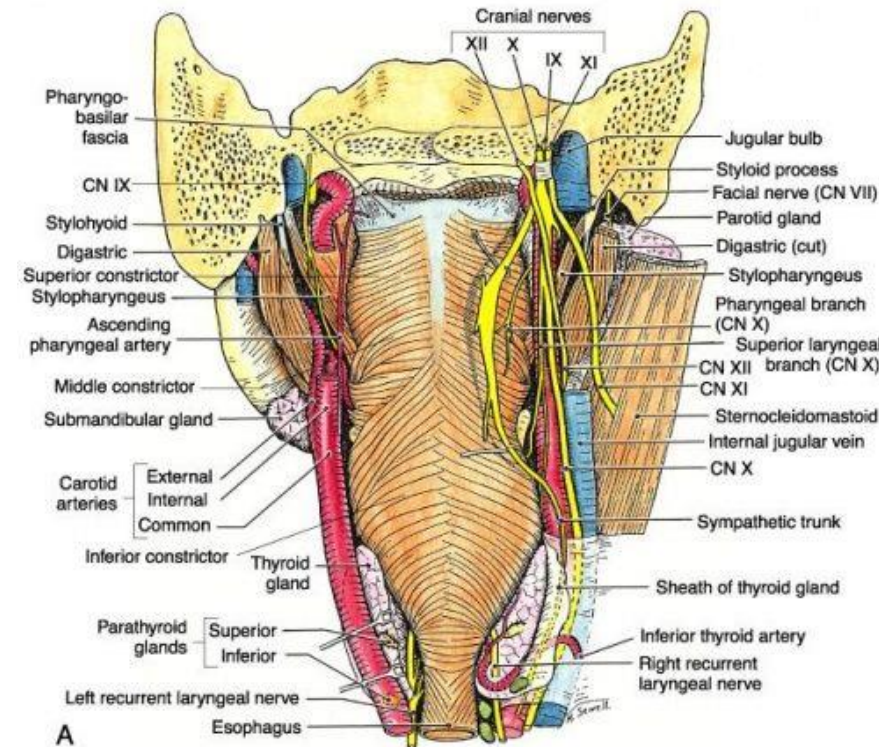
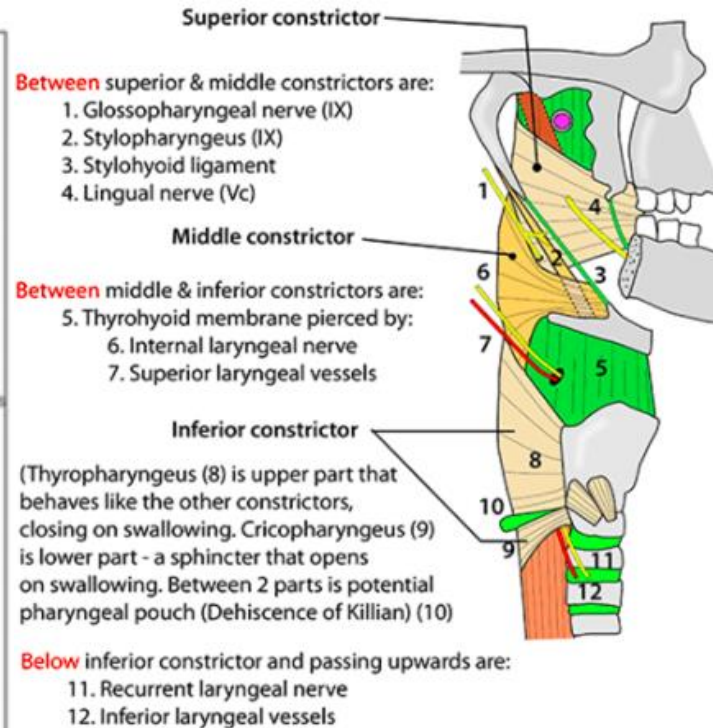
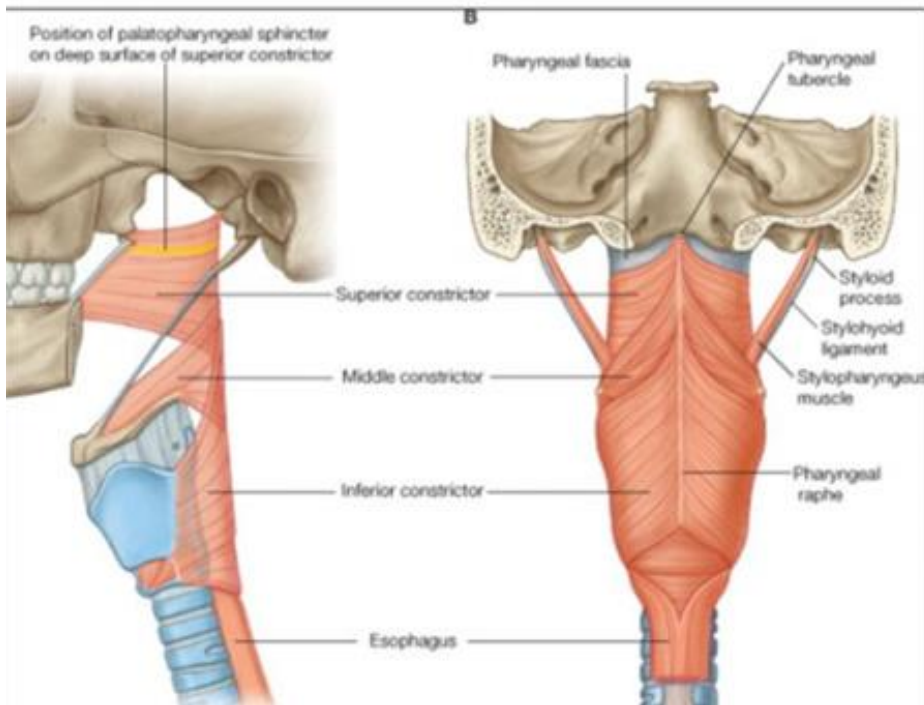


FIGURE 9.23 Pharynx and related vasculature and nerves. Posterior views. A. Overview.

# Question

## **The inferior constrictor muscle**

- A. arises from the stylohyoid ligament and the hyoid bone
- B. includes the cricopharyngeus muscle
- C. is supplied by the internal laryngeal nerve
- D. is supplied by the glossopharyngeal nerve
- E. has none of the above properties

**Thank you & good luck! :)**