NECK

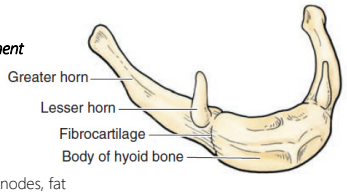
❒ BONES

Cervical Vertebrae

Type			
Typical	C3-6	•	Body small and wide
		•	***Vertebral foramen*** large & triangular
		•	TP incl ***foramina transversaria*** for vert vessels
		•	Sup facets sup/post vs Inf facets inf/post
		•	***Bifid spin process***
Atypical	C1	•	no spine process or body, articulates with occiput
	C2	•	***dens*** projects and articulates with C1
	C7	•	long non-bifid SP, large TP with small foramina transversaria

Hyoid

- Level C3
- Attached to styloid via ***Stylohyoid ligament***
- Attached to thyroid cartilage



❒ FASCIA

SUPERFICIAL FASCIA

- Cutaneous nerves, bloods, lymphatics, nodes, fat

Platysma

- From 2nd pharyngeal arch
- ***Deep fascia of deltoid & pec major → inf border mandible***
- Innervated by CNVII
- Deep to incl EJV

DEEP CERVICAL FASCIA

- Investing, Pretracheal, Prevertebral

> Carotid sheath & pretracheal fascia communicate with cranial vault and mediastinum

Investing

- Most superficial, surrounding entire neck
- At margins splits into *deep/superficial* and invest *trapezius* & *SCM* (supplied by CN XI)
- Investment of SCM also includes ***suprasternal space*** enclosing ant jugular veins, jugular arch, fat, deep nodes

Superior Attachments

- Sup nuchal line of occipital
- Mastoid process of temp
- Zygomatic arch
- Inf border mandible (split to enclose submandibular, parotid gland)
- Hyoid
- SP of C-vert

Inferior Attachments

- Manubrium, clavicle, acromion, spine of scapula

Pretracheal

- *Hyoid → pericardium*
- ***Muscular part***: thin, encloses *Infrahyoid*
- ***Visceral part***: thyroid, trachea, oesophagus, cont post/sup with ***buccopharyngeal fascia***
- Superior: intermediate tendon of *digastric* passes up then loops down to suspend hyoid

Prevertebral

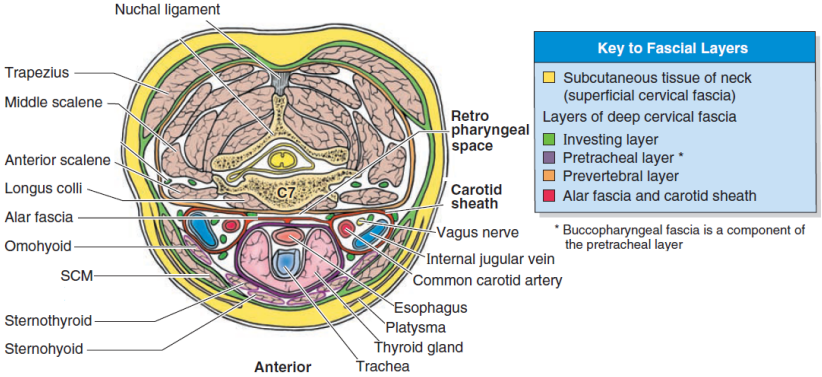
- Around vert column and ass muscles
  (ant: longus colli & capitis, lat: scalenes, post: deep cervical)
- Cranial base → Endothoracic fascia & ant longitudinal ligament @ T3 & axillary sheath
  (encloses plexus, vessels)

Carotid sheath

- Condense around ***Common carotid, IJV & CN X, carotid sinus nerve, carotid periarterial plexus***
- All 3 contribute to sheath
- Artery medial, IJV lateral, CN X posterior

Retropharyngeal space

- Between prevertebral layer and buccopharyngeal fascia/pretracheal fascia (cont)
- Alar fascia: midline buccopharyngeal fascia (Cranium → C7) to carotid sheath



Key to Fascial Layers

- Subcutaneous tissue of neck (superficial cervical fascia)

Layers of deep cervical fascia

- Investing layer
- Pretracheal layer *
- Prevertebral layer
- Alar fascia and carotid sheath

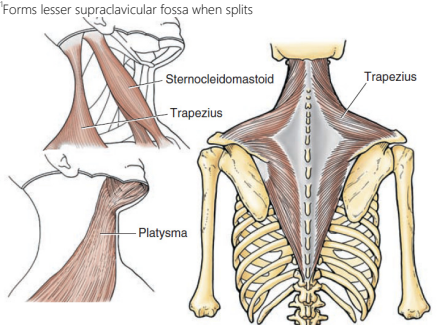
* Buccopharyngeal fascia is a component of the pretracheal layer

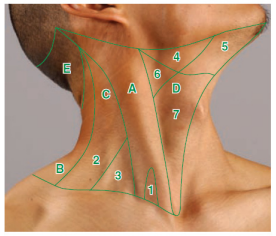
SUPERFICIAL STRUCTURES OF THE NECK

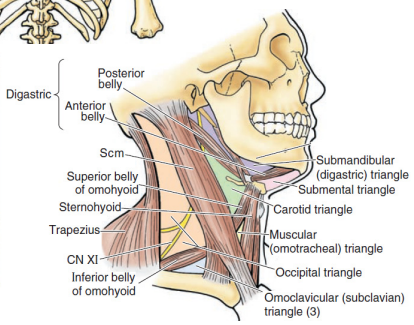
Compartments: SCM, Posterior, Lateral, Anterior

SCM	Mastoid process of temp bone & Sup Nuchal line of occiput	Manubrium & medial 1/3 clavicle[1]	CN XI	Lateral flexion/rotation Extension @ atlanto-occipital Flex (chin to chest) Ext sup & flex inf vert Elevate manubrium
Platysma	Inf border mandible,	Deep fascia deltoid & pec major	CN VII	Tenses skin → superficial vein release pressure, Depress mandible &angles of mouth
Trapezius	Med 1/3 sup nuchal line, ext occipital protuberance, C7-12 SP	Lateral 1/3 clavicle, acromion, spine scapula	CN XI	Scapula: elevate, retract, rotate Superior fibres: elevate pec girdle Middle fibres: retract scapula Inferior fibres: depress shoulder Fixed shoulders: extend neck or flex to either side

[1]Forms lesser supraclavicular fossa when splits







(A) Sternocleidomastoid Region

- Overlies SCM
- Anterior region in front / Lateral Region behind

(B) Posterior Cervical Region

- Post to ant border of Trapezius (NB ***Sub occipital region*** *(E)* deep to superior part)

(C) Lateral Cervical Region aka Posterior Triangle

Border	Structure
Ant	Post border of SCM
Post	Ant border trapezium
Inf	Middle 1/3 clavicle
Apex	SCM + Trap
Roof	Investing layer of deep fascia
Floor	Prevertebral muscles

Sup to Inf: Splenius capitis, Levator scapulae, Middle scalenes, Posterior scalenes

Subdivisions	
Occipital Triangle (2)	• Divided by inferior belly of *Omohyoid* • *Occipital artery* in apex • *CN XI* crosses
Omoclavicular Triangle (3) *supraclavicular fossa*	• *EJV* crosses • *Subclavian a.* deep to

Arteries

- Lateral branches of *Thyrocervical trunk* or 3rd part of *Subclavian a.* & *occipital a.*

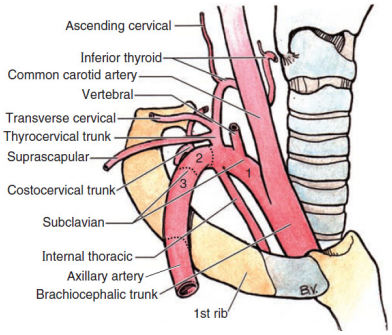
Artery	Origin	Course
Suprascapular	Thyrocervical trunk (branch of Subclavian)	Inferolateral across ant scalene & phrenic n., Subclavian a, brachial plexus then post to clavicle to supply muscles on post scapula
Cervicodorsal trunk		Laterally ant to phrenic n., ant scalene through brachial plexus to supply them terminates deep to levator scapulae and rhomboids and supply them
Occipital	ECA	Ascends to head to supply post scalp
Subclavian (3rd part)	Brachiocephalic trunk	Cont from alt border of ant scalene → post sup to vein and ant to plexus→ deep to clavicle and on 1st rib

Veins

- EJV retromandibular + posterior auricular → EJV near angle of mandible
- Desc over SCM → Pierces investing layer & lateral SCM to Subclavian

Nerves

- CN XI runs deep to SCM and emerges in sup 1/3
- Descends in lateral region and exits under trapezius



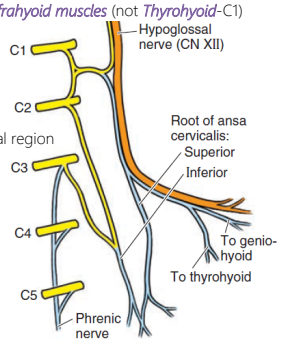
NECK

❒ FASCIA

Brachial Plexus C5-T1
- *Roots:* btwn ant/mid scalenes
- *Trunks:* pass through ***cervicoaxillary canal*** (1st rib, clavicle, scapula)
- ***Suprascapular n.*** from superior trunk → Supraspinatus, Infraspinatus & jt

Cervical Plexus C1-4
- Btwn levator scapulae & middle scalenes (deep to SCM)

Ansa cervicalis
- Superior Root: C1,2, joins *CN XII* briefly as it descends then splits away at level C3
- Inferior Root: C2,3
- Both combine to form *secondary loop* to supply *Infrahyoid muscles* (not *Thyrohyoid*-C1)



Branches of C2-3 loop
- Lesser Occipital: C2 | neck, post scalp
- Great Auricular: C2,3 | over SCM to parotid
  supply skin on parotid, mastoid, auricle
- Transverse cervical: C2,3 | skin over anterior cervical region

Branches of C3-4 loop
- Supraclavicular nerve: emerges beaneath SCM to
  supply clavicle and shoulder skin

Phrenic Nerve
- C3,4,5
- Motor, sensory, sympth
- Diaphragm, mediastinal pleura, pericardium
- Forms at lateral border of *ant scalenes* (sup border of thyroid cart)
- Descends ***deep to Prevertebral layer***
- Left crosses ant to *1st part Subclavian a.* | Right crosses ant to *2nd part*
- Both desc post to Subclavian vein/ant to internal thoracic artery

Lymphatics
- Superficial cervical along EJV → deep cervical

(D) Anterior Cervical Region

Border	Structure
Ant	Median line of neck
Post	Ant border SCM
Sup	Inf border mandible
Apex	Jug notch
Roof	Platysma and subcut tissue
Floor	Pharynx, larynx, thyroid

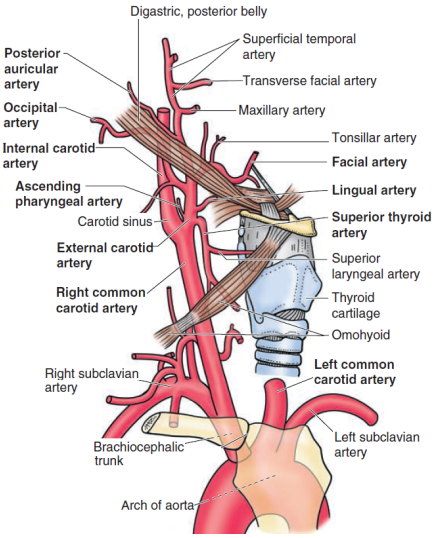
Subdivisions[1]		
Submental (5)(unpaired)	•	Hyoid/mandible/digastric/mandibular symphysis • Floor: Mylohyoid • Contains ***nodes and ant jugular vein***
Submandibular (4)	•	Mandible/ant/post bellies of digastric • Floor: Mylohyoid & hyoglossus, middle pharyngeal constrictor • ***Submandibular gland fills most of triangle, Submandibular nodes, CN XII and branch of V3***
Carotid (6)	•	Superior belly Omohyoid, posterior belly of digastric, ant border SCM • Contains ***common carotid*** dividing at level of thyroid cartilage • Other contents: ***Carotid sinus*** (CN IX, X) | ***Carotid body*** (CN IX, X)
Muscular (7)	•	Superior belly Omohyoid, ant border scm, median plane of neck • Infrahyoid muscles

[1]By Omohyoid & digastric

Arteries
- Brachiocephalic branches into r Subclavian & *r carotid* vs *L carotid* from Ao arch
- Both bifurcate at ***level of thyroid cartilage***
- Internal carotid has no branches in neck, enters cranium via ***carotid canal*** (in petrous temp)

External carotid
- Supplies outside of cranium except scalp and orbits (supraorbital artery)
- Terminates as *maxillary* and *superficial temporal artery* after traversing parotid gland
- **6 main branches arise (1-2-3 = 1 medial, 2 posterior, 3 anterior)**

Branch	Arise	Notes
Ascending pharyngeal	Medial	• Only medial branch • Asc on parynx – medial to IC • Dsit: pharynx, pervert muscles, middle ear, cranial meninges
Occipital	Posterior	• Begins on post side IC • (and superior to facial artery) • Parallels post belly digastric • Branches and supplies posterior scalp • Superficial to CN IX-XI
Posterior auricular	Posterior	• Asc btwn EAC & mastoid to supply parotid, CN VII, temporal bone, auricle, scalp
Superior thyroid	Anterior	• Deep to Infrahyoid to thyroid gland • Branches to Infrahyoid muscls and scm • Branches to superior laryngeal a.
Lingual	Anterior	• Lies on middle pharyngeal constrictor • Deep to CN XII, Stylohyoid, post belly digastric
Facial	Anterior	• Anterior branch with or above lingual • Ascends under digastric, Stylohyoid and abgle • Submandibular gland, subemtnal branch



Veins
- *Sigmoid sinus* in post cranial fossa → jugular foramen → IJV
- Descends in carotid sheath
- Cervical sympathetic trunk post to sheath
- Exits anterior region through *supraclavicular fossa*

Tributaries
- Inferior petrosal sinus (from cranium via jug foramen and into IJV)
- Facial vein enters near hyoid
- Lingual enters IJV near artery
- Pharyngeal veins at level of angle of mandible
- Thyroid veins (superior/middle)

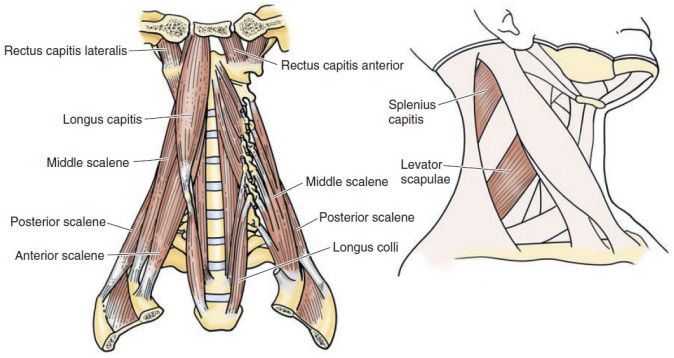
Nerves
- Transverse cervical (C2-3)
- CN XII
- CN IX
- CN X

❒ DEEP STRUCTURES OF THE NECK

Prevertebral Muscle

Anterior Vertebral Muscle[1]				
Longus Colli	C1 ant tubercle C1-3 body C3-6 TP	C5-T3 body C3-5 TP	Ant Rami C2-6	Flex neck with rotation
Longus Capitis	Basilar occipital	C3-6 TP (ant tubercle)	Ant rami C1-3	Flex head
Rectus capitis ant	Base of cranium[2]	Ant lat arch C1	C1-2 loop branches	
Anterior Scalenes	C3-6 TP	1st rib	C4-6	
Lateral Vertebral Muscles				
Rectus capitis lateralis	Jugular process occipital bone	C1 TP	C1-2 loop	Flex head, stabilise
Splenius capitis	Lateral aspect of mastoid process	Inf ½ nuchal ligament, SP of T1-6	Post rami C3-5	Flex/rotate or extend
Levator scapulae	C2-6 TP	Sup-Med scapula	C5 dorsal scapular, C3-4 spinal nerves	Down rotate scapula → Glenoid tilt inf
Middle scalenes	C5-7 TP	Sup surface 1st rib post to Subclavian groove	Ant rami c-spine	Flex, elevate rib 1
Posterior scalenes		External border C2	Ant rami C7,8	Flex, elevate 2nd rib

[1]post to retropharyngeal space & medial to cervical/brachial plexus and Subclavian a
[2]ant to occipital condyle



NECK

ROOT OF NECK

Arteries

- *Brachiocephalic trunk* branches post to SCJ on right
- *Subclavian* on both sides begin at SCJ and reach highest point behind ant scalenes

3 parts based on location to scalenes

Part	Location	Branches
1	Medial	*Vertebral, Internal Thoracic, Thyrocervical trunk*
2	Posterior	*Costocervical trunk*
3	Lateral	*Dorsal Scapular*

Vertebral Artery

- Cervical (branch of vertebral) ascends btwn scalenes and longus, passes deep through foramen transversaria of C1-6
- Sub occipital part ascends in groove on post arch C1 through foramen magnum
- Cranial part supplies medulla, cord, cerebellum, dura
- Joins to form basilar artery

Thyrocervical trunk

- Branches from Subclavian near medial border of ant scalenes

4 branches

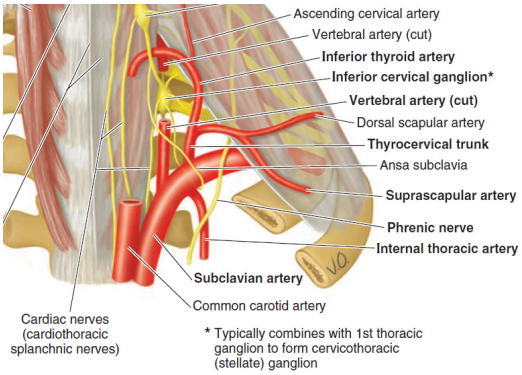
- Inferior thyroid
- Asc cervical artery
- Suprascapular
- Cervicodorsal trunk

Costocervical trunk

- Branches into sup intercostal and deep cervical

Lymphatics	Drainage
Prelaryngeal	Superior deep cervical
Pretracheal	Paratracheal
Paratracheal	Inferior deep cervical
Lateral	

- *Axillary a.* forms when SC a. passes 1st rib



Veins

- EJV (scalp and skin of face) & AJV
- AJV drains into EJV at root
- Suprasternal, AJV combine to form *jugular venous arch*
- Subclavian vein begins at lateral border 1st rib → IJV (NB EJV joins near insertion to IJV)

NERVES

Vagus

- Exits through Jugular foramen & travels post in carotid sheath
- Right: ant to 1st part of SCA/post to brachiocephalic vein and SCJ
- Left: btwn L Common carotid/Subclavian and post to SCJ

Recurrent Laryngeal

- Right: loops under R SCA at T1-2
- Left: loops under Arch Ao at T4-5
- Both asc in trachea-oesophageal groove

Phrenic

- Descends ant to ant scalene under IJV & SCM

Sympathetic Trunk

- Cervical portion: anterolateral to vert column
- No white rami
- Efferent to cervical spinal nerves via grey rami communicantes
  - Thoracic viscera via cardiopulmonary splanchnic nerves
  - Head and neck viscera via cephalic arterial branches

❒ VISCERA OF THE NECK

1. Endocrine (thyroid/parathyroid)
2. Respiratory (larynx/trachea)
3. Alimentary (pharynx/oesophagus)

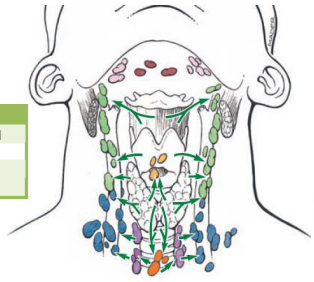
1. ENDOCRINE LAYER

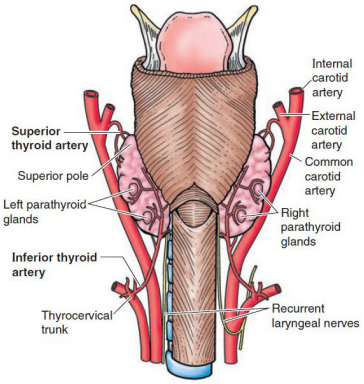
Thyroid

- Deep to Sternothyroid and Sternohyoid
- C5-T1 or tracheal ring 2-3
- Anterolateral to larynx

Artery	Origin	Course
Superior Thyroid	1st branch of ext carotid	Pierces fascia and branches into ant/post ***Dist: anterosuperior thyroid***
Inferior Thyroid	Branch of Thyrocervical trunk (from Subclavian)	Ascends post to carotid sheath, Inserts post before branching ***Dist: inferoposterior thyroid, all parathyroid***
Thyroid Ima	Brachiocephalic	10% of people Dist: isthmus

NB heavy anastomoses between sup/inf thyroid arteries





Vein	Drainage of	Drainage to	Orientation
Superior	Superior lobes	IJV	With sup a.
Middle	Middle area		Parallel to inf a.
Inferior	Inferior lobes	Brachiocephalic	Indep

Innervation

- Superior middle inferior nerves
- From cardiac and superior/inferior thyroid periarterial plexus
- Vasomotor (secretion is hormonally regulated)

Parathyroid

- x2 superior x2 inferior (superior less variable)
- Superior located at inferior border of cricoid cartilage
- Without capsule but within sheath

Vessels

- *Inferior thyroid a.*
- Parathyroid vein → thyroid plexus
- Lymphatics → Paratracheal or deep cervical nodes

Innervation

- Thyroid branches of *cervical sympth ganglia*
- Vasomotor not vasosecretory

2. RESPIRATORY LAYER

Laryngeal Skeleton

- 9 cartilages: unpaired x3 (thyroid, cricoid, epiglottic) & 3 paired (arytenoid, corniculate, cuneiform)

Thyroid cartilage

Aspect	Structure
Anterior	Fuse to form ***laryngeal prominence*** with ***sup thyroid notch***
Posterior	Open, greater horn and lesser horns
Superior	***Thyrohyoid membrane*** attaches sup horn and sup border to hyoid (greater horn and body) Sup border @ C4
Inferior	***Cricothyroid joint***: inf horn → post cricoid (movt incl rotation & gliding → Δ VC length) Remainder attaches via ***median cricothyroid ligament***

Cricoid

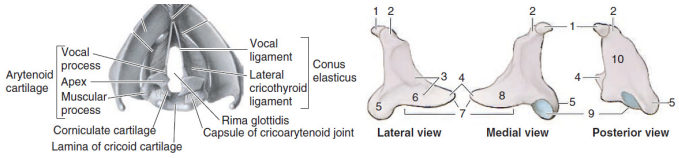
- Only complete ring
- Arch anterior, lamina posterior
- Cricotracheal ligament to 1st tracheal ring

NECK

Arytenoid

Structure	Position	
Corniculate cart (1)	Sup/Med	Sits on apex
Apex (2)	Sup/Med	Attachment for ary-epiglottic fold/ligament[1]
Vocal process (4)	Inf/Med/Ant	Post attachment for vocal ligament
Muscular process (5)	Inf/Lat	attaches posterior and lateral crico-arytenoid muscles
Crico-arytenoid jt (9)	Inf/Mid/Post	Movt: slide together, tilt ant/post or rotate
Oblong fovea (6)	Inf/Lat	Thyro-arytenoid attaches

[1]Forms lateral border of inlet, attaches to ***quadrangular membrane*** to lat/inf edge of epiglottis



Epiglottic Cartilage

- Elastic cartilage covered with mucous membrane
- Posterior to root of tongue but anterior border of laryngeal inlet
- Free edge superiorly with tapered end inferiorly as ***stalk of epiglottis*** attached to thyroid lamina via ***thyro-epiglottic ligament***
- ***Hyo-epiglottic ligament*** attaches to hyoid
- ***Quadrangular membrane*** attaches inferior edge of epiglottis to arytenoid

Conus Elasticus
- Made up of vocal ligament, lateral cricothyroid ligament and ***rima glottis***

Vocal Ligament
- From internal laryngeal prominence of thyroid cartilage → vocal process of arytenoid cartilage

Lateral Cricothyroid Ligament
- Membrane from vocal ligament to cricothyroid

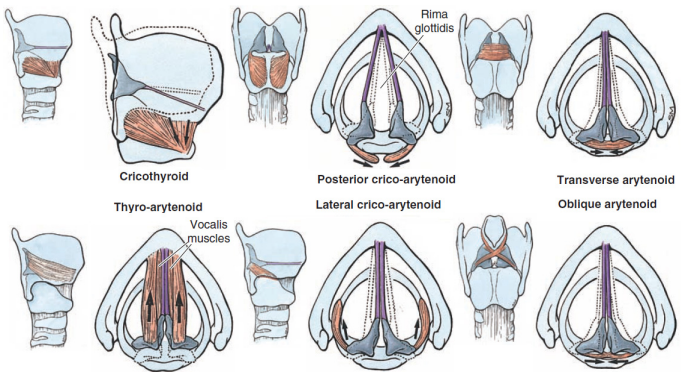
Superior Laryngeal Inlet
- Lateral epiglottic border
- Ary epiglottic fold
- Cuneiform tubercle
- Corniculate tubercle
- Superior thyroid horn

Interior Larynx
- Laryngeal vestibule (parts above vestibular folds)
- Middle part (btwn vestibular and vocal folds)
- Laryngeal ventricle (btwn vestibular & vocal folds)
- Infraglottic cavity

Laryngeal Muscles
Extrinsic
- Move larynx as a whole
- Include Infrahyoid & Suprahyoid

Intrinsic
- Move individual components
- All supplied by CN X (recurrent laryngeal) except *cricothyroid* (*external laryngeal – from sup laryngeal*)

Cricothyroid	Ant cricoid car	Inf margin/horn thyroid cart	Pivots thyroid post on inf horn → stretch cord
Thyro-arytenoid	Post aspect of thyroid lamina	Ant surface arytenoid	Pulls arytenoid towards thyroid lamina → relax cord
Post crico-arytenoid	Post cricoid lamina	Vocal process	Pivots arytenoids outwards → abduct cords
Lateral crico-arytenoid	Arch of cricoid		Pivots arytenoids inwards → adduct cords
Transverse & Oblique arytenoids	One arytenoid cartilage	Contralateral arytenoid cartilage	Adducts arytenoids → closing rima glottides
Vocalis	Vocal process	Ipsilateral VC	Same as thyro-aretynoid



Arteries
- Branches of superior & inferior thyroid

Artery	Origin	Course
Superior Laryngeal	*Superior Thyroid*	With *sup laryngeal nerve* → Thyrohyoid membrane Dist: ***internal larynx***
Cricothyroid	*Superior thyroid*	Cricothyroid muscle
Inferior Laryngeal	*Inferior thyroid*	With *inf laryngeal nerve* → ***mucous membrane/muscles of inf larynx***

Veins
- Superior and inferior follow arteries and nerves
- Superior → sup thyroid → IJV
- Inferior → *venous plexus* on trachea → L brachiocephalic trunk

Lymphatics
- Superior to vocal folds → sup deep cervical nodes
- Inferior to vocal folds → pre & paratracheal nodes → inferior deep cervical nodes

Nerves

Branch	Course	Supply
Superior laryngeal – form inferior vagal ganglion		
Internal	Pierces Thyrohyoid membrane with sup ***laryngeal*** artery	Sensory to superior surface of vocal folds and above
External	Pierces inf pharyngeal constrictor follows superior ***thyroid*** artery	Pharyngeal plexus as well as cricothyroid
Inferior laryngeal – follow inf laryngeal artery		• Motor to all laryngeal muscles (except cricothyroid) • Sensory to Infraglottic larynx
Anterior	lateral cricothyroid, thyro-arytenoid, vocalis, ary-epiglottis, thyro-epiglottis	
Posterior	posterior crico-arytenoids, transverse/oblique arytenoids	

TRACHEA
- Incomplete tracheal rings (post) with *Trachealis muscle* overlies incomplete areas
- 2.5cm diameter
- C6 → T4/5

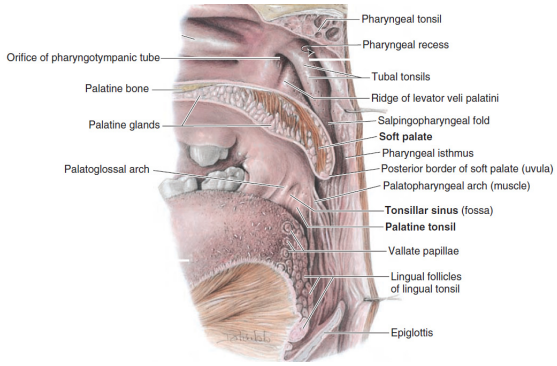
Aspect	Surrounding Structure
Lateral	Common carotids, thyroid
Inferior	Jugular venous arch, inferior thyroid veins
Right	Brachiocephalic trunk

3. ALIMENTARY LAYERS

Pharynx
- Cranial base → inf border of cricoid cartilage & C6
- *Widest opp hyoid* vs *Narrowest at inferior end*
- Piriform fossa (around larynx) houses internal & recurrent laryngeal nerves

Interior
- Nasopharynx: post nose → soft palate
- Oropharynx: posterior to mouth
- Laryngopharynx: posterior to larynx

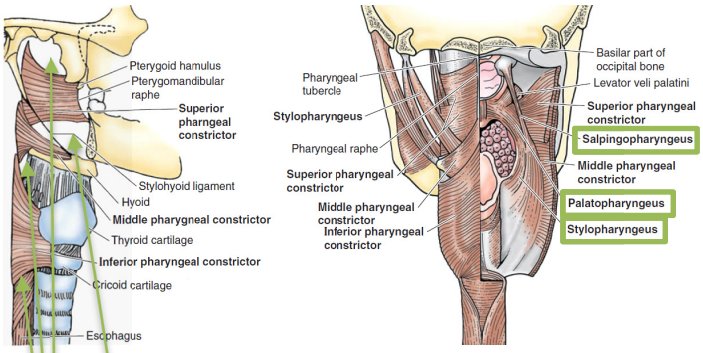
Tonsils
- Lymphoid aggregates
- ***Palatine***: Roof/post wall of nasopharynx
- ***Pharyngeal***: *post to nasal cavity*
- ***Tubal***: sup to entry of pharyngotympanic tube
- ***Lingual***: post tongue



NECK

External Layer: Pharyngeal constrictors				
Superior	Pterygoid hamulus, Pterygomandibular raphe, Post Mylohyoid line of mandible, Lateral tongue	Occipital bone (pharyngeal tubercle)	Pharyngeal branch of CN X & plexus[1]	Constrict
Middle	Hyoid: <, > horns and Stylohyoid ligament	Pharyngeal raphe	+ branches of ext/recurrent laryngeal	
Inferior	Thyroid and cricoid cartilage	Pharyngo-oesopahgeal junction		
Internal				
Palatopharyngeus	Hard palate & palatine aponeurosis	Thyroid lamina	Pharyngeal branch of CN X	Elevate
Salpingopharyngeus	Pharyngotympanic tube	Palatopharyngeus		
Stylopharyngeus	Styloid			

[1]Located on lateral wall of pharynx mostly on middle constrictor



Passage[1]	Contents
Sup & Cranium	Levator veli palatine, pharyngotympanic tube, asc palatine artery Pharyngobasiliar fascia (ant) and buccopharyngeal fascia (post) blend = ***pharyngeal recess***
Sup & Mid	Stylopharyngeus, glossopharyngeal nerve, Stylohyoid ligament
Mid & Inf	Internal laryngeal nerve, sup laryngeal a. v.
Inf to Inf const.	Recurrent laryngeal, inferior laryngeal

[1]Made by gaps in muscles

Vessels
- Tonsillar artery (branch of facial) pierces superior constrictor
- External palatine vein → *pharyngeal venous plexus*
- Lymphatics → jugulodigastric nodes

Nerves
- Pharyngeal plexus
- Motor: CN X to all but *Stylopharyngeus* (CN IX) and *tensor veli palatine* (CN V3)
- Sensory: CN XII

OESOPHAGUS
- Cervical oesophagus starts at C6 – also the ***narrowest part of oesophagus***
- Supplied by ***inferior thyroid*** arteries
- Drained by ***inferior thyroid*** veins
- Lymphatics → Paratracheal or inf deep cervical nodes
- Innervated by recurrent laryngeal (somatic) and cervical sympathetic trunk (motor)