



Thoracic wall.



Anterior

Skin → superficial Fascia → Deep Fascia → pectoralis major muscle →
Latissimus → Serratus anterior → Bone

Function ⇒ (1) protection to viscera. (2) fluid mechanical function of breathing (3) Affords attachment for the muscles of thorax + upper extremity + Abdomen + back.

Cavity of thoracic.

(1)

mediastinum.
in the middle

(2)

pleura + lung ⇒ lung covered by pleura.
in the lateral side.

visceral layer ↓

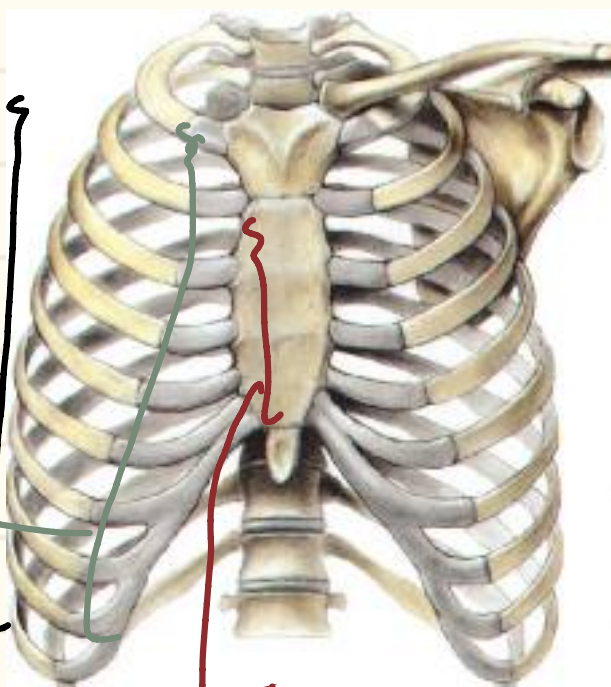
↳ lung

parietal layer ↓

↳ Chest wall

pleural cavity

Thoracic Cage.



∴ The region in between neck and Abdomen.

Ribs.

⇒ Flat curved bones with high resilience

(2) Types. ⇒ (1) Relation to sternum

(1) True - 7 (sternum), False ⇒ 8, 9, 10 = Chondral

Flloating ⇒ 11, 12. ⇒ ribs dead. حجاب كبد

live, spleen, stomach, side structure of liver

(2) Relation to vertebrae ⇒ Typical ⇒ 3-9

Atypical ⇒ 1, 2, 10, 11, 12.

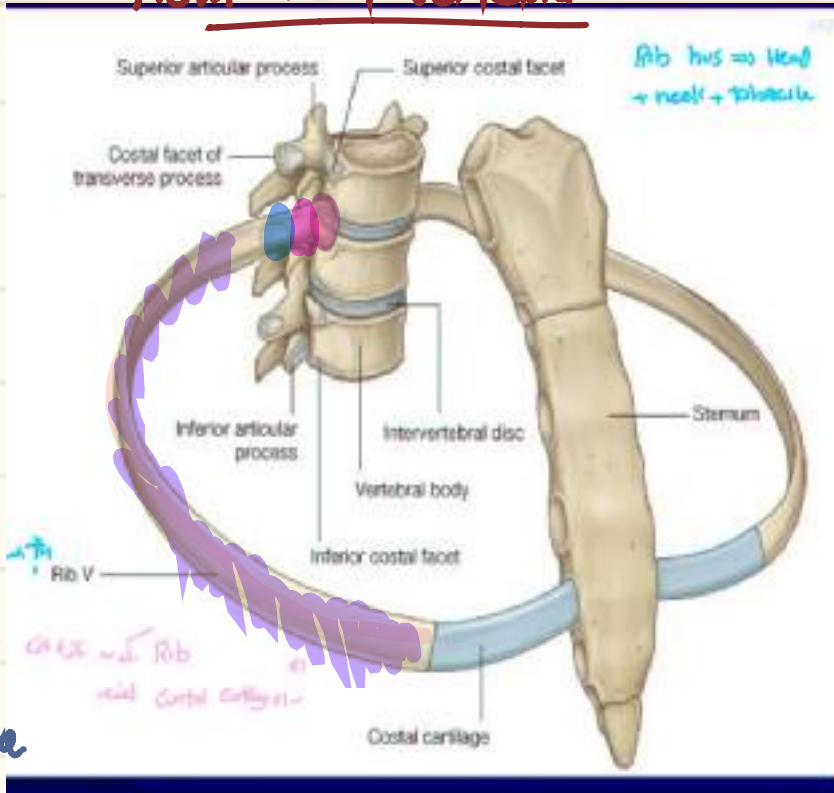
12 pair of Ribs

12 pair of Costal Cartilage.

Sternum.

From 3-9 vertebra.

Typical $\Rightarrow$ curved
post end higher
than ante end
+ run down ward
+ CC upward.



$\rightarrow$ wedge in shape.

● head $\Rightarrow$ (2) Facet
one of corresponding
ve. + ve. Above.

in between we have

Crest.

● $\Rightarrow$ Neck $\Rightarrow$ neck
head + Tubercle.

● $\Rightarrow$ Tubercle $\Rightarrow$ Facet

to Transverse process of
corresponding vertebra

● $\Rightarrow$ Shaft (body)

$\Rightarrow$ Angle + Costal groove

$\rightarrow$ medial part of Rib $\Rightarrow$ Divided to $\Rightarrow$ most curve part

1/4 pos. + 3/4 Ant. the Rib of the Rib.

+ Have upper + lower border.

Costal groove $\Rightarrow$ lower aspect of inner surface of Rib (angle).

VAN

$\rightarrow$ Outer surface $\Rightarrow$ Convex + covered by muscle + inner surface
Concave + covered by pleura.

$\Rightarrow$ 1-7 Rib $\Rightarrow$ 7 The longest Rib.

8th $\Rightarrow$ The most one have projection.

$\Rightarrow$ 1-8 $\Rightarrow$ ↑ Transverse diameter, 9 most oblique

10 $\Rightarrow$ The lowest point

Atypical 1st Rib $\Rightarrow$ Flat Rib + Highest + shortest + strongest

+ most Fixed rib. No Angle + No Costal groove + Has one Facet

On head + upper + lower + outer + inner surface.

Scalene Tubercle $\Rightarrow$ Accessory muscle for respiration. Artery + vein. di.

$\rightarrow$ groove for Scalene muscle insertion.

In front $\Rightarrow$ groove for subclavian vein. posterior to it $\Rightarrow$ subclavian artery $\leftarrow$ groove to it.

Relation of neck to 1st Rib $\Rightarrow$ (1) Inferior cervical sympathetic ganglion $\Rightarrow$ medially

+ Anterior primary rami of 1st thoracic nerve ascend most laterally $\Rightarrow$ in between.

sup. intercostal artery $\Rightarrow$ In the middle.

bony ligament → Cervical Rib. ⇒ extra rib from C7 ⇒ pressure on structure that lie on upper surface of 1st rib. 0.1 of people.
 ⇒ pressure on nerve + Artery that supply upper limb ⇒ Tingling + numbness.
 paralysis ⇒ Under side of forearm and hand. partial.
 ⇒ Ischemic muscle pain ⇒ pallor - coldness.

Rib Fractures

Common in 5-10 Rib. ⇒ Angle most weakest point.

Sever localized pain on coughing, sneezing, laughing.

Complication ⇒ Injury to underlying structure ⇒ lung ⇒ (Rib),
 spleen ⇒ 9, 10, 11, Liver ⇒ 5.

Pneumothorax ⇒ Air in pleura. Hemothorax ⇒ Blood. or Both ⇒ pneumo hemo
Signs of Fracture. Blood + air. ↓

① localized pain, pain worse with palpation + coughing + deep breathing.

Analgesia ⇒ essential in treatment management.

Flail Chest ⇒ كسر في مكانين ⇒ Two or more adjacent ribs fractured in two or more places.

Sternum. ⇒ Flat, vertically, elongated bone ⇒ Form middle + Anterior part of thoracic cage.

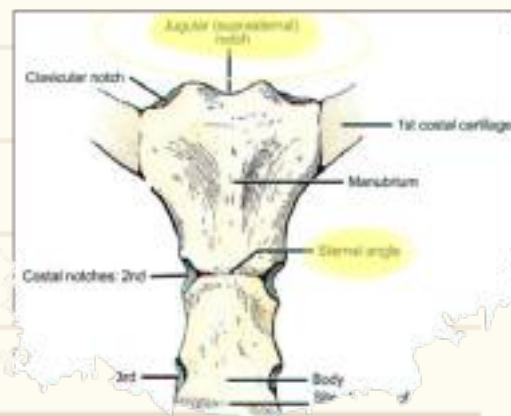
3 part. ⇒ Manubrium ⇒ 2 inch. Body ⇒ 4 inch, xiphoid ⇒ 1 inch.

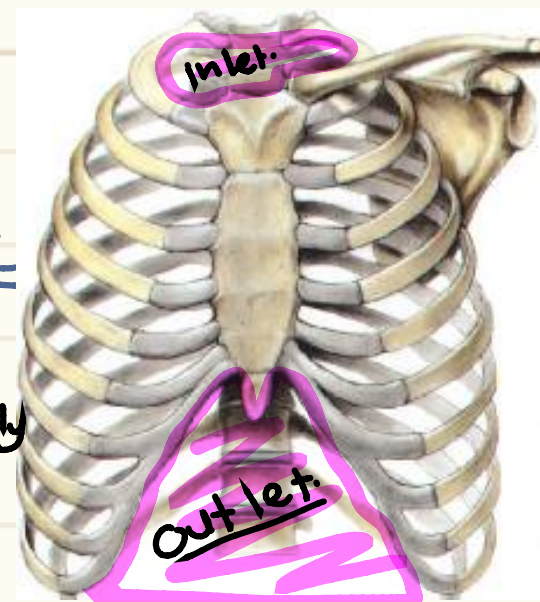
↪ Handle of dagger. ⇒ opposite to 3, 4 T.vertebrae.

① Jugular Costal notch = supra sternal notch ② Clavical notch ⇒ Articulate with Clavical point.

+ manubriosternal joint = sternal angle. = Angle of Lewis.
 ⇒ easily palpated sup. + inf. mid sternum

2^o Costal cartilage ⇒ connecting the rib + intercostal spaces





Body $\Rightarrow$ 5-9 T.v $\Rightarrow$ 3rd - 7th Costal Cartilage

xiphoid $\Rightarrow$ T9 $\Rightarrow$ Hyaline cartilage $\Rightarrow$ ossified 40y.

Sternal puncture $\Rightarrow$ Red bone marrow + subcutaneously
+ Thin layer of cortical bone

Sternal splitting $\Rightarrow$ in Cardiac surgery.

Sternal Fracture $\Rightarrow$ Blunt trauma $\Rightarrow$ Cardiac tamponade. $\Rightarrow$ Heart is in danger

2 thoracic opening $\Rightarrow$ outlet + inlet.

Boundaries of inlet $\Rightarrow$ T₁ + 1st rib + manubrium $\Rightarrow$ Shape $\Rightarrow$ oblique

" " outlet $\Rightarrow$ T₁₂ + 11th + 12 ribs + 7-10 cc + xiphoid joint

Muscles of Thoracic wall.

Diaphragm, IM, Accessory muscles of resp.

$\Rightarrow$ Primary muscle for respiration.

Two parts $\Rightarrow$ Fleashy $\Rightarrow$ Thin muscle (2 parts)

② Tendinous part $\Rightarrow$ more to Anterior than post.

Separate thoracic from Abdomen cavity.

Have 3 origin. ① Sternal origin $\Rightarrow$ 2 Fleashy slips from back of xiphoid.

② Costal origin $\Rightarrow$ Fleashy slip from inner surface of lower 6 ribs + cc. (7-12)

③ vertebral origin $\Rightarrow$ 2 strong muscle crural $\Rightarrow$ Rt Lt

Rt crural $\Rightarrow$ 1-3 lumbar vertebra + Inter vertebral disk. $\Rightarrow$ sling around esophagus

Lt crural $\Rightarrow$ 1-2 " " " " " "

Insertion $\Rightarrow$ Central tendon.

Innervation $\Rightarrow$ Motor $\Rightarrow$ phrenic nerve $\Rightarrow$ C₃, C₄, C₅ no 2nd

Sensory $\Rightarrow$ Central $\Rightarrow$ phrenic nerve Lateral $\Rightarrow$ intercostal nerve T₁-T₁₂

Arcuate Ligaments $\Rightarrow$ ① Medial $\Rightarrow$ Lumbar 2 body $\rightarrow$ Lumbar 1 Transvers process

Lateral $\Rightarrow$ Lumbar 1 Transvers process $\rightarrow$ 12th Rib Median $\Rightarrow$ medial borders of crural.

Diaphragm have 2 domes.

Rt dome $\Rightarrow$ upper border

of 5 rib $\Rightarrow$ support to

Rt lung.

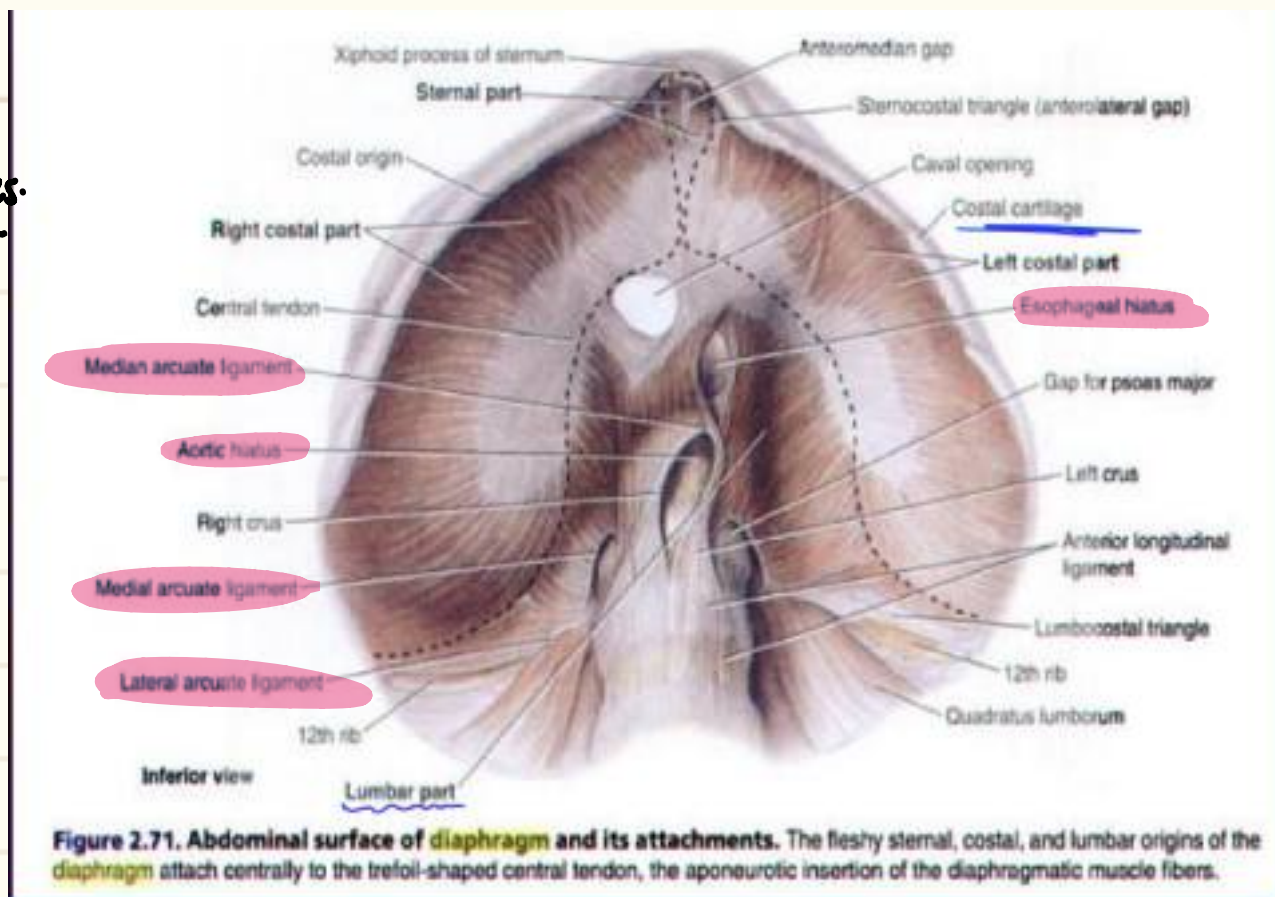
Lt dome $\Rightarrow$ lower border

of 5 rib $\Rightarrow$ support to

Lt lung.

Central tendon is
between $\Rightarrow$ and fused with

Fibrous pericardium $\Rightarrow$ support the heart At xiphisternal joint (a)



Opening of diaphragm

3- main opening $\Rightarrow$ ① Aortic opening

In the middle of T12 between crus
aorta. Azygos vein and Thoracic duct

② esophageal open. $\Rightarrow$ 1 inch
to IT in sling of Rt crus

+ vagus nerve At T10

③ Caval open $\Rightarrow$ 1 inch to Rt

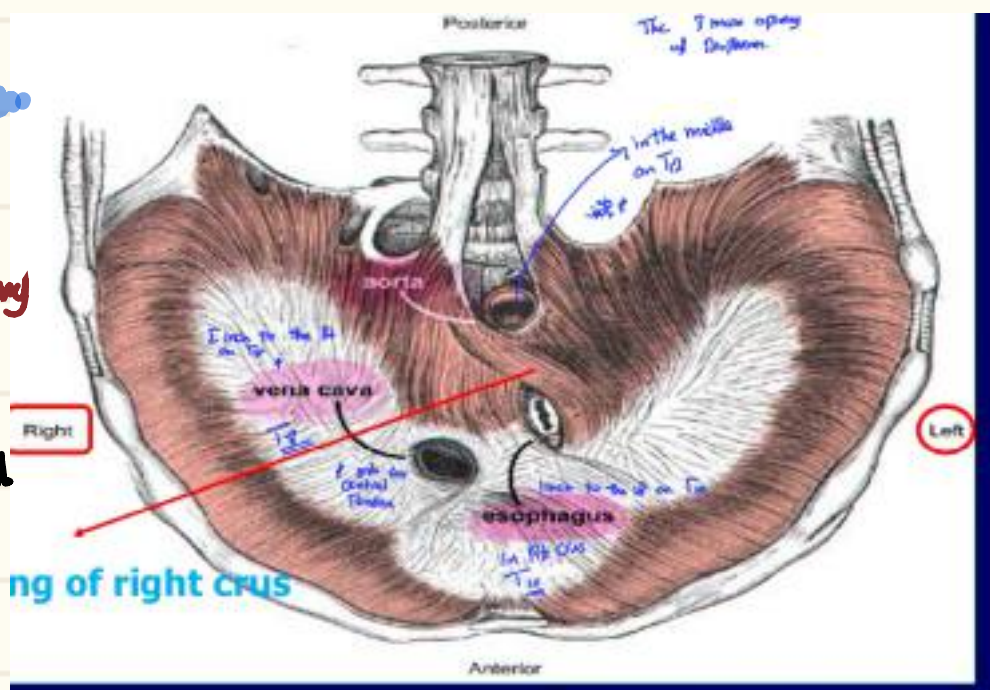
AT T8 in Central Tendon.

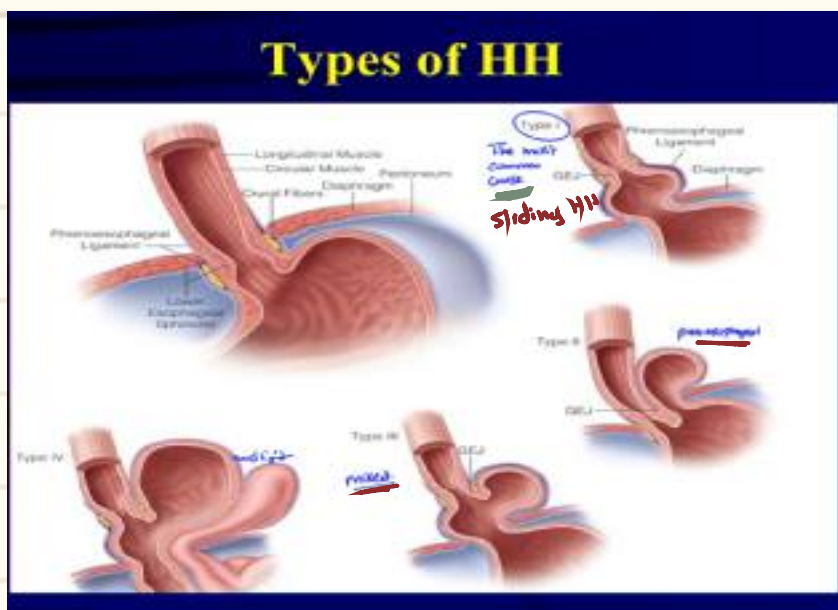
IVC and Rt phrenic in Rt side of IVC

Hiatus Hernia $\Rightarrow$ Anatomical Abnormality in which part of
stomach protrudes through the diaphragm and up into central tendon.

2 Type $\Rightarrow$ Sliding HH, Para esophageal ③ mixed type

Hiccup $\Rightarrow$ Involuntary contraction of diaphragm $\Rightarrow$ After eating or drinking
 $\Rightarrow$ irritation of vagus nerve.





Phrenic nerve injury.

It's elevated cupola of diaphragm
 It's paradoxical movement with respiration
 inspiration =>
 expiration =>
 (Note: The diagrams show the diaphragm moving up during inspiration and down during expiration, which is the opposite of the typical description in the text.)

Keher's sign.

=> irritation of under surface of diaphragm => C3, C4, C5.
 sensation to hands
 => Lead to shoulder pain due to shared embryological development.

Small opening of diaphragm

- Sup epigastric artery.
- Musculo-phrenic artery.
- Lower 5 intercostal nerves.
- Subcostal nerve and vessel behind lateral arcuate lig
- Sympathetic trunk behind medial arcuate lig
- Inf hemi azygos pierce Lt crus
- Lt phrenic pierce muscle of lt dome
- Greater and lesser splanchnic nerves

Intercostal muscle => pectoralis major + serratus Ant. of
 3 layer of muscle cover IC spaces

① External ICM => Tubercle of Rib -> Junction to costal cartilage.

Downward + Forward toward sternum From lower border of Rib Above to upper border of Rib below. => Anteriorly => intercostal membrane.

② Internal ICM => Downward + backward => sternum -> midaxillary line

=> posterior intercostal membrane , outer lip of costal groove of Rib Above -> upper border of Rib below

③ Innermost ICM => midaxillary line to Angle of Rib. Downward and backward

From inner lip of costal groove of Rib Above -> upper border of Rib below.

Occupies middle 2/4 of IC space.

Transversus Thoracic intercostal muscle => 4, 5 slips of muscles From post. surface of lower

1/2 sternum -> 2-6 costal cartilage.

groove $\Rightarrow$ in lower aspect of inner surface of Rib $\Rightarrow$ as needle and

UAN $\Rightarrow$ Run between The inter-innermost ICM.

Chest tube should be passed Above the Rib to avoid injury of intercostal nerves and vessels.

Nerves supply of ICM $\Rightarrow$ Anterior primi rami of corresponding IC nerve and collateral branches From 1-12

Action $\Rightarrow$ Elevation of Ribs in inspiration.

- Tension of ICM prevent Bulging and draw inward in breathing.

Inspiration $\Rightarrow$ ICM + Diaphragm. Expiration $\Rightarrow$ lung $\Rightarrow$ ترجع حيزه

Effort في اداء

Abdominal muscle may help in it. $\Rightarrow$ passive recd 13



Intercostal neurovascular Bundle

In costal groove $\Rightarrow$ UAN.

① Arteries Each IC space $\Rightarrow$ ① Large post. Intercostal Artery + ② small anterior IC Arteries.

Large pos. $\Rightarrow$ From descending aorta 3-12 except 1st + 2nd From Costocervical Trunk.

② small Arte $\Rightarrow$ Internal Thoracic artery 1-9 + musculophrenic artery.

in part of the neck $\leftarrow$ Subclavian artery $\Rightarrow$ 3 branches $\Rightarrow$ 1st part of this artery give

us $\Rightarrow$ ① Internal mammary a. = Internal thoracic artery.

② vertebral a. ③ thyrocervical a.

2nd part of Subclavin $\Rightarrow$ Costocervical Trunk $\Rightarrow$ Post 1st + 2nd Inter Costal artery.

$\rightarrow$ $\Rightarrow$ descend vertically downward + behind upper 6 CC + 1.5 cm lateral to sternum.

At 6th Intercostal spaces divided into $\rightarrow$ sup. epigastric a + musculophrenic a.

7, 8, 9 spaces.

Branches of Internal mammary a.

- 6 pair of An. intercostal a. - perforating branches to breast
- $2^{th} + 3 + 4^{th}$ ICS. - pericardio - phrenic artery
- pericardium, pleura + diaphragm.

Intercostal veins

Long post. + 2 small Ant. $\Rightarrow$ Intercostal Thoracic v. + musculophrenic v.

$\hookrightarrow$ Azygos vein + hemi-Azygos

$\hookrightarrow$ venous channel connect SVC + IVC $\Rightarrow$ enter thoracic through aortic opening $\hookrightarrow$ diaphragm.

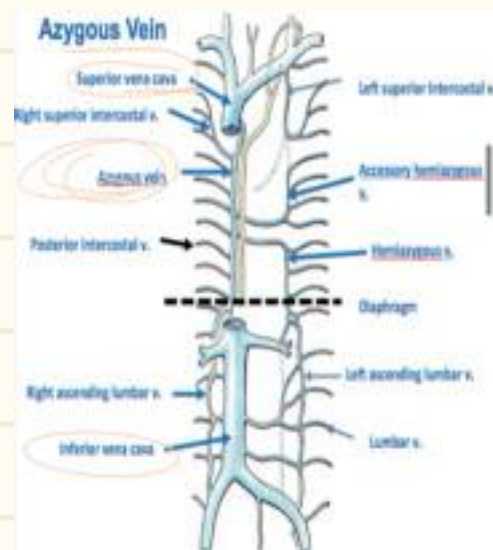
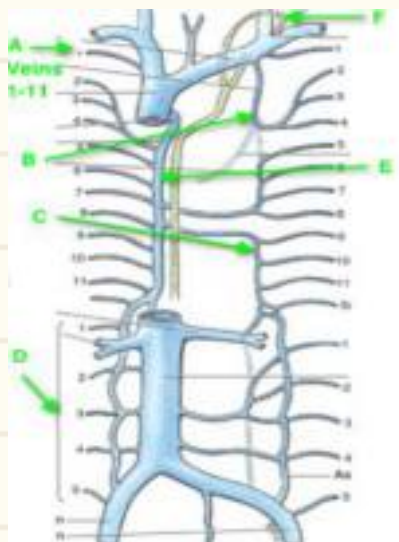
it's ascend first in post mediastinum till disc between $T_{12} - T_{15}$ Then sup. mediastinum.

In post. M $\Rightarrow$ on Rt side of $T_{12} - T_{15}$ on Rt side of desc. Thoracic aorta and separated by thoracic duct.

In sup. M $\Rightarrow$ make arch, Behind Forward Above root of lung it's cross Rt side of esophagus + trachea + Rt vagus nerve.

Tributaries of Azygos.

- Rt ascending lumbar vein. - Rt subcostal vein
- Rt pos intercostal vein 11-5 end separately - Rt sup. intercostal vein union of 2-3-4, pos intercostal vein - end in arch of azygos
- sup. hemiazygos $T_8 \Rightarrow$ At 4th sid (5-8 R.b).
- Infe " " $T_4 \Rightarrow$ (9, 10, 11, 12)
- Bronchial + pericardial vein.



IC nerves. At angle of Rib $\swarrow$ lateral collateral

Form near to vertebral column $\Rightarrow$ pass

① beneath pleura.

$\hookrightarrow$ Then between external + innermost intercostal A.

$\hookrightarrow$ between innermost + internal ICM.

Curve till reach 1/2 inch lateral to sternum + Pierce Anterior Intercostal membrane and pectoralis major muscle. as anterior cutaneous nerve

Branches.

- ① Collateral branches before Cg (Angle) in upper border of Rib
- ② White ramus communicate to sympathetic ganglia ($\rightarrow$)
- ③ Muscular branches 3 ICM (external + Internal + innermost)
- ④ Lateral cutaneous nerve $\Rightarrow$ near to angle of the Rib divide to cut. post branches.

+ Anterior branch $\Rightarrow$ middle + lateral branches

Intercostal nerve.

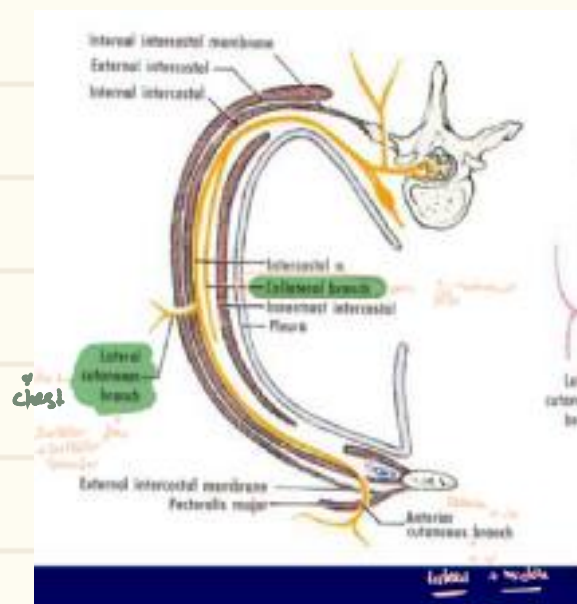
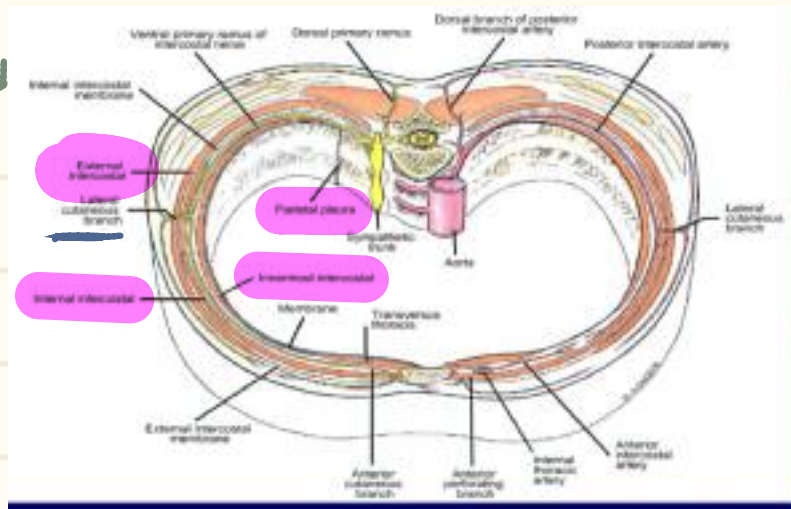
11 intercostal + ① subcostal = 12

1st nerve most of fibers ascend to join brachial plexus + smaller part run in 1st ICS to supply ICM + gives no cut. cutaneous branches

Subcostal nerve $\Rightarrow$ All its course in abdomen + end above symphysis pubis
Lateral cutaneous nerve supply gluteal region

Typical intercostal n. = 2, 3, 4, 5, 6 $\Rightarrow$ All course in thorax

non-typical " " = 7, 8, 9, 10, 11 $\Rightarrow$ part of course in thorax + part in abdomen.



Suprapleural membrane

Dense Fascial layer $\Rightarrow$ Close thoracic inlet.
attached laterally $\Rightarrow$ medial border of 1^o rib + CC

Tent-shaped
Fibrous

Sup. $\Rightarrow$ Tip of Transvers process of C₇

medially $\Rightarrow$ Fascia investing the structures passing from the
thoracic into neck.

protect Apex of lung + underlying cervical pleura.

+ resists the changes in intrathoracic pressure occurring during respiratory
movement.

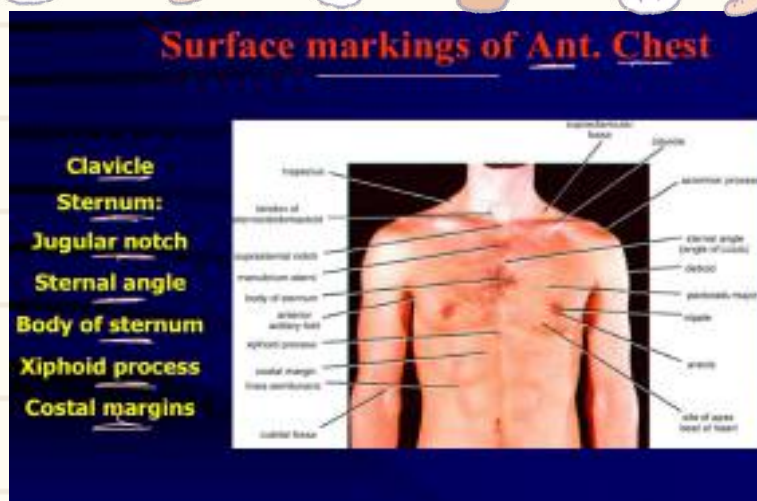
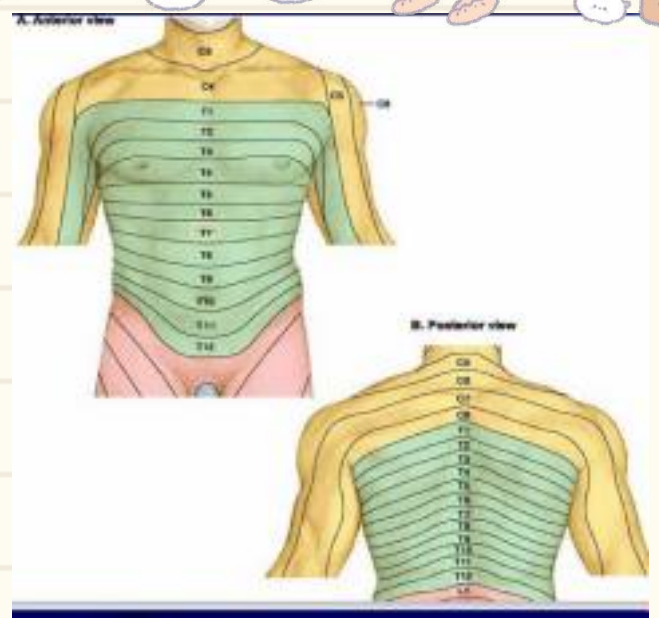
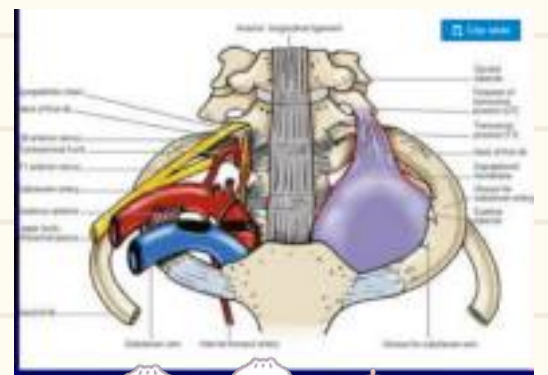
Cutaneous innervation of thoracic + abdominal wall

① Above level of sternal angle $\Rightarrow$ skin
supplied by C₂ - C₄

C₅ $\rightarrow$ C₇ $\Rightarrow$ upper limb.

② Below Angle $\Rightarrow$ start from T₁

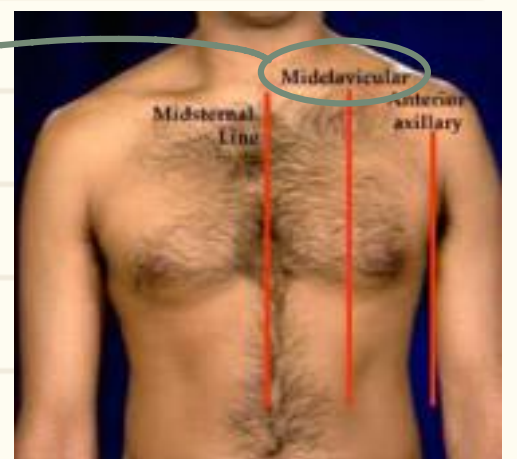
T₁₀ $\Rightarrow$ skin of umbilical, T₇ $\Rightarrow$ xiphoid



Surface Anatomical lines.

+ median sagittal line $\Rightarrow$
intersection of median plane
with ant. chest wall.

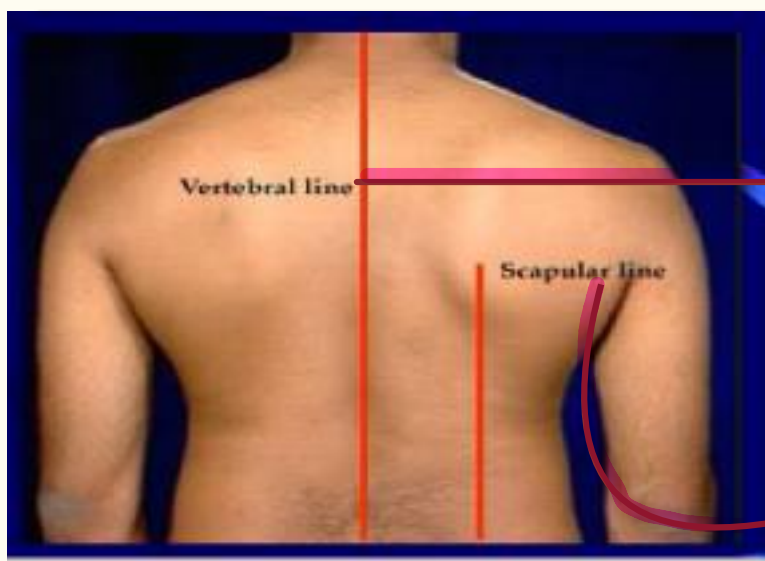
midpoint of clavical $\rightarrow$
to inguinal region



Along ant. axillary fold (Formed by border of pectoralis major muscle).

Run From the apex of axilla parallel to ant. + post line

Along post. axillary fold (Formed by latissimus dorsi + teres major muscle)



= post. median line $\Rightarrow$ over the tips of spinous process of all vertebrae.

$\Rightarrow$ Through sup + inf. angle of the scapula when arms at

Vagus + phrenic nerve anatomical position.

Vagus $\Rightarrow$ Cranial nerve 10 $\Rightarrow$ parasympathetic.

Rt vagus $\Rightarrow$ lateral to trachea + medial to dZygus. + post to root of Rt lung.

gives Rt recurrent laryngeal n. that loops around subclavian a.

L vagus $\Rightarrow$ between lf. CC + lf. subc. + Ant. + lf. to aortic arch.

$\Rightarrow$ Lf recurrent laryngeal nerve + post to lf. root.

Join with esophagus $\Rightarrow$ opening lf $\Rightarrow$ anterior opening, Rt $\Rightarrow$ post to opening.

Phrenic nerve. $\Rightarrow$ C3, C4, C5.

$\Rightarrow$ motor $\Rightarrow$ to diaphragm.

$\Rightarrow$ sensory $\Rightarrow$ to central part of diaphragm. + pericardium, parietal pleura + peritoneum.

Rt $\Rightarrow$ lateral to brachiocephalic + SVC $\Rightarrow$ Ant. to root of Rt lung. + Rt side of pericardium

+ Rt to IVC. (Caval opening).

L $\Rightarrow$ lf subclavian a. + lateral to vagus (lf) + Ant. to root of lung.

Pleura + lung.

2 pulmonary (lat.) + mediastinum (central).

Pleura $\Rightarrow$ Fluid filled sac that surrounded the lung.

Fpn. $\Rightarrow$ $\downarrow$ Friction between parietal + visceral.

pleural surfaces $\Rightarrow$ Costal surface $\Rightarrow$ rib + ICM. , Mediastinal surface $\Rightarrow$ medi.

Diaphragmatic surface $\Rightarrow$ Cupula. Cervical pleura $\Rightarrow$ extend to neck. (2-3cm above clavicle)

Pleural Recesses $\Rightarrow$ Deep space created by pleural reflection. (not filled by lung)

① Costodiaphragmatic Recess $\Rightarrow$ ج. ذ $\Rightarrow$ Costal + diaphragmatic ج. ذ surfaces of pleura.

② Costomediastinal Recess $\Rightarrow$ Costal + mediast. surfaces ج. ذ $\Rightarrow$ larger in LF side. (heart).

neurovascular supply to pleura.

parietal $\Rightarrow$ Sensitive to pain $\Rightarrow$ Follow thoracic wall (VAN)

visceral $\Rightarrow$ Follows lung $\Rightarrow$ Bronchial a. + v. $\leftarrow$ insensitive to pain

Diaphragmatic $\Rightarrow$ musculophrenic a. + phrenic nerve.

pneumothorax $\rightarrow$ Air

Chylothorax $\rightarrow$ lymph.

hemothorax $\rightarrow$ Blood

pyothorax $\rightarrow$ pus

Complication $\Rightarrow$ parietal lung collapse + impaired respiration.

Rx $\Rightarrow$ Thoracocentesis (ج. ذ) $\Rightarrow$ needle $\Rightarrow$ skin - superficial Fasc. serratus Anterior.

Simple pneumothorax $\Rightarrow$ usually self correcting / ICM - parietal - cavity.

Sign + symptoms $\Rightarrow$ Chest pain + Dyspnea, Tachypnea, $\downarrow$ Breath sound in affected side.

Any pneumothorax $\Rightarrow$ its Best Treatment Chest tube. in 5th intercostal space.

Just Anterior to midaxillary line $\Leftarrow$ Closed pneumothorax.

Open pneumothorax $\Rightarrow$ Chest wall open $\Rightarrow$ allow to air enter to pleural cavity

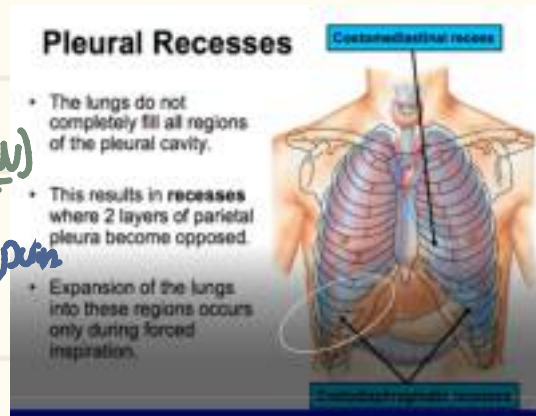
w/ lung collapse $\Rightarrow$ $\uparrow$ pleural cavity pressure.

Thoracocentesis $\Rightarrow$ Rib 10 $\rightarrow$ Int 1, 2 $\rightarrow$ pleural space

Dressing is Treatment to open pneumothorax.

Lung Ant. $\Rightarrow$ Clavicular line $\Rightarrow$ 6 - inter costal space + 8 pleural

midaxillary line $\Rightarrow$ lung $\Rightarrow$ 8, pleura $\Rightarrow$ 10



vital organ for respiration

Lungs

Each lung $\Rightarrow$ Apex $\Rightarrow$ 1 inch above mid 1/3 of clavicle anteriorly + Reach neck of rib posterior.

Base $\Rightarrow$ Concave lie over cupula of diaphragm.

3 surfaces $\Rightarrow$ Costal + mediastinal + Diaphragm. 3 border $\Rightarrow$ Sharp ant. + round post + inferior.

Rt lung $\Rightarrow$ Larger + shorter + thicker than LF lung.

Have 2 Fissures. $\Rightarrow$ Oblique Fissure $\Rightarrow$ at post. border of lung 6cm below Apex at level of 3rd Transvers spine ends at 6 CC Junction. Crosses 6th rib in midaxillary.

Transvers Fissure = Horizontal $\Rightarrow$ 4th CC anteriorly $\rightarrow$ mid axillary line.

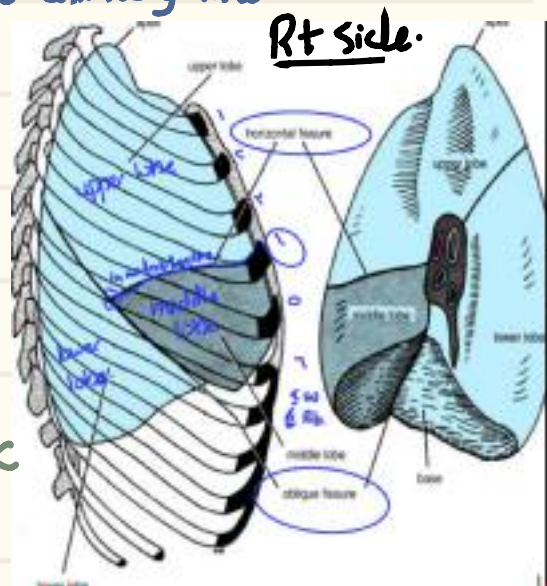
$\Rightarrow$ Have 3 lobes $\Rightarrow$ upper + lower + middle.

Lf lung $\Rightarrow$ Smaller than Rt $\Rightarrow$ heart taller + narrower Have 2 lobes $\Rightarrow$ upper + lower

Have one Fissure. $\Rightarrow$ Oblique Fissure

Ant. Border $\Rightarrow$ Cardic notch demarcated from 4th - 6th CC

Lingula $\Rightarrow$ beneath the notch.



Root + Hilum of the lung.

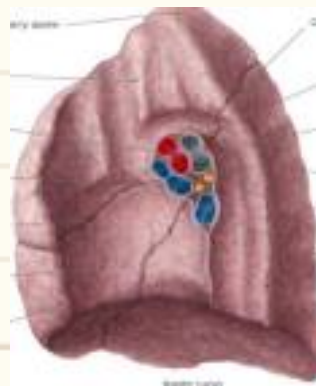
Root $\Rightarrow$ Structure that enter from mediastinum to Hilum of lung or leave the lung. Connect lung with heart + trachea.

$\Rightarrow$ pulmonary a. + v. + Branchi, enclosed in tube of pleura $\Rightarrow$ opposite to 5th + 7th thoracic vertebra.

Hilum $\Rightarrow$ Aperture through which structure from root enter or leave lung. Lie in pos. part of medias surface + midway between apex + base of lung.

Pulmonary Ligament $\Rightarrow$ 2 layered fold of mediastinal pleura

surrounds lung hilum, extends downward and ends at the lung base



Arrangement of structures in root of lung

most anterior $\Rightarrow$ upper pulmonary vein.

Inferior $\Rightarrow$ lower pulmonary vein

most posterior $\Rightarrow$ principle bronchus

On Rt side $\Rightarrow$ eparterial bronchus $\Rightarrow$ Above main bronchus

pulmonary artery $\Rightarrow$ between SPV + principle bronchus. in Rt lung.

" " on Lt side $\Rightarrow$ Above and inferior of main bronchus.

Root of Lt lung contain one Bronchus only.

These structure surrounded by pleura $\Rightarrow$ pleural ligament.

Root of The lung Closure to post. border than anterior one

mediastinal surface of Rt lung $\Rightarrow$ middle surface

Rt Related more to venous structure.

In Front and below of hilum $\Rightarrow$ wide concave impression for Rt atrium.

2 vertical grooves for SVC + IVC

Behind of hilum $\Rightarrow$ groove to azygos vein + esophagus

- Immediately above hilum $\Rightarrow$ Curved groove for arch of azygos vein

- Above level of arch of azygos 3 grooves $\Rightarrow$ esophagus + Trachea + SVC.

mediastinal surface of Lt lung.

- In Front + below hilum $\Rightarrow$ wide deep concave area for Lt Ventricle.

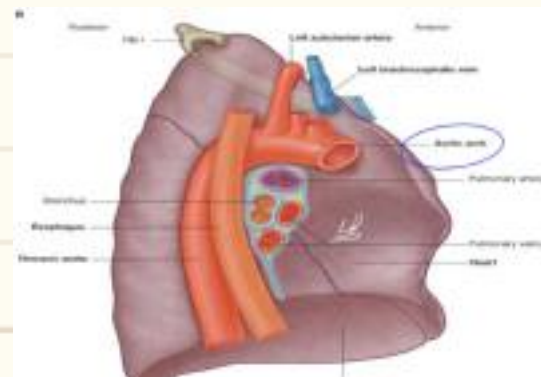
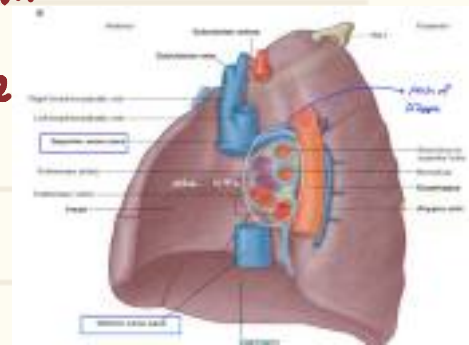
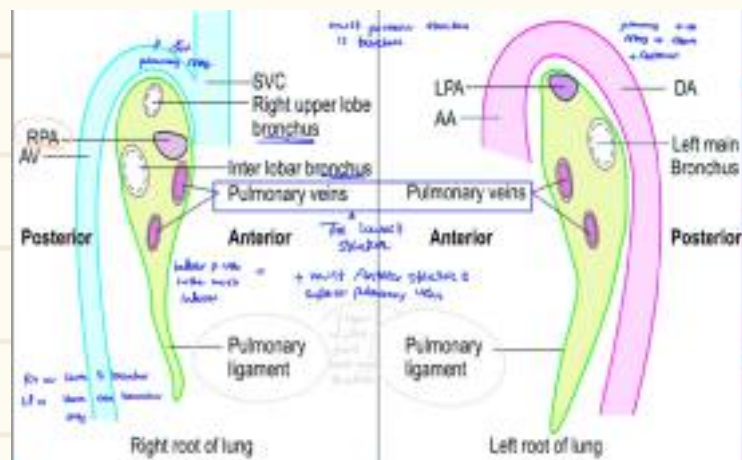
- Behind of hilum $\Rightarrow$ longitudinal groove for descending aorta.

- Immediately above hilum $\Rightarrow$ groove to arch of aorta.

- Above aortic arch $\Rightarrow$ 2 groove for Lt subclavian + Lt Common carotid a.

- phrenic nerve + vagus nerve from post sub plexus on pos.

aspect of root.



Trachea $\Rightarrow$ Fibro cartilaginous tube $\Rightarrow$ C6 - sternal angle.

U-shaped bars of hyaline cartilage + smooth muscle (trachealis).

Rt bronchus $\Rightarrow$ wider + shorter + more vertical

Lt bronchus $\Rightarrow$ narrower + longer + more horizontal

Tracheal Relations: Anterior $\Rightarrow$ Lt. Brachiocephalic vein + manubrium.

Posterior $\Rightarrow$ esophagus + recurrent laryngeal nerve.

Right $\Rightarrow$ Rt vagus nerve + Azygos vein. Lt side $\Rightarrow$ Aortic arch, Lt CC, subclavian artery + Lt Vagus nerve.

Rt vagus $\rightarrow$ posterior, Lt Vagus $\rightarrow$ Anterior

$\Rightarrow$ length of Trachea $\approx$ 10-12 cm, 2 cm up

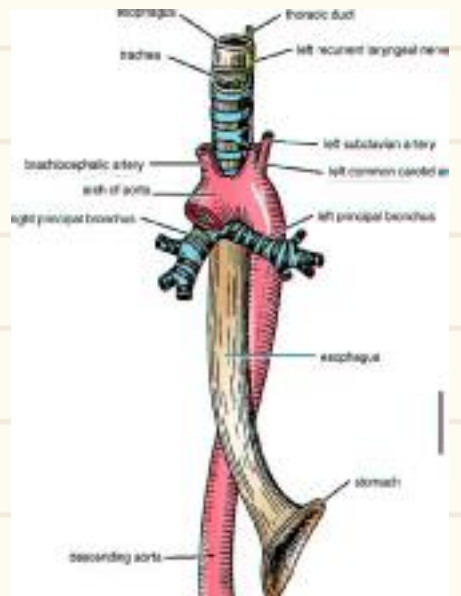
end at 2nd costal cartilage at angle of Louis

Bronchi $\leftrightarrow$ Rt Lt main bronchi.

① main bronchi $\Rightarrow$ one on each side, from angle of Louis $\rightarrow$ hilum of lung.

Rt one $\Rightarrow$ wider + shorter + more vertical $\Leftarrow$ most common in choking.

Lt one $\Rightarrow$ narrowing + longer + more horizontal.



Lt bronchus	Rt bronchus
Longer and narrower	Shorter wider
Less in line with trachea	More in line with trachea
1 st branch arise <u>two inch</u> from bifurcation <i>to division of 1st branch</i>	1 st branch arise <u>one</u> inch from bifurcation <i>2nd branch of 1st branch of 1st branch</i>
Lt PA cross in front of stem Lt bronchus Before origin of 1 st branch	Rt PA cross in front of stem Rt bronchus after origin of 1 st branch
Arch of aorta crosses above Lt bronchus from in front backward	Arch of azygos vein crosses above Rt bronchus, from behind forward

Pulmonary artery cross Rt one After give its first branch But Lt before 1st branch.

2. lobar bronchi: $\Rightarrow 2 \text{ Lf} + 3 \text{ Rt}$.

3. segmental bronchi: $\Rightarrow 10 \text{ Rt} \Rightarrow 3 \text{ upper} + 2 \text{ middle} + 5 \text{ lower}$.

$8 \text{ Lf} \Rightarrow 4 \text{ upper} + 4 \text{ lower}$.

$\Rightarrow$ Bronchopulmonary segments. $\Rightarrow$ Have its own blood supply $\Rightarrow$ جنت نكه

structural unit

segmentes. بوسه با نيائي با في segments

$\rightarrow$ Anatomical Functional + Surgical units

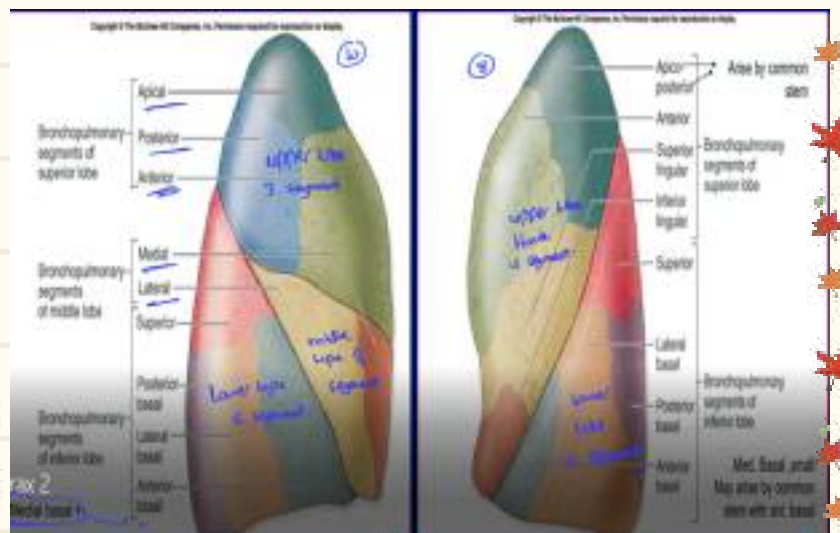
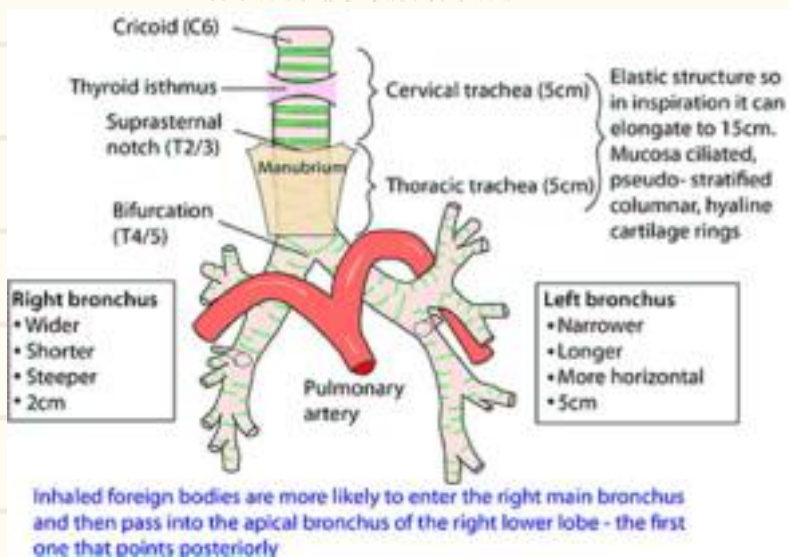
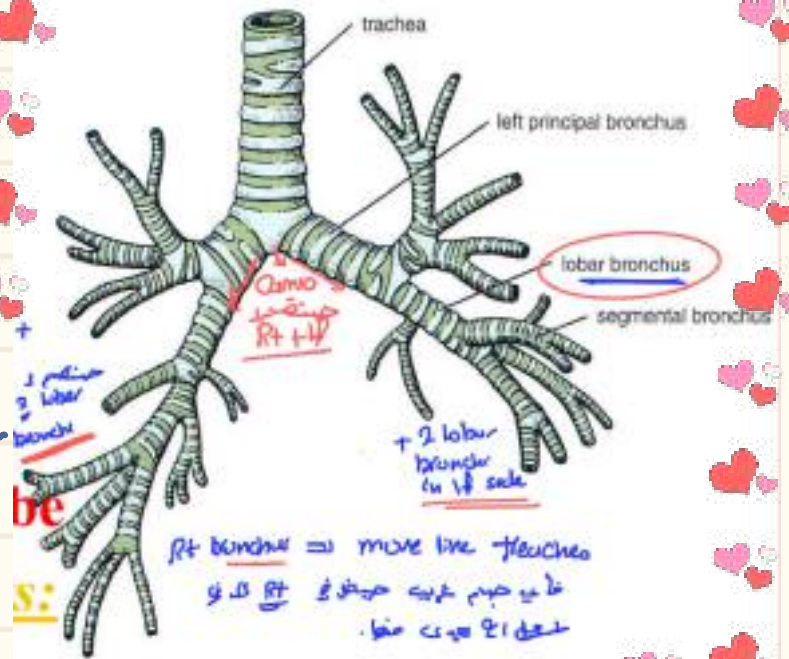
of lung.

$\Rightarrow$ pyramidal in shape like a wedge.

$\Rightarrow$ Apex $\Rightarrow$ Root, Base $\Rightarrow$ pleural surface

$\Rightarrow$ Each segment has its own blood supply + innervation

$\Rightarrow$ separated by connective tissue.



First Chapter is Done.

Nose.

is the upper part of Respiratory passage. $\Rightarrow$ Contain olfactory receptors.

Have wide base + narrow sup. apex

ndres $\Rightarrow$ Ante inferior opening $\Rightarrow$ cleft in shape

Bounded by Cartilage

posterior wide opening is Chonca. $\Rightarrow$ bone.

nose $\Rightarrow$ passage between outside (anti) + nasopharynx (post).

Coverd by. $\Rightarrow$ out $\Rightarrow$ skin, in $\Rightarrow$ mucose membrane.

2 parts $\Rightarrow$ (1) external nose (2) nasal cavity.

We have 3 regions of nose.

1- vestibule $\Rightarrow$ Dilated space just internal to nares.

2- Respiratory Region $\Rightarrow$ largest area of nasal cavity lined by ciliated epith + rich neurovascular supply.

3- Olfactory Region $\Rightarrow$ small in apex of nasal cavity.
 $\hookrightarrow$ response to smell

$\Rightarrow$ External nose. $\Rightarrow$ (1) Bone $\Rightarrow$ Frontal process of maxilla + nasal Bone.

(2) Cartilage $\Rightarrow$ upper lateral + lower lateral $\Rightarrow$ Disappear after death

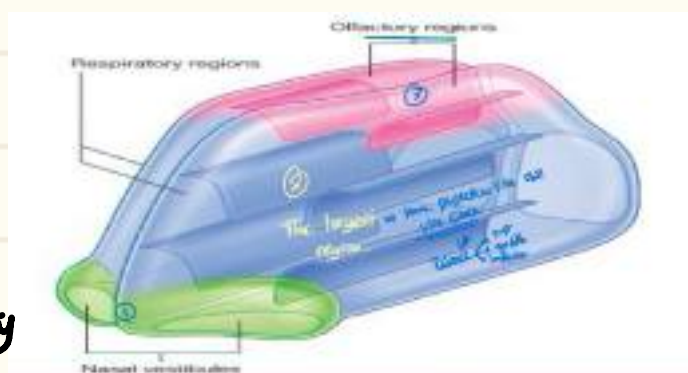
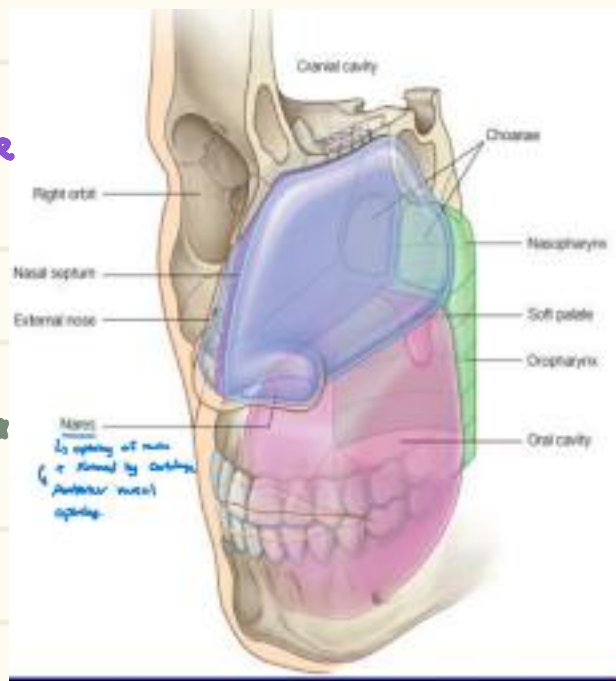
Nasal septum = medial wall = Boundaries.

● post. $\Rightarrow$ Superior + post. $\Rightarrow$ perpendicular plate of ethmoid bone.

● inferior + post $\Rightarrow$ lower bone. ● Ante. $\Rightarrow$ septal cartilage.

$\Rightarrow$ Nasal Cavity. $\Rightarrow$ Extends from nostrils to post $\rightarrow$ conchae. / Divided by septum $\leftarrow$ Rt

Boundaries. $\Rightarrow$ Lat. wall $\Rightarrow$ vestibule $\Rightarrow$ Ant. aspect of nasal cavity lined with modified hairy skin called vibrissae $\Rightarrow$ Tough + short + coarse hair + strong.



Have 2 opening $\Rightarrow$ nares.

② Atrium $\Rightarrow$ Region of lateral wall of middle meatus above vestibule

(3) Merge Conquer $\Rightarrow$ sup. + mid + inf $\Rightarrow$ minutes $\Rightarrow$ Conquer is 20

Sup. + middle concha part of ethmoid bone
+ inf. concha is sphenoid bone.

(2) med wall $\Rightarrow$ nasal septum.

③ $\text{Roof}(\text{sup}) =, \underline{\text{narrow.}}$

- () Highest in middle Formed by cribriform plate of ethmoid bone.

- Us have spining to olfactory nerve.

→ Anterior ⇒ it's slips to nudes ⇒ and Formed Frontal and nasal bone.

Post. =, slopes inferior $\Rightarrow$ Body of sphenoid, Vomer, Palatine Bone.

(3) Floor (Inf) = Bony hard palate. $\Rightarrow$ oral + nasal cavity

Nasal conchae and meatuses lateral wall.

Conchae = Any elections that project inf.

③ sup. + mid + inf. $\Rightarrow$ meatus. + Canaliculi desc.
meatus (passage)

sup. meatus $\Rightarrow$ open post. Ethmoid sinus.

mid meatus $\Rightarrow$, open frontal sinus + maxillary sinus + ant. + mid Ethmoid sin.

Inf meatus $\Rightarrow$ open naso lacrimal duct in ant. part of lat. wall.

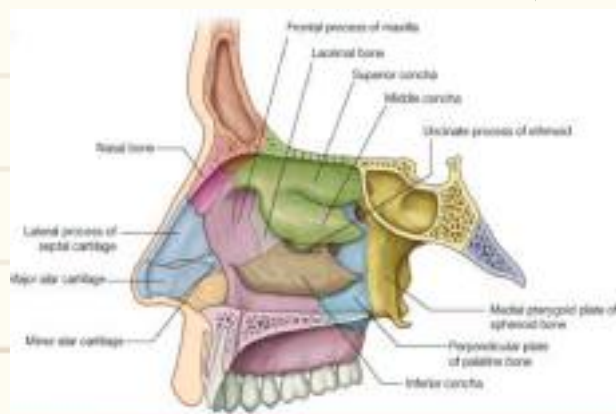
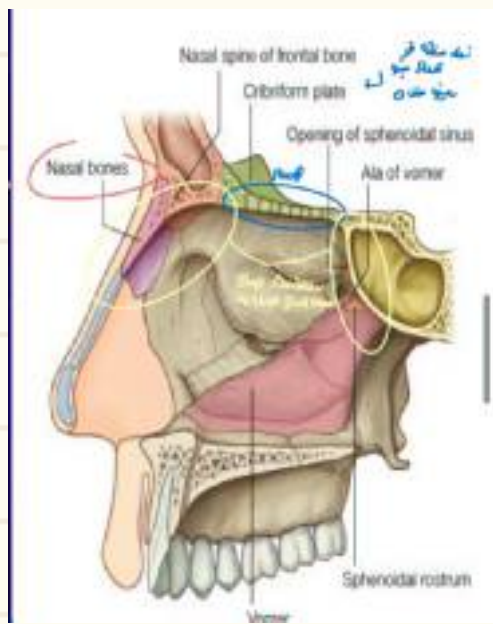
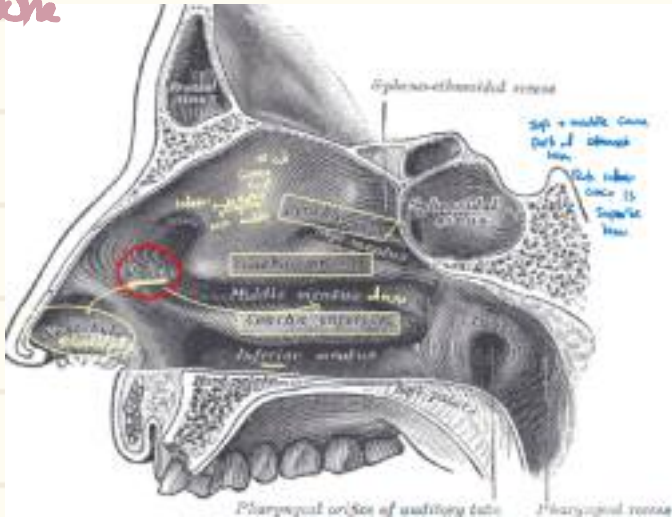
Sphen. Ethmoid recess $\Rightarrow$ sphenoid sinus

Δ ανάλογος ημιτόνου δι

open above superior concav. (فوق السطح الجانبي)

Between Sphuncoid + Ethmoid bones

Receives = Spherical sinus opening.

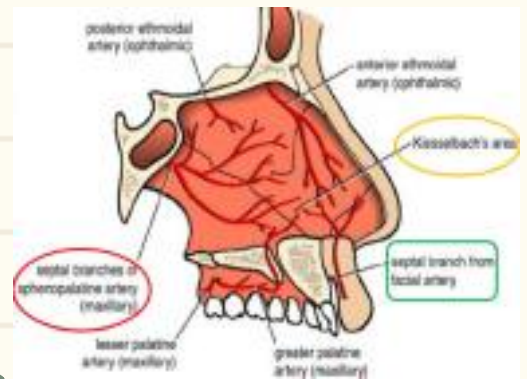


Arterial Blood supply.

3 Artery $\Rightarrow$ warm the air that enter the lungs

External Carotid artery $\Rightarrow$ maxillary artery.

- ① maxillary $\rightarrow$ sphenopalatine A. $\Rightarrow$ The most imp. blood supply $\Rightarrow$ supply.
lateral wall, nasal septum.
 $\rightarrow$ Greater palatine $\Rightarrow$ supply floor of nasal cavity.



- ② Facial Artery $\Rightarrow$ From external carotid artery
 $\rightarrow$ sup. labial artery $\Rightarrow$ supply lip (upper lip) + nasal cavity.

- ③ Ethmoid artery $\Rightarrow$ branch of ophthalmic inter carotid artery
(Ant + post). Internal carotid artery. no clt

$\Rightarrow$ Anastomosis at anterior + inferior part of nose $\Rightarrow$ The most imp. part.
 $\Rightarrow$ The most part occur in it bleeding.

Venous drainage. $\Rightarrow$ Through nasal venous plexus within submucosal.

Drains into $\Rightarrow$ ① Facial vein (ant.). ② Pterygoid venous plexus (post).

Epistaxis. $\Rightarrow$ nasal bleeding $\Rightarrow$ Causes ① localized $\Rightarrow$ Trauma, picking

② Systemic $\Rightarrow$ uncontrol hypertension or drugs

Location $\Rightarrow$ most commonly Anterior-inferior part of nasal septum (Little's area). / Septal branches artery anastomosis $\Rightarrow$ Kiesselbach's plexus.

Clot Forme

① $\Rightarrow$ packing nasal cavity with absorbent material.

② Direct pressure on external nose in normal position of head to ~10 min

Innervation of nasal cavity.

- ① Olfactory nerve ① $\Rightarrow$ small, located in post. part of nasal cavity above superior concha.
- ② General sensation $\Rightarrow$ maxillary nerve (V₂) $\Rightarrow$ post. } From Trigeminal
ophthalmic nerve (V₁) $\Rightarrow$ Anterior. } nerve (5).

Paranasal sinuses.

4 pairs. $\Rightarrow$ Air Filled located within the bone of skull and facial bones around the nose.

maxillary, sphenoid, ethmoid, Frontal.

$\downarrow$ rudimentary at Birth

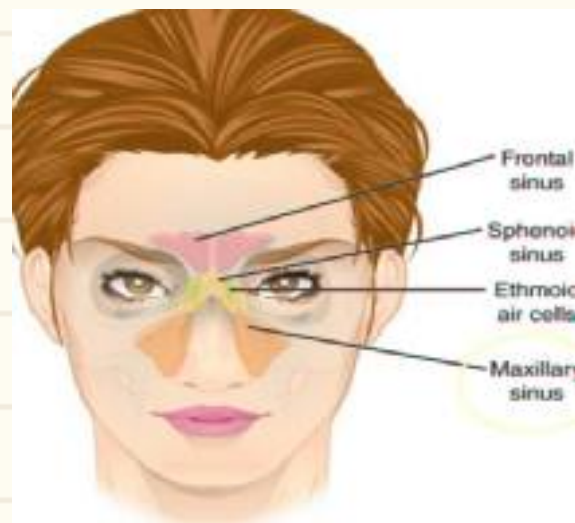
$\downarrow$ The only sinus not present at birth.

These sinus at birth $\Rightarrow$ Filled with fluid.

maxillary $\Rightarrow$ The largest one + lie inferior to eyes in maxillary bone + 1st sinus to develop

Function $\Rightarrow$ ① Humidification + warming of inspiration air.

- ② Resonance of voice ③ produce a mucus that moisturizes the inside of the nose
- ④ make the bone of skull lighter
- ⑤ protect the surrounding vital structure



Sinusitis. $\Rightarrow$ inflammation of paranasal sinuses due to viral, bacterial, Fungus or allergic reaction.

Symptoms $\Rightarrow$ nasal obstruction and congestion, purulent nasal discharge + Facial pain + pressure + malaise + headache + Fever.

2^o Chapter is Done.

Pharynx.

⇒ 12 cm + Funnel in shape ⇒ wide upper part 2.5 cm.

+ Situated under the base of skull.

+ narrow border 1.2 cm. ⇒ Continues as esophagus at C6 = lower border of cricoid cartilage.

lie behind nasal cavity + oral cavity + larynx.

Anteriorly → no wall ↓ open to it ante

walls.

Ant. ⇒ Deficient ⇒ Connect with nose + mouth + Larynx.

Lat. + post ⇒ mucous membrane, Fibrous covering (2), muscles.

Muscles of pharynx. ⇒ Arranged into 2 direction.

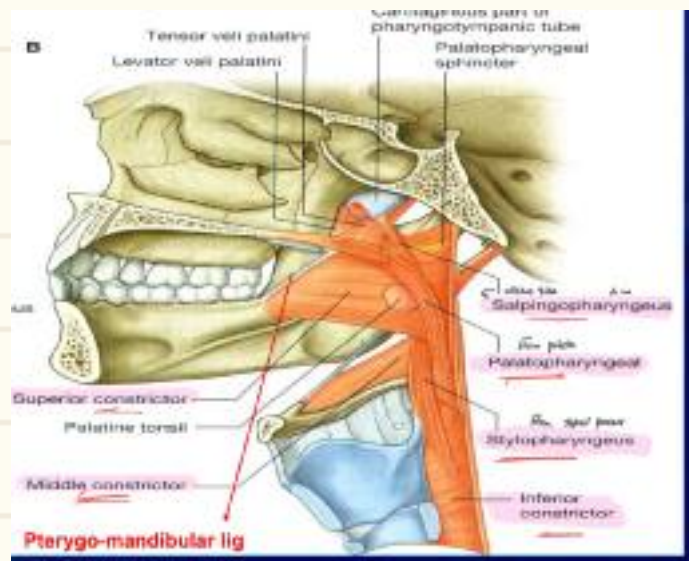
① Outer circular ⇒ ③ Constrictors = sup. mid. inf. ⇒ responsible for swelling

② Inner longitudinal ⇒ ③ ⇒ ① stylo, ② salpingo, ③ palato pharyngeus.

نسيج الـ لارنج

All muscle of pharynx is supplied by Pharyngeal plexus ⇒ (cranial part of accessory nerve thru vagus nerve) Except

Stylopharyngeus ⇒ glossopharyngeal nerve.



Constrictor ⇒ make rapid peristaltic wave to propel the bolus to the esophagus.

Longitudinal ⇒ elevate the larynx during swallowing

③ sup. - mid. - inf. ⇒ attached pos. to Pharyngeal Raphe

They lie on the side wall and post. wall of pharynx.

Overlap in each other in the direction of midline

Longitudinal ⇒ Stylo ⇒ pass between sup. mid constrictor

⇒ Styloid process ⇒ posterior border of thyroid cartilage + innervation by glossopharyngeal.

② Palato $\Rightarrow$ Palatine apophysis $\rightarrow$ thyroid cartilage.

③ Salpingopharyngeus $\Rightarrow$ Auditory tube (medial end) Blend with thyroid cartilage.

Nasopharynx $\Rightarrow$ Base of skull to Atlas vertebra.

Boundaries $\Rightarrow$ Roof $\Rightarrow$ support by sphenoid + Basilar part of Occipital bone.

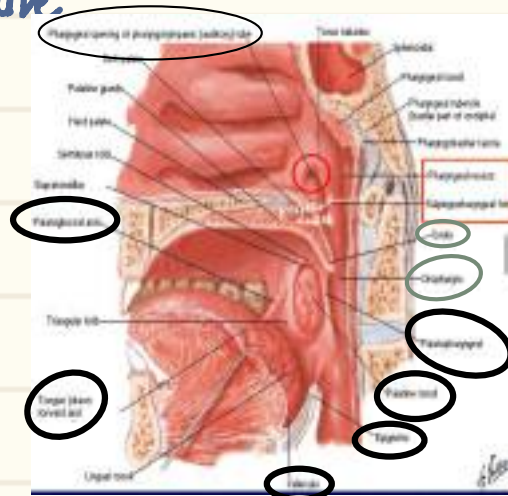
+ Have pharyngeal tonsils in submucosa.

Floor $\Rightarrow$ sloping upper surface of soft palate.

Ante wall $\Rightarrow$ post. nasal aperture

post. wall $\Rightarrow$ ant. arch of atlas.

lat. wall $\Rightarrow$ has pharyngeal opening of auditory tube
 $\Rightarrow$ tubal elevation, Salpingopharyngeal Fold and pharyngeal recess.



Oropharynx $\Rightarrow$ Post. to oral cavity + open to it oropharyngeal

isthmus $\hookrightarrow$ extend from soft palate to upper border of epiglottis

Floor $\Rightarrow$ 1/3 post. of tongue + epiglottis

$\hookrightarrow$ Contain palatine tonsils $\Rightarrow$ Ant. + post. pillars $\approx$ we sup. constrictor m. $\Rightarrow$ Tonsillar bed.



behind the oral cavity + in front of the 2nd + 3rd Cervical vertebra

Boundaries

Roof $\Rightarrow$ undersurface of soft palate and pharyngeal isthmus $\Rightarrow$ mouth

Floor $\Rightarrow$ 1/3 post. tongue + ant. surface of epiglottis mouth + pharynx

Vellocula $\Rightarrow$ Depression between post 1/3 of tongue + ant. border of epiglottis

Anterior wall $\Rightarrow$ open into mouth. through the oropharyngeal isthmus.

post wall $\Rightarrow$ support by the 2nd and 3rd Cervical vertebrae.

lateral wall $\Rightarrow$ palatoglossal and palatopharyngeal arches and tonsillar sinus in between.

Laryngopharynx: $\Rightarrow$ upper border of epiglottis $\rightarrow$ Cricoid Cartilage. $\Rightarrow$ As esophagus.

Behind the laryngeal inlet above and post. of larynx below and in front of 4th, 5th, 6th Cervical vertebrae.

Boundaries $\Rightarrow$ Ant. wall. Laryngeal inlet and post. wall of larynx (mucous membrane covering the Cricoid Cartilage).

post wall $\Rightarrow$ body of 4, 5, 6 C.v

Lateral wall $\Rightarrow$ support by thyroid cartilage and thyrohyoid membrane.

Vallecula $\Rightarrow$ epiglottis + post. tongue guide to vocal cords and entrance of larynx.

Relation of Palatine Tonsils.

Ant. Palatoglossal Fold

post. palatopharyngeal Fold

sup. soft palate

inf. tongue



medically. $\Rightarrow$ show pits, largest is upper tonsillar sinus.

Piriform Fossa. $\Rightarrow$ Apper. Cancer in this site.

$\Rightarrow$ small, imp. space in mm of laryngopharynx, situated on each side of laryngeal inlet.

Oblique, backward, downward From the region of back of tongue + esophagus.

Boundled by $\Rightarrow$ medially $\Rightarrow$ aryepiglottic Fold, laterally $\Rightarrow$ lamina of thyroid cartilage + thyroid membrane.

Common site For lodging sharp ingested bodies such as Fish bone.

Inervation $\Rightarrow$ Internal laryngeal nerve pass in this Fossa beneath the hyoid G branch of Sup. laryngeal nerve $\rightarrow$ branch of vagus nerve.

Sensory innervation of pharynx.

Nasopharynx $\Rightarrow$ maxillary nerve.

Oropharynx + Laryngopharynx $\Rightarrow$
glossopharyngeal nerve through the
pharyngeal plexus.

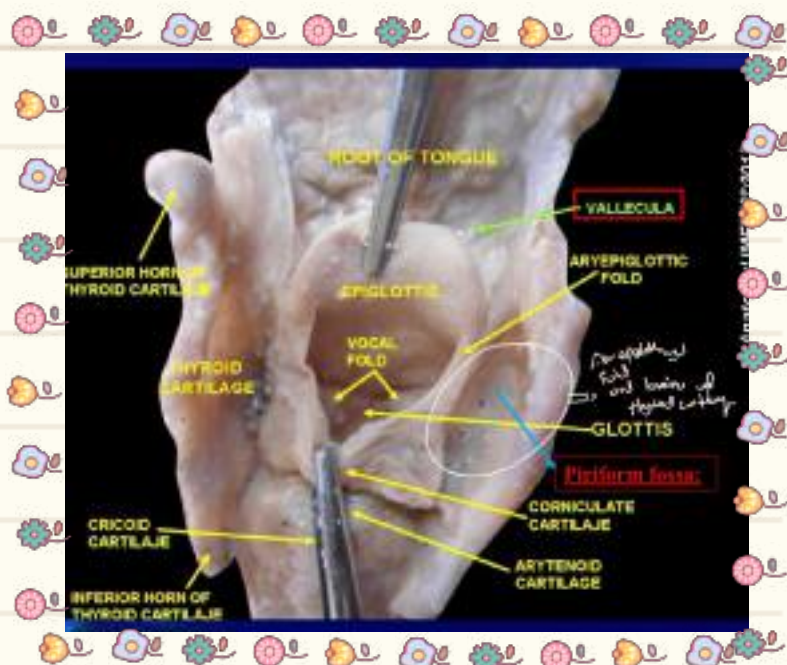
Area surrounding the laryngeal inlet
 $\Rightarrow$ Fossa $\Rightarrow$ Internal laryngeal $\rightarrow$ vagus.

Gag reflex.

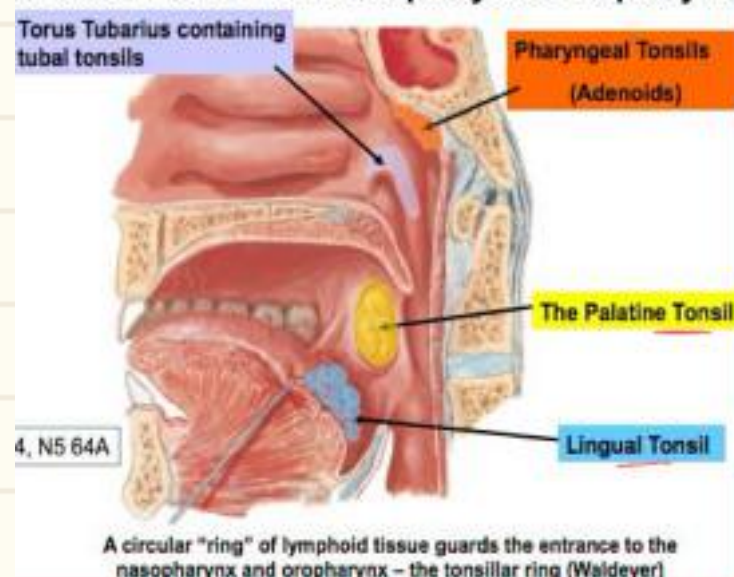
Both $\Rightarrow$ Afferent sensory + efferent motor innervation of pharynx working together
sensory stimulation of pharyngeal mucosa (ux)
 $\Rightarrow$ contraction of pharyngeal musculature (pharyngeal plexus)

Waldeyer's Tonsillar Ring.

- ① Palatine Tonsils $\Rightarrow$ on lat. wall of mouth cavity
Rt $\leftarrow$ + $\rightarrow$ Lt.
- ② Tubal Tonsils $\Rightarrow$ on lat. wall of nasopharynx
Rt $\leftarrow$ $\rightarrow$ Lt.
- ③ Pharyngeal Tonsil $\Rightarrow$ single, roof of nasopharynx.
- ④ Lingual Tonsil $\Rightarrow$ single, in base of tongue.



Tonsillar Tissue in the Nasopharynx & Oropharynx



Third Chapter is Done.

The Larynx

upper part of trachea $\Rightarrow$ it's organ of ① Respiration (open).

② phonation partially closed ③ protection closed (RT في حالة السعال مغلقة)

④ Coughing ① closed $\rightarrow$ pressure in intra abdomen + intra thoracic $\uparrow \rightarrow$ open $\Rightarrow$ body في الجذب

$\Rightarrow$ in median part of Front of The neck, below The hyoid bone.

In front the lower part of pharynx and Tongue $\Rightarrow$ C3 + 4 + 5 + 6

extend from upper border of epiglottis $\rightarrow$ lower border of Cricoid cartilage

upper end open in laryngopharynx by the laryngeal inlet

lower end continuous with trachea at C6 $\Leftarrow$ lower border.

Larynx consist of $\Rightarrow$ Cartilages (9).

+ muscles + ligament and mucus membranes

+ Joints

① Cartilages. Single $\Rightarrow$ Thyroid + Cricoid + epiglottic

paired $\Rightarrow$ Cuneiform + Corniculate + Arytenoid.

Hyoid bone. $\Rightarrow$ supportive structure to Larynx + Tongue

$\hookrightarrow$ Attachment point to extrinsic muscle of larynx.

U-shaped $\rightarrow$ located in ant. part of neck.

$\Rightarrow$ Body - Lesser (Ant.) + Cornua - Greater cornua (post).

Thyroid Cartilage $\Rightarrow$ Have Rt + Lt lamina + long sup. horn $\rightarrow$ hyoid bone
+ Inferior horn $\rightarrow$ short $\Rightarrow$ cricothyroid joint + oblique line $\Rightarrow$ muscle

The largest Cartilage of larynx. (open-book)

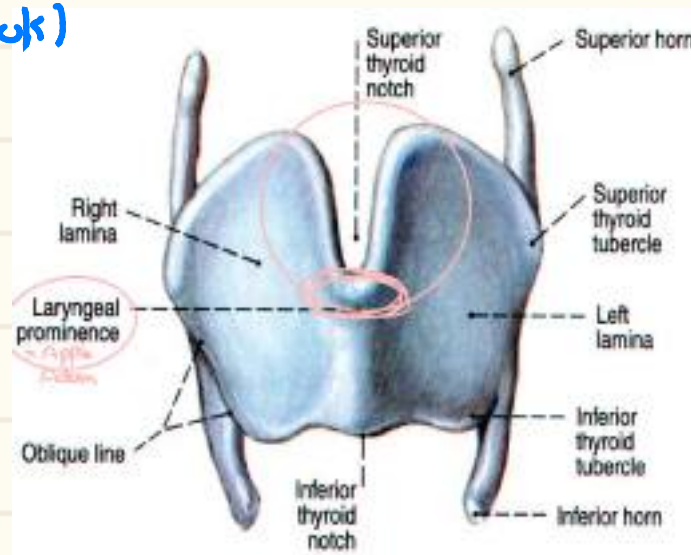
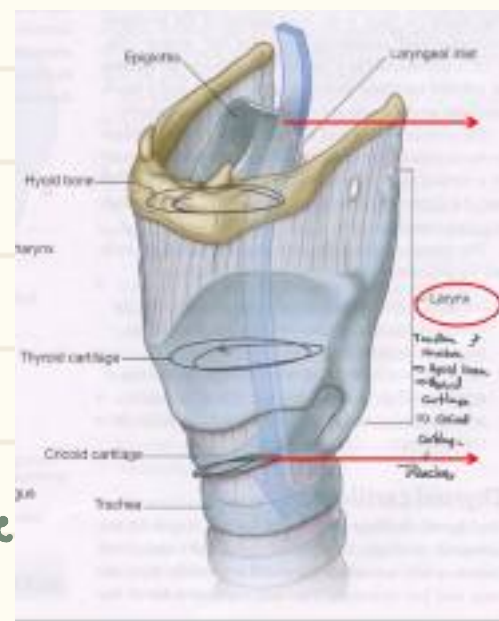
2 laminae $\Rightarrow$ widely separated behind + unite
ant. + inf.

lateral outer surface of lamina has oblique
line in post. part

$\Rightarrow$ sternothyroid m. $\Rightarrow$ inserted.

Thyrohyoid take origin.

Thyroid notch
supi



The angle between two lamina $\Rightarrow$ Thyroid angle $\Rightarrow 90^\circ$ in male
 $+ 120^\circ$ in Female $\Rightarrow$ ADAM'S Apple

This mean that vocal cord longer 2.5cm in male + 1.5 cm in Female
medial surface of lamina are smooth and concave and
give origin to vocal ligament.

Cricoid Cartilage

Signet ring + wide part of ring behind.

Ant. $\Rightarrow$ Arch post. $\Rightarrow$ lamina.

$\Rightarrow$ encircles the larynx below thyroid cartilage and
connect to 1st ring to trachea.

laterally $\Rightarrow$ Arch of cricoid articulate with inf. horn of the
Thyroid cartilage $\Rightarrow$ Cricothyroid Joint.



Arytenoid Cartilage.

pyramidal shaped $\Rightarrow$ Apex + base + 3 surfaces.

back of Adam apple $\rightarrow$ vocal cord at this place

Apex $\Rightarrow$ upward + articulate with Corniculate cartilage.

Base $\Rightarrow$ downward + " " upper border of lamina of cricoid

lateral angle $\Rightarrow$ of base projects and form the muscular process.

Anterior angle $\Rightarrow$ of base project to form vocal process $\rightarrow$ vocal cord
back of adam apple $\leftarrow$ Cord

Corniculate Cartilage. $\Rightarrow$ Small cartilage on the apex of
arytenoids. $\Rightarrow$ enclosed in aryepiglottic fold forming
the Corniculate Tubercle

Cuneiform Cartilage $\Rightarrow$ small, nodule enclosed in the aryepiglottic fold
forming Cuneiform Tubercle

Epiglottis Cartilage . $\Rightarrow$ Leaf-shaped elastic Cartilage
project upwards behind the tongue and hyoid bone
upper Broad Free end + lower Tapering end.

Ant. $\Rightarrow$ ① Root of tongue by median and lateral glosso-epiglottic
Fold
 $\hookrightarrow$ ① median + ② lateral $\approx$ 3 Folds.

② Hyoid bone $\Rightarrow$ Hyo-epiglottic ligament. in between $\Rightarrow$ Vallecula.

③ Inner surface of thyroid cartilage by Thyro-epiglottic ligament.

Relations of larynx.

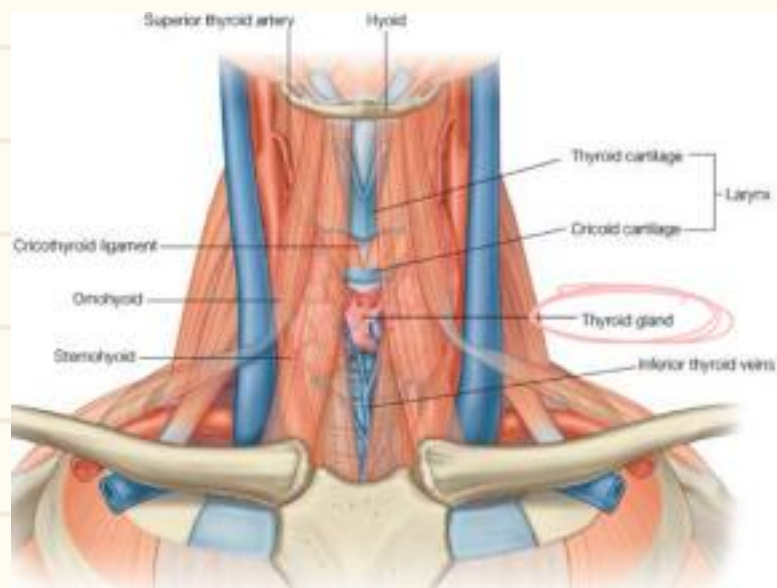
Anterolateral $\Rightarrow$ Skin, Fascia - 2 layers $\hookrightarrow$ strap M. $\Rightarrow$ ① Omohyoid
Sternohyoid superficial muscle . Deep muscle $\Rightarrow$ Thyrohyoid
on each side $\Rightarrow$ great vessels of neck (common carotid + internal
Jugular $\rightarrow$ lobe of thyroid gland.
Behind $\Rightarrow$ Pharynx.

Joint of larynx $\rightarrow$ Cricothyroid
 $\rightarrow$ Cricovertebra

Cricothyroid $\Rightarrow$ Inf horn of thyroid
+ lateral side of lamina of Cricoid.

$\Rightarrow$ (m) permits to the 2 cartilages to become closure or further apart
This movement is produced by the action of Cricothyroid muscle
and thyro-arytenoids tense or Relax the vocal cord.

Cricovertebra Joints $\Rightarrow$ between base of the arytenoids and
the Cricoid lamina.



membrane + ligaments.

(1) Thyrohyoid mem. $\Rightarrow$ space between hyoid bone and Thyroid cartilage

(2) Cricothyroid ligament $\Rightarrow$ elastic band which lies below and on inner aspect of the thyroid cartilage + connect thyroid + Cricoid. + arytenoids cartilage.

This ligament $\Rightarrow$ 2 parts. (1) median cricothyroid ligament.

$\Rightarrow$ Ant. thickened part of lig. which connect the border of Cricoid + thyroid. + overlapped by the Cricothyroid muscle

median ligament $\Rightarrow$ Cricothyroid ectomy or Trenched ectomy.

(2) Lateral Cricothyroid ligament = Crico-vocal membrane

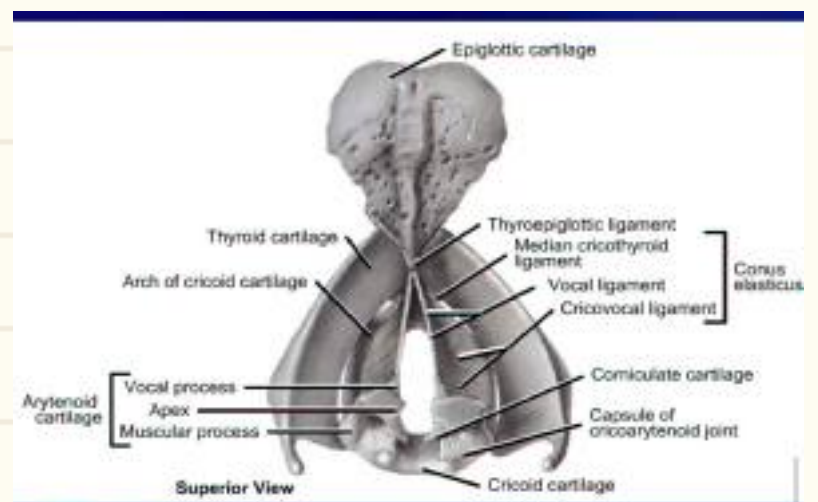
Attached inf to upper border of Cricoid cartilage

Superiorly $\Rightarrow$ has 2 attachments. (1) inner surface thyroid cartilage anteriorly to vocal process of Arytenoid cartilage posteriorly.

Has upper free border = Vocal-Ligament. $\Rightarrow$ attached to inner surface of thyroid cartilage (anteriorly) and to vocal process of arytenoid cartilage (posteriorly).

Laryngeal inlet.

opening of communication of the pharynx + larynx
 $\Rightarrow$ upward + backward.



Boundaries: upper border of epiglottis $\Leftarrow$ Ant

Aryepiglottic Fold $\Leftarrow$ on each side

M.M between the arytenoids cartilage $\Leftarrow$ post.

Aryepiglottic Fold.

$\Rightarrow$ Fold of mucosa extending between the apex of arytenoids cartilage and the side of epiglottis.

encloses the Aryepiglottic muscle + Cuneiform and Corniculate cartilage.

Vestibular Folds = False vocal cords

vestibular ligament + mucosa.

Thickening of the quadrangular membrane, between the thyroid cartilage and arytenoids

Rima vestibuli.

Vestibule of larynx $\Rightarrow$ part of the cavity between the inlet and the vestibular folds (2 False vocal cord)

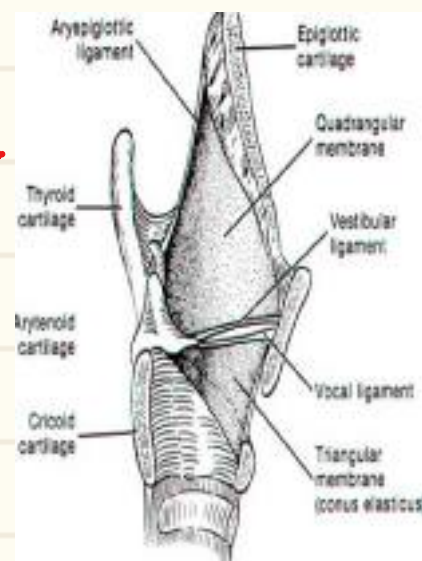
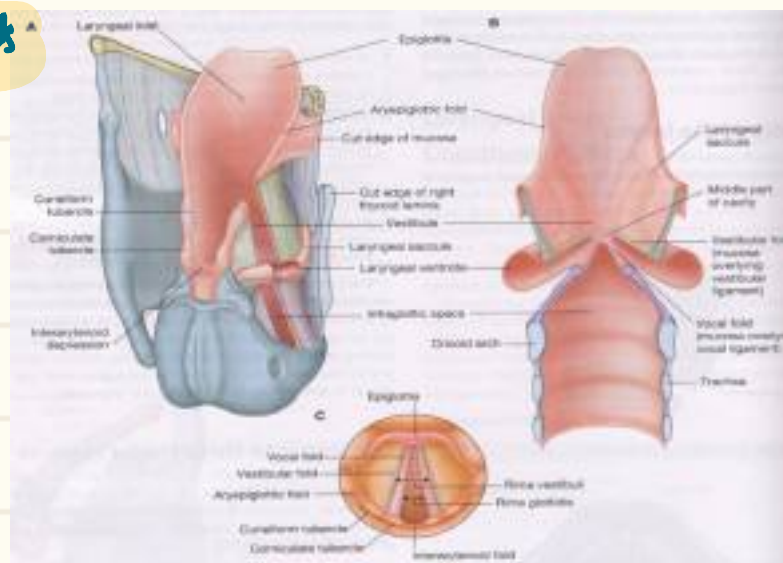
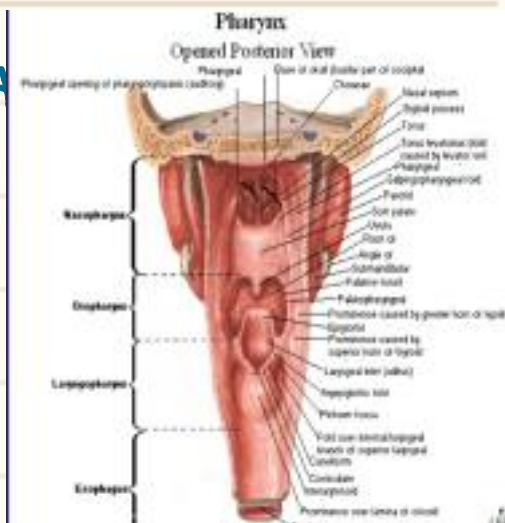
Vocal Fold = True

$\Rightarrow$ Ligamentous structure covered by m.m extending from the inner surface of thyroid cartilage to vocal process of arytenoid cartilage.

is chief agents by which voice is produced.

The fold enclose the vocal ligament (upper border of lateral cricothyroid ligaments).

Fissure between the 2 vocal cord is called $\Rightarrow$ Rima glottidis



The subglottic region $\Rightarrow$ extend from below the vocal fold till lower margin of Cricoid cartilage. $\Rightarrow$ Trachea. (2 + layers of cells)

Between Rima glottidis (larynx is below it)

Muscles of the larynx.

Extrinsic + Intrinsic.

① Extrinsic muscle. the only muscles that have only one attachment or origin in the larynx.

Elevators + Depressors. they Function support the position and movement of the larynx and in deglutition البلع

move up $\Rightarrow$ during swallowing + Downward after swallowing.
the hyoid bone move with larynx.

+ Elevators = Digastric, Stylohyoid, Mylohyoid, Geniohyoid
Stylopharyngeus, Salpingopharyngeus, Palatopharyngeus.

هذه هي muscles تضعه في العضلات أثناء البلع.

Depressors $\Rightarrow$ Sternohyoid, Sternothyroid, Omohyoid.

(2) Intrinsic muscle.

① muscles controlling the movements of vocal cords.

① Tenses $\Rightarrow$ Critic - Thyroid $\Rightarrow$ vocal cord, neck

② Relaxors =, Thyro- Arytenoid =, Relax to vocal cord

(3) Abductors (Open) = posterior cricoarythenoid vocal cord ۱۱ جفت

(4) Adductors (close) =, lateral cricoarytenoid, Transverse arytenoids

② muscles controlling the laryngeal inlet.

A- Narrowers $\Rightarrow$ Oblique Arytenoids

R. Wideners $\Rightarrow$ Thyr-Epilyotlic

Cricothyroid muscle.

Origin $\Rightarrow$ outer aspect of arch of cricoid cart.

Insertion $\Rightarrow$ inf. horn and lower border of thyroid cartilage

nerve supply $\Rightarrow$ external laryngeal nerve.

Action $\Rightarrow$ Elongation + tension of vocal cords.

The only muscle of intrinsic muscle supply By External laryngeal nerve + Only muscle seen on outside of larynx.

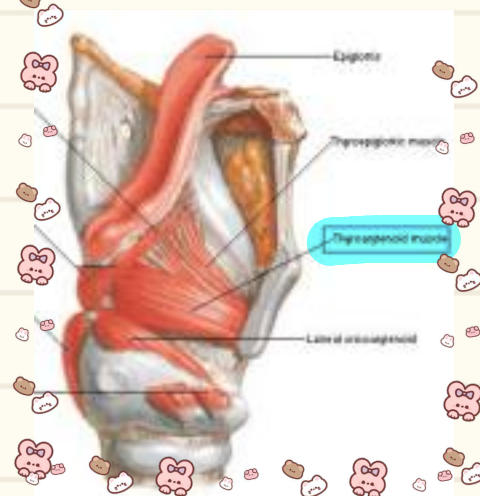
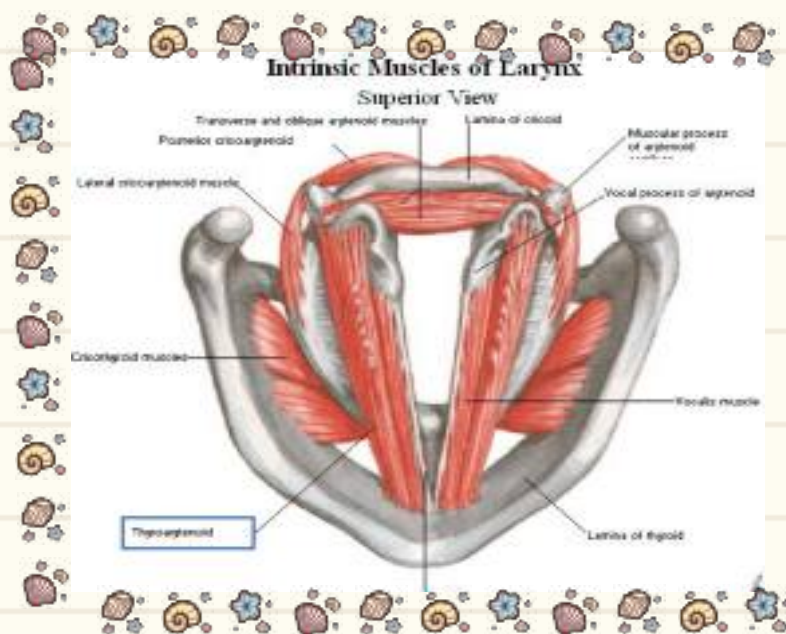
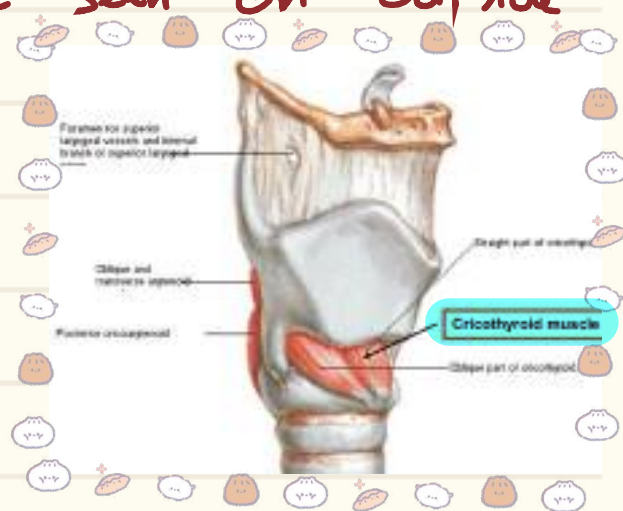
② Thyroarytenoid m.

Origin $\Rightarrow$ inner surface of thyroid cart.

Insertion $\Rightarrow$ anterolateral surface of arytenoid cart.

N.S $\Rightarrow$ Recurrent laryngeal n.

Action $\Rightarrow$ Shortening and relaxation of vocal fold.



Nerve supply of the larynx.

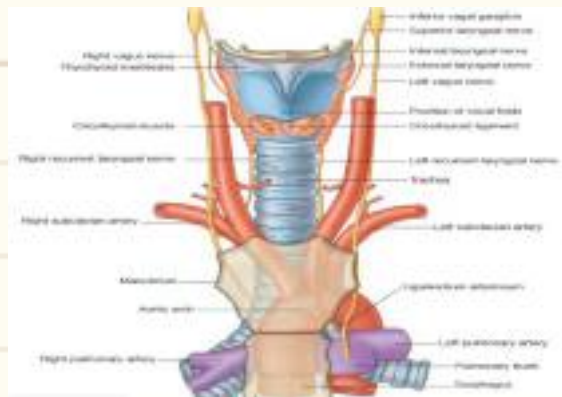
① Superior laryngeal nerve $\Leftarrow$ From vagus.

External $\Rightarrow$ (motor) $\Rightarrow$ اذا انقطع صوت
Supply cricothyroid m. $\Rightarrow$ صقرييك
صوتيه.

Internal $\Rightarrow$ (sensory) $\Rightarrow$ supply mucous membrane
Above the level of vocal fold.

② Recurrent laryngeal n. $\Rightarrow$ From vagus.

motor sensory.



motor $\Rightarrow$ All intrinsic mus. Except $\Rightarrow$ cricothyroid muscle.

Sensory $\Rightarrow$ mucous membrane Below the level of vocal folds.

Blood sup. to larynx.

— Superior laryngeal A. $\Rightarrow$ From sup. thyroid A. $\rightarrow$ From External Carotid A.

— Inferior laryngeal A. $\Rightarrow$ Inf thyroid A. $\rightarrow$ From thyrocervical trunk

$\rightarrow$ From 1st part of subclavian A.

Lymphatic drainage.

① supra-glottic larynx $\rightarrow$ infra hyoid nodes
 $\Rightarrow$ upper deep Cervical Nodes.

② Infra-glottic larynx $\rightarrow$ pre laryngeal
 $\Rightarrow$ lower Deep Cervical Nodes.

① Injury of External Lary. nerve. $\Rightarrow$ paralysis of cricothyroid muscle $\Rightarrow$ affect the voice (weakness) with no effect on air pathway. $\Rightarrow$ loss of high pitched voice.

② Injury of recurrent lary. n.

Unilateral complete section $\Rightarrow$ affected vocal cord will be between adduction + abduction $\Rightarrow$ other cord will compensate and crosses to the other side

$\Rightarrow$ hoarseness of voice early $\Rightarrow$ late voice may improve

Bilateral $\Rightarrow$ Both vocal cords will be in between $\Rightarrow$ voice will be lost (Aphonia) and respiration is affected may lead to stridor.



Fourth chapter is Done

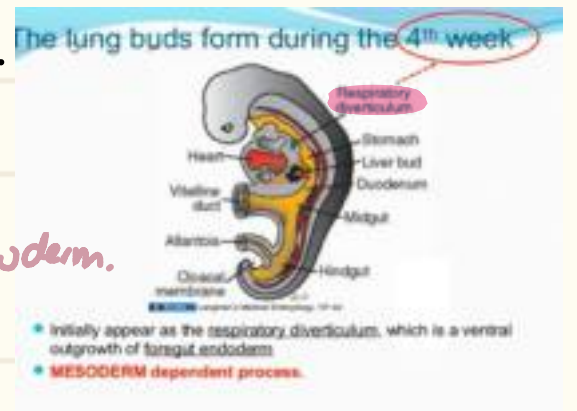


Respiratory Embryology.

AT 4 week. $\Rightarrow$ Respiratory diverticulum

$\hookrightarrow$ in Ventral aspect of Foregut endoderm.

Anterior to esophagus



Respiratory tract is derived From Foregut endoderm and associated mesoderm.

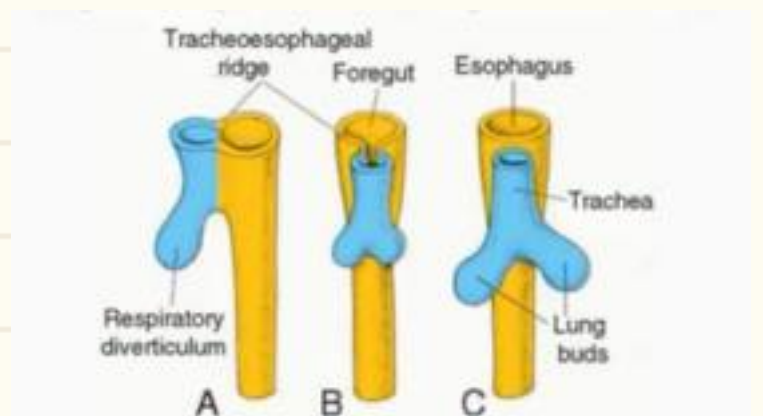
From endoderm $\Rightarrow$ epithelial lining of trachea, larynx, bronchi, alveoli.

From splanchnic mesoderm $\Rightarrow$ Cartilage + muscle + connective tissue of tract and visceral pleura.

$\Rightarrow$ Foregut will split into esophagus + trachea.

$\Rightarrow$ Tracheoesophageal ridge $\Rightarrow$ part $\Rightarrow$ esophagus

+ Abdominal syst. , Ant $\Rightarrow$ Trachea + Lung Buds.



Complete split

جاء رزق

$\rightarrow$ Divides into $\Rightarrow$ Dorsal portion $\Rightarrow$ primordium of oropharynx and esophagus + Ventral portion $\Rightarrow$ trachea + bronchi + lungs.

Proximal part of respiratory diverticulum remain tubular $\rightarrow$ Form larynx + trachea

Distal part $\Rightarrow$ Divide into Rt + Lt $\Rightarrow$ Lung Bud $\Rightarrow$ 2 primary bronchi $\Rightarrow$

2nd bronchi $\rightarrow$ 3rd bronchi

2 primary bronchial buds grow laterally into the pericardio-peritoneal canal.

Primordium of pleural cavity $\Rightarrow$ pleural cavity

cavity $\Rightarrow$ pleural cavity.

① main bronchus

Bronchial Bud divide and give $\Rightarrow$ bronchial tree.

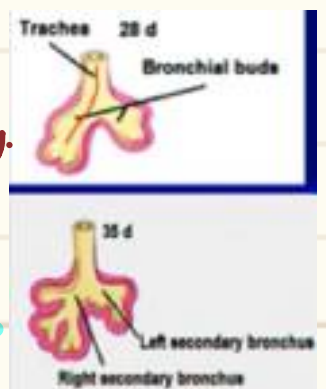
2nd bronchus. $\Rightarrow$ 2nd $\rightarrow$ 4th + 3rd in Rt.

Rt main bronchus is larger + more $\Rightarrow$ في اليمين أكبر

3rd bronchus. $\Rightarrow$ segmental.

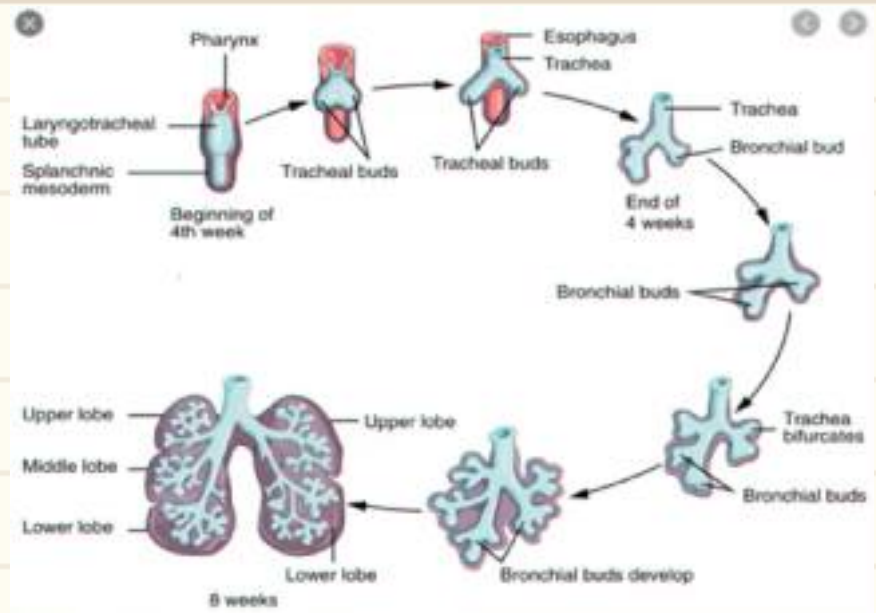
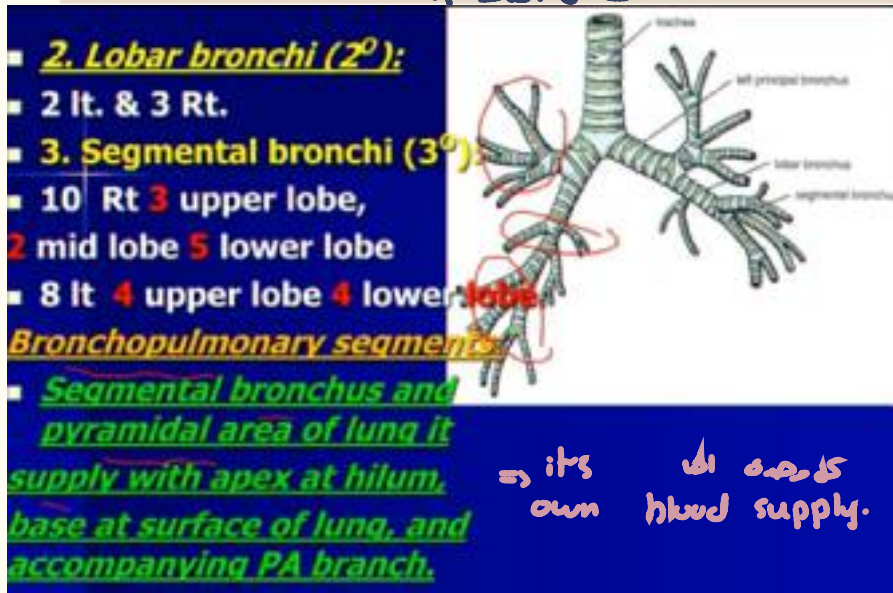
oriented to vertical than Lt one.

Segmental bronchi $\Rightarrow$ (3rd) 10 in Rt lung + 8 or 10 in Lt lung.



Begin to Form in 7th week

Each broncho-pulmonary segment surrounded with mass of mesenchyme



By 24 weeks $\Rightarrow$ 17 order of 3° bronchus has formed. and respiratory bronchioles have developed.

+ 7 $\Rightarrow$ developed AFTER birth. $\Rightarrow$ 24 branch of 3° bronchus

At lung developed $\Rightarrow$ visceral pleura $\Rightarrow$ From splanchnic mesenchyme.

parietal pleura $\Rightarrow$ From somatic mesoderm.

Maturation of the lungs. $\Rightarrow$ 4 periods.

① Pseudoglandular (5-17 week).

② Canalicular (16-25 weeks).

③ Terminal sac (24 - birth).

④ Alveolar (Late Fetal period - childhood).

$\Rightarrow$ overlap each other because Cranial segments of the lungs mature faster than Caudal ones.

17 weeks $\Rightarrow$ تمام اليه الى جنودا في

- 25 week $\Rightarrow$ will dead.

At 17 weeks all major elements of the lung have formed Except alveoli $\Rightarrow$ respns to gas exchange.

Respiration is not possible $\Rightarrow$ Fetuses born during this period are unable to survive.

Lung tissue become highly vascular + laminar of bronchi + terminal bronchioles become larger.

At 24 week each terminal bronchiole given rise to 2 or more respiratory bronchioles

Some thin walled terminal $\leftarrow$ Divided to 3-6 tubular passage $\Rightarrow$ Alveolar ducts.

Sac (primordial alveoli) $\Rightarrow$ develop at end of Respiratory bronchioles $\Rightarrow$ gas-exchange. $\leftarrow$ جدران

Some of fetus born in this stage may be survive if given to intensive care unit But is usually die due to immaturity of Respiratory or other system.

Stage 3: $\Rightarrow$ 24 weeks - birth

many more terminal sacs develop. + epithelium become very thin + capillaries begin to bulge into developing alveoli.

Blood air barrier: $\Rightarrow$ epithelial cells of the alveoli and the endothelial cells of the capillaries come in intimate contact and establish the BAB.

Adequate gas exchange can occur which allows the prematurely born fetus to survive

By end of 24 week, terminal sac are lined by ① squamous type I pneumocytes and rounded secretory type II pneumocytes that secrete a mixture of phospholipids called surfactant. $\Rightarrow$ surfactant

Collapses $\Rightarrow$ resistance $\Rightarrow$ tension in alveoli

Surfactant :- production begins by 20 weeks and $\uparrow$ during the terminal stages of pregnancy.

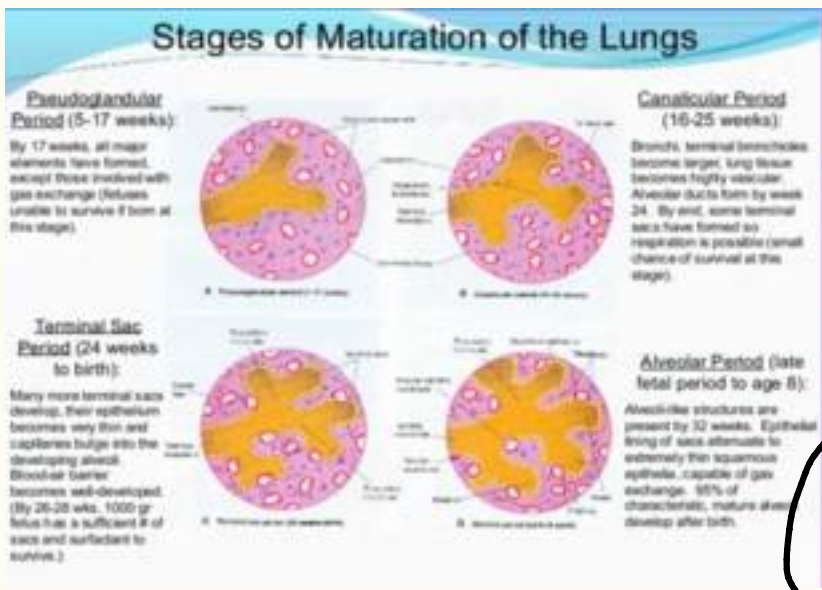
sufficient terminal sac, pulmonary vasculature and surfactant are present to permit survival of a prematurely born infants.

Fetuses born prematurely at 24-26 weeks may suffer from respiratory distress due to surfactant deficiency But may survive if given intensive care

Stage 4: $\Rightarrow$ 32 weeks - 8 years.

Respiratory bronchiole terminates in a cluster of thin-walled terminal

Sacculles. separated from one another by loose CT.
 $\hookrightarrow$ represent future alveoli, sacs.



mature alveoli don't form until after birth 95% of alveoli develop postnatally.

50 million alveoli, one 5th of the adult number are present in the lungs of a full term newborn infant At birth.

300 million at 8 year
الزفير في السنة 8

From 3-8 year or so, the number of immature alveoli continues to increase. Unlike mature alveoli, immature alveoli have the potential for forming additional primordial alveoli.

Most increase in the size of the lungs results from an increase in the number of respiratory bronchioles and primordial alveoli, rather than from an increase in the size of the alveoli.

Breathing movement.

occur before birth, are not continuous and increase as the time of delivery approaches

no gas exchange, amniotic fluid enter and leave the lung.

stimulate lung development = This helps in conditioning of respiratory mus. and essential for normal lung development.

lungs are half-filled with amniotic =, Cleared at Birth By

- ① pressure on the fetal thorax during delivery.
- ② Absorption into the pulmonary capillaries and lymphatic.

Lungs of newborn. Fresh healthy lung ⇒ contains some air & lung float in water

- Diseased lung ⇒ some fluid and may not float (may sink).

- Lungs of a stillborn infant ⇒ Firm + contain fluid and may sink in water.

↓
birth dead.

Factors important for normal lung development

- Adequate thoracic space for lung growth.
- Fetal breathing movements.
- Adequate amniotic fluid volume.

Developmental anomalies

- Laryngeal atresia.
- Tracheoesophageal fistula.
- Tracheal stenosis & atresia.
- Congenital lung cysts.
- Agenesis of lungs.
- Lung hypoplasia.
- Accessory lungs.

هذا
الرجل

Tracheoesophageal fistula. => 5 type

abnormal passage between the trachea and esophagus.

↳ Due to incomplete division of cranial part of Foregut into respiratory + esophageal parts.

Occur = 3000 - 4500 live births

most affected in male

95% of cases => Fistula is associated to esophageal atresia

the most imp. type => 86% => upper esophagus

have atresia + distal esophagus => connect to trachea.

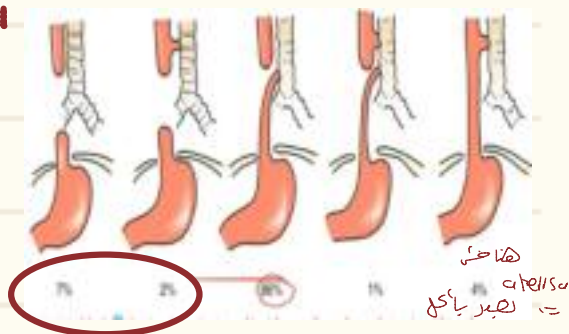


Type 1 + Type 11 => gasless abdomen => stomach is not inflated

Type 3 + 4 + 5 => air enter to stomach => Severe abdominal distension.

Type 2 => lung is not inflated

Type 1 => connection to esophagus.



Other anomalies

C, Tracheo - esophageal fistulas. => VACTER or VATER

5 other anomalies

V -> Vertebra, A -> Anal, C -> Cardiac, T -> Tracheoesophageal

E -> esophageal atresia, R -> Renal, L -> Limb

anomalies.

Cardiac => VSD + ASD + other heart defects



Differentiation of pleural me.

Lung bud $\Rightarrow$ punch into visceral mesoderm

Middle to lateral + pushing lateral $\Rightarrow$ visceral lung. الزجاج

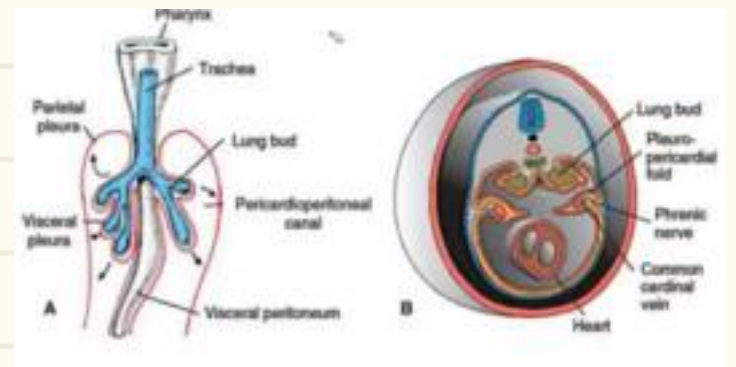
Somatic meso $\Rightarrow$ parietal
Cavity in between.

Septum transversum $\Rightarrow$ لضعه

separate abdomen + thoracic diaphragm.

Have 3 openings $\Rightarrow$ $\textcircled{T_{12}}$, $\textcircled{T_8}$, $\textcircled{T_6}$

Upper diaphragm from septum transversum.

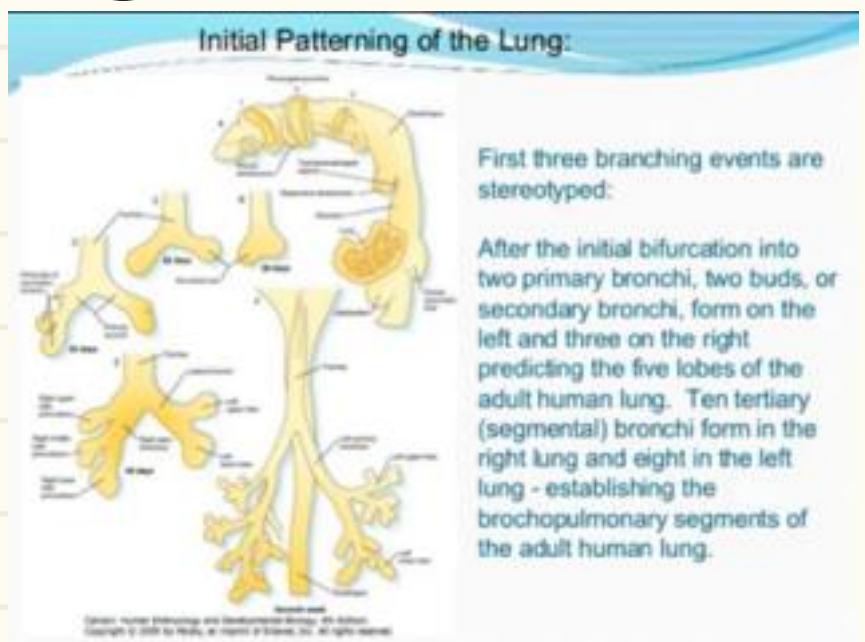


Respiratory distress syndrome = hyaline membrane disease

Affect in 2% of life newborn

$\Rightarrow$ Cause $\Rightarrow$ surfactant deficiency.

حس حركه تنفسه كذا - او surface tension ع



Clinical Correlations:

Congenital Lung Cysts:

Cysts (filled with fluid or air) are thought to be formed by the dilation of terminal bronchi, probably due to irregularities in later development. If severe, cysts are visible on radiographs. Highly variable outcomes result from different cystic conditions.

Agenesis of the Lungs:

Can occur bilaterally or unilaterally. Unilateral lung agenesis is compatible with life as remaining side hyperexpands and compensates.

Lung Hypoplasia:

Often caused by congenital diaphragmatic hernias or congenital heart disease. Characterized by reduced lung volume. Extreme hypoplasia is inconsistent with life.

خوبه

Agenesis of lung $\rightarrow$ unilateral مكنه بجي
Bilateral $\Rightarrow$ will die.

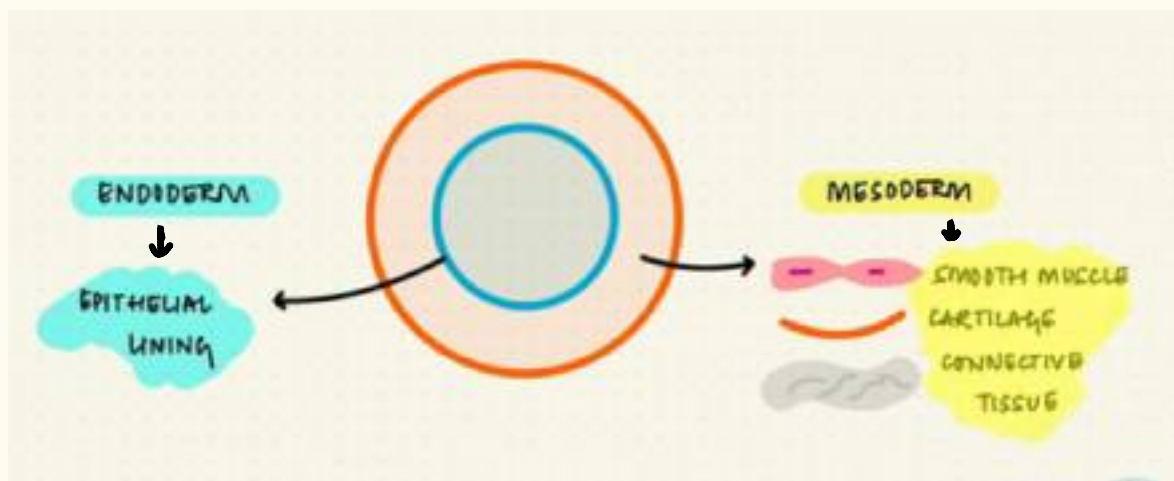
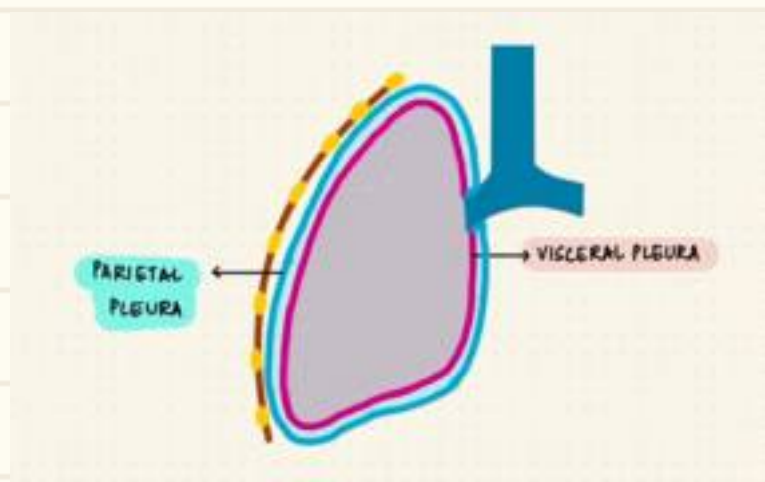
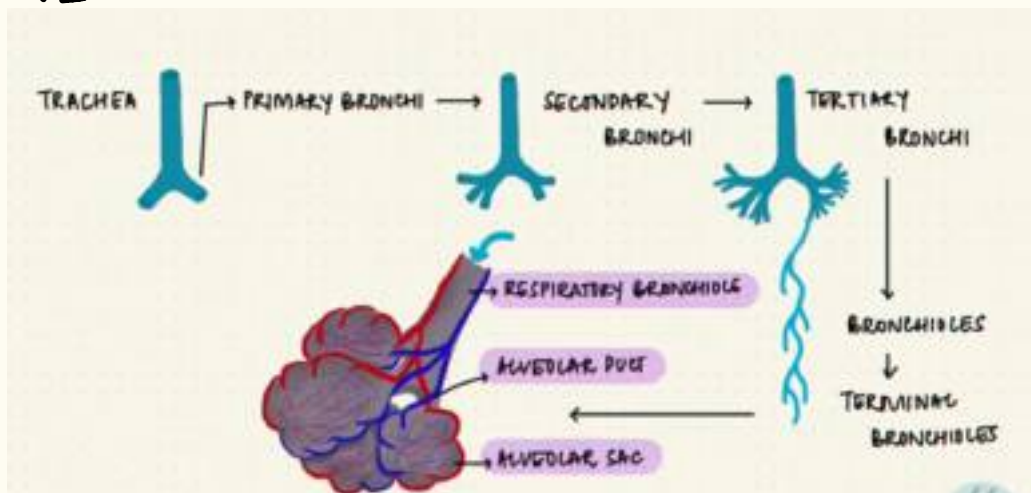
Lung hypoplasia $\Rightarrow$ of mild $\Rightarrow$ مكنه بجي
extreme hypoplasia $\Rightarrow$ inconsistent with life

Wlooooo sh.

Anatomy is Done.

Respiratory Embryology

□



Week 4:

primitive Foregut tube $\Rightarrow$ in its upper portion $\Rightarrow$

Respiratory diverticulum $\Rightarrow$ the caudal portion of it

To form $\Leftarrow$ surrounded by splanchnic mesenchyme mesoderm derivative.

$\Rightarrow$ upper portion of diverticulum $\Rightarrow$ trachea + larynx.

lower portion " " $\Rightarrow$ Lung Bud $\Rightarrow$ that can form respiratory tree.

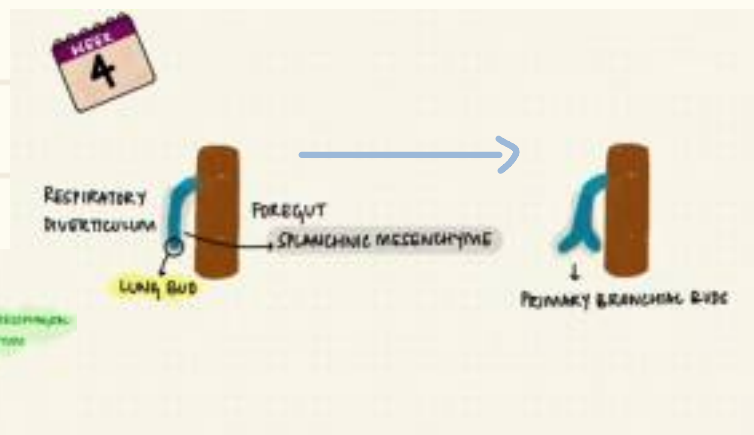
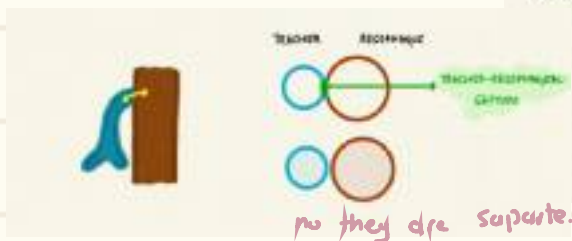
Bronchial Buds $\Rightarrow$ will form bronchia.

+ Bronchiolar bud $\Rightarrow$ will form bronchiol

Trachea + esophagus $\Rightarrow$ connected

$\hookrightarrow$ have to close.

when the septum forms the trachea and esophagus are separate.



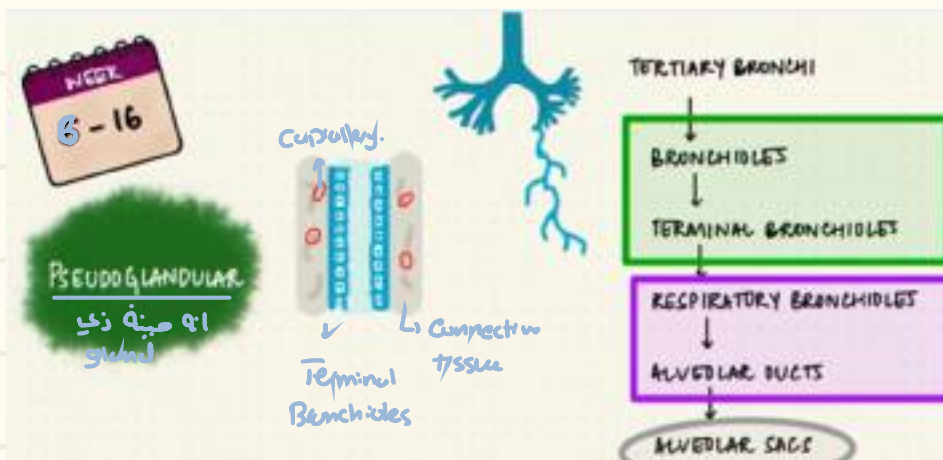
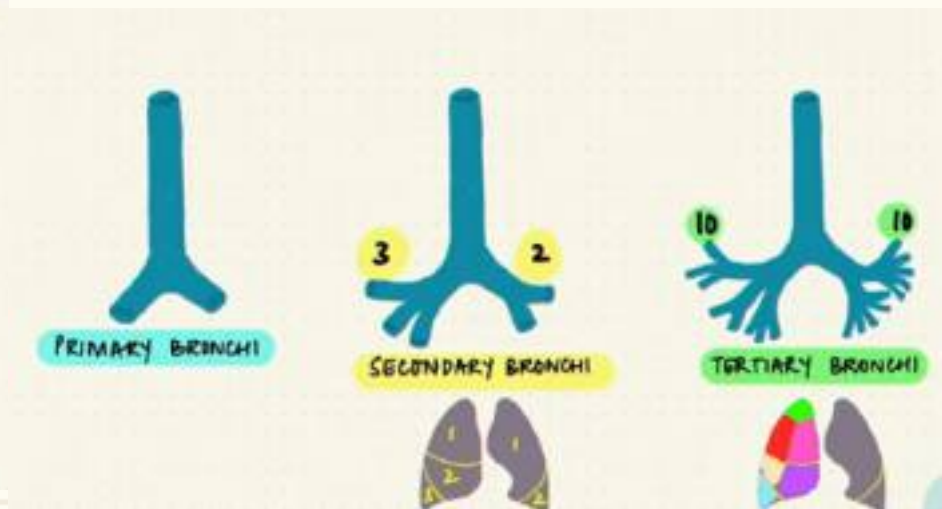
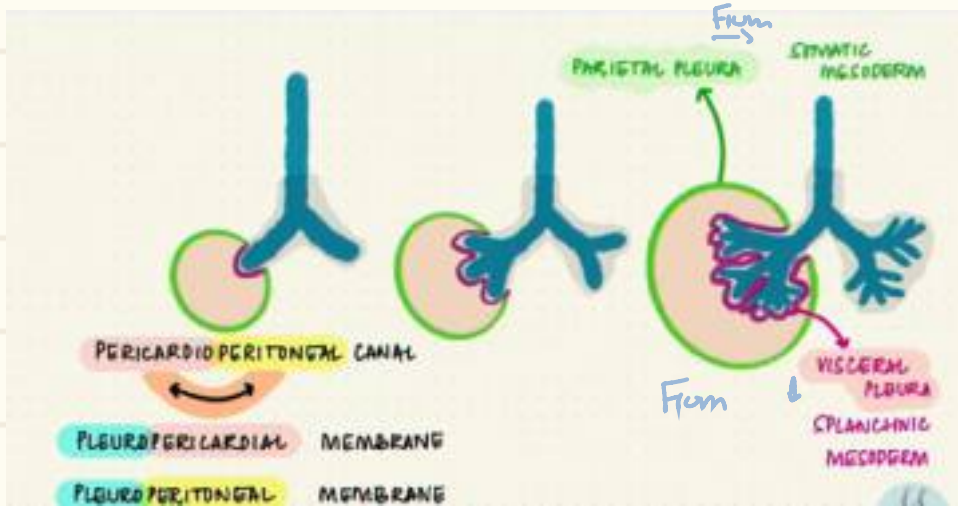
pericardioperitoneal Canal $\Rightarrow$ will form

the peritoneal cavity

These connect pericardial + peritoneal cavity as buds grow in this cavity

The Communion between these two fold have to close $\Rightarrow$ membrane.

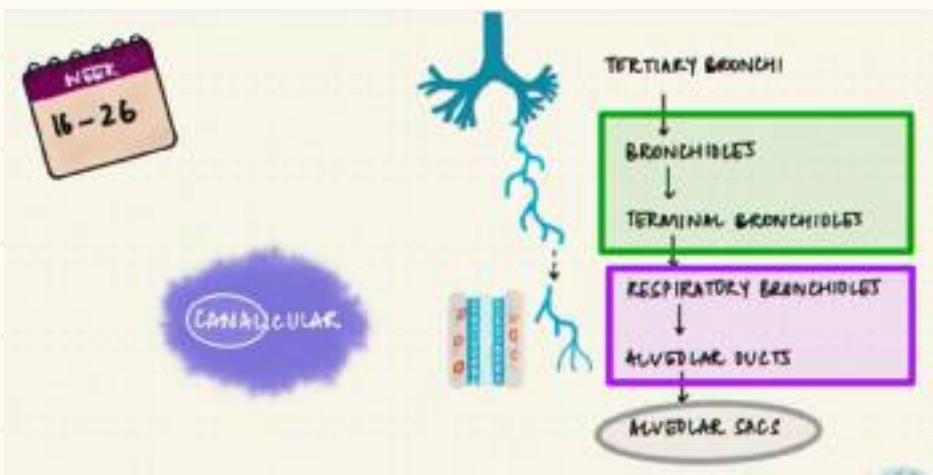
pleural pericardial membrane + pleuro peritoneal membrane $\Rightarrow$



From terminal bronchi $\Rightarrow$ Respiratory
Bronchioles $\Rightarrow$ lead to fewer
Alveolar ducts.

So new smaller canals are

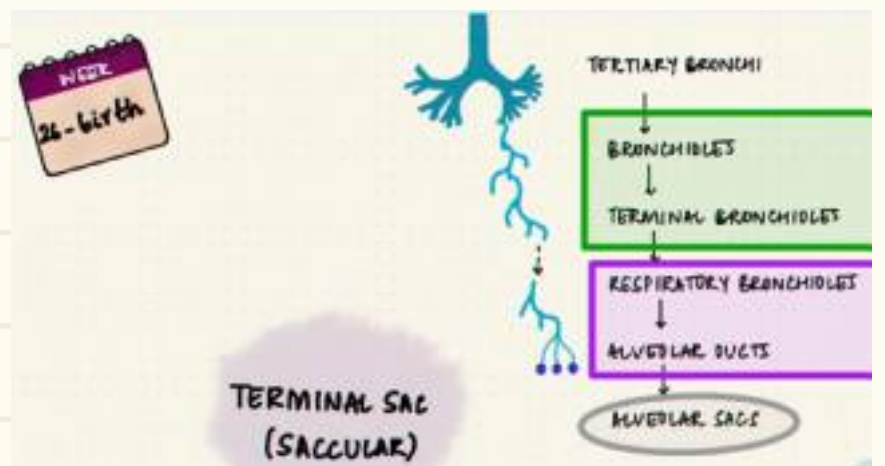
and $\uparrow$ Formed in previous stage increase $\leftarrow$ Forming



$\Rightarrow$ A. Duct $\Rightarrow$ Form

Alveolar sacs

so Terminal sac = Saccular stage



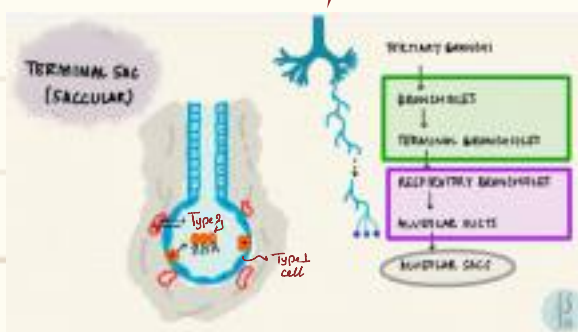
These alveoli are primitive $\Leftarrow$

$\Rightarrow$ alveolar $\Rightarrow$ imp to gas exchange.

Capillary become very close to alveolar

Type 1 cell are thin to make easy to

+ Type 2 cell

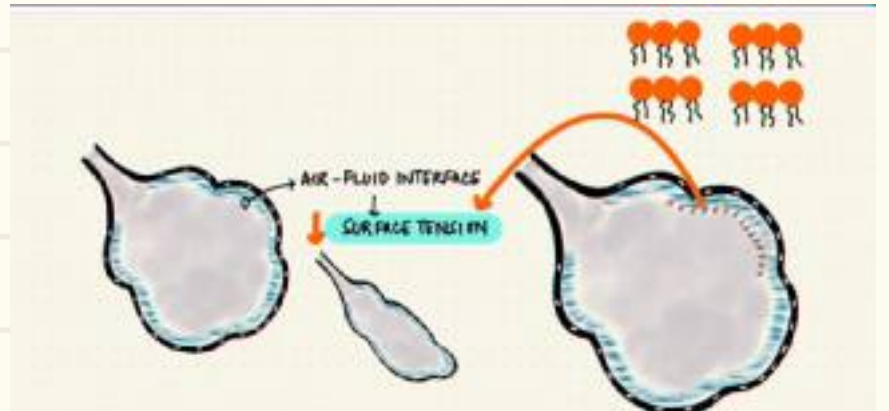


Type 2 Cell $\Rightarrow$ impo to enter alveoli

we have air fluid interface $\Rightarrow$ Func. 3- increase surface tension

Which can cause small alveoli to collapse.

$\therefore$ surface tension $\Rightarrow$ phospholipid that line inside alveoli + decrease surface tension.



$\Rightarrow$ we need millions of alveoli

$\hookrightarrow$ Alveolar Stage $\Rightarrow$ From Birth to 8- years.

where they are mature and proliferate



At Fetal life $\Rightarrow$ lung Filled with Fluid + alveoli are collapsed

+ pulmonary vascular resistance are high

$\Rightarrow$ we know heart shunts and

At Birth. $\Rightarrow$ Baby take 1st breath $\Leftarrow$ Fetal circulation in previous module

$\Rightarrow$ lung Fluid are Absorbed + Filled with air

$\Rightarrow$ pulmonary vascular resistance $\Downarrow$

$\Rightarrow$ Cardiac shunt close

+ blood Flow through the lungs

Now there Function of gastric change begin.

