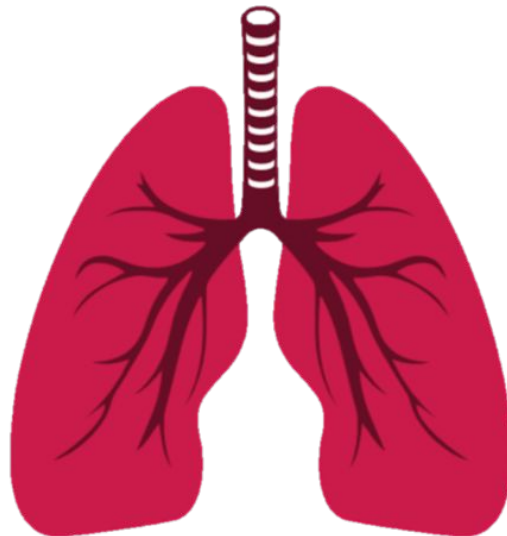




Revision

Respiratory block-Anatomy

Editing file



Done by:

Contents:

- 1) Muscles involved in respiration
- 2) Anatomy of the Nasal Cavity & Pharynx
- 3) Anatomy of the Larynx, Trachea & Bronchi
- 4) Anatomy Lung & Pleura
- 5) Embryology of Respiratory system
- 6) Mediastinum
- 7) Radiological Anatomy of chest

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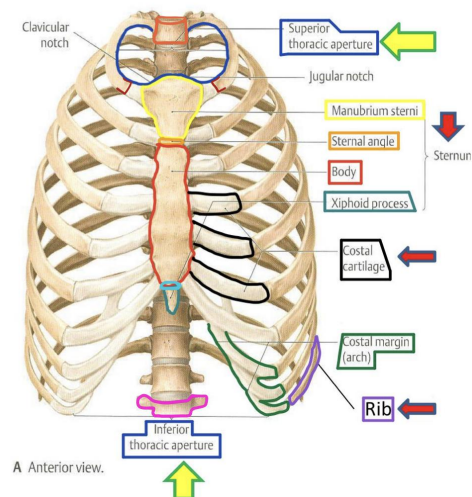


1. Muscles involved in respiration

Thoracic cage :

- formed by sternum & costal cartilages anteriorly, ribs & intercostal spaces laterally, thoracic vertebrae posteriorly.
- Has 2 apertures (openings): Superior (**thoracic outlet**) and Inferior.

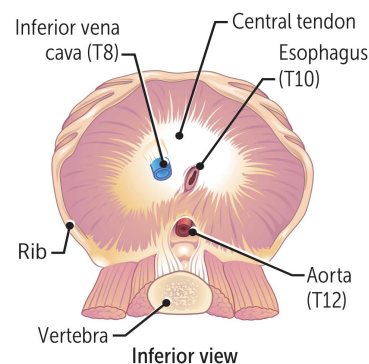
Openings boundaries	Anteriorly	Laterally	Posteriorly
Superior opening	Superior border of the manubrium	Medial borders of 1st rib	T1
Inferior opening	Xiphisternal joint	Costal margin	T12



Articulations:

Type:	Primary cartilaginous	Plane synovial
Examples:	- Sternocostal (1st) - Costochondral joints - Interchondral joints	- Sternocostal (2nd-7th) - costovertebral joints

Diaphragm structures



Respiratory movements:

1) movements of diaphragm:

- **Inspiration:** contraction of diaphragm increases the vertical diameter of thoracic cavity
- **Expiration:** relaxation of diaphragm

2) movements of ribs:

- Pump handle movement > increase in anteroposterior diameter
- Bucket handle movement > increase in transverse(lateral) diameter

Inspiratory muscles

Normal inspiration	Origin	insertion	Nerve supply
Diaphragm ★	- lower 6 ribs and their costal cartilages - xiphoid process - upper 3 lumbar vertebrae (right & left crura + arcuate ligaments)	Central tendon (lies at the level of T9)	Phrenic nerve (C3,4,5) Action: Contraction of diaphragm increase the vertical diameter of thoracic cavity
External intercostal muscle	Lower border of rib above	Upper border of rib below	Intercostal nerves Action: Rib elevators Direction of fibers: downward & medially
Forced inspiration	Origin	insertion	Action
Scalene muscles	Cervical vertebrae	1st & 2nd ribs	Elevates 1st & 2nd ribs
Pectoralis major	Sternum and costal cartilages	Humerus	Increases the anteroposterior diameter of thoracic cavity, when arm is fixed

1. Muscles involved in respiration

Expiratory muscles (act only during forced expiration)

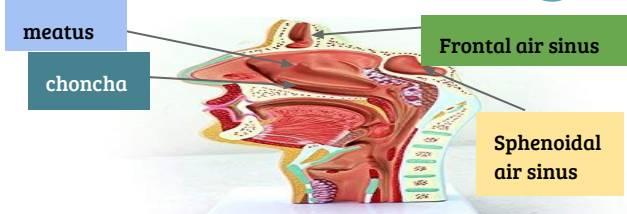
Forced expiration	Muscles	direction
Rib depressors: - supplied by ventral rami of T1-T11 - intercostal vessels and nerves (neurovascular bundle) lie in intercostal space	1- Internal intercostal 2- Innermost intercostal	Backward & laterally
	3- subcostal 4- transversus thoracis	-
Anterior abdominal wall muscles: - compression of abdominal viscera to help in ascent of diaphragm - supplied by lower 5 intercostal nerves (T7-T11), subcostal nerve(T12), and first lumbar nerve(L1)	1- External oblique	downward & medially
	2- internal oblique	Upward & medially
	3- transversus abdominis	Transverse
	4- Rectus abdominis	Vertical

2. Anatomy of the Nasal Cavity & Pharynx



Definition It's divided by the septum to :	The external (anterior) nares or nostrils, lead to the nasal cavity . It's Formed by : bone+ hyaline cartilage and Extends from the external (anterior) nares to the posterior nares (choanae).
1- Roof	Narrow & formed (from behind forward) by the: 1.Body of sphenoid. 2.Cribriform plate of ethmoid bone. 3.Frontal bone. 4-nasal bone and cartilage.
2- Floor	Separates it from the oral cavity. Formed by : the hard (bony) palate.
3- Medial wall (the septum)	Osteocartilaginous partition. Formed by: 1.Perpendicular plate of ethmoid bone. 2.Vomer. 3.Septal cartilage.
4- Lateral wall	Contains : superior, middle & inferior conchae . superior, middle & inferior meatuses and a sphenoidal recess .
Nasal mucosa	*Olfactory : It is delicate and contains olfactory nerve cells . It is present in the upper part of nasal cavity. *Respiratory : It is thick, ciliated highly vascular and contains mucous glands & goblet cells . It lines the Lower part of the nasal cavity. It functions to moisten, clean and warm the inspired air. (moistening by the glands, cleaning by the cilia and warming it by the venous plexus) The Vestibule is lined by Skin.

2. Anatomy of the Nasal Cavity & Pharynx



<p>Paranasal Sinuses</p> <p>(fun fact : horses have paranasal sinuses as well!!)</p>	<p>Air filled cavities located in the bones around the nasal cavity: Ethmoid, Sphenoid, Frontal bones & Maxillae.</p> <p style="text-align: right;">Lined by respiratory mucosa.</p>
<p>Paranasal Sinuses function</p>	<ol style="list-style-type: none"> 1- Lighten the skull. 2- Act as resonance chambers for speech. 3- Air conditioning: The respiratory mucosal lining helps in warming, cleaning and moistening the incoming air.
<p>Paranasal sinus drainage :</p>	
<p>Sphenoethmoidal recess</p>	<p>sphenoidal sinus.</p>
<p>Superior meatus</p>	<p>posterior ethmoidal sinus.</p>
<p>Middle meatus</p>	<p>middle ethmoidal ,anterior ethmoidal, Maxillary & frontal sinuses.</p>
<p>Inferior meatus</p>	<p>nasolacrimal duct.</p>

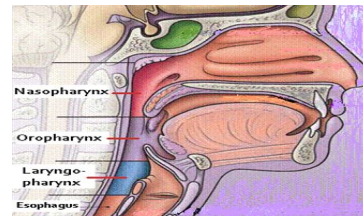
<p>DEFINITION</p>	<p>It is a Muscular tube Extending from the base of the skull to level of the 6th cervical vertebra, where it is continuous with the esophagus</p>
<p>The anterior wall is deficient and shows (from above downward)</p>	

Muscles

<p>Circular (Constrictor) Muscles</p>	<ul style="list-style-type: none"> • Superior constrictor. • Middle constrictor. • Inferior constrictor. <p>The three muscles overlap each other.</p>	<p>*Propel the bolus of food down into the esophagus.</p> <p>*lower fibers of the inferior constrictor (Cricopharyngeus) act as a sphincter, preventing the entry of air into the esophagus between the acts of swallowing.</p>
<p>Longitudinal Muscles</p>	<ul style="list-style-type: none"> • Stylopharyngeus. • Salpingopharyngeus. • Palatopharyngeus. 	<p>Elevate the larynx & pharynx during swallowing.</p>

2. Anatomy of the Nasal Cavity & Pharynx

Pharynx is divided into three parts



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<p>1- Nasopharynx</p>	<p>*Extends from the base of skull to the soft palate.</p> <p>*communicates with the nasal cavity through posterior nasal apertures</p>	<p>*Pharyngeal tonsils (Adenoids) present in the submucosa covering the Roof.</p> <p>*Lateral wall shows:</p> <ol style="list-style-type: none"> 1) Opening of auditory tube. 2) Tubal elevation (produced by posterior margin of the auditory tube). 3) Tubal tonsil. 4) Pharyngeal recess. 5) Salpingopharyngeal fold (raised by salpingopharyngeus muscle).
<p>2- Oropharynx</p>	<p>*Extends from soft palate to upper border of epiglottis.</p> <p>*communicates with the oral cavity through the oropharyngeal isthmus</p>	<p>Lateral wall shows:</p> <ol style="list-style-type: none"> 1) Palatopharyngeal fold. 2) Palatoglossal fold 3) Palatine tonsil located between them in a depression called the tonsillar fossa
<p>3- Laryngopharynx</p>	<p>*Extends from upper border of epiglottis to lower border of cricoid cartilage.</p> <p>*Lies behind the laryngeal inlet & the posterior surface of larynx.</p> <p>*communicates with the larynx through the laryngeal inlet</p> <p>*A small depression situated on either side of the laryngeal inlet is called 'Piriform Fossa'.</p> <p>Branches of internal laryngeal & recurrent laryngeal nerves lie deep to the mucous membrane of the fossa and are vulnerable to injury during removal of a foreign body</p>	

3. Larynx, Trachea & Bronchi

Larynx: is the part of the respiratory tract which contains the vocal cords. **starts** from laryngopharynx and **End** in trachea.

has function in:

- **Respiration** (breathing) ➤ **Phonation** (voice production) ➤ **Deglutition** (swallowing)

Relations of the Larynx : its related to major critical structures in the neck

Arteries	Veins	Nerves
<p>3 Carotid arteries: (common, external and internal).</p> <p>3 Thyroid arteries: (superior & inferior thyroid arteries thyroidemia artery).</p>	<p>2 Jugular veins (external & internal)</p>	<p>Laryngeal nerves:(Superior laryngeal & recurrent laryngeal).</p>
		<p>Vagus nerves.</p>

3. Larynx, Trachea & Bronchi

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Larynx components

<p>Cartilaginous skeleton</p>	<p>The Cartilaginous Skeleton is made up of 9 cartilages:</p> <p>3 single: 1. Epiglottis 2. Thyroid 3. Cricoid</p> <p>3 pairs 1. Arytenoid 2. Coniculate 3. Cuneiform</p>	<p>All the cartilages are hyaline EXCEPT the Epiglottis, its elastic.</p> <p>The cartilages are: Connected by joints, & ligaments. Lined by membranes. Moved by muscles.</p>		
<p>Membranes and Ligaments</p>	<ul style="list-style-type: none"> ● Thyrohyoid membrane → it has 2 thickenings: median thyrohyoid ligament and 2 x lateral thyrohyoid ligaments ● Cricotracheal Membrane ● Cricothyroid Membrane (<i>Conus Elasticus</i>) <ul style="list-style-type: none"> → Its lower margin is attached to the upper border of cricoid cartilage. → Its upper margin form the vocal ligament which forms the vocal fold or true vocal fold. 	<ul style="list-style-type: none"> ● Quadrangular (aryepiglottic) Membrane → Its lower margin form the vestibular ligament which forms the vestibular fold or false vocal fold. ● In between the epiglottis and the hyoid bone Hyoepiglottic ligament ● In between the epiglottis and the thyroid Thyroepiglottic ligament 		
<p>Mucosal Lining</p>	<ul style="list-style-type: none"> ● The laryngeal cavity is lined by: ciliated columnar epithelium EXCEPT the surface of the vocal cords its lined by: Non-keratinized stratified squamous epithelium 	<p>The ventricle part has an upward vagination called saccul that contains goblet cells (mucous glands) to lubricate the vocal cords.</p>		
<p>Muscles</p>	<p style="text-align: center;">Extrinsic muscles</p>		<p style="text-align: center;">Intrinsic muscles:</p>	
	<p>Elevators of the Larynx</p>	<ul style="list-style-type: none"> ● Suprahyoid(MSGD): Mylohyoid, Stylohyoid, Geniohyoid and Digastric ● Longitudinal muscles of the pharynx (SSP) 	<p>Muscles controlling the laryngeal inlet</p>	<p>Oblique Arytenoid muscle Aryepiglottic muscle</p>
<p>Depressors of the Larynx</p>	<ul style="list-style-type: none"> ● Infracyoid : Infracyoid, Sternothyroid, Omothyoid 	<p>Muscles controlling Movement of the vocal cord</p>	<ul style="list-style-type: none"> ● Decrease Vocal cord length and tension (<i>Vocalis</i>): Thyroarytenoid muscle ● Increase vocal cord length and tension: Cricothyroid muscle (<i>Only one can found outside the larynx</i>) ● Adductors: <ul style="list-style-type: none"> 1) Lateral Cricoaarytenoid 2) Transverse Arytenoid ● Abductors: Posterior Cricoaarytenoid 	

3. Larynx, Trachea & Bronchi

Trachea : Mobile, fibrocartilage tube.

- **Begins:** Below the cricoid cartilage (at C6) **Ends:** Thorax (behind sternal angle) lower border of T4 dividing into: **right** and **left** primary(main) bronchi.
- its wall supported by **16-20 horseshoe cartilage** anteriorly.
- The ridge at the bifurcation from inside is called **carina**
 → It is the most sensitive part of the respiratory tract → Its associated with the cough reflex

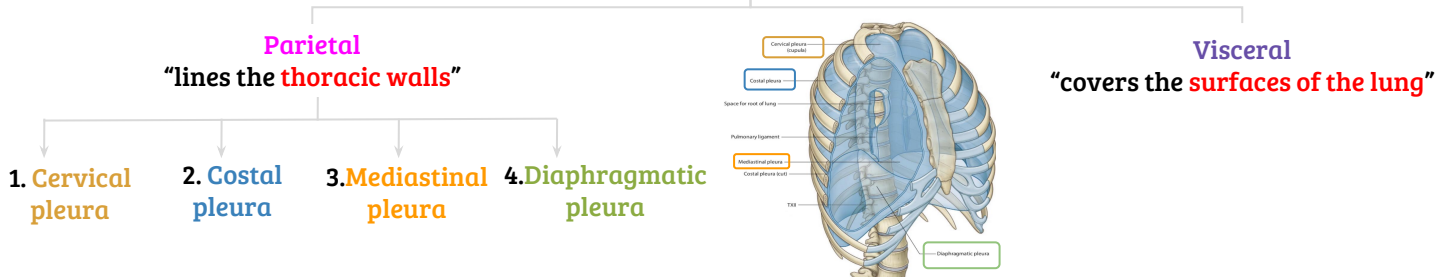
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Relations in the trachea			
Anterior	Posterior	Right	Left
-Sternum - Thymus -Left brachiocephalic vein -Arch of the aorta, origin of: brachiocephalic artery left common carotid artery	-Esophagus -Left recurrent laryngeal nerve	-Azygos vein -Right vagus nerve	-Left vagus nerve -Left phrenic nerve -Left pleura -Arch of the aorta -left common carotid artery -left subclavian artery

Bronchi	
Right Bronchus: <ul style="list-style-type: none"> • One inch long., wide,short,more vertical bronchus • Gives superior lobar <u>before</u> entering the hilum and gives the inferior and middle lobar after. 	Left Bronchus : <ul style="list-style-type: none"> • Two inches long., narrow,long, more horizontal bronchus • Gives superior and inferior lobar <u>after</u> entering the hilum. (no middle lobar) • Passes below the aortic arch and in front of the esophagus.
Divisions : Primary bronchus → Secondary bronchus (Lobar) → Tertiary bronchus (segmental) → Bronchiole → Terminal bronchiole → Respiratory bronchiole → Alveolar duct → Alveoli	

4. Anatomy of lung & pleura

1. Pleura layers



2. Surface anatomy (pleura):

Apex:	Lies <u>one inch</u> above the medial 1/3 of the Clavicle .
Anterior margin:	Right pleura: extends vertically from Sternoclavicular joint to xiphisternal joint (6th costal cartilage) .
	Left pleura: extends from Sternoclavicular joint to the 4th costal cartilage , then <u>deviates laterally</u> and extends to <u>lateral margin</u> of the sternum to form cardiac notch then turns sharply <u>downward</u> to xiphisternal joint (6th costal cartilage) .
Inferior margin:	Passes around the chest wall, on the 8th rib in midclavicular line , 10th rib in mid-axillary line and finally reaching to 12th rib adjacent to vertebral column posteriorly (T12).
Posterior margin:	Along the vertebral column from the apex (C7) to the inferior margin (T12).

3. Surface anatomy (Lung):

Apex, anterior border:	Correspond nearly to the lines of Pleura but are slightly away from the median plane .
Oblique fissure:	Represented by a line extending from 3rd or 4th thoracic spine , obliquely ending at 6th costal cartilage .
Transverse fissure: (Only in the right lung)	Represented by a line extending from 4th right costal cartilage to meet the oblique fissure .
Inferior margin	passes around the chest wall, on the 6th rib in midclavicular line , 8th rib in mid-axillary line and finally reaching to 10th rib adjacent to vertebral column posteriorly. -as pleura but more horizontally and finally reaching to the (T10).
Posterior margin:	Along the vertebral column from the apex (C7) to the inferior margin (T10)

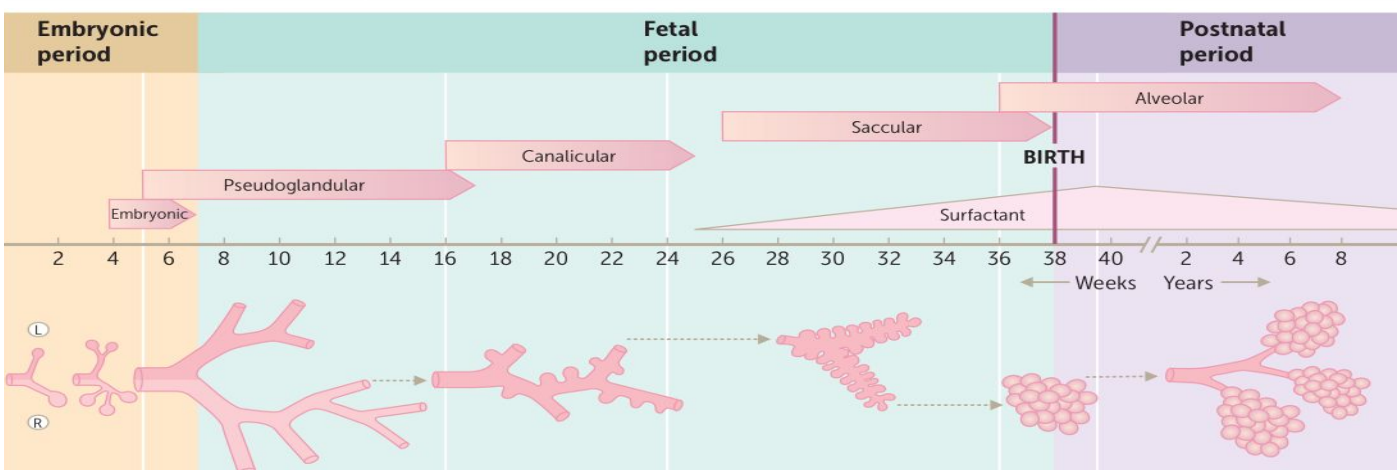
4.	Roots	Differences	Mediastinum surface
Right Lung	- Bronchi: 2 bronchi "posterior"	1. Divided by 2 fissures.	<ul style="list-style-type: none"> • Vagus nerve posterior to the root of the lung. • Phrenic nerve anterior to the root of the lung. • Cardiac impression: related to right atrium. • Azygos vein & its arch posterior & over the root of the lung. ★ Esophagus posterior to the root. ★ Below hilum and in front of pulmonary ligament : groove for I.V.C.
	- Pulmonary artery: "Superior"	2. Larger & shorter than left lung.	
	- 2 Pulmonary veins: "Are inferior & anterior " *the Left lung is the same*	3. Has 3 lobes .	
Left Lung	- Bronchi: One bronchi "posterior"	1. Divided by one oblique fissure.	<ul style="list-style-type: none"> • Vagus nerve posterior to the root of the lung & over the root. • Phrenic nerve anterior to the root of the lung. • Cardiac impression: related to left ventricle. ★ Descending aorta & its arch posterior & over the root of the lung. ★ Groove for left common carotid and left subclavian arteries.
	//	2. It has a cardiac notch at lower part of its anterior border.	
		3. Has 2 lobes .	

5. Embryology of respiratory system

Lung development

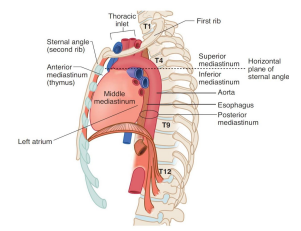
Occurs in five stages. Initial development includes development of lung bud from distal end of respiratory diverticulum during week 4.

Stage	Important terms	Notes
Embryonic (weeks 4–7)	Lung bud → trachea → bronchial buds → mainstem bronchi → secondary (lobar) bronchi → tertiary (segmental) bronchi.	Errors at this stage can lead to tracheoesophageal fistula.
Pseudoglandular (weeks 5–17)	Endodermal tubules → terminal bronchioles. Surrounded by modest capillary network.	Respiration impossible, incompatible with life. (weeks 5–17)
Canalicular (weeks 16–25)	Terminal bronchioles → respiratory bronchioles → alveolar ducts. Surrounded by prominent capillary network.	By 24 weeks each terminal bronchiole has given rise to two or more respiratory bronchioles.
Saccular (week 26–birth)	Alveolar ducts → terminal sacs. Terminal sacs. Pneumocytes develop.	Surfactant production begins by 20 weeks.
Alveolar (week 36–8 years)	Terminal sacs → adult alveoli. In utero, “breathing” occurs via aspiration and expulsion of amniotic fluid → ↑vascular resistance through gestation. At birth, fluid gets replaced with air → ↓in pulmonary vascular resistance.	At birth: 20–70 million alveoli. By 8 years: 300–400 million alveoli.



Tracheoesophageal Fistula	An abnormal passage between the trachea and esophagus.
Esophageal Atresia	esophagus ends in a blind-ended pouch “close end” rather than connecting normally to the stomach.

6. Mediastinum



- It is a **thick moveable** partition between right & left pleural sacs & lungs.
- It includes all structures lie in the intermediate compartments of the thoracic cavity

Boundaries :

Superior: Thoracic outlet **Inferior:** Diaphragm
Anterior: Sternum **Posterior:**Thoracic vertebrae **Lateral:** Lungs & pleurae

Divisions :

by a horizontal plane **from sternal angle to lower border of T4** into:

It is the Level of:
 Sternal angle
 Second costal cartilage
Why the Level of T4 is important:
 Bifurcation of trachea
 Bifurcation of pulmonary trunk
 Beginning & termination of arch of aorta

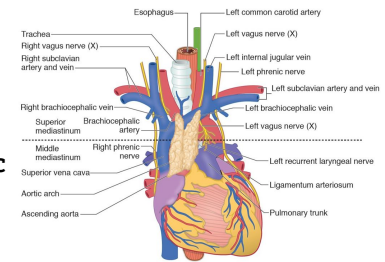
Superior Mediastinum

Boundaries

Superior: Thoracic outlet
Inferior: Horizontal plane
Anterior: Manubrium of sternum
Posterior: T1-T4
Lateral: lungs & pleurae

Contents :From superficial to deep:

- (1) Gland :**Thymus gland
- (3) Veins:** right & left brachiocephalic - superior vena cava
- (4) Arteries:** arch of aorta & its branches- brachiocephalic artery-left common carotid - left subclavian
- (4) Nerves:** right & left vagus -right & left phrenic
- (2) Tubes:** Trachea-Esophagus (most posterior)
- (1) Duct:** thoracic duct
- Lymph nodes**



Inferior mediastinum

Anterior Mediastinum

Boundaries:

Superior: Horizontal plane
Inferior: Diaphragm
Anterior: Body & xiphoid of sternum
Posterior: Heart
Lateral: Lungs & pleurae

Contents:

Thymus gland
 Lymph nodes

NOTE: There are **6** structures present in more than one region in mediastinum
3 in superior and posterior :
 Thoracic duct ,Esophagus , vagus nerves
2 in superior and middle:
 phrenic nerves ,superior vena cava
1 in superior and anterior: Thymus gland

Middle Mediastinum

Site: Between anterior & posterior mediastinum

Contents:

- Heart & pericardium**
- Ascending Aorta**
- Pulmonary trunk**
- Superior & inferior vena cava**
- Right & left pulmonary veins**
- Right & left phrenic nerves**
- Lymph nodes**

Posterior Mediastinum

Boundaries:

Superior: Horizontal plane
Inferior: Diaphragm
Anterior: Heart
Posterior: vertebrae from T5 to T12
Lateral: Lungs & pleurae

Contents:

- Esophagus** (most anterior)
- Right & left Vagus nerves:** around esophagus
- Thoracic duct:** posterior to esophagus
- Azygos vein:** posterior & to the right of esophagus
- Descending aorta:** posterior & to the left of esophagus
- Right & left sympathetic trunks**
- Lymph nodes**

Aorta

Ascending aorta:
Beginning: at aortic orifice of left ventricle.
End: continues as arch of aorta (at level of T4)
Arch of aorta: continues as descending thoracic aorta (at level of T4)
Descending aorta: continues as abdominal aorta through diaphragm

Vagus

10th cranial nerve.
The right vagus: → to the right of trachea→forms the **posterior** esophageal plexus → continues in abdomen as **posterior** gastric nerve
The left vagus →between left common carotid & left subclavian arteries→ forms the **anterior** esophageal plexus → continues in abdomen as **anterior** gastric nerve.

Phrenic

-Root value: C3,4,5
-Motor & sensory fibers to diaphragm
-Sensory fibers to pleurae & pericardium
The right phrenic descends on the right side of SVC & heart.
The left phrenic descends on the left side of heart.
 Both nerves terminate in the diaphragm.

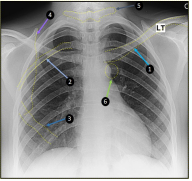
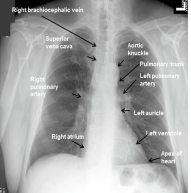
Lymph vessels & Thoracic duct

Beginning: continuation of **Cysterna chyli** at the level of L1
Course: It passes through the aortic opening of diaphragm.
 →ascends in the posterior mediastinum (posterior to esophagus)→ascends in the superior mediastinum (left to esophagus).
End: in the **left brachiocephalic vein.**
 •Lymph from the lower half of the body → **Cysterna chyli** → **Thoracic duct.**
 Lymph from the upper left side of the body → **Thoracic duct**
 •Lymph from the upper right side of the body → the **Right lymphatic duct** → **right brachiocephalic vein**

7. Radiological anatomy of the chest

<p style="text-align: center;">Posteroanterior (PA)</p> <p>The x-rays enter through the posterior aspect of the chest, and exit out of the anterior aspect where they are detected by an x-ray film. Gives a good assessment of the Cardiac Size by avoiding the magnification of the heart. It is identified by the presence of the fundal gas bubble and the absence of the scapulae in the lung fields.</p>	<p style="text-align: center;">Anteroposterior (AP)</p> <p>The x-rays enter through the anterior aspect and exit through the posterior aspect of the chest.</p>
<p style="text-align: center;">Lateral: Indicated only for further interpretation</p>	<p style="text-align: center;">Decubitus: lying at the side</p>
<p>A chest x-ray may be used to diagnose, plan treatment and follow up for various conditions, including:</p> <ul style="list-style-type: none"> •Fractures of the chest bones. •Lung disorders •Heart disorders •Screen for job-related lung diseases in industries. •Sometime its Requested as pre-employment demand. 	

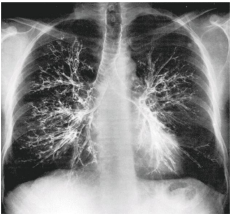
For Posteroanterior radiograph, the following systems must be examined in order:

<p>1- Superficial soft tissues</p> <ul style="list-style-type: none"> -The nipples in both sexes -The breast in female are seen superimposed on the lung fields <p>2- Bones of thoracic cage</p> <ul style="list-style-type: none"> -Clavicle -Posterior rib -Anterior rib -Medial border of scapula: -Thoracic vertebrae: -Costotransverse joints  <p>3- Diaphragm</p> <p>The diaphragm appears as a dome-shaped shadow on each side.</p> <ul style="list-style-type: none"> -The right side is slightly higher than the left. -Beneath the right dome is the homogeneous, dense shadow of the liver. -Beneath the left dome a gas bubble mostly seen in the fundus of the stomach. -the costophrenic angle, where the diaphragm meets the thoracic wall.. -the cardiophrenic angle where the diaphragm meet the heart. 	<p>4- Trachea</p> <p>is seen in the midline of the neck as a dark area, superimposed by the lower cervical and upper thoracic vertebrae.</p> <p>5- Lungs</p> <p>-Lung roots: relatively dense shadows caused by the presence of: Blood-filled pulmonary and bronchial vessels Large bronchi. Lymph nodes.</p> <p>-Notice that the lower margin of left hilum lies at the level of the upper margin of right hilum.</p> <p>-The lung fields, by translucent.</p> <p>-The pulmonary blood vessels are seen as a series of small, rounded, white shadows radiating from the lung root.</p> <p>-The large bronchi, are seen as similar round shadows.</p> <p>The smaller bronchi are not seen.</p>	<p>6- Mediastinum</p> <p>-The right border of mediastinum; consists of: (1) Right brachiocephalic vein (2) Superior vena cava (3) Right atrium (4) Inferior vena cava (sometimes)</p> <p>-The left border of mediastinum consists of: (1) Aortic knuckle(2) Pulmonary trunk (3) Left auricle (4) Left ventricle and apex of heart.</p> <p>-The inferior border: (lower border of the heart) blends with the diaphragm and liver shadow.</p> <p>-Normally the transverse diameter of the heart should not exceed half of the width of thoracic cage.</p>  <p>Right ventricle & left atrium Appear only in lateral view* Aortic knuckle, pulmonary trunk, and the thoracic vertebrae can be seen also in lateral view</p>
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Bronchography

is special study of the bronchial tree by introduction of contrast medium into a particular bronchus.

usually under fluoroscopic control. The contrast media are non irritating and sufficiently radiopaque to allow good visualization of the bronchi..



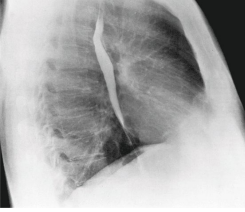
Contrast visualization of Esophagus

by swallowing a contrast media, (barium swallow).

Other barium contrast studies:

- Barium meal: stomach
- Barium follow through: small intestine
- Barium enema: large intestine

Left lateral radiograph of the chest of a normal adult man after a barium swallow.




Coronary Angiography

an X-ray with radio-opaque contrast in the coronary arteries*

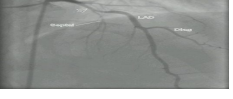
The are visualized by introduction of material into their lumen*

Pathological narrowing or blockage of coronary artery can be identified.*

Right



Left



All nerves and blood vessels supply

Nerve supply

12

Lung	Pulmonary plexus	Sympathetic fibers > sympathetic trunk	Pharynx	Sensory	Nasopharynx > maxillary Oropharynx > glossopharyngeal Laryngopharynx > vagus
		Parasympathetic fibers > vagus nerve			
Parietal pleura	Costal	Intercostal	Nasal mucosa	Motor	All muscles > pharyngeal plexus Stylopharyngeus > glossopharyngeal
	Mediastinal	Phrenic			
	Diaphragmatic	Phrenic + lower 6 intercostal			
Visceral pleura	Pulmonary plexus	Autonomic fibers		Motor	Olfactory nerve
Larynx	Motor	Intrinsic muscle > recurrent laryngeal Cricothyroid > external laryngeal	Diaphragm	Phrenic (C3-C4-C5)	
	Sensory	Above vocal cords > internal laryngeal Below vocal cords > recurrent laryngeal	External intercostal	Intercostal nerve	
Trachea	Mucosal membrane	Branch of vagus and recurrent laryngeal nerves	Rip depressors	Intercostal nerves (T1-T11)	
	Trachealis	Sympathetic trunk	Anterior abdominal	Lower 5 intercostal (T5-T11)/ subcostal(T12)/ L1 nerve	

Lymph drainage

Larynx	deep cervical lymph nodes
Trachea	Pre/para-tracheal lymph nodes
Pharynx	Directly > deep cervical lymph nodes lymph nodes Indirectly > para-tracheal or retro-pharyngeal lymph nodes
Nasal mucosa	Vestibule > sub-mandibular lymph nodes
	Rest of the cavity > upper deep cervical lymph nodes

Blood supply

Lung	(Bronchial arteries) descending Aorta, carry Oxygenated blood to: Lung / Bronchi / Tissues / Visceral	Pharynx	Ascending pharyngeal artery Ascending palatine artery
	(Pulmonary arteries) Carry non--oxygenated blood from right ventricle to lung alveoli		Maxillary artery
Larynx	Upper half: Superior laryngeal artery+branch of superior thyroid	Nasal mucosa	Facial artery
	Lower half: Inferior laryngeal artery+branch of inferior thyroid		Lingual artery
Trachea	Inferior thyroid artery+bronchial arteries	Branches of: Maxillary, facial and ophthalmic	

Venous drainage

Lung	Bronchial vein > azygos and hemiazygos
	Pulmonary vein > carry oxygenated blood from lung alveoli to left atrium
Larynx	Accompany corresponding arteries
Trachea	Inferior thyroid vein
Pharynx	Pharyngeal venous plexus > internal jugular vein
Nasal mucosa	Facial / ophthalmic / sphenopalatine

