PLEURAL CAVITIES

Two **pleural cavities**, one on either side of the mediastinum, surround the lungs (Figs. 3.29, 3.30):

- superiorly, they extend above rib I into the root of the neck;
- inferiorly, they extend to a level just above the costal margin; and
- the medial wall of each pleural cavity is the mediastinum (Fig. 3.31).

Clinical app

The arrangement of pleural cavities is clinically significant

The pleural cavities are completely separated from each other by the mediastinum. Therefore, abnormal events in one pleural cavity do not necessarily affect the other cavity. This also means that the mediastinum can be entered surgically without opening the pleural cavities.

Another important feature of the pleural cavities is that they extend above the level of rib I. The apex of each lung actually extends into the root of the neck. As a consequence, abnormal events in the root of the neck can involve the adjacent pleura and lung, and events in the adjacent pleura and lung can involve the root of the neck.

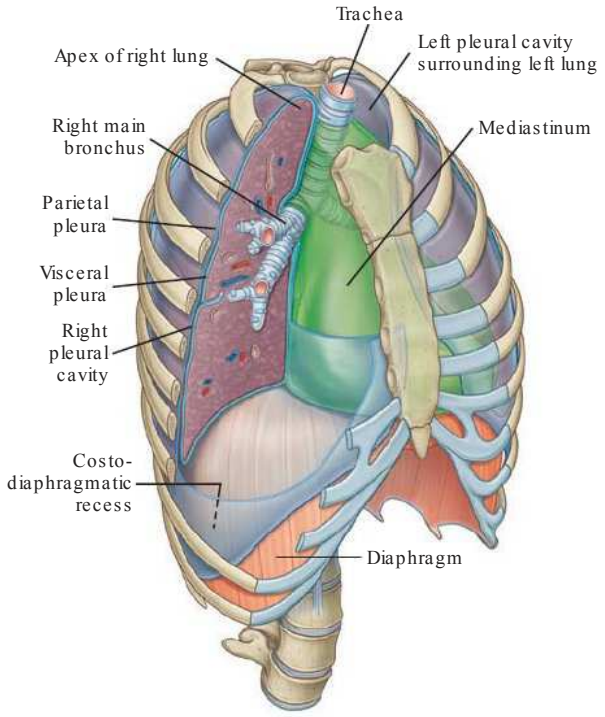

Fig. 3.29 Pleural cavities.

Pleura

Each pleural cavity is lined by a single layer of flat cells, mesothelium, and an associated layer of supporting connective tissue; together, they form the pleura.

The **pleura** is divided into two major types, based on location:

- pleura associated with the walls of a pleural cavity is **parietal pleura** (Fig. 3.30); and
- pleura that reflects from the medial wall and onto the surface of the lung is **visceral pleura** (Fig. 3.30), which adheres to and covers the lung.

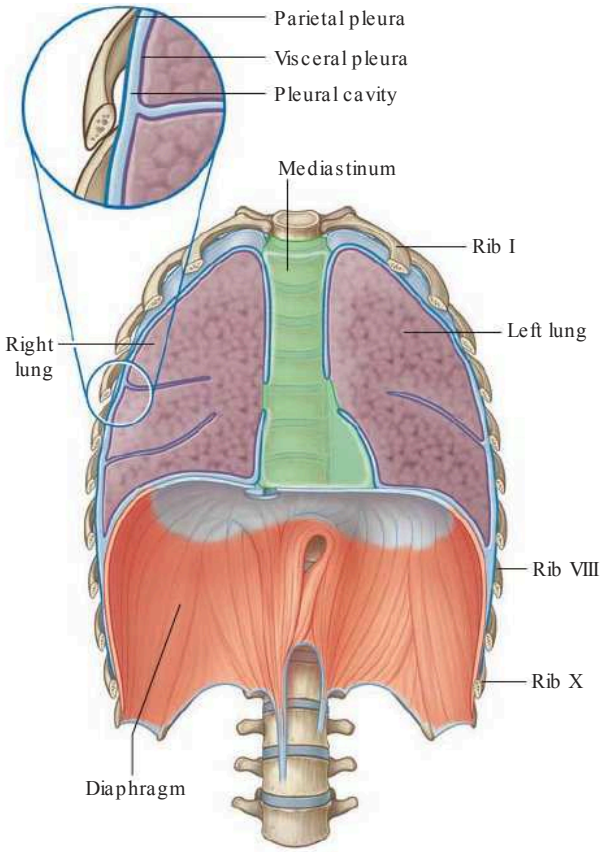

Fig. 3.30 Pleural cavities.

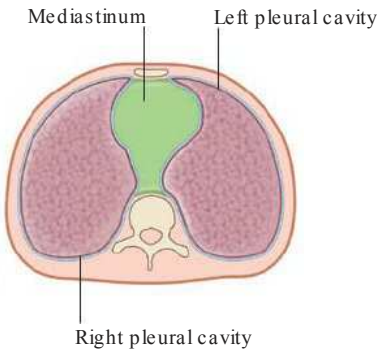

Fig. 3.31 Cross-section of the thorax showing the position of the mediastinum.

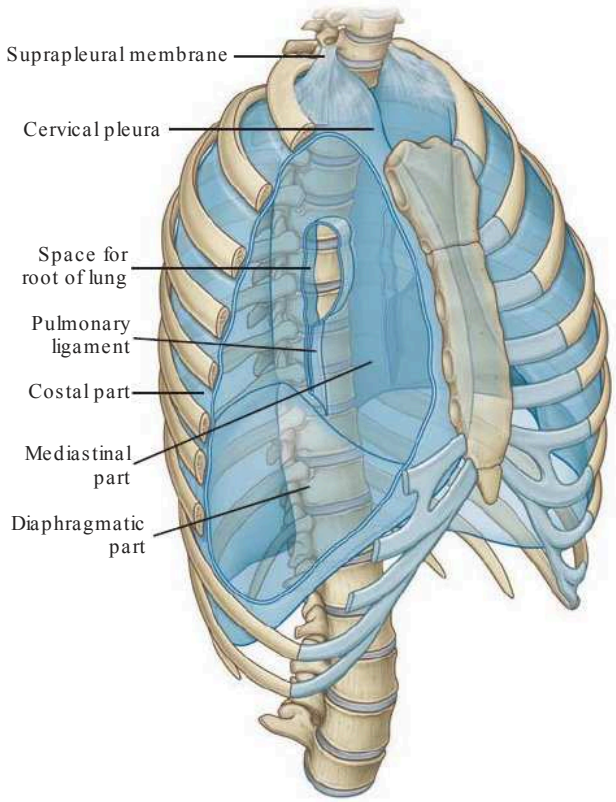

Fig. 3.32 Parietal pleura.

Each pleural cavity is the potential space enclosed between the visceral and parietal pleurae. They normally contain only a very thin layer of serous fluid. As a result, the surface of the lung, which is covered by visceral pleura, directly opposes and freely slides over the parietal pleura attached to the wall.

Parietal pleura

The names given to the parietal pleura correspond to the parts of the wall with which they are associated (Fig. 3.32):

- Pleura related to the ribs and intercostal spaces is termed the **costal part**.
- Pleura covering the diaphragm is the **diaphragmatic part**.
- Pleura covering the mediastinum is the **mediastinal part**.
- The dome-shaped layer of parietal pleura lining the cervical extension of the pleural cavity is **cervical pleura** (**dome of pleura** or **pleural cupola**).

Covering the superior surface of the cervical pleura is a distinct domelike layer of fascia, the **suprapleural membrane** (Fig. 3.32). This connective tissue membrane is attached laterally to the medial margin of the first rib and behind to the transverse process of vertebra CVII. Superiorly, the membrane receives muscle fibers from some of the deep muscles in the neck (scalene muscles) that function to keep the membrane taught. The suprapleural membrane provides apical support for the pleural cavity in the root of the neck.

In the region of vertebrae TV to TVII, the mediastinal pleura reflects off the mediastinum as a tubular, sleevelike covering for structures (i.e., airway, vessels, nerves, lymphatics) that pass between the lung and mediastinum. This sleevelike covering, and the structures it contains, forms the **root of the lung**. The root joins the medial surface of the lung at an area referred to as the **hilum of lung**. Here, the mediastinal pleura is continuous with the visceral pleura.

Clinical app

Innervation of parietal and visceral pleura

The parietal pleural is innervated by somatic afferent fibers. The costal pleura is innervated by branches from the intercostal nerves and pain would be felt in relation to the thoracic wall. The diaphragmatic pleura and the mediastinal pleura are innervated mainly by the phrenic nerves (originating at spinal cord levels C3, C4, and C5). Pain from these areas would refer to the C3, C4, and C5 dermatomes (lateral neck and the supraclavicular region of the shoulder).

The visceral pleural is innervated by visceral afferent fibers that accompany bronchial vessels and pain is generally not elicited from this tissue.

Peripheral reflections

The peripheral reflections of parietal pleura mark the extent of the pleural cavities (Fig. 3.33).

Superiorly, the pleural cavity can project as much as 3 to 4 cm above the first costal cartilage, but does not extend

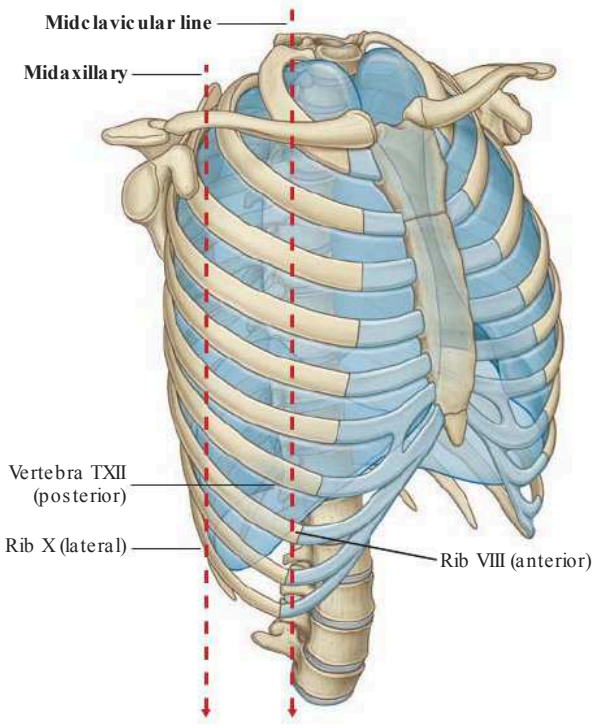

Fig. 3.33 Pleural reflections.

above the neck of rib I. This limitation is caused by the inferior slope of rib I to its articulation with the manubrium.

Anteriorly, the pleural cavities approach each other posterior to the upper part of the sternum. However, posterior to the lower part of the sternum, the parietal pleura does not come as close to the midline on the left side as it does on the right because the middle mediastinum, containing the pericardium and heart, bulges to the left.

Inferiorly, the costal pleura reflects onto the diaphragm above the costal margin. In the midclavicular line, the pleural cavity extends inferiorly to approximately rib VIII (Fig. 3.34). In the midaxillary line, it extends to rib X. From this point, the inferior margin courses somewhat horizontally, crossing ribs XI and XII to reach vertebra TXII. From the midclavicular line to the vertebral column, the inferior boundary of the pleura can be approximated by a line that runs between the rib VIII, rib X, and vertebra TXII.

Visceral pleura

The visceral pleura is continuous with the parietal pleura at the hilum of each lung where structures enter and leave the organ. The visceral pleura is firmly attached to the surface of the lung, including both opposed surfaces of the fissures that divide the lungs into lobes.

Costomediastinal recesses

Anteriorly, a **costomediastinal recess** occurs on each side where the costal pleura is opposed to the mediastinal pleura. The largest is on the left side in the region overlying the heart (Fig. 3.34).

Costodiaphragmatic recesses

The largest and clinically most important recesses are the **costodiaphragmatic recesses**, which occur in each pleural cavity between the costal pleura and diaphragmatic pleura (Fig. 3.34). The costodiaphragmatic recesses are the regions between the inferior margin of the lungs and inferior margin of the pleural cavities. They are deepest after forced expiration and shallowest after forced inspiration.

During quiet respiration, the inferior margin of the lung crosses rib VI in the midclavicular line, rib VIII in the midaxillary line, and then courses somewhat horizontally to reach the vertebral column at vertebral level TX. From the midclavicular line and around the thoracic wall to the vertebral column, the inferior margin of the lung can be approximated by a line running between rib VI, rib VIII, and vertebra TX. The inferior margin of the pleural cavity at the same points is rib VIII, rib X, and vertebra TXII. The costodiaphragmatic recess is the region between the two margins.

During expiration, the inferior margin of the lung rises and the costodiaphragmatic recess becomes larger.

Clinical app

Pleural recesses

The lungs do not completely fill the anterior or posterior inferior regions of the pleural cavities (Fig. 3.34). This results in recesses in which two layers of parietal pleura become opposed. Expansion of the lungs into these spaces usually occurs only during forced inspiration; the recesses also provide potential spaces in which fluids can collect and from which fluids can be aspirated.

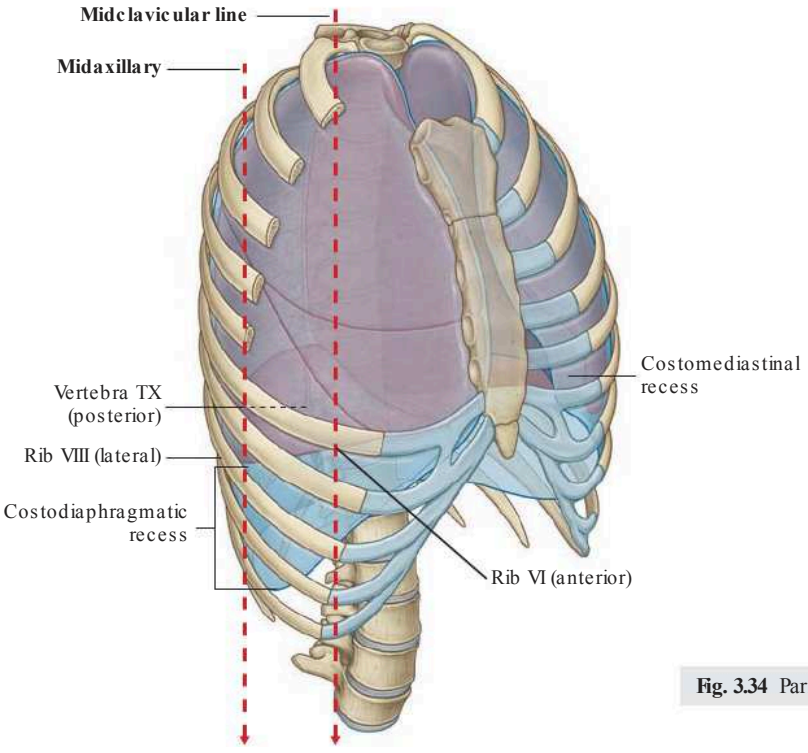

Fig. 3.34 Parietal pleural reflections and recesses.

Clinical app

Pleural effusion
A pleural effusion occurs when excess fluid accumulates within the pleural space. As the fluid accumulates within the pleural space the underlying lung is compromised and may collapse as the volume of fluid increases. Once a pleural effusion has been diagnosed, fluid often will be aspirated to determine the cause, which can include infection, malignancy, cardiac failure, hepatic disease, and pulmonary embolism.

Clinical app

Pneumothorax
A pneumothorax is a collection of gas or air within the pleural cavity. When air enters the pleural cavity the tissue elasticity of the parenchyma causes the lung to collapse within the chest impairing lung function. Occasionally, the gas within the pleural cavity may accumulate to such an extent that the mediastinum is "pushed" to the opposite side, compromising the other lung. This is termed a tension pneumothorax and requires urgent treatment.

Most pneumothoraces are spontaneous (i.e., they occur in the absence of pathology and lung disease.) Secondly, pneumothoraces may occur as a result of trauma, inflammation, smoking, and other underlying pulmonary diseases.

The symptoms of pneumothorax are often determined by the degree of air leak and the rate at which the accumulation of gas occurs and the ensuing lung collapse. They include pain, shortness of breath, and cardiorespiratory collapse if severe.

Lungs

The two lungs are organs of respiration and lie on either side of the mediastinum surrounded by the right and left pleural cavities. Air enters and leaves the lungs via the main bronchi, which are branches of the trachea.

The pulmonary arteries deliver deoxygenated blood to the lungs from the right ventricle of the heart. Oxygenated blood returns to the left atrium via the pulmonary veins.

The right lung is normally a little larger than the left lung because the middle mediastinum, containing the heart, bulges more to the left than to the right.

Each lung has a half-cone shape, with a base, apex, two surfaces, and three borders (Fig. 3.35).

- The **base** sits on the diaphragm.
- The **apex** projects above rib I and into the root of the neck.
- The two surfaces—the **costal surface** lies immediately adjacent to the ribs and intercostal spaces of the thoracic wall. The **mediastinal surface** lies against the mediastinum anteriorly and the vertebral column posteriorly and contains the comma-shaped hilum of the lung through which structures enter and leave.
- The three borders—the **inferior border** of the lung is sharp and separates the base from the costal surface. The **anterior** and **posterior borders** separate the costal surface from the medial surface. Unlike the anterior and inferior borders, which are sharp, the posterior border is smooth and rounded.

The lungs lie directly adjacent to, and are indented by, structures contained in the overlying area. The heart and major vessels form bulges in the mediastinum that indent the medial surfaces of the lung; the ribs indent the costal

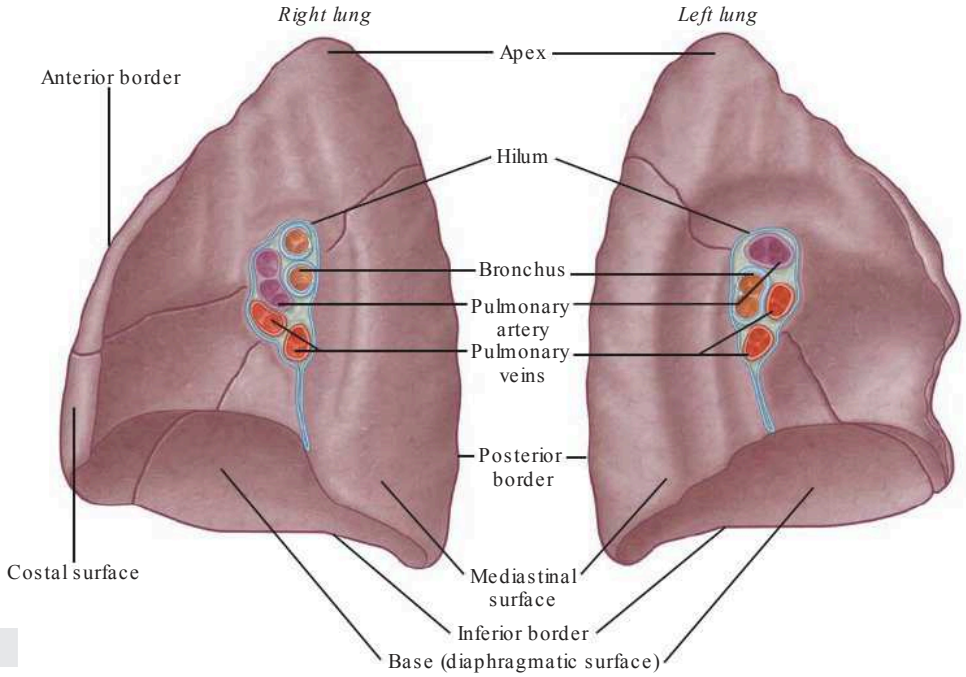

Fig. 3.35 Lungs.

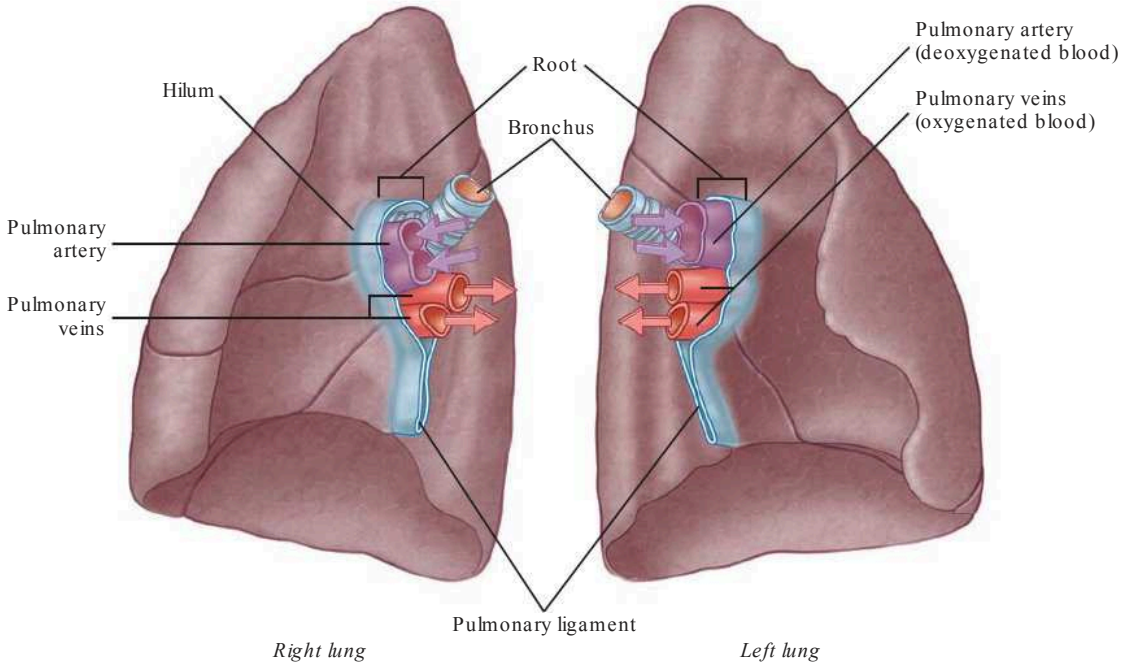

Fig. 3.36 Roots and hila of the lungs.

surfaces. Pathology, such as tumors, or abnormalities in one structure can affect the related structure.

Root and hilum

The **root** of each lung is a short tubular collection of structures that together attach the lung to structures in the mediastinum (Fig. 3.36). It is covered by a sleeve of mediastinal pleura that reflects onto the surface of the lung as visceral pleura. The region outlined by this pleural reflection on the medial surface of the lung is the **hilum**, where structures enter and leave.

A thin blade-like fold of pleura projects inferiorly from the root of the lung and extends from the hilum to the mediastinum. This structure is the **pulmonary ligament** (Fig. 3.36). It may stabilize the position of the inferior lobe and may also accommodate the down-and-up translocation of structures in the root during breathing.

In the mediastinum, the vagus nerves pass immediately posterior to the roots of the lungs, while the phrenic nerves pass immediately anterior to them.

Within each root and located in the hilum are:

- a pulmonary artery,
- two pulmonary veins,
- a main bronchus,
- bronchial vessels,
- nerves, and
- lymphatics.

Generally, the pulmonary artery is superior at the hilum, the pulmonary veins are inferior, and the bronchi are somewhat posterior in position.

On the right side, the lobar bronchus to the superior lobe branches from the main bronchus in the root, unlike on the left where it branches within the lung itself, and is superior to the pulmonary artery.

Right lung

The **right lung** has three lobes and two fissures (Fig. 3.37A). Normally, the lobes are freely movable against each other because they are separated, almost to the hilum, by invaginations of visceral pleura. These invaginations form the fissures:

- the **oblique fissure** separates the **inferior lobe (lower lobe)** from the **superior lobe (upper lobe)** and the **middle lobe of the right lung**;
- the **horizontal fissure** separates the superior lobe (upper lobe) from the middle lobe.

The horizontal fissure follows the fourth intercostal space from the sternum until it meets the oblique fissure as it crosses rib V.

The largest surface of the superior lobe is in contact with the upper part of the anterolateral wall and the apex of this lobe projects into the root of the neck. The surface of the middle lobe lies mainly adjacent to the lower anterior and lateral walls. The costal surface of the inferior lobe is in contact with the posterior and inferior walls.

The medial surface of the right lung lies adjacent to a number of important structures in the mediastinum and the root of the neck (Fig. 3.37B). These include the:

- heart,
- inferior vena cava,

- superior vena cava,
- azygos vein, and
- esophagus.

The right subclavian artery and vein arch over and are related to the superior lobe of the right lung as they pass over the dome of cervical pleura and into the axilla.

Left lung

The **left lung** is smaller than the right lung and has two lobes separated by an oblique fissure (Fig. 3.38A). The **oblique fissure** of the left lung is slightly more oblique than the corresponding fissure of the right lung.

The largest surface of the **superior lobe** is in contact with the upper part of the anterolateral wall, and the apex of this lobe projects into the root of the neck. The costal surface of the **inferior lobe** is in contact with the posterior and inferior walls.

The inferior portion of the medial surface of the left lung, unlike the right lung, is notched because of the heart's projection into the left pleural cavity from the middle mediastinum.

From the anterior border of the lower part of the superior lobe, a tonguelike extension (the **lingula of left lung**) projects over the heart bulge (Fig. 3.38A).

The medial surface of the left lung lies adjacent to a number of important structures in the mediastinum and root of the neck (Fig. 3.38B). These include the:

- heart,
- aortic arch,
- thoracic aorta, and
- esophagus.

The left subclavian artery and vein arch over and are related to the superior lobe of the left lung as they pass over the dome of the cervical pleura and into the axilla.

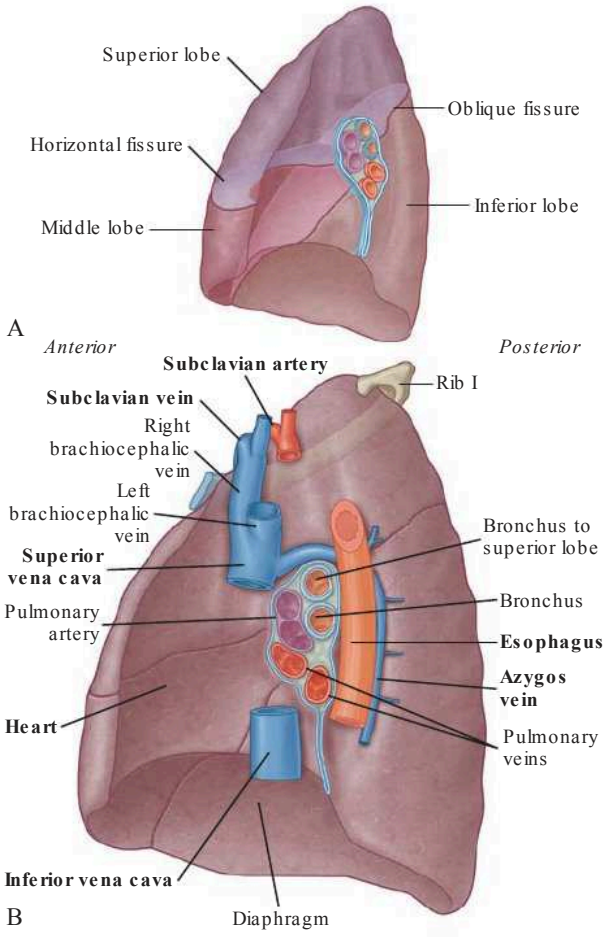

Fig. 3.37 **A.** Right lung. **B.** Major structures related to the right lung.

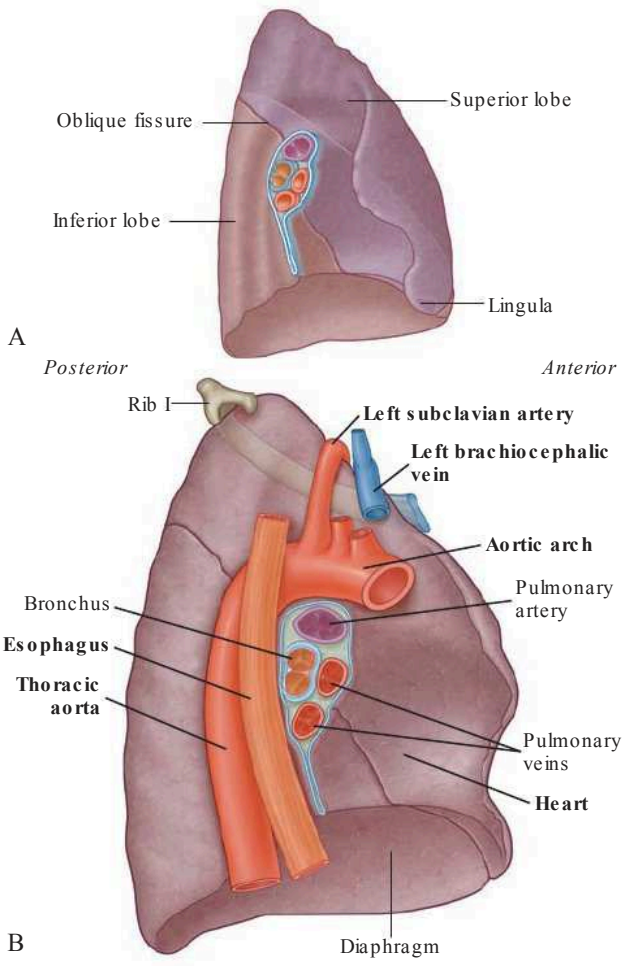

Fig. 3.38 **A.** Left lung. **B.** Major structures related to the left lung.

Surface anatomy

Visualizing the pleural cavities and lungs, pleural recesses, and lung lobes and fissures

Palpable surface landmarks can be used to visualize the normal outlines of the pleural cavities and the lungs and to determine the positions of the lobes and fissures of each lung.

Superiorly, the parietal pleura projects above the first costal cartilage. Anteriorly, the costal pleura approaches the midline posterior to the upper portion of the sternum. Posterior to the lower portion of the sternum, the left parietal pleura does not come as close to the midline as it does on the right side. This is because the heart bulges onto the left side (Fig. 3.39A).

Inferiorly, the pleura reflects onto the diaphragm above the costal margin and courses around the thoracic wall following an VIII, X, XII contour (i.e., rib VIII in the midclavicular line, rib X in the midaxillary line, and vertebra TXII posteriorly).

The lungs do not completely fill the area surrounded by the pleural cavities, particularly anteriorly and inferiorly.

- Costomediastinal recesses occur anteriorly, particularly on the left side in relationship to the heart bulge (Fig. 3.39A).
- Costodiaphragmatic recesses occur inferiorly between the lower lung margin and the lower margin of the pleural cavity (Fig. 3.39A,B).

In quiet respiration, the inferior margin of the lungs travel around the thoracic wall following a VI, VIII, X contour (i.e., rib VI in the midclavicular line, rib VIII in the midaxillary line, and vertebra TX posteriorly).

In the posterior view, the oblique fissure on both sides is located in the midline near the spine of vertebra TIV (Figs. 3.39B and 3.40A). It moves laterally in a downward direction, crossing the fourth and fifth intercostal spaces and reaches rib VI laterally.

In the anterior view, the horizontal fissure on the right side follows the contour of rib IV and its costal cartilage and the oblique fissures on both sides follow the contour of rib VI and its costal cartilage (Fig. 3.40B).

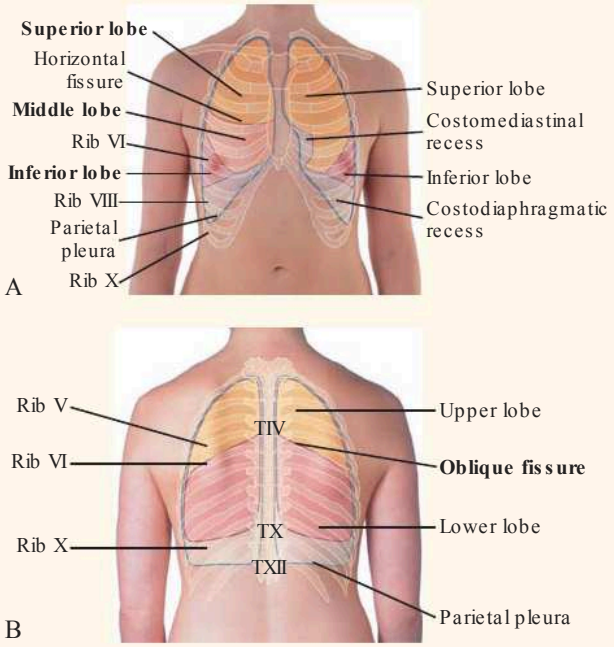

Fig. 3.39 Views of the chest wall showing the surface projections of the lobes and the fissures of the lungs. **A.** Anterior view in a woman. On the right side, the superior, middle, and inferior lobes are illustrated. On the left side, the superior and inferior lobes are illustrated. **B.** Posterior view in a woman. On both sides, the superior and inferior lobes are illustrated. The middle lobe on the right side is not visible in this view.

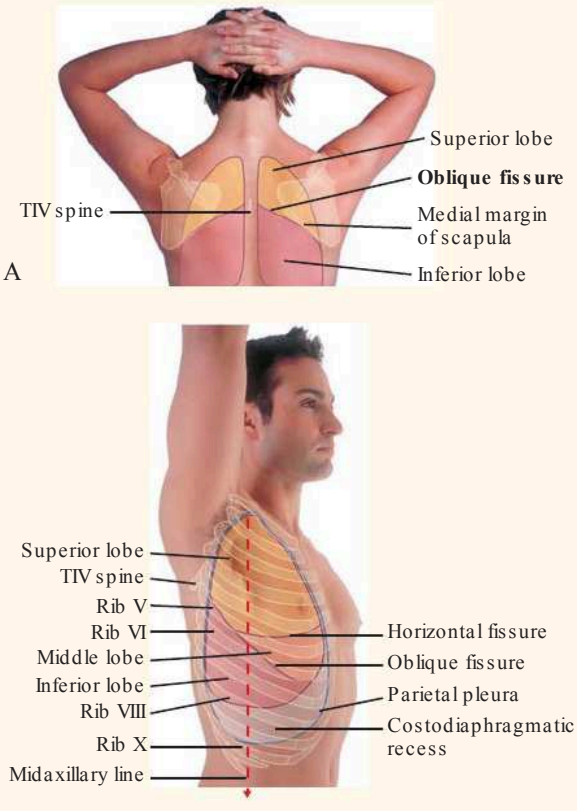

Fig. 3.40 Views of the chest wall. **A.** Posterior view in a woman with arms abducted and hands positioned behind her head. On both sides, the superior and inferior lobes of the lungs are illustrated. When the scapula is rotated into this position, the medial border of the scapula parallels the position of the oblique fissure and can be used as a guide for determining the surface projection of the superior and inferior lobes of the lungs. **B.** Lateral view in a man with his right arm abducted. The superior, middle, and inferior lobes of the right lung are illustrated. The oblique fissure begins posteriorly at the level of the spine of vertebra TIV and passes inferiorly, crossing rib IV, the fourth intercostal space, and rib V. It crosses the fifth intercostal space at the midaxillary line and continues anteriorly along the contour of rib VI. The horizontal fissure crosses rib V in the midaxillary space and continues anteriorly, crossing the fourth intercostal space and following the contour of rib IV and its costal cartilage to the sternum.

Surface anatomy

Where to listen for lung sounds

The stethoscope placements for listening for lung sounds are shown in Figure 3.41.

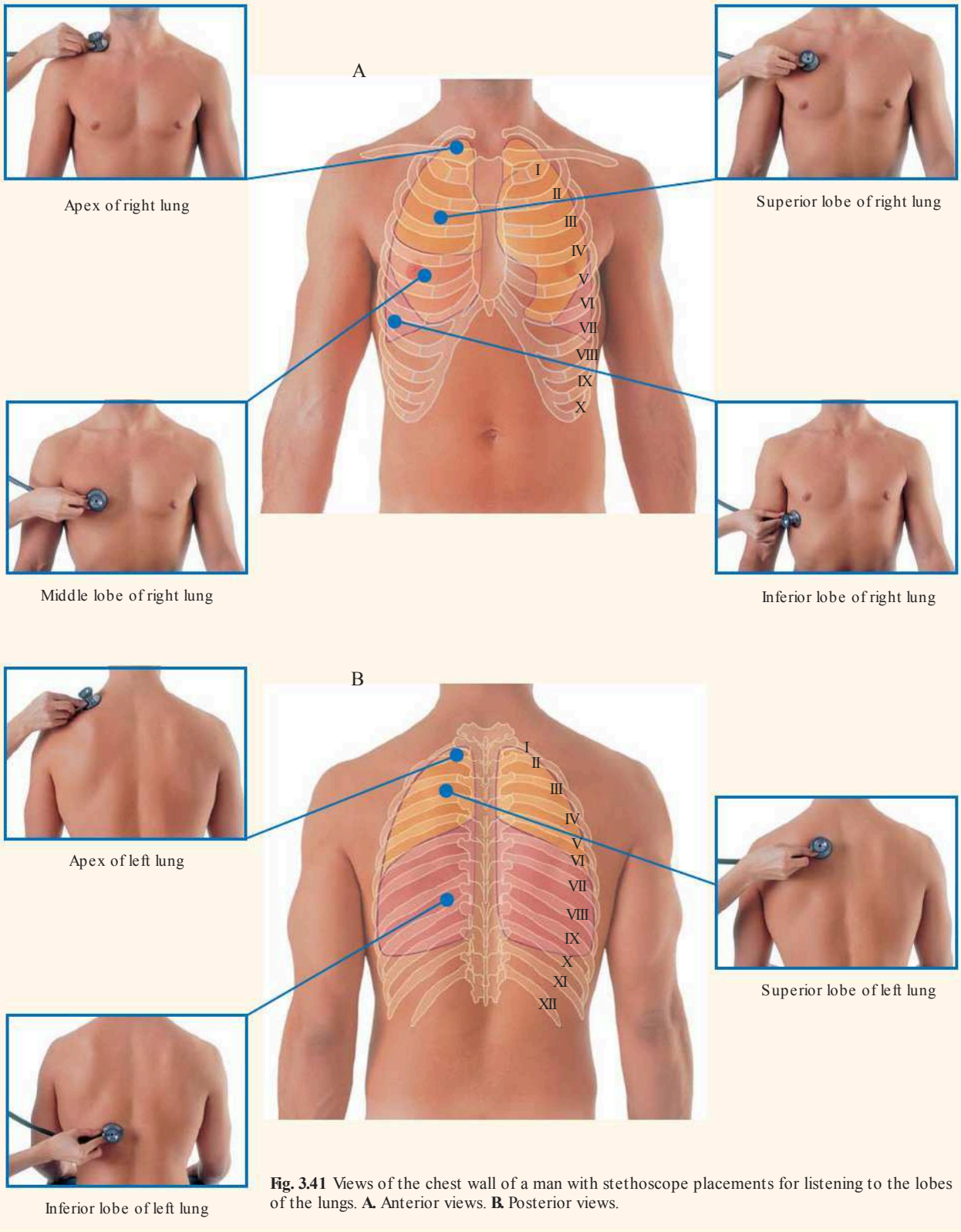

Fig. 3.41 Views of the chest wall of a man with stethoscope placements for listening to the lobes of the lungs. **A.** Anterior views. **B.** Posterior views.

Bronchial tree

The **trachea** is a flexible tube that extends from vertebral level CVI in the lower neck to vertebral level TIV/V in the mediastinum, where it bifurcates into a right and a left main bronchus (Fig. 3.42). The trachea is held open by C-shaped transverse cartilage rings embedded in its wall—the open part of the C facing posteriorly. The lowest tracheal ring has a hook-shaped structure, the carina, that projects backward in the midline between the origins of the two main bronchi. The posterior wall of the trachea is composed mainly of smooth muscle.

Each main bronchus enters the root of a lung and passes through the hilum into the lung itself.

The main bronchus divides within the lung into **lobar bronchi** (secondary bronchi), each of which supplies a lobe. On the right side, the lobar bronchus to the superior lobe originates within the root of the lung.

The lobar bronchi further divide into **segmental bronchi** (tertiary bronchi), which supply bronchopulmonary segments (Fig. 3.42B).

Within each bronchopulmonary segment, the segmental bronchi give rise to multiple generations of divisions and, ultimately, to bronchioles, which further subdivide and supply the respiratory surfaces. The walls of the bronchi are held open by discontinuous elongated plates of cartilage, but these are not present in bronchioles.

Clinical app

Inhaled objects

The right main bronchus is wider and takes a more vertical course through the root and hilum than the left main bronchus (Fig. 3.42A). Therefore, inhaled foreign bodies tend to lodge more frequently on the right side than on the left.

Bronchopulmonary segments

A **bronchopulmonary segment** is the area of lung supplied by a segmental (tertiary) bronchus and its accompanying pulmonary artery branch.

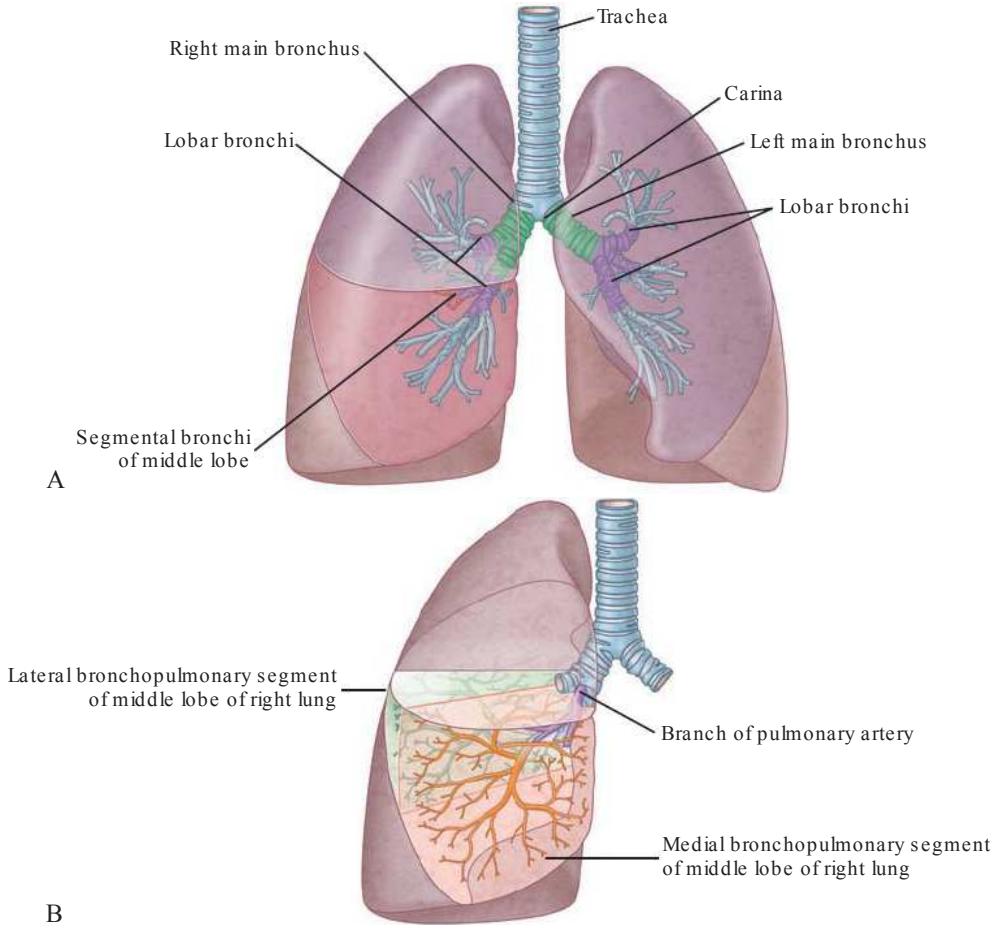

Fig. 3.42 **A.** Bronchial tree. **B.** Bronchopulmonary segments.

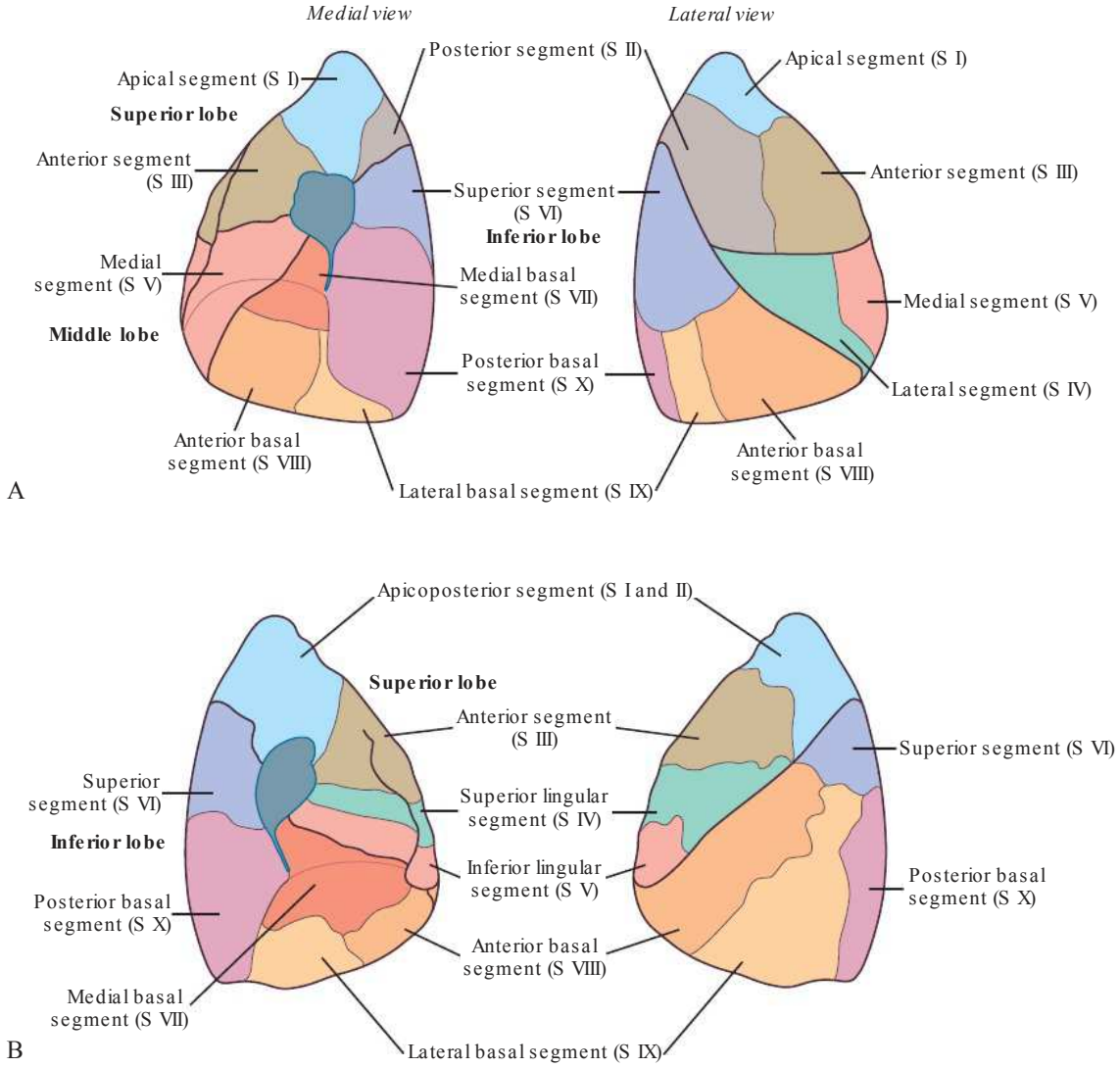

Fig. 3.43 Bronchopulmonary segments. **A.** Right lung. **B.** Left lung. (Bronchopulmonary segments are numbered and named.)

Tributaries of the pulmonary vein tend to pass intersegmentally between and around the margins of segments.

Each bronchopulmonary segment is shaped like an irregular cone with the apex at the origin of the segmental (tertiary) bronchus and the base projected peripherally onto the surface of the lung.

A bronchopulmonary segment is the smallest, functionally independent region of a lung and the smallest area of lung that can be isolated and removed without affecting adjacent regions.

There are 10 bronchopulmonary segments in each lung (Fig. 3.43); some of them fuse in the left lung.

Pulmonary arteries

The right and left pulmonary arteries originate from the **pulmonary trunk** and carry deoxygenated blood to the lungs from the right ventricle of the heart (Fig. 3.44).

The bifurcation of the pulmonary trunk occurs to the left of the midline just inferior to vertebral level TIV/V, and anteroinferiorly to the left of the bifurcation of the trachea.

Right pulmonary artery

The **right pulmonary artery** is longer than the left and passes horizontally across the mediastinum (Fig. 3.44). It passes:

- anteriorly and slightly inferiorly to the tracheal bifurcation and anteriorly to the right main bronchus; and
- posteriorly to the ascending aorta, superior vena cava, and upper right pulmonary vein.

The right pulmonary artery enters the root of the lung and gives off a large branch to the superior lobe of the lung. The main vessel continues through the hilum of the lung, gives off a second (recurrent) branch to the superior lobe, and then divides to supply the middle and inferior lobes.

Left pulmonary artery

The **left pulmonary artery** is shorter than the right and lies anterior to the descending aorta and posterior to the superior pulmonary vein (Fig. 3.44). It passes through the root and hilum and branches within the lung.

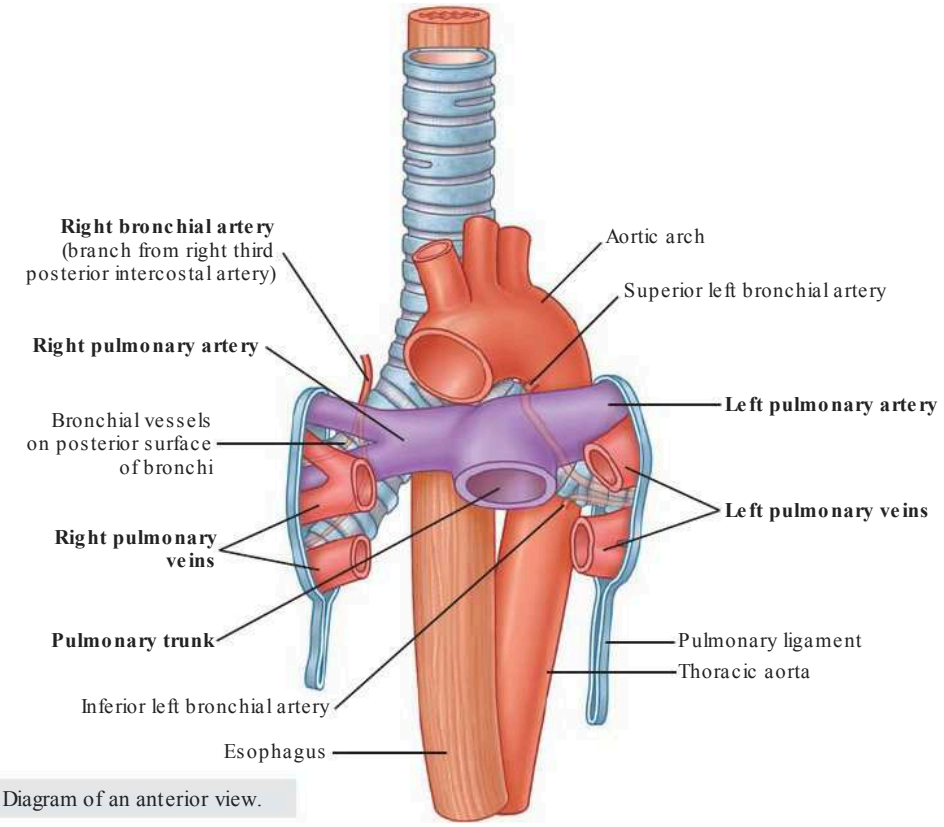

Fig. 3.44 Pulmonary vessels. Diagram of an anterior view.

Imaging app

Visualizing the pulmonary trunk by computed tomography

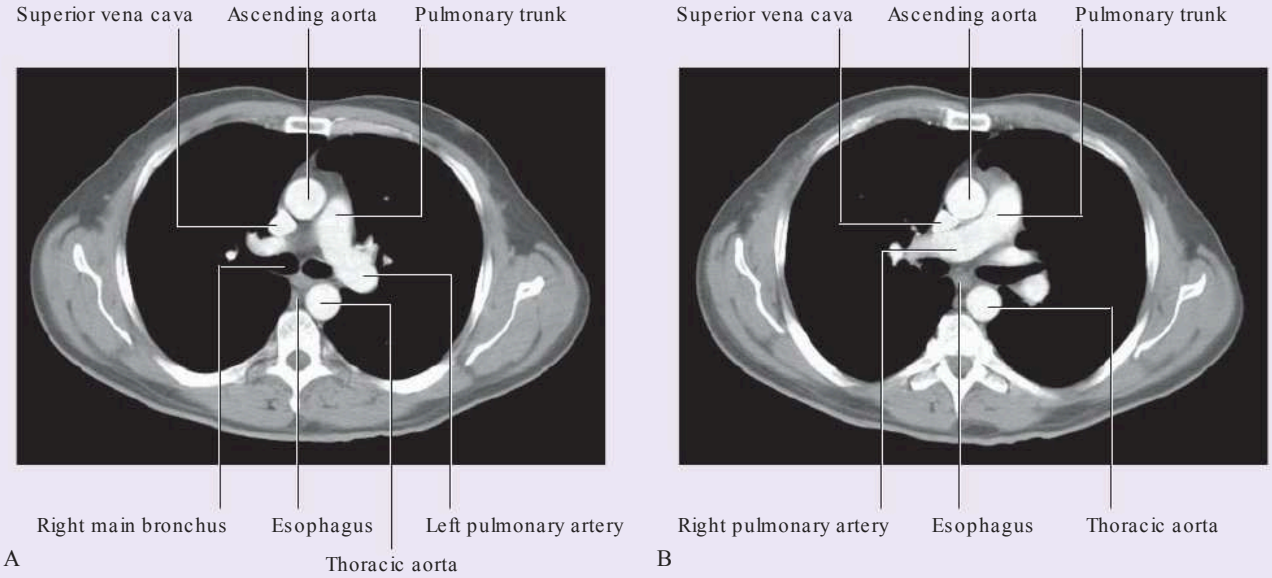

Fig. 3.45 Pulmonary vessels. **A.** Axial computed tomography image showing the left pulmonary artery branching from the pulmonary trunk. **B.** Axial computed tomography image (just inferior to the image in **A**) showing the right pulmonary artery branching from the pulmonary trunk.

Pulmonary veins

On each side a **superior pulmonary vein** and an **inferior pulmonary vein** carry oxygenated blood from the lungs back to the heart (Fig. 3.44). The veins begin at the hilum of the lung, pass through the root of the lung, and immediately drain into the left atrium.

Bronchial arteries and veins

The bronchial arteries (Fig. 3.44) and veins constitute the "nutritive" vascular system of the pulmonary tissues (bronchial walls and glands, walls of large vessels, and visceral pleura). They interconnect within the lung with branches of the pulmonary arteries and veins.

The bronchial arteries originate from the thoracic aorta or one of its branches:

- A single **right bronchial artery** normally arises from the third posterior intercostal artery (but occasionally, it originates from the **upper left bronchial artery**).
- Two **left bronchial arteries** arise directly from the anterior surface of the thoracic aorta—the **superior left bronchial artery** arises at vertebral level TV, and the inferior one inferior to the left bronchus.

The bronchial arteries run on the posterior surfaces of the bronchi and ramify in the lungs to supply pulmonary tissues.

The **bronchial veins** drain into:

- either the pulmonary veins or the left atrium; and
- into the azygos vein on the right or into the superior intercostal vein or hemiazygos vein on the left.

Innervation

Structures of the lung, and the visceral pleura, are supplied by visceral afferents and efferents distributed through the anterior pulmonary plexus and posterior pulmonary plexus (Fig. 3.46). These interconnected plexuses lie anteriorly and posteriorly to the tracheal bifurcation and main bronchi. The anterior plexus is much smaller than the posterior plexus.

Branches of these plexuses, which ultimately originate from the sympathetic trunks and vagus nerves, are distributed along branches of the airway and vessels.

Visceral efferents from:

- the vagus nerves constrict the bronchioles;
- the sympathetic system dilates the bronchioles.

Lymphatic drainage

Superficial, or subpleural, and deep lymphatics of the lung drain into lymph nodes called **tracheobronchial nodes** around the roots of lobar and main bronchi and along the sides of the trachea (Fig. 3.47). As a group, these lymph nodes extend from within the lung, through the hilum and root, and into the posterior mediastinum.

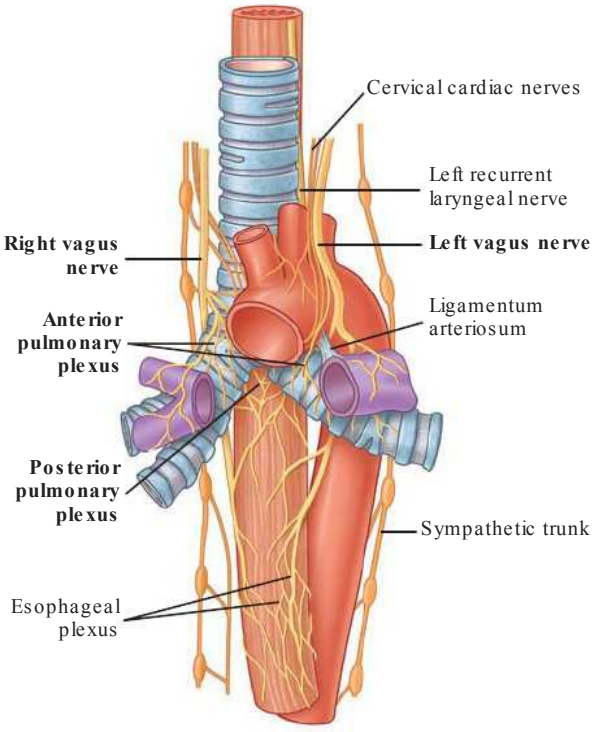

Fig. 3.46 Pulmonary innervation.

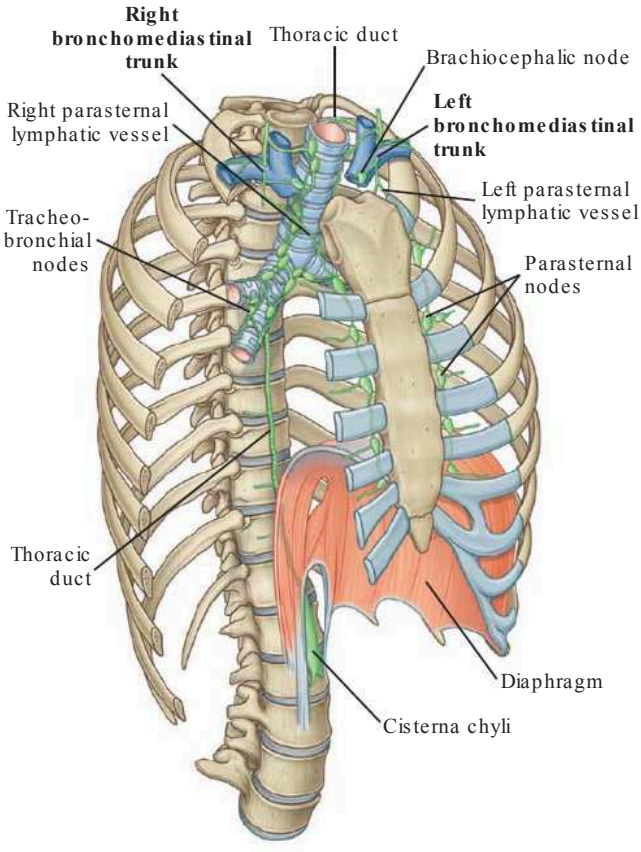

Fig. 3.47 Lymphatic drainage of lungs.

Efferent vessels from these nodes pass superiorly along the trachea to unite with similar vessels from parasternal nodes and brachiocephalic nodes, which are anterior to brachiocephalic veins in the superior mediastinum, to form the **right** and **left bronchomediastinal trunks**. These trunks drain directly into deep veins at the base of the neck, or may drain into the right lymphatic trunk or thoracic duct.

Imaging app

Visualizing the lungs

Medical imaging of the lungs is important because they are one of the commonest sites for disease in the body. While the body is at rest, the lungs exchange up to 5 L of air per minute, and this may contain pathogens and other potentially harmful elements (e.g., allergens).

Techniques to visualize the lung range from bronchoscopy, high-resolution computed tomography (CT), to plain chest radiographs.

Bronchoscopy

Patients who have an endobronchial lesion (i.e., a lesion within a bronchus) may undergo bronchoscopic evaluation of the trachea and its main branches (Fig. 3.48). The bronchoscope is passed through the nose into the pharynx and is then directed by a control system into the larynx and then past the vocal cords into the trachea. The bronchi are inspected and, if necessary, small biopsies are obtained.

High-resolution lung computed tomography

High-resolution computed tomography (HRCT) is a diagnostic method for assessing the lungs but more specifically the interstitium of the lungs (Fig. 3.49). The technique involves obtaining narrow cross-sectional slices of 1 to 2 mm. These scans enable the physician and radiologist to view the patterns of disease and their distribution. Diseases that may be easily demonstrated using this procedure include emphysema, pneumoconiosis (coal worker's pneumoconiosis), and asbestosis.

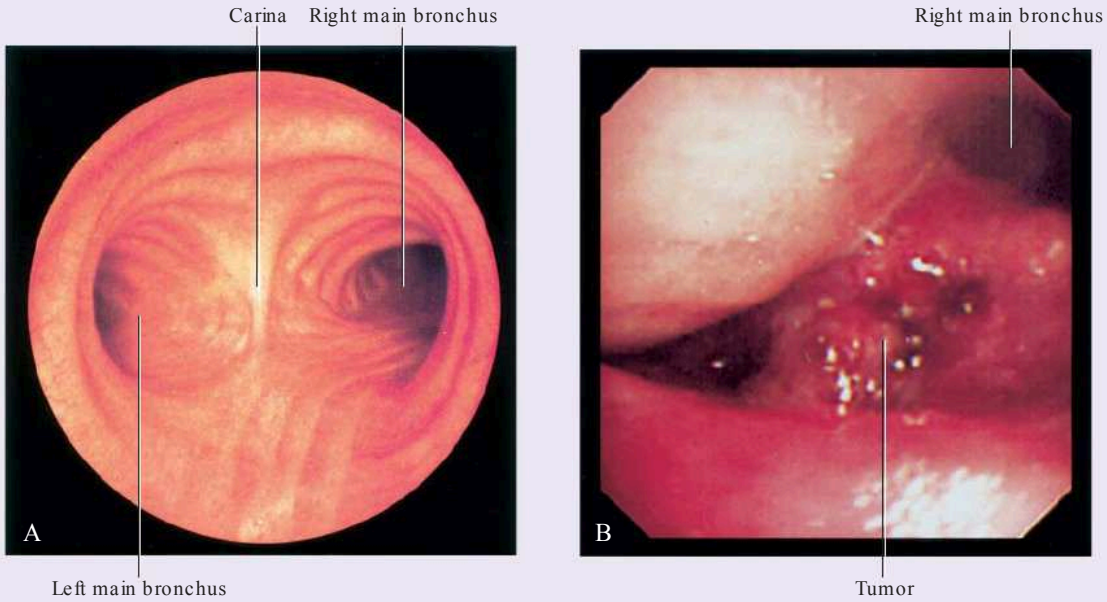

Fig. 3.48 Bronchoscopic evaluation. **A.** Of the lower end of the normal trachea and its main branches. **B.** Of tracheal bifurcation showing a tumor at the carina.

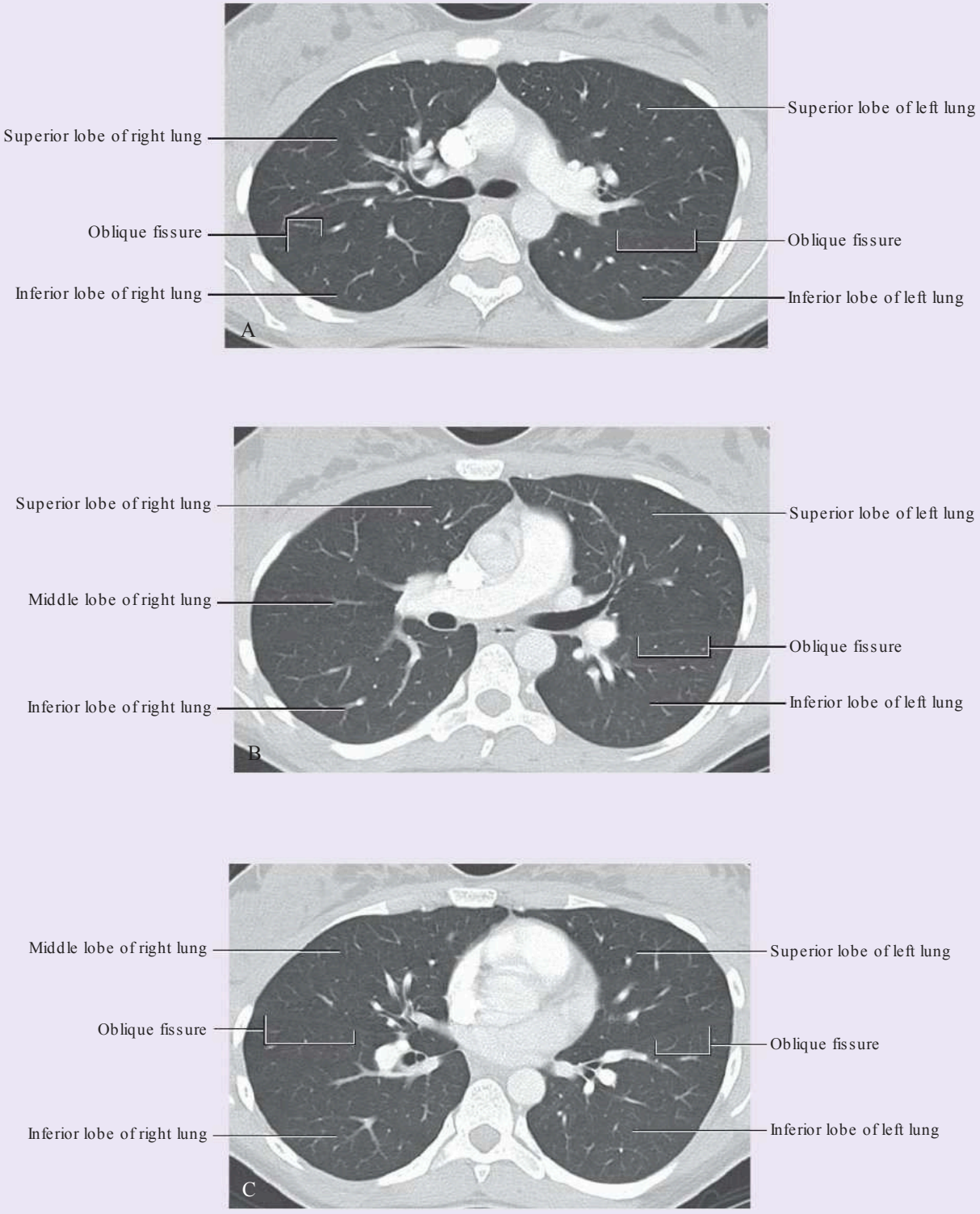

Fig. 3.49 CT images, with contrast, in axial plane: **A.** Right lung and left lung demonstrating superior and inferior lobes. The oblique fissures are visible. **B.** Right lung demonstrating superior, middle, and inferior lobes, and the left lung demonstrating superior and inferior lobes. The oblique fissure associated with the left lung is visible. **C.** Right lung demonstrating middle and inferior lobes and the left lung demonstrating superior and inferior lobes. The oblique fissures are visible.

Imaging app

Plain chest radiograph

Plain chest radiographs are the most common method of visualizing the lungs (Fig. 3.50).

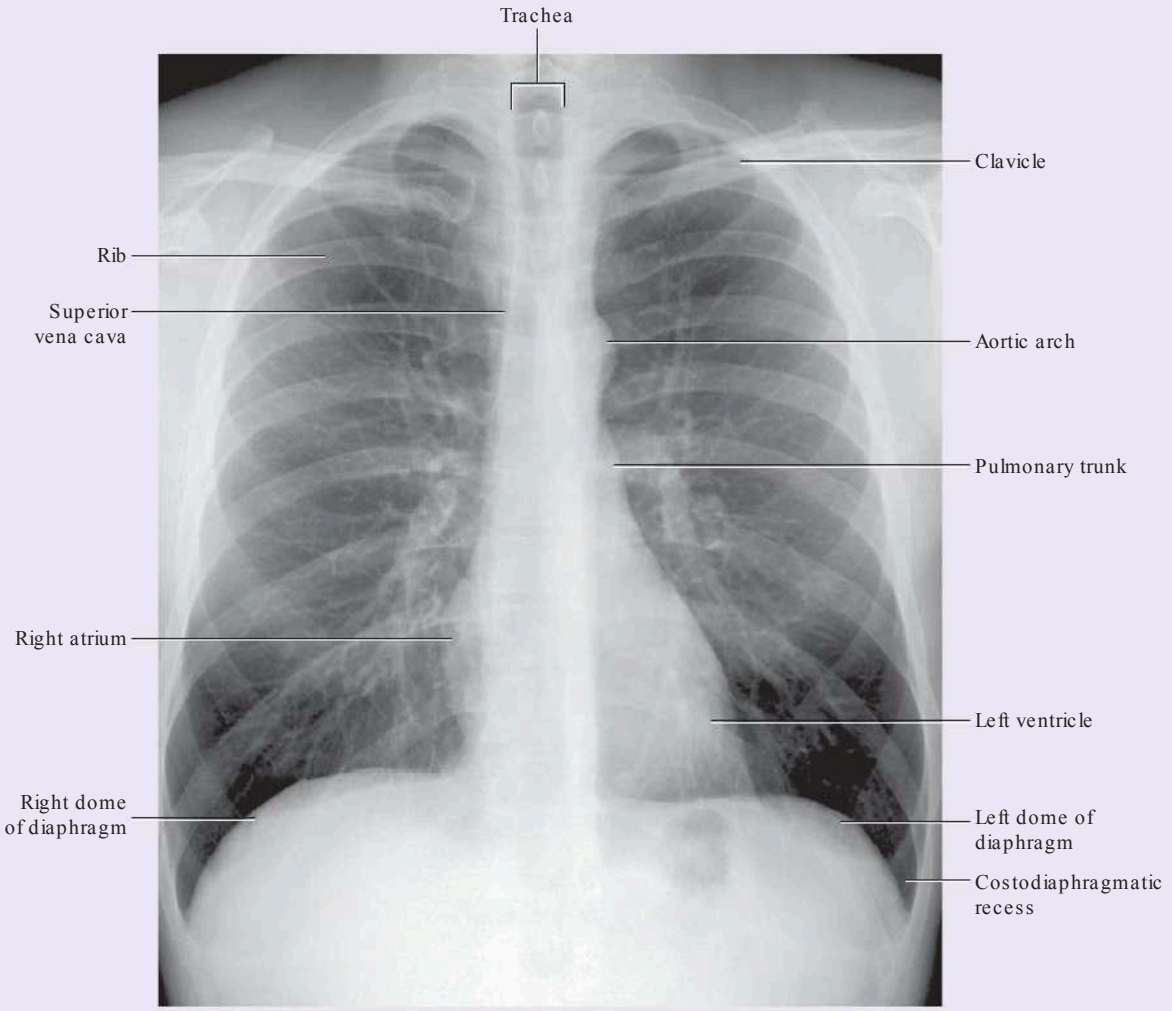

Fig. 3.50 Chest radiograph, AP view.

Clinical app

Lung cancer
It is important to stage lung cancer because the treatment depends on its stage.

If a small malignant nodule is found within the lung, it can sometimes be excised and the prognosis is excellent. Unfortunately, many patients present with a tumor mass that has invaded structures in the mediastinum or the pleurae or has metastasized. The tumor may then be inoperable and is treated with radiotherapy and chemotherapy.

Spread of the tumor is by lymphatics to lymph nodes within the hila, mediastinum, and root of the neck.

Imaging methods to assess spread include plain radiography, computed tomography (Fig. 3.51), and magnetic resonance imaging (MRI). Increasingly, radionuclide studies using fluorodeoxyglucose positron emission tomography (FDG PET) are being used.

In FDG PET a gamma radiation emitter is attached to a glucose molecule. In areas of excessive metabolic activity (i.e., the tumor), excessive uptake occurs and is recorded by a gamma camera.

Fig. 3.51 Axial CT image of lungs showing tumor (arrow) in right lung.

Clinical app

Pneumonia
Chest infection is a common disease. In most patients the infection affects the large airways and bronchi. If the infection continues, exudates and transudates are produced, filling the alveoli and the secondary pulmonary lobules. The diffuse, patchy nature of this type of infection is termed bronchial pneumonia.

MEDIASTINUM

The **mediastinum** is a broad central partition that separates the two laterally placed pleural cavities (Fig. 3.52). It extends:

- from the sternum to the bodies of the vertebrae; and
- from the superior thoracic aperture to the diaphragm.

The mediastinum contains the thymus gland, the pericardial sac, the heart, the trachea, and the major arteries and veins. It also serves as a passageway for structures such as the esophagus, thoracic duct, and various components of the nervous system as they traverse the thorax on their way to the abdomen.