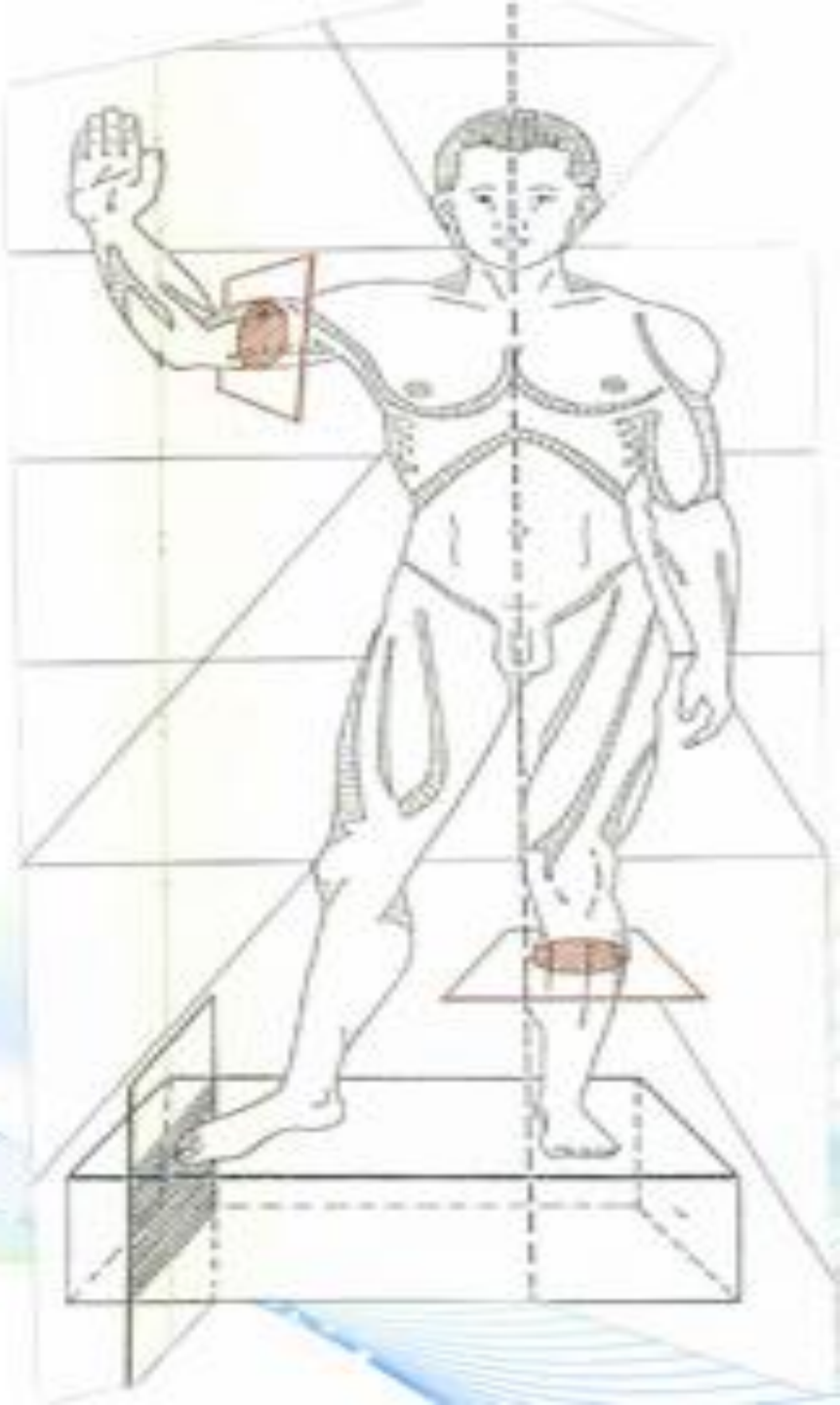
THE PULMONARY PEDICLES



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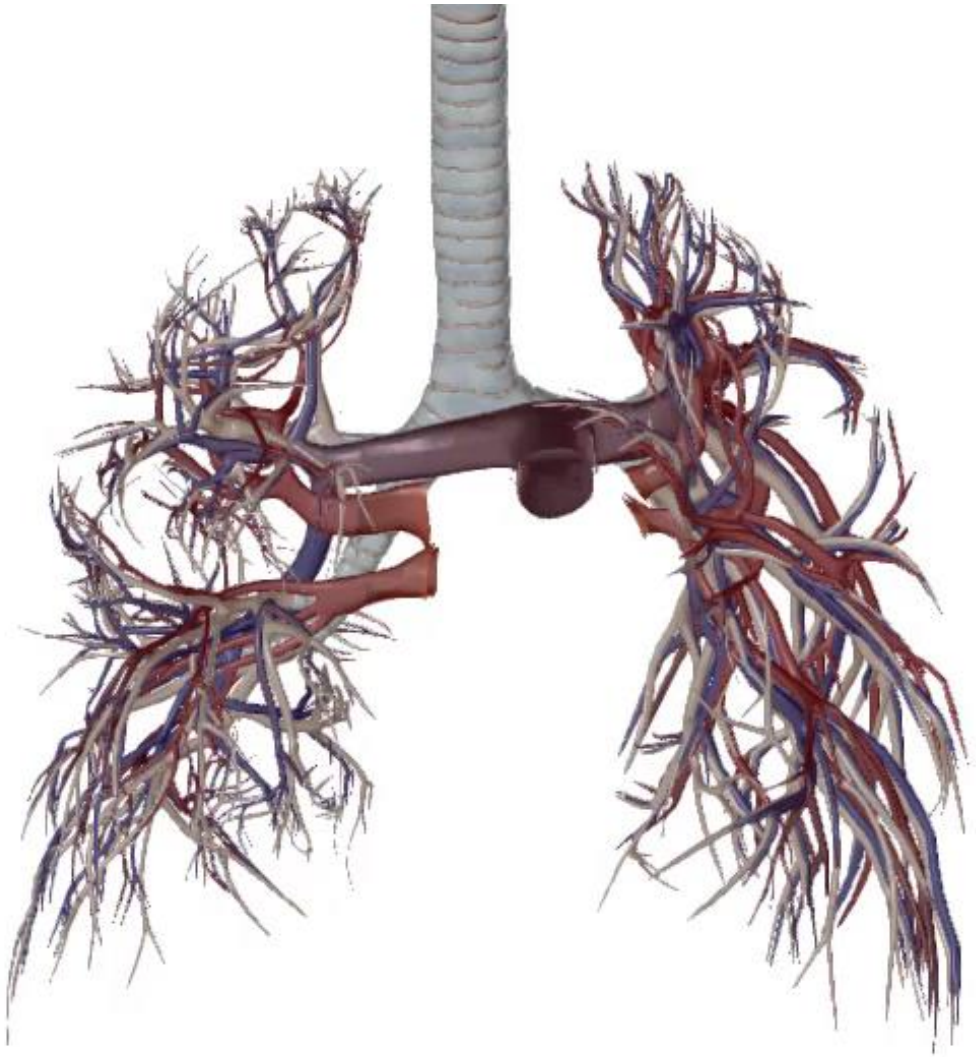
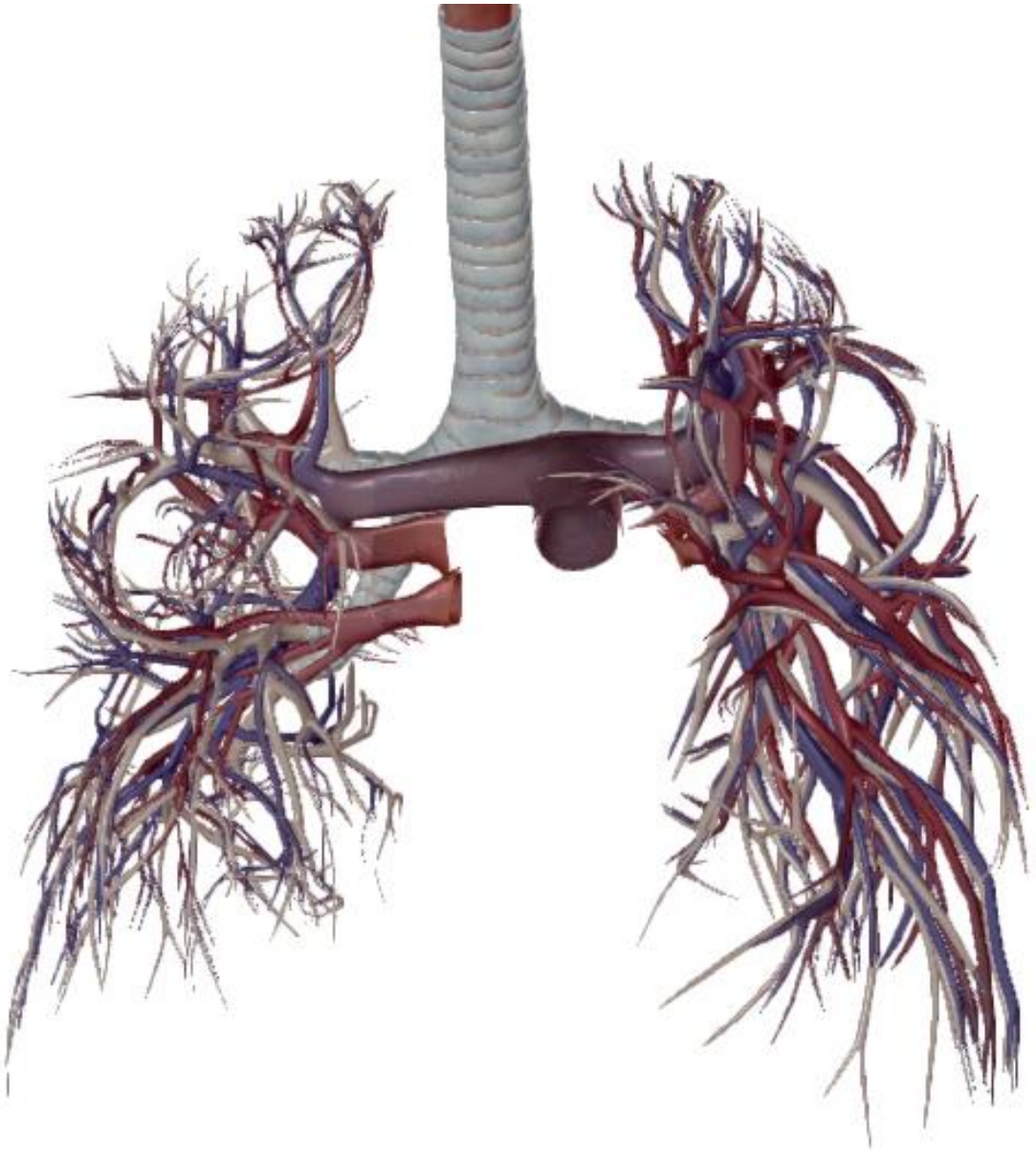


I. INTRODUCTION :

- The pulmonary pedicles are formed by the extrapulmonary segment of the bronchial, vascular or nerve elements that enter or exit the lungs.
- Each pedicule is composed of :

- Functional pedicle :
  - ✓ The bronchi,
  - ✓ The pulmonary arteries,
  - ✓ The pulmonary veins.

- Nourishing pedicle :
  - ✓ The bronchial arteries,
  - ✓ The bronchial veins,
  - ✓ The bronchial nerves,
  - ✓ The lymphatics.



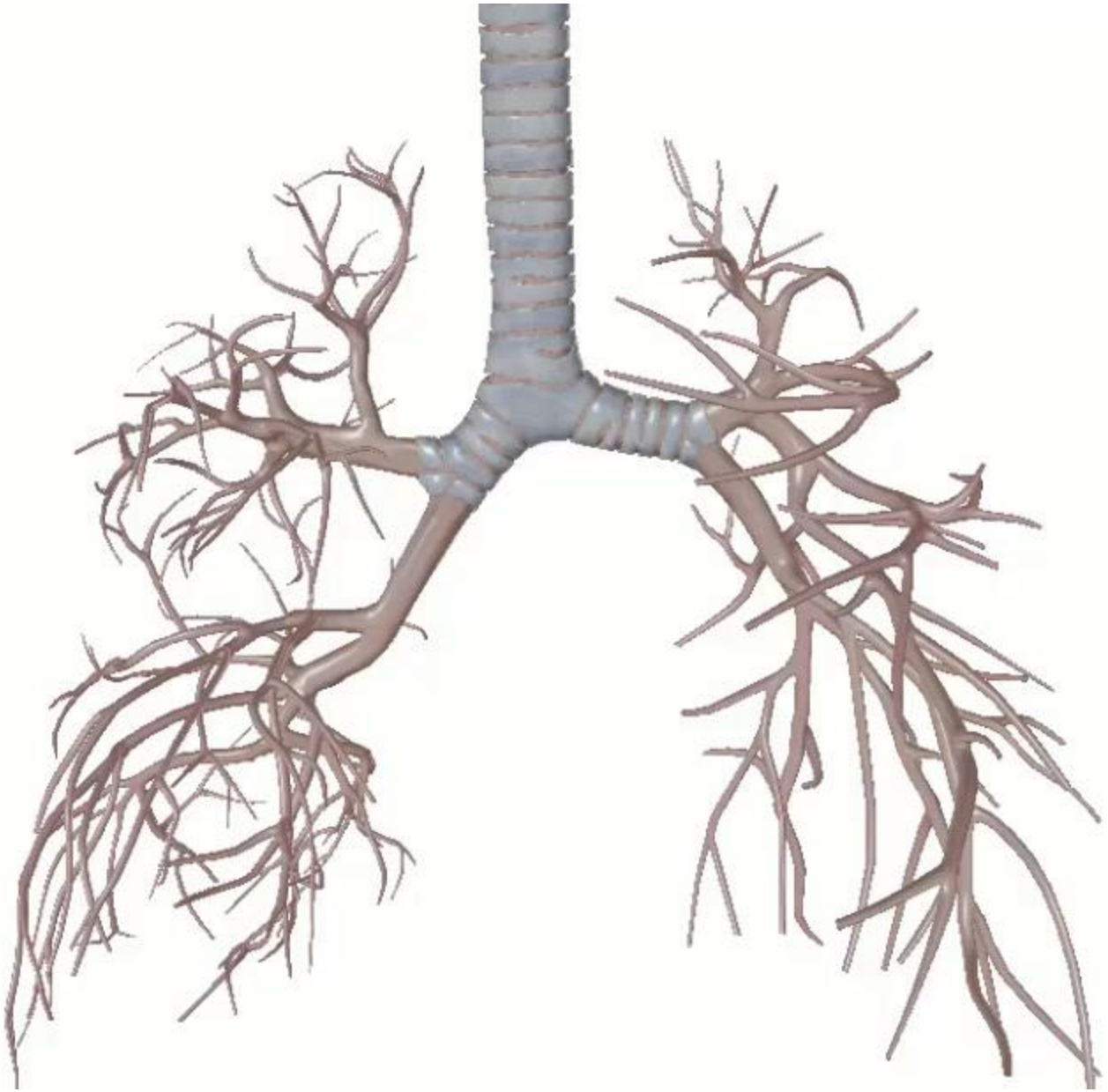
II. CONSTITUENT ELEMENTS OF THE PEDICLES :

1. Functional pedicle:

a. The bronchi :

- Right main bronchus :
  - ✓ Superior lobar bronchus,
  - ✓ Middle lobar bronchus,
  - ✓ Inferior lobar bronchus.

- Left main bronchus :
  - ✓ Superior lobar bronchus,
  - ✓ Inferior lobar bronchus.



b. Pulmonary trunk:

- **Origin:**

It originates at the pulmonary orifice, located at the base of the right ventricle.

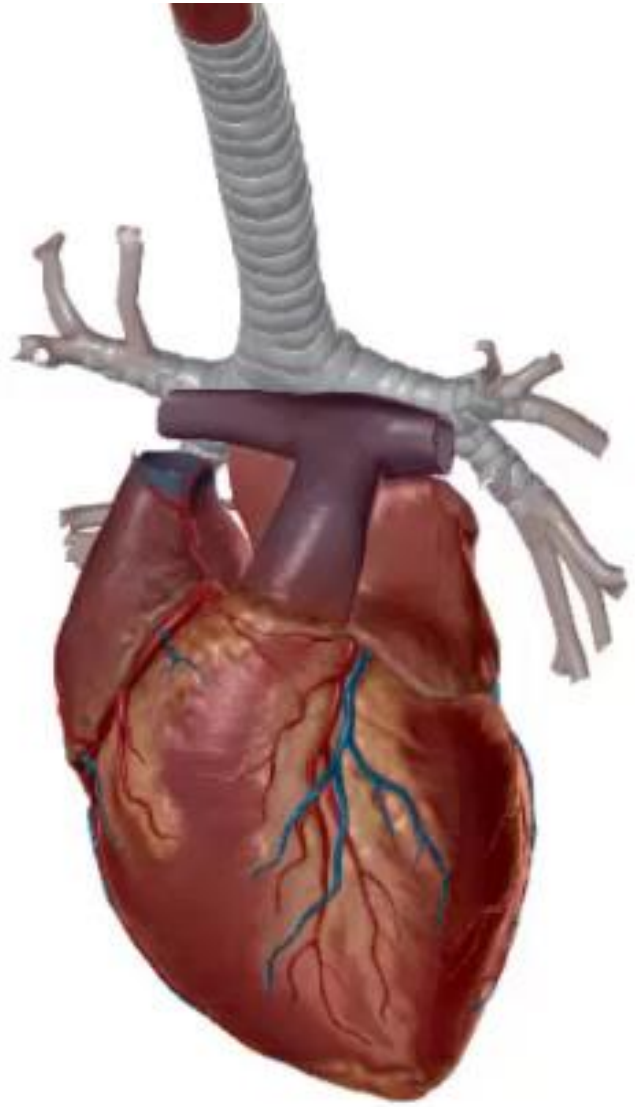
- **Course:**

It courses posteriorly, to the left and slightly upward.

- **Termination:**

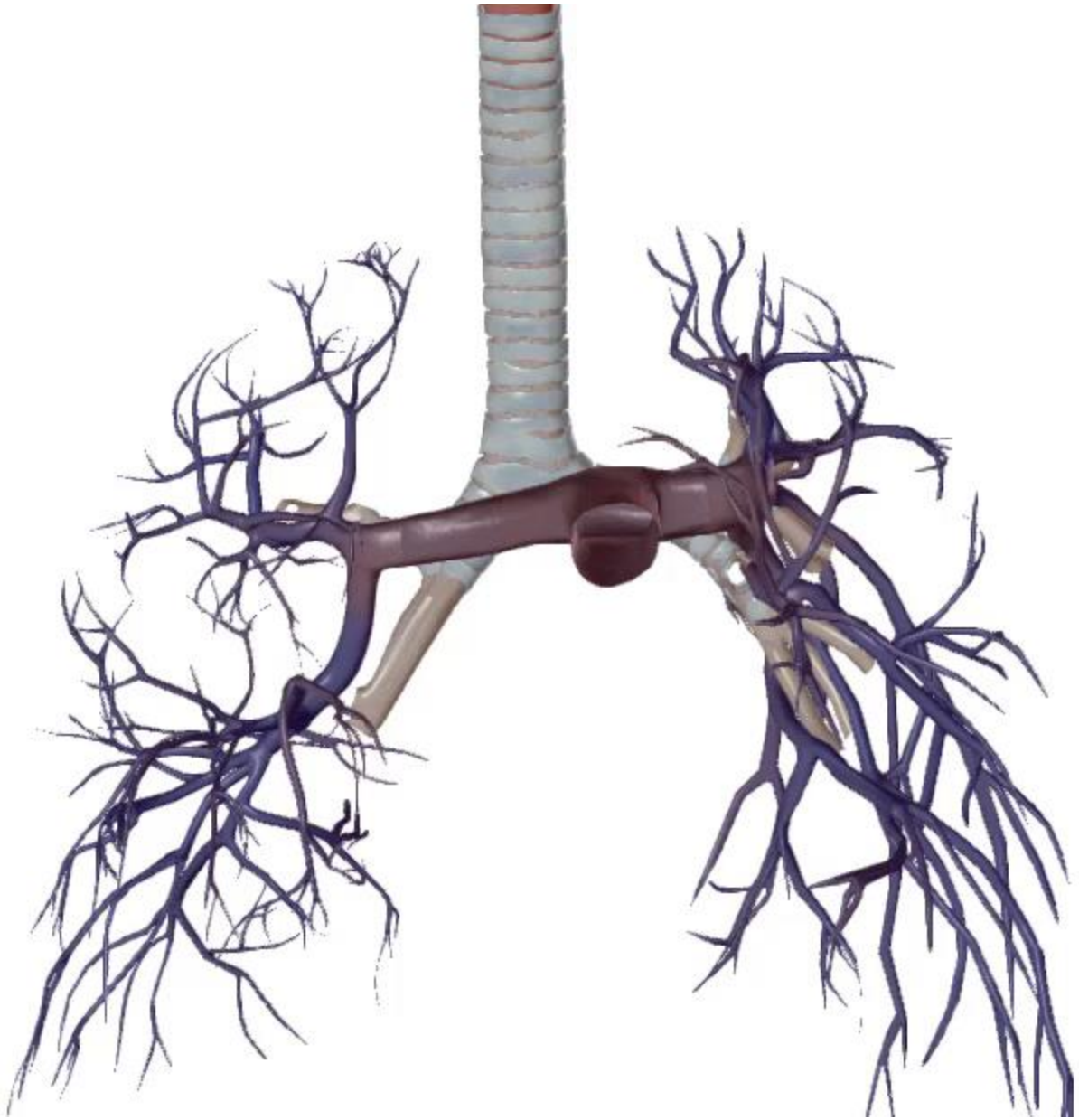
It bifurcates into 2 branches : the right and left pulmonary arteries.

- **Dimension:**
  - ✓ Length: 5 cm
  - ✓ Diameter: 30 mm.



c. The pulmonary arteries :

- They will divide into :
  - Lobar arteries,
  - Segmental arteries,
  - Subsegmental arteries.

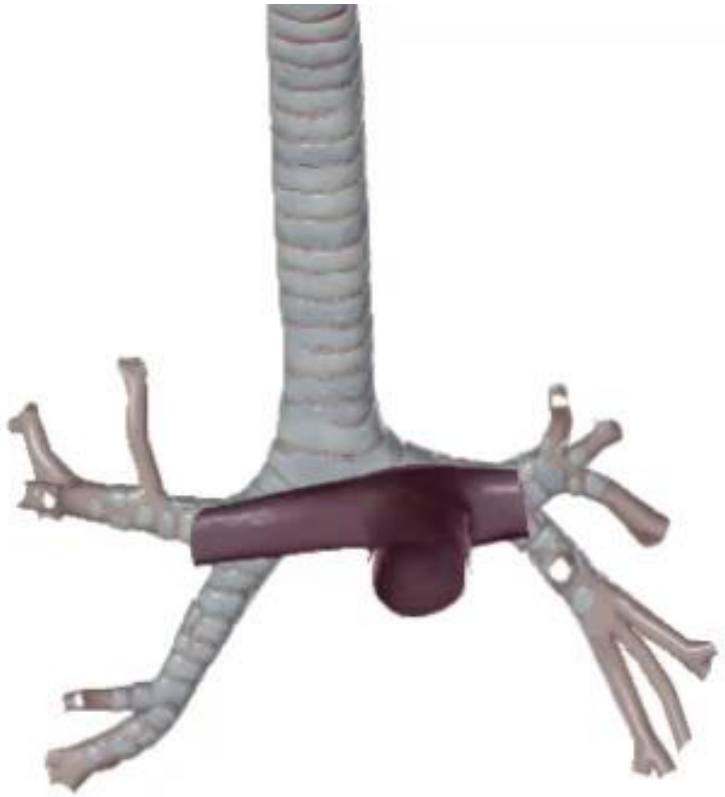


Right pulmonary artery:

- **Dimensions :**
  - Longer and larger
  - Length : 5 cm
  - Diameter : 22 mm.

- **Course – Anatomical relations :**

- It transvers the mediastinum, passing:
  - ✓ Behind the ascending aorta and the superior vena cava.
  - ✓ Above the transverse sinus of the pericardium.
  - ✓ Below the aortic arch and the arch of the azygos vein
  - ✓ Infront of the tracheal bifurcation.
- It enters the hilium of the right lung anteriorly and inferiorly to the origin of the superior lobar bronchus.
- It curves passing above and then behind the middle lobar bronchus.
- It descends along the posterolateral border of the inferior lobar bronchus.



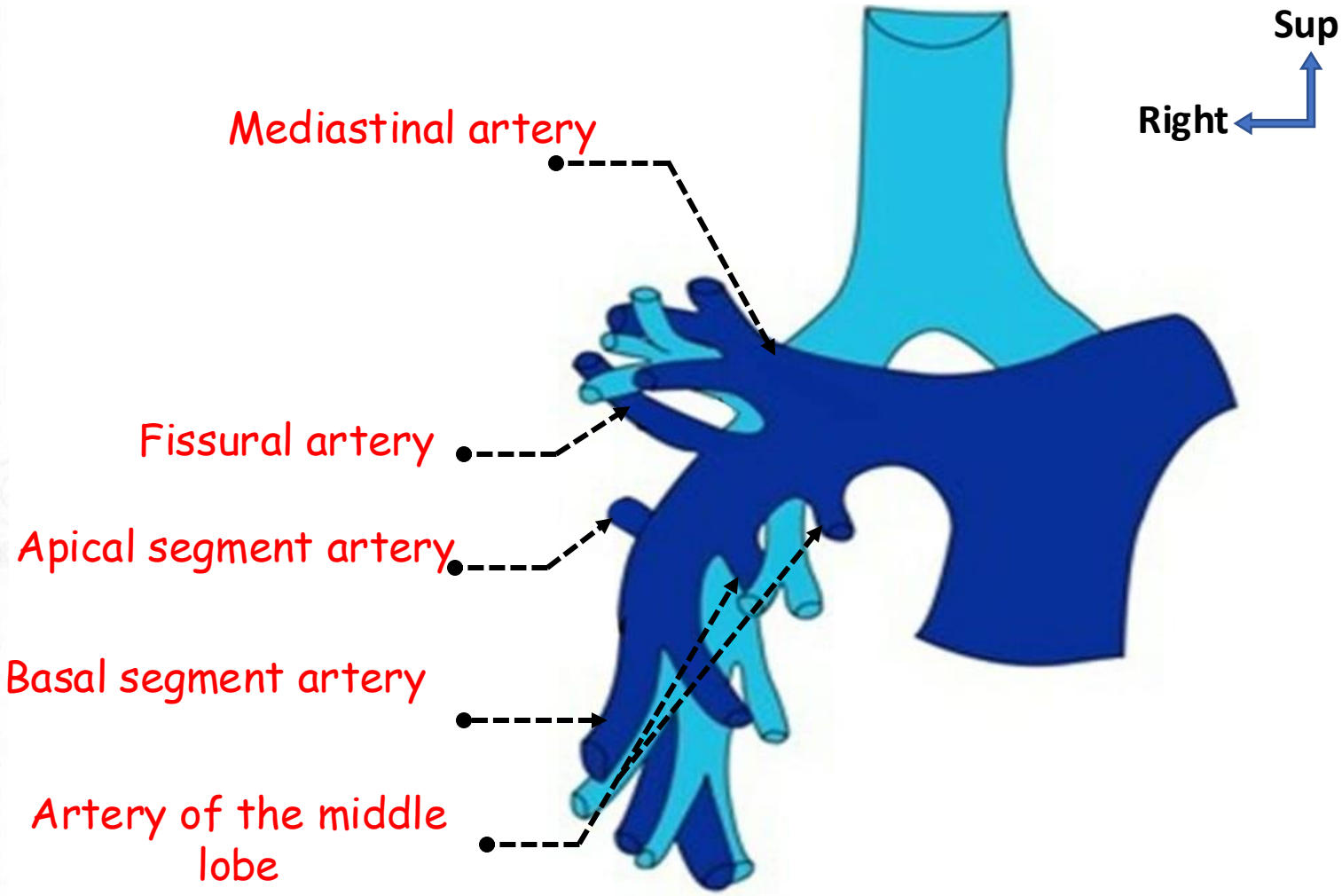
Right pulmonary artery :

➢ **Termination :**

It terminates at the posterior surface of the posterior basal segmental bronchus.

➢ **Collateral branches :**

- For the right upper lobe :
  - ✓ Mediastinal artery,
  - ✓ Fissural artery.
- For the right middle lobe :
  - ✓ Arteries of the middle lobe.
- For the right lower lobe :
  - ✓ Apical segment artery,
  - ✓ Basal segment artery.



ANTERIOR VIEW OF THE COLLATERAL BRANCHES OF THE RIGHT PULMONARY ARTERY

Left pulmonary artery

- **Dimensions :**
  - Length : 3 cm
  - Diameter : 18 mm.

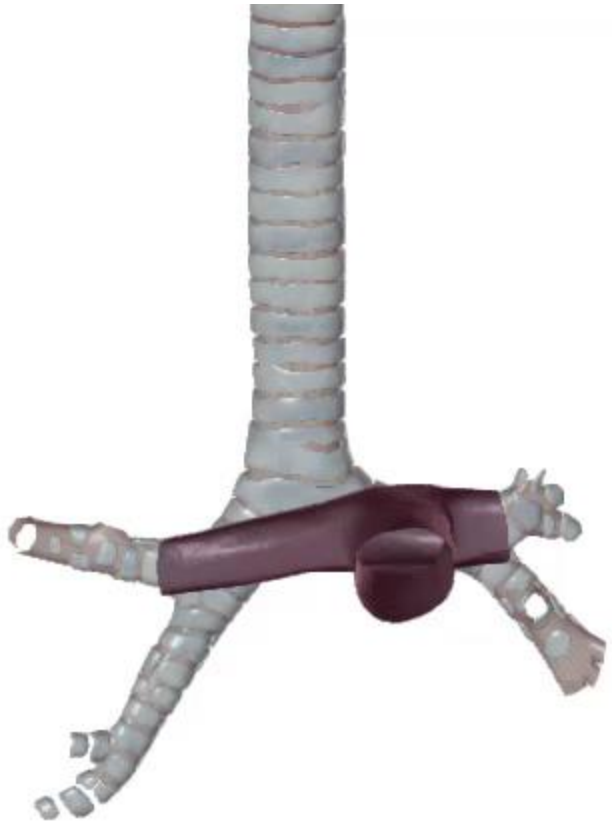
- **Course – Anatomical relations :**

- It ascends in an almost sagittal direction, passing in front of :
  - ✓ The left main bronchus,
  - ✓ Above the upper left lobar bronchus.

- It then descends along the posterior surface of the left upper bronchus and continues along the posterolateral border of the left lower lobar bronchus.

- **Termination :**

- It terminates at the posterior surface of the posterior basal segmental bronchus.

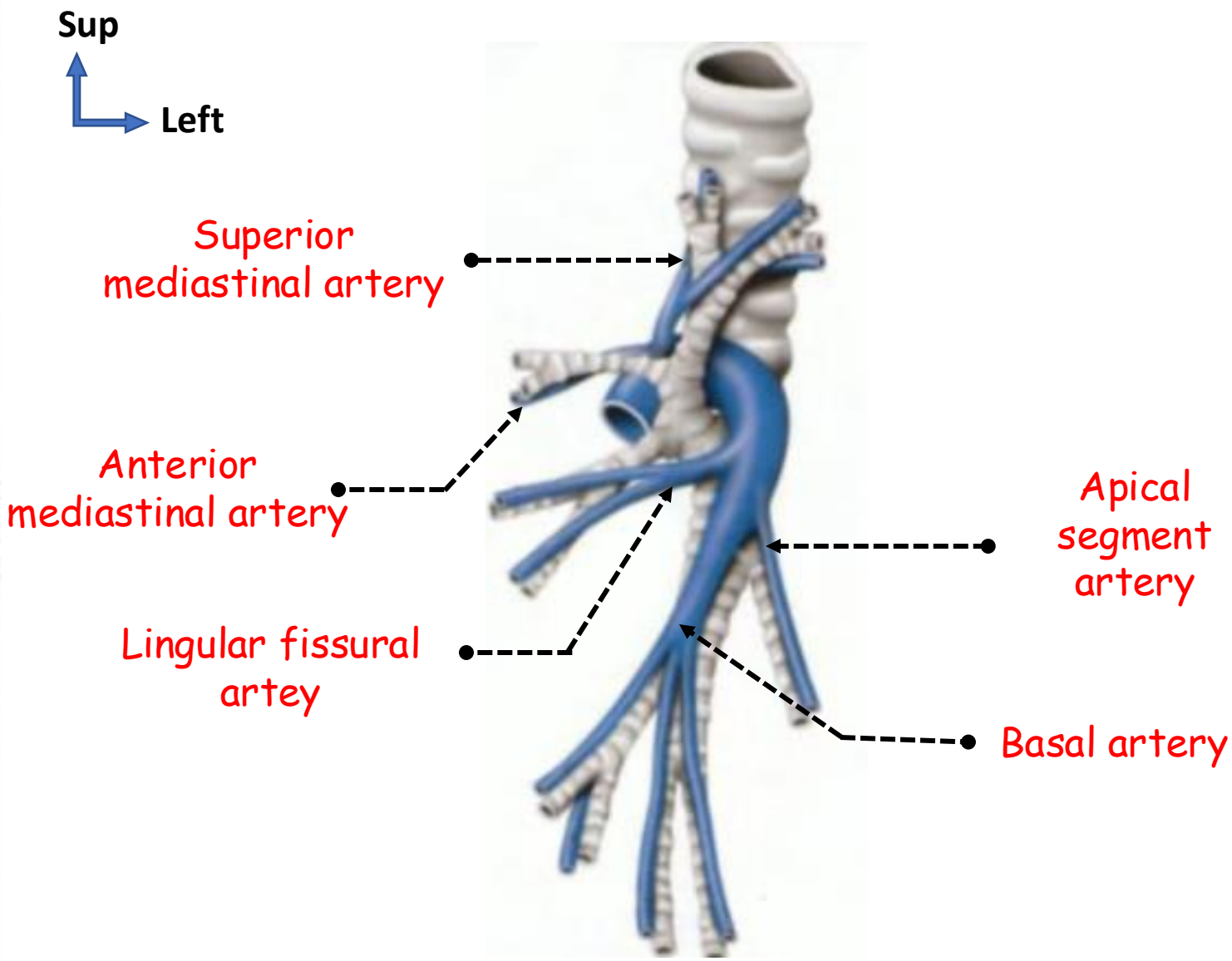


Left pulmonary artery:

- **Collateral branches :**

- For the left upper lobe :
  - ✓ Superior mediastinal artery or apico-dorsal artery,
  - ✓ Anterior mediastinal artery or ventral artery
  - ✓ Dorsal fissural artery,
  - ✓ Lingular fissural artery.

- For the left lower lobe :
  - ✓ Apical segmental artery,
  - ✓ Basal artery of the lower lobe.



LATERAL VIEW OF THE COLLATERAL BRANCHES OF THE LEFT PULMONARY ARTERY

d. Pulmonary veins :

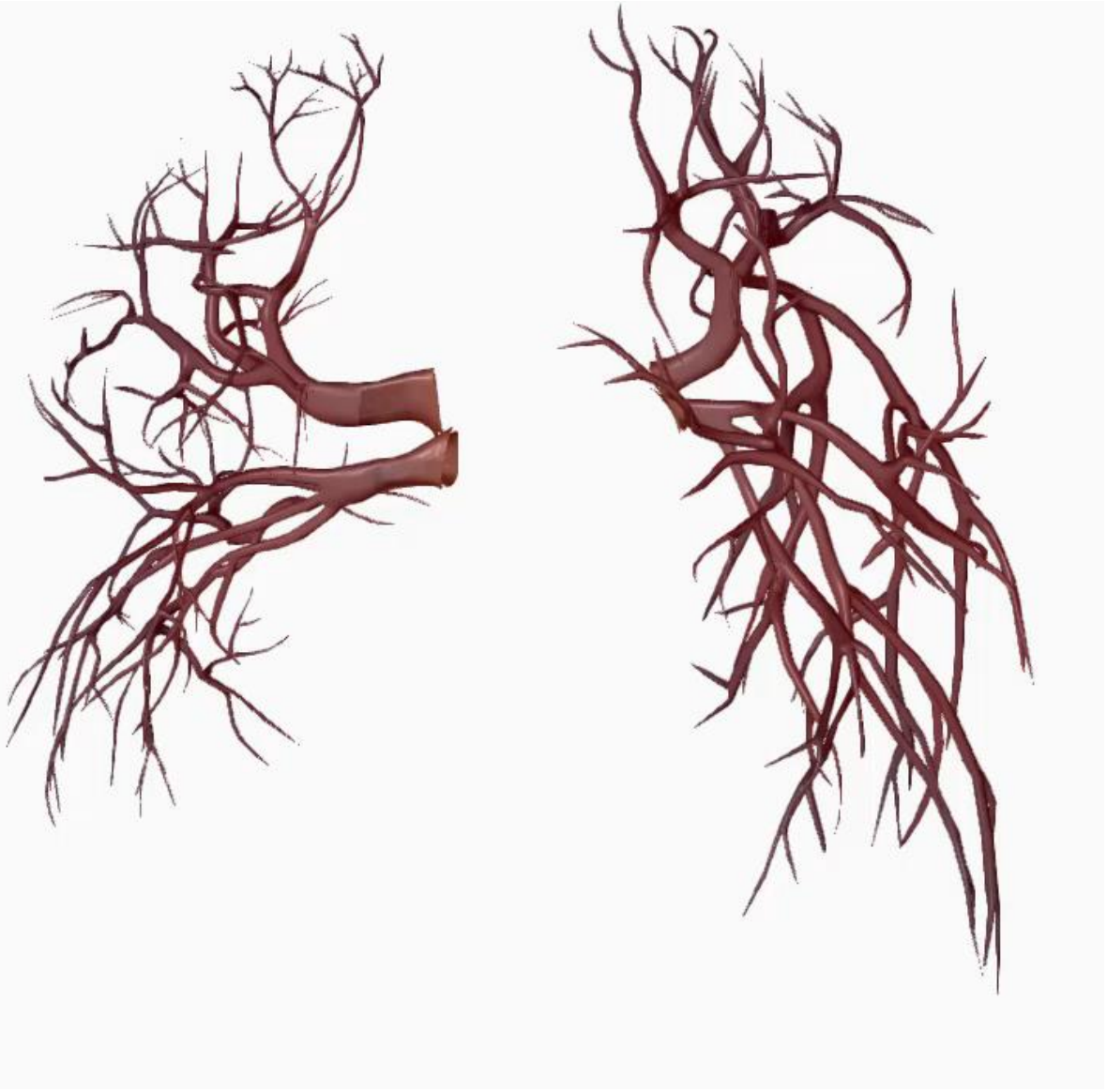
Veins of the right lung:

➢ Right superior pulmonary vein:

- It drains the upper and middle lobes.
- Located in the anteroinferior part of the pedicle, it is formed by the union of the two tributaries :
  - ✓ Superior tributary : draining the upper lobe,
  - ✓ Inferior tributary : draining the middle lobe.

➢ Right inferior pulmonary vein:

- It drains the lower lobe.
- It is located in the inferior part of the pulmonary pedicle.
- It is formed by the union of the two tributaries :
  - ✓ Superior tributary,
  - ✓ Inferior tributary.



Left pulmonary veins:

- Left superior pulmonary vein:
- It drains the upper lobe.

- Left inferior pulmonary vein:
- It drains the lower lobe.
- It follows a pattern similar to the right inferior pulmonary vein.

2. The nourishing pedicle :

a. The bronchial vessels :

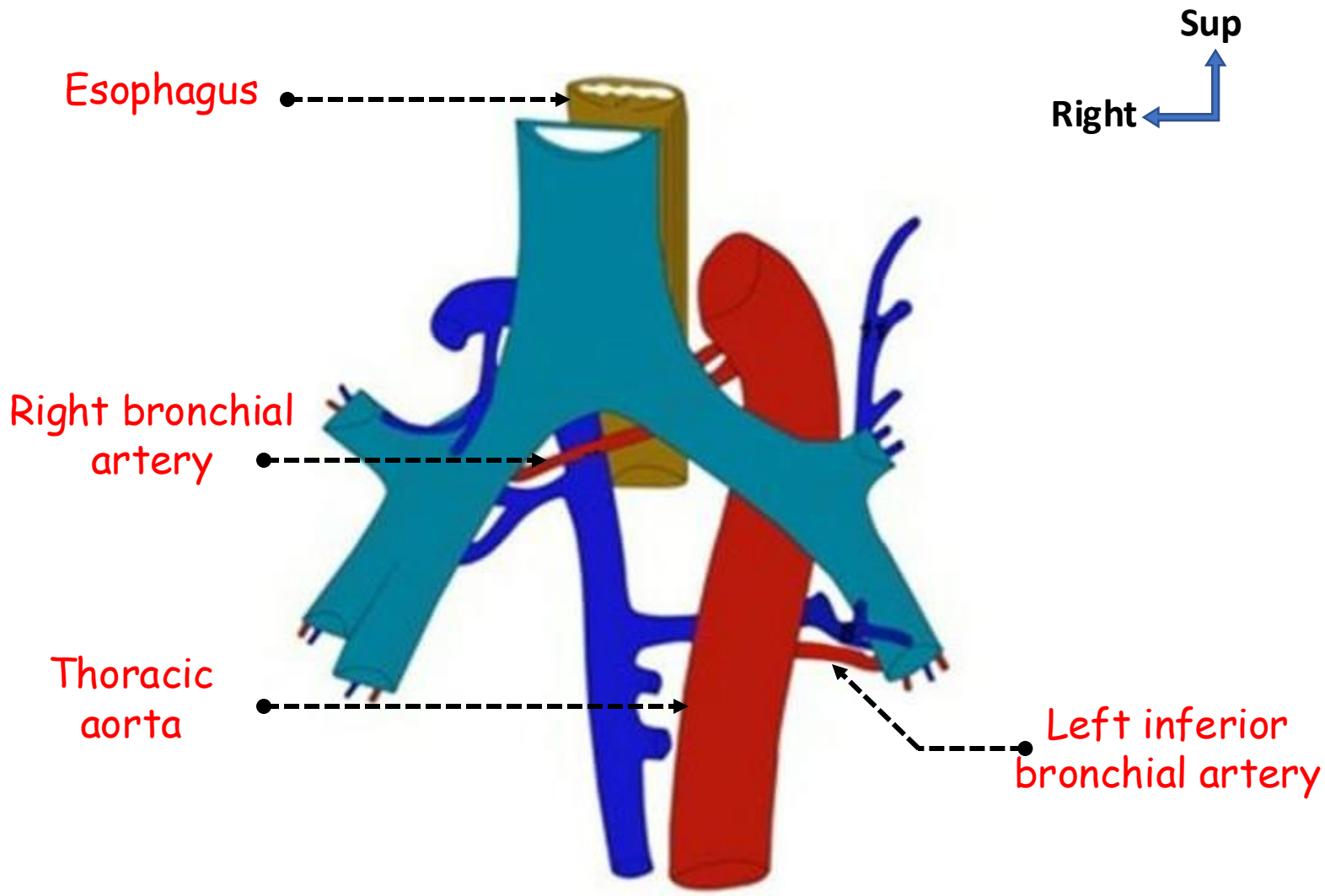
Bronchial arteries :

- On the right :

• Typically a single bronchial artery.

- On the left :

• Typically two bronchial arteries, classified as superior and inferior.



BRONCHIAL ARTERIES AND VEINS

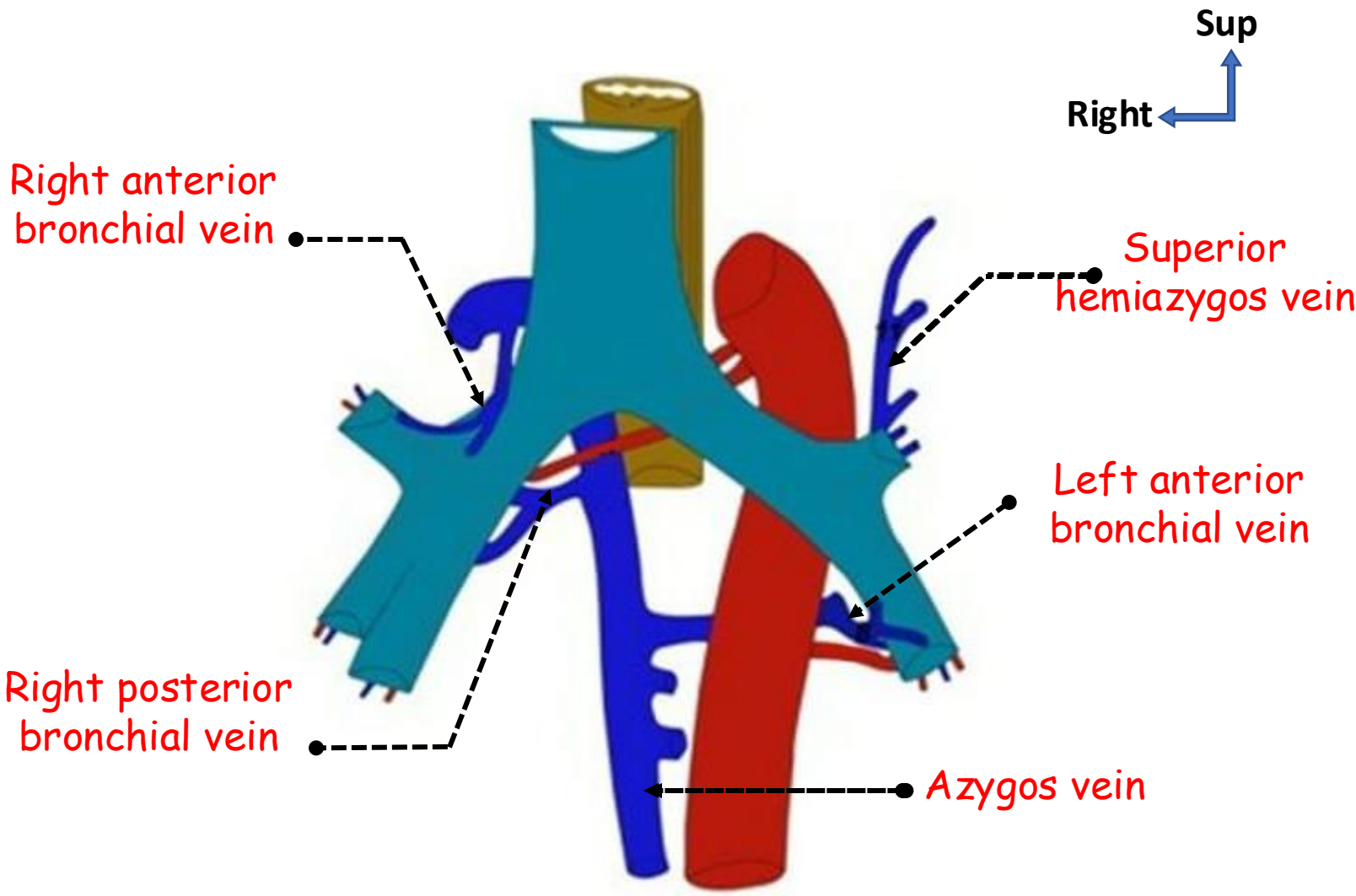
Bronchial veins :

The posterior bronchial vein :

- It travels posterior to the bronchus.
- It drains :
  - On the right : into the azygos vein or an intercostal vein.
  - On the left : into the superior azygos vein.

The anterior bronchial vein :

- It's located anterior to the main bronchus.
- It drains either into:
  - A pulmonary vein, or
  - The azygos vein on the right or the superior hemiazygos vein on the left.



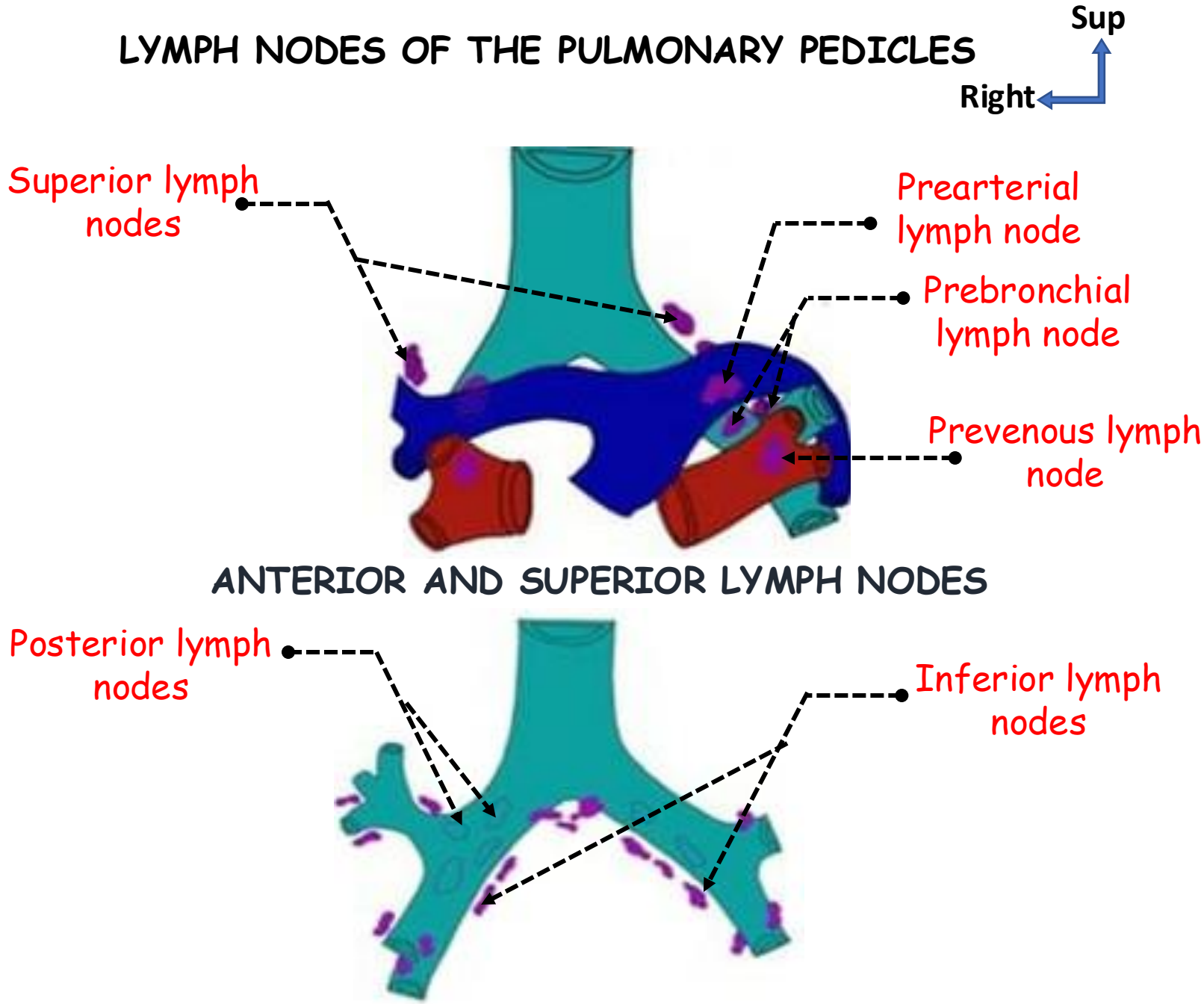
BRONCHIAL ARTERIES AND VEINS

b. Lymphatics:

Lymph nodes of the pulmonary pedicles :

- Anterior lymph nodes :
  - Prevenous lymph node,
  - Prearterial lymph node,
  - Prebronchial lymph nodes.
- Posterior lymph nodes.
- Superior lymph nodes.
- Inferior lymph nodes.

LYMPH NODES OF THE PULMONARY PEDICLES



ANTERIOR AND SUPERIOR LYMPH NODES

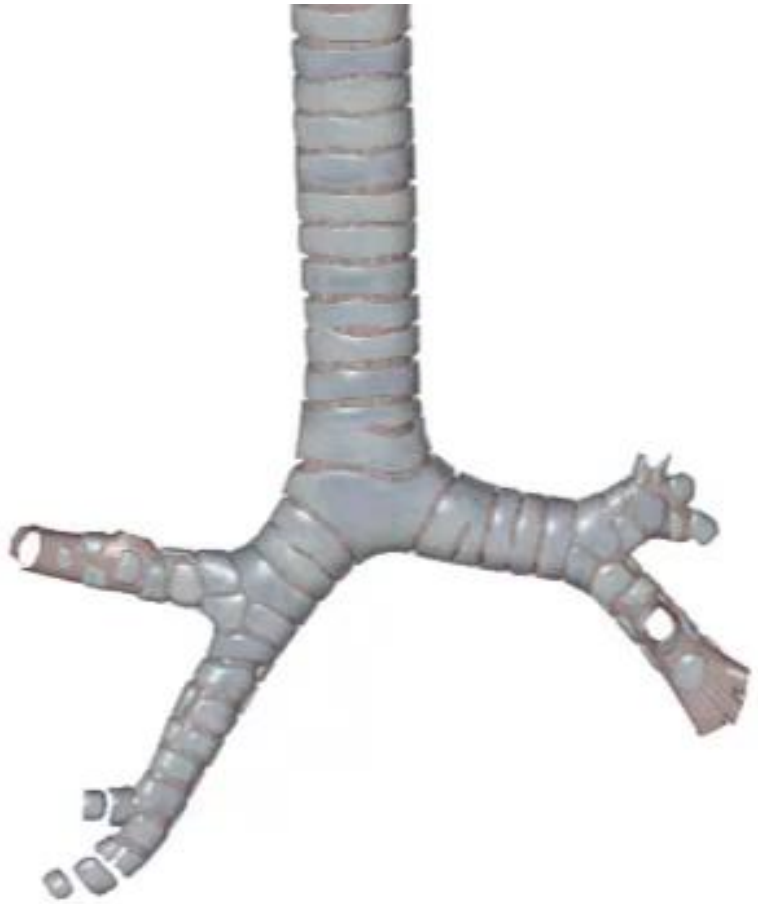
INFERIOR AND POSTERIOR LYMPH NODES

b. Bronchial nerves :

- They are arranged into two plexus :
- Anterior plexus
- Posterior plexus

- They are formed by :

- Branches of the vagus nerves (pneumogastric nerves)
- Pulmonary branches of the sympathetic nervous system.

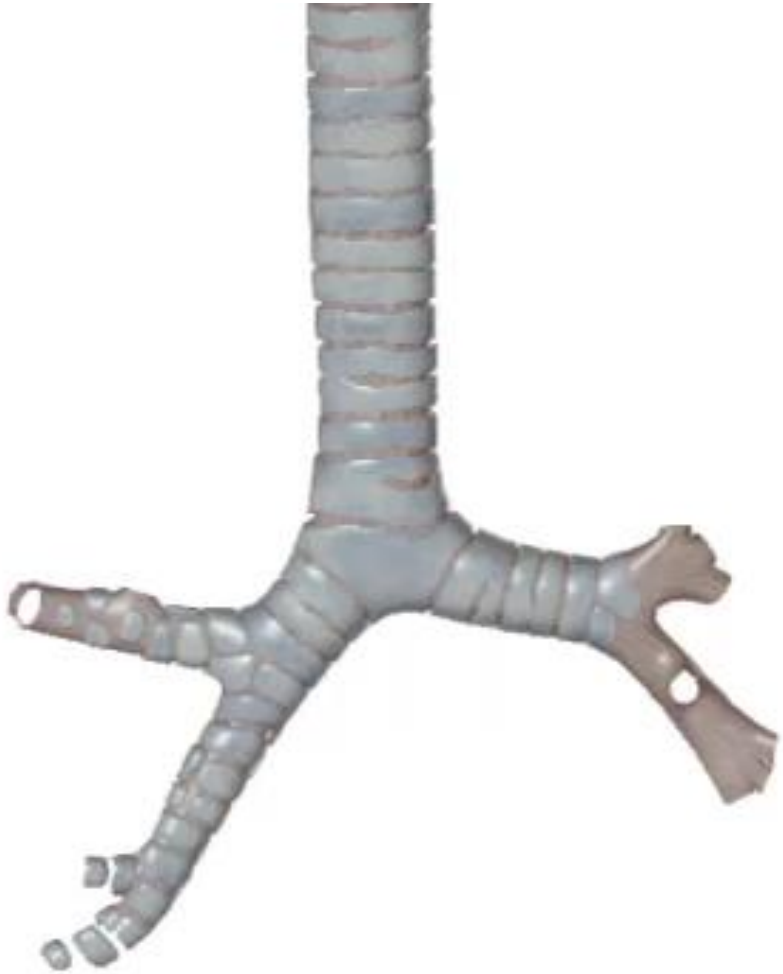


IV. ANATOMICAL RELATIONS :

1- Right pulmonary pedicle :

a. Mediastinal segment :

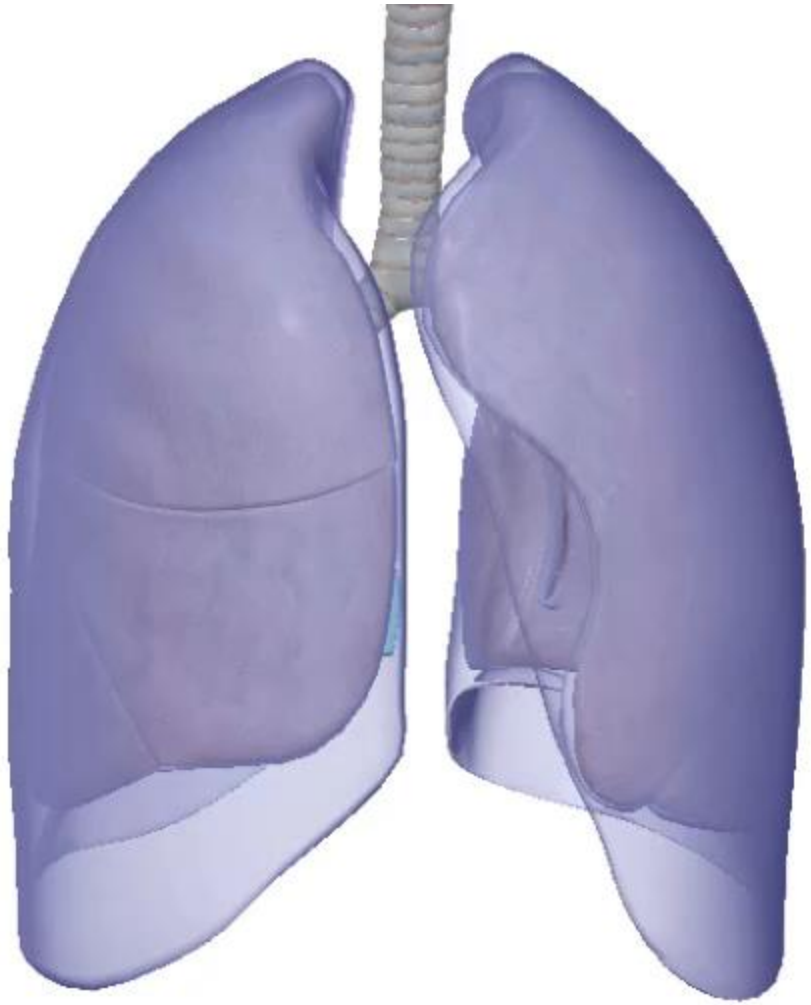
- Anteriorly :
  - ✓ The superior vena cava.
- Superiorly :
  - ✓ The arch of the azygos vein,
  - ✓ Right laterotracheal lymphatic chain (arch ganglia).
- Posteriorly :
  - ✓ The azygos vein,
  - ✓ The right vagus nerve.
- Inferiorly :
  - ✓ The triangular ligament,
  - ✓ The inferior vena cava,
  - ✓ The right atrium.



1- The right pulmonary pedicle :

b. The hilar segment :

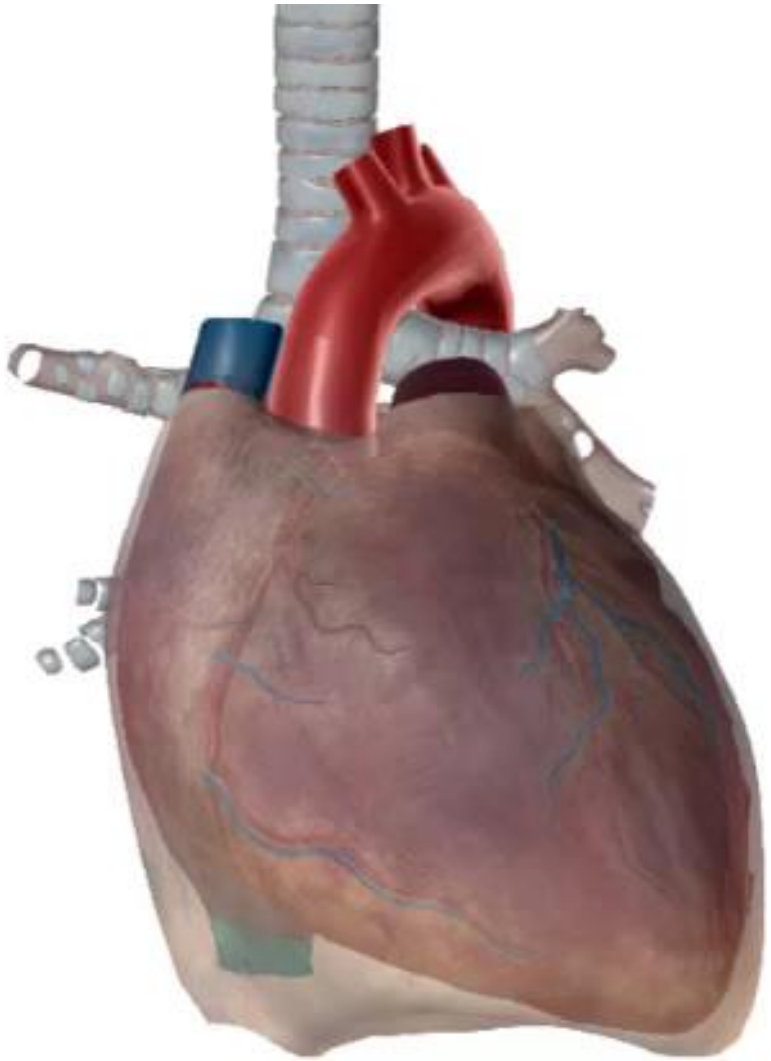
- At this level, it corresponds to the margins of the hilary fossa, which are lined with pleura that invaginates into the fossa.



2. The left pulmonary pedicle :

a. The mediastinal segment :

- Anteriorly :
  - ✓ The aortic arch.
- Superiorly :
  - ✓ The aortic arch,
  - ✓ The left recurrent laryngeal nerve,
  - ✓ The ligamentum arteriosum.
- Posteriorly :
  - ✓ The descending thoracic aorta,
  - ✓ The esophagus,
  - ✓ The thoracic duct,
  - ✓ The left vagus nerve.
- Inferiorly :
  - ✓ The triangular ligament,
  - ✓ The left atrium,
  - ✓ The left ventricle.

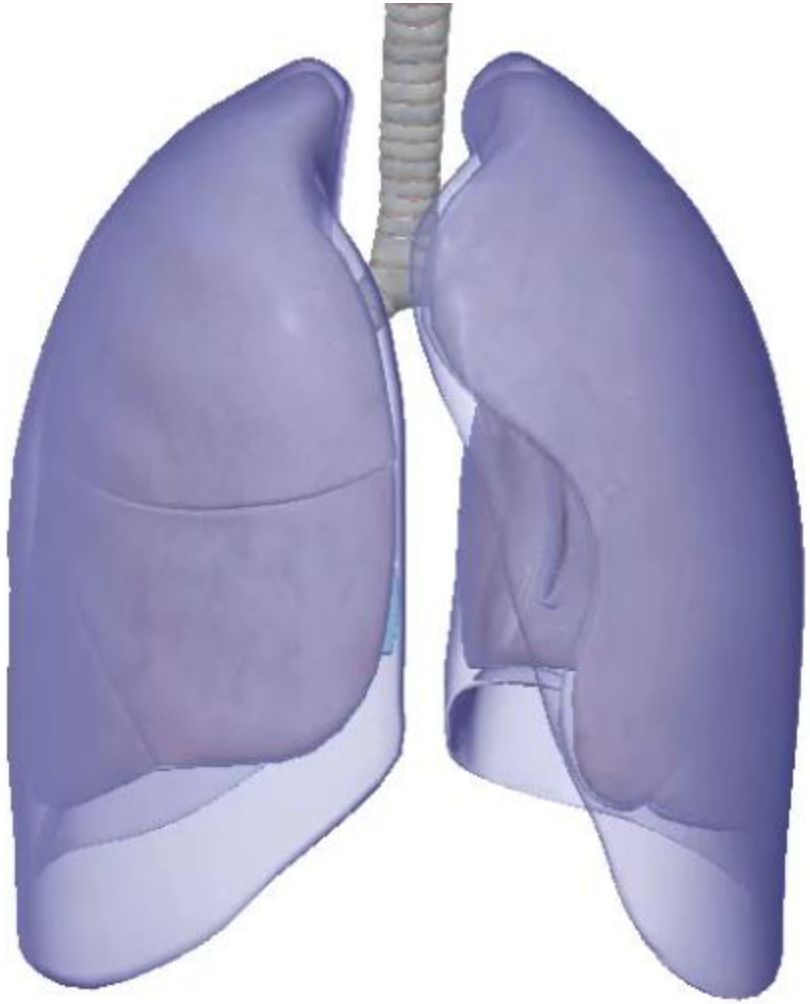


2. The left pulmonary pedicle :

b. The hilar segment :

- The relations are the same as on the right side, however the hilum is more central and positioned higher.

- The are only two lobar pedicules.



IV. ANATOMICAL APPLICATIONS

➢ Haemoptysis :

- The haemoptysis is defined as red, aerated blood of subglottic origin expelled through the mouth during a cough effort.
- It serves as an alarm symptom that requires further urgent etiological investigation.
- Thoracic imaging is crucial. Volumetric CT angiography allows for a comprehensive, non-invasive assessment.
- Endovascular treatment is the first line invasive approach :
  - ✓ Bronchial artery embolisation,
  - ✓ Pulmonary artery vaso-occlusion of the pulmonary artery.

V. CONCLUSION :

- Knowledge of the anatomy of the pulmonary pedicle is crucial for :
  - The understanding of cardio-pulmonary pathologies,
  - The interpretation of thoracic radiological exams,
  - The practice of certain therapeutic interventional procedures.