THE MIDDLE MEDIASTINUM

The University of Jordan School of
Medicine Department of Anatomy 2019

Middle mediastinum

Contains

THE Pericardial Sac

INCLUDES

Heart

Origins of the great vessels:

Ascending Aorta

Pulmonary trunk

Lower half of superior vena cava

Small part of inferior vena cava

very small part of

Pulmonary veins

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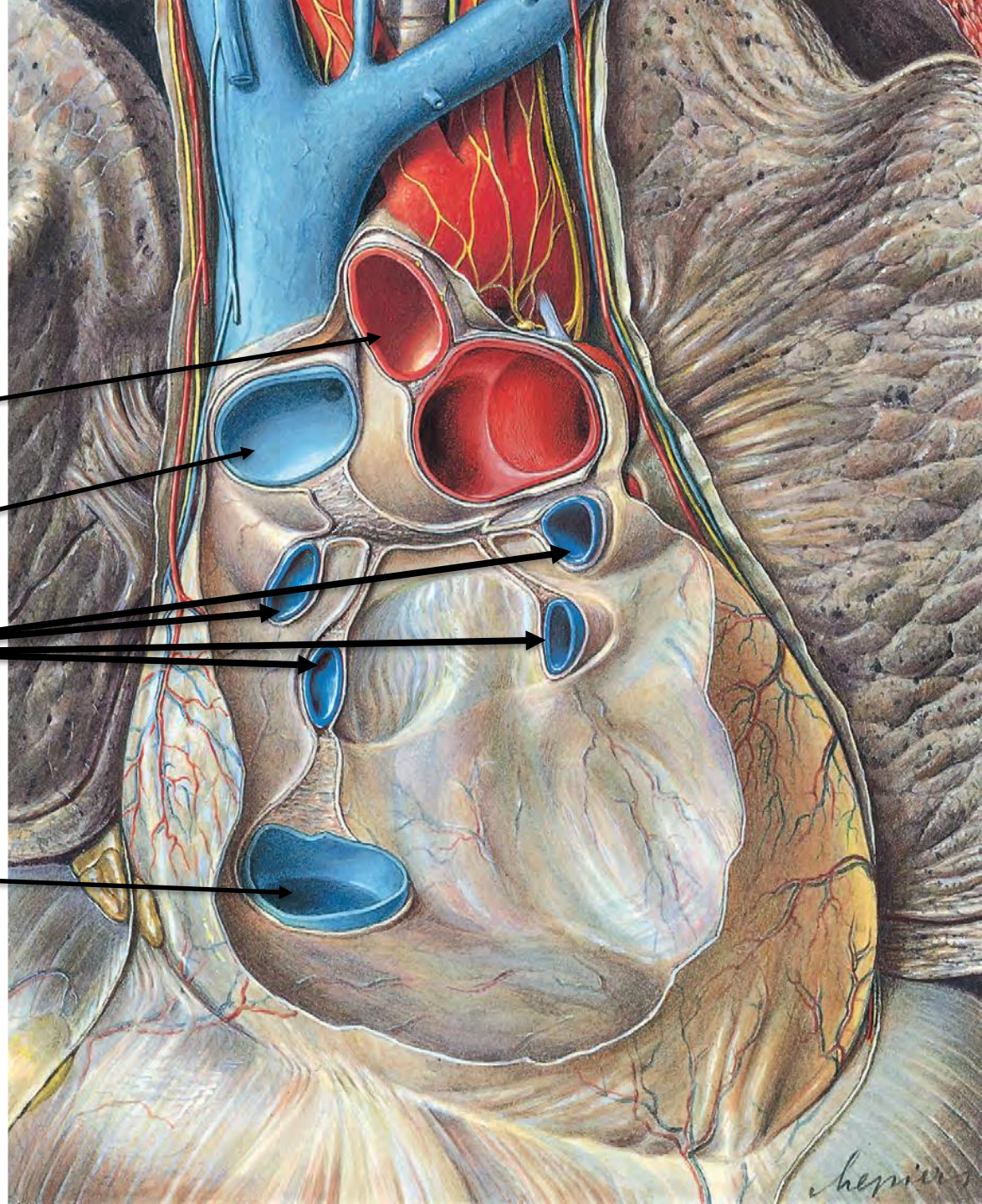

Dr. Amjad Shatarat

THE PERICARDIUM

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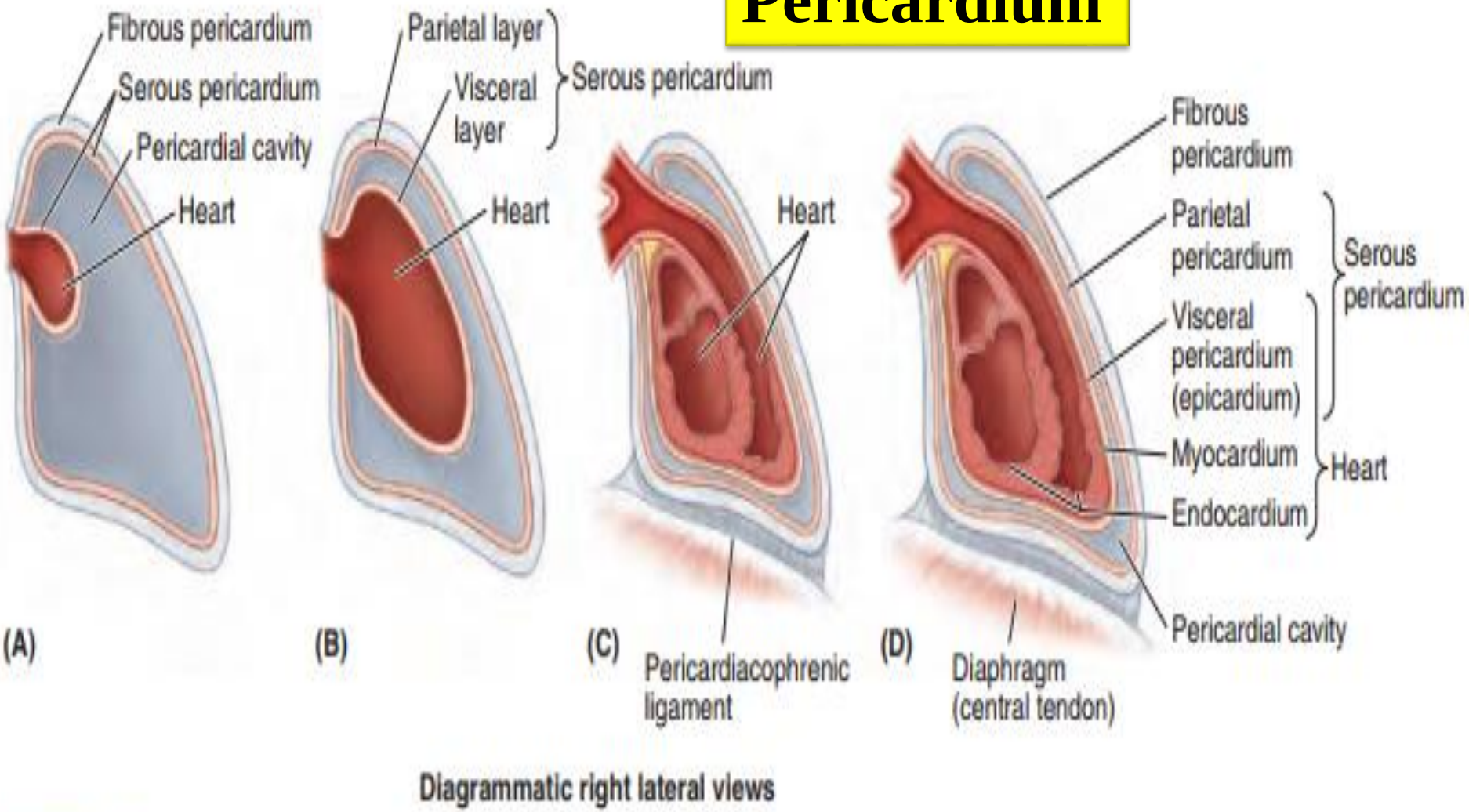
Pericardium



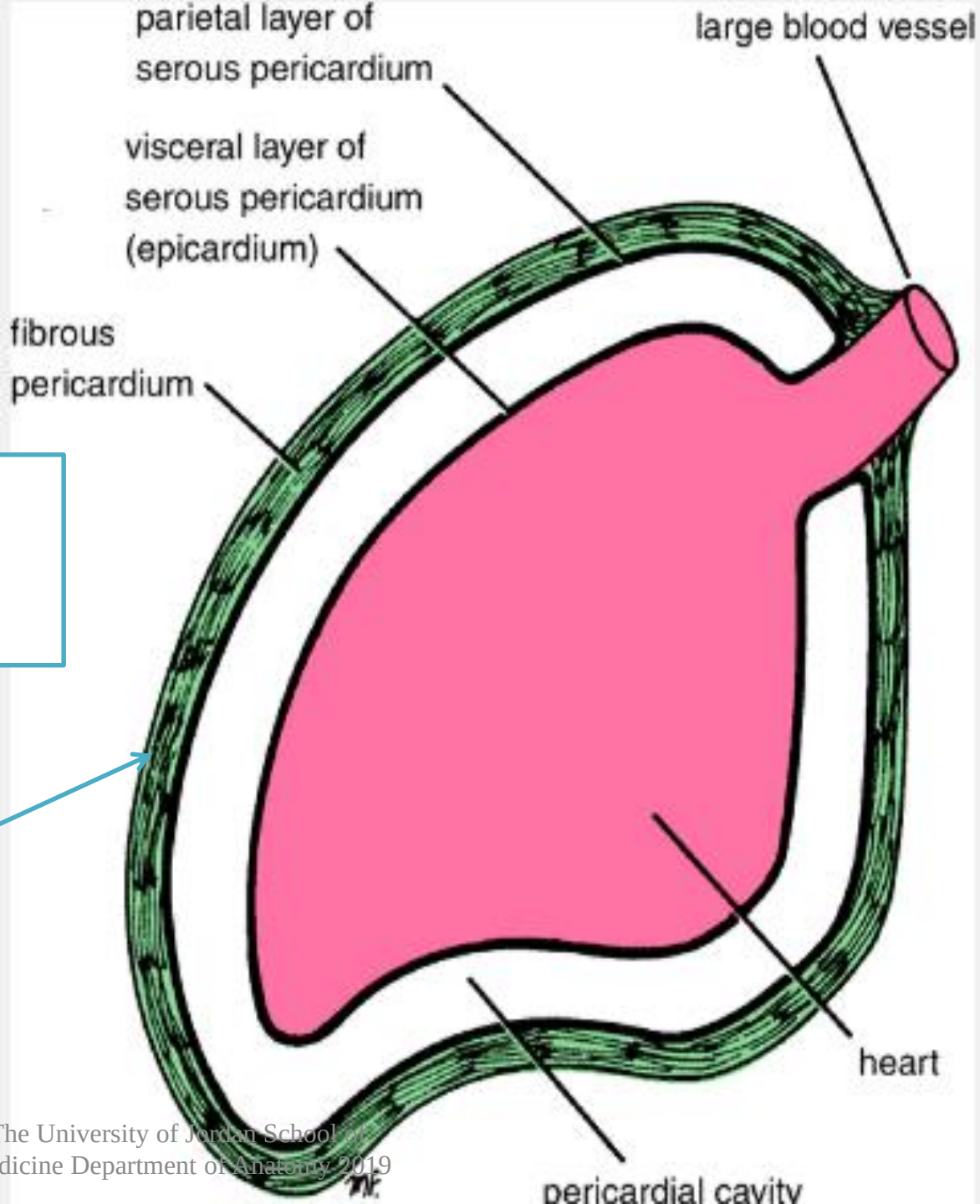
Diagrammatic right lateral views

FIGURE 1.43. Pericardium and heart. A. The heart occupies the middle mediastinum and is enclosed by pericardium, composed of two parts. The tough, outer fibrous pericardium stabilizes the heart and helps prevent it from overdilating. Between the fibrous pericardium and the heart is a "collapsed" sac, the serous pericardium. The embryonic heart invaginates the wall of the serous sac (**B**) and soon practically obliterates the pericardial cavity (**C**), leaving only a potential space between the layers of serous pericardium. **C** and **D**. The pericardiacophrenic ligament is the continuity of the fibrous pericardium with the central tendon of the diaphragm.

➢is a **<u>fibroserous sac</u>** surrounding the heart and the roots of the great vessels.

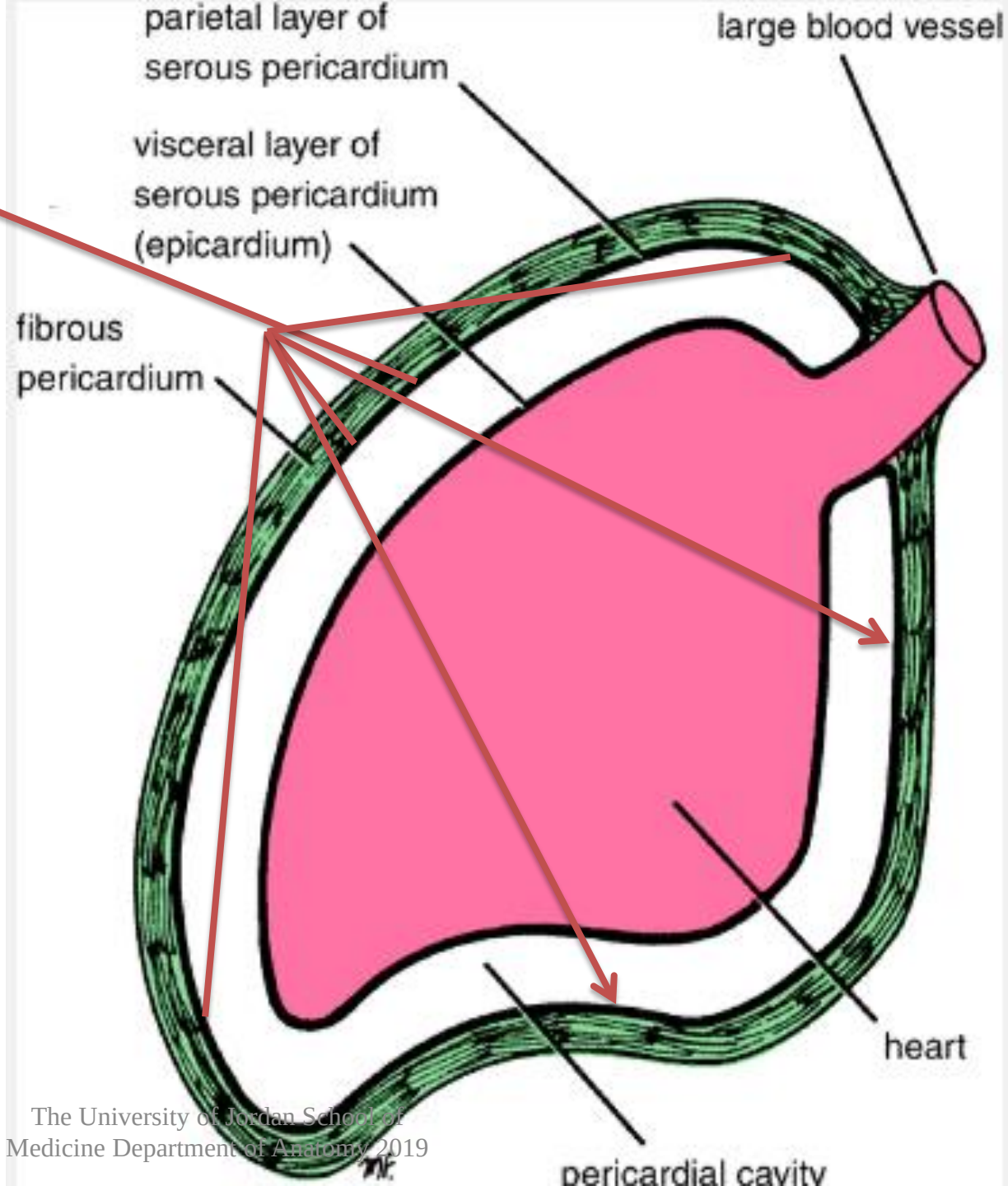
➢It consists of two components:
<u>1- The Fibrous Pericardium</u>
<u>2- The Serous Pericardium</u>

The fibrous pericardium is a tough connective tissue **<u>outer layer</u>**



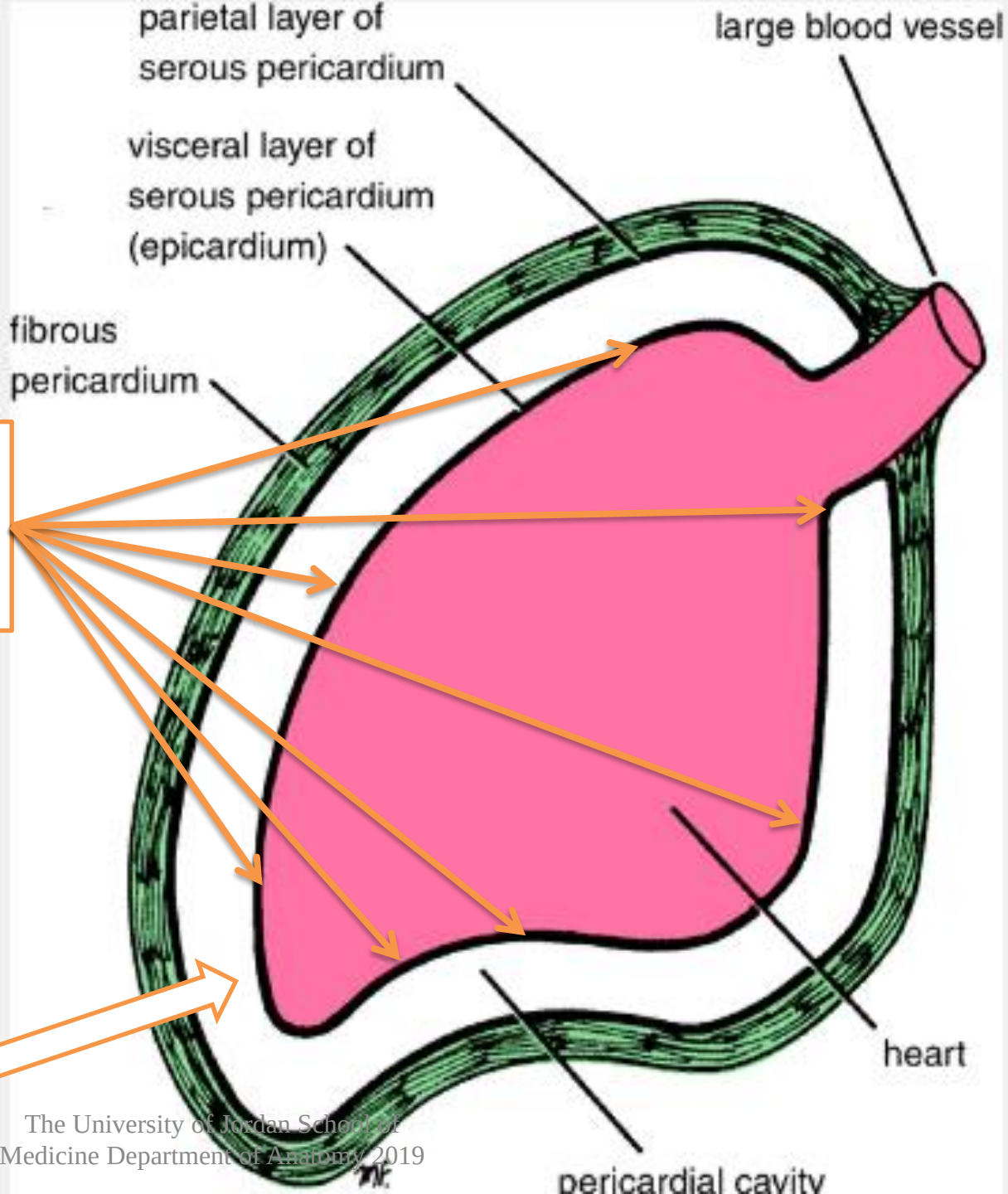
The serous pericardium is thin and consists of two parts:

1-THE PARIETAL LAYER lines the inner surface of the fibrous



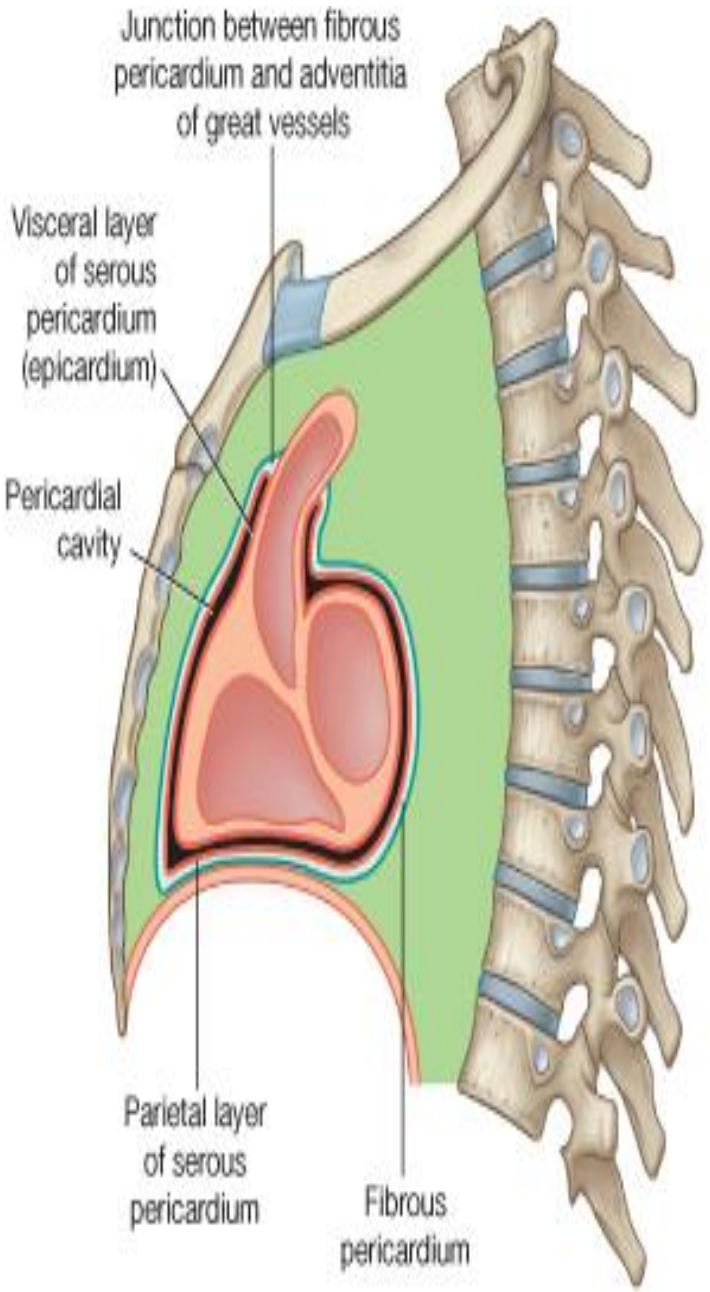
2-THE VISCERAL LAYER
(epicardium) of serous pericardium adheres to the heart and forms its outer covering

The narrow space created between the two layers of serous pericardium, containing a small amount of fluid, is the **pericardial cavity**.



The Fibrous Pericardium

- is a cone-shaped bag with its base on the diaphragm and its apex continuous with the **adventitia** of the great vessels
- The base is attached to the **central tendon of the diaphragm** and to a small muscular area of the diaphragm on the left side.
- Anteriorly, it is attached to the posterior surface of the sternum by **sternopericardial ligaments**.



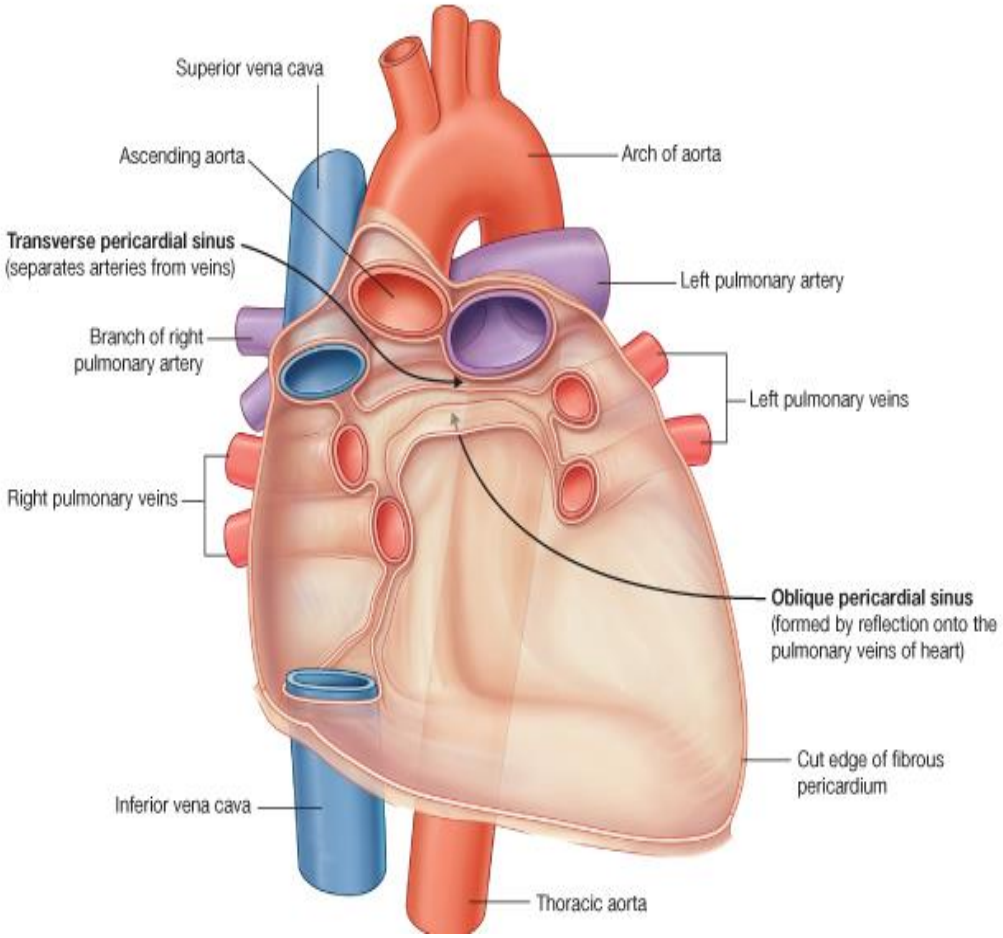
Serous pericardium

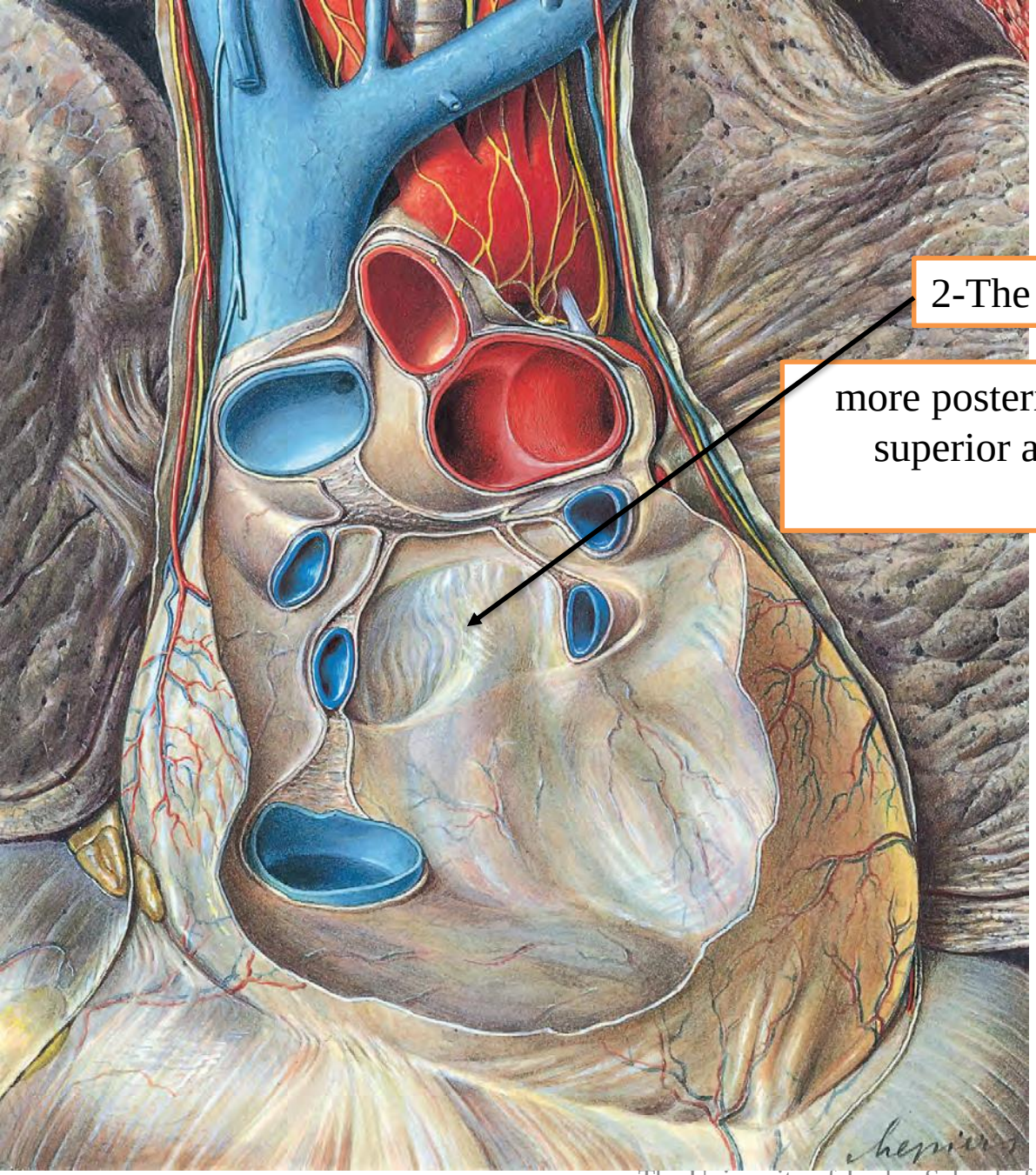
The parietal layer of serous pericardium is continuous with the visceral layers of serous pericardium around the roots of the great vessels.

- These reflections of serous pericardium occur in two locations:

1-Transverse pericardial sinus surrounding the arteries, the aorta and pulmonary trunk;

This sinus lies posteriorly to the ascending aorta and the pulmonary trunk, anteriorly to the superior vena cava, and superiorly to the left atrium





2-The **oblique pericardial sinus**

more posteriorly, surrounding the veins, the superior and inferior vena cava and the pulmonary veins

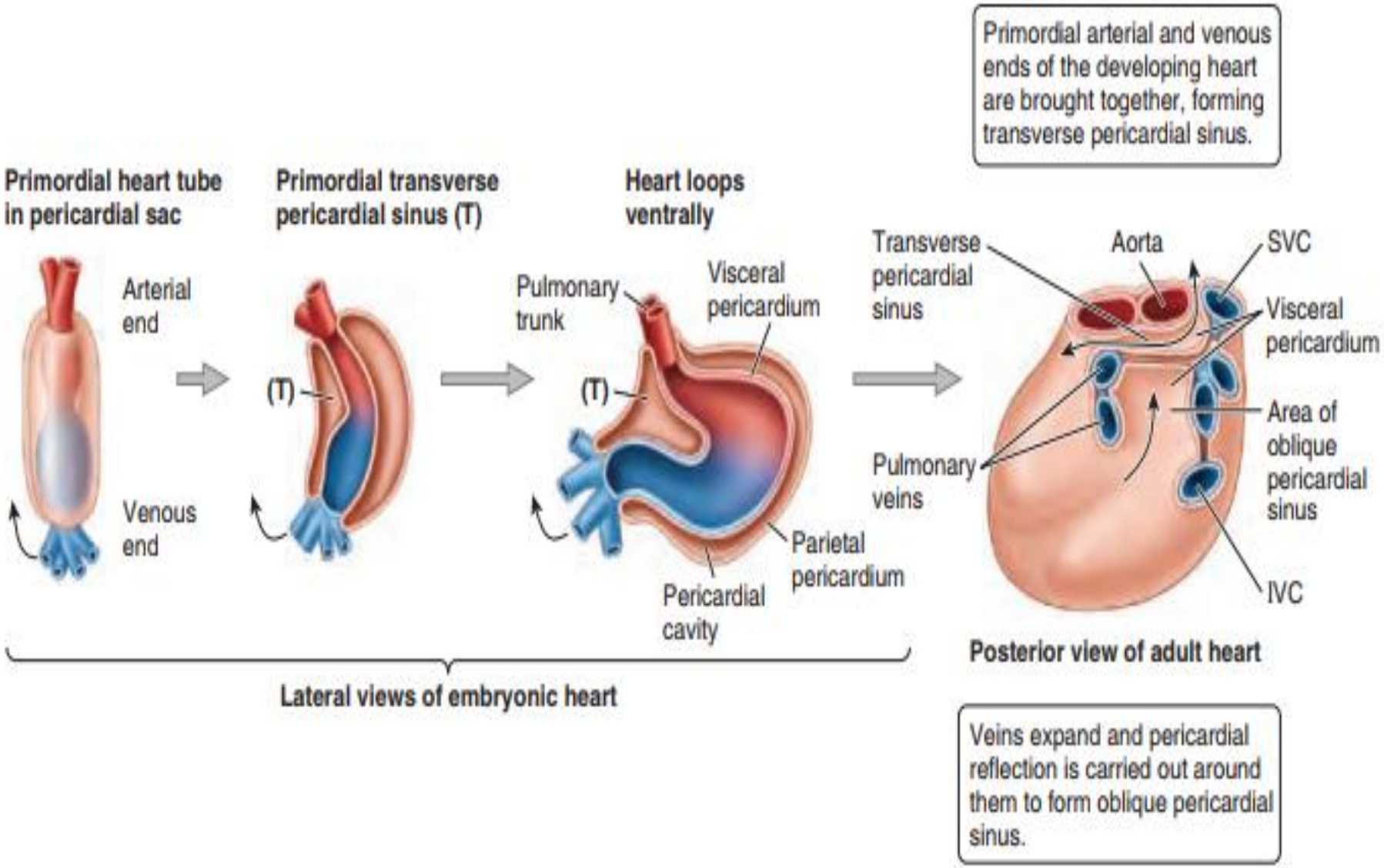


FIGURE 1.45. Development of heart and pericardium. The longitudinal embryonic heart tube invaginates the double-layered pericardial sac (somewhat like placing a wiener in a hot dog bun). The primordial heart tube then "loops" ventrally, bringing the primordial arterial and venous ends of the heart together and creating the primordial transverse pericardial sinus (*T*) between them. With growth of the embryo, the veins expand and spread apart, inferiorly and laterally. The pericardium reflected around them forms the boundaries of the oblique pericardial sinus. *IVC*, inferior vena cava; *SVC*, superior vena cava.

When the pericardium is opened anteriorly during surgery, a finger placed in the transverse sinus separates arteries from veins

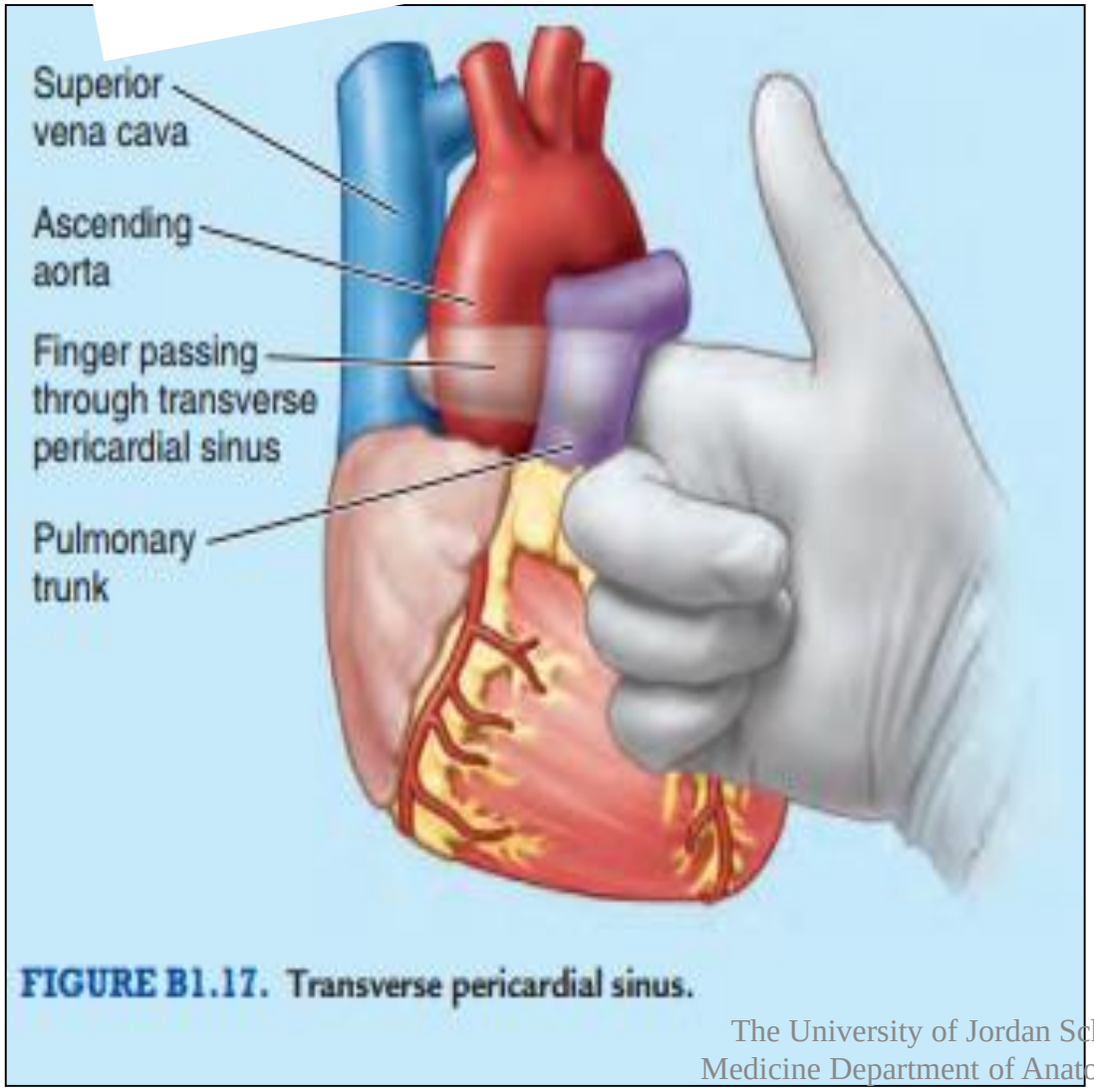


FIGURE B1.17. Transverse pericardial sinus.

The transverse pericardial sinus is especially important to cardiac surgeons.
After the pericardial sac is opened anteriorly,
a finger can be passed through the transverse pericardial sinus posterior to the ascending aorta and pulmonary trunk
. By passing a surgical clamp or a ligature around these large vessels, inserting the tubes of a coronary bypass machine, and then tightening the ligature, surgeons can stop or divert the circulation of blood in these arteries while performing cardiac surgery, such as coronary artery bypass grafting.

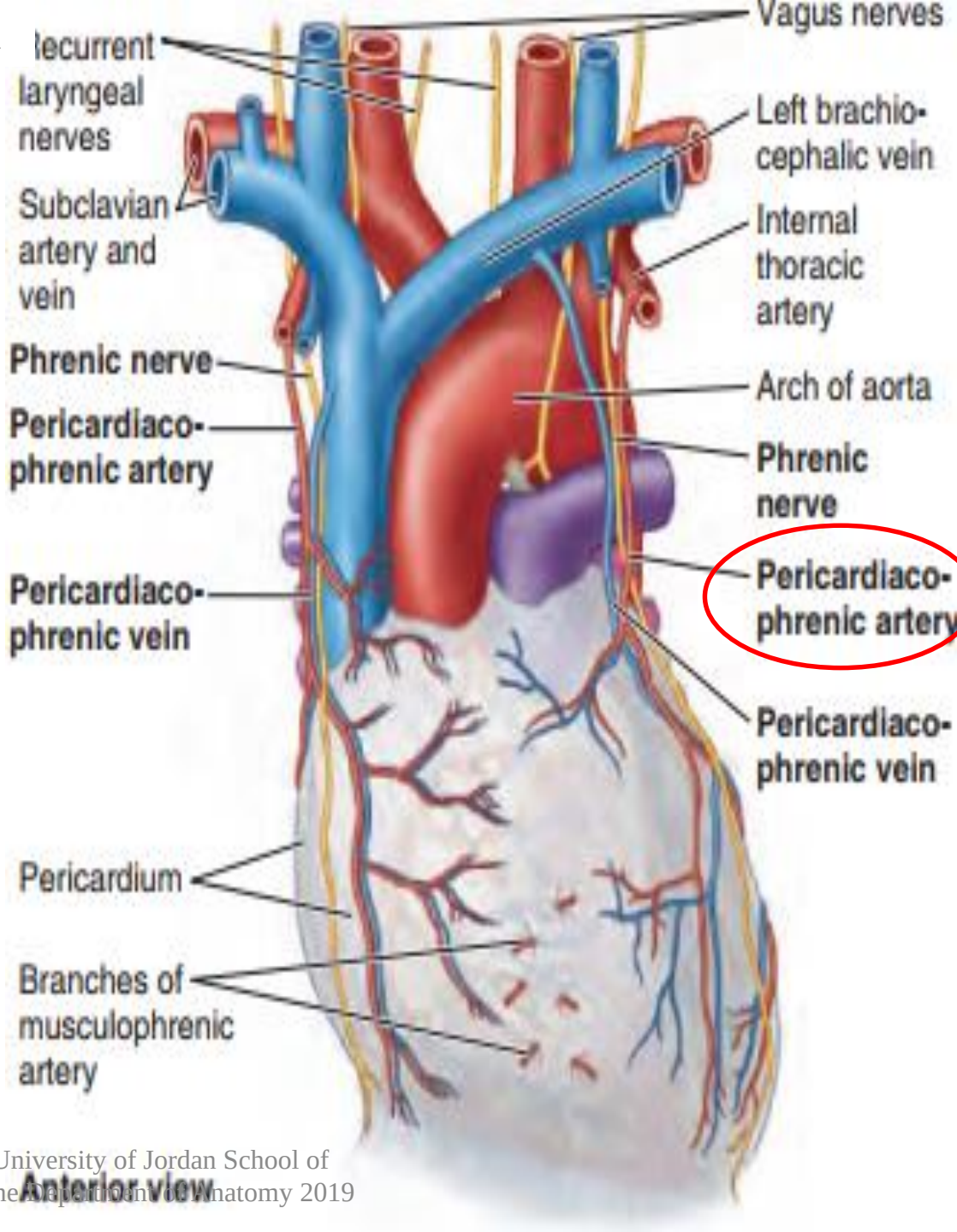
The arterial supply of the pericardium

❖ is ***mainly*** from a slender branch of **the internal thoracic artery**, the pericardiacophrenic artery, that often accompanies or at least parallels the phrenic nerve to the diaphragm.

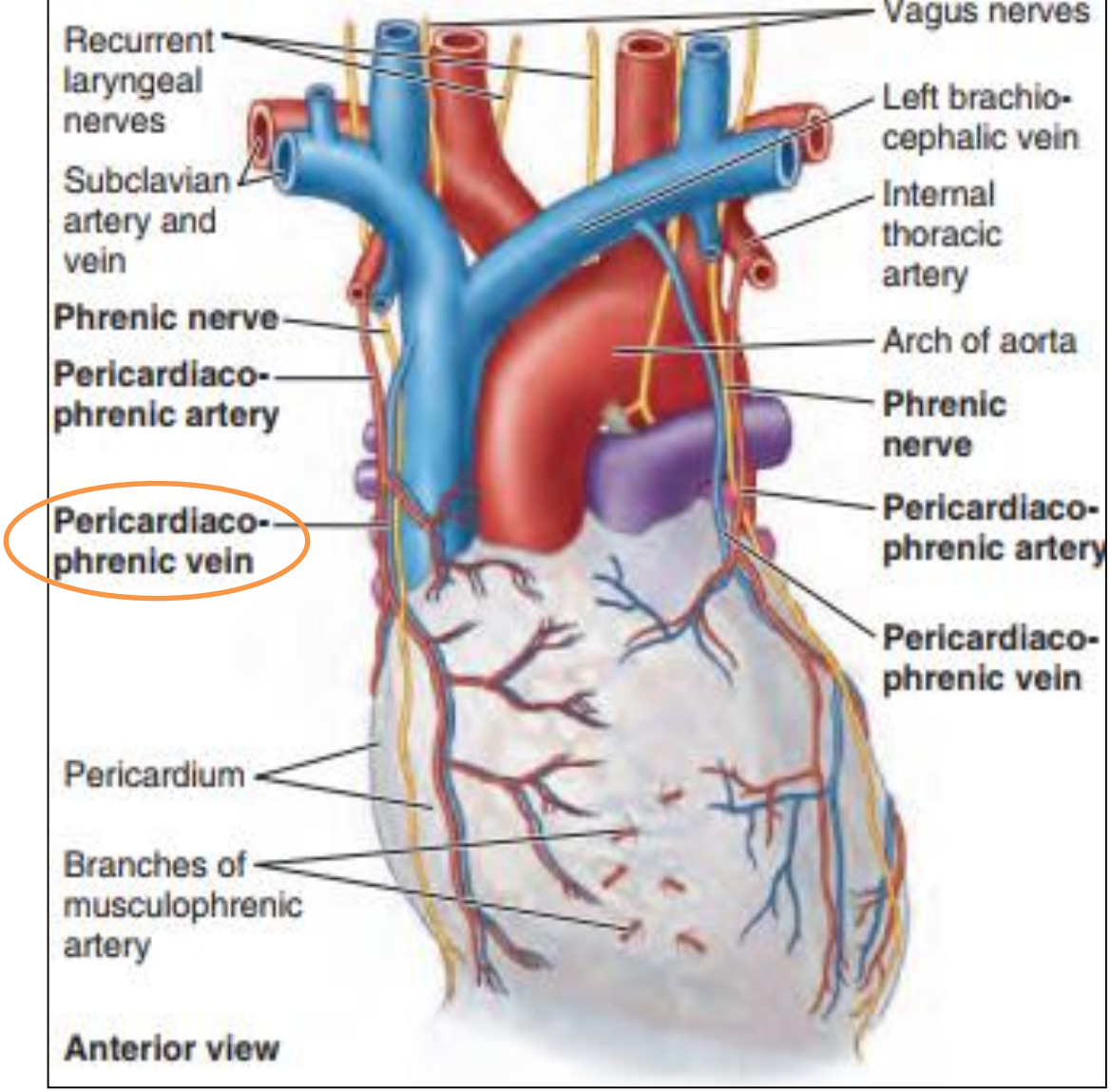
Smaller contributions of blood come from the:

- **Musculophrenic artery**, a terminal branch of the internal thoracic artery.
- **Bronchial, esophageal, and superior phrenic arteries,** branches of the thoracic aorta.

- ***Coronary arteries (visceral layer of serous pericardium only)***



The venous drainage of the pericardium is from the: • ***Pericardiacophrenic veins***, tributaries of the **brachiocephalic** (or **internal thoracic**) veins. Variable tributaries of the **azygos venous system**



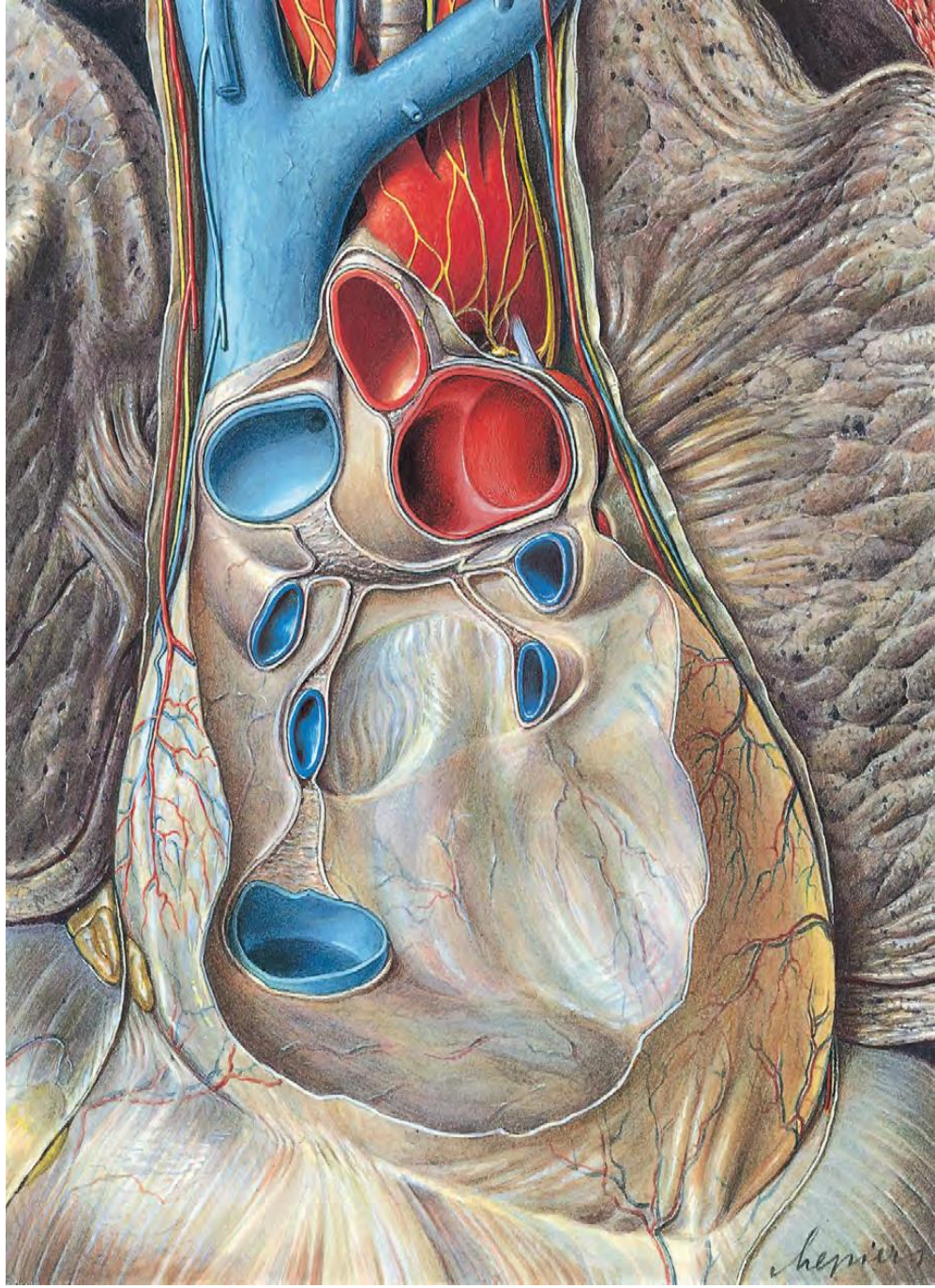
The nerve supply of the pericardium is from the:

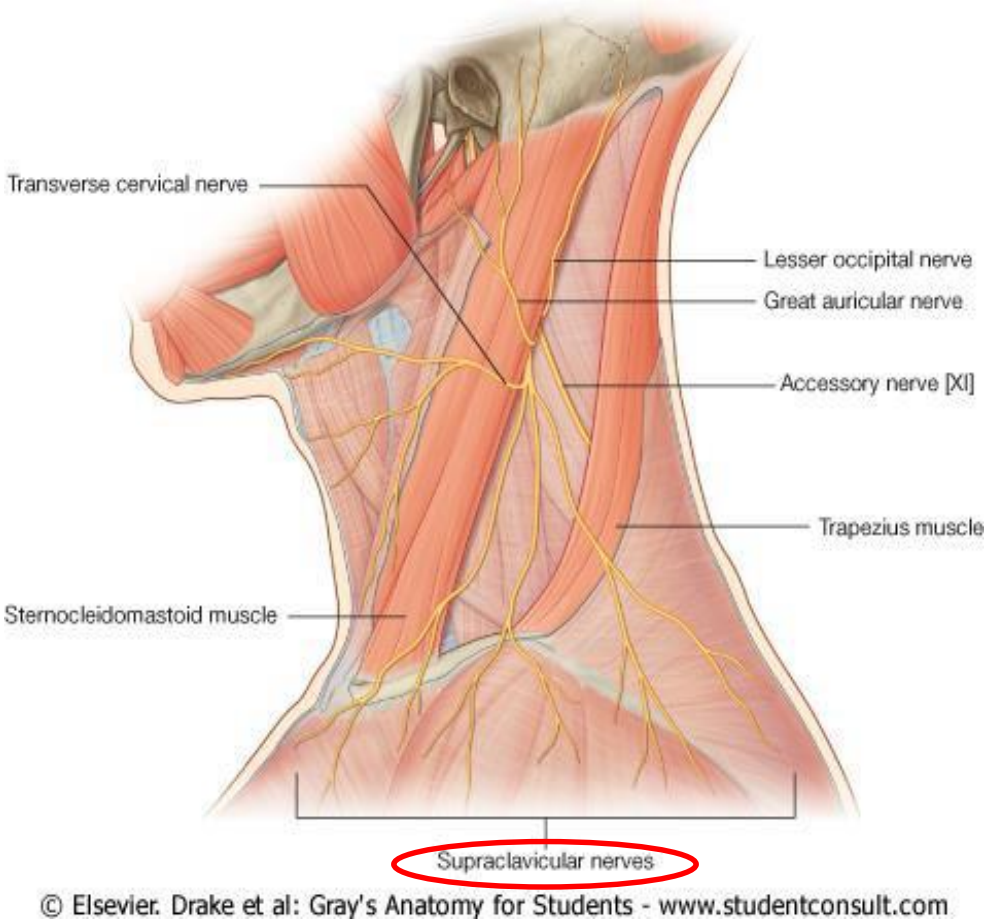
• **Phrenic nerves (C3–C5)**

primary source of sensory fibers; pain sensations conveyed by these nerves are commonly referred to the skin **(C3–C5 dermatomes)**

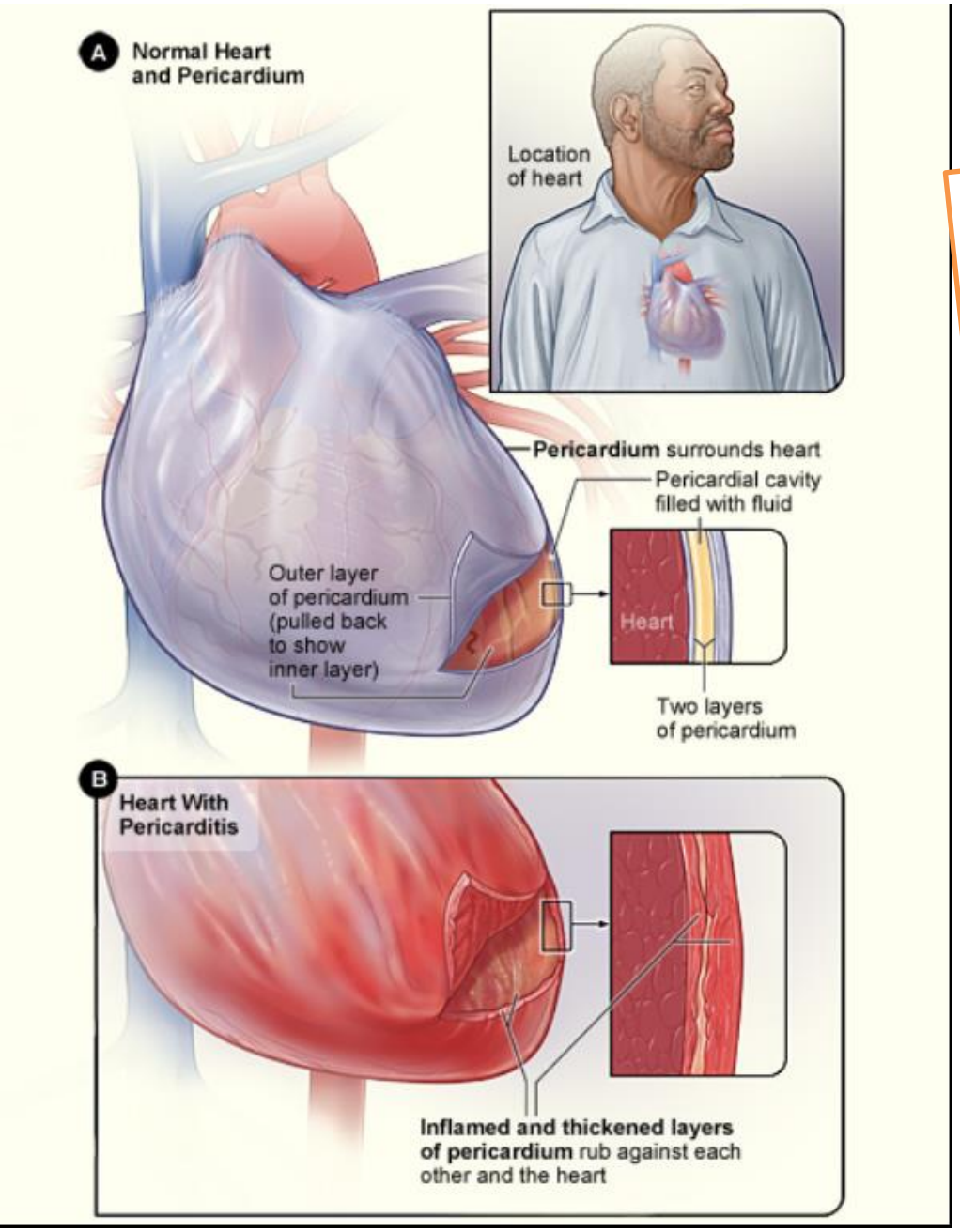
It is important to note that the source of ***somatic sensation*** *(pain) from the parietal pericardium is carried in the* ***phrenic nerves****.*

For this reason, **'pain' related** *to a* **pericardial problem** *may be referred to the* **supraclavicular region** *of the shoulder*





- **The supraclavicular nerve (C3 and 4) which is a branch of the cervical plexus,** supplies the skin over **the shoulder region**
- **This nerve is important clinically, because it shares the same root value with phrenic nerve and pain may be referred along the supraclavicular nerve from the phrenic nerve (pericarditis)**



Pericarditis is inflammation of the pericardium (the fibrous sac surrounding the heart).
Symptoms typically include sudden onset of sharp chest pain.

The pain may also be felt in the **shoulders**, neck, or back.

Important

Pain from the pericardium may be exacerbated
by lying back or on the left side and relieved by leaning forward

Pericardial effusion

Normally, only a **tiny amount** of fluid is present between the visceral and parietal layers of the serous pericardium.
In certain situations, this space can be filled with excess fluid (pericardial effusion).
Because the fibrous pericardium is a 'relatively fixed' structure that cannot expand easily, a rapid accumulation of excess fluid within the pericardial sac compresses the heart

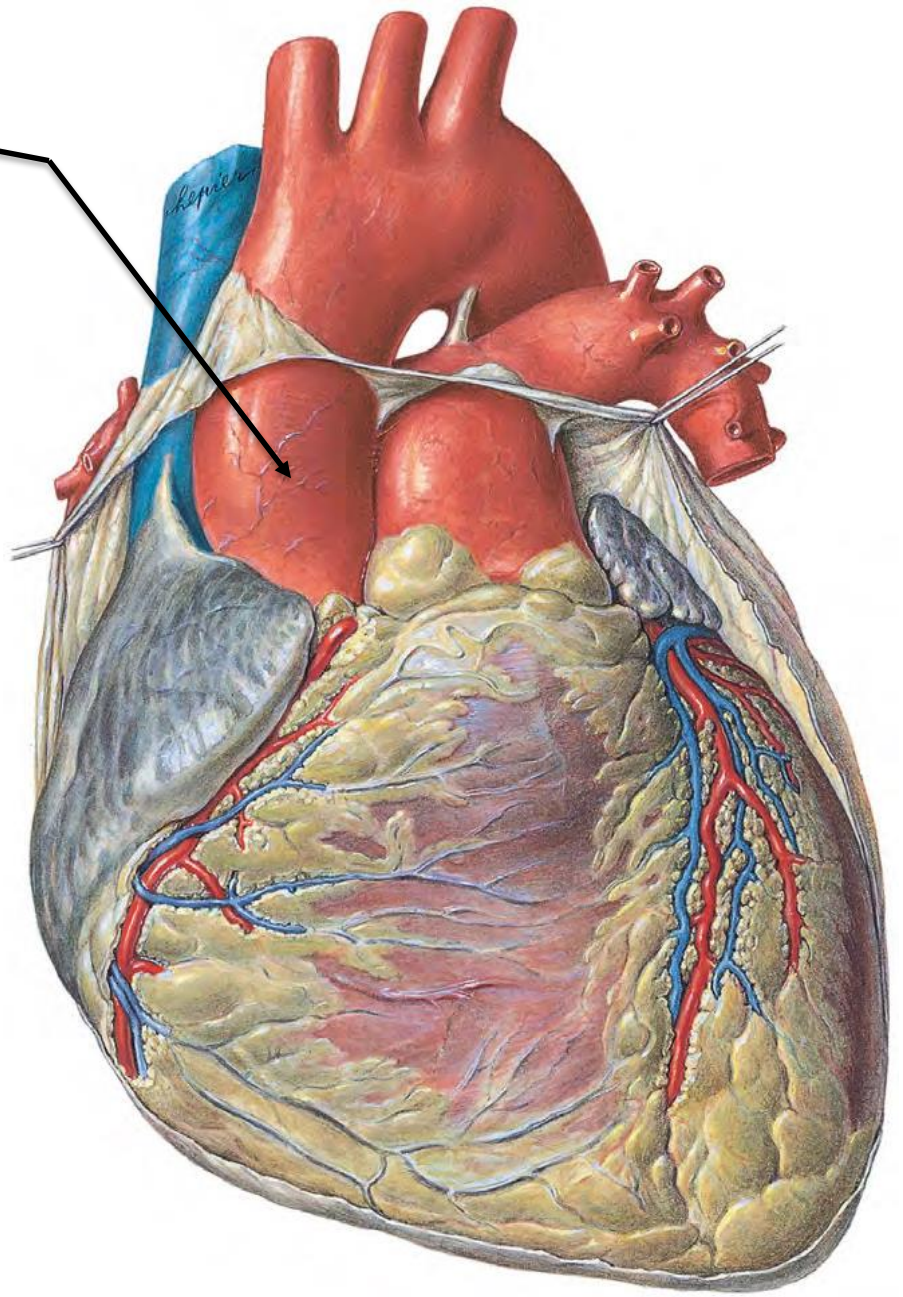
(cardiac tamponade)

resulting in biventricular failure.
Removing the fluid with a needle inserted into the pericardial sac can relieve the symptoms

ASCENDING AORTA

- The ascending aorta is typically 5 cm long
- begins at the base of the left ventricle, at the level with ***the lower border of the third left costal cartilage***

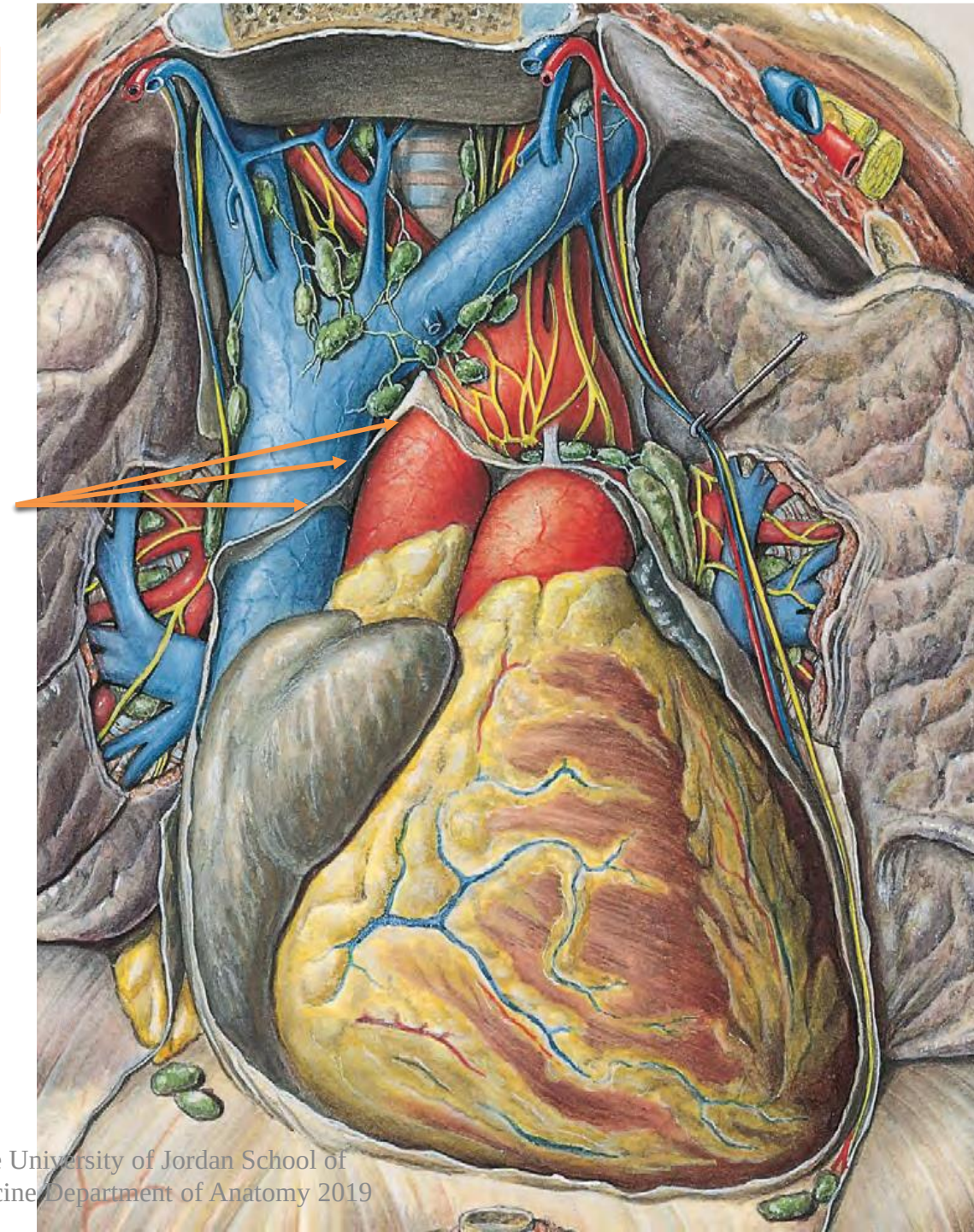
- It ascends obliquely, behind the left half of the sternum to the level of the upper border **of the second left costal cartilage (Ends at the level of the sternal angle), where it becomes continuous with the arch of the aorta**



ASCENDING AORTA… CONTINUED

- The ascending aorta lies within the ***fibrous pericardium***
- ***(what does this mean?)***

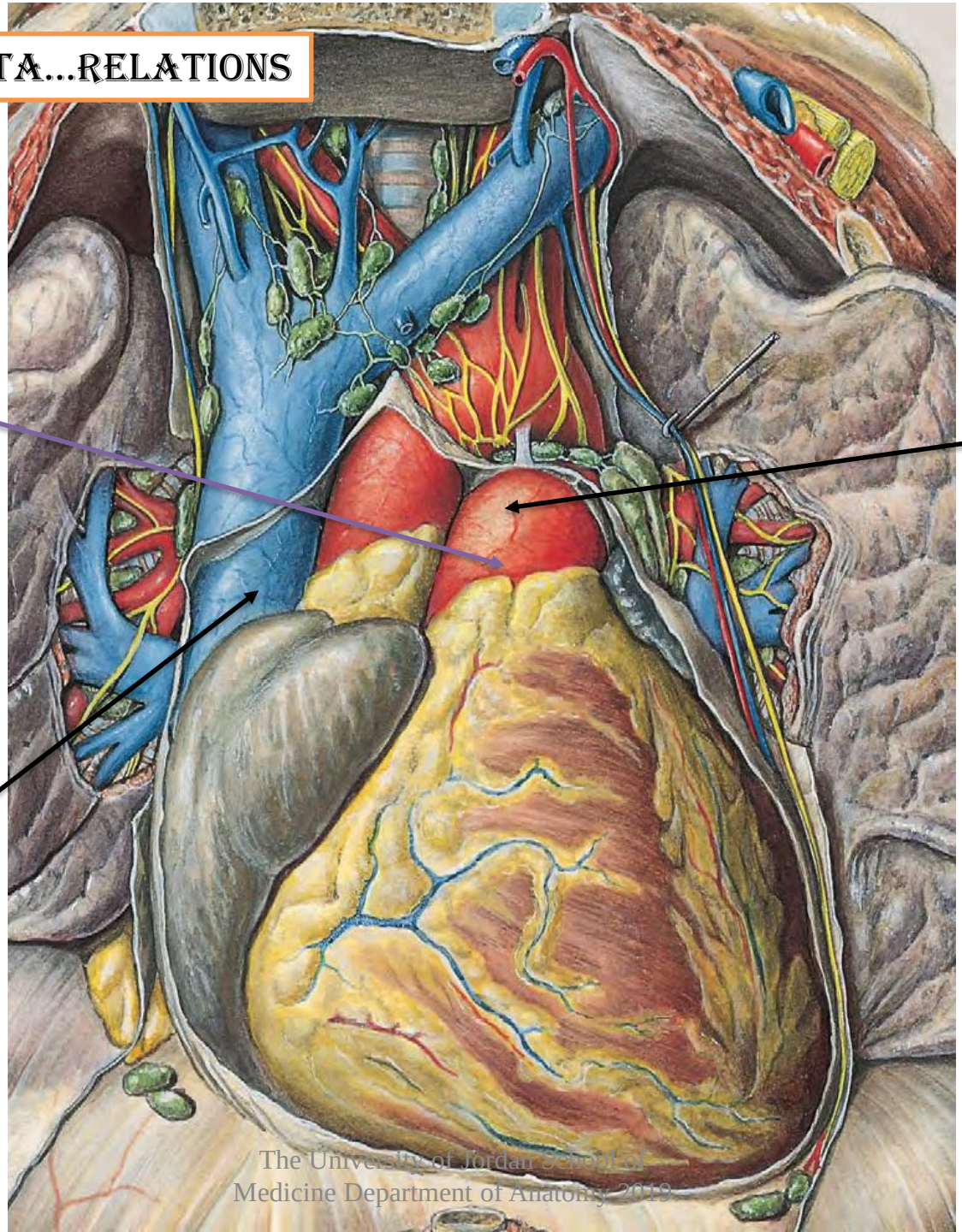
- At its root it possesses three bulges, the **sinuses of the aorta**



ASCENDING AORTA…RELATIONS

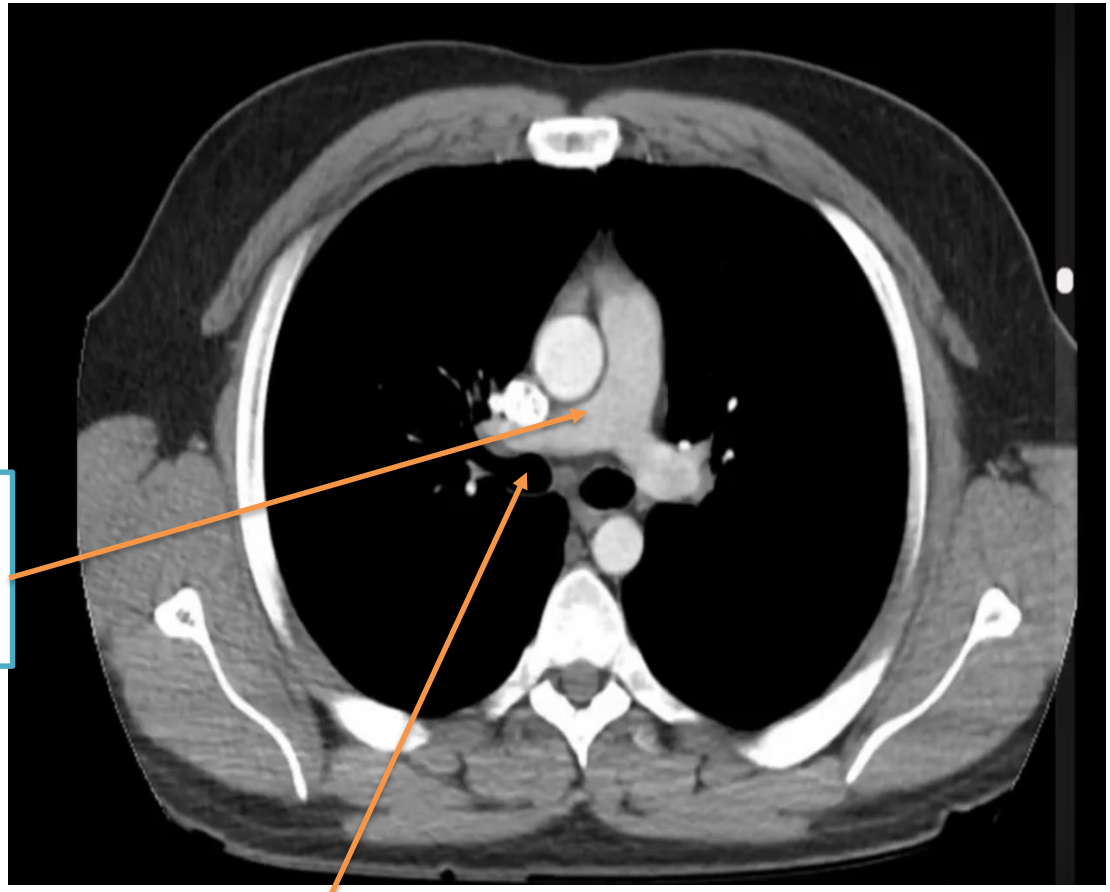
- **Anterior** the initial segment of the ***pulmonary trunk***

Right lateral is the LOWER part of superior vena cava



left lateral the pulmonary trunk

❖ Posterior to the Ascending aorta



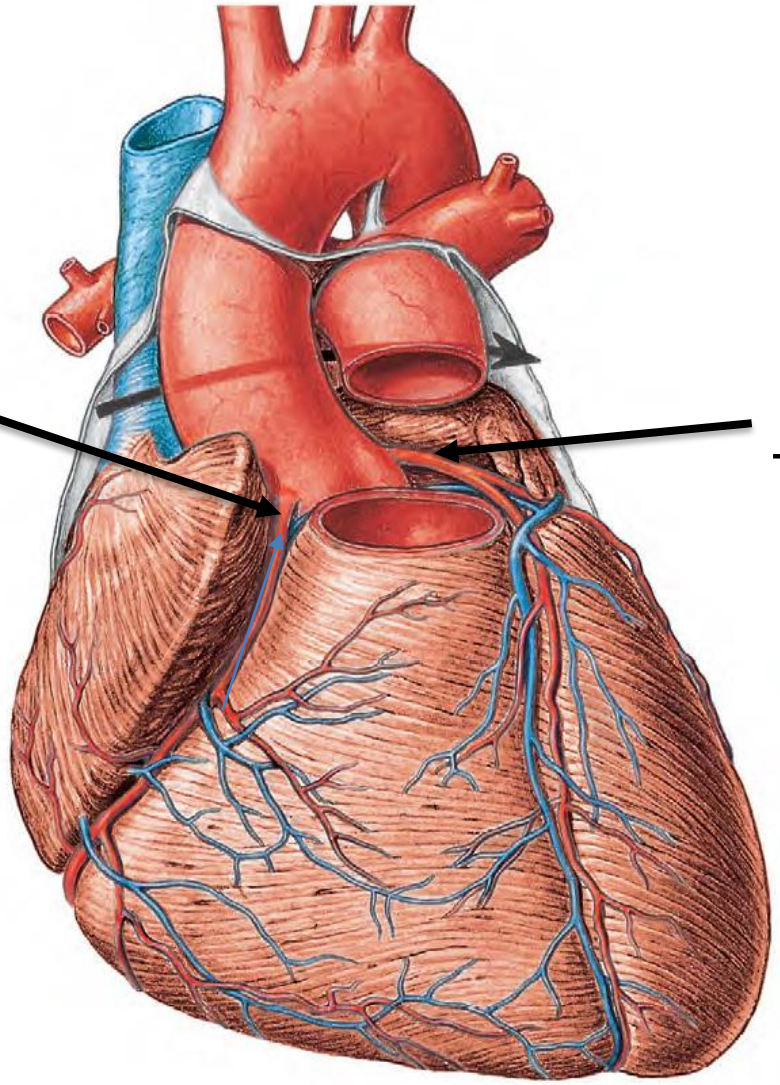
❖ **Right pulmonary artery**

❖ **principal bronchus**

CT scan

Ascending Aorta

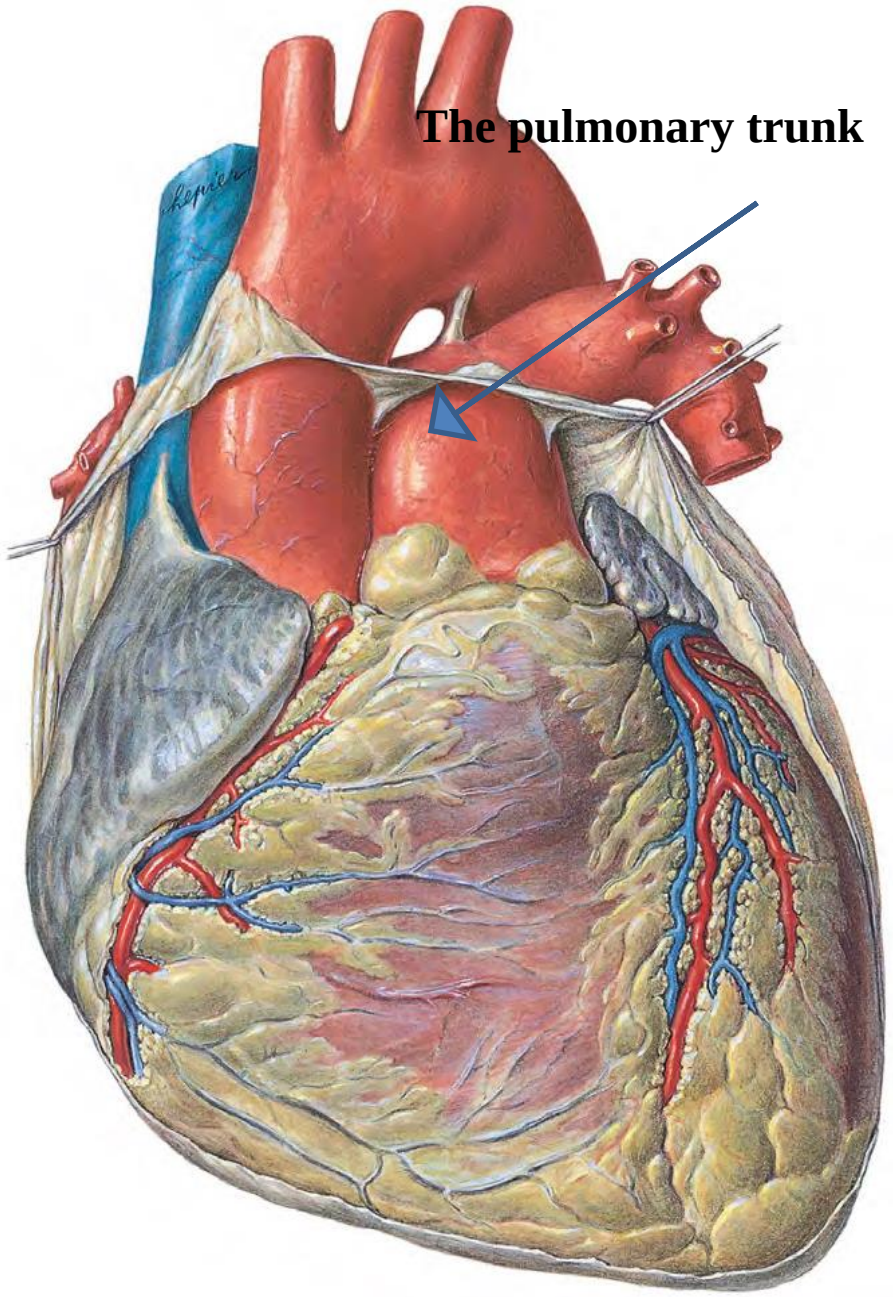
Branches



The right coronary artery

The left coronary artery

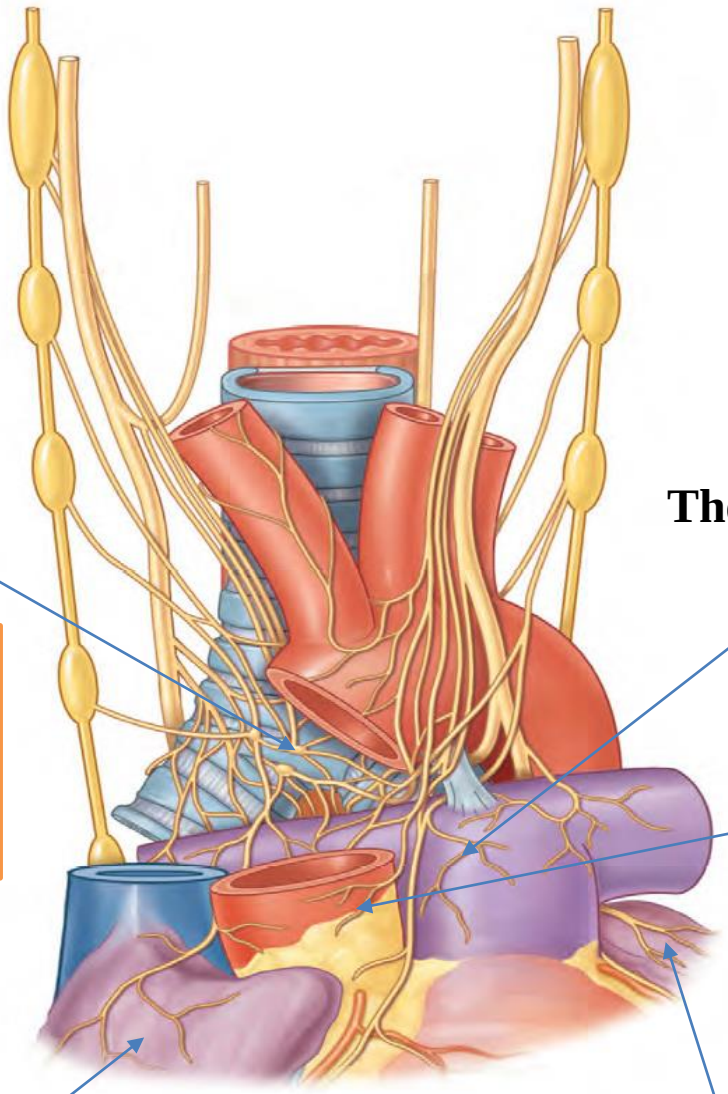
➢The **pulmonary trunk** is contained within the pericardial sac (Middle mediastinum)



- The pulmonary trunk, or pulmonary artery, conveys deoxygenated blood from the right ventricle to the lungs
- About 5 cm in length and 3 cm in diameter, it is the **most anterior** of the cardiac vessels
- Arises from the base of the right ventricle and it slopes up and back, ***at first in front of the ascending aorta, then to its left.***

The ascending aorta ultimately lies on its right

The Tracheal Bifurcation



The Pulmonary Trunk

❖ The pulmonary trunk bifurcation lies below, in front and to the left of the tracheal bifurcation

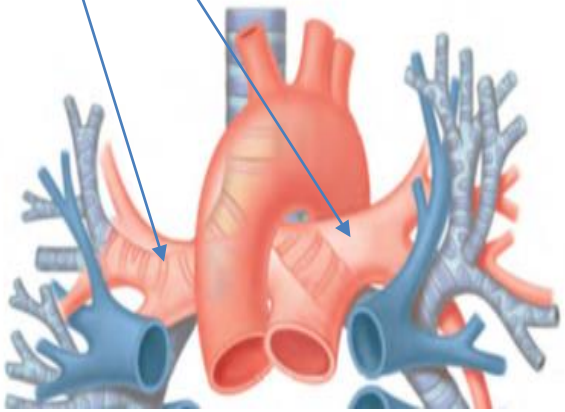
An auricle and coronary artery lie on each side of its origin

Below the aortic arch

- At approximately the level of the intervertebral disc between vertebrae TV and TIV divides into the:

Angle of LOUIS

Right pulmonary artery
Left pulmonary artery



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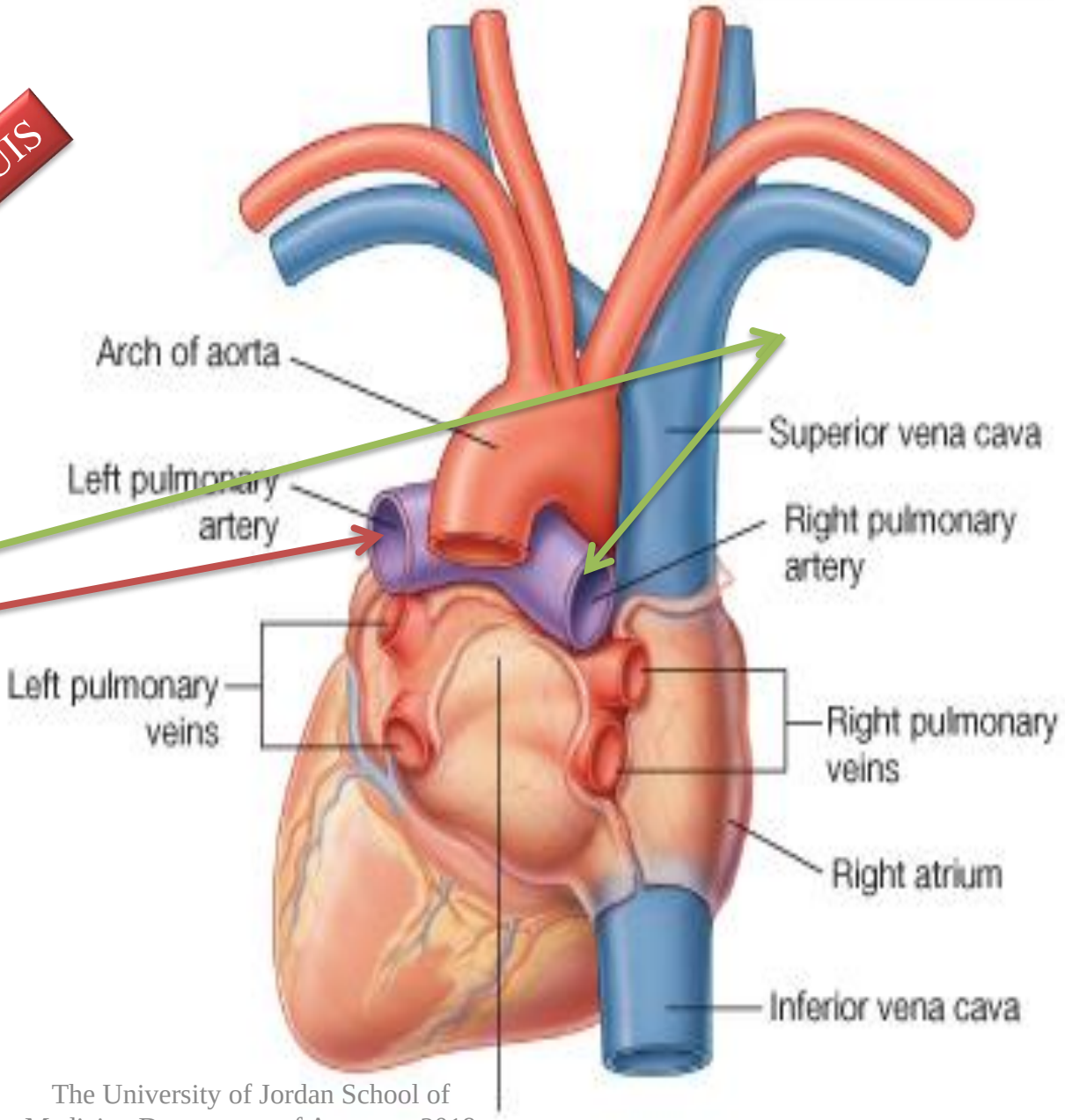
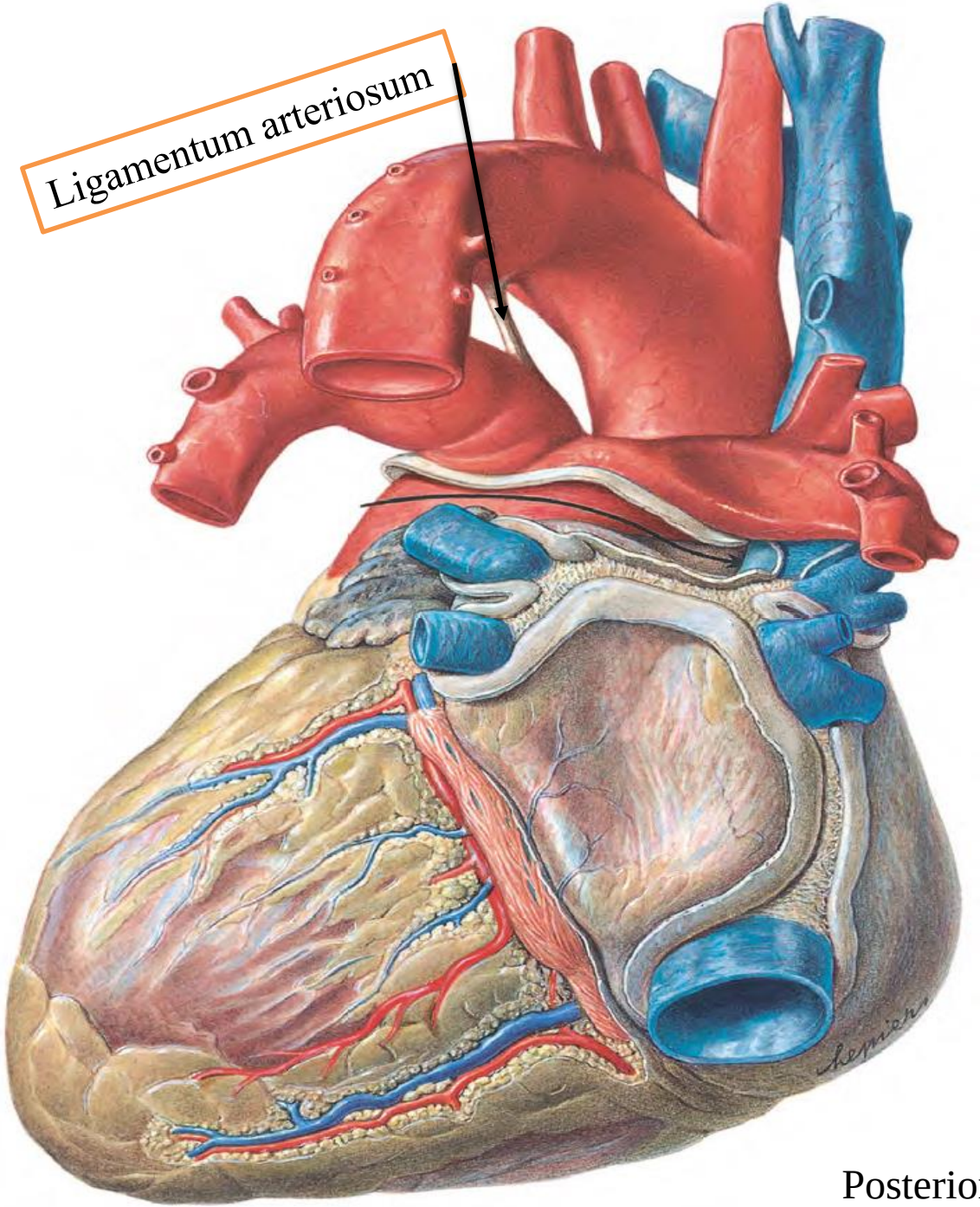




In the fetus, at the level of the bifurcation the pulmonary artery is connected
to the aortic arch by
The ductus arteriosus
which lies in the same direction
as the pulmonary artery.

Posterior view

Pulmonary Embolism

❖ Obstruction of a pulmonary artery by a blood clot (embolus) is a common cause of morbidity (sickness) and
mortality (death).
An embolus in a pulmonary artery forms when a blood clot, fat globule, or air bubble travels in
the blood to the lungs from a leg vein.
The embolus passes through ***the right side of the heart to a lung through a pulmonary artery***.
The embolus may block a pulmonary artery—pulmonary embolism—or one of its branches.
The immediate result is partial or complete obstruction of blood flow to the lung.
The obstruction
results in a sector of lung that is ventilated but not perfused with blood.
When a large embolus occludes a
pulmonary artery, the person suffers acute respiratory distress because of a major decrease in the oxygenation
of blood owing to blockage of blood flow through the lung. A medium-size embolus may block an artery
supplying a bronchopulmonary segment, producing a pulmonary infarct, an area of necrotic (dead) lung tissue.

Read this paper

Sex-Specific Parameters of Ascending Aorta, Descending Aorta and Pulmonary Trunk by Computed Tomographic Angiography with Impact of Age, Hypertension, Smoking and Diabetes

Amjad S. Shatarat; Maher T. AL-Hadidi; Darwish H. Badran; Faraj F. Bustami; Azmy M. AL-Hadidy; Emad S. Tarawneh; Nathir M. Obeidat & Sherin W. Abd El Malek

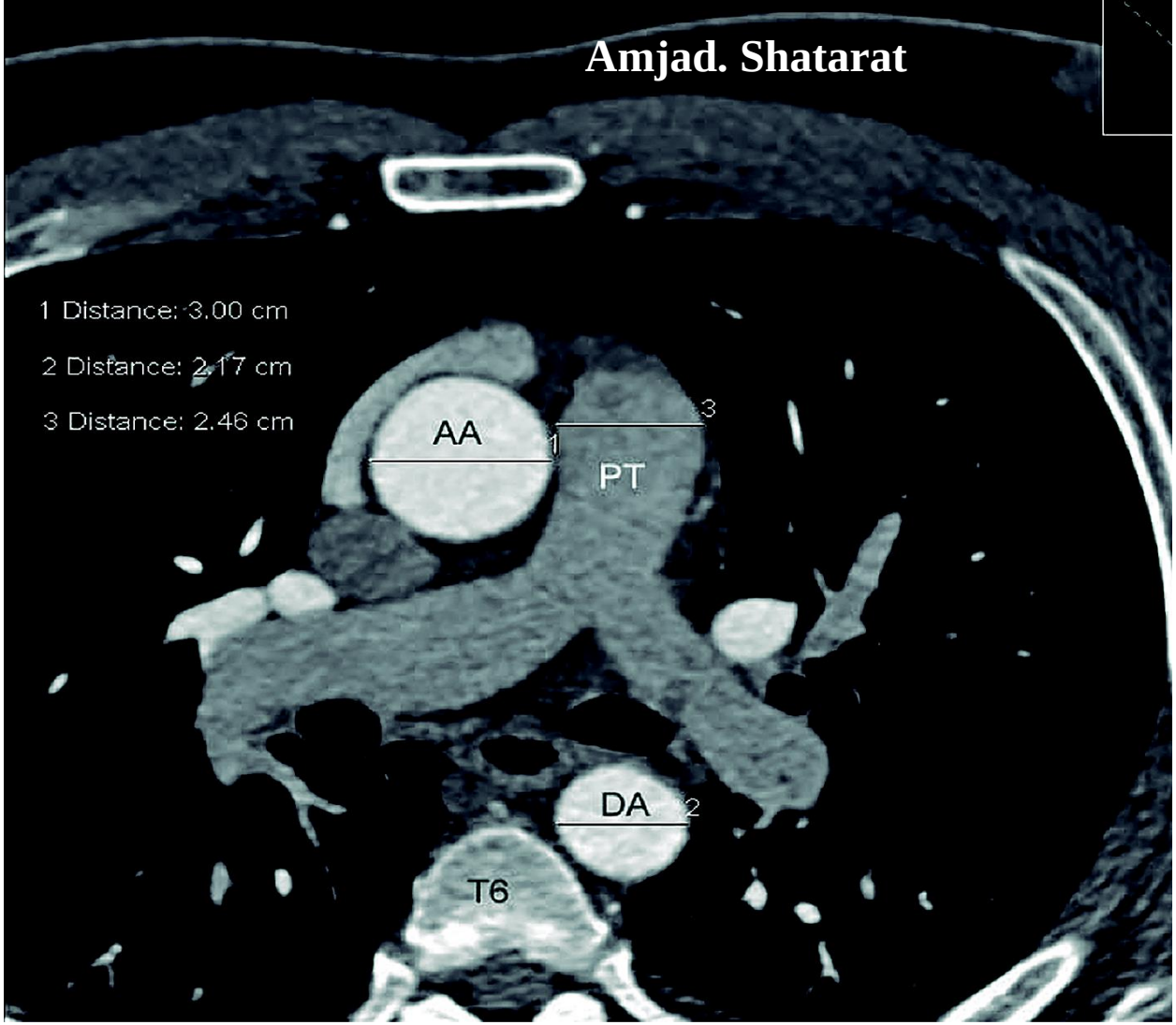
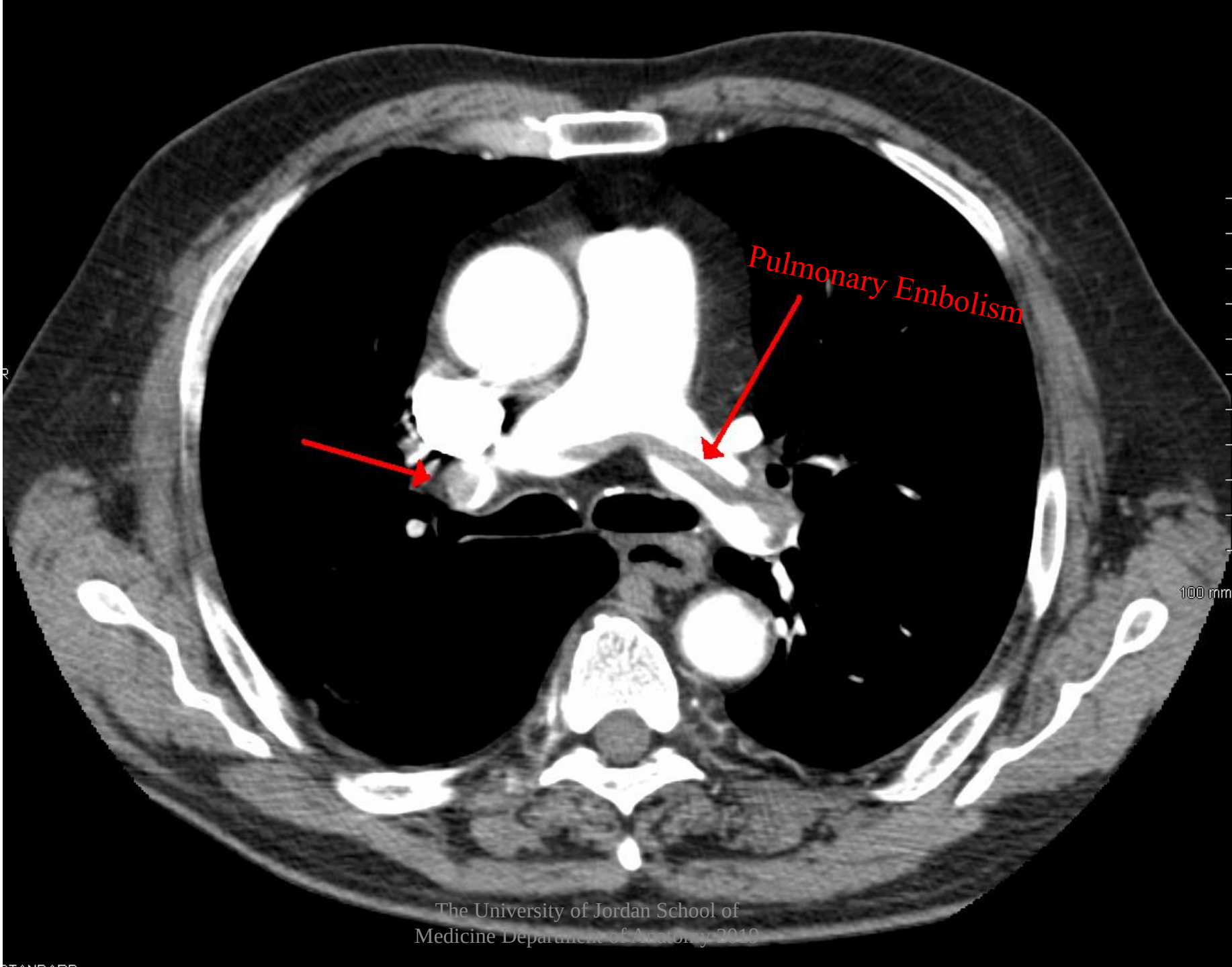


Fig. 1. Axial CTA image of the thorax, demonstrates ascending aorta, descending aorta and pulmonary trunk at the ***upper border of the sixth thoracic vertebra***. AA=ascending aorta, DA= descending aorta, PT= pulmonary trunk


Pulmonary Embolism
100 mm
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