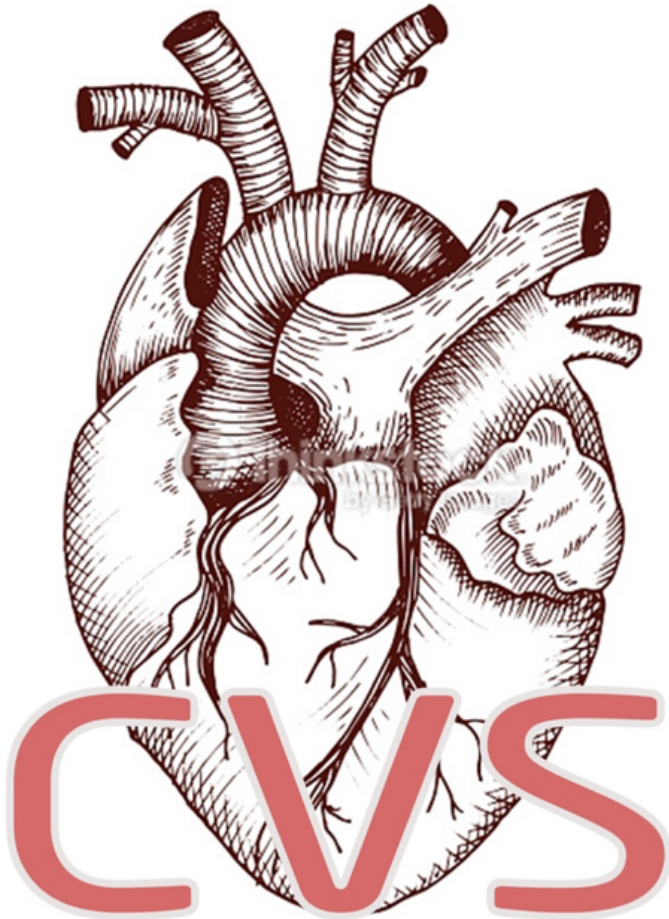


CVS

Anatomy

Slide

Sheet

THE MIDDLE MEDIASTINUM

Time period	Main cardiac anatomy concepts
Pre-Hippocratic: Ancient Egypt (3500 B.C)	Cardiocentric theory of the anatomy of the cardiovascular system.
Pre-Hippocratic: China and India (2600 B.C)	Relationship between the blood, the heart, and the pulse.
Pre-Hippocratic: Greece (500 B.C)	Coexistence of blood and "pneuma" or air.
Hippocratic (460 B.C)	• Consolidation of the doctrine implying that the heart is the center of the cardiovascular system. • Early recognition of vessels and semilunar valves.
Early post-Hippocratic (384 B.C)	• Identification of the connections between the heart and the lungs. • Early description of the chordae tendinae.
Alexandrian (300 B.C)	• Anatomical differentiation of arteries and veins. • Description of the four valves of the heart.
Roman (130 B.C)	• Identification of the contractile myocardial fibers. • Discovery of the diaphragm or interventricular septum. • Differentiation between inlet and outlet valves.
Medieval Islamic (1000 A.D)	• Description of the coronary vessels. • Early understanding of pulmonary circulation.
Medieval European (1400 A.D)	• Establishment of the structure of the heart as a four-chambered organ. • Discovery of the moderator band of the right ventricle. • Naming of the "mitral valve" • Discovery of the connection between air and blood in the lungs.
Seventeenth Century	• Detailed explanation of the pulmonary circulation. • Description of the muscular structure of the heart. • First description of the heart as a pump. • Discovery of the intervenous tubercle of Lower. • Initial description of heart lymphatics.
Eighteenth Century	• Detailed description of the coronary vessels and coronary sinus. • Discovery of Vieussens and Thebesian valves. • Description of the mitral subvalvular apparatus. • Innervation of the cardiac system.
Nineteenth and Twentieth Centuries	• Discovery of the conductive bundle of His. • Discovery of the conductive Purkinje fibers. • Description of the bundle branches. • Discovery of the AV node and description of the AV conducting system.

Loukas et al 2016
History of Cardiac Anatomy: A Comprehensive Review from the Egyptians to Today

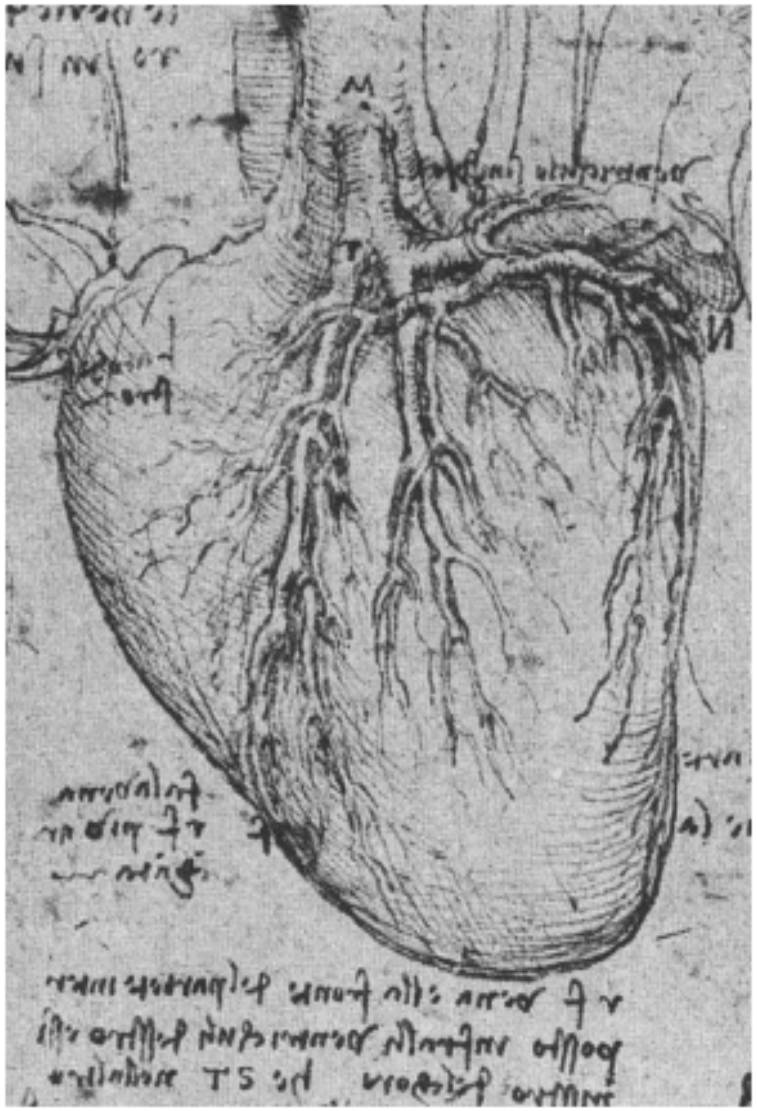


Fig. 4. Leonardo da Vinci's sketch of the heart. Leonardo da Vinci on the human body: The anatomical, physiological and embryological drawings of Leonardo da Vinci. http://leonardodavinci.stanford.edu/projects/heart/leoheart4big.jpg

Fig. 3. Illustrations by Mansur Ibn Ilyas. Tashrih-ibadan-iinsan [Anatomy of the Human Body], Iran, ca. 1390. Adapted from the National Library of Medicine's Historical Anatomies on the Web. Courtesy of Clark WVA at the School of the Museum of Fine Arts, Boston. http://library.smfa.edu/IllustrationGuide. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

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

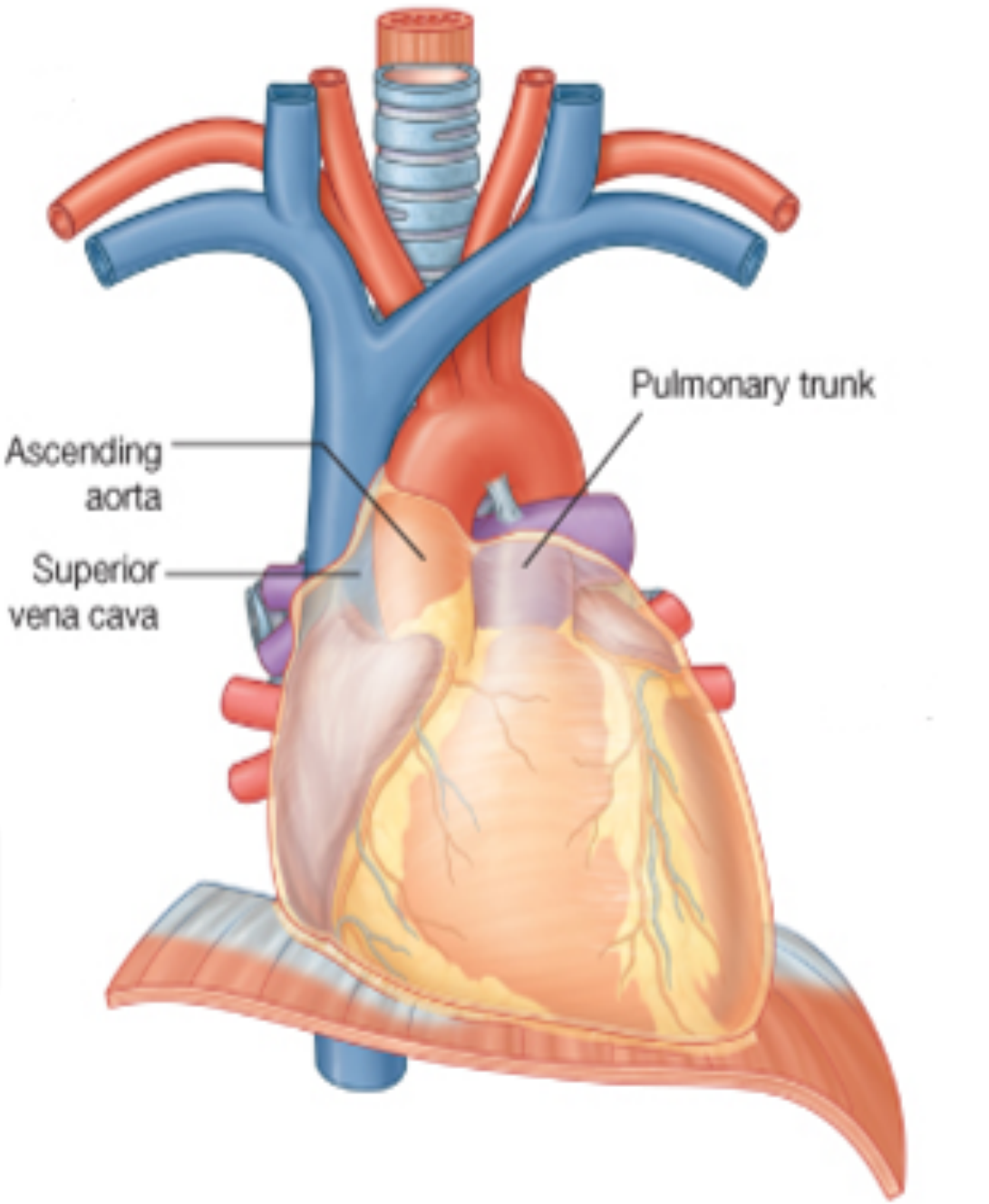
Pulmonary veins

Ascending Aorta

- The ascending aorta lies within the ***fibrous pericardium***
- ***(what does this mean?)***
- Begins at ***the base of the left ventricle***
- Ends at the level of **the sternal angle,** where it becomes ***continuous with the arch of the aorta***
- At its root it possesses three bulges, the sinuses of the aorta

Branches

The right coronary artery
The left coronary artery



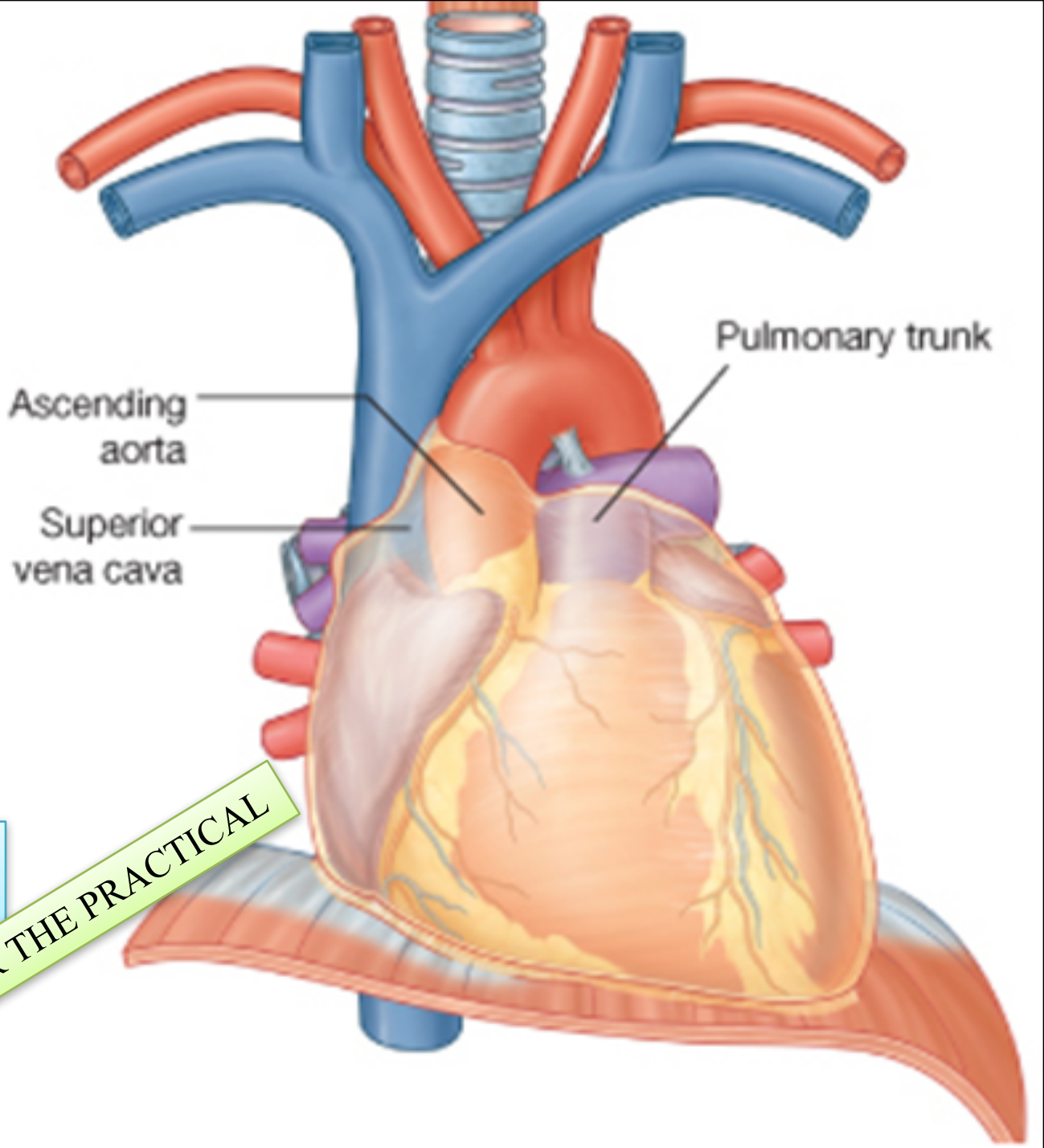
The **pulmonary trunk**

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

- It arises from **the right ventricle** at the opening of **the pulmonary trunk**

- Lies initially anterior and then to the left of the ascending aorta.

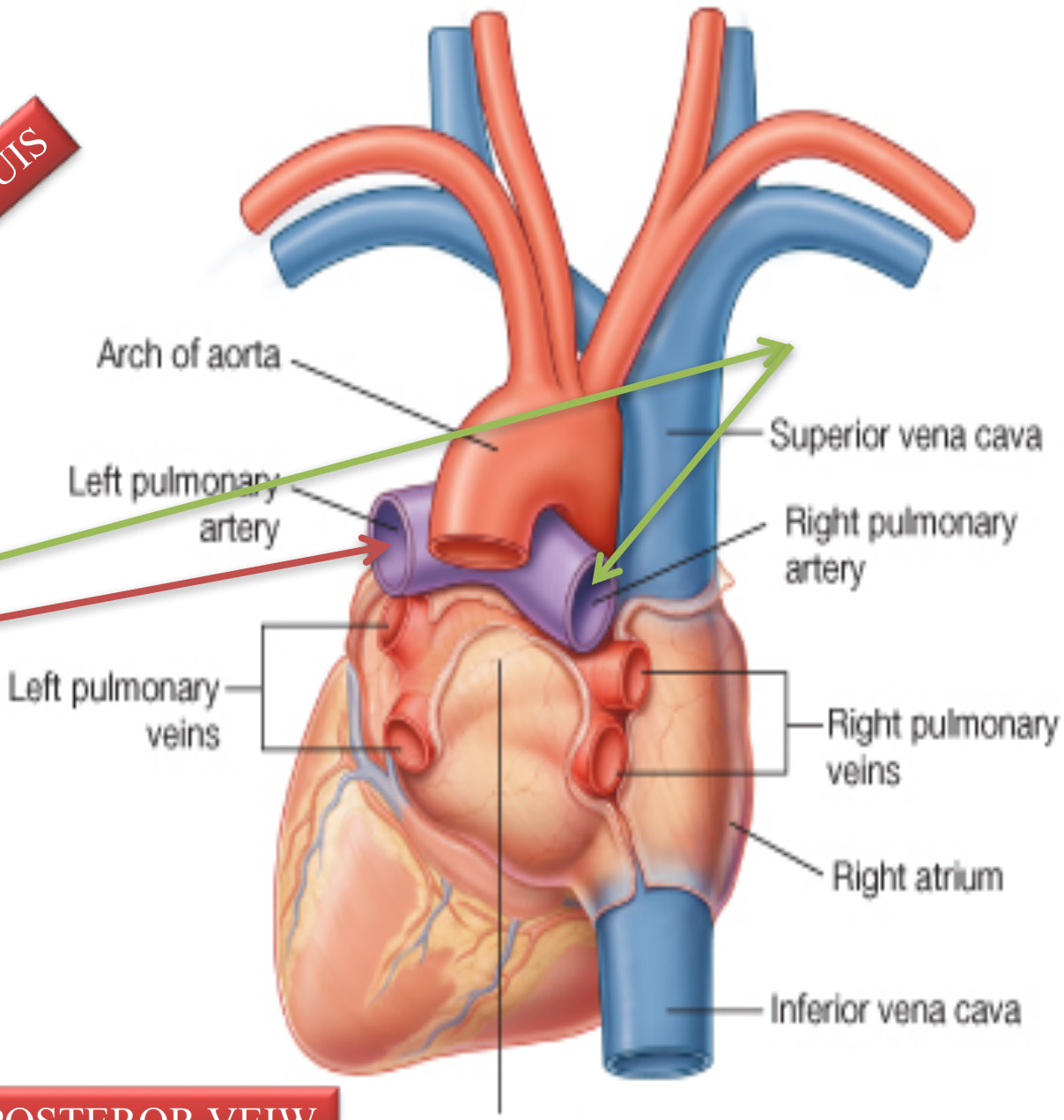
IMPORTANT FOR THE PRACTICAL



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

Angle of LOUIS

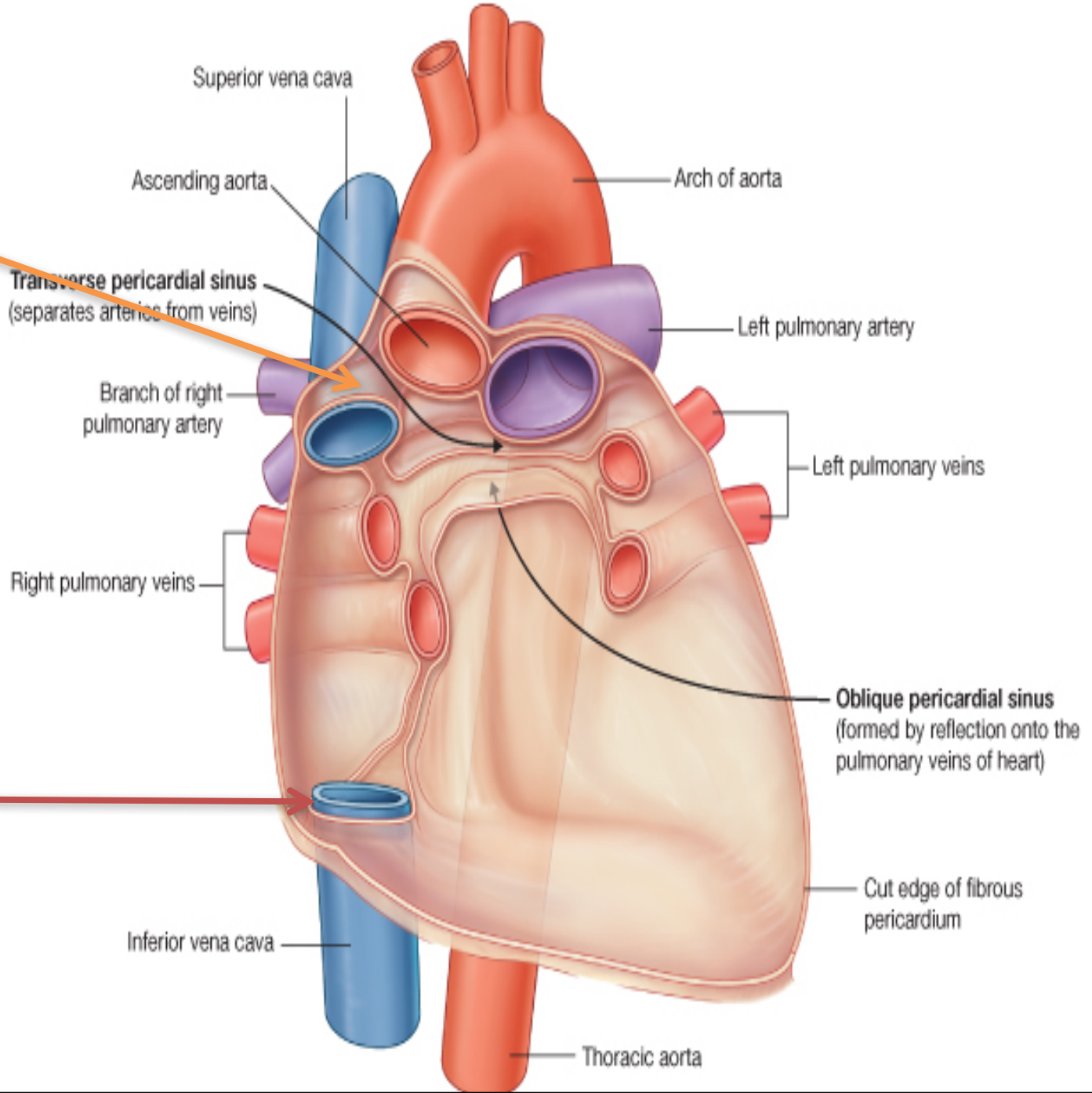
Right pulmonary artery
Left pulmonary artery



POSTEROR VEIW

The inferior half of the **superior vena cava** is located within the pericardial sac

the **inferior vena cava** enters the fibrous pericardium. A short portion of this vessel is within the pericardial sac before entering the right atrium



THE PERICARDIUM

Pericardium

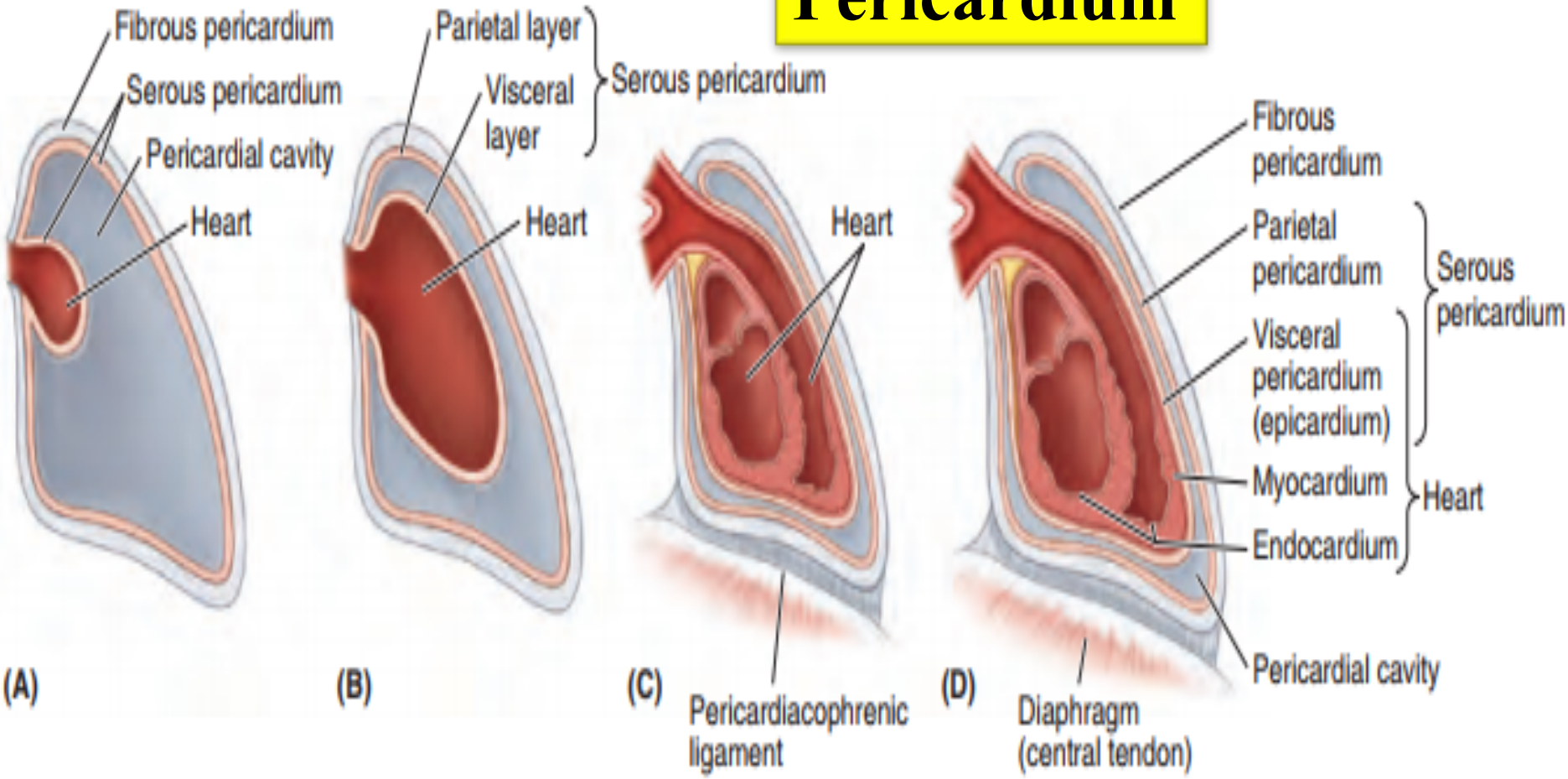
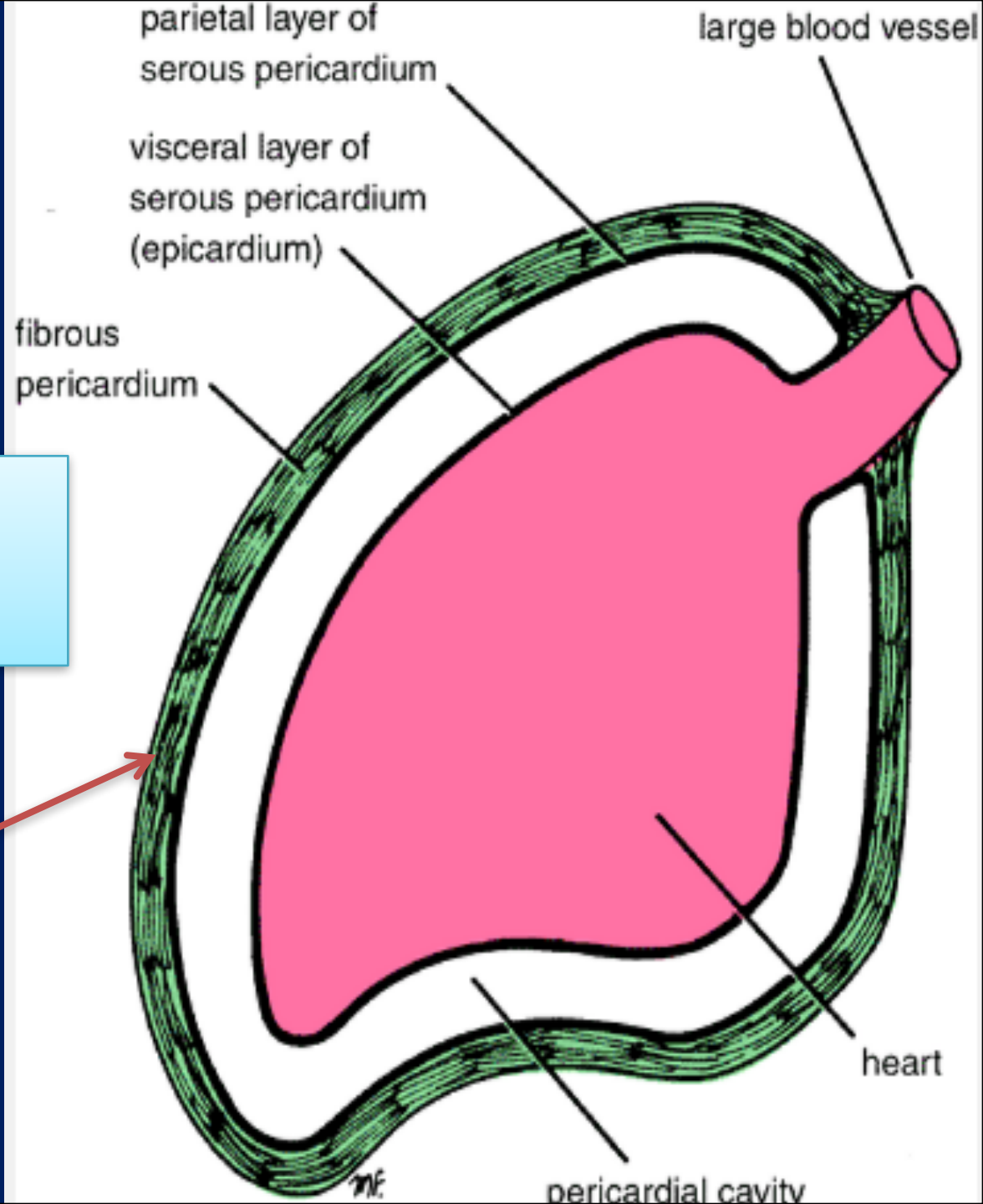


FIGURE 1.43. Pericardium and heart. A. The heart occupies the middle mediastinum and is enclosed by pericardium, composed of two parts. The tough, outer fibrous pericardium stabilizes the heart and helps prevent it from overdilating. Between the fibrous pericardium and the heart is a "collapsed" sac, 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 **fibroserous sac** surrounding the heart and the roots of the great vessels.

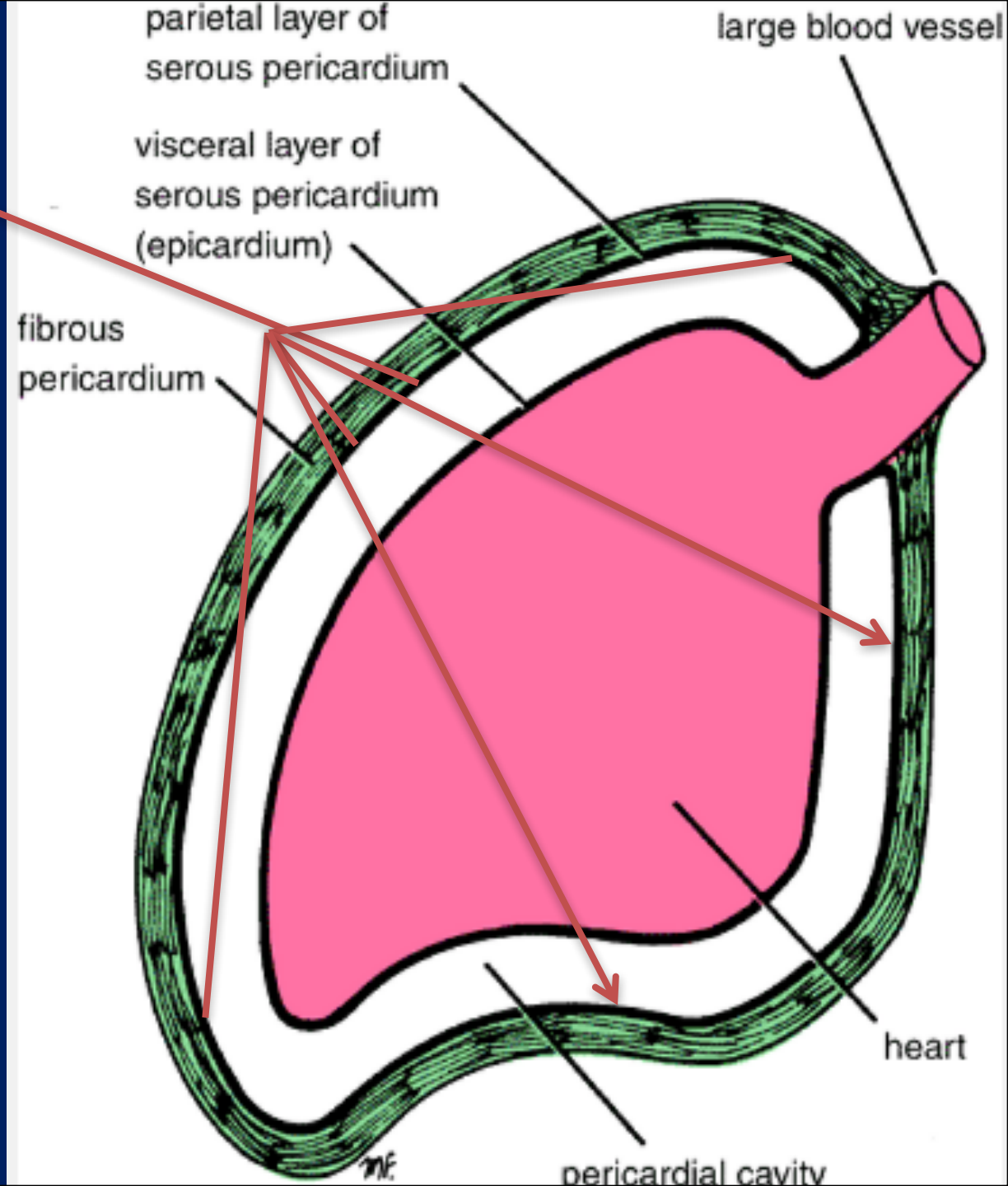
➢It consists of two components:
1- The Fibrous Pericardium
2- The Serous Pericardium

The fibrous pericardium is a tough connective tissue **outer layer**



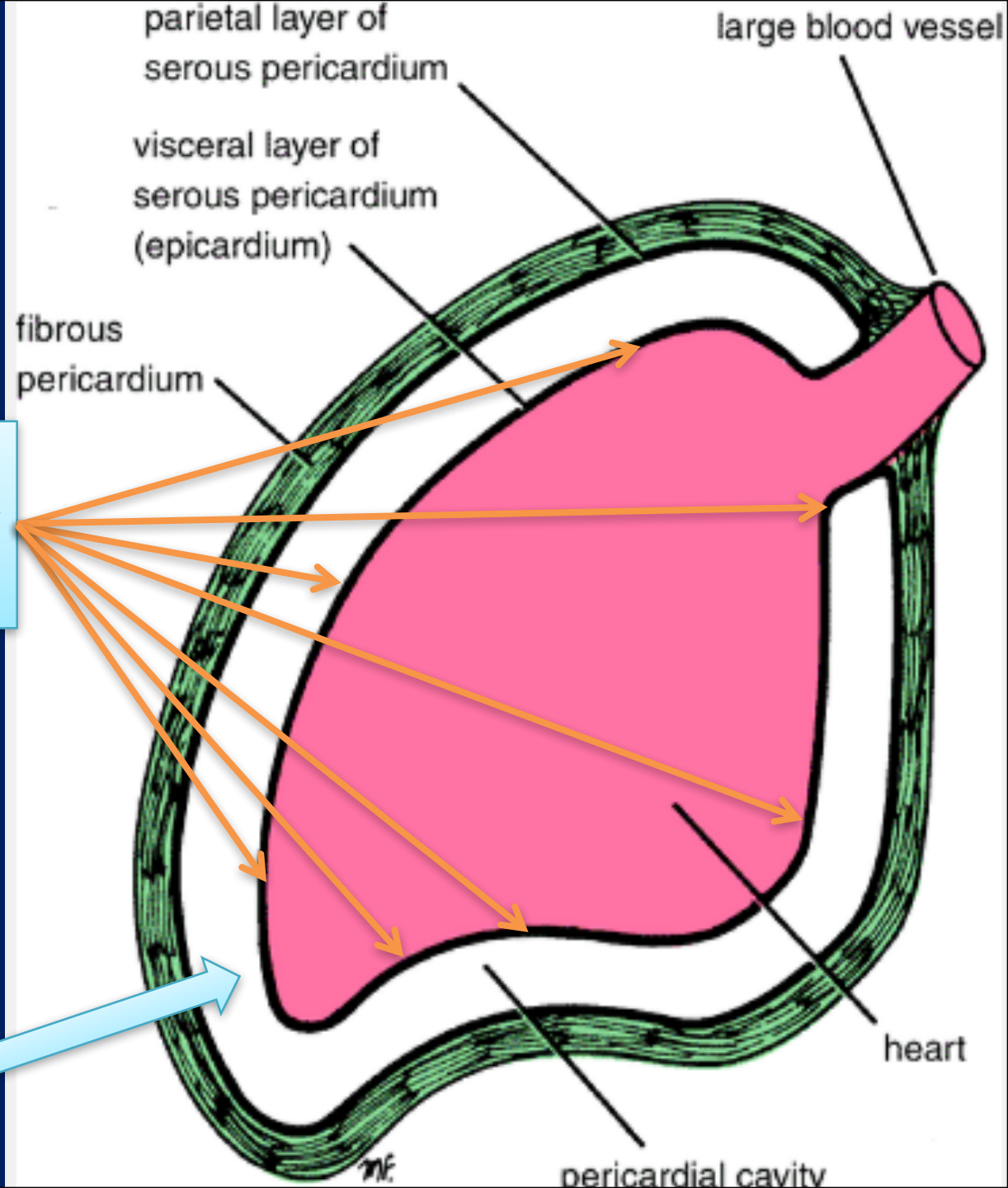
The serous pericardium is thin and consists of two parts:

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



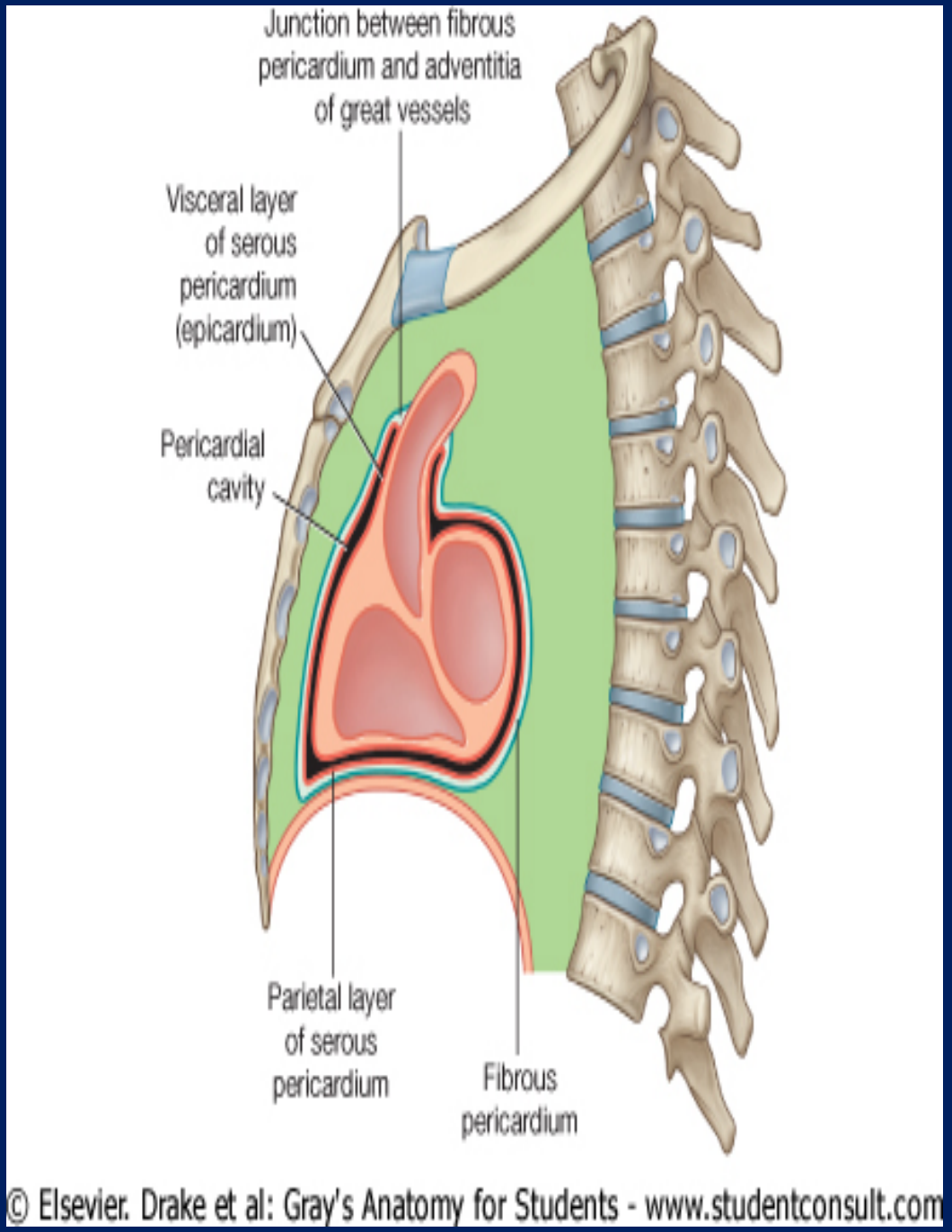
2-THE VISCERAL LAYER (epicardium) of serous pericardium adheres to the heart and forms its outer covering

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**.



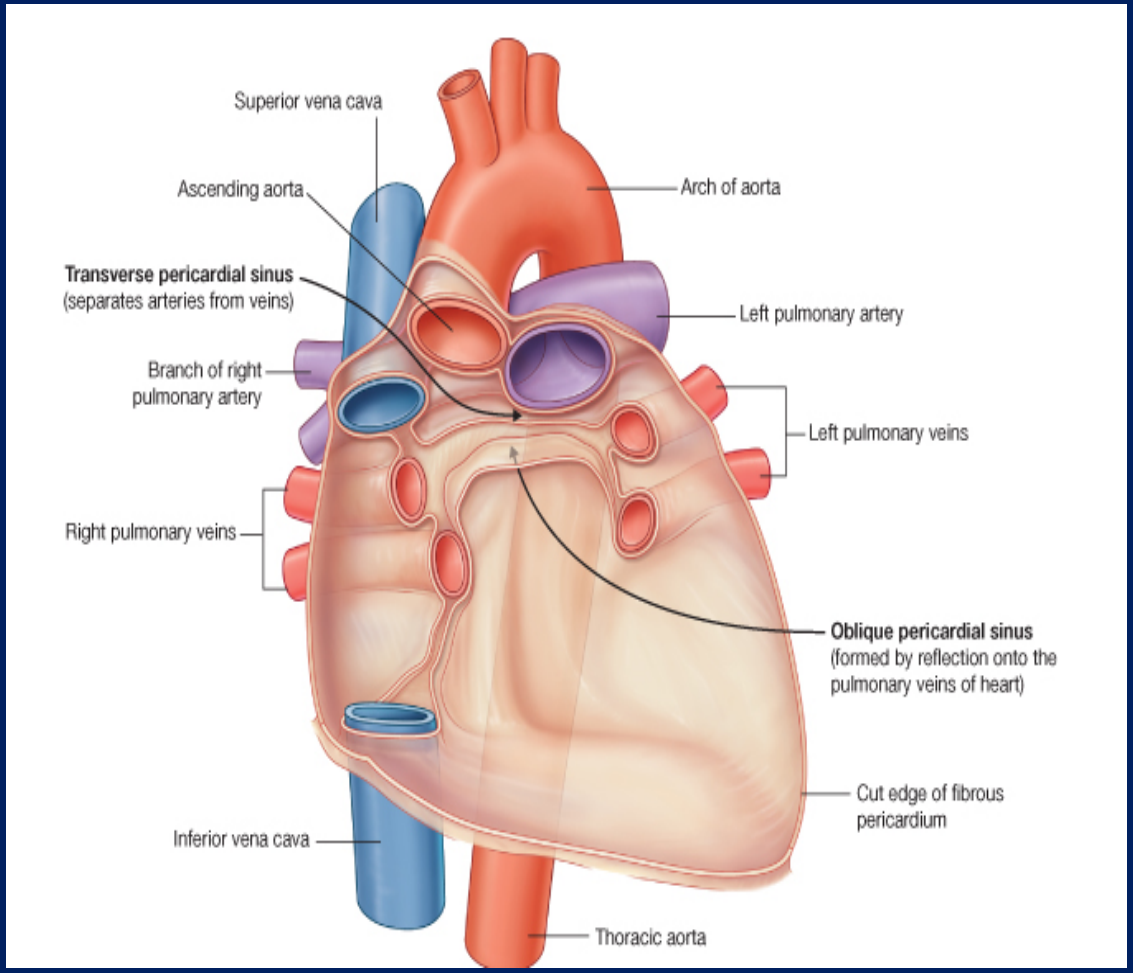
Serous pericardium

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

- 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

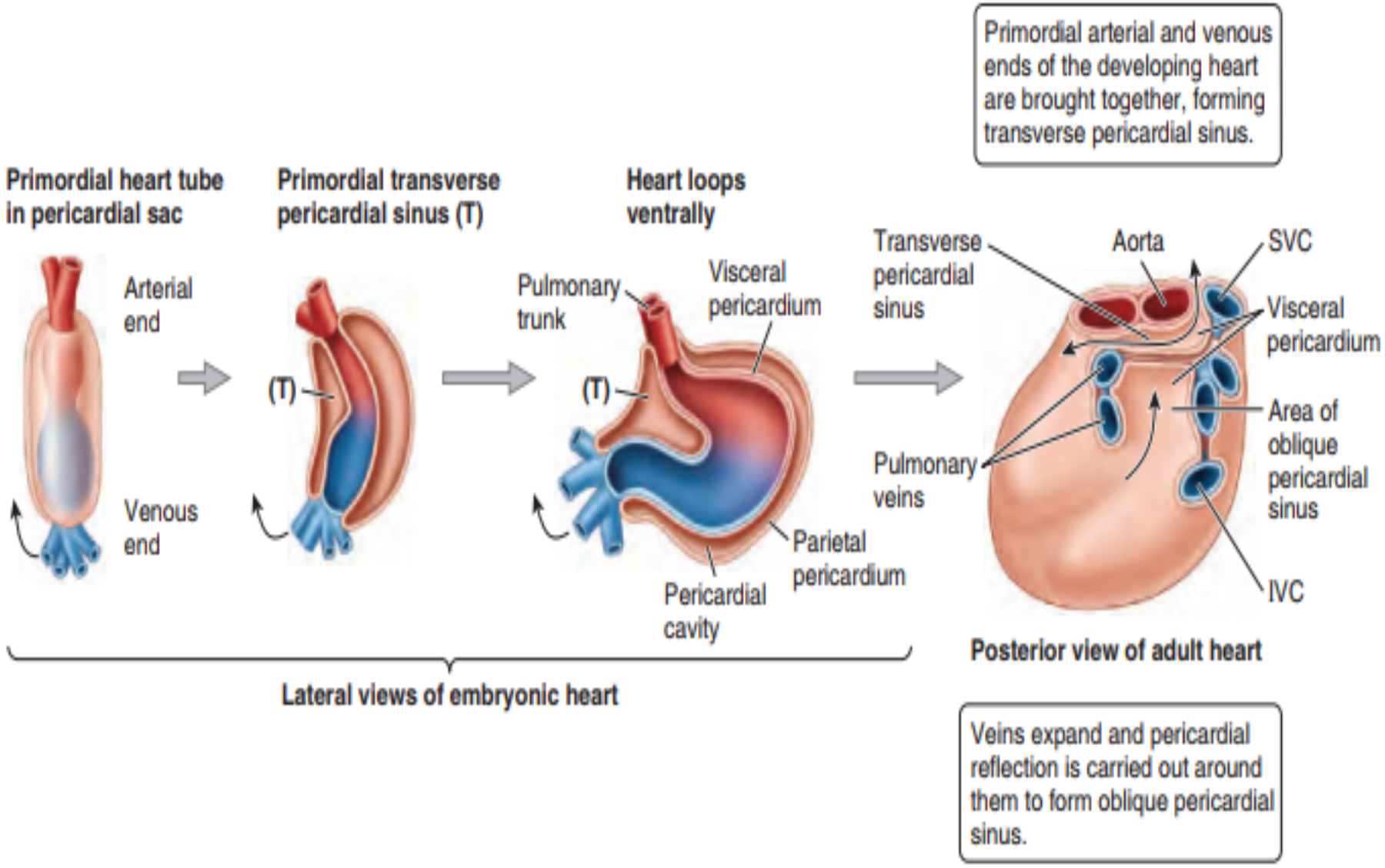


FIGURE 1.45. Development of heart and pericardium. The longitudinal embryonic heart tube invaginates the double-layered pericardial sac (somewhat like placing a wiener in a hot dog bun). The primordial heart tube then "loops" ventrally, bringing the primordial arterial and venous ends of the heart together 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

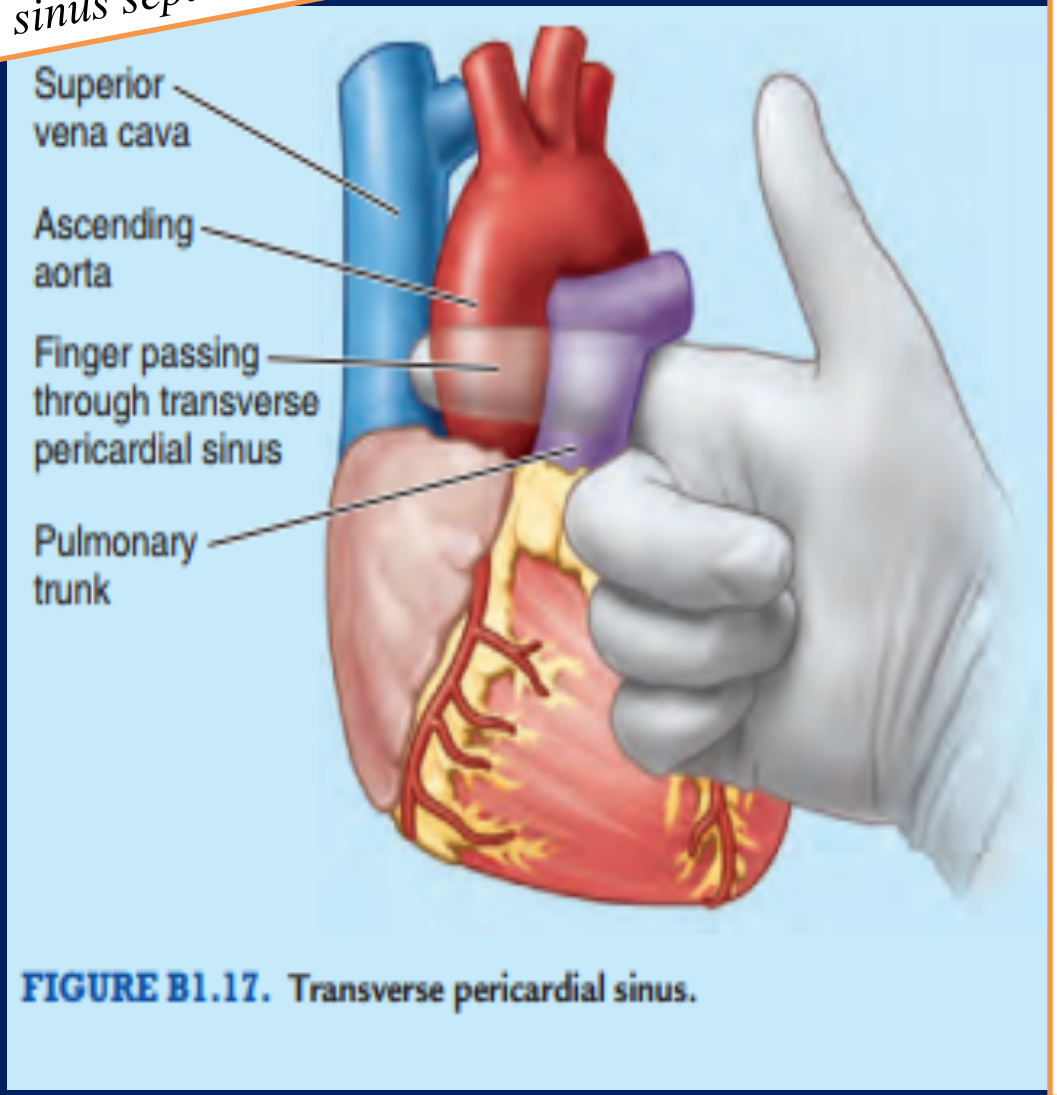


FIGURE B1.17. Transverse pericardial sinus.

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.

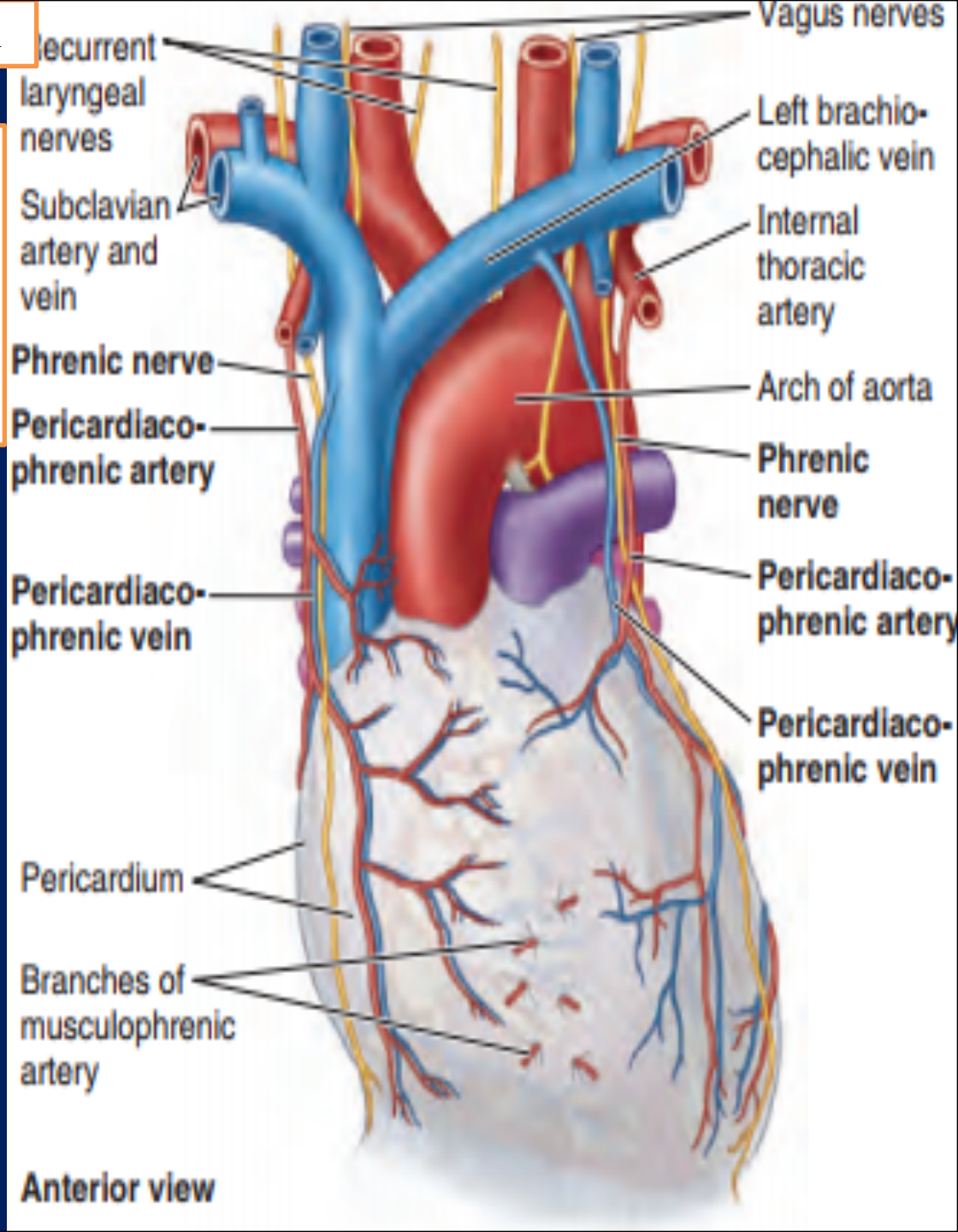
The arterial supply of the pericardium

❖ 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.

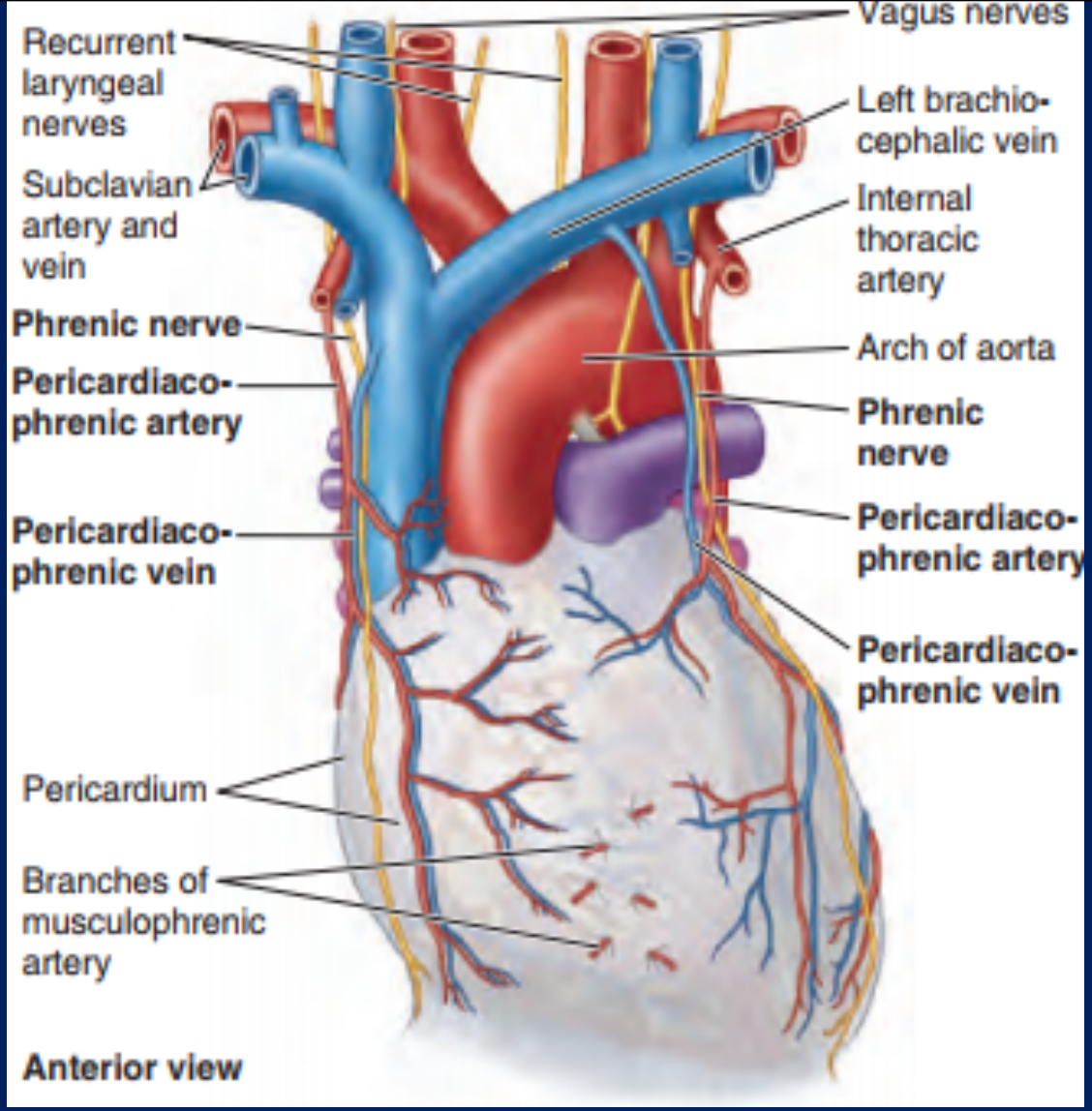
Smaller contributions of blood come from the:

- **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

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