TRUNCUS ARTERIOSUS AND BULBUS CORDIS

Read only

Potentially confusing terms have been used to describe these structures; some consider these two outflow chambers to be a single structure, sometimes referred to as the bulbus cordis, sometimes as the truncus arteriosus. Another term used for the interface between the two is the "conus cordis." Word combinations are also used, such as "truncoconal" to describe septal swellings

Read only

Some textbooks divide it the into

Read only

Distal 1/3
Truncus arteriosus

Middle 1/3
conus

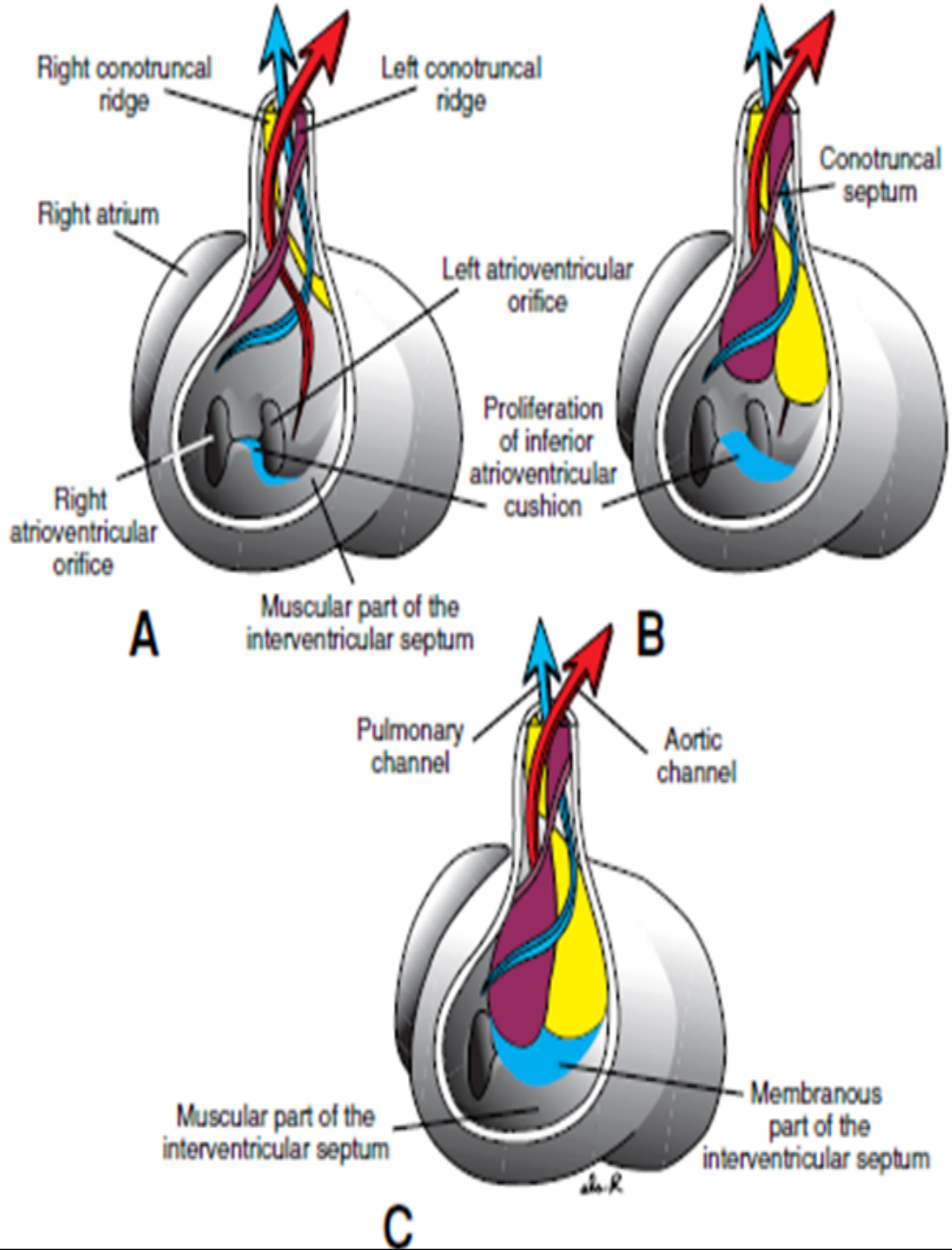
Proximal 1/3

In all my lectures , I would use the terms
bulbus cordis
truncus arteriosus

Two opposing ridges are developed in the walls of the truncus arteriosus
Truncal ridges
And in the walls of bulbus cordis
(bulbar ridges)

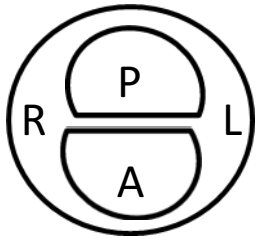
ridges are derived mainly from the

neural crest



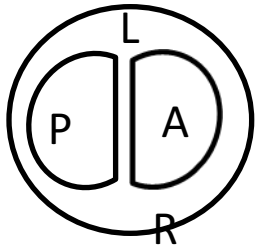
SEPTATION OF THE TRUNCUS ARTERIOSUS

A-in the lower part of the truncus the ridges are right and left as traced upwards



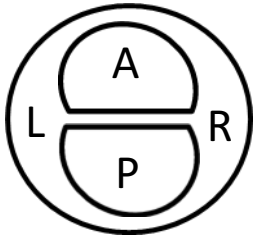
A

B- in the middle of the truncus the right ridge becomes anterior while the left ridge becomes posterior



B

C- in the upper part of the truncus the anterior ridge becomes left while the posterior ridge becomes right



C

2- When the two ridges fuse together a spiral septum is formed which is called the

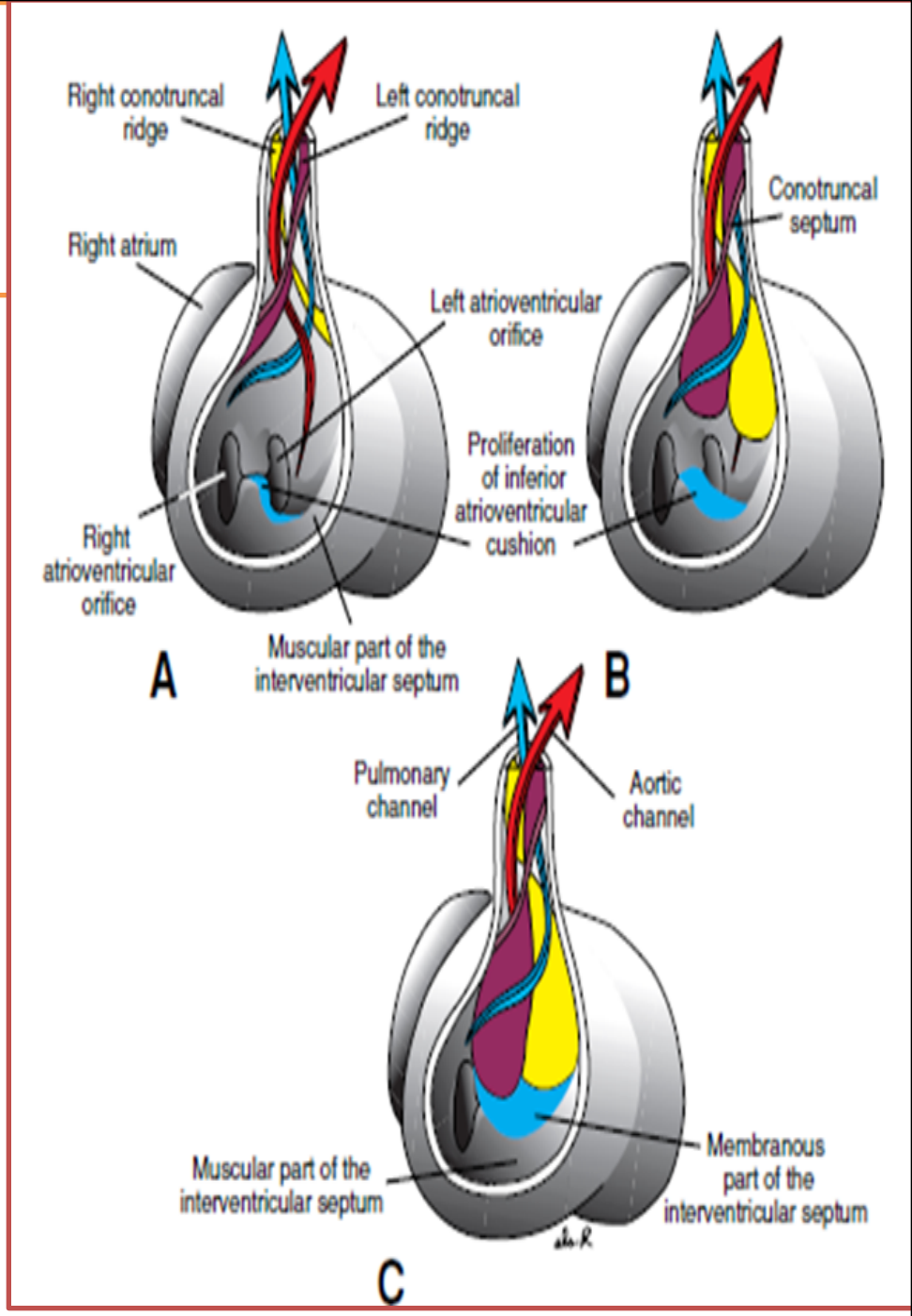
Spiral aortico-pulmonary septum

The bulbar and truncal ridges undergo
180-degree spiraling
results in the formation of a spiral
aorticopulmonary septum
when the ridges fuse

This septum the truncus arteriosus

into two arterial channels

The Ascending AORTA and the PULMONARY TRUNK



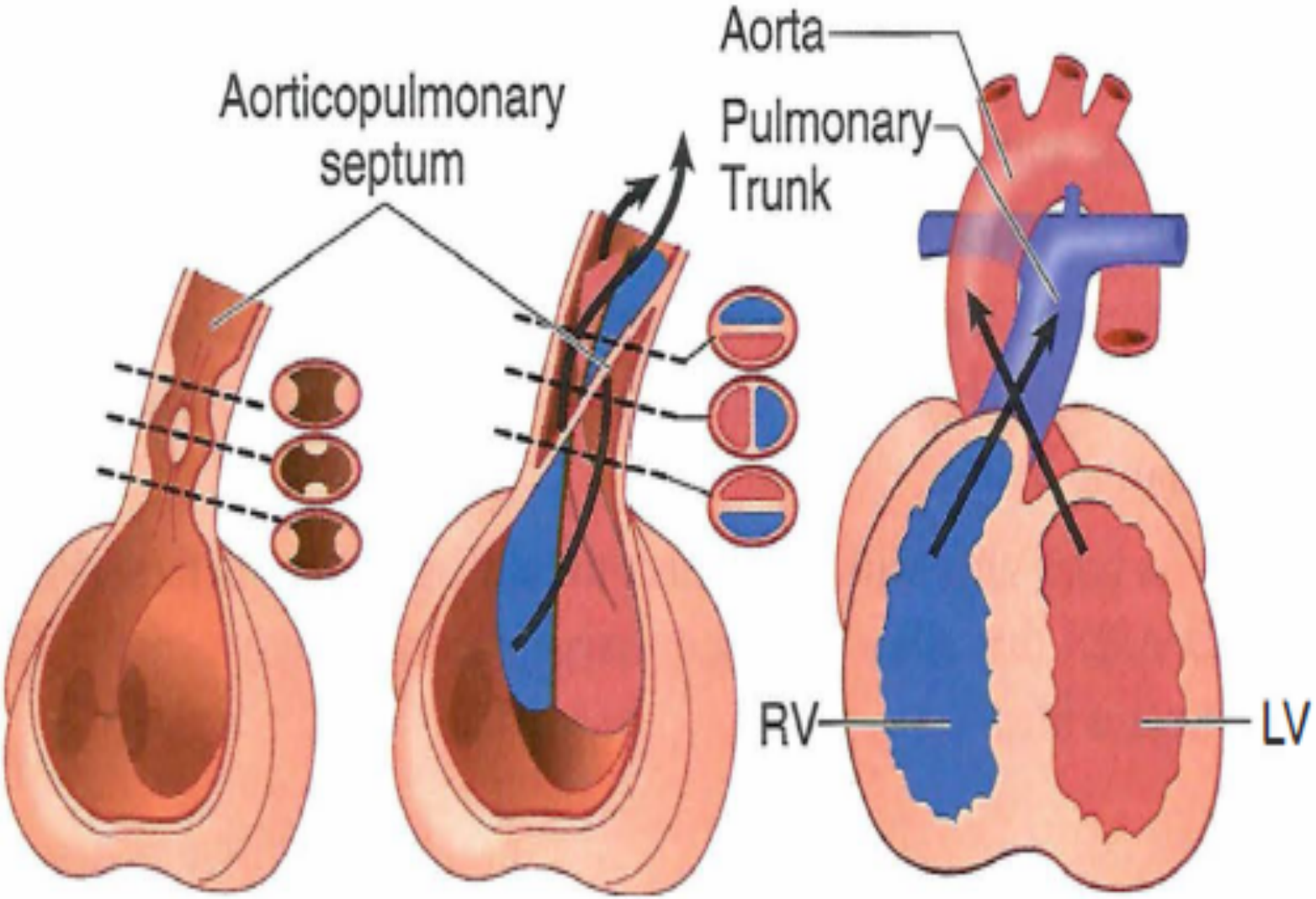
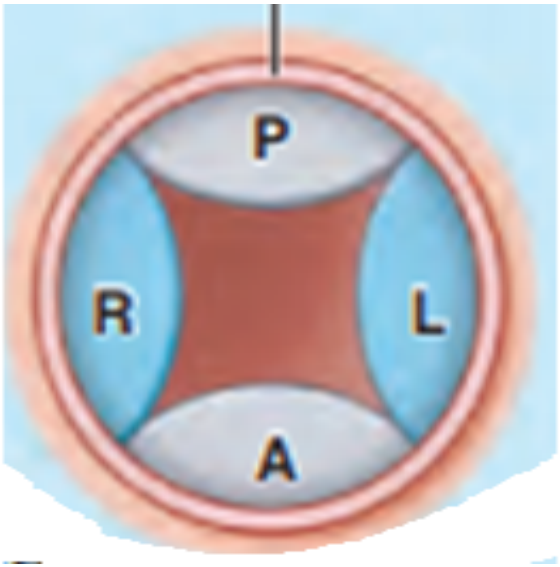


Figure III-2-18. Formation of the Aorticopulmonary Septum

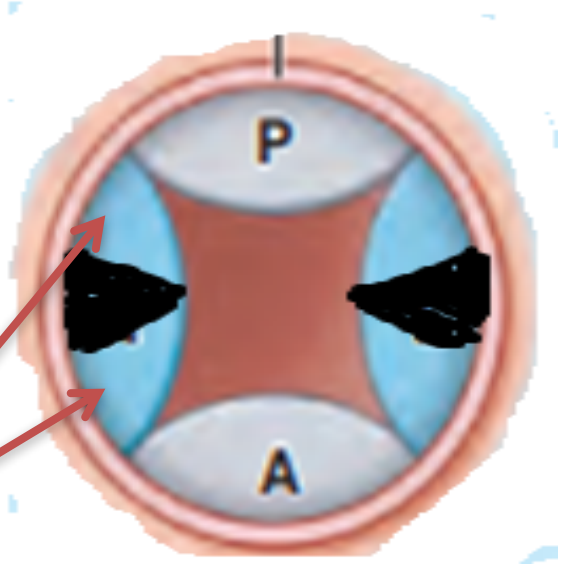
SEPTATION OF BLUBUS CORDIS

The distal bulbar septum

1- Four endocardinal cushions
(one anterior, one posterior,
and two lateral right and left)
are developed in the distal part of the bulbus cordis.

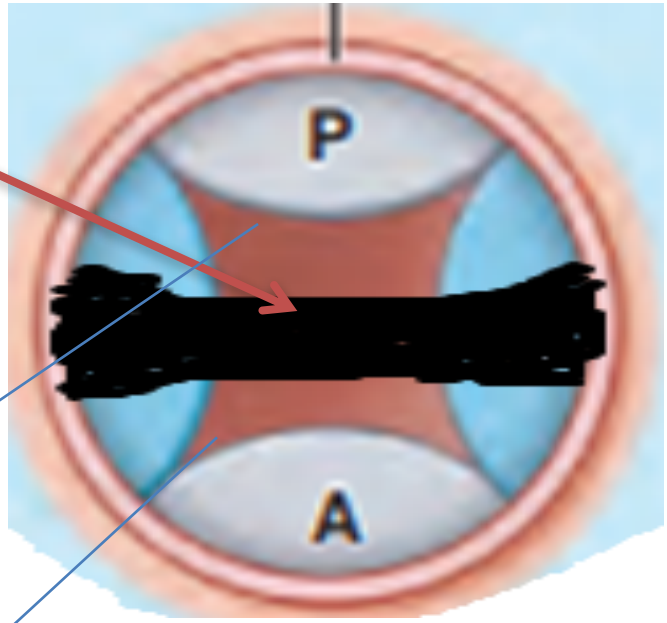


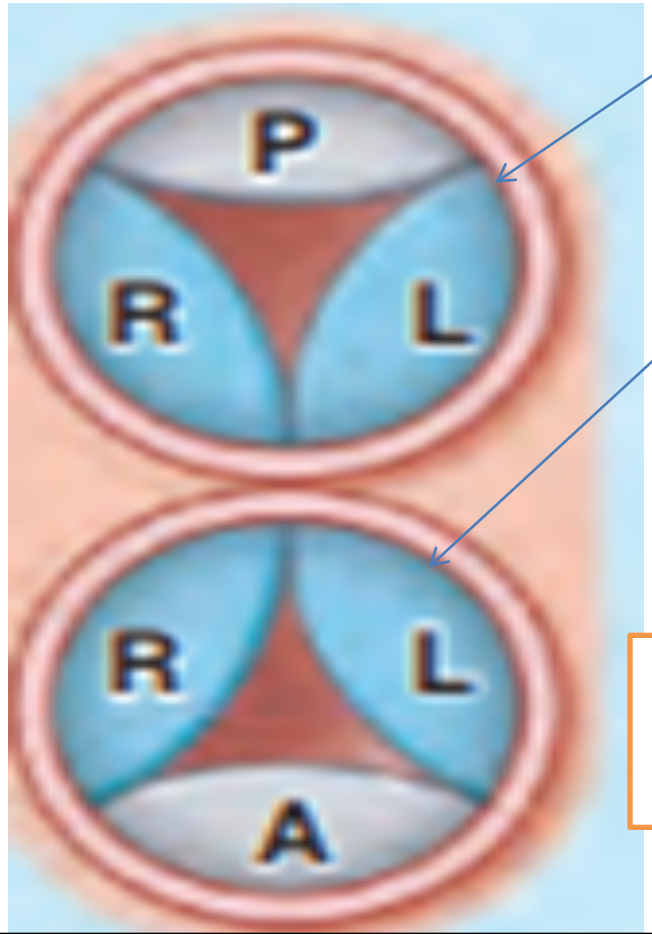
2- A ridge is developed in the middle of each of the two lateral cushions.



It should be noted that the development of these ridges will divide each of the lateral cushions into two

3-These ridges will fuse to form a complete septum called **the distal bulbar septum.**





Posterior

Anterior

4- **The distal bulbar septum will divide the cranial end of bulbus cordis into** into **two orifices:**

The pulmonary orifice anteriorly

and

The aortic orifice posteriorly

5- The distal bulbar septum will also divide the pulmonary and aortic orifices three cushions. These cushions form the cusps

6- The cusps of the pulmonary valve are one anterior and two posterior but as a result of rotation of the vessels the two cusps become anterior and one posterior

7- The cusps of the aortic valve are two anterior and one posterior but as a result of rotation of the vessels one cusp becomes anterior and two posterior.

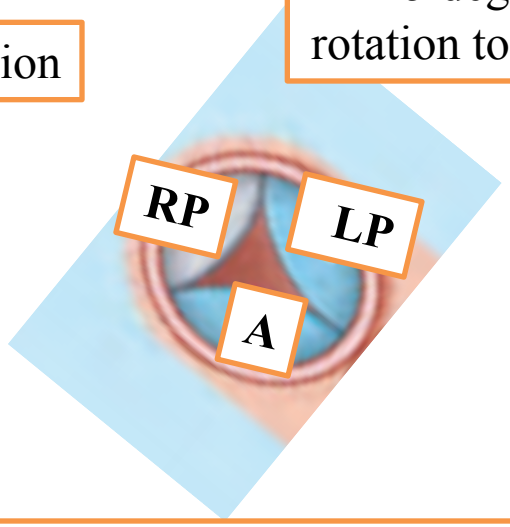
two anterior and one posterior

posterior

NO rotation

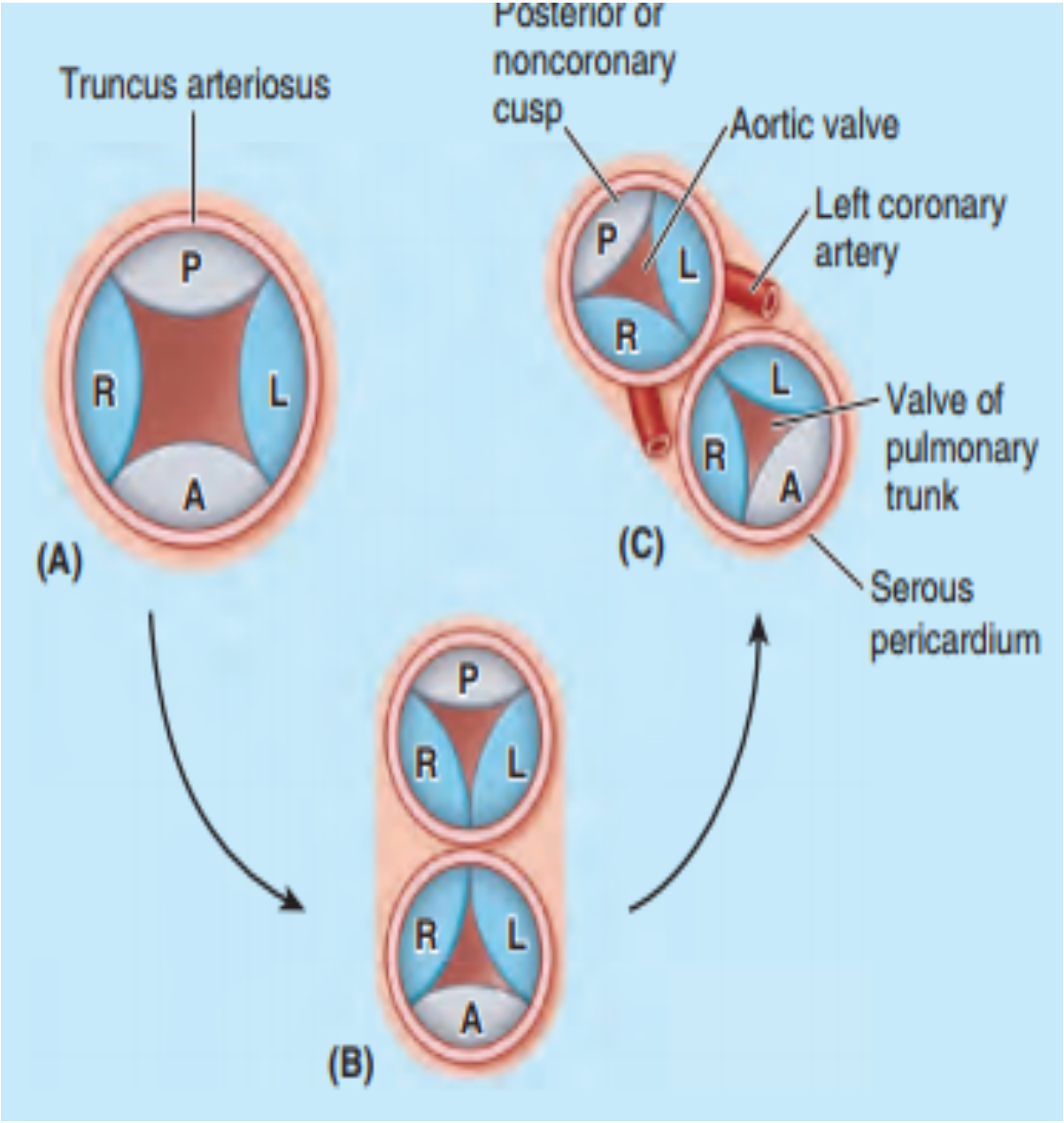
anterior

45 degrees rotation to the left



one cusp becomes anterior and two posterior.

Because of the spiraling of the aorticopulmonary septum, the pulmonary trunk twists around the ascending aorta


Truncus arteriosus
P
R
L
A
(A)
(B)
P
R
L
R
L
A
Posterior or noncoronary cusp
Aortic valve
Left coronary artery
P
L
R
L
R
A
(C)
Valve of pulmonary trunk
Serous pericardium

The proximal bulbar septum

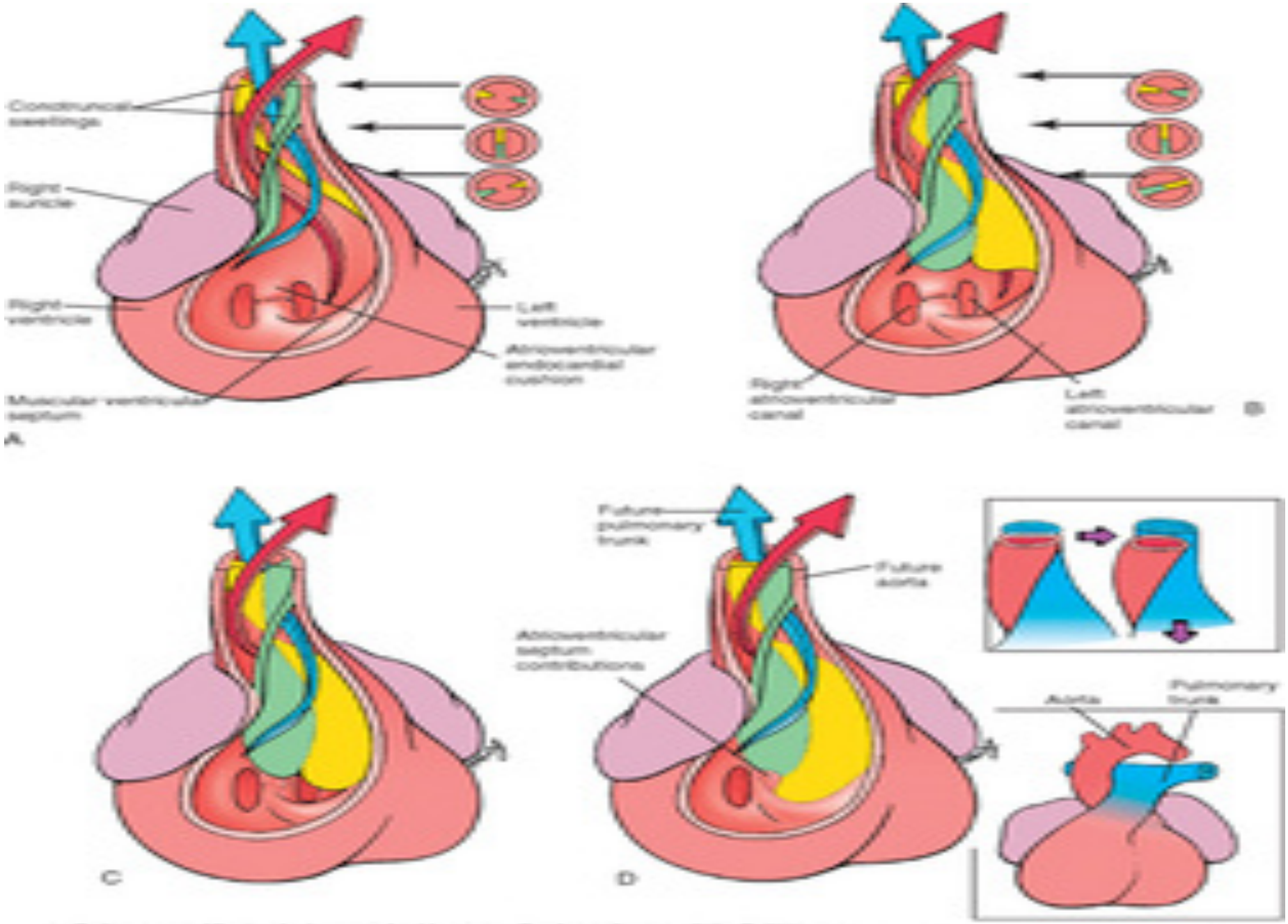
develops as two ridges which fuse together
they share in closing **the interventricular foramen**
And they divide the mid portion of the bulbus cordis into the

infundibulum and the vestibule

The bulbus cordis is incorporated into the walls of the definitive ventricles in several ways

In the right ventricle, the bulbus cordis is represented by the conus arteriosus (infundibulum), which gives origin to the pulmonary trunk

In the left ventricle, the bulbus cordis forms the walls of the aortic vestibule, the part of the ventricular cavity just inferior to the aortic valve.



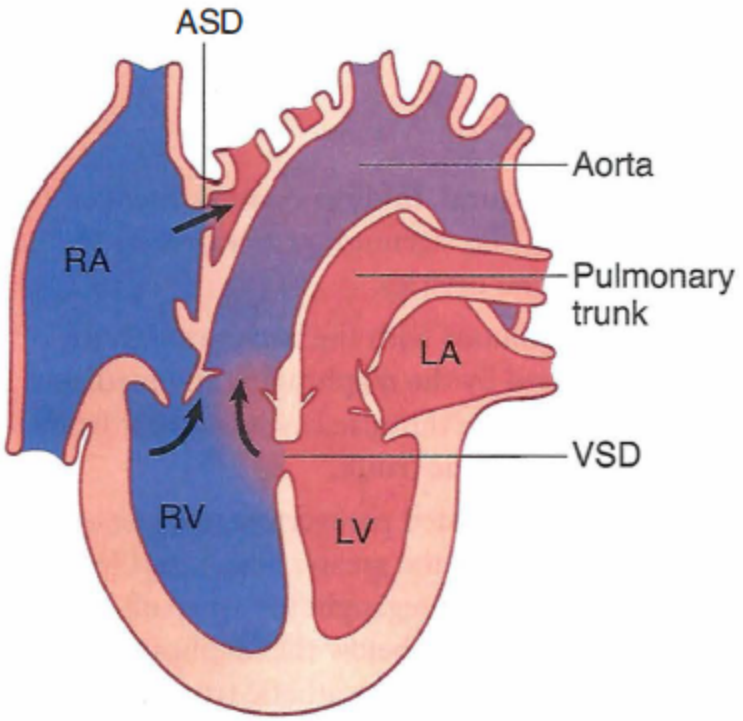
Truncus arteriosus defects

Three classic **cyanotic congenital heart abnormalities** occur with defects in the development of the aorticopulmonary septum and are related to the failure of neural crest cells to migrate into the truncus arteriosus:

1. **Tetralogy of Fallot** (Figure III-2-19) is the **most common** cyanotic congenital heart defect. Tetralogy occurs when the AP septum fails to align properly and shifts anteriorly to the right. This causes **right-to-left** shunting of blood with resultant **cyanosis** that is usually present sometime after birth. Imaging typically shows a boot-shaped heart due to the enlarged right ventricule.
   - There are 4 major defects in Tetralogy of Fallot:
     - Pulmonary stenosis (most important)
     - Overriding aorta (receives blood from both ventricles)
     - Membranous interventricular septal defect
     - Right ventricular hypertrophy (develops secondarily)

2. **Transposition of the great vessels** (Figure III-2-20) occurs when the AP septum fails to develop in a spiral fashion and results in the aorta arising from the right ventricle and the pulmonary trunk arising from the left ventricle. This causes **right-to-left** shunting of blood with resultant **cyanosis**.

- Transposition is the most common cause of severe cyanosis that persists immediately at birth. Transposition results in producing 2 closed circulation loops.
- Infants born alive with this defect usually have other defects (PDA, VSD, ASD) that allow mixing of oxygenated and deoxygenated blood to sustain life.

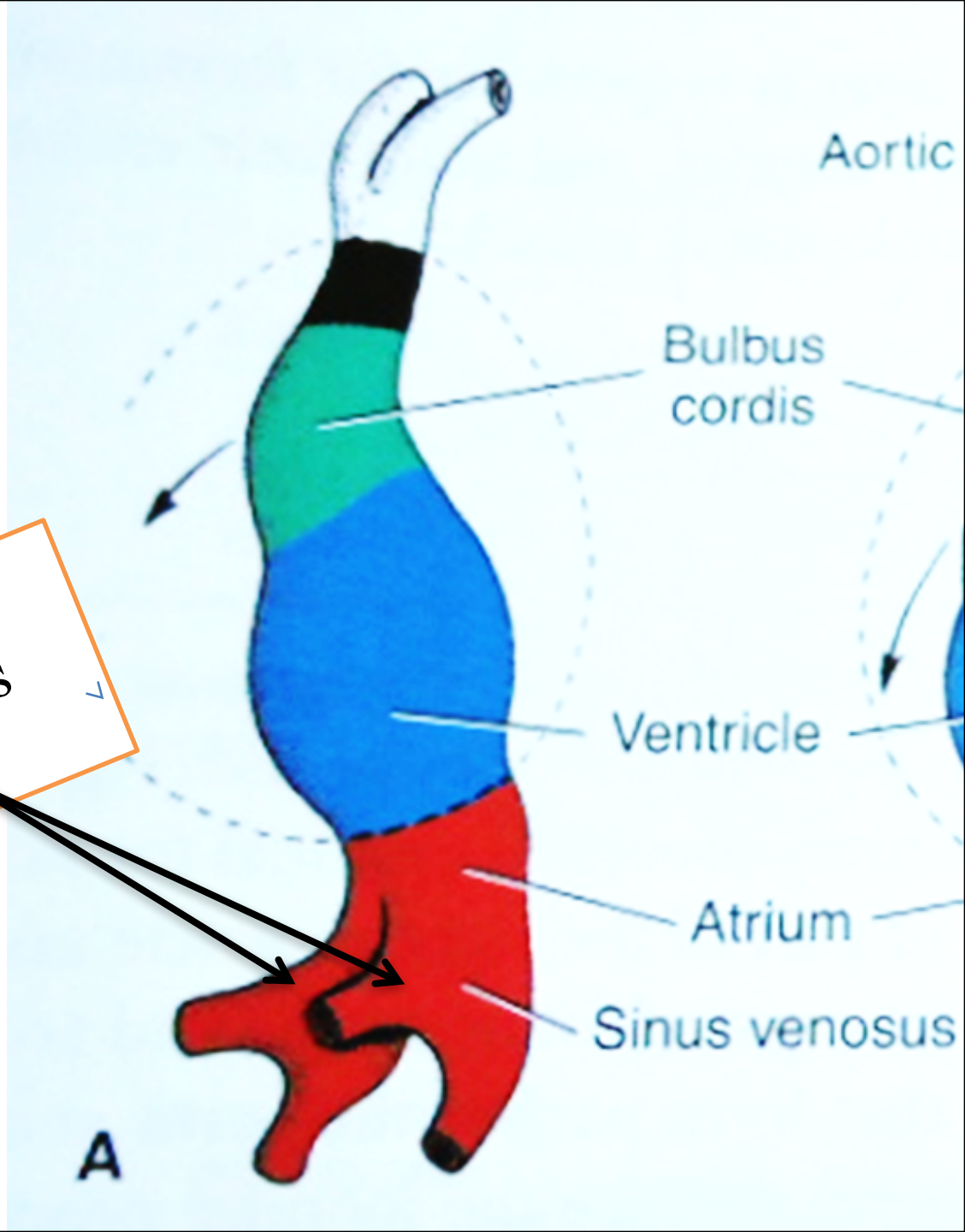


1. Aorta arises from the right ventricle
2. Pulmonary trunk arises from the left ventricle
3. Usually associated with a VSD, ASD, or patent ductus arteriosus

Figure III-2-20. Transposition of the Great Vessels

Changes in Sinus Venosus

Remember that the sinus venosus has two horns

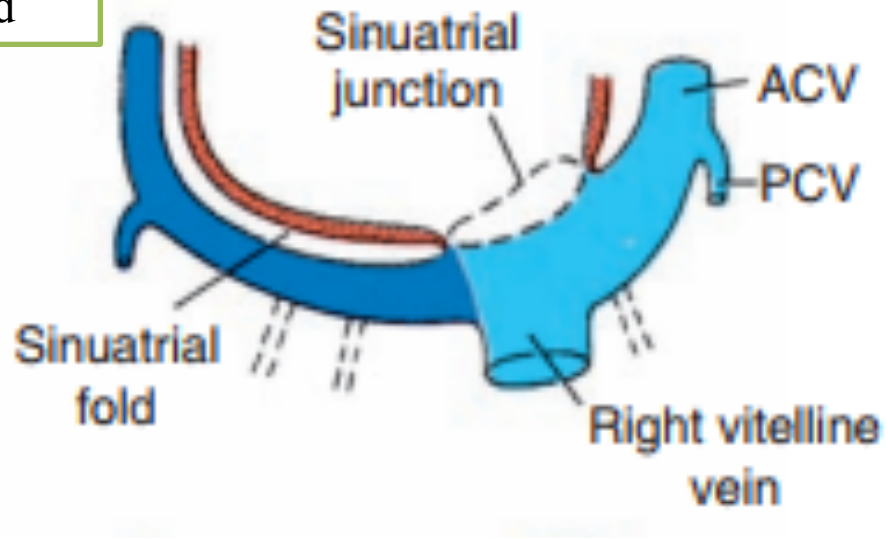


The Left horn

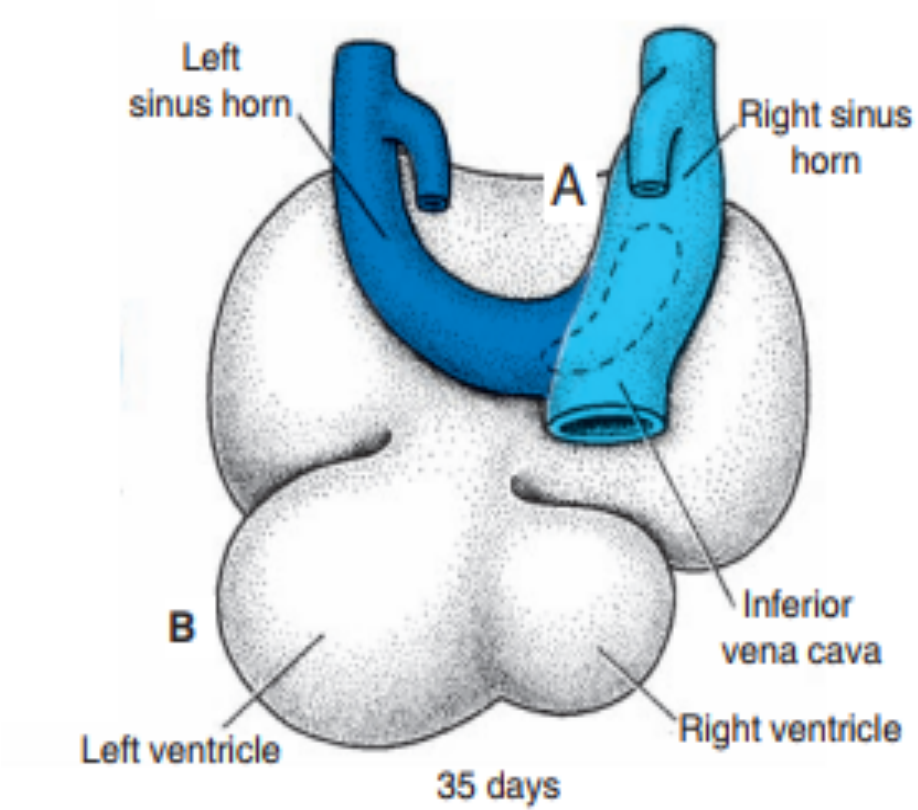
At 10 weeks

the left common cardinal vein is obliterated

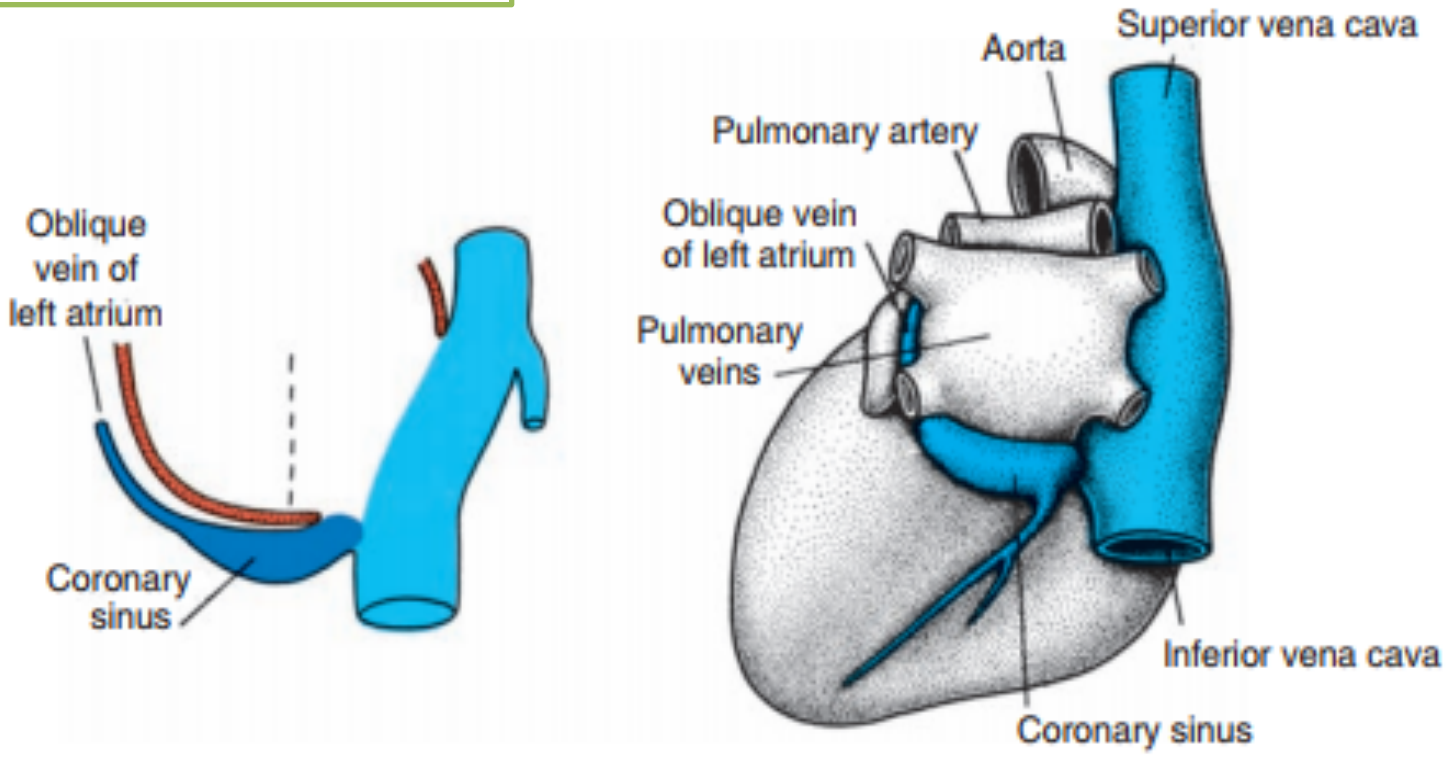
The left sinus horn rapidly loses its importance



all that remains of the left sinus horn is



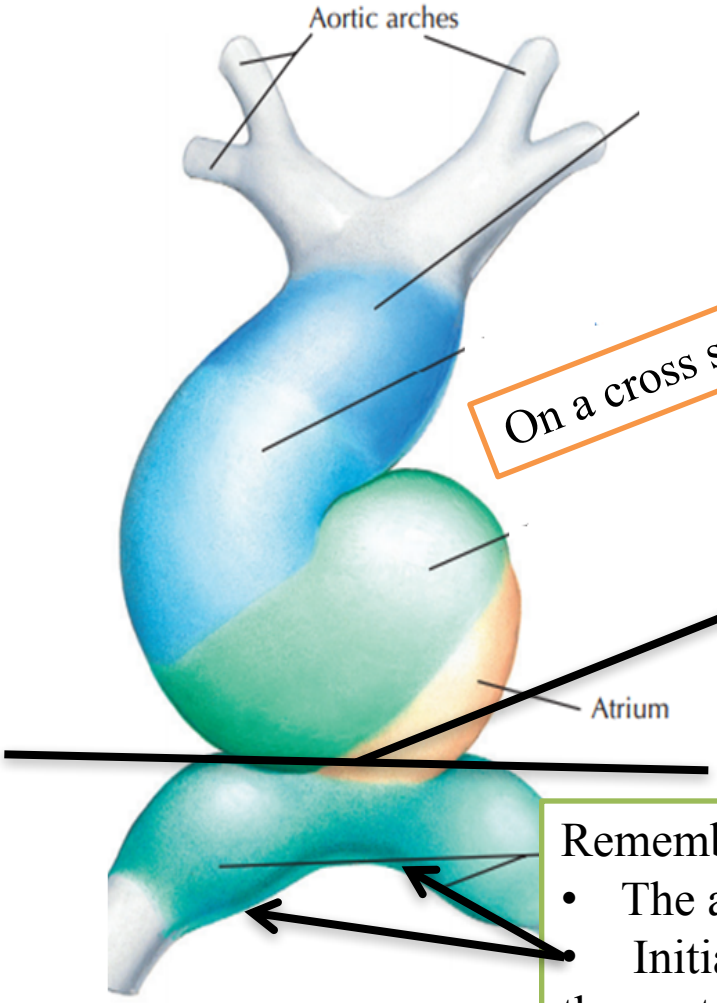
The oblique vein of the left atrium and the coronary sinus



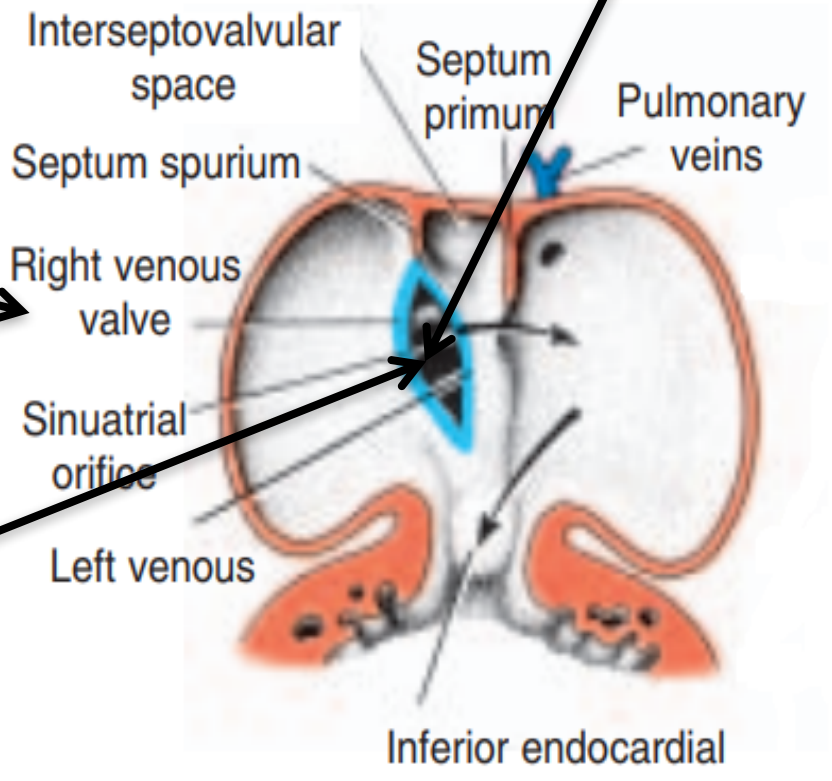
Thus, what has been left from the sinus venosus **is** **the right horn**

the sinus venosus (the right horn)
and the primordial atrium of the cardiac tube

communicate with each other through **the sinuatrial orifice**



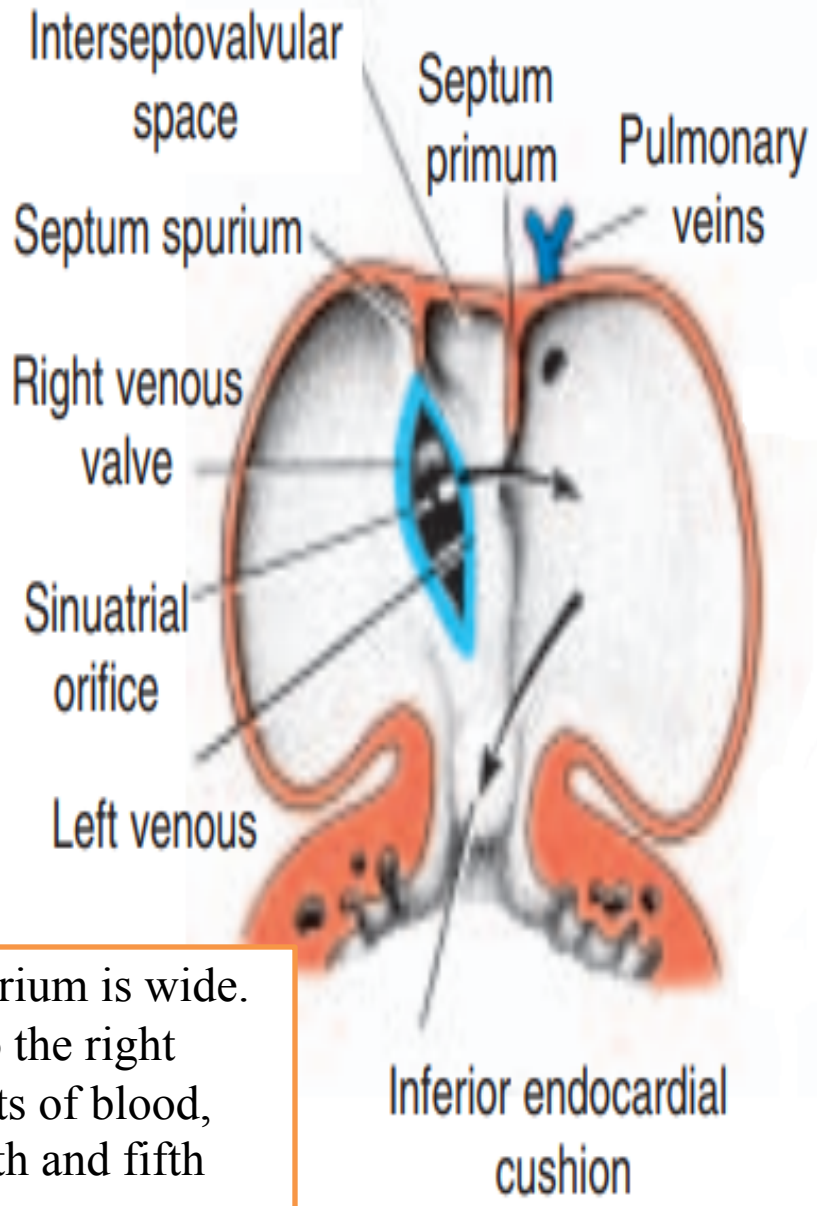
On a cross section



Remember

- The atrium is made of one chamber that has began to divided
- Initially, the sinus venosus opens into the center of the posterior wall of the primordial atrium

- By the end of the fourth week, the right sinual horn becomes larger than the left sinual horn
- As this occurs the sinuatrial orifice moves to the right and opens in the part of the primordial atrium that will become the adult **right atrium**
- As the right sinuatrial horn enlarges, it receives all the blood from the head and neck through the SVC, and from the placenta and caudal regions of the body through the IVC

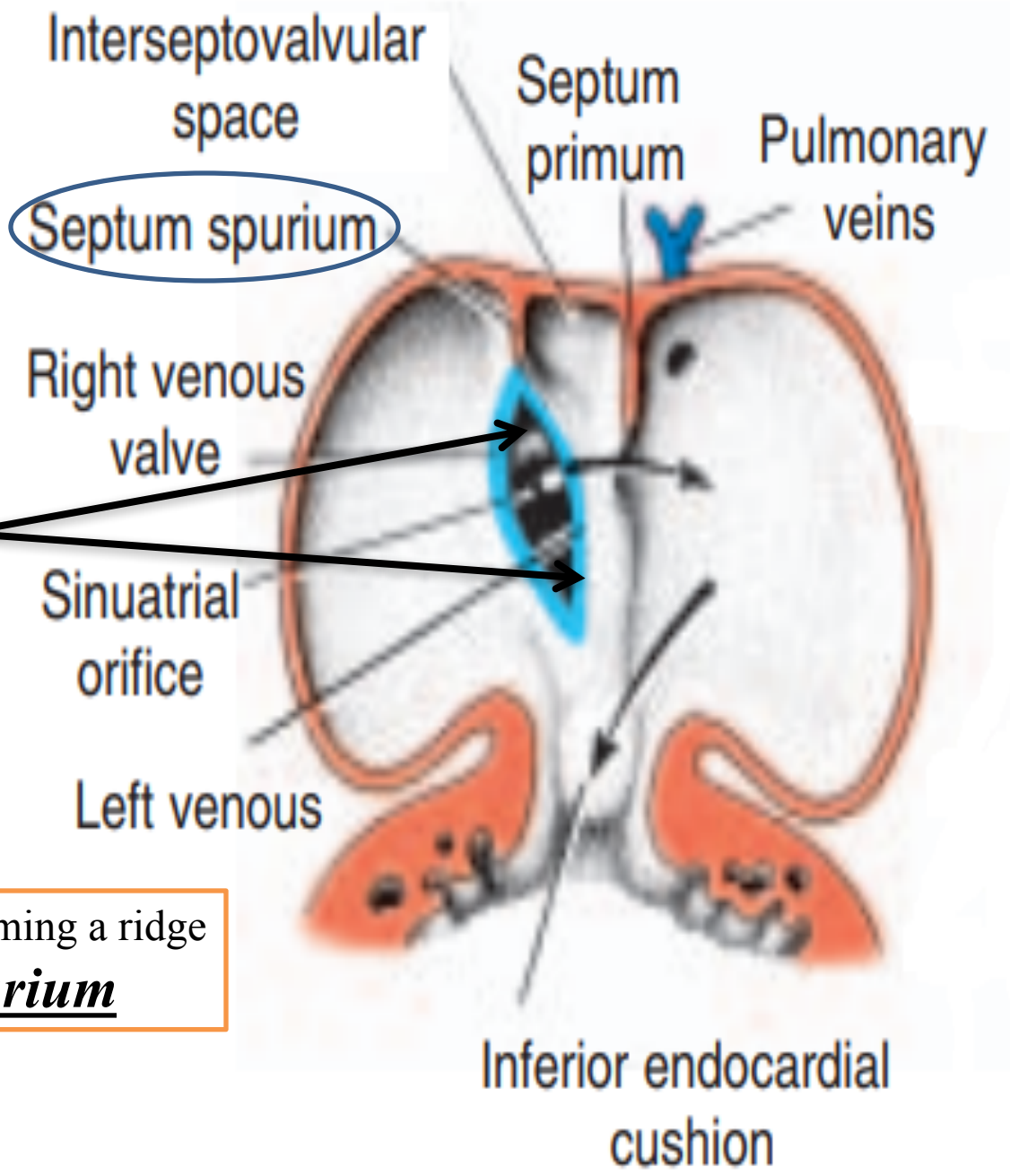


At first communication between the sinus and the atrium is wide. Soon, however, the entrance of the sinus shifts to the right This shift is caused primarily by left-to-right shunts of blood, which occur in the venous system during the fourth and fifth weeks of development

The right horn of the sinus **Venosus**

is incorporated into the right atrium to form the smooth-walled part of the right atrium

Its entrance,
the sinuatrial orifice, is flanked on each side by
a valvular fold
the right and left venous valves



Dorso cranially the valves fuse, forming a ridge known as ***the septum spurium***

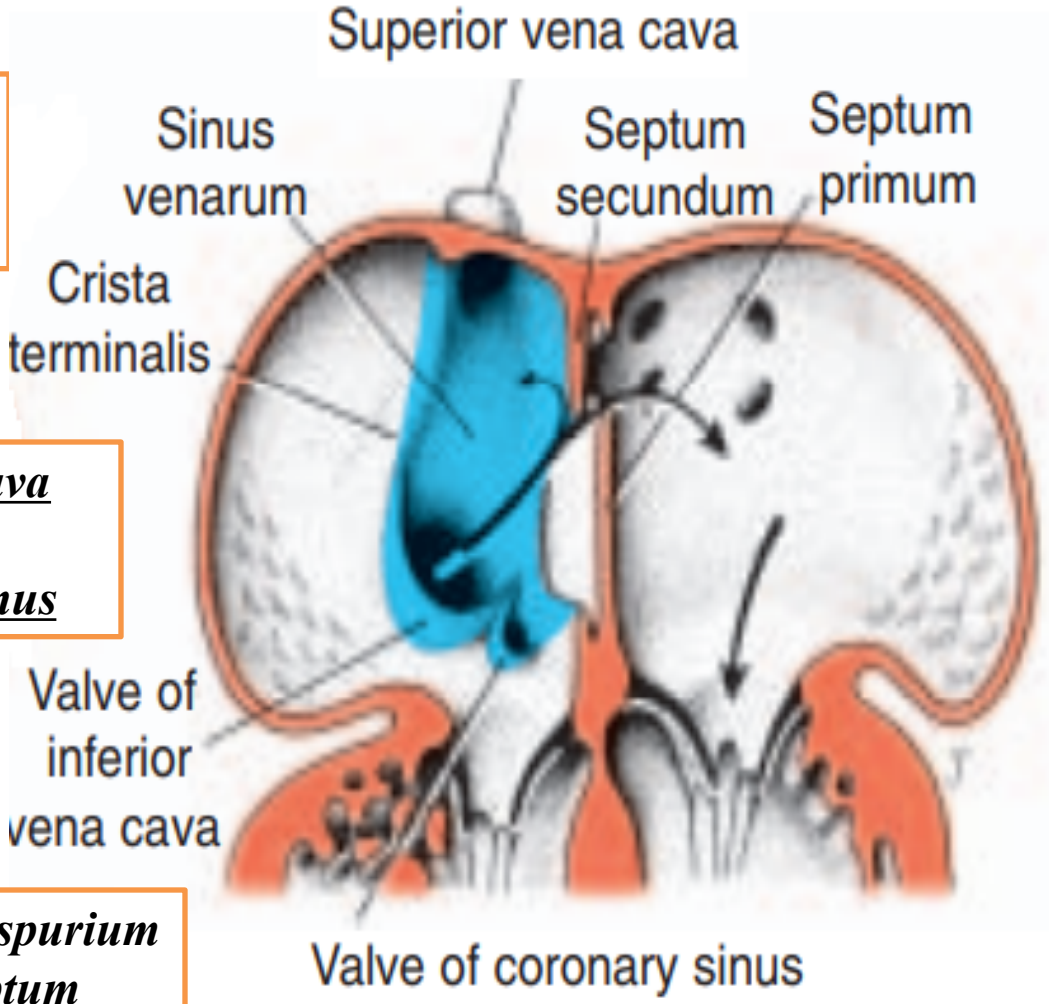
The right sinuatrial valve

The cranial part of the right sinuatrial valve of the right venous valve becomes ***The crista terminalis***

The inferior portion develops into two parts:

(a) The valve of the inferior vena cava

(b) (b) The valve of the coronary sinus



The left venous valve

The left venous valve and the septum ***spurium fuse with the developing atrial septum***

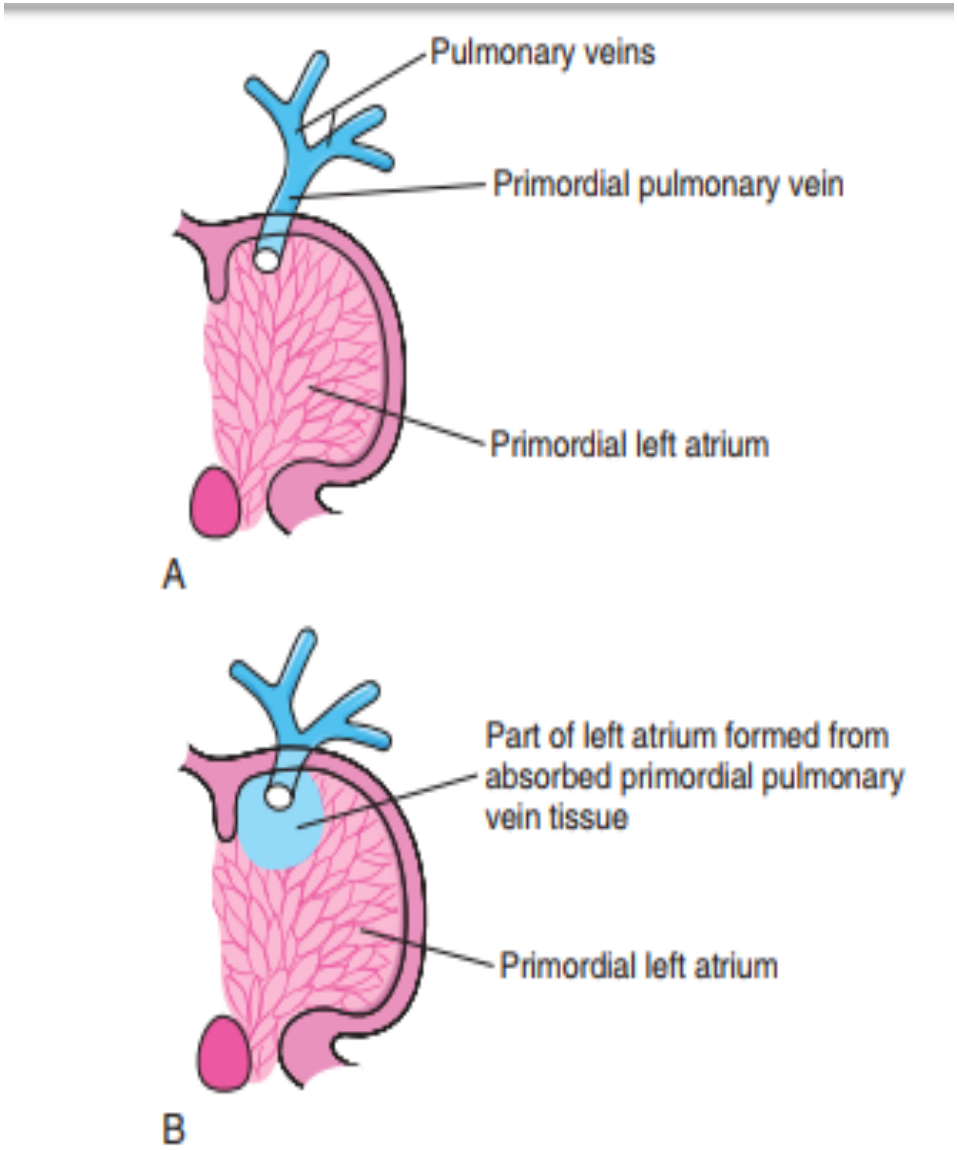
- The right horn of the sinus venosus

is incorporated into the wall of the right atrium
becomes the smooth part of the internal wall of the right atrium—

THE SINUS VENARUM

Primordial Pulmonary Vein and Formation of Left Atrium

- Most of the wall of the left atrium is smooth because it is formed by the incorporation of the primordial pulmonary vein
- This vein develops as an outgrowth of the dorsal atrial wall, just to the left of the septum primum.
- As the atrium expands, the primordial pulmonary vein and its main branches are gradually incorporated into the wall of the left atrium



- As a result, four pulmonary veins are formed
- The small left auricle is derived from the primordial atrium; its internal surface has a rough, trabeculated appearance