

Cardiovascular System

The heart is mesodermal in origin. It develops from primitive heart tube, which forms from mesenchyme in the **cardiogenic area** of the embryo. The heart starts functioning at the end of the third week of intrauterine life (IUL).

Formation of Heart Tube and its Subdivisions

The mesenchymal cells in the cardiogenic area condense to form two cords called **cardiogenic cords**. These cords get canalized to form **two endothelial heart tubes** (Fig., 2) These tubes fuse with each other in a craniocaudal direction to form a **single primitive heart tube**.

The heart tube forms five dilatations. From cranial to caudal end, these are as follows:

1. Truncus arteriosus
2. Bulbus cordis
3. Primitive ventricle
4. Primitive atrium
5. Sinus venos

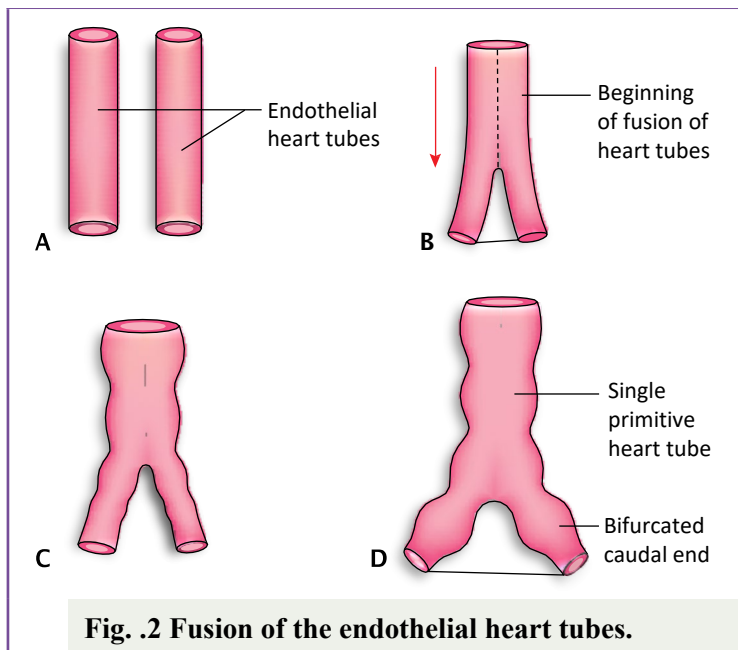


Fig. .2 Fusion of the endothelial heart tubes.

Formation of Cardiac Wall

The cardiac wall is made up of three layers. From inside to outside, these are:

1. Endocardium
 2. Myocardium
 3. Epicardium
- The endothelial heart tube forms the endocardium of the heart.
 - The myoepicardial mantle forms the myocardium and the epicardium.

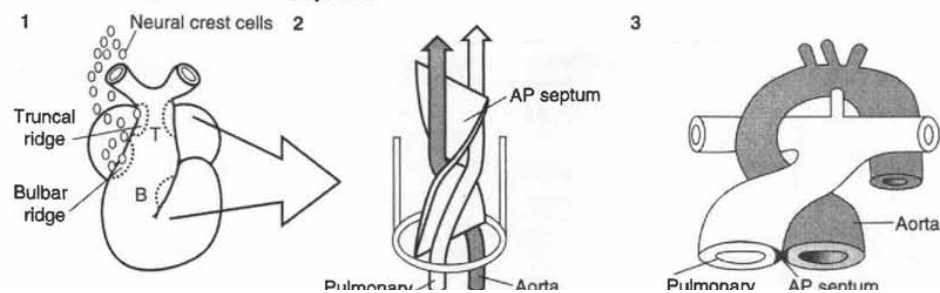
Formation of the Cardiac Septa

The major septa of the heart are formed between the 27th and 37th days of development.

1-The Aorticopulmonary (AP) Septum(fig 3)

Formation: Neural crest cells migrate from the hindbrain region through pharyngeal arches 3, 4, and 6 and invade both the **truncal ridges and bulbar ridges**. The truncal and bulbar ridges grow and twist around each other in a spiral fashion and eventually fuse to form the AP septum.

A. Formation of the AP Septum

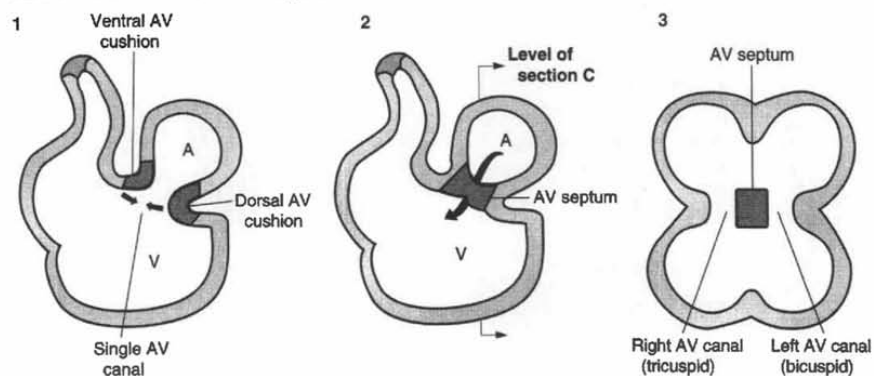


(Figure 3)

2- Atrioventricular (AV) septum (Figure 4). The AV septum divides the AV canal into the right AV canal and left AV canal.

Formation. The dorsal and ventral AV cushions fuse to form the AV septum.

A. Formation of the AV Septum



(Fig 4)

3-Atrial Septum: The atrial septum divides the primitive atrium into the right and left atria.

4- The Interventricular (IV) Septum ()

The muscular IV septum develops in the midline on the floor of the primitive ventricle and grows toward the fused AV cushions. The IV foramen is located between the free edge of the muscular IV septum and the fused AV cushions. This foramen is closed by the membranous IV septum, which forms by the proliferation and fusion of tissue from three sources: the right bulbar ridge, left bulbar ridge, and AV cushions

Development of the Arterial System.

In the head and neck region, the arterial pattern develops mainly from six pairs of arteries (called aortic arches). The aortic arch arteries undergo a complex remodeling process that results in the adult arterial pattern. In the rest of the body, the arterial pattern develops mainly from the right and left dorsal aortae. The right and left dorsal aortae fuse to form the dorsal aorta, which then sprouts posterolateral arteries, lateral arteries, and ventral arteries.

Development of the Venous System

General pattern: The general pattern develops mainly from three pairs of veins: vitelline, umbilical, and cardinal that empty blood into the sinus venosus. These veins undergo remodeling due to L-R shunting of venous blood to the right atrium.