

Formation of heart tube:	3 <sup>rd</sup> week
Heart beat:	22 <sup>nd</sup> – 23 <sup>rd</sup> day (beginning of fourth week)
USG detection of heart beat:	7 <sup>th</sup> week
Foetal ECG:	11 <sup>th</sup> week

Endocardium	from original <b>heart tube</b>
Myocardium (visceral pericardium)	from surrounding <b>mesoderm</b> & <b>epicardium</b> (myoepicardial mantle)
Lining of pericardium	epithelium of pericardial cavity
Transverse sinus	formed by <b>disappearance of dorsal mesocardium</b> (Present between arterial and venous ends of the heart tube)

## FATE OF SINUS VENOSUS

Left horn of sinus venosus, along with  
medial part of common cardinal vein forms

coronary sinus

Lateral part of common cardinal  
vein forms

oblique vein of left atrium

Left venous valve merges with septum secundum.

Right venous valve is divided in three parts by appearance of two transverse muscular bands, called limbic bands.

- i) The part **above superior limbic band** forms  
crista terminalis
- ii) The part **between the two bands** forms  
valve of inferior vena cava
- iii) The part **below the inferior limbic** band forms  
valve of coronary sinus

## INTERATRIAL SEPTUM

- i) **Upper**, thicker part is formed by **septum secundum**
- ii) **Lower**, thin part (floor of fossa ovalis)  
is formed by **septum primum**
- iii) Sharp **margin of fossa ovalis**  
is formed by **lower, curved margin of septum secundum**

## DEVELOPMENT OF RIGHT ATRIUM

It develops from

1. Right half of primitive atrial chamber (rough part);
2. Absorption of right horn of sinus venosus (smooth part)  
and
3. Right atrioventricular canal.

## DEVELOPMENT OF LEFT ATRIUM

It develops from

1. Left half of primitive atrial chamber (rough part – confined to the auricle);
2. Absorption of pulmonary veins (smooth part) and
3. Left atrioventricular canal.

## DEVELOPMENT OF LEFT ATRIUM

It develops from:

1. Left half of primitive atrial chamber (rough part - confined to the auricle);
2. Absorption of pulmonary veins (smooth part) and
3. Left atrioventricular canal.



**Bulbus cordis** elongates and this part can be divided into:

1. Proximal **bulbus cordis**,
2. Middle **conus cordis** and
3. Distal **truncus arteriosus**.

# INTERVENTRICULAR SEPTUM

1. Lower, **fleshy** part of IV septum is formed by growth from the **ventricular wall**
2. Upper, **membranous** part is formed below by **fused endocardial cushions** and above by the fused right and left **bulbar ridges**.

The membranous part of IV septum separates

right ventricle from left ventricle  
and also left ventricle from  
right atrium.

## DEVELOPMENT OF RIGHT VENTRICLE

- i) By the right half of primitive ventricular chamber & proximal bulbus cordis and
- ii) Its outflow part (infundibulum) is formed by right half of conus cordis.

## DEVELOPMENT OF LEFT VENTRICLE

- i) By the left half of primitive ventricular chamber & proximal bulbus cordis and
- ii) Its outflow part (vestibule) is formed by left half of conus cordis.

# CONGENITAL ANOMALIES OF HEART

## I. Anomalies of **position**:

- i). Dextrocardia
- ii). Ectopia cordis

## II. Anomalies of **interatrial septum**:

- i). Probe patency
- ii). Persistent foramen secundum
- iii). Persistent foramen ovale
- iv). Premature closure of foramen ovale
- v). Three chambered heart  
cor triloculare biatriale

## III. Anomalies of **interventricular septum**:

- a. ventricular septal defect
- b. absence of ventricular septum-cor triloculare  
biventriculare

## CONGENITAL ANOMALIES OF HEART (contd.)

### IV. Anomalies of **truncus arteriosus** and **bulbus cordis**:

- i). Fallot's tetralogy comprises
  - a) Pulmonary stenosis
  - b) Overriding aorta
  - c) Persistent IV foramen (VSD in membranous IV septum)
  - d) Hypertrophy of right ventricle
- ii). Persistent truncus arteriosus
- iii). Transposition of great vessels

### V. Anomalies of **valves**:

Stenosis/ atresia of pulmonary, aortic, mitral or tricuspid valves

## FATE OF AORTIC ARCHES

First aortic arch disappears (except a small portion which forms part of maxillary artery).

Second arch artery disappears (except the stapedial artery which also disappears after birth).

Third aortic arch forms :

- a. Common carotid artery from its proximal part.
- b. Internal carotid artery from its distal part.

Fourth aortic arch :

- a. On the right side forms proximal part of right subclavian artery.
- b. On the left side forms part of arch of aorta

Fifth aortic arch disappears.

Sixth aortic arch:

- a. Proximal part forms pulmonary artery
- b. Distal part –
  - i) Disappears on right side.
  - ii) Forms ductus arteriosus

## DEVELOPMENT OF ARCH OF AORTA

1. Ascending aorta is formed by aortic sac.
  2. Part of arch of aorta between brachiocephalic and left common carotid arteries is formed by left limb of aortic sac.  
Part of arch of aorta between left common carotid and left subclavian arteries is formed by left 4th aortic arch.
- Remaining part is formed by left dorsal aorta up to the level of the future lower border of 4th thoracic vertebra.

## Development of common carotid artery

1. Formed by proximal part of 3<sup>rd</sup> aortic arches.

## Development of internal carotid artery

1. Proximal part is formed by distal part of 3<sup>rd</sup> aortic arch
2. Distal part is formed by cranial part of dorsal aorta.

## Development of subclavian arteries:

- i) Left subclavian artery is formed by 7<sup>th</sup> cervical intersegmental artery.
- ii) Right subclavian artery is formed by right 4<sup>th</sup> aortic arch and 7<sup>th</sup> cervical intersegmental artery



## **CONGENITAL ANOMALIES**

1. Persistence of ductus arteriosus.
2. Coarction of aorta:
  - i) Preductal
  - ii) Postductal
3. Right sided arch of aorta
4. Double arches of aorta
5. Abnormal origin of right subclavian artery.

# Development of brachiocephalic veins

1. Right brachiocephalic vein is formed by cranial part of right precardinal vein and
1. Left brachiocephalic is formed by cranial part of left precardinal vein and the interprecordial anastomosis.

## Development of superior vena cava

- The part up to the opening of vena azygos develops from caudal part of right precardinal vein and
- The part below the opening (intrapericardial part) is formed by the right common cardinal vein.