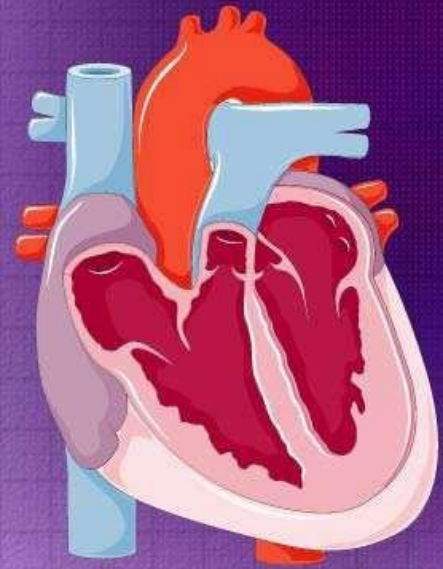


# CONGENITAL HEART DISEASES



DR SHAHAB

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## ☞ Congenital Heart Diseases (CHD)

- ☐ Incidence

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- ☐ Etiological Factors

## ☞ Classification of CHD

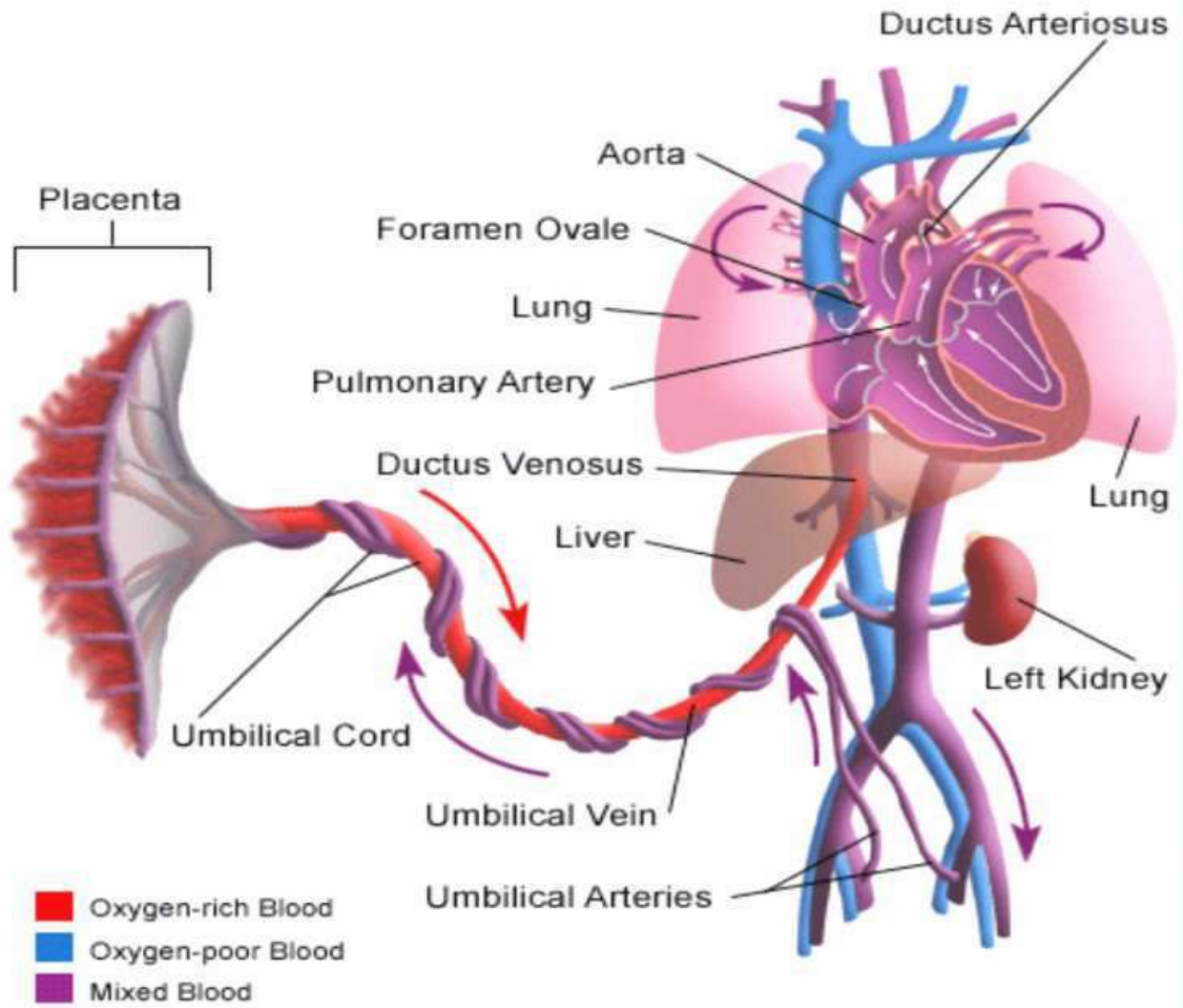
- ☐ Cyanotic

- ☐ Acyanotic

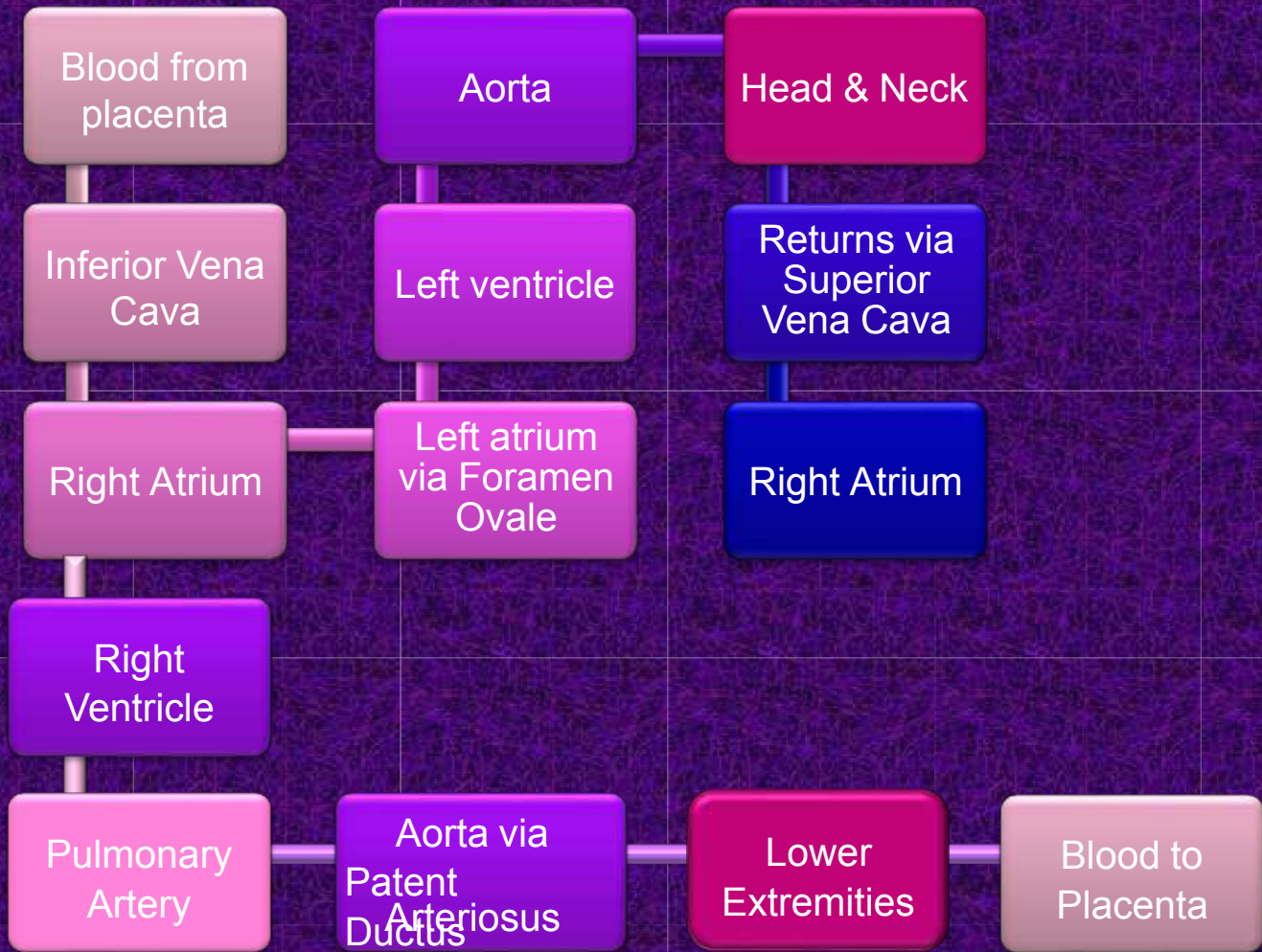
## ☞ Hemodynamics of Common CHD

## ☞ Assessment & Management

# Fetal Circulation



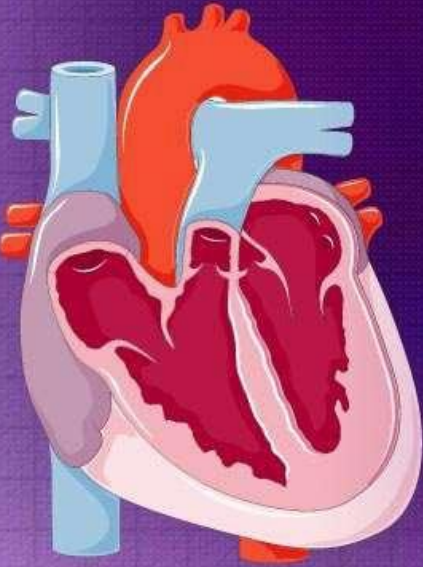
# FETAL CIRCULATION



# CONGENITAL HEART DISEASES (CHD)

☞ These are cardiac anomalies arising as a result of a defect in the structure or function of the heart and great vessels which is present at birth

☞ These lesions either obstruct blood flow in the heart or vessels near it, or alter the pathway of blood circulating through the heart



# CLASSIFICATION OF CHD

**PINK  
BABY**

**ACYNOTIC**

**Volume or  
Pressure  
Overload**

**PDA, VSD, ASD,  
Coartation of Aorta**

**BLUE  
BABY**

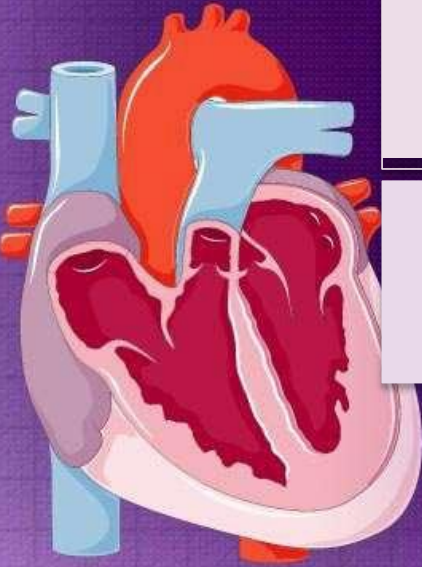
**CYNOTIC**

**OR**



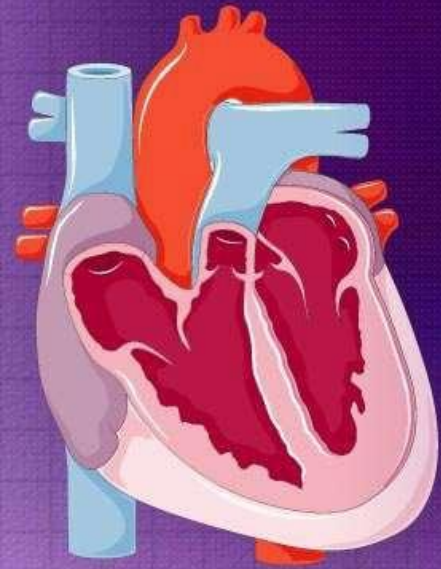
**Pulmonary  
Blood flow**

**Tetralogy of Fallot,  
Transposition of  
great vessels,  
Tricuspid Atresia**



## Atrial Septal Defect (ASD)

- An abnormal opening in the atrial septum which allows oxygenated blood from the left atrium to mix with deoxygenated blood in the right atrium at a minor pressure difference
- Right atrium receives blood from SVC, IVC as well as from left atrium leading to volume overload and pulmonary congestion
- Occurs in about 4-10% of CHD
- More common in female child



## Types of ASD:

- **Ostium Secundum**

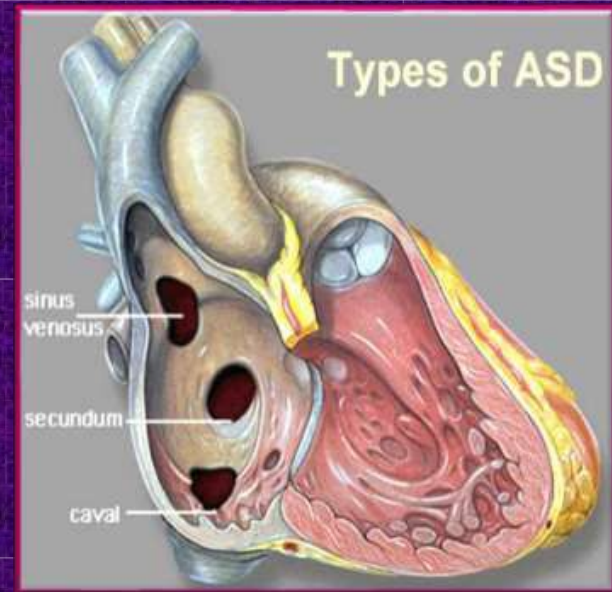
most common- 50-70%,  
In the middle of the septum in  
the region of the foramen ovale

- **Ostium primum**

30% -Low position  
Form of AV septal defect

- **Sinus venosus**

Least common-10%  
Site-at entry of superior  
venacava into right atrium





## Clinical Presentation:

- Most infants and children are asymptomatic but over years to decades may experience the symptoms depending on type and severity of ASD
- ✓ Infant gets tired during feeding
- ✓ Child gets tired with playing/eating
- ✓ Shortness of breath
- ✓ Fatigue
- ✓ Sweating
  - ✓ Palpitations
  - ✓ Stunted growth

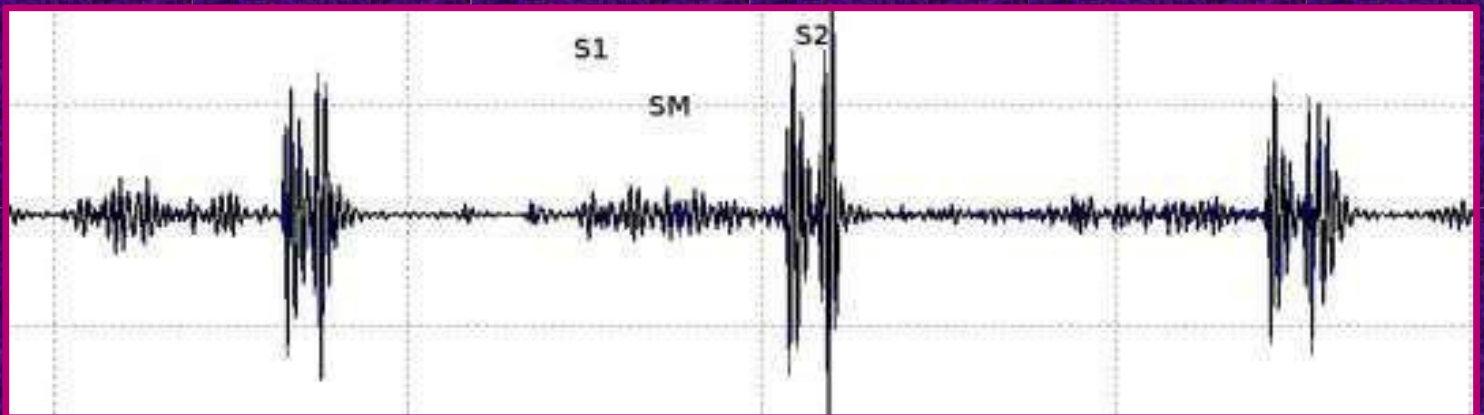
## 📄 Diagnosis:

### On Auscultation-

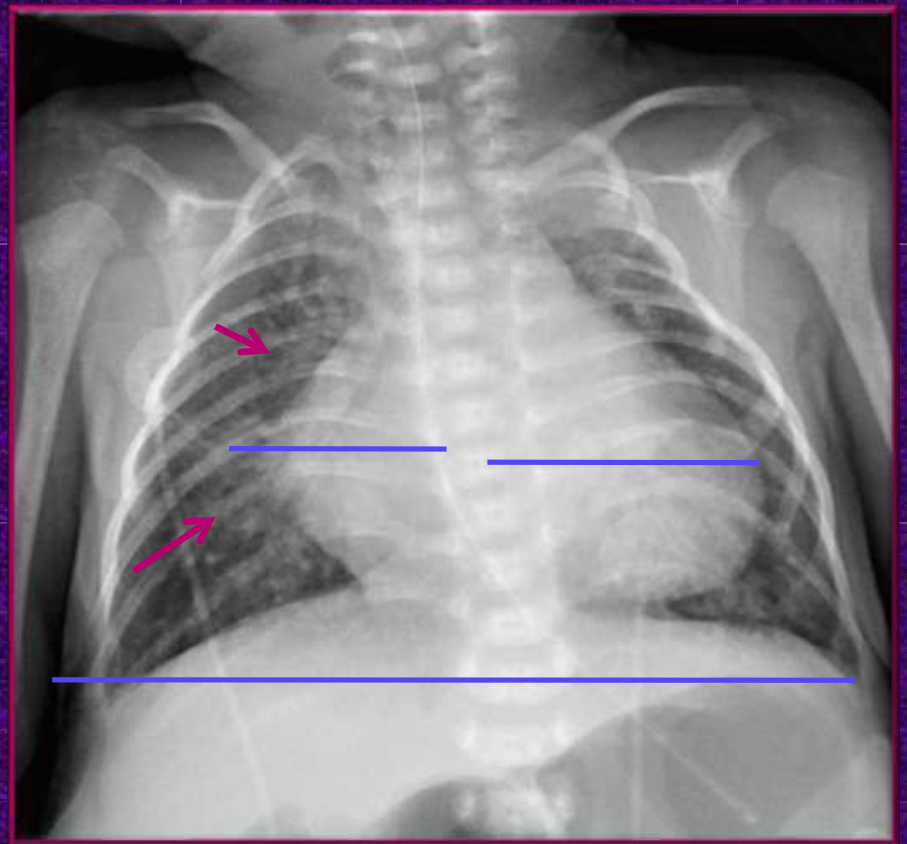
✓ S1 : normal

✓ S2: Widely split & fixed with P2 accentuated

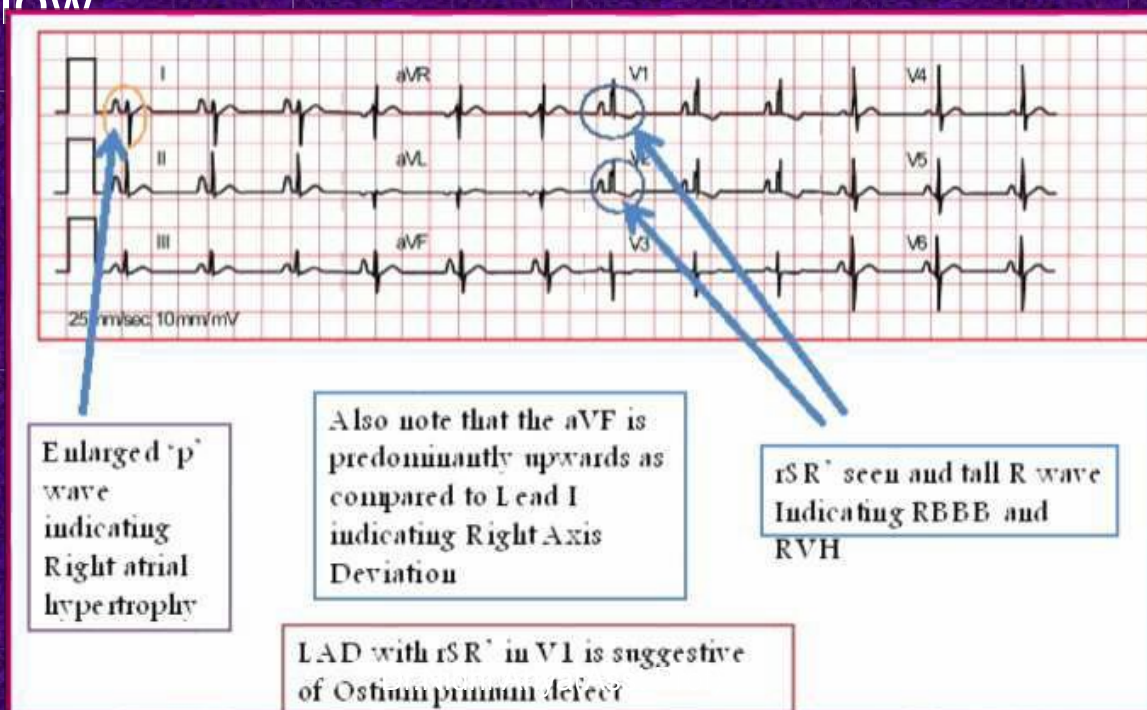
✓ Ejection systolic murmur is present



- Chest X-ray - Mild to moderate cardiomegaly with enlarged right atrium & right ventricle, prominent pulmonary artery segment, increased pulmonary vascular markings

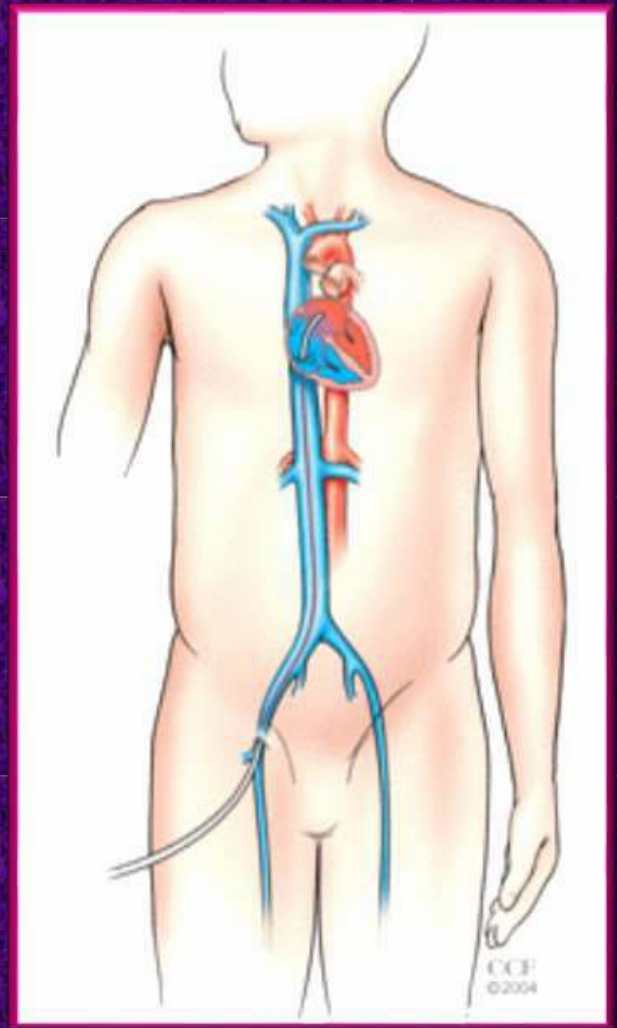
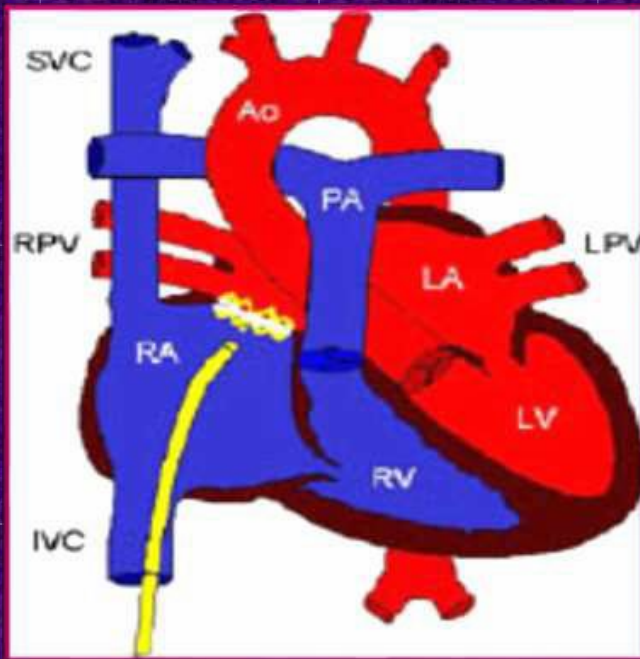


- ECG- Right Axis Deviation, Right ventricular strain pattern in lead V<sub>1</sub>
- Echocardiogram- position, size, signs of L→R shunt, flow



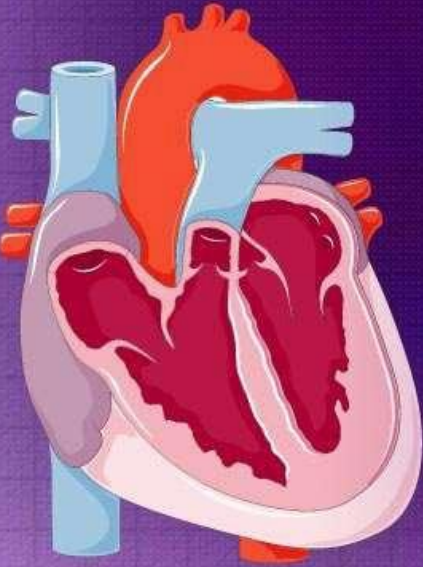
## Management :

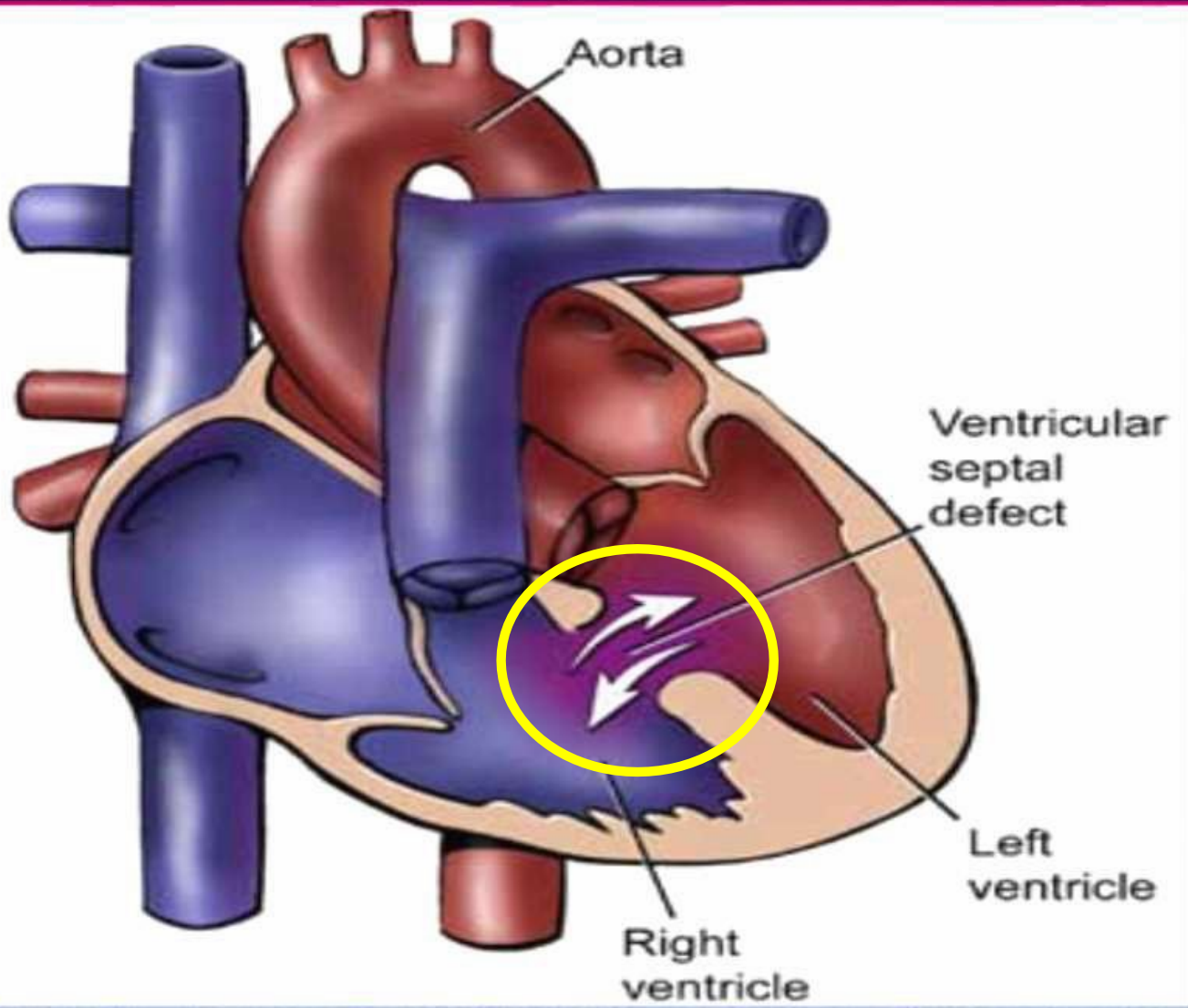
- 20% of atrial septal defects will close spontaneously in the first year of life or as the child grows
- For defects of 3-8mm, or smaller, supportive medical management – Digoxin, diuretics and prophylactic antibiotics are sufficient up till spontaneous closure
- If defect is >8mm, surgical repair may be required
- If spontaneous closure does not occur by school-going age, surgical repair becomes essential to prevent lung problems that will develop from long-time exposure to extra blood flow
- Surgical repair- defect may be closed with stitches or a special patch. The material utilized for patch closure of ASD's may be the patient's own pericardium, commercially available bovine pericardium, or synthetic material  
(CoreTex, Dr. Nidhi Ahya (Asst Prof))



## Ventricular Septal Defect (VSD)

- An abnormal opening in the ventricular septum which allows oxygenated blood from the left ventricle to mix with deoxygenated blood in the right ventricle
- Right ventricle receives blood from right atrium as well as from left ventricle leading to volume overload and pulmonary congestion
- VSDs are the most commonly occurring type of congenital heart defect, occurring in 14-17 % of babies born each year





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## Types of VSD:

- **Supracristal VSD**

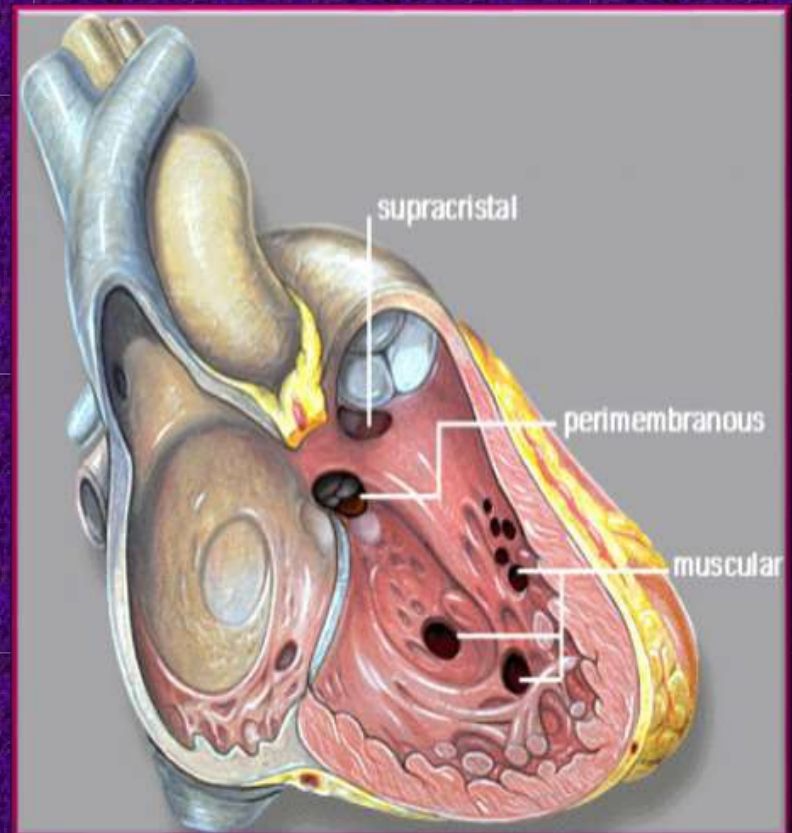
occurs just beneath the aortic valve at the left ventricular outflow tract

- **Membranous VSD**

The most common type and originate inferior to the crista supraventricularis

- **Muscular VSD**

Occur in the mid to apical interventricular septum

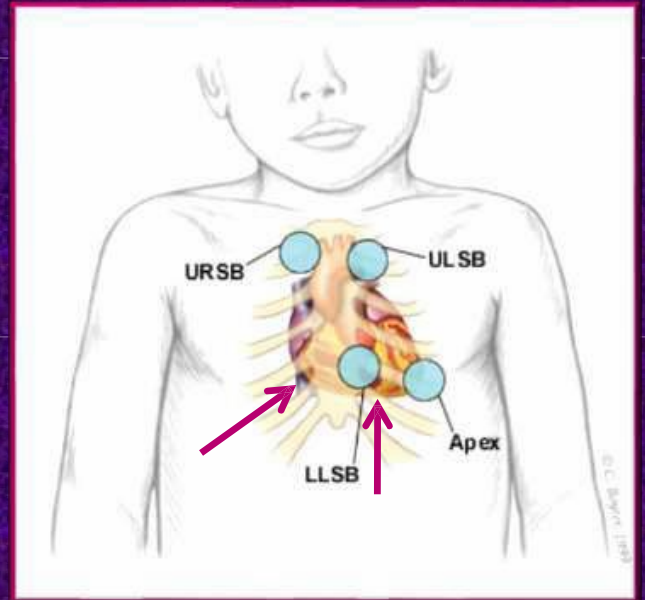


## Clinical Presentation:

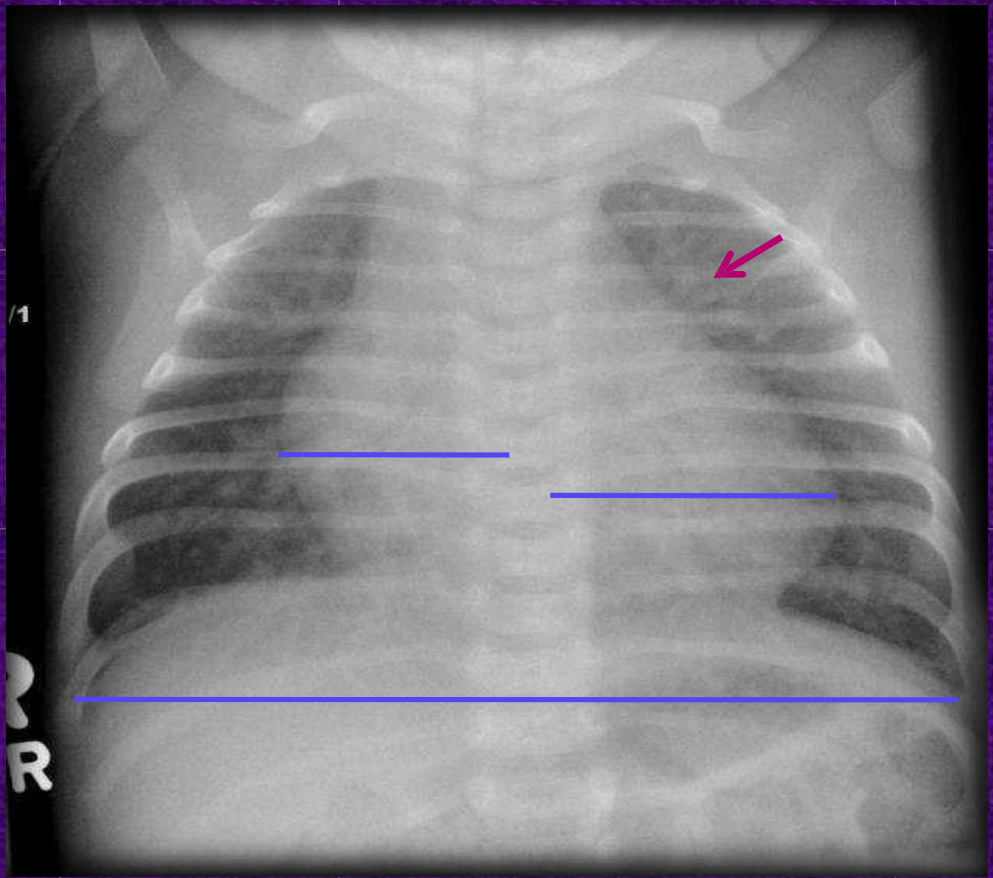
- Signs and symptoms vary with the size of the defect.
- Clinical symptoms are usually not seen at birth because of continued high pulmonary vascular resistance in the newborn
- Infants with moderate to large defects will become symptomatic within the first few weeks of life.
- ✓ Shortness of breath while feeding
- ✓ Poor growth
- ✓ Failure to gain weight
- ✓ Pounding Heart
- ✓ Frequent respiratory tract infections
- ✓ If reversal of shunt occurs- cyanosis, clubbing, respiratory distress

## Diagnosis:

- On Auscultation-
  - ✓ Pansystolic murmur is present
  - ✓ S1 is masked by the murmur
  - ✓ S3 can be heard at the apex



- Chest X-ray- Cardiomegaly and increased pulmonary vascular markings

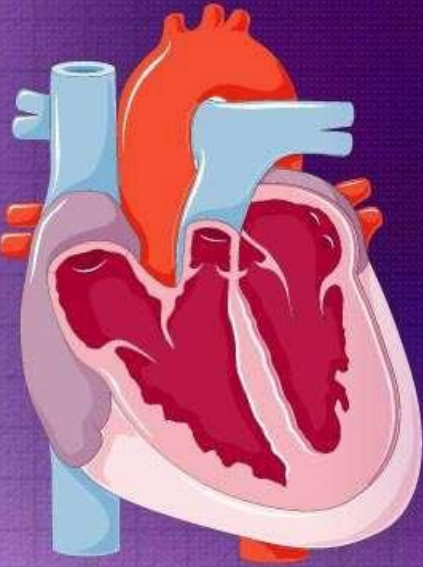




## Management :

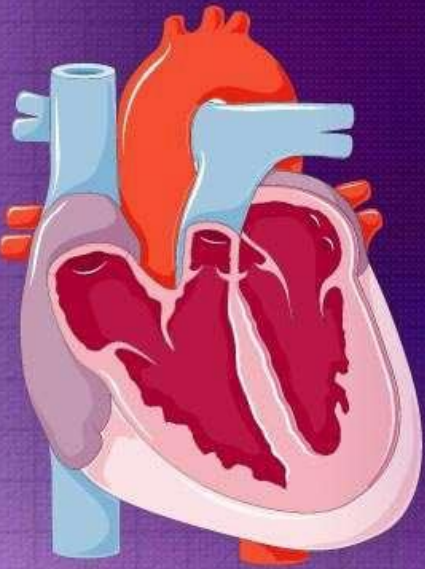
- Medical management
  - ✓ digoxin
  - ✓ Diuretics
  - Adequate nutrition
  - ✓ high-calorie formula or breast milk
  - ✓ supplemental tube feedings
  - Prophylactic antibiotics to prevent bacterial endocarditis

- Surgical repair – closed stitches or special patch
- Interventional cardiac catheterization – Septal occluder
- Outcome of Surgery- 95% success rate, growth of child catches up in 1-2 years, size of the heart reduces, murmurs can be heard 2-3 months post-operative also but hold very little clinical importance

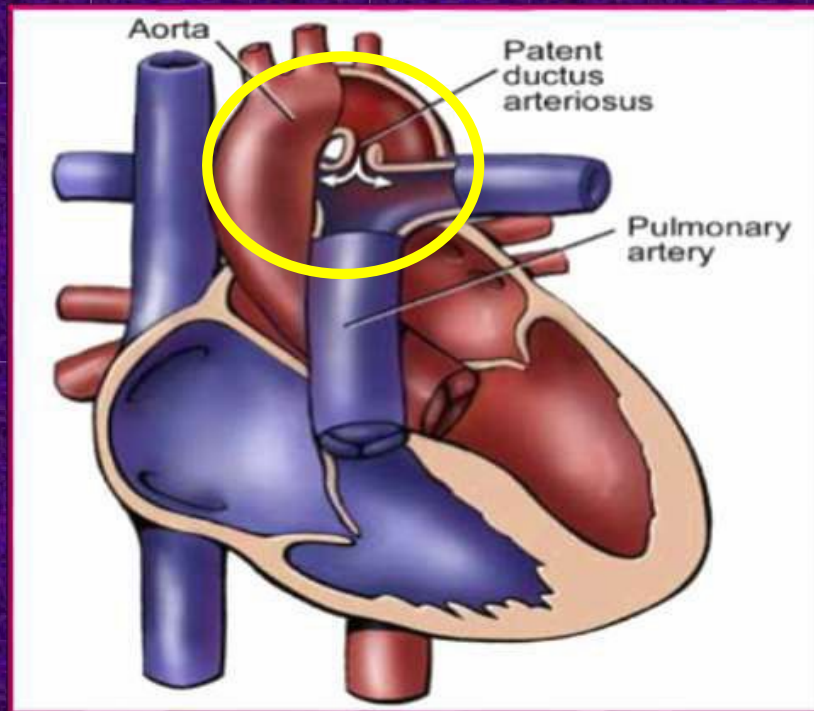


# Patent Ductus Arteriosus (PDA)

- Failure of closure of ductus arteriosus
- Incidence: Mostly in premature infants or infants born to a mother who had rubella during the first trimester of pregnancy
- Through the PDA □ oxygenated blood passes from the aorta to the pulmonary artery & mixes with the deoxygenated blood which goes to the lungs □ □ blood volume to the lungs □ pulmonary hypertension & congestion



- As blood is pumped at high pressure through the PDA, the lining of the pulmonary artery will become irritated and inflamed. Bacteria in the bloodstream can easily infect this injured area □ bacterial endocarditis



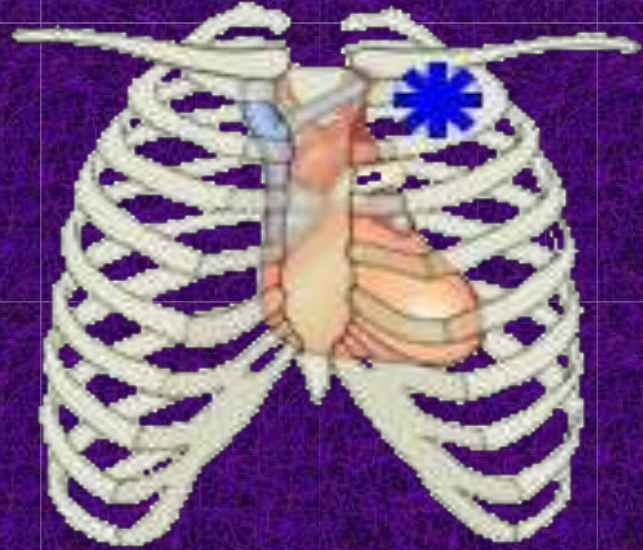


## Clinical Presentation:

- Shortness of breath
- Congested breathing
- Disinterest in feeding, or tiring while feeding
- Poor weight gain
- Sweating
- Tachypnea
- Bounding pulse

## 📄 Diagnosis:

- On Auscultation-  
✓ Continuous machinery murmur in the left infraclavicular region



- Management:

- ✓ **Medical Management**

- Indomethacin IV (prostaglandin inhibitor) may help close a PDA. It works by stimulating the muscles inside the PDA to constrict, thereby closing the connection

- Digoxin

- Diuretics

- ✓ **Adequate nutrition**

- High-calorie formula or breast milk

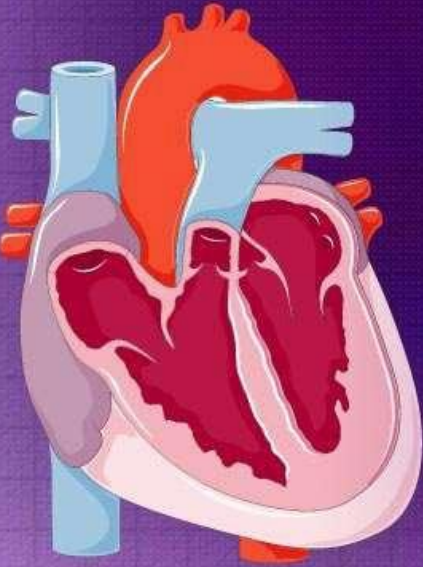
- Special nutritional supplements may be added to formula or pumped breast milk that increase the number of calories in each ounce

## ✓ Surgical Management

- Repair is usually indicated in infants younger than 6 months of age who have large defects that are causing symptoms, such as poor weight gain and rapid breathing
- Transcatheter coil closure of the PDA
- PDA ligation-involves closing the open PDA with stitches or the vessel connecting the aorta and pulmonary artery may be cut and cauterized

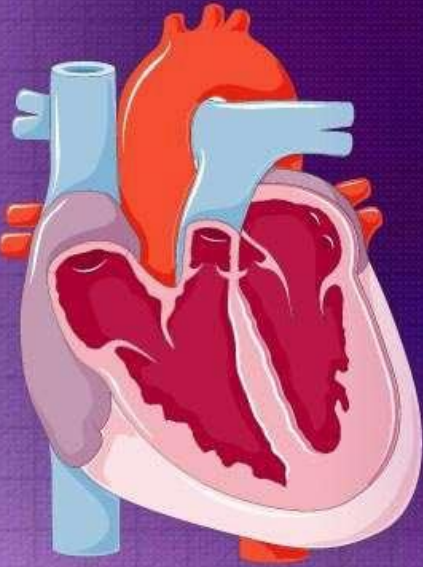
# CYNOTIC HEART DISEASE

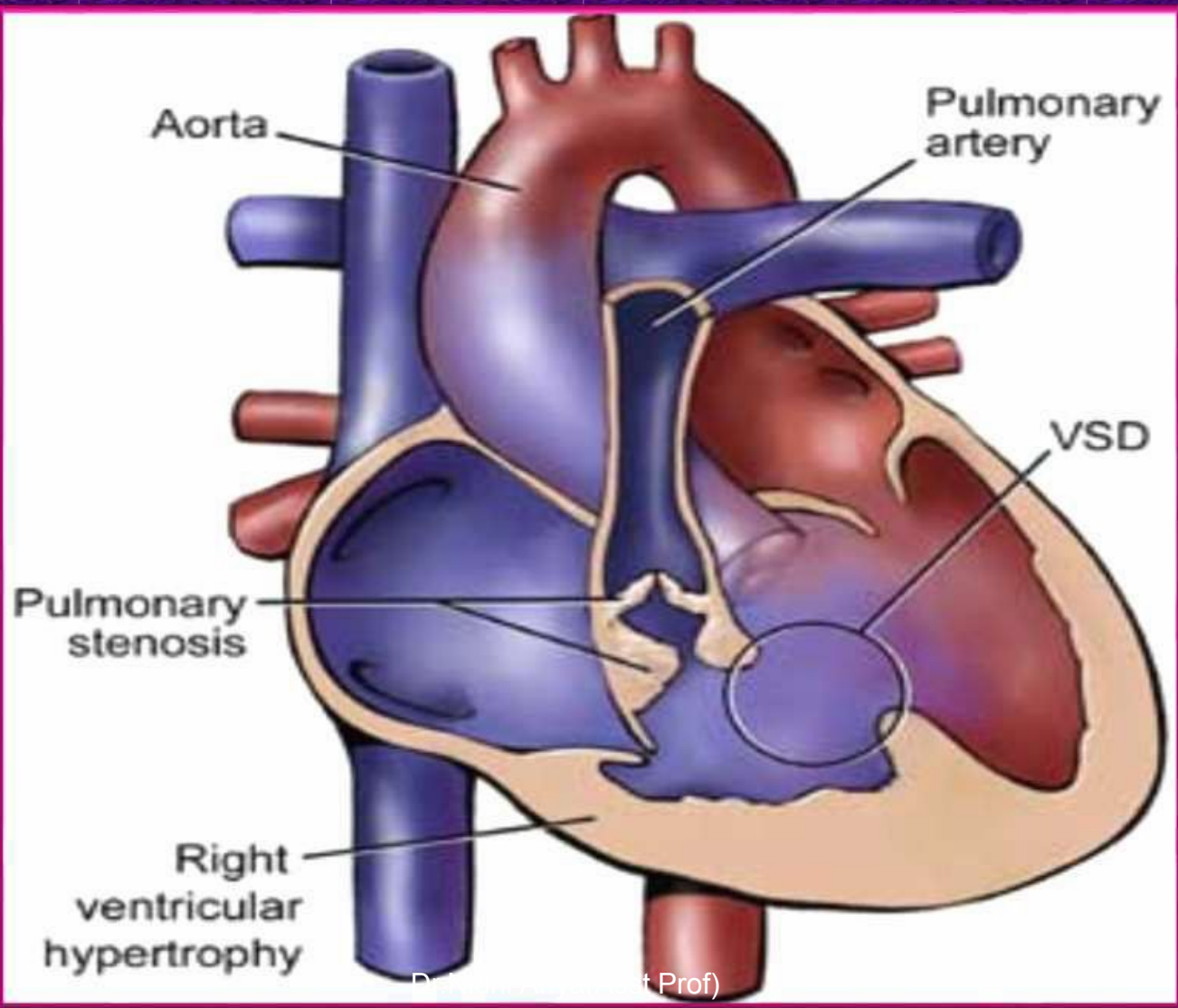
- ❑ These type of defects lead to either increased or decreased pulmonary blood flow
- ❑ The primary pathology arises either due to an obstructive lesion; or due to abnormal anatomy or both
- ❑ The shunt present is predominantly from Right to Left leading to shunting of venous blood without passing through the lungs to be oxygenated
- ❑ Unoxygenated blood circulates in arteries □ cyanosis
- ❑ Example: Tetralogy of Fallot, TGV



## Tetralogy of Fallot (TOF)

- A complex condition of several congenital defects that occur due to abnormal development of the fetal heart during the first 8 weeks of pregnancy
- '*Tetra*' meaning '*four*'
  - ✓ Ventricular septal defect (VSD)
  - ✓ Pulmonary valve stenosis
  - ✓ Overriding aorta
  - ✓ Right ventricular hypertrophy





Dr. (Prof)

- Due to pulmonary artery stenosis, RV has to work harder to push blood into the lungs, thereby increasing the RV pressure and size
- Presence of VSD facilitates blood to pass from the RV into the left ventricle, and mixing of blood takes place.
- Overriding of aorta- The aorta sits above both the left and right ventricles over the VSD, rather than just over the left ventricle. As a result, oxygen poor blood from the right ventricle can flow directly into the aorta instead of into the pulmonary artery to the lungs
- Decreased pulmonary blood flow and poorly oxygenated blood circulating throughout the body leads to CYNOSIS



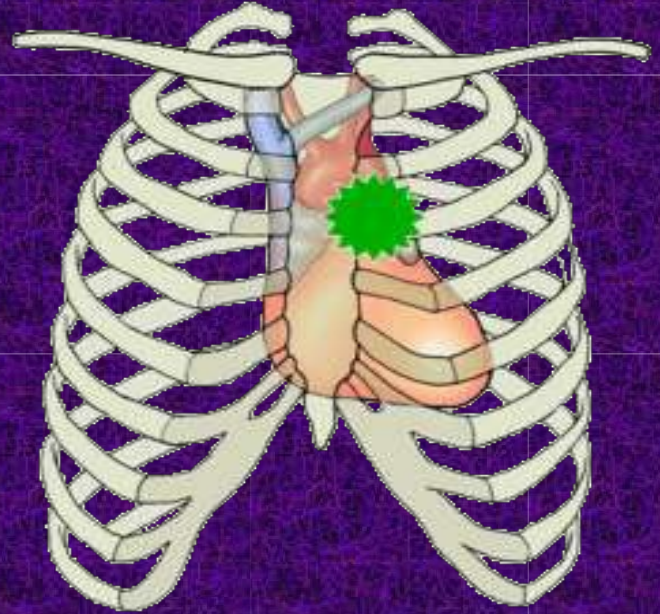
## Clinical Presentation:

- Cyanosis -(bluish color of the skin, lips, and nail beds) that occurs with such activity as crying or feeding
- Irritability
- Lethargic
- Reduced physical activity
- Fainting
- Clubbing of nails of fingers/toe
- Breathing difficulty



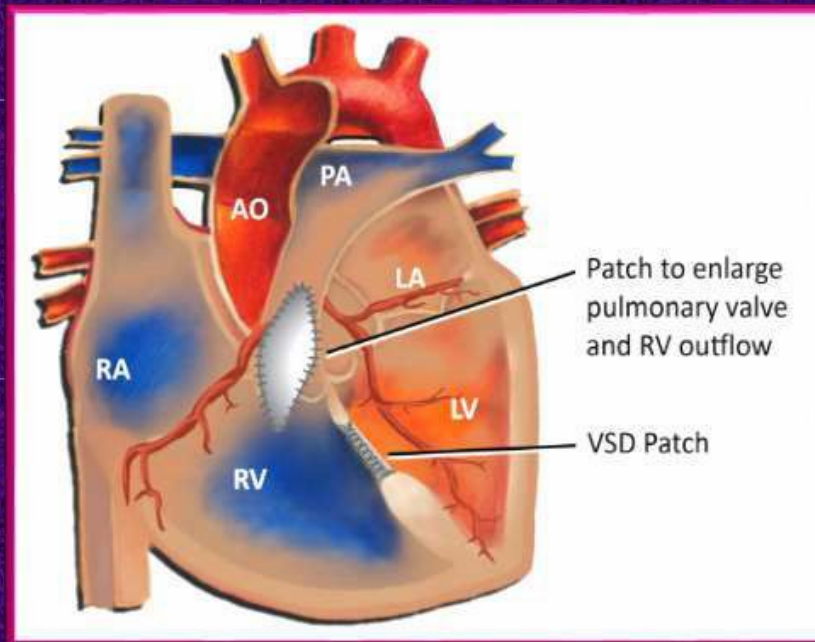
## 📄 Diagnosis:

- On Auscultation- An ejection systolic murmur is present at the Left parasternal region 3<sup>rd</sup> ICS due to pulmonary stenosis.



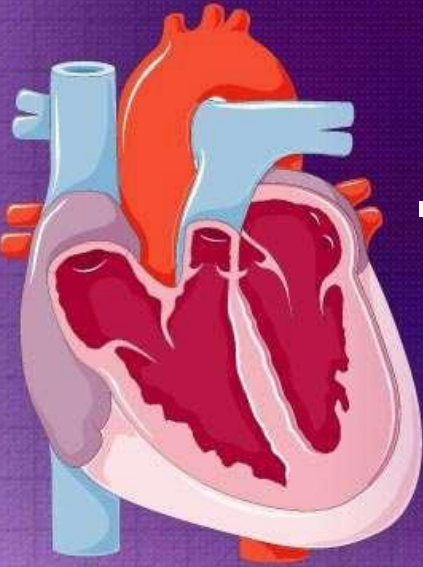
## Management :

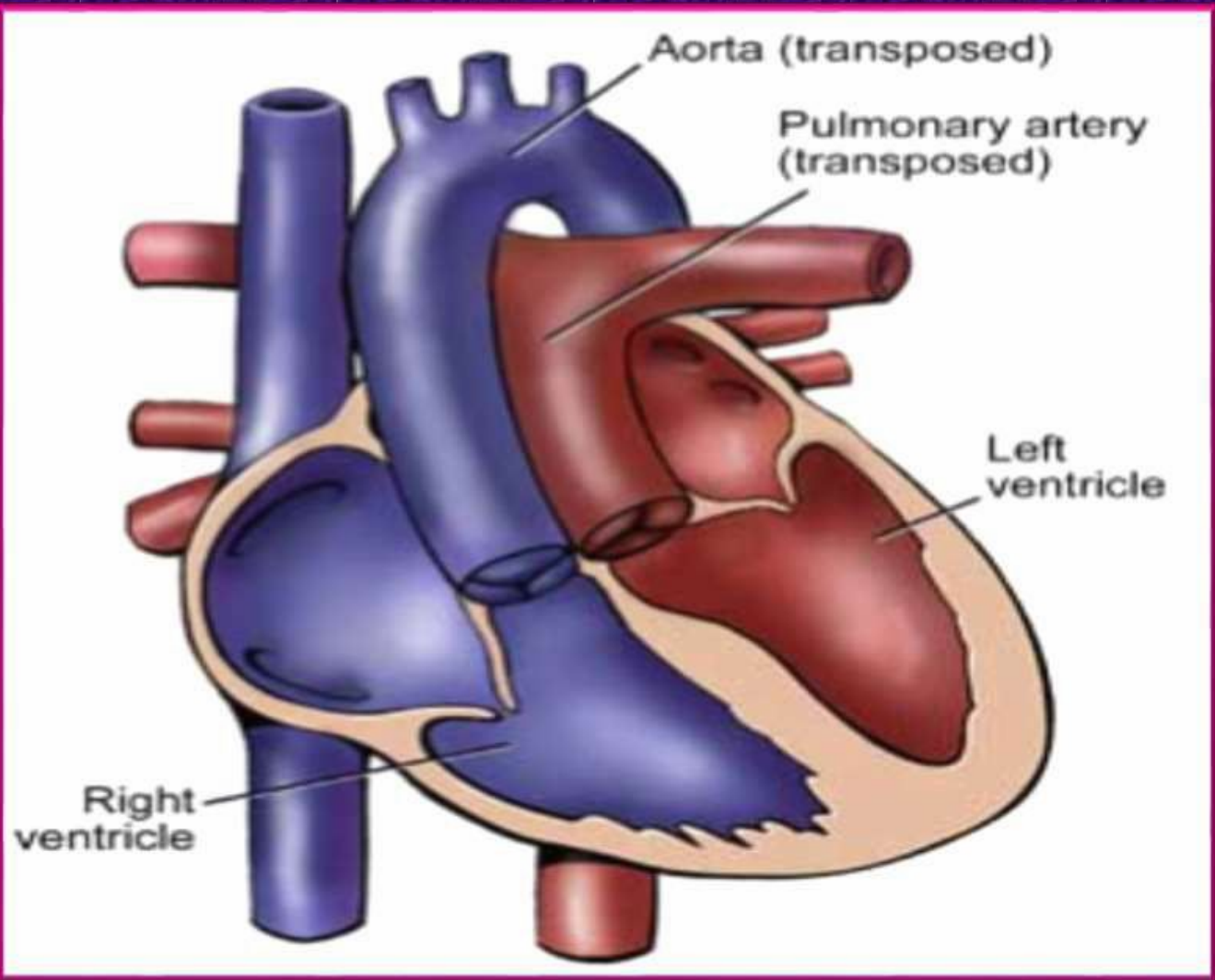
- Requires surgical repair usually undertaken at 6-18 months age
- It involves- closure of VSD with a tangential patch to correct the override and the pulmonary stenosis is relieved with a patch).



# Transposition of Great Vessels (TOG)

- The aorta is connected to the right ventricle, and the pulmonary artery is connected to the left ventricle
- Oxygen-poor (blue) blood returns to the right atrium from the body □ passes through the right atrium and ventricle, □ into the misconnected aorta back to the body.
- Oxygen-rich (red) blood returns to the left atrium from the lungs □ passes through the left atrium and ventricle, □ into the pulmonary artery and back to the lungs.





## Clinical Presentation:

- Cyanosis -(bluish color of the skin, lips, and nail beds) that occurs with such activity as crying or feeding
- Rapid and laboured breathing
- Cold and clammy skin
- Failure to thrive

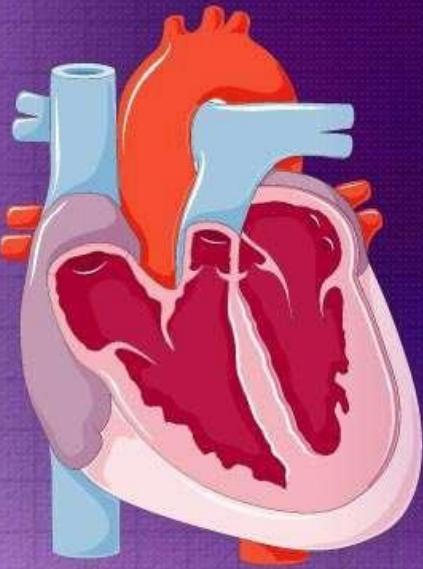
## Management:

- Admitted to NICU
- On ventilator support
- Cardiac Catheterization
- Ballon Atrial Septostomy
- I.v. Prostaglandins administered
- By 2<sup>nd</sup> week of life, TGA repair is done
- *'Switch'* operation



# Summary

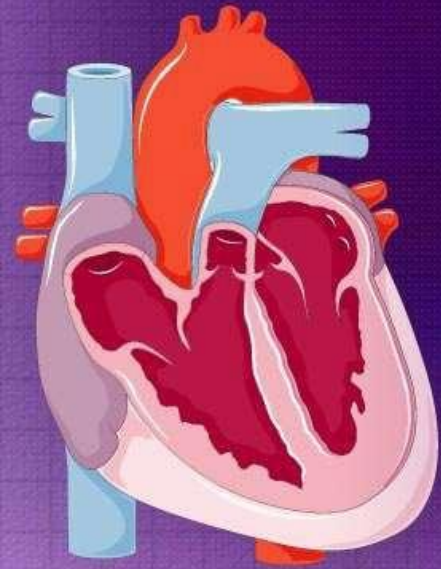
- ❏ Fetal Circulation Congenital Heart
- ❏ Diseases
- ❏ Classification of CHD
- ❏ Hemodynamics of Common CHD
- ❏ Assessment & Management





# QUESTIONS

1. WRITE ABOUT FATEL CIRCULATIONS.
2. GIVE THE CLASSIFICATION OF CHD.
3. WRITE THE ASSESMENT AND MANGEMENT OF THE CHD





Thank you...!!!