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Physiotherapy cardio-respiratory Clinic Course

L 22 & 23: Congenital Heart Diseases

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Epidemiology

- **Congenital heart disease occurs in 8 / 1000 births.**
- **Severity :Ranges from asymptomatic to fatal.**
- **Causes:**
  1. Multifactorial,
  2. Chromosomal disorders, single gene defects(Down syndrme ,Turnr syndrme),
  3. Teratogens(drugs anticonvulsant , congenital infectins :TORCH),
  4. Maternal disease(DM, SLE ,) .

Classification of CHD

Left-to-right shunts: ventricular septal defectVSD,Atrial septal defect ASD,Patent ductus arteriousus PDA

Right-to-left shunts: Tetralogy Of Fallot, Transposition of great arteries, Tricuspid atresia

Obstructive stenotic lesions Aortic stensis ,pulmonary stensis ,coarctation of aorta.

VENTRICULAR SEPTAL DEFECT

- VSDs are the most common congenital heart defect, accounting for 25% of all congenital heart
- ❖ disease : could be muscular or perimembranous VSD .
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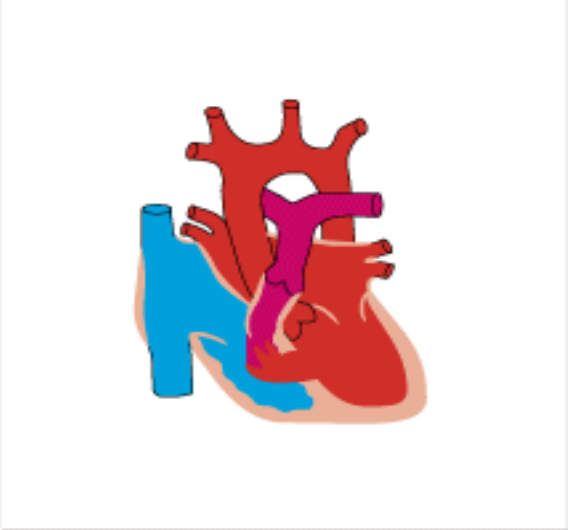
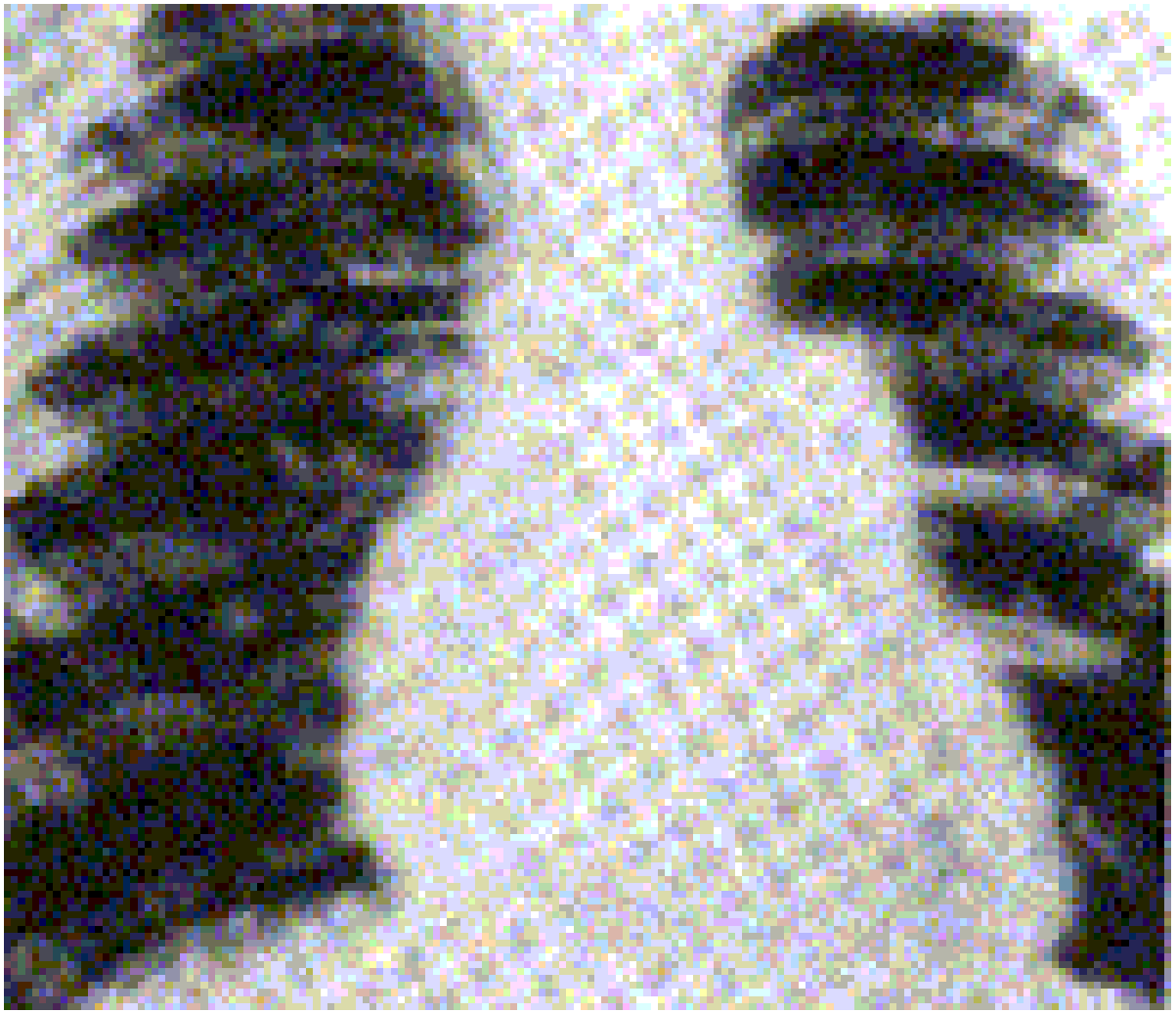


Investigations:

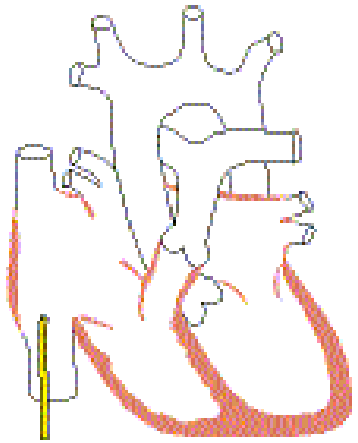
- **ECG and chest x-ray** findings depend on the size of the VSD. Small VSDs may have normal studies.
- **Larger VSDs** cause volume overload to the left side of the heart resulting in ECG findings of left atrial and ventricular enlargement and hypertrophy.
- **A chest radiograph** may reveal cardiomegaly, enlargement of the left ventricle, and an increase in the pulmonary artery silhouette and increased pulmonary blood flow. Pulmonary hypertension due to either increased flow or increased pulmonary vascular resistance may lead to right ventricular enlargement and hypertrophy.



Treatment :

- Approximately 35% of all VSDs close spontaneously.
- Small VSDs usually close spontaneously; if they do not close, surgical closure may not be required, but prophylactic antibiotics are needed to prevent subacute bacterial endocarditis.
- Large VSDs are treated with diuretics and digoxin. Continued poor growth or pulmonary hypertension despite therapy requires closure of the defect.
- Most VSDs are closed in surgery, but some VSDs, especially muscular defects, can be closed with devices placed at cardiac catheterization.

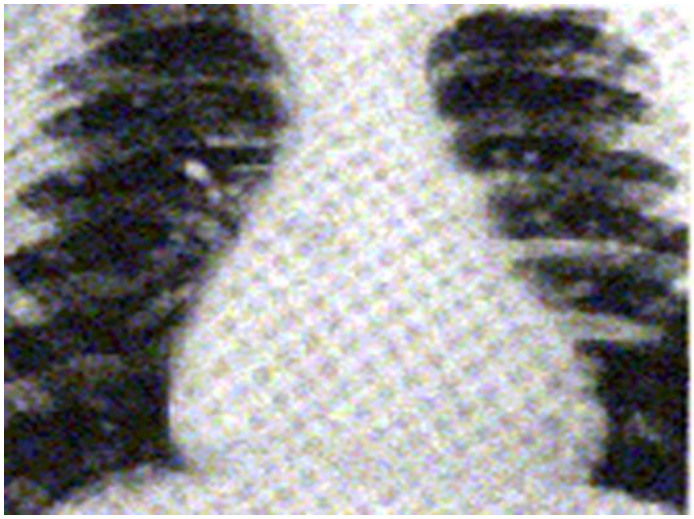
ATRIAL SEPTAL DEFECT



- ASD :pathophysiology and amount of shunting depend on the size of the defect .
- infants and children are rarely symptomatic.

Imaging Studies:

- ECG and chest x-ray findings reflect the **increased blood flow** through the right atrium, right ventricle, pulmonary arteries, and lungs. The ECG may show **right axis deviation** and **right ventricular hypertrophy**.
- A chest radiograph may show cardiomegaly, right atrial enlargement, and a prominent pulmonary artery.

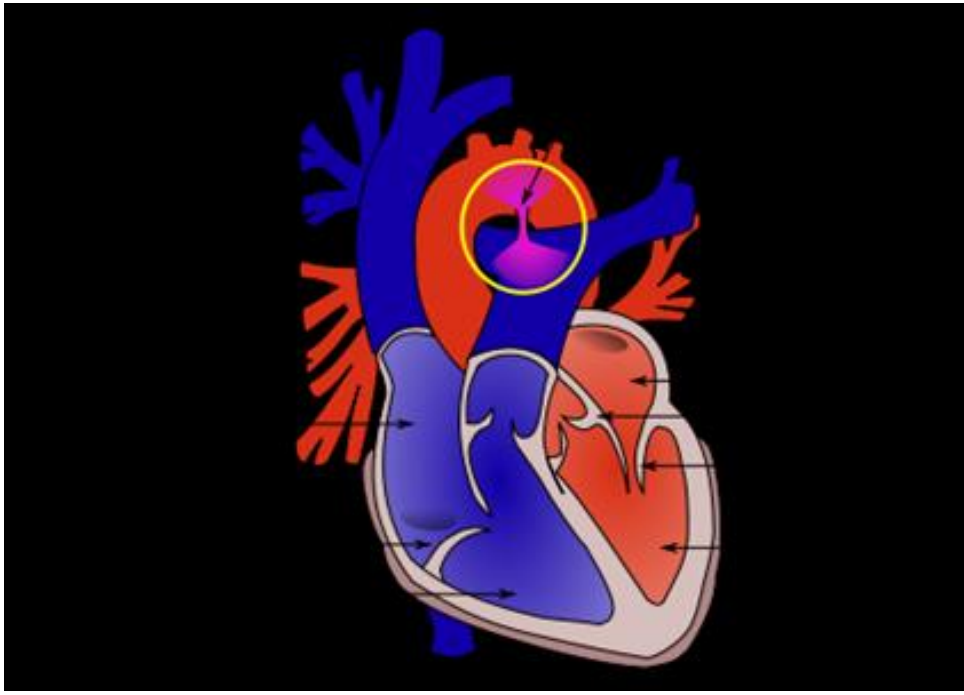


Treatment

- Medical management is rarely indicated; prophylaxis for subacute bacterial endocarditis is not needed.
- closure is by catheterization or surgical closure.

PATENT DUCTUS ARTERIOSUS

- The ductus arteriosus allows blood to flow from the pulmonary artery to the aorta during fetal life. Failure of the normal closure of this vessel results in a PDA, with a falling pulmonary vascular resistance after birth, left-to-right shunting of blood and increased pulmonary blood flow occur.
- Symptoms depend on the size of the PDA (including diameter, length, and tortuosity) and the pulmonary vascular resistance.



Imaging Studies:

- ECG and chest x-ray findings are normal with small PDAs.
- Moderate to large shunts may result in cardiomegaly &increased pulmonary vascularity. ECG findings vary from normal to evidence of left ventricular hypertrophy. If pulmonary hypertension is present, there is also right ventricular hypertrophy.

Treatment :

- Spontaneous closure of a PDA after a few weeks of age is uncommon in full-term infants, unlike preterms.
- Moderate and large PDAs are treated with diuretics and digoxin,
- Closure(by cath.) of small PDAs also is recommended because of the risk of subacute bacterial endocarditis.

Complications of Lt. to Rt. Shunts

1. Recurrent chest infections.
2. Heart failure (tachycardia,tachypnea,gallop rhythm ,hepatomegally.).
3. Failure t thrive .
4. Infective endocarditis.
5. Psycosocial imbact .
6. Esinmenger syndrme (severe PHT ,reversal of the shunt ,cyanosis & clubbing .)

Cyanotic Congenital Heart Diseases

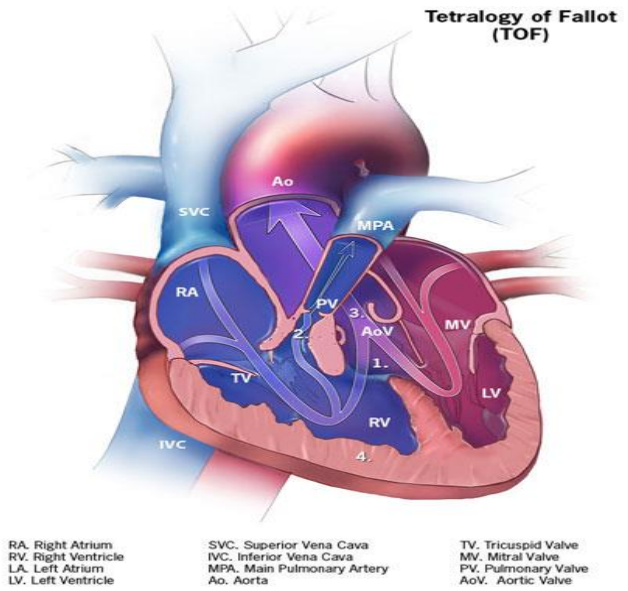
- Cyanotic congenital heart disease occurs when some of the systemic venous return crosses from the right heart to the left and goes back to the body without going through the lungs (right-to-left shunt).

- The most common cyanotic congenital heart defects are the 5 "Ts": tetralogy of Fallot, transposition of the great arteries, tricuspid atresia, truncus arteriosus, and total anomalous pulmonary venous return.

Tetralogy of Fallot

- **Tetralogy of Fallot is the most common cyanotic congenital heart defect, representing about 10% of all congenital heart defects .**

- **Anatomically, there are four structural defects: VSD, pulmonary stenosis, overriding aorta and right ventricular hypertrophy.).**



Clinical presentatin :

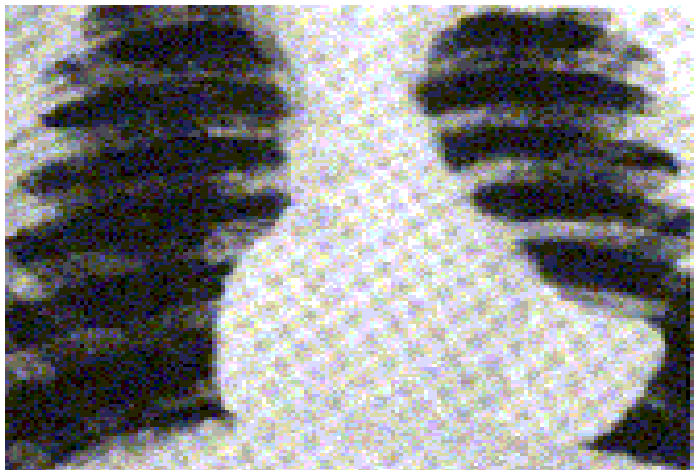
1. Cyanosis
2. Clubbing
3. systolic murmer @ pulmnary area

Hypoxic ("Tet") spells :

- Occur, they are usually progressive. During a spell, the child typically becomes restless and agitated and may cry inconsolably. An ambulatory toddler may squat.
- Hyperpnea occurs with gradually increasing cyanosis and loss of the murmur. In severe spells, prolonged unconsciousness and convulsions, hemiparesis, or death may occur. Independent of hypoxic spells,

Imaging Studies:

- The ECG usually has right axis deviation and right ventricular hypertrophy.
- The classic chest x-ray finding is a boot-shaped heart created by the small main pulmonary artery and upturned apex secondary to right ventricular hypertrophy.



TOF Treatment

Medical:

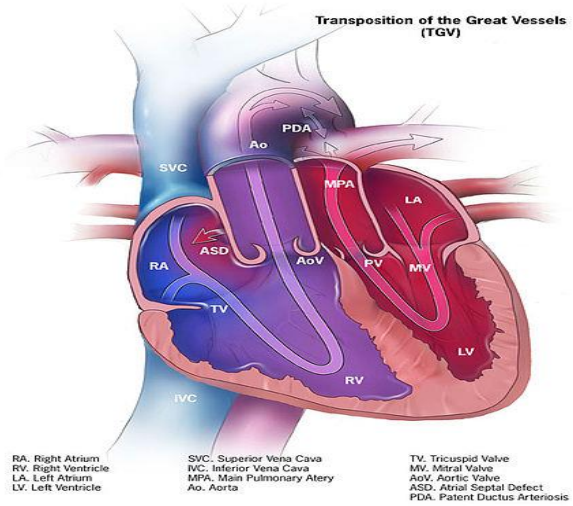
1/ Treatment of hypoxic spells consists of oxygen administration, placing the child in the knee-chest position (to increase venous return), and giving morphine sulfate (to relax the pulmonary infundibulum and for sedation.

2/ Propranolol .

Surgery :

- Complete surgical repair with closure of the VSD and removal or patching of the pulmonary stenosis can be performed in infancy.
- palliative shunt surgery ,shunt between the subclavian artery and pulmonary artery is performed for complex forms of tetralogy of Fallot with more complete repair at a later time(Blalock Tausig ,BT shunt).
- Subacute bacterial endocarditis prophylaxis is indicated.

TRANSPOSITION OF THE GREAT ARTERIES(TGA)



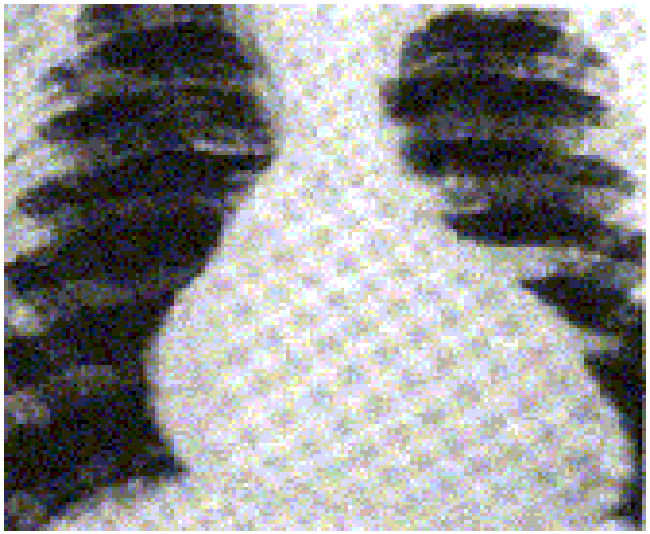
- Transposition of the great arteries represents only about 5% of congenital heart defects, it is the most common cyanotic lesion to present in the newborn period .
- The aorta arises from the right ventricle, and pulmonary artery arises from the left ventricle.
- Without mixing of the two circulations, death occurs quickly. Mixing can occur at the atrial (patent foramen ovale/ASD), ventricular (VSD), or great vessel (PDA) level.

Presentation pf patient

- Cyanosis
- Tachypnea
- CHF .

Imaging Studies :

- ECG findings typically include right axis deviation and right ventricular hypertrophy.
- The chest x-ray reveals increased pulmonary vascularity, and the cardiac shadow is classically an egg on side .



Treatment:

- Initial medical management includes prostaglandin E_1 to maintain ductal patency.
- If the infant remains significantly hypoxic on prostaglandin therapy, a balloon atrial septostomy is performed to improve mixing between the two circulations.
- Complete surgical repair is most often an arterial switch.

Complications of cyanotic heart diseases.

- **Polycythaema**
- **Cerebral thromboembolism .**
- **Cerebral abscesses resulting in part from their right-to-left intra-cardiac shunt.**

End