Heart defects in children

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Incidence of congenital heart defects (CHD)

- From 3-5 to 12 in 1000 live births
- Average 10 in 1000 live births
- In most cases cardiac surgery is required, usually in the first year of life

Etiology

- multifactorial, usually unknown
- most of defects are sporadic
- Higher risk of disease in children with relevant family history of cardiovascular abnormalities
- Some defects are associated with chromosomal anomalies (Down syndrome)

Etiology

- Environmental factors acting in utero :
  - Infections e.g.: rubella
  - Diabetes mellitus
  - Lupus erythematosus
  - Alcoholism
  - Epilepsy
  - Some medications (e.g. hydantoin)

Diagnosis

- Case history
- Physical examination
- ECG
- Thoracic X-ray
- Echocardiography
- Isotope angiography
- Cardiac catheterization and angiocardiography

Physical examination

- Examination by:
  - Watching
  - Palpating
  - Percussion
  - Ascultation
- The most common abnormalities:
  - Cyanosis
  - Abnormal cardiac tones
  - Heart murmurs
  - Heart failure

Levine Scale of heart murmurs

- 1- very silent
- 2- soft, audible but silent
- 3- audible, but without the thoracic tremor
- 4- audible, with thoracic tremor
- 5- loud, audible with stetoscope
- 6- very loud, audible without the stetoscope

Symptoms suggesting heart disease after birth

- Heart murmurs
- Abnormal respiration (tachypnea)
- Cyanosis
- Cardiac arrhythmias
- Cardiomegaly on X-ray
- Hepatomegaly, peripheral and lung oedema
- Abnormal peripheral pulse

Cyanosis

- Occurs when concentration of deoxygenated haemoglobin is over 5 g%
- Evaluation of oxygenation of haemoglobin based on skin colour is unreliable
- More reliable assessment based on intensity of discoloration of tongue and mucous membranes
- Oxygen and hyperventilation tests are pivotal in differentiation between cardiological and non-cardiological causes in newborns

Oxygen test

- Measurement of PaO2 in blood sample from right radial artery during calm, regular respiration of atmospheric air or 30% oxygen
- Subsequently, newborn breathes 100% oxygen for 10 minutes
- The test is positive when PaO2 and saturation in arterial blood increases over 100 mmHg and saturation to 100%

Hyperventilation test

- Manual ventilation of newborn with 100% oxygen with respiration frequency 100 – 150/ minute for 10 minutes
- Hyperventilation decreases PaCO2 by about 25 mmHg and increases pH of arterial blood
- In persistent pulmonary hypertension PaO2 in arterial blood increases – the test is positive if PaO2 increased during the test by 30 mmHg
- The test is negative in cyanotic heart defects

Congenital heart defects with symptoms occurrence in the first 3 days of life

- Transposition of the Great Arteries – TGA
- Hypoplastic Left Heart Syndrome – HLHS
- Critical Aortic Stenosis Ao – AS
- Critical Pulmonary Stenosis or Atresia – PS/PA
- Interruped Aortic Arch Ao –IAA

Congenital heart defects with symptoms occurrence between 4 and 14 days of life

- Tetralogy of Fallot- TOF
- PS/PA
- TGA+VSD+PS
- Coarctation of the Aorta CoAo

Classification of heart defects

- The most common division: cyanotic and non-cyanotic
- With normal, increased or decreased pulmonary blood flow
- With or without blood leaking (left to right or right to left)

Non-cyanotic heart defects

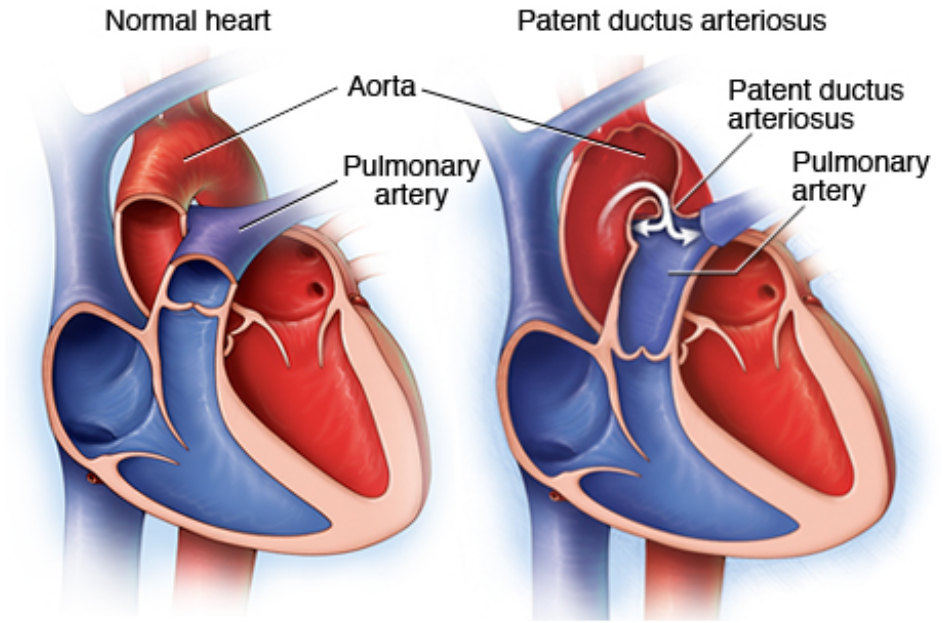
- Patent Ductus Arteriosus – PDA
- Atrial Septal Defect – ASD
- Ventricular Septal Defect – VSD
- Atrioventricular Septal Defect – AVSD
- Coarctation of the Aorta – CoAo
- Critical Aortic Stenosis Ao – AS
- Critical Pulmonary Stenosis – PS

Cyanotic heart defects

- Tetralogy of Fallot– TOF
- Transposition of the Great Arteries – TGA
- Common Arterial Trunk (Truncus Arteriosus) – TA
- Total Anomalous Pulmonary Venous Drainage – TAPVD
- Tricuspid atresia – AT
- Hypoplastic Left Heart Syndrome – HLHS

Patent Ductus Arteriosus – PDA

- 10% of heart defects in mature newborns
- 40% of heart defects in premature newborns born in 25 – 27 week pregnancy
- Occurs 3 times more frequent in girls



Premature newborns

Increased pulmonary blood flow:

- Tachycardia
- Palpable heart beat
- Rapid, subtle pulse
- Systolic heart murmur 2-3 in Levine scale
- Heart failure
- Blood stealing from the abdominal organs
  - necrotizing enterocolitis (NEC)
  - acute renal failure
- Blood stealing from the brain
  - intraventricular hemorrhage (IVH)
  - periventricular leukomalacia

Treatment of heart defects

Duct-dependent CHD:

- Infusion of prostaglandin PGE1 immediately after labour – maintain the flow in patent ductus arteriosus

- Cardiac surgery
- In case of suspicion of congenital heart defect, patient should be referral and treated at the specialist centres

Acquired heart diseases

Infective endocarditis

- 70% Streptococci (Str. viridans,Enterococcus)
- 20% Staphylococcus (St. aureus, St. epidermidis)

Symptoms:

- Heart murmur
- Fever
- Splenomegaly
- Osler's nodes (painful lesions on the hands and feet)
- Non-tender erythematous or haemorrhagic macules on the hands and feet
- Line haemorrhagic lesions
- Roth's spots (retinal haemorrhages)