Pediatric Nursing
Cardiovascular, part 2
Lecture 13
Pulmonary or tricuspid atresia

Pathophysiology:

- **Pulmonary atresia** is the absence of communication between right ventricle & pulmonary artery due to closed pulmonic valve.

- In presence of ASD & underdeveloped right ventricle; blood is shifted from right atrium into the left atrium by ASD.

- **Tricuspid atresia**, is absent tricuspid valve with presence of ASD & underdeveloped right ventricle; blood is shifted from right atrium into the left atrium by ASD.
Pulmonary atresia
Tricuspid Atresia

- Opening Between Atria
- Closed Tricuspid Valve

Underdeveloped Right Ventricle

AO = Aorta
PA = Pulmonary Artery
LA = Left Atrium
RA = Right Atrium
LV = Left Ventricle
RV = Right Ventricle

Oxygen-rich Blood
Oxygen-poor Blood
Mixed Blood
Clinical manifestations:
- Cyanosis is present at birth.
- Tachypnea, CHF, edema, acidosis, hepatomegaly.
- Hypoxic episodes, clubbing nail, growth delay occur.
- Continuous murmur is heard in the pulmonic area, a single S2 is heard in the aortic area.

Diagnostic procedure:
- Chest **radiograph** may reveal a normal size or slightly increased sized heart.
- The **ECG** may reveal right side hypertrophy.
- The **echocardiogram** show ascent right ventricular outflow.
Clinical Therapy

- Prostaglandin is given to maintain a patent ductus arteriosus.
- Digoxin & diuretics are used.
- Increase the atria opening by ballooning.

**Prognosis:**
- Outcome depend on the size of the pulmonary outflow tract developed by surgery & the fibrosis in the right ventricle
Defects obstructing systemic blood flow

- Aortic stenosis
- Coarctation of aorta.
Aortic stenosis

Pathophysiology:

• Narrowing of the aortic valve will obstructs the blood flow to systemic circulation.
• Blood is accumulated in the left ventricle leading to hypertrophy & increase risk of infections.

Clinical manifestations:

• Most children are asymptomatic.
• Blood pressure is normal, weak peripheral pulses,
• Systolic murmur & thrill occur in the aortic & pulmonic area, ejection click may be heard.
Diagnostic procedures:
- Chest radiograph is normal.
- ECG normal or may show mild left ventricular hypertrophy.

Clinical therapy:
- Prostaglandin is given to maintain a patent ductus arteriosus
- Increase the aortic opening by ballooning
- Aortic valve replacement
Coarctation of aorta.

Pathophysiology:

• Is narrowing or constriction in the descending aorta, often near to the ductus arteriosus, leading to obstruction of the systemic blood flow.

• This will increase pressure in the left atrium and left ventricle in response → leading to hypertrophy of the left ventricle.
Clinical manifestations:

- Children are asymptomatic.
- B/P in legs is lower than in arms.
- Lower pulses are weak, upper is bounding.
- A thrill is felt in the suprasternal notch.
**Diagnostic tests:**

- Chest radiograph show cardiomegaly.
- MRI shows the site of the descending aorta.
- ECG show left ventricular hypertrophy; right ventricular hypertrophy is seen in sever cases.
- Echocardiogram show the size of aorta, the actual coarctation, the function of the aortic valve.

**Clinical therapy:**

- Balloon dilation by catheterization: if child under 3 month use the umbilical artery instead of the femoral artery to avoid its injury).
- Repair by *surgical intervention* is preferred before the end of the first year to avoid hypertension.
Acquired heart diseases

- Rheumatic fever.

- Kawasaki disease.
Rheumatic fever.

• Is an inflammatory disorder of connective tissue that follows an initial infection by some strain of group A beta-hemolytic streptococci.

• It cause changes in heart, joints, brain, skin tissues.

• The exact cause is unknown, but a probable cause is an immune response to the protein in the streptococcal organisms that affects the normal, tissues of the heart, joints, CNS & skin.
Clinical manifestations

After 1-3 weeks of untreated streptococcal infection:

• In the heart:
  1. a hemorrhagic bullous lesions developed in the heart’s connective tissue. It called Aschoff bodies.
  2. Endocarditis may lead to permanent mitral or aortic valve damage.

• In the joints:
  1. It become inflamed, painful, and subcutaneous nodule may be felt near to the joints even after full recovery.
• **In skin:**
  1. A skin rash called erythreema marginatum, with pink maculae & blanching in the middle of the lesion. It seen over the trunk & extremities.

• **In CNS involvement:**
  1. Aimless movement of the extremities & facial grimacing (*Sydenham chorea*)
  2. fever is seen.

• A way to remember the major criteria is by the word: **C.A.N.C.E.R**
  
  **C:** Carditis
  **A:** Arthritis
  **N:** Nodules (subcutaneous)
  **C:** Chorea
  **ER:** ERythema Marginatum
Clinical therapy

- Administration of **antibiotics**. Such as penicillin or erythromycin to treat the streptococcal infection.

- **Aspirin** is used to treat carditis if present and to control joint inflammation & reduce fever.

- **Steroids** may be used in severe cases with CHF involvements.

- Recovery is full, but children need long-term **prophylaxis** to prevent reoccurrence of the infection.
To diagnose RF

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Nursing Managements

• **Prevention of the disease:**
  By taking throat cultures for the children who have sore throat even if mild ones.

• **Hospitalization:**
  1. In sever cases, nurse must check V/Ss every 4 hours.
  2. Ensure bed rest
  3. Observe any changes in skin, joints.
  4. Administer antibiotic & aspirin as order.
  5. Position & handle the child carefully.
  6. Encourage family visits & telephone calls from family & friends.
  7. Emotional support for children with chorea. (as it lasts for 5-15 weeks).
Kawasaki disease

• Is an acute systemic inflammatory illness. It has no known cause but it usually preceded by infection usually in respiratory system.

• It does not spread from person to another.
• The inflammation involves the small & medium sized arteries including the coronary arteries.

• Damaged coronary artery can lead to aneurysms, ischemic heart disease, and infarction.
• The disease occur over three stages: acute, subacute & convalescent.
Clinical manifestations:

- **The acute stage**: is characterized by fever, irritability, conjunctival hyperemia, red throat, swollen hands & feet, rash on the trunk, enlargement of the lymph node.

- **The subacute stage**: is characterized by cracking lips, fissures, desquamation of the skin on the tip of the finger & toes starting after 10 days from fever begins, joint pain, cardiac diseases & thrombocytosis.

- **In the convalescent stage**: 6-8 weeks of the disease onset, the child appears normal but may have abdominal pain, paralytic ileus, diarrhea, vomiting, dysuria, aseptic meningitis & arthritis.
Diagnostic Criteria for Kawasaki Disease

Presence of at least five of six conditions:

1. Fever for five days or more
2. Bilateral conjunctival injection without exudates
   • Changes in lips and mouth:
     1. Reddened, dry, or cracked lips
     2. Strawberry tongue
     3. Diffuse redness of oral or pharyngeal mucosa
   • Changes in extremities:
     1. Reddening of palms or soles
     2. Edema of hands or feet
     3. Desquamation of skin of hands, feet, and groin (in convalescence)
   • Cervical lymphadenopathy:
     1. More than 15 mm in diameter, usually unilateral, single, non-purulent, and painful
Clinical Therapy

• Is treated by intravenous immunoglobulin & aspirin to treat infection & fever.
• Children are hospitalized for 3 days, depending on the persistence of fever.
• Most children recover fully.