Paediatric Cardiac Emergencies
- Recognition & Management

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2 month old baby
Well at birth
Noted to be more dyspnoeic one morning.
Refuses feeds.
Cyanosed poor pulse volume.
Heart murmur.

→ Paediatric cardiac emergency!
Introduction

- Most pediatric cardiac emergencies are related to CHD. Sudden cardiac emergencies are rare.
- The emergency room and pediatrician will usually be the first and second lines of care.
- Timely recognition is important in the treatment of paediatric cardiac emergencies.
Age

- Myocarditis
- Arrhythmias
  - Never been operated
    - Arrhythmias
    - Complication
  - Operated
    - Myocarditis
    - Arrhythmias

- Infancy
  - Left to right shunt
  - Ductal dependent lesions
  - Complete heart block

Age of presentation

- Young children
The manner by which the patient presents gives tale telling signs of the aetiology.
Left to right shunting

- Presented with heart failure.
- Heart failure in paediatrics is different from heart failure in adults.
- Symptoms:
  - Pink
  - Shortness of breath during crying and feeding.
  - Interrupted feeding
  - Sweating during feeds
  - Failure to thrive
Management

- CXR: Cardiomegaly, plethoric lung fields.
- ECG: Sinus tachycardia, left ventricular hypertrophy.
- Treatment:
  1. Low flow oxygen (<2L/min)
  2. Diuretics (frusemide, spironolactone)
  3. Reduce afterload (captopril)
  4. Difficult to control left heart failure (ventilate or BiPAP – PEEP)
  5. Refer for early corrective surgery
During Infancy…

Ductal dependent lesions

- Heart lesions which requires patency of PDA for survival.
- Two types – cyanotic and non cyanotic
  - Non cyanotic – Co-arctation of Ao
  - Cyanotic – TOF or TOF PA
- Typically symptomatic when the PDA closes 2 weeks → 3 months old
- Presents with lethargic, acute heart failure and even circulatory collapse.
- Poor pulse volumes. Unresponsive to standard therapy.
What should I do?

- Resuscitate. Airway, breathing & Circulation.
- Give O2. Intubate if necessary.
- Ventilate the baby.
- Fluid boluses.
- Restart PGE1.
- Antibiotic cover (Gram positive & negative)
Children with Tetralogy of Fallot exhibit bluish skin during episodes of crying or feeding.

"Tet spell"
Cyanosis

More blood going to the Ao by passing the PA

Tachycardia and infundibular stenosis

Hypoxic

Worried

Tetralogy of Fallot (TOF or "Tet")

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

- Mitral Valve
- Aorta Shifted to Right
- Opening Between Ventricles
- Tricuspid Valve
- Pulmonary Valve
- Right Ventricular Outflow Obstruction
- Oxygen-rich Blood
- Oxygen-poor Blood
- Mixed Blood
How to treat Hypercyanotic Spell

- Sedate / relief pain - to break the cycle
- Knee to body position to bend the Ao ➔ increase SVR
- Fluid bolus
- Prophylactic beta blocker (propranolol 0.1mg’kg ➔ 1mg/kg)
During Infancy
Congenital Heart Block

- Wide spectrum.
- Born with hydrops – oedematous during delivery or
- Born well.
- Invariably has low heart rate.
- Mother – SLE.
- Start Adrenaline, Isoprenaline
Indication for permanent pacing

- Symptomatic – heart failure / syncope.
- Wide QRS complexes
- CNS changes.
- Poor rate response. (HR remains low despite crying)

For those not paced.
- Follow up with Paediatric Cardiology clinic.
- Periodic developmental assessment and holter.
Young Children

- **Non operated heart**
  - Myocarditis
  - Arrhythmias
  - Chronic rheumatic heart disease

- **Operated heart**
  - Anatomy related flow disturbance
  - Arrhythmias
Myocarditis

- Inflammatory disease of the myocardium preceded by viral infection.
- Often insidious.
- May have a fulminant presentation characterized by acute severe hemodynamic compromise with severe congestive heart failure or cardiogenic shock. May have transient complete heart block.
- Clinical presentation is varied and can be similar to other common conditions, such as gastroenteritis, asthma and pneumonia.
Diagnostic Criteria

- (1) the presence of severe and acute heart failure;
- (2) left ventricular dysfunction on echocardiography;
- (3) recent history of viral illness; and
- (4) no history of cardiomyopathy
Management

- Anti-inflammatory medication eg NSAIDS, Aspirin and Steroids has not been proven to be useful.
- Antifailure – diuretics, ACE inhibitors, digoxin / beta blocker.
- Severe case – ECMO.
Evolution of mean left ventricular ejection fraction (LVEF) in survivors according to time after presentation. Plots represent mean LVEF and vertical lines represent the confidence intervals (mean (SD)). Measures of LVEF are given for admission and days 15, 30, 60, 90, 180 and 360 of evolution.

Arrhythmias

- 1-4 / 1000 children.
- Commonest being supraventricular tachycardia.
- Associated with Wolf-Parkinson-White Syndrome
- Patient are often haemodynamically stable. May be symptomatic
How to differentiate SVT from sinus tachycardia?

**Sinus tachycardia**
- Heart rate < 180/min
- Beat to beat variability
- Underlying precipitating factors
- p waves clearly seen

**SVT**
- Heart Rate > 180/min
- No beat to beat variability
- No underlying precipitating factors
- Embedded p waves
Which one do you think is SVT?
Management

Haemodynamically stable?

Yes

Adenosine (0.1mg/kg)

No

Synchronized Cardioversion (0.5-1J/kg)

Doesn’t work

IV Amiodarone (25mcg/kg/min for 4 hours → 15 mcg/kg/min) & call for help.

Doesn’t work
Chronic Rheumatic Heart Disease

- Chronic heart valve damage that can occur after a person has had an episode of acute rheumatic fever.
- Mitral valve disease is the most common cardiac problem seen in rheumatic heart disease → MS/ MR in children
- In adults – AR.
- Mitral regurgitation – main cause of heart failure
Duckett Jones Criteria

**Major**
- Pancarditis
- Migratory Joint pains
- Erythema Marginatum
- Sydenham Chorea
- Subcutaneous nodules

**Minor**
- Arthralgia
- Raised inflammatory markers (WBC, ESR)
- Fever
- History of previous rheumatic fever
- Prolonged PR interval

* Evidence of Streptococcal infection
Management

- Confirm the diagnosis
- T. Penicillin 250-500mg qid for 10 days
- T Prednisolone 1-2mg/kg/day if there is carditis
- T. Aspirin 25mg/kg day (maximal 2g per day) for joint pains
- Bed rest until the ESR normalizes
- Refer for echocardiography assessment.
If the patient has had previous cardiac surgery ...

- Anatomy related
  - Patient Blue or Pink
- Rhythm related
  - Slow rhythm
Post op, unstable pink patients

- Pink
- Recently post surgery
- Tachypnoeic
- Muffled heart sounds
- ECG: small complexes.
- CXR: Cardiomegaly
Management

- Nil orally
- Stabilize the patient
- Maintain good BP
- Refer to the nearest cardiac centre
Post op, unstable blue patients

- Ductal dependent lesion
- History of PDA stenting or BT shunt some time ago.
- Increased cyanosis
- Lethargic
- Murmur not well heard
Management

- Maintain airway
- Intubate and ventilate if necessary
- Fluid boluses to increase preload to the heart
- Transfer to the nearest cardiac centre for refashioning of the BT shunt or PDA stent.
Post op, bradycardia

- Watch out for complete heart block!
- Risk factors (VSD, TOF)
- Post operative, bradycardia.
- Syncope.
- If a patient already has a pacemaker implanted, do perform an ECG to see if the pacemaker is functioning well → CXR if suspicious of lead fracture.
Don’t forget possibility of wound infection → sepsis
Most patients with paediatric cardiac emergency have a history of congenital heart disease.

Timely identification of paediatric cardiac emergency requires a sound knowledge of the age of presentation and the presentation proper.

History of surgery is important to identify possible complications of the surgery.

Arrhythmias is an unlikely but not to be missed paediatric problem.
THANK YOU