

ECG ABNORMALITIES

SINUS TACHYCARDIA

Recognition and assessment

- Sinus rhythm (P wave precedes every QRS complex) with a heart rate above normal limit for age and gestation

Symptoms and signs

- Fever
- Infection
- Low haemoglobin
- Pain

Differential diagnosis

- Hypovolaemia
- Hyperthyroidism
- Myocarditis
- Drugs (e.g. caffeine and salbutamol)

SINUS BRADYCARDIA

Recognition and assessment

- Sinus rhythm (P wave precedes every QRS complex) with a heart rate below normal limit for age and gestation

Differential diagnosis

- Hypoxia (most likely cause)
- Vagal stimulation (ET tube touching carina)
- Post-intubation
- Hypovolaemia
- Hypothermia
- Metabolic derangement

Immediate management

- Manage airway and breathing
- Adjust ET position, if too low
- If post-intubation, use atropine (see **Neonatal Formulary**)
- Correct hypovolaemia
- Correct metabolic derangement
- If persistent, obtain 12-lead ECG

PREMATURE ATRIAL BEAT

Recognition and assessment

- Most common form of arrhythmia
- In a regular sinus rhythm at a normal rate, a P wave occurring before next expected P wave is a premature atrial beat
- Most premature atrial beats are benign

Investigations

- 12-lead ECG

PREMATURE VENTRICULAR BEAT

Recognition and assessment

- Premature abnormal QRS complex not preceded by a premature P wave

Investigations

- 12-lead ECG

- Measure QTc interval on ECG during period of sinus rhythm
- Echocardiogram to rule out structural abnormality of heart

Immediate treatment

- Seek advice from paediatric cardiologist

SUPRAVENTRICULAR TACHYCARDIA

Recognition and assessment

- Rapid regular tachyarrhythmia
- Heart rate >230/min
- ECG:
 - P waves commonly absent. When present, almost always have a different morphology
 - narrow QRS complex
 - in fast sinus tachycardia, P waves can be very difficult to see
 - look for delta waves consistent with Wolff-Parkinson White syndrome as this affects the choice of anti-arrhythmic agent used by cardiologists at BCH

Symptoms and signs

- Persistent SVT can cause haemodynamic compromise

Investigations

- 12-lead ECG to document SVT: if not definite SVT treat for cause of sinus tachycardia (e.g. fluid for hypovolaemia)

Immediate management

- Assess airway, breathing and circulation
- Check for signs of cardiac failure
- Vagal manoeuvre such as applying ice pack to face
- Adenosine IV bolus
 - use central venous access or IV access in a bigger vein (antecubital fossa)
 - connect 3-way connector to end of cannula/catheter
 - establish patency of IV access
 - connect syringe with adenosine to one port and normal saline flush to another port
 - run ECG strip
 - give adenosine as a quick bolus and push the bolus of sodium chloride 0.9% at the end quickly
- document change in cardiac rhythm on ECG

Adenosine dosage

- Start with 150 microgram/kg IV bolus
- if no response, increase by 50 microgram/kg
- Repeat every 1-2 min
- maximum dose 300 microgram/kg
- if no response, discuss with BCH cardiologists regarding DC shock

Subsequent management

- Echocardiogram to assess ventricular function and presence of congenital heart disease
- Correct electrolyte and metabolic imbalance, if present
- Discuss with paediatric cardiology centre for further management or earlier if necessary

VENTRICULAR TACHYCARDIA

Recognition and assessment

- Heart rate >200/min
- Wide QRS complexes

Immediate management

- Manage airway and breathing

- Correct hypoxia
- Correct electrolyte disturbance
- Discuss with paediatric cardiology centre
- Consider synchronised cardioversion (in very fast heart rates, defibrillators cannot synchronise with the patient and unsynchronised will be required) if intubated, with analgesia
- Amiodarone 5 mg/kg over 30 min IV (repeat if necessary)
- if no response Lidocaine 5 mg/kg IM or 4 mg/kg (0.4 mL/kg 1% adrenaline-free lidocaine over 1 hr) IV

TACHYARRHYTHMIA

- True heart rate?
- Is baby crying/in pain?
- Check airway and breathing
- Check saturation
- Consider arterial/capillary gas
- Check perfusion
- Check blood pressure
- Manage airway and breathing
- Correct hypoxia
- Correct electrolyte disturbance

