

Tachycardia and Bradycardia

Supraventricular Tachycardia

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Key Amendments

Date	Amendment	Approved by
<i>9th Feb 24</i>	<i>No changes approved at Paediatric Guideline Review Day</i>	<i>Paediatric Guideline Review</i>

The following guidance is taken from the Partners In Paediatrics (PIP)

Tachycardia and bradycardia 2018–20

TACHYCARDIA AND BRADYCARDIA

SUPRAVENTRICULAR TACHYCARDIA

*Early diagnosis and effective management of supraventricular tachycardia (SVT) are vital as there is a small risk of **death***

RECOGNITION AND ASSESSMENT

Symptoms and signs

- Recurrent condition
- Infants
- gradual onset of increasing tachypnoea
- poor feeding
- pallor
- occasionally more dramatic presentation with a rapid onset of severe cardiac failure
- Toddlers
- recurrent episodes of breathlessness, cold sweats and pallor
- Older children
- recurrent palpitations, episodes of dizziness and pallor

Investigations

- Confirm diagnosis with 12-lead ECG
- Continuous ECG monitoring **and** recording is essential
- Assess for cardiac failure

Differential diagnosis

- Sinus tachycardia, particularly in infants, can be >200/min. However, rates of 220–300/min are most likely to be SVT
- If first presentation, check for any other cause of cardiac failure
- Failure to respond to adenosine can be used to distinguish origin of a tachycardia in a stable patient

Causes of tachyarrhythmias

- Re-entrant congenital conduction pathway abnormality (common)
- Poisoning
- Metabolic disturbance
- After cardiac surgery
- Cardiomyopathy
- Long QT syndrome

ECG DIAGNOSIS

Infants

- Majority have a P wave before every QRS complex, usually by >70 msec (2 mm at 25 mm/sec)
- QRS complexes are generally normal but may be wide
- Accessory pathway frequently capable of anterograde as well as retrograde conduction
- this will be revealed during normal sinus rhythm by short P-R interval and presence of a delta wave (classic Wolff-Parkinson-White syndrome)

Older children

- Nodal tachycardias become more common with increasing age

- characterised by fast, regular, narrow QRS complexes without visible P waves
- Wide QRS complex or bundle branch block in childhood is rare
- changes also present in sinus rhythm
- review previous ECGs

If in doubt, seek more experienced help

IMMEDIATE TREATMENT

- Resuscitate (ABC) first
- If first presentation, refer to consultant
- See following Algorithms

Vagal manoeuvres

These may include:

- Diving reflex
- wrap infants in a towel and immerse their whole face into iced water for about 5–10 sec, or in children place a bag or rubber glove containing iced water over face
- One side carotid massage
- Valsalva manoeuvre
- Where possible, maintain ECG monitoring and recording during all procedures

Do NOT use eyeball pressure because of risk of ocular damage

Adenosine

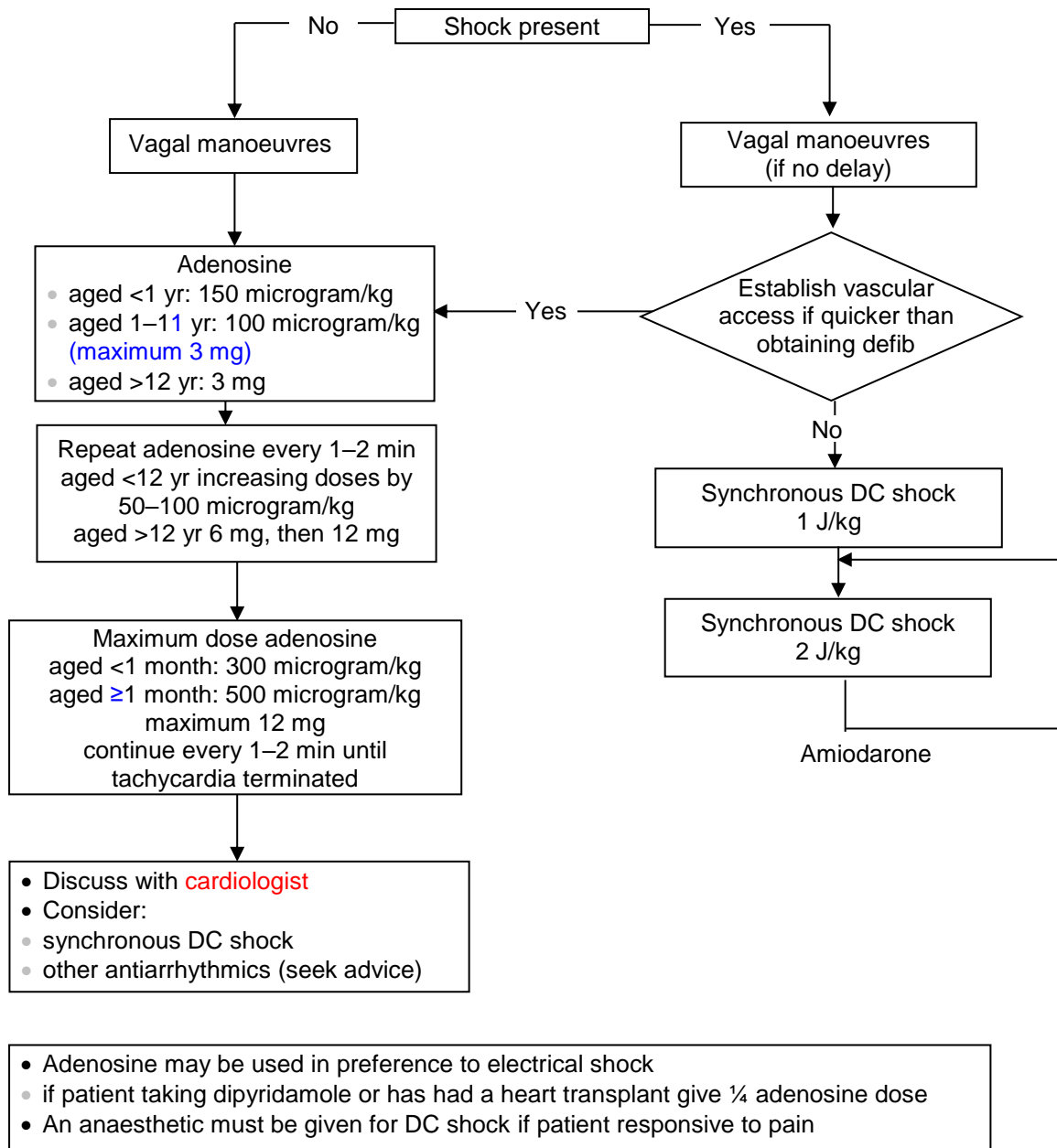
- Drug of choice as it has a rapid onset of action and is not negatively inotropic
- Very short half-life (10–15 sec) giving short-lived side-effects (flushing, nausea, dyspnoea, chest tightness)
- Effective in >80% of junctional tachycardias and will not convert ventricular tachycardias into ventricular fibrillation
- Can be used in broad-complex tachycardia of uncertain origin
- Must be given as a rapid bolus IV via a large peripheral or central vein and followed by sodium chloride 0.9% flush
- In patients with sinus tachycardia, heart rate will slow to bradycardia but will rapidly increase again

Other drugs

- If adenosine ineffective, seek advice from a paediatric cardiologist
- In refractory Wolff-Parkinson-White tachycardia, flecainide is particularly useful
- In refractory atrial tachycardia, amiodarone is useful

Do not use verapamil and propranolol in same patient, as both have negative inotropic effects. Do not use verapamil in children aged <1 yr

Supraventricular tachycardia



WIDE COMPLEX TACHYCARDIA RECOGNITION AND ASSESSMENT

Definition

- Ventricular tachycardia
- ≥3 successive ectopic ventricular beats
- sustained if it continues >30 sec

Causes

- Underlying cause (e.g. myocarditis, cardiomyopathy, or patient with congenital heart disease)
- Poisoning (e.g. phenothiazines, tricyclic antidepressants, quinidine and procainamide)
- Electrolyte disturbance (e.g. hypokalaemia, hypomagnesaemia)
- Ventricular tachycardia can degenerate into ventricular fibrillation

Diagnosis

- Wide-QRS SVT (SVT with aberrant conduction) is uncommon in infants and children. Correct diagnosis and differentiation from VT depends on careful analysis of at least a 12-lead ECG +/- an oesophageal lead
- Assess patient and obtain family history to identify presence of an underlying condition predisposing to stable ventricular tachycardia
- SVT or VT can cause haemodynamic instability: response to adenosine can help identify underlying aetiology of the arrhythmia, but adenosine should be used with extreme caution in haemodynamically stable children with wide-complex tachycardia because of the risk of acceleration of tachycardia and significant hypotension. This should not delay definitive treatment in children with shock
- Seek advice
- Ventricular tachycardia not always obvious on ECG, clues are:
 - rate varies between 120 and 250 beats/min (rarely 300 beats/min)
 - QRS complexes are almost regular though wide
 - QRS axis abnormal for age (normal for aged >6 months is <+90°)
 - no preceding P wave, or A-V dissociation
 - fusion beats (normally conducted QRS complex merges with an abnormal discharge)

Supraventricular tachycardia

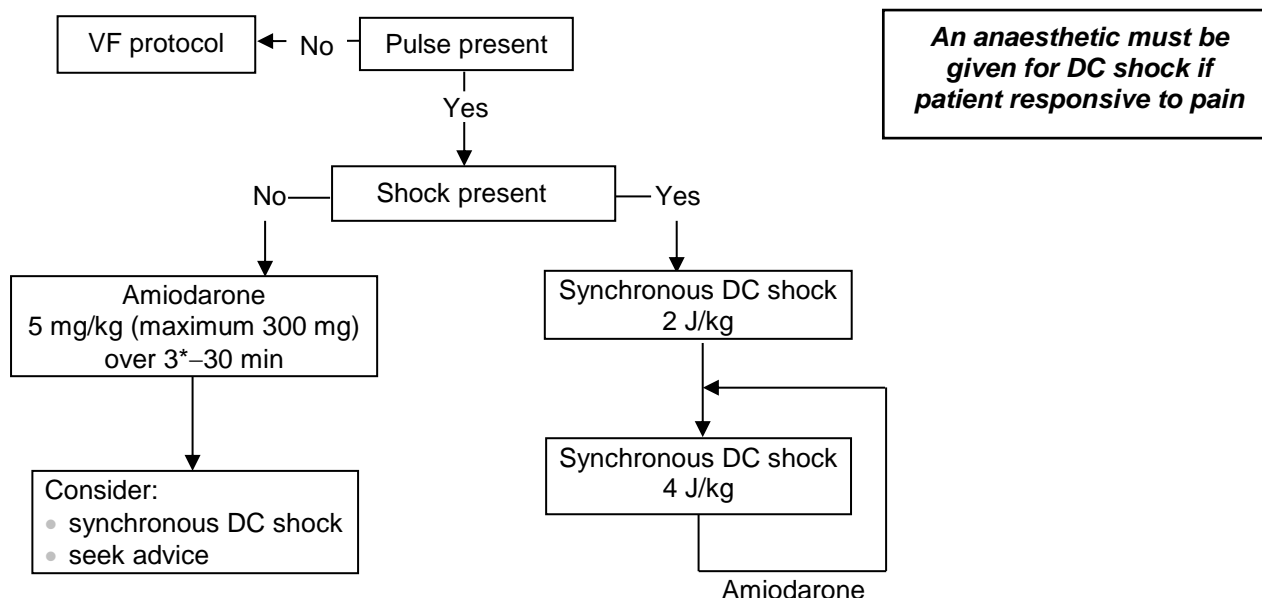


Premature ventricular complex



IMMEDIATE TREATMENT

Ventricular tachycardia



An anaesthetic must be given for DC shock if patient responsive to pain

- Treatment of haemodynamically stable child with ventricular tachycardia should always include early consultation with a **paediatric cardiologist**. They may suggest amiodarone: can cause hypotension, which should be treated with volume expansion
- Use synchronous shocks initially, as these are less likely than an asynchronous shock to produce ventricular fibrillation. If synchronous shocks are ineffectual, and child is profoundly hypotensive, subsequent attempts will have to be asynchronous
- Treatment of torsade de pointes ventricular tachycardia is magnesium sulphate 25–50 mg/kg (**maximum dose** 2 g) diluted to 100 mg/mL in sodium chloride 0.9% over 10–15 min. Can be repeated once if necessary
- *Amiodarone 5 mg/kg (**maximum** 300 mg) may be given over 3 min in ventricular tachycardia if child in severe shock

BRADYARRHYTHMIAS

- Urgently manage:
 - pre-terminal event in hypoxia or shock
 - raised intracranial pressure
 - vagal stimulation

Investigations

- ECG to look for:
 - conduction pathway damage after cardiac surgery
 - congenital heart block (rare)
 - long QT syndrome

Management

- ABC approach: ensure adequate oxygenation and ventilation
- if above ineffective give a bolus of adrenaline 10 microgram/kg IV and
- if above ineffective try an infusion of adrenaline 0.05–1.5 microgram/kg/min IV
- If vagal stimulation is cause
 - give atropine 20 microgram/kg (**minimum** 100 microgram; **maximum** 600 microgram)
 - dose may be repeated after 5 min [**maximum** total dose 20–40 microgram/kg (1.2 mg)]
- Contact **paediatric cardiologist** for advice
- send **ECG to cardiologist**