Supraventricular Tachycardia; Management of

Disclaimer

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Rationale

- To restore normal sinus rhythm to infants and children with supraventricular tachycardia (SVT).

Equipment

- Consider additional ampoules of Adenosine.
- Zoll® defibrillator.

Procedure

- Assess for signs of shock (eg: hypotension, poor perfusion, altered mental state).
- Treatment options depend on presence or absence of cardiovascular shock (see Algorithm)
- Record heart rate, usually above 240bpm (+ 40bpm) which does not alter with crying or activity
- Record 12 lead ECG showing regular narrow complex tachycardia (where available this can be faxed to NETS/Accepting/Cardiology consultant). If faxing an ECG, first photocopy on a dark setting so the grid is included, then fax the copy
- Check/insert IV cannula: Relatively large, more central vein (like cubital fossa) is preferred.
- Treatment options: Generally discussed with NETS/Accepting consultant or Cardiologist prior to initiation. Particularly in neonatal SVT, treatment options other than vagal stimulation should be discussed with the Accepting Consultant. A Cardiologist is likely to be involved.
- Vagal Stimulation:
  - Do not use eyeball pressure in children.
  - Infants: Apply ice to infant’s face using a plastic bag filled with ice & water or wrap infant and plunge infant’s face into iced water for up to 10 seconds.
  - Older children: Valsalva manoeuvre eg blowing into a 20mL syringe trying to expel the plunger
  - These provide vagal stimulation causing slowing of the heart rate. The effect is almost instantaneous but may be transient.
- Adenosine:
  - Most forms of SVT involve a re-entry pathway with rapid conduction via the AV node. Adenosine produces rapid and transient AV node block.
  - Give as a rapid IV push via peripheral cannula or central line (see Recommended Dose).
  - Because of the very short half life of adenosine the cannula should be placed as proximal as possible. The antecubital fossa is ideal. Lower limb veins are less ideal.
  - Draw up required dose and if necessary dilute to 1mL in saline.
  - Connect a three way tap with 5mL saline flush.
  - Give the dose rapidly and follow immediately with the rapid flush.
Further, incremental doses can be given after two minutes if necessary. There may be a significant period (a few seconds) of sinus pause after a dose of adenosine. Monitoring ECG throughout is mandatory. Recording a rhythm strip at the time of administration may be very valuable diagnostically even if sinus rhythm is not achieved or maintained.

- **Other Antiarrhythmic Agents:**
  - To be discussed with a cardiologist or receiving consultant.

- **Cardioversion:**
  - This is uncommon and not without risks. Unless immediately life threatening, discuss with the cardiologist or receiving consultant. Cardioversion should be managed by synchronised DC cardioversion as described in the Zoll Defibrillator Guideline:

- **To cardiovert patient:**
  - Consider the need for analgesia/sedation with or without intubation (discuss with accepting consultant).
  - Attach appropriate gel pad [multi function electrode (MFE)] in appropriate position Turn selector switch to ‘defib’.
  - If in vehicle:
    - Road ambulance: Notify driver “We need to defibrillate, slow down and stop when safe to do so”. (Wait until stopped)
    - Aircraft: Notify pilot-in-command (may be via Flight Nurse) “We need to defibrillate, is that OK?” (Await response).
    - Defibrillation should only occur when road vehicle has stopped or the pilot has given permission in an aircraft.
  - Select Energy required on defibrillator.
  - Select ‘synchronise’.
  - Check the monitor (Is SVT still present?)
  - Ensure all personnel are clear of the patient and stretcher, call out “ALL CLEAR”.
  - Charge (press ‘charge’ button) and immediately Discharge (press ‘shock’ button)
  - NB: If second shock required, be sure to reset the ‘synchronise’ button as the unit defaults to non-synchronised mode.

### Recommended Doses

- **Adenosine:** Initial dose 100 microgram/kg (max 12mg) dose rapid IV push. See Algorithm
  - Recommended for first shock 1J/kg followed by 2 J/kg subsequently.

### Documentation

- 12 lead ECG.
- Rhythm strip during treatment administration.
- Vital signs before and after administration of treatments.
- Effect and side effects.

### Complications

- Reactions due to Adenosine are transient due to short half life but include:
  - Skin flushing
  - Sweating
  - Respiratory distress
  - Transient bradycardia
  - May cause bronchospasm in asthmatics, but this is not usually a contraindication to its use
Educational Notes

- SVT is the commonest arrhythmia in infancy and childhood. SVT is also the most common neonatal tachyarrhythmia, which can stay asymptomatic for days and present as CCF. In its severest form (in utero) may present as non-immune hydrops fetalis. The heart is commonly structurally normal. SVT has been associated with transposition of the great arteries (TGA) and Ebstein’s anomaly.
- 70-80% of infants with paroxysmal supraventricular tachycardia have normal hearts.
- The majority of SVT in childhood is thought to be due to re-entry tachycardia. The remainder are due to enhanced atrial or AV nodal automaticity.
- Adenosine causes a feeling of impending doom, so forewarn the patient of a short duration unpleasant feeling.
- Adenosine:
  - Half life <10 seconds.
  - Onset of action (termination of SVT) is 6-20 seconds.
- Recurrence of SVT is common. Sometimes prophylactic antiarrhythmic treatment is used.

References

1. Park, Myung K. The Pediatric Cardiology Handbook; 2nd Ed; 1997; Morsby, St Louis.
Algorithm for the management of Supraventricular Tachycardia (SVT) in the paediatric patient

1. **Shock present?**
   - Yes: Vagal manoeuvre (if no delays)
     - Vasc acc quicker than defib?
       - Yes: Adenosine 100 mcg/kg, 2 minutes
       - No: Synchronous DC shock 1 J/kg
         - Consider Amiodarone
         - Synchronous DC shock 2 J/kg
2. No: Vagal manoeuvre
   - Yes: Adenosine 200 mcg/kg, 2 minutes
   - No: Adenosine 300 mcg/kg
     - Consider:
       - Adenosine 400 – 500 mcg/kg
       - Synchronous DC shock
       - Amiodarone
       - or
       - Procainamide
       - Or
       - Other antiarrhythmics (seek advice)