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Supraventricular Tachycardia

Standard Operating Procedure (SOP)



Union of Myanmar Special region - 1
Pediatric (SOP)

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Union of Myanmar Special region - 1
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Supraventricular Tachycardia

Supraventricular tachycardia (SVT) is the commonest arrhythmia in children and episodes of SVT are caused by any mechanism but more commonly due to AV Node Re-entry Tachycardia (AVNRT). It has a significant impact on morbidity and possible mortality in children if the attacks last more than 24 hours.

Clinical manifestation of SVT

- *SVTs can present with a wide spectrum of symptoms depending on age, heartrate, duration and underlying heart condition.*
- *Palpitation is the most common symptom*
- *Infancy: brief attacks detected by pallor and rapid breathing (white attacks), vomiting, not tolerating feeds, irritable or with signs of congestive heart failure. An inter-current febrile illness is often noted*
- *In older children*
 - *Faints especially on standing up*
 - *Breathlessness*
 - *Central chest pain*
 - *Occasionally sudden loss of consciousness or major fits (cerebral anoxia)*
 - *May become acutely ill and develop heart failure if the attack lasts for >6-24 hours*
- *The cardiovascular examination*
 - *Usually does not help in the diagnosis of SVT*
 - *Pale, sweating and coldness of extremities (increased sympathetic activity)*
 - *Small volume pulse, regular increased heart rate*
 - *If the episode has been untreated for several hours - poor perfusion and cardiac failure*

Diagnosis

A 12 lead ECG should be recorded during SVT before initiating empirical therapy. SVTs typically present as a narrow complex tachycardia

In narrow QRS tachycardia, the most important point is to differentiate whether it is sinus tachycardia or supraventricular tachycardia (See Table 3.3)

Figure 3.2 Sinus tachycardia



Figure 3.3 Supraventricular tachycardia (P waves are not visible because they are hidden in preceding T waves)



Table 3.3 Clinical and ECG differences between sinus tachycardia and supraventricular tachycardia

	<i>Sinus Tachycardia</i>	<i>Supraventricular Tachycardia</i>
<i>History</i>	<i>Clues (Physiological; e.g. fever, pain, crying, Pathological; e.g. anaemia, sepsis, fluid or blood loss)</i>	<i>Non-specific No clear aetiology</i>
<i>Heart rate (beats/min)</i>	<i>Infant: <220 Child: <180</i>	<i>Infant: >220 Child :>180</i>
<i>P wave</i>	<i>Present/ Normal (not clearly seen at heart rate 220/1)</i>	<i>Absent/Abnormal</i>
<i>Beat to beat variability (R-R)</i>	<i>Yes, Responds to stimulation</i>	<i>No</i>
<i>Onset and end</i>	<i>Gradual</i>	<i>Abrupt</i>

Source: American Heart Association, Pediatric Advanced Life Support: Pediatric tachycardia with a pulse and poor perfusion Algorithm 2011

Management

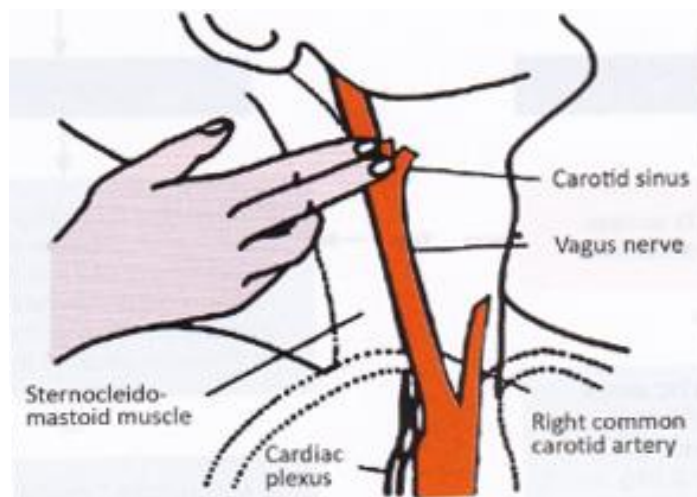
- Assess ABC-check BP (if shock +) and assess for heart failure
- Perform 12 lead ECG and start continuous cardiac monitoring

Vagal maneuvers

- Try vagal stimulation with continuing ECG monitoring
- The following techniques can be used:
 - Diving reflex: It produces an increase in vagal tone, slows atrioventricular conduction and interrupts the tachycardia, This can be done by the application of a rubber glove filled with iced water over the face or if this is ineffective, wrapping the infant in a towel and immersing the face in iced water for 5 seconds.
 - One-sided carotid sinus massage.

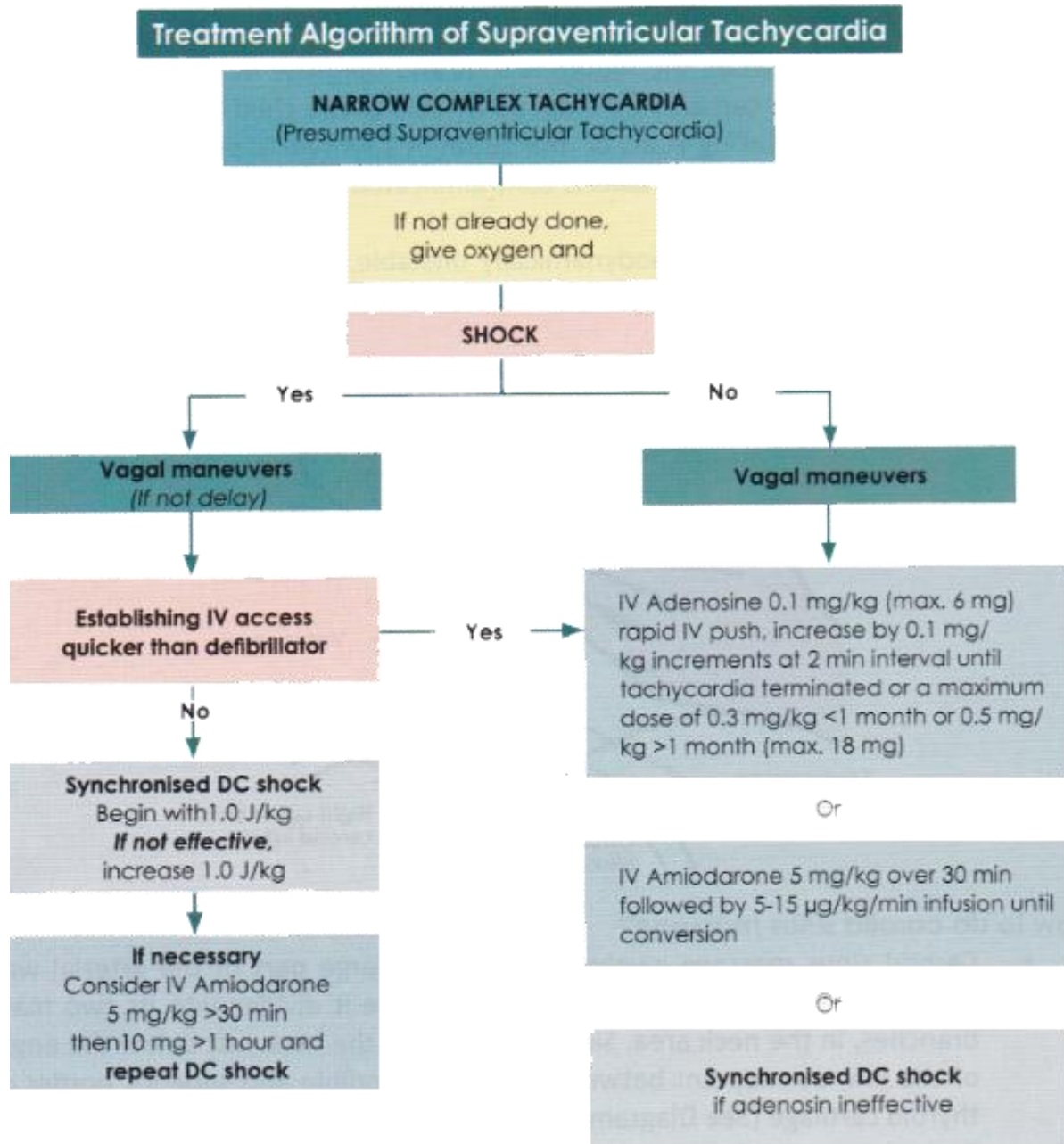
- Older children can try a Valsalva maneuver. This is a forced attempt at expiration when the mouth is shut and the nose held closed in supine position. It can also be induced by asking the child to blow through a pinched drinking straw or the outlet of a syringe to expel the plunger
- Pressing on the eye balls is contraindicated because this may injure the eyes
- If the child is hemodynamically unstable, omit vagal maneuvers and
- attempt pharmacological or electrical cardioversion immediately

Figure 3.4 Location of carotid sinus in the neck



How to do carotid sinus massage?

- Carotid sinus massage involves rubbing the large part of the arterial wall of common carotid artery, at the point where it divides into its two main branches, in the neck area. Sinus is located in the neck just below the angle of the jaw, at midpoint between angle of mandible and superior border of thyroid cartilage (See Diagram)
- To do the carotid sinus massage, the patient is asked to lie down with his neck fully extended and the head turned to the other side to expose the neck area completely.
- This procedure is always done under a heart monitoring (Life scope or ECG).
- The carotid sinus is touched gently and massaged to see whether there is any change in the electrical activity of the heart, Do not apply so much pressure to occlude carotid and continue massage for 5 second period. If none, the pressure is increased more firmly with gentle rotating motion.
- The procedure is repeated on the other side as well, but never on both sides at the same time.
- If asystole occurs and is longer than 3 seconds, to stop procedure and administer precordial thump for prolonged asystole.



IV Adenosine

- It is effective in terminating greater than 90% of AV node dependent tachycardias
- A rapid intravenous push (half-life is only 10 sec) followed immediately by 2-5 ml of saline flush is essential and it must be administered via a vein as close to the heart as possible as once in the blood stream it is rapidly metabolized by red cell enzymes
- Warn parents and child about possible side effects- Flushing, shortness of breath, chest pain, headache, nausea
- Asthmatic patients may develop bronchospasm with adenosine which is a relative contraindication to its use
- Most adenosine failure is caused by inadequate administration of the drug

- *Caution in known WPW Syndrome and a defibrillator must be available in the event that sinus arrest or new arrhythmia emerge, particularly post adenosine atrial fibrillation*

IV Amiodarone

- *Only 10% of atrial tachycardias terminate with adenosine and the remaining 90% may convert with an antiarrhythmic drug*
- *Is contraindicated in severe respiratory failure, circulatory collapse or severe hypotension. Circulatory collapse may be precipitated by too rapid administration or overdose*
- *Congestive heart failure is contraindication when using IV amiodarone as a bolus injection but it is used in CPR*
- *In small babies, IV preparation containing benzyl alcohol is dangerous and large amount can cause a gasping syndrome and may be fatal*

Electric Cardioversion (Synchronous Dc shock)

- *When the patient is resistant to these medications, this should be performed*
- *This must be done under sedation or anaesthesia if the patient is conscious*
- *If two attempts are unsuccessful, amiodarone should be given before the third attempt*

Long Term Medical Therapy

- *In patients with symptoms that are intolerably frequent, severe or prolonged, long term prophylaxis should be given*
- *In patients with AV node dependent tachycardias (AVNRT, AVRT and Junctional)*
 - *First line*
Atenolol - 1-2 mg/kg OD or
Verapamil - <1 month - 1-2 mg/kg
1 month-2 years-20 mg
>2 years-40-120 mg tds
 - *Second line If or patients who do not tolerate first line drugs or who have recurrences)*
Amiodarone loading dose 5 mg/kg (maximum 200 mg) bd or tds then maintenance dose 5 g/kg (maximum 200 mg) OD
- *WPW syndrome - Amiodarone (to lengthen the accessory pathway refractory period) alone or in combination with a beta blocker. (Digoxin or a calcium channel blocker should be avoided because both can potentiate accessory pathway conduction)*
- *Long term Amiodarone therapy may result in intolerable side effects including thyroid, liver and pulmonary toxicity that requires regular surveillance. Thus it is appropriate to reserve for refractory SVTs*