

Revision Sheet

Paroxysmal Supraventricular Tachycardia (PSVT) in Children

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1. Definition

Paroxysmal supraventricular tachycardia (PSVT) is the most common symptomatic tachyarrhythmia in children. It is characterized by a sudden onset and sudden termination of a regular narrow-complex tachycardia originating above the ventricles, most commonly due to atrioventricular reentrant tachycardia (AVRT) or atrioventricular nodal reentrant tachycardia (AVNRT).

- ❏ Clinical priority: Recognize hemodynamic instability, confirm the rhythm with ECG when possible, and initiate appropriate treatment promptly.

2. Clinical Presentation

A. History

Ask about

Sudden onset/termination

Palpitations

Chest pain

Dizziness/syncope

Dyspnea

Feeding difficulty (infants)

Irritability

Excessive sweating

Vomiting

Duration of episode

Previous similar episodes

Congenital heart disease

Family history of arrhythmia or sudden death

Medication or stimulant use

Clinical significance

Typical of PSVT

Most common symptom in older children

Usually benign but assess carefully

May indicate poor cardiac output

Severe episodes

Common infant presentation

Common in infants

Sign of prolonged tachycardia

May occur in infants

Longer duration increases risk of heart failure

Suggests recurrent PSVT

Higher arrhythmia risk

Evaluate inherited conditions

Possible trigger

B. Physical Examination

Assess ABCs first.

Look for:

- Heart rate
- Blood pressure
- Capillary refill
- Peripheral pulses
- Respiratory distress
- Oxygen saturation
- Mental status
- Hepatomegaly (heart failure)
- Signs of shock

Typical Heart Rate

Age	Typical PSVT Rate
Infant	220–300 bpm
Child	180–250 bpm

A heart rate >220 bpm in infants or >180 bpm in children that is very regular strongly suggests PSVT.

3. Diagnostic Approach

Step 1. Is the Child Stable?

Signs of Hemodynamic Instability

- Hypotension
- Altered mental status
- Shock
- Poor perfusion
- Severe respiratory distress
- Acute heart failure
- Chest pain with poor perfusion
- Syncope

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Immediate synchronized cardioversion

Stable Patient

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Obtain:

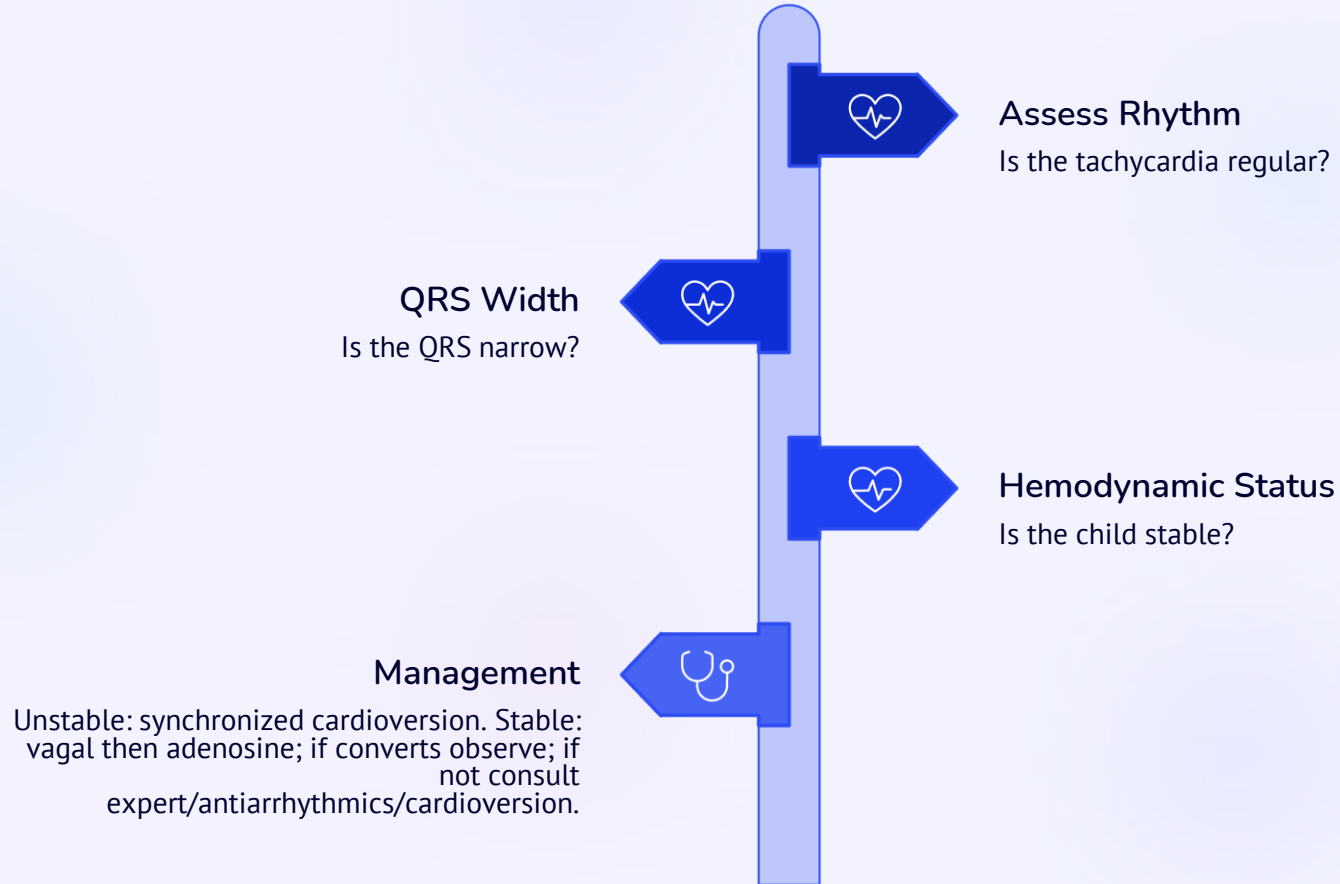
- 12-lead ECG
- Cardiac monitor
- IV access
- Oxygen if needed

ECG Features of PSVT

Finding	Suggests PSVT
Regular rhythm	Yes
Narrow QRS (<0.09 sec in children)*	Typical
P waves absent or retrograde	Common
Sudden onset/termination	Typical
Very fast rate	Yes

*Age-dependent QRS duration should be considered.

Diagnostic Algorithm



4. Differential Diagnosis

Diagnosis	Distinguishing Features
Sinus tachycardia	Variable rate, identifiable cause (fever, dehydration, pain), visible P waves
PSVT	Sudden onset, very regular rhythm
Atrial flutter	Sawtooth flutter waves
Atrial ectopic tachycardia	Warm-up/cool-down phenomenon
Ventricular tachycardia	Wide QRS, AV dissociation
Junctional ectopic tachycardia	Usually postoperative cardiac surgery

PSVT vs Sinus Tachycardia

Feature	Sinus Tachycardia	PSVT
Onset	Gradual	Sudden
End	Gradual	Sudden
Rate variability	Yes	No
P wave	Present	Often absent
Underlying illness	Usually present	Often absent

5. Investigations

Essential

- 12-lead ECG
- Continuous ECG monitoring
- Blood glucose
- Electrolytes (if prolonged episode)
- Venous/arterial blood gas if unstable

Consider

Investigation

Indication

Echocardiography

First episode, abnormal examination, recurrent PSVT, suspected structural heart disease

Thyroid function

Persistent unexplained tachycardia

Holter monitor

Intermittent symptoms

Event recorder

Infrequent episodes

6. Management Algorithm

Unstable Patient

Immediate synchronized cardioversion

Initial dose: 0.5–1 J/kg

If unsuccessful: 2 J/kg

Sedate if time and clinical condition allow.

Step 1. ABC Assessment

↓

Determine stability

Stable Patient — Step 1

Vagal maneuvers

Older children:

- Modified Valsalva (preferred)
- Blowing through a syringe
- Ice-water facial immersion (selected cases)

Infants:

- Ice bag to face (avoid covering nose and mouth)

Do NOT perform carotid sinus massage in children.

↓ If unsuccessful

Step 2 — Adenosine (rapid IV push)

Initial: 0.1 mg/kg | Maximum first dose: 6 mg

If unsuccessful: 0.2 mg/kg | Maximum second dose: 12 mg

Always follow immediately with a rapid saline flush using the closest IV access possible.

↓ If unsuccessful

Consult pediatric cardiology. Options include:

- Procainamide (avoid combining with amiodarone)
- Amiodarone
- Synchronized cardioversion

7. Drug Summary Table

Drug	Dose	Important Notes
Adenosine	0.1 mg/kg IV rapid push	Max 6 mg
Repeat adenosine	0.2 mg/kg	Max 12 mg
Procainamide	15 mg/kg IV over 30–60 min	Avoid with amiodarone
Amiodarone	5 mg/kg IV over 20–60 min	Specialist guidance
Esmolol	ICU/specialist use	Continuous infusion
Propranolol	Selected recurrent cases	Maintenance therapy

8. Admission Criteria

Admit if:

First episode in infancy

Hemodynamic instability

Recurrent episodes during admission

Need for antiarrhythmic infusion

Congenital heart disease

Ventricular dysfunction

Heart failure

Electrolyte abnormalities

Diagnostic uncertainty

Persistent arrhythmia

9. Referral Criteria

Refer to Pediatric Cardiology if:

- First documented PSVT
- Recurrent PSVT
- Suspected WPW syndrome
- Structural heart disease
- Syncope
- Failed adenosine therapy
- Need for long-term medication
- Consideration of catheter ablation

Urgent referral:

- Hemodynamic instability
- Ventricular dysfunction
- Refractory PSVT

10. Follow-up

Assess:

- Recurrence frequency
- ECG review
- Echocardiography (when indicated)
- Medication adherence
- Exercise tolerance
- School activities
- Family education regarding recurrence
- Instruction on vagal maneuvers for older children

Children with recurrent PSVT should have ongoing follow-up with pediatric cardiology. Catheter ablation is considered for recurrent symptomatic episodes or medication failure, particularly in older children.

11. Clinical Pearls

✓ PSVT is the most common symptomatic tachyarrhythmia in children.

✓ A very regular narrow-complex tachycardia strongly suggests PSVT.

✓ Obtain a 12-lead ECG before treatment whenever possible, but do not delay therapy in unstable patients.

✓ Always determine hemodynamic stability before treating the rhythm.

✓ Sinus tachycardia rarely exceeds 220 bpm in infants or 180 bpm in older children and usually has an identifiable cause.

✓ Adenosine has an extremely short half-life (<10 seconds)—administer as a rapid IV push immediately followed by a saline flush.

✓ Failure of adenosine may result from:

- Incorrect diagnosis
- Inadequate IV access
- Slow administration
- Wide-complex tachycardia
- Atrial tachycardia or atrial flutter

✓ Always inspect the ECG carefully for evidence of Wolff–Parkinson–White (WPW) syndrome after conversion to sinus rhythm.

12. Common Mistakes in Exams and Practice

✗ Treating PSVT as sinus tachycardia without assessing the ECG.

✗ Delaying synchronized cardioversion in an unstable child.

✗ Administering adenosine slowly rather than as a rapid bolus.

✗ Forgetting the immediate saline flush after adenosine.

✗ Performing carotid sinus massage in children.

✗ Assuming all narrow-complex tachycardias are benign.

✗ Missing heart failure in infants with prolonged tachycardia.

✗ Failing to obtain a post-conversion ECG to evaluate for WPW.

✗ Using procainamide and amiodarone together, which increases the risk of hypotension and QT prolongation.

13. Key Take-Home Messages

01	02
PSVT is the most common symptomatic tachyarrhythmia in children.	Always assess hemodynamic stability first; unstable patients require immediate synchronized cardioversion.
03	04
A regular narrow-complex tachycardia with abrupt onset and termination is characteristic of PSVT.	Differentiate PSVT from sinus tachycardia by onset, rate regularity, and the presence of an underlying cause.
05	06
Vagal maneuvers are the first-line treatment for stable patients.	Adenosine (0.1 mg/kg IV rapid push, then 0.2 mg/kg if needed) is the first-line pharmacologic therapy for stable PSVT.
07	08
Obtain a 12-lead ECG whenever feasible, but do not delay treatment in unstable patients.	Consider WPW syndrome in all children with PSVT and review the post-conversion ECG carefully.
09	10
Refer children with recurrent episodes, WPW, structural heart disease, or failed medical therapy to pediatric cardiology.	Catheter ablation is a highly effective definitive treatment for recurrent symptomatic PSVT in appropriately selected children.

High-Yield Examination Checklist

✓ Ask	✓ Examine	✓ Think	✓ Do
Sudden onset/termination	Heart rate	PSVT	ABC assessment
Previous episodes	Blood pressure	Sinus tachycardia	Obtain ECG
Syncope	Perfusion	WPW	Assess stability
Congenital heart disease	Heart failure signs	Structural heart disease	Vagal maneuver if stable
Family history	Mental status	Electrolyte disorders	Adenosine rapid IV push
Medication use	Respiratory status	Ventricular tachycardia	Cardiovert if unstable