Case Report

SVT in children: Case study

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Abstract

Background: Supraventricular tachycardia (SVT) in children can be refractory to medical management, necessitating definitive intervention. Atrioventricular re-entrant tachycardia (AVRT) mediated by a concealed accessory pathway is a common mechanism that can present with significant symptoms or tachycardiomyopathy.

Key words: Supraventricular tachycardia (SVT); Atrioventricular re-entrant tachycardia (AVRT)

1. Case Presentation

An 11-year-old female, known to have supraventricular tachycardia (SVT) refractory to drugs, presented with recurrent palpitations and chest pain for one day. She was initially evaluated at an outpatient clinic and subsequently admitted for further management. ECG revealed atrial fibrillation with rapid ventricular response with premature ventricular or aberrantly conducted complexes.

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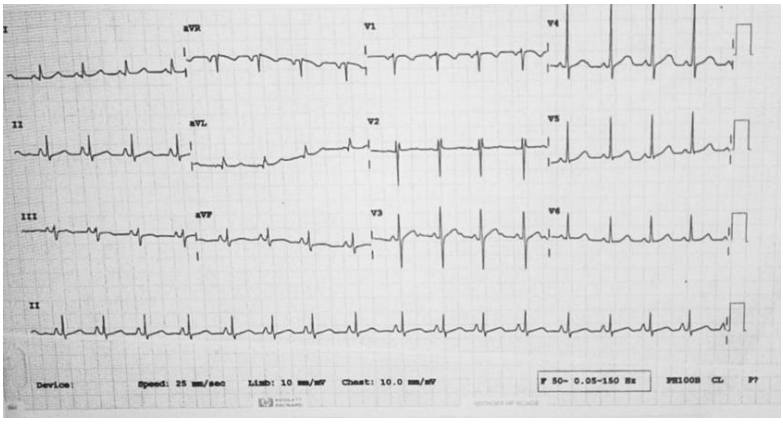

Fig (1): ECG showing Atrial fibrillation

The patient underwent an electrophysiology (EP) study with radiofrequency (RF) ablation on 06/12/2025, which demonstrated inducible atrioventricular re-entrant tachycardia (AVRT) due to a concealed left lateral pathway. Ablation was performed successfully using 3D guided electroanatomic mapping (ENSITE NAVIX), with complete elimination of the pathway. The procedure was uneventful, and her post-procedure hospital stay

remained stable without complications. She is now being discharged in good condition with advice for regular follow-up, avoidance of strenuous activity for the immediate recovery period, adherence to prescribed medications if any, and prompt reporting of recurrent palpitations, chest pain, syncope, or other concerning symptoms. Family counselling regarding the nature of SVT, the success of ablation, and the importance of follow-up has been provided.

2. Discussion

Supraventricular tachycardia (SVT) is one of the most common tachyarrhythmias in children, affecting about 1 in 500. It is defined as a rapid heart rate originating from atrial tissue above the atrioventricular (AV) node and interventricular septum. The main mechanisms responsible for SVT are re-entry circuits, abnormal automaticity, and triggered activity. Re-entry circuits, the most frequent cause, involve abnormal electrical loops that allow impulses to re-enter and reactivate the same pathway, often through an accessory pathway or within the AV node. Abnormal automaticity occurs when non-pacemaker cardiac cells spontaneously depolarize, producing ectopic beats that trigger tachycardia, while triggered activity results from after-depolarization either early or delay that reach threshold potential and generate additional action potentials. Contributing factors such as congenital heart defects, electrolyte imbalances, and genetic predisposition may also play a role. Clinically, infants often present with poor feeding, vomiting, irritability, sleepiness, diaphoresis, or syncope, whereas older children may experience palpitations, chest pain, dizziness, shortness of breath, or fainting. Diagnosis relies on electrocardiograms, Holter monitoring, exercise stress testing, and electrophysiologic studies. Long-standing SVT may cause cardiomyopathy and ventricular failure, presenting with signs of congestive heart failure, including increased respiratory effort, hepatomegaly, and edema.

Acute management begins with vagal maneuvers, such as the Valsalva technique, ice water facial immersion, or induced vomiting, which are safe and effective in stable patients. If unsuccessful, adenosine—a rapid onset, short-acting drug with a half-life of 5–10 seconds that blocks AV node conduction—is highly effective in terminating AV node-dependent SVT. However, adenosine is associated with several side effects, including transient flushing, chest tightness or discomfort, and a brief pause on the ECG trace as the AV node is blocked. Rarely, atrial fibrillation or prolonged pauses may occur, and bronchospasm can exacerbate asthma, making it unsuitable for children with severe asthma or active wheeze. Rapid re-initiation of tachycardia may also occur due to premature atrial contractions stimulated by adenosine. In rare cases, it can precipitate atrial fibrillation in children with Wolff-Parkinson-White syndrome, which may require electrical cardioversion. Contraindications include use in patients on dipyridamole, post-cardiac transplant patients with denervated hearts, and those with adenosine-deaminase deficiency. Beta blockers and calcium channel blockers may be considered for recurrent episodes but carry risks of hypotension, while electrical cardioversion remains the treatment of choice in unstable children with severe hypotension.

Long-term management depends on symptoms, frequency of episodes, and safety considerations. Digoxin is useful in AVNRT, while amiodarone combined with propranolol or verapamil may be effective in atrial tachycardia. Radiofrequency ablation (RFA) has become the first-line therapy for many children, offering cure rates of up to 95% with low recurrence and minimal complications, though risks such as vascular injury, valvular damage, AV node block, or myocardial perforation exist. Complications of untreated SVT include hemodynamic instability, thromboembolic events, heart failure, exercise

limitation, and reduced quality of life. Therefore, patient and family education is essential, focusing on understanding the condition, treatment options, potential complications, and psychological support, ultimately aiming to improve the child's physical, emotional, social, and school functioning.

3. Conclusion

The management of supraventricular tachycardia (SVT) in pediatric patients must be individualized according to age and hemodynamic stability, with rapid intervention prioritized in unstable presentations. Synchronized electrical cardioversion remains the treatment of choice for children who are hemodynamically unstable, ensuring prompt restoration of sinus rhythm. In stable patients, initial noninvasive strategies such as vagal maneuvers are safe and effective, while adenosine serves as the first line pharmacologic agent due to its rapid onset and transient atrioventricular nodal blockade. Adenosine should be administered with caution, with continuous monitoring for side effects including flushing, chest discomfort, transient pauses, atrial fibrillation, or bronchospasm. For patients who fail to respond to adenosine or in whom it is contraindicated, further pharmacologic options may be considered, but timely cardiology consultation is essential to guide advanced therapy, including antiarrhythmic drugs or electrophysiologic evaluation with catheter ablation. In addition to medical management, emphasis should be placed on patient and family adherence to prescribed therapy, regular follow up visits, and counselling about the condition, drug use, and recognition of warning symptoms. Families should be advised on when to seek urgent medical help, and awareness programs or community camps may be conducted to facilitate early detection of arrhythmia in children. Consideration of the cost of treatment, particularly for advanced therapies such as catheter ablation, is important in planning long term care, and discussions about future treatment options should be included in counselling. This structured, stepwise approach, combined with education, awareness, and support, ensures safe, effective, and evidence-based management of SVT in children, optimizing both clinical outcomes and quality of life.

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