

CASE REPORTS

Attention deficit hyperactivity disorder: would you think of a supraventricular tachycardia?

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Introduction

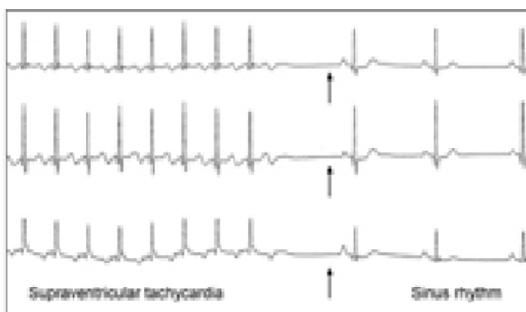
Attention deficit and hyperactivity disorder (ADHD) is characterized by inattention, hyperactivity, distractibility and impulsiveness lasting over at least 6 months. Symptoms usually start at the age of three to four years [1]. The prevalence of an ADHD is up to 9.5-11%, depending on the diagnostic tests and criteria [2]. In children with poor school performance, restlessness and inattention there is a low threshold for this diagnosis.

Supraventricular tachycardias (SVTs) are frequent in children with an overall incidence of 0.1-0.4%. In 95% the underlying mechanism is an atrioventricular reentrant circuit via an accessory pathway [3]. Symptoms of recurrent intermittent SVTs are unspecific and may mimic ADHD. The taking of an accurate history from the patient himself can be difficult depending on the age of the child. Clinical diagnosis however is easy if the patient is seen during a tachycardic episode as illustrated by the following case report.

Case report

A ten years old boy suffered from hyperactivity and poor concentration since the age of four years. In the last months his school achievement and sports performance decreased. A medical doctor providing alternative medicine was consulted for pulse diagnostics in view of a therapy of the ADHD. He noted a very fast heart rate and the patient was referred to the hospital. On examination the boy was restless but compensated; his heart rate was elevated at 160/bpm. The clinical examination was uneventful, but the 12 lead ECG showed a supraventricular tachycardia with narrow QRS complexes. P waves could be seen before each QRS complex with long RP and short PR intervals, typical for atrioventricular reentrant tachycardias (Figure 1).

Figure 1: 24 hour Holter monitoring showed most of the time a supraventricular tachycardia, with short spontaneous sequences in sinus rhythm



The size of the left ventricle was at the upper limit of normal and systolic function was moderately impaired reduced cardiac with an ejection fraction of 40% (normal > 55%) as shown by echocardiography. The tachycardia was incessant and converted intermittently to sinus rhythm for a few seconds. The 12 lead ECG during sinus rhythm was normal (arrow). Administration of intravenous Amiodarone did not result in permanent termination of the tachycardia but the episodes of the tachycardia became shorter which allowed the

cardiac function to improve within five days. Electrophysiological examination two weeks later revealed a left-sided accessory pathway. The tachycardia was successfully terminated by radiofrequency ablation of the accessory pathway. The patient's personality returned to normal. His school performance improved dramatically and he remained free of symptoms without any medication.

Discussion

ADHD is frequent in the pediatric age group. Diagnosis is established by clinical judgement based on comprehensive clinical evaluation and assessment considering the typical symptoms [1]. SVTs are not unusual in children but clinical presentation may vary [4]. Older children often complain about the characteristic palpitations, heart stumble or funny heartbeat. Especially in younger patients, atypical and unspecific symptoms such as pain in the head, throat, or chest, dizziness, anxiety, paleness, sleep disturbances, restlessness and hyperactivity may appear. At first sight it may not be evident that these symptoms refer to a tachycardia. Even in adults a SVT can be elusive. Lessmeier et al [9] studied 107 adult patients with SVTs. In a retrospective survey 67% fulfilled the criteria for panic disorders and SVT was not recognized after initial medical evaluation in 55%. A SVT can be detected with a careful clinical assessment at various stages of physical activity, keeping in mind the age dependant normal heart rate values [5]. A 12 lead ECG will confirm the diagnosis but sometimes repeated 24h Holter ECG monitoring or an event recorder is necessary to record and verify the tachycardia. Early detection and therapy of permanent tachycardias is mandatory to prevent left ventricular dysfunction and tachycardia induced cardiomyopathy [6].

Since the development of radiofrequency catheter ablation (RFA) as a new treatment option in the early 1990s, a definitive cure of the tachycardia can often be achieved [7]. With an overall, initial success rate of 91% and a low complication rate of 2.9% [6] this approach has become an accepted standard method in the management of pediatric patients suffering from SVT and fulfilling the following criteria [8]: signs of cardiomyopathy or cardiac impairment (as in our case), existence of a fast conducting pathway or frequent and bothersome episodes.

In conclusion, diagnosis of a SVT is often possible by the means of a clinical examination and an ECG. The prognosis of SVTs is good, in most of the patients it can be cured by RFA even in the presence of a tachycardia related cardiomyopathy. Nevertheless symptoms of a SVT can be unspecific and difficult to interpret, especially in children, and may be misinterpreted as neuro-psychiatric disorders.

References

1. Nair J, Ehimare U, Beitman BD, Nair SS, Lavin A. Clinical review: evidence-based diagnosis and treatment of ADHD in children. *Missouri Medicine* 2006; 103: 617-621.

2. Katragadda S, Schubiner H. ADHD in children, adolescents and adults. *Prim Care Clin Office Pract* 2007; 34: 317-314
3. Bauersfeld U, Pfammater J-P. Arrhythmien im Kindesalter. *Ther Umsch* 2004; 61: 245-249
4. Vos P, Pulles-Heintzberger CFM, Delhaas T. Supraventricular tachycardia: an incidental diagnosis in infants and difficult to prove in children. *Acta paediatr* 2003; 92: 1058-1061
5. Davignon A, Rautaharju P, Boisselle E, Soumis F, Megelas M, Choguette A. Normal ECG standards for infants and children. *Pediatr Cardiol* 1979/80; 1: 123-31
6. Dubin AM, Van Hare GF. Radiofrequency catheter ablation: Indications and Complications. *Pediatr Cardio* 2000;21: 51-556
7. Dick M, O'Connor BK, Serwer GA, LeRoy S, Armstrong B. Use of radiofrequency current to ablate accessory connections in children. *Circulation* 1991; 84: 2318-24
8. Pfammater J-P, Pavlovic M, Bauersfeld U. Impact of

curative ablation on pharmacologic management in children with reentrant supraventricular tachycardias. *International Journal of Cardiology* 2004; 94: 279-282

9. Lessmeier TJ, Gamperling D, Johnson-Liddon V, Fromm BS, Steinman RT, Meissner MD, Lehmann MH. Unrecognized paroxysmal supraventricular tachycardia. Potential for misdiagnosis as panic disorder. *Arch Intern Med* 1997; 157(5): 537-43

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