

Managing Stable Ventricular Tachycardia in an Adolescent - Don't Grab the Paddles Too Quickly

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Case Report

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Abstract

Spontaneous ventricular tachycardia (VT) rarely occurs in pediatric patients, therefore; management recommendations are very limited [1]. We present an adolescent with palpitations found to have a monomorphic wide complex rapid tachyarrhythmia. Despite a very rapid ventricular rate of 235 beats per minute (bpm) she remained hemodynamically stable and was successfully pharmacologically cardioverted. We highlight the considerations in managing a hemodynamically stable pediatric patient with VT with emphasis on the utilization of pharmacologic therapies as opposed to electrical cardioversion.

Case Report

A 17-year-old female with complex congenital heart disease (CHD) consisting of transposition of the great arteries, ventricular septal defect, sub-pulmonary stenosis (TGA,VSD, PS) s/p a REV (réparation à l'étage ventriculaire) procedure

presents via ambulance complaining of palpitations while playing field hockey. Paramedics administered intravenous (IV) amiodarone 150 milligrams (mg) for ventricular tachycardia (VT) 25 minutes prior to arrival with no observed change.

On arrival, her heart rate was 235 beats per minute (bpm) with a blood pressure of 125/80 mmHg and oxygen saturation of 97% on room air with a weight of 53.3 kilograms (kg). She was complaining her heart was beating fast, but otherwise alert, well perfused and in no acute distress.

She was administered adenosine 6mg then 12mg without a change in her cardiac rhythm. She then received a second dose of IV amiodarone 150 mg over 15 minutes. The cardiac rhythm subsequently converted to sinus tachycardia.

Discussion

We present a case of a 17-year-old female with CHD with abrupt onset of palpitations during exertion in stable rapid VT. Except for palpitations, she remained asymptomatic and hemodynamically stable. Usually,

a monomorphic wide complex rapid tachyarrhythmia is associated with hemodynamic instability supporting urgent cardioversion. The management of the stable pediatric patient in VT in the ED is infrequently observed, especially at a very rapid ventricular rate. While Pediatric Advanced Life Support (PALS) provides a guideline for stable, regular, monomorphic VT with a pulse, the literature supporting these recommendations is limited [2].

The abrupt onset of her tachycardia suggests a reentrant arrhythmia; most of which in adolescents are supraventricular and respond to vagal maneuvers or adenosine. The Rastelli operation for TGA, VSD, PS

carries a significant risk for late supraventricular and ventricular arrhythmias in contrast to the REV procedure which has revealed an appreciably lower prevalence of ventricular arrhythmias.

Our cardiologist recommended adenosine administration as it was unclear whether the rhythm was VT or supraventricular tachycardia (SVT) with aberrant conduction. If stable, Advanced Cardiac Life Support (ACLS) recommends adenosine may be given in a wide QRS (>120 msec) rhythm if the tachycardia is regular and monomorphic.³ If the rhythm could be identified as VT (pattern of VA dissociation) or is not responsive to adenosine, ACLS recommends proceeding to an alternative antiarrhythmic infusion [3]. This patient's tachycardia did not respond to adenosine and had a different QRS axis making it more consistent with a reentrant ventricular arrhythmia.

Cardiology subsequently recommended lidocaine 1.5 mg per kg administered rapidly with effect expected within 5 minutes. Per the new American Heart Association (AHA) guidelines, lidocaine is considered equal to amiodarone [4]. Lidocaine has been associated with improved ROSC (return of spontaneous circulation) and 24 hour survival [5]. Options beyond lidocaine for stable wide QRS complex tachycardia include sotalol, procainamide and amiodarone.

The ACLS recommendation for amiodarone is 5 mg per kg to a maximum adult dose of 150 mg. In this case, Cardiology recommended 2.5 mg per kg at any weight and age given over 20 to 30 minutes with close monitoring for hypotension.⁵ Slow IV administration is particularly important in infants or children with marginal hemodynamics as too rapid of infusion may cause cardiovascular collapse. If the patient does not convert, repeat the dose. Bolus dose(s) should be stopped once the patient converts to sinus rhythm. Echocardiogram should be obtained before and after conversion to assess ventricular function. Pediatric patients,

generally do not have recurrence of their VT unless they have a cardiomyopathy with myocardial dysfunction or a channelopathy; in contrast to adult patients following ischemic events when electrical irritability can cause persistence of the abnormal rhythm.

As this patient received multiple medications, we cannot definitely report what led to her conversion to sinus rhythm. However; the time course suggests conversion from amiodarone versus spontaneous cardioversion. Nevertheless, she remained stable. Pediatric patients may have stable, rapid VT at rates that would be more alarming in an adult. Pharmacological management with lidocaine or amiodarone should be considered as first line therapy for pediatric patients in stable, spontaneous VT. Electrical cardioversion is not always immediately indicated and clinicians should pause and consider medical approaches in hemodynamically stable patients, regardless of ventricular rate.

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Figures

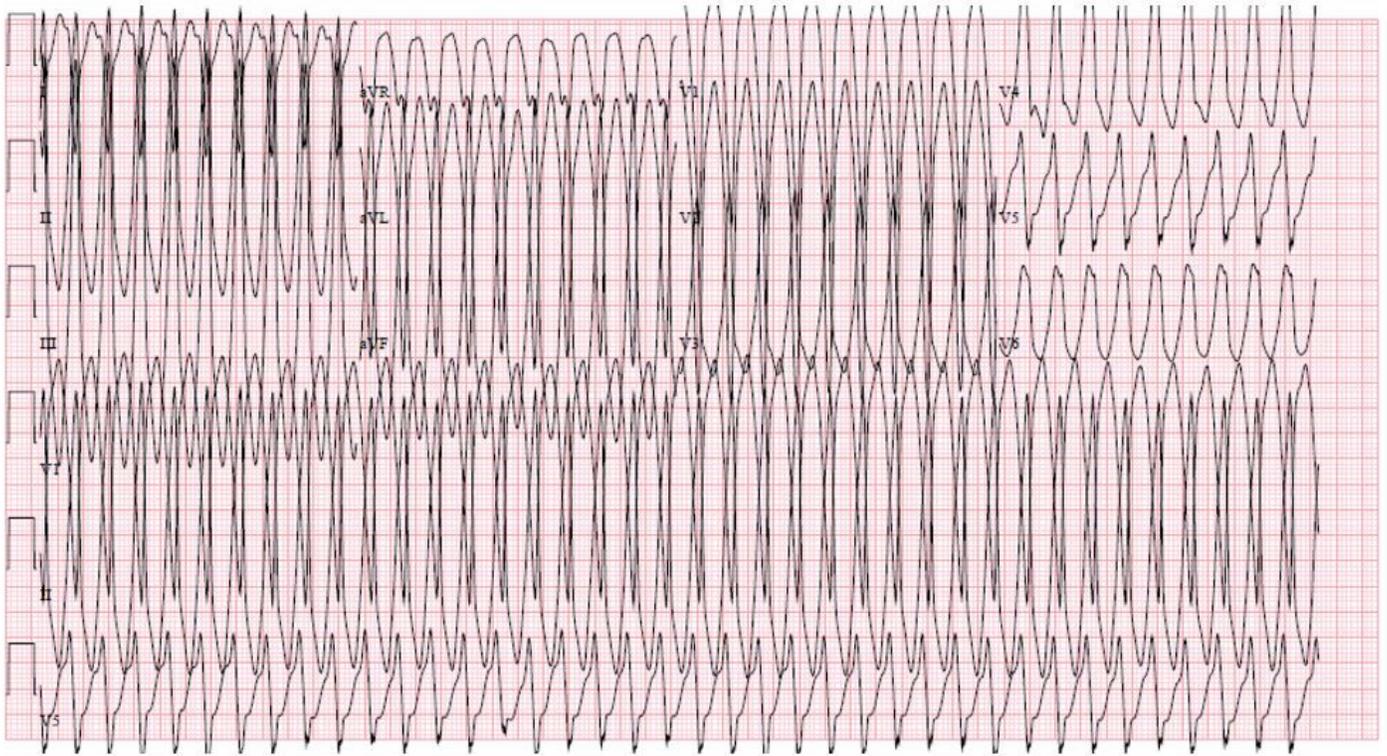


Figure 1

Initial ED ECG, which demonstrates a monomorphic wide complex tachycardia at a rate of 235 bpm with left bundle branch block and inferior axis. There is no clear evidence of ventriculoatrial (VA) dissociation.

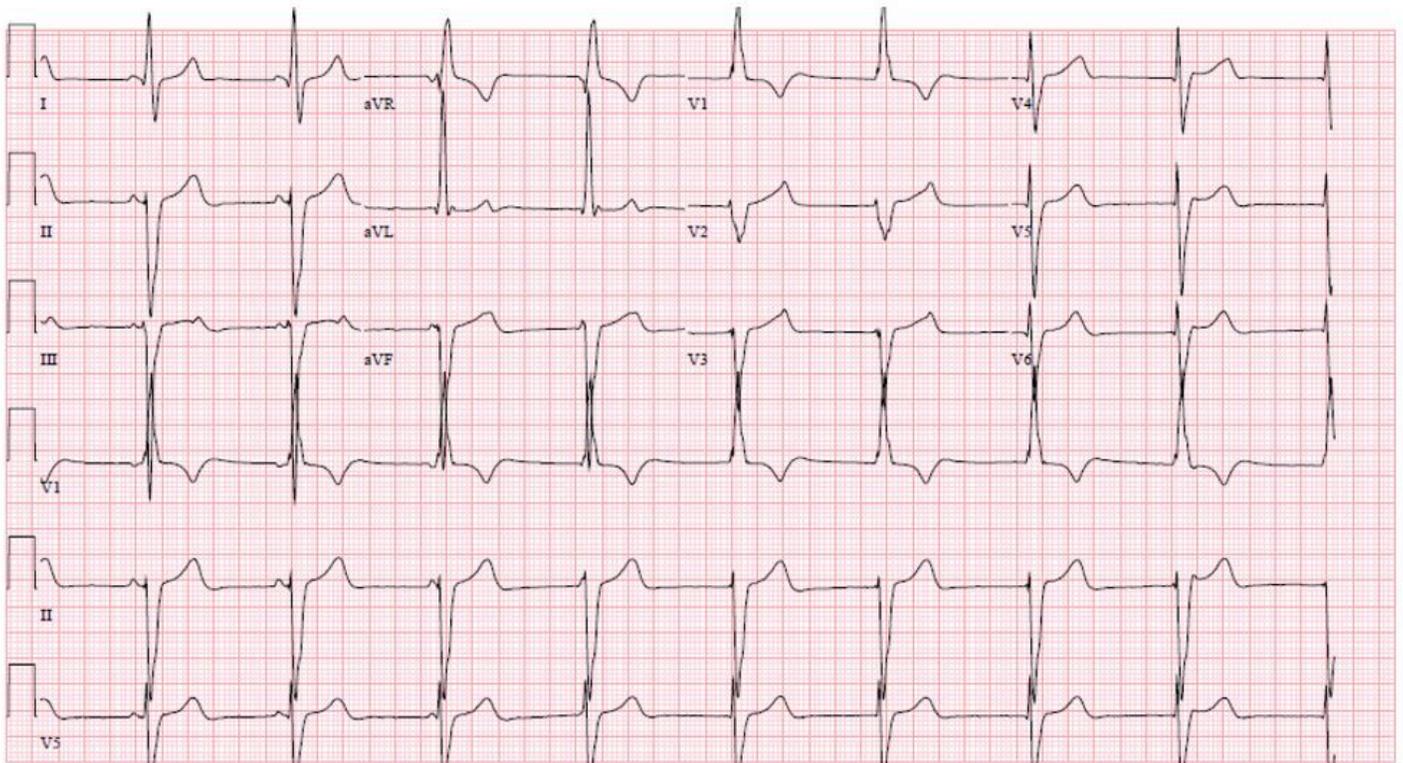


Figure 2

ECG after conversion to sinus rhythm with some sinus slowing and junctional escape. There is left axis deviation (negative in II and aVF), which is a different QRS axis than her baseline wide complex tachycardia.