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Case Report

Distinguished VT and SVT with Aberrations in Young Aged Patient: A Case Report

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ABSTRACT

Background: Arrhythmia with tachycardia is one of the emergencies that is often found in the ER. However, very often VT and SVT with aberrant especially in young aged patients make general practitioners confused about taking further action. **Case Summary:** A 19-year-old male patient came to the ER with complaints of palpitations since 30 minutes. From the physical examination, the BP was 102/60, the pulse was 160x/minute. The ECG showed signs of arrhythmia with tachycardia. **Conclusion:** Treatment for SVT is clearly very different from VT, but sometimes making a diagnosis in the ER is still a challenge. It is necessary to looking at the history and the ECG so that the therapy given is appropriate.

Highlights:

1. This case underscores the diagnostic challenge of distinguishing VT from SVT with aberrancy in young patients presenting with tachycardia. In this 19-year-old male with stable vitals and a wide-complex tachycardia, careful ECG interpretation and clinical history were essential to guide appropriate therapy and avoid mismanagement.

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Introduction

Arrhythmia with tachycardia is one of the emergencies that is often found in the ER. However, very often VT and SVT with aberrant especially in young aged patients make general practitioners confused about taking further action. The usual thing to do to differentiate them is to look at the ECG image, where differentiating these two things is important for further treatment and prognosis.

Ventricular tachycardia (VT) is defined as an arrhythmia originating in the tissue below the AV node that penetrates and produces rapid ventricular beats (>100 beats per minute; bpm). VT can occur in hearts that are structurally normal or abnormal, and can be hemodynamically stable or unstable[1]. Aberrant ventricular is an abnormal distribution of a supraventricular impulse in the ventricle, resulting from intermittent physiologic refractoriness in the ventricular conducting system from an early supraventricular beat.[3]

Misdiagnosis of VT as supraventricular tachycardia (SVT) with aberrant may be because this pathology usually occurs in young patients with normal cardiac structure, relatively narrow QRS during tachycardia, and typical response to IV verapamil. Thus, initial misdiagnosis of idiopathic VT as SVT can occur almost 100% (in adolescents) without high clinical and electrocardiographic quality[4]. The two entities are difficult to differentiate because the QRS complex morphology of idiopathic fascicular VT can resemble supraventricular QRS transformation because it also occurs primarily in patients with normal cardiac structure and rapidly involves the His-Purkinje network. Distinguishing between these two is critical for proper management.[2]

In this case, a 19-year-old male patient came to the ER with complaints of palpitations and was diagnosed with SVT with aberrant which was then diagnosed with idiopathic VT.

Case Presentation

A 19-year-old male patient came to the ER with complaints of palpitations since 30 minutes, complaints felt when the patient was resting, accompanied by fever and joint pain. The patient has asthma. The patient's history in the last week has been quite busy with school and exercise routine, the patient also drinks coffee every day. From the physical examination, the BP was 102/60, the pulse was 160x/minute. The ECG showed signs of arrhythmia with tachycardia, thyroid labs were within normal limits and ASTO was negative. The patient was diagnosed with SVT with aberrant dd VT and was given Amiodarone 300mg within 1 hour, then had another ECG in sinus rhythm with PVC possible origin from LV apex with an episode of non-sustained VT. The patient is planned to be treated in the ICCU.

While in the ICCU, therapy was continued with Amiodarine drip 50 mg/hour. Bedside echocardiography was performed and the results showed normal heart chamber dimensions, normal LV and RV systolic function. After that, it was seen on the monitor that there was a change in rhythm, so an ECG was performed which showed VT because there is an image of AV dissociation. After stopping Amiodarone, therapy was continued with Verapamil 2x80 mg. The ECG before going home showed T inversion, after being treated for 4 days the patient was sent home with an improved condition and will be planned to be referred for catheter ablation.

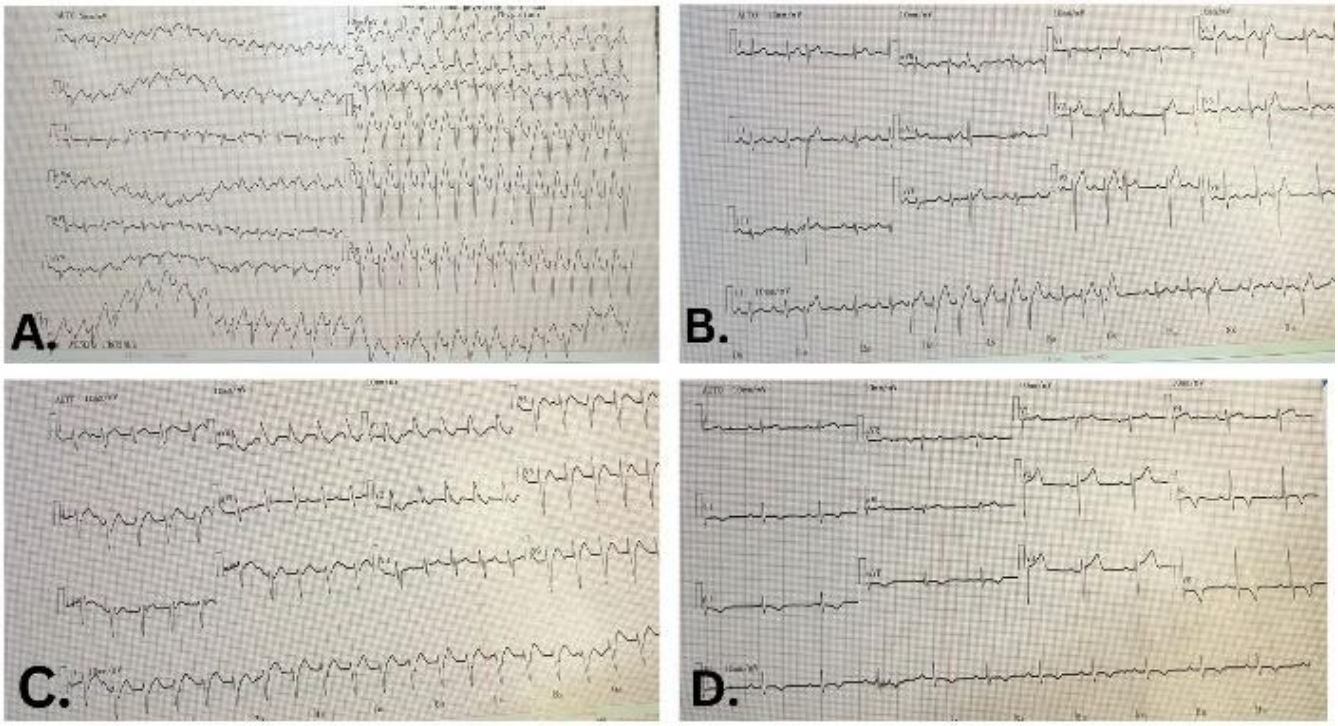

Figure. 1 ECG results when in the ER, A. before the amiodarone drip, B. after the amiodarone drip (non-sustained VT with PVC), C. VT with HR 122x/minute D. ECG post Verapamil.

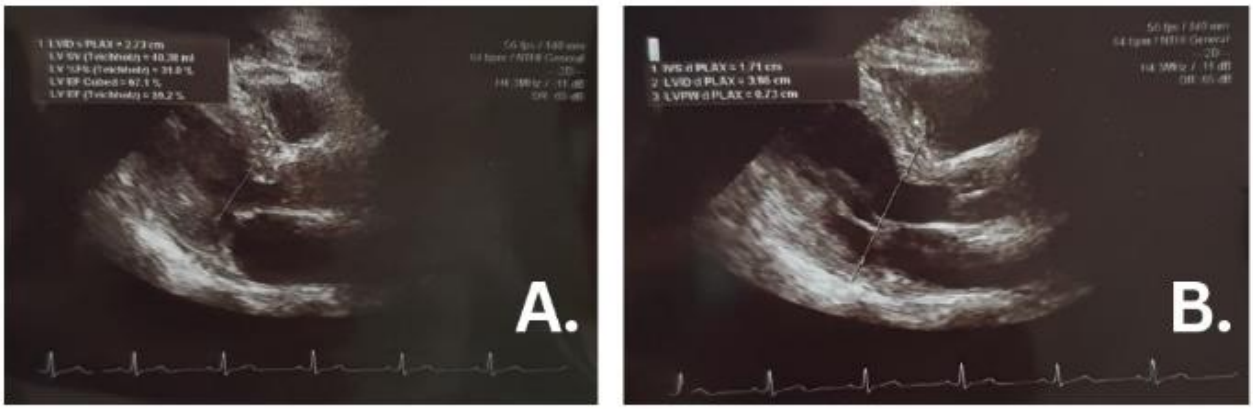

Fig. 2 Normal LV and RV systolic function (no structural abnormalities)

Discussion

The most common arrhythmia in children and young adults is tachycardia, and the most common type is supraventricular tachycardia, which originates in or above the atrioventricular node and HIS bundle. The incidence is reported to be 13/100,000 and the prevalence is 2.25/1000. Ventricular tachycardia is less common but more dangerous. the incidence is 1/100,000 in the general child population and the prevalence is 2-8/100,000 in school age[5]. Ventricular tachycardia (VT) in children usually occurs idiopathically without underlying heart disease and with normal heart structure. Although usually cases like this are not associated with death due to sudden arrhythmia, they are associated with a decrease in the patient's quality of life.[4]

Misdiagnosis of VT as supraventricular tachycardia (SVT) with aberrant may be because this pathology usually occurs in young patients with normal cardiac structure, relatively narrow QRS during tachycardia, and typical response to IV verapamil. Thus, initial misdiagnosis of idiopathic VT as SVT can occur almost 100% of the time (in adolescents) without high clinical and electrocardiographic suspicion[4]. In this case, when the patient first came with complaints of palpitations and an ECG examination was carried out, it could not be determined 100% whether the tachyarrhythmia that occurred was VT or SVT with aberrant. because judging from the patient's age, it is more suspicious that what happened was an SVT with aberrant.

Distinguishing SVT with aberrant and VT can be done using several criteria such as the Wellen criteria, Griffith criteria, Brugada algorithm and others. Several things that can help us to differentiate VT from SVT with abnormalities in ECG are as follows:

1. AV dissociation

A single dissociated P wave at the onset of WQRST may reflect AV dissociation and thus indicate VT.

The sensitivity of AV dissociation tends to be high (100%) while the specificity is low (20%–50%). two things to pay attention are the fusion beat and the capture beat. Fusion beats result from simultaneous ventricular depolarization by supraventricular impulses, usually sinus, as well as VT pulses or a combination of both. Capture beats occur when sinus impulses travel through the AV node and depolarize the ventricles, resulting in narrower QRS complexes between the VT complexes. the wide one.[8]

2. QRS Morphology

Right Bundle Branch Blok

A positive triphasic QRS complex in lead V1, R/S ratio >1 in lead V6, particularly if normal axis is present, is likely to represent SVT with aberrant conduction. Monophasic QRS complexes in V1 and an R/S ratio <1 in V6 suggests a diagnosis of VT.[8]

Left Bundle Branch Blok

LBBB morphology in SVT due to aberrant conduction, the QRS complex in lead V1 shows a narrow initial R wave (<30 msec) and a sharp, smooth descent. Formation on the lower slope of the S wave in leads V1 and/or V2 and the interval from the beginning of the QRS complex to the nadir of the S wave >60 msec and/or LBBB morphology showing a qR or R/S ratio <1 in lead V6 or right axis deviation indicates VT diagnosis.[8]

3. Precordial concordance

Precordial concordance suggests a diagnosis of VT (PPV 90%–100%, sensitivity 88%). The presence of predominately positive QRS complexes across leads V1 through V6 is positive concordance and the presence of negative QRS complexes across the precordial leads is negative concordance[8]. In this case, due to age and emergency conditions where AV dissociation is difficult to find, the initial diagnosis is SVT with aberrant dd VT.

Treatment for SVT is obviously very different from VT, and mortality outcomes are also very variable, with SVT being more benign. Immediate cardioversion is an option if the patient is unstable with either SVT or VT. SVT treated with amiodarone, procainamide, lidocaine, or cardioversion may not be the right choice, but it is not directly harmful. VT treated with verapamil, adenosine, or diltiazem can be very dangerous.[6]

In cases of diagnostic uncertainty, the arrhythmia should be treated as ventricular in origin and administration of drugs, such as verapamil, should be avoided. The most commonly prescribed antiarrhythmic drug is amiodarone due to its efficacy and relatively safe short-term safety profile. In paroxysmal fascicular VT, acute treatment in the emergency room is always successful with intravenous (IV) verapamil, due to its characteristic response to IV verapamil[4]. Treat like VT if you find a patient with wide complex tachycardia.

If stable, Advanced Cardiac Life Support (ACLS) recommends adenosine which can be given in a wide QRS rhythm (>120 msec) if the tachycardia is regular and monomorphic. If the rhythm can be identified as VT (VA dissociation pattern) or is unresponsive to adenosine, ACLS recommends to proceed to an alternative antiarrhythmic infusion. The ACLS recommendation for amiodarone is 5 mg per kg up to a maximum adult dose of 150 mg. If the patient does not convert, repeat the dose. Bolus dosing should be discontinued once the patient switches to sinus rhythm. Echocardiograms should be taken before and after conversion to assess ventricular function[7]. For arrhythmic disorders such as VT or SVT catheter ablation can be performed as a first line treatment, if this is possible.

In this case there was diagnostic uncertainty between SVT with irregularity and VT so Amiodarone 300 mg was given in 1 hour and the ECG was seen before and after administration, Amiodarone administration was continued at 50 mg/hour, after seeing the ECG which showed AV dissociation, CRBBB and Right Axis Deviation showed the diagnosis to VT left fascicular, which was sensitive to verapamil so treatment was continued with administration of oral verapamil and after two days the patient went home with sinus rhythm and will be planned to be referred for catheter ablation.

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Conclusion

Treatment for SVT is clearly very different from VT, but sometimes making a diagnosis in the ER between VT and SVT with aberrant is still a challenge. It is necessary to carry out several examinations both by looking at the history and from an ECG examination and if you still cannot establish a definite diagnosis, treat the patient as if they were VT if you find a patient with wide complex tachycardia.

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