

The less common arrhythmias in the acute cardiac care unit

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SOUHRN

Oddělení akutní kardiologie představuje tým vysoce specializovaných zdravotních pracovníků umožňující nepřetržitou péči o pacienty se širokým spektrem kardiovaskulárních onemocnění. Cílem této práce je popsat případy méně častých arytmií na oddělení akutní kardiologie, jejich diagnostiku a terapeutické možnosti. Z didaktických důvodů tyto arytmie budou rozděleny na supraventrikulární a komorové tachykardie. Prezentujeme tři případy z reálné praxe.

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ABSTRACT

Acute cardiac care (ACC) is being continuously delivered by healthcare professionals to the patients with a wide spectrum of acute cardiovascular diseases or conditions. The aim of this communication is to demonstrate the diagnosis and treatment strategies of less common arrhythmias in the ACC unit. Due to didactic reasons, these arrhythmias will be divided into supraventricular and ventricular. We present three real-life cases.

Introduction

Acute cardiac care (ACC) is being continuously delivered by healthcare professionals to the patients with a wide spectrum of acute cardiovascular diseases or conditions. The aim of this communication is to demonstrate the diagnosis and treatment strategies of less common arrhythmias in the ACC unit. Due to didactic reasons, these arrhythmias will be divided into supraventricular and ventricular. We present three real-life cases.

Supraventricular tachycardia

Supraventricular tachycardias (SVT) require atrial tissue for their initiation and maintenance. The specific exception to this definition is atrioventricular re-entry tachycardia (AVRT) since the impulse travels reciprocally between atria and ventricles. SVTs are generally benign, however in specific situations could be associated with

an increased risk of sudden cardiac death (SCD). Typical example is atrial fibrillation in the setting of ventricular preexcitation.¹ In that case, arrhythmia can be conducted to the ventricles via accessory pathway with a risk of degeneration into ventricular fibrillation. Another issue related to the SVT is tachycardia-induced cardiomyopathy which can develop in association with any SVT but most frequently with atrial fibrillation. The distinction between an SVT and VT based on the surface ECG is crucial since these arrhythmias have different management and prognostic impact.

Case 1

65-year-old patient with the previous history of paroxysmal atrial fibrillation was admitted to the ACC unit for dyspnoea and signs of left-sided cardiac decompensation with elevated serum level of natriuretic peptide BNP of 236 µg/l. Echocardiography was unremarkable.

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ECG on admission

Atrial fibrillation with fast ventricular response of 100–145 bpm with variable cycle length of pre-excited QRS complexes and morphology of the right bundle branch block (so-called preexcited atrial fibrillation) is depicted. The shortest RR interval is 320 ms, suggesting relative low conduction properties of presumably left-sided accessory pathway (Fig. 1). Before planned electrical cardioversion, a spontaneous restoration of the sinus rhythm occurred. The patient was scheduled for elective catheter ablation procedure.

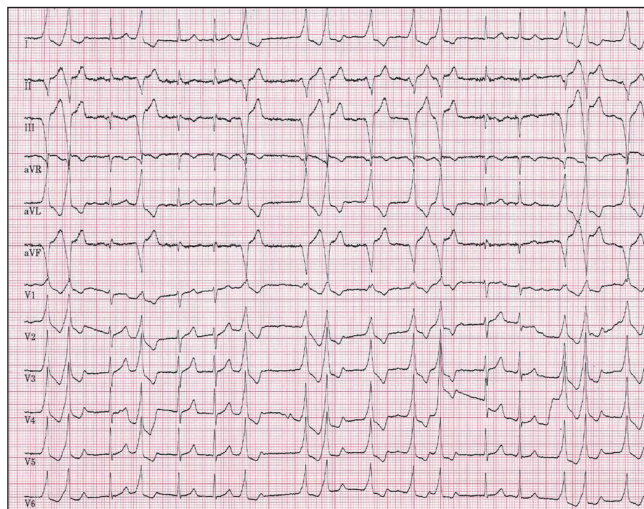


Fig. 1 – Case 1, ECG on admission (description in text).

Discussion

Atrial fibrillation in patients with ventricular preexcitation is potentially life-threatening arrhythmia since rapid antegrade conduction over the accessory pathway can trigger ventricular fibrillation. The risk of SCD is not increased in case of concealed accessory pathways which conduct only retrogradely, from ventricles to atria. It is estimated that about one-third of patients with ventricular preexcitation have atrial fibrillation. It is believed that atrial fibrillation is triggered by AVRT which leads to increase in the left atrial wall stress. Considering the hemodynamic status and thromboembolic risk it is recommended to perform acute electrical cardioversion for patients with preexcited atrial fibrillation. Administration of drugs selectively blocking atrioventricular node (adenosine, verapamil or digoxin) is contraindicated since they can promote non-decremental conduction over the accessory pathway and increase the probability of ventricular fibrillation. Radiofrequency catheter ablation of the accessory pathway is a method of choice in long-term strategy treatment.

Ventricular tachycardia

Ventricular tachycardia (VT) originates in the ventricles distally to the His bundle (HB), including myocardial tis-

sue and Purkinje fibres. VTs can be classified according to different criteria. Prognostic classification differentiates idiopathic VTs and VTs associated with structural heart disease.² Idiopathic VTs affect younger persons with structurally normal heart. They are considered benign and usually of focal origin. On the other hand, VTs in patients with structural heart disease are potentially malignant or malignant arrhythmias and predominantly re-entrant in origin. Re-entry circuit could be multiple and are related to the presence of the myocardial scar or fibrosis. Catheter ablation is recommended in symptomatic patients with idiopathic VTs (often as the first-line treatment with curative effect) and for recurrent or incessant VTs in the patients with structural heart disease.^{2,3} Catheter ablation can be a life-saving option in a case of focally triggered ventricular fibrillation.⁴

Case 2

31-year-old patient with the history of palpitations and panic disorder treated with a combination of antipsychotic drugs. The patient had frequent episodes of narrow QRS complex tachycardia, acutely treated by intravenous administration of verapamil in the local hospital. It was considered to be paroxysmal SVT, so the patient was discharged without further evaluation and without recommendation for curative catheter ablation. He was admitted to our ACC unit due to recurrence of palpitations. Echocardiography was unremarkable.

ECG on admission

Regular, narrow complex tachycardia at the rate of 183 bpm with QRS width below 120 ms and morphology of the right bundle branch block and left anterior hemiblock is displayed. AV dissociation is evident in lead II (Fig. 2). These findings are consistent with posterior (also called typical) idiopathic fascicular VT. Sinus rhythm was restored after intravenous administration of verapamil. Repolarization abnormalities, apparent during sinus rhythm, are associated with the atypical electrical activation of the ventricles during VT, the so-called cardiac memory. The patient was scheduled for elective catheter ablation procedure.

Discussion

Fascicular or verapamil-sensitive VT is one of the specific idiopathic VTs originating in the left ventricle. Its prevalence is highly variable according to the geographical area with the highest rate in the Middle East and Asia. It is re-entrant arrhythmia utilising tissue of both anterior and posterior fascicle of the left bundle. Three different types of fascicular VT are differentiated, depending on the site and orientation of re-entry circuit.⁵ The most common type (90–95%) is posterior or typical with an exit close to the left posterior fascicle and characteristic morphology of RBBB with left axis deviation. Less common types are anterior (with RBBB morphology and right axis

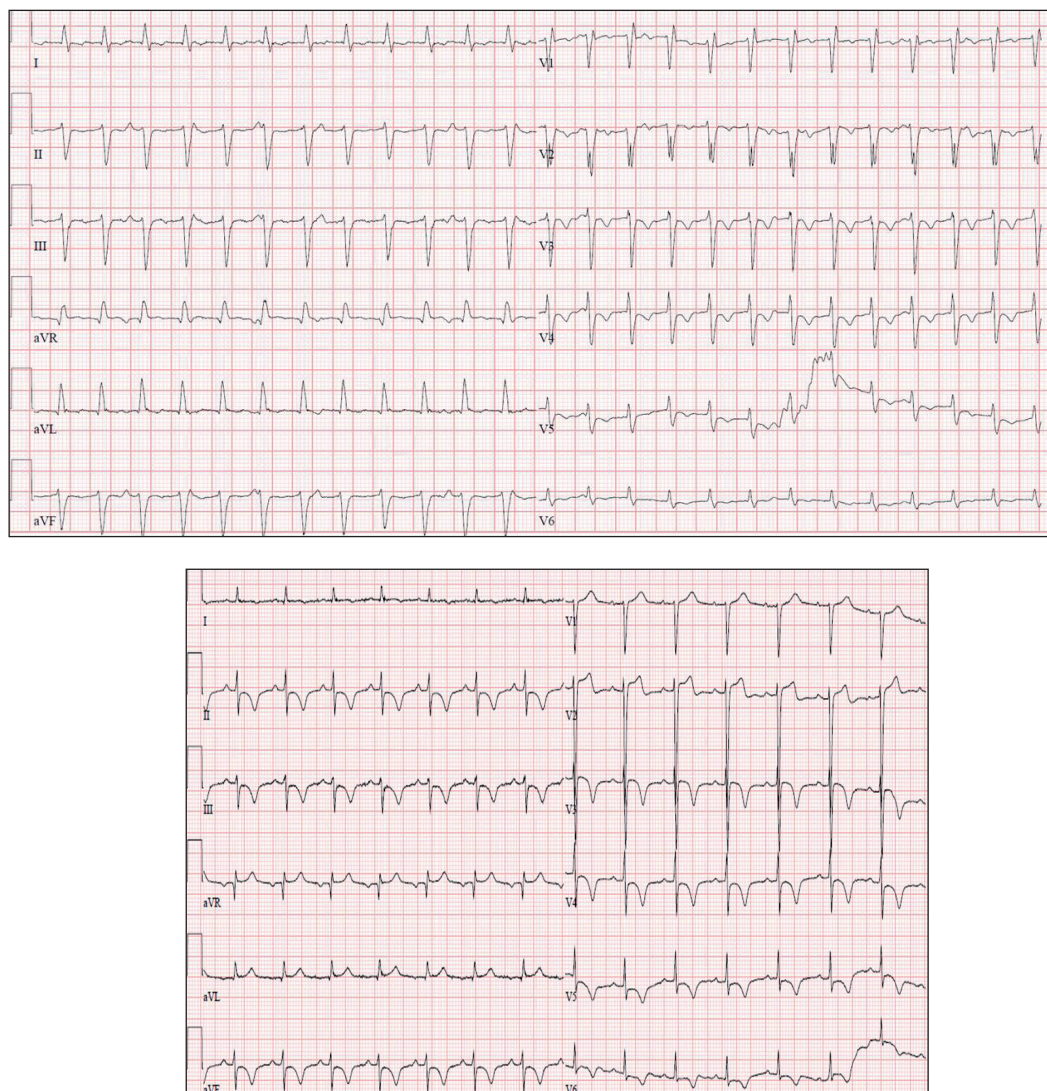


Fig. 2 – Case 2, ECG on admission (description in text).

deviation due to the exit close to the left anterior fascicle) and upper septal type. Fascicular VT has a good long-term prognosis. Chronic oral treatment with verapamil is less effective and radiofrequency catheter ablation should be considered in all symptomatic patients.⁵

Case 3

73-year-old, chronically dialysed patient with advanced heart failure due to ischemic cardiomyopathy, with implanted CRT-D (cardiac resynchronization therapy device). He underwent extensive radiofrequency modification of the arrhythmogenic substrate in the left ventricle in the past. He was admitted to the ACC unit because of electrical storm. An apparent trigger of the storm was not identified.

ECG on admission

Wide QRS complex tachycardia at the rate of 154 bpm with left bundle branch block morphology and narrow

rS complex in precordial leads is displayed (Fig. 3). The disproportion between very wide QRS complexes and narrow rS complex suggests the mechanism of bundle branch re-entry. Antiarrhythmic therapy was ineffective and an acute electrophysiology study was indicated. Clinical tachycardia was easily induced with re-entrant circuit incorporating both left (as a retrograde limb) and right bundle branch (as an antegrade limb). Catheter ablation at the distal portion of the right bundle was performed, leaving this particular arrhythmia non-inducible.

Discussion

Bundle branch re-entry VT is a life-threatening arrhythmia characterized by re-entry circuit within the left and right bundle and adjacent septal myocardium. Typical surface ECG manifestation of these arrhythmias is left bundle branch pattern with narrow rS complex in contrast to the prominent width of the whole QRS complex. Less frequently, the impulse can travel in opposite direction, resulting in right bundle branch block pattern. Bun-

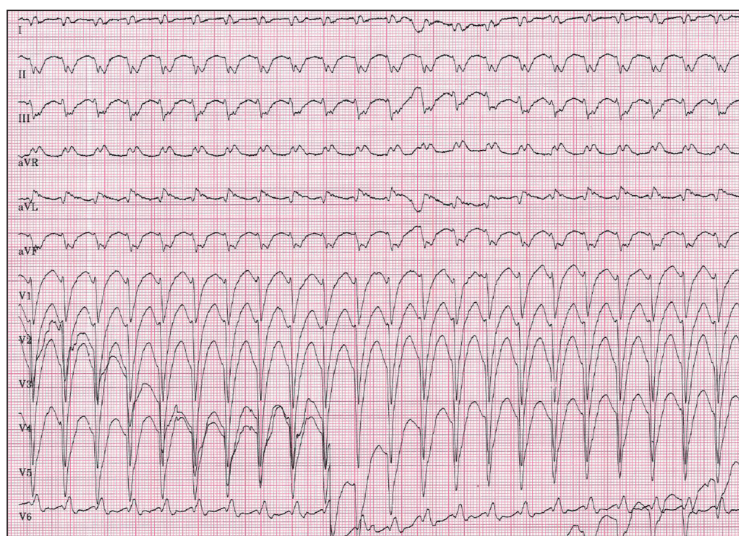


Fig. 3 – Case 3, ECG on admission (description in text).

dle branch arrhythmia is usually associated with severe structural heart disease, especially dilated cardiomyopathy and with intraventricular conduction abnormality or first-degree AV block. Therefore, the outcome of the patients with bundle branch re-entry is often very poor due to underlying disease. On the other hand, radio-frequency catheter ablation of the right bundle is a treatment of choice that prevents arrhythmias occurrence.^{3,6}

Conclusion

The above real-life cases demonstrate examples of less common arrhythmias in the ACC unit and highlight the importance of differential diagnosis and catheter ablation management of these arrhythmias.

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