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CASE REPORT

Proarrhythmic Effect of Implantable Defibrillator Function

Athanasios G. Manolis, MD, Constantinos C. Akridas, MD, Zenon S. Kyriakides, MD

2nd Department of Cardiology, Hellenic Red Cross Hospital of Athens, Athens, Greece

ABSTRACT

Proarrhythmia usually refers to the worsening of an arrhythmia from an antiarrhythmic medication. However, implantable cardioverter defibrillator (ICD) devices can also be proarrhythmic as is shown in the case herein presented.

KEY WORDS: *proarrhythmia; implantable cardioverter defibrillator; ventricular tachycardia; defibrillation; antitachycardia pacing; DC shock*

ABBREVIATIONS
ATP= antitachycardia pacing
EGM= electrogram
ICD= implantable cardioverter defibrillator
PVC= premature ventricular contraction
VT= ventricular tachycardia

INTRODUCTION

The implantable cardioverter – defibrillator (ICD) is a device that treats ventricular tachyarrhythmias (VT) when they appear in a sustained form. The device can be programmed to deliver the following therapies: 1) antitachycardia pacing (ATP), 2) cardioversion and 3) defibrillation. Contemporary devices also have the capability of every mode of cardiac pacing, i.e. atrial, ventricular, atrio-ventricular and biventricular pacing.

It is well known that antiarrhythmic drug therapy can exhibit proarrhythmic effects. Likewise, the antiarrhythmic apparatus can possibly aggravate an existing VT or cause the appearance of a new arrhythmia, attempting to convert the clinical tachyarrhythmia.

CASE REPORT

A case of proarrhythmic effect related to the therapeutic sequences delivered by an ICD is delineated in the following continuous recording of an arrhythmic event, as it was stored in the Holter function of the device (Fig. 1). The case in hand concerns a patient with ischemic cardiomyopathy, low left ventricular ejection fraction (~30%), sustained VT recorded on ambulatory monitoring, in whom a single chamber ICD had been implanted.

On the upper left quadrant there is the arrhythmia episode report, including the treatment details of the VT detected by the device. The rest of the slide (panels A to F) represents the continuous tracing of the arrhythmic event, recalled from the device's memory. Each panel consists of the endocardiac ventricular electrogram (EGM) and the detected cardiac rhythm cycle length (in ms).

Correspondence to:
Athanasios G. Manolis, MD
Associate Director of Cardiology
2nd Department of Cardiology
Hellenic Red Cross Hospital of Athens
Athens, Greece
E-mail: agmanoli@otenet.gr

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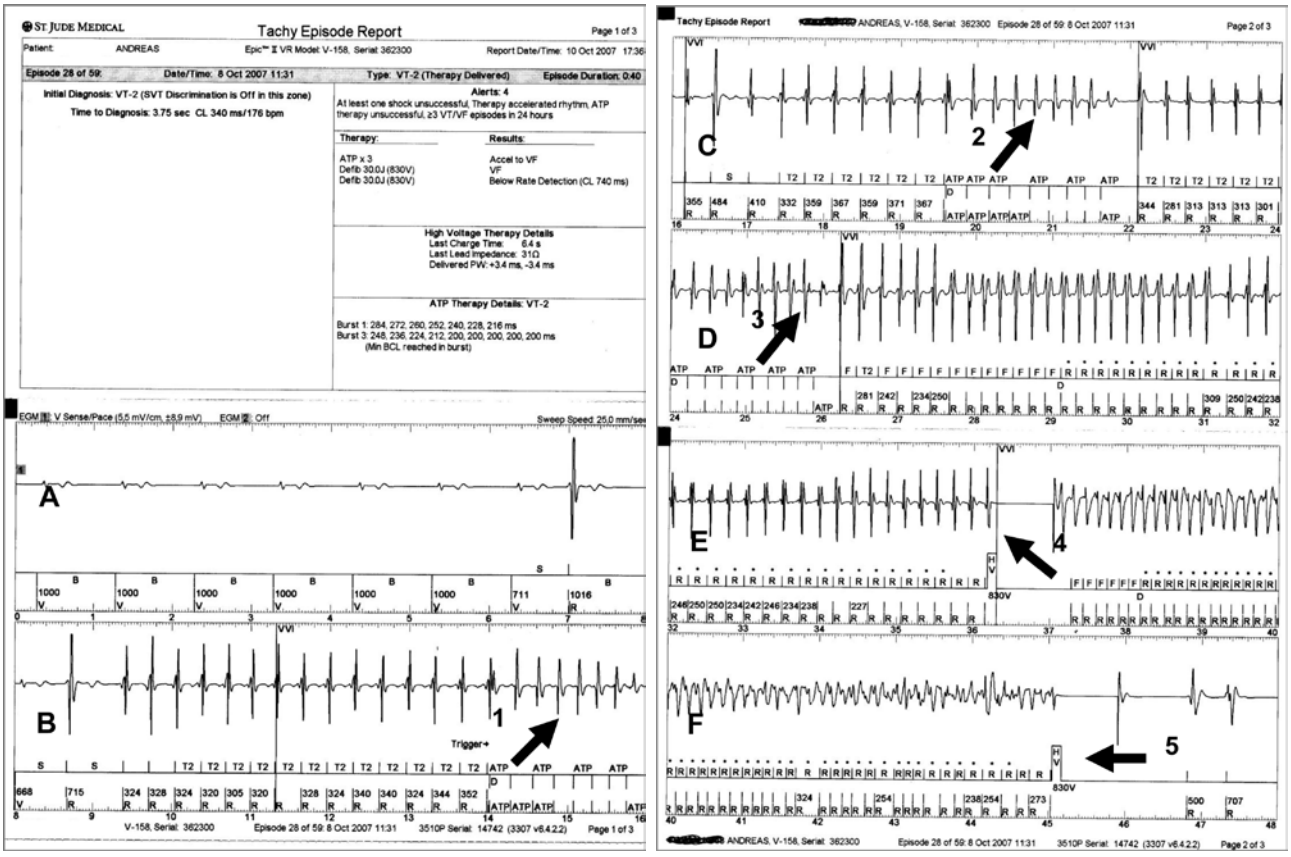

FIGURE 1.

On panel A, the basic paced rhythm (60 bpm) and a premature ventricular contraction (PVC) is recorded. On panel B, it is a PVC that induces a sustained VT at a rate of 185 bpm. The first ATP scheme is released (arrow 1) with no effect. On panel C, the ICD attempts to terminate the VT by a second ATP sequence (arrow 2), resulting in a slight acceleration of the ventricular rate (191 bpm). The third ATP scheme (panel D, arrow 3) is followed by a significant acceleration of the tachycardia rate (240 – 250 bpm), which caused the device to deliver a shock (panel E, arrow 4). Subsequently, the VT degenerated into ventricular fibrillation (panel F) and finally, a second shock of 30J (arrow 5) restored the regular rhythm.

DISCUSSION

In the present example, the ICD caused worsening of the existing VT, before it succeeded in terminating it in the end. This demonstrates a proarrhythmic effect of the antiarrhythmic device.

Arrhythmogenic effects of the delivered therapies in patients with implanted defibrillating systems have been recorded at a rate of 5%. Directly related to the appearance of proarrhythmic effect are in general the following factors: 1) high frequency of clinical VT, 2) rate of aggressiveness of the preprogrammed ATP protocol, 3) degree of myocardial dysfunction, 4) existence of myocardial ischemia, 5) coexistence of electrolyte disorders.[1-3]

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