Arrhythmia Quiz 4

Arrhythmia Diagnosis Following An ICD Shock

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A 70 year old male underwent placement of a Medtronic Marquis DR ICD following syncope. He has coronary artery disease and severe LV dysfunction and was inducible for rapid hemodynamically unstable ventricular tachycardia at intracardiac electrophysiological study prior to implantation of the ICD. Three weeks later, he presents with an ICD shock. He had been drinking excessive amounts of alcohol and experienced lightheadedness prior to experiencing the ICD shock. Electrogram of the episode obtained upon device interrogation is shown in **Figure 1**:
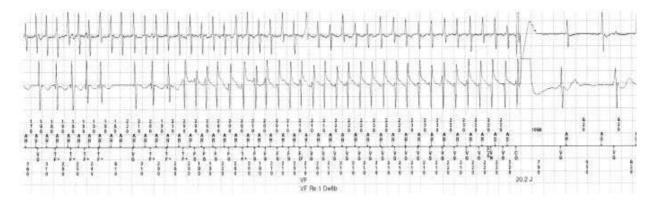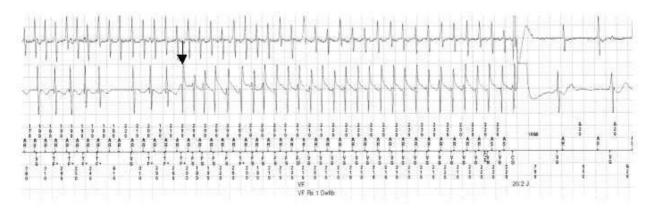

Figure 1: From top to bottom, the traces represent atrial electrograms, ventricular electrograms, atrial and ventricular marker channels with inter-beat intervals.

Which of the following is a true statement regarding this arrhythmia?

1. A ventricular arrhythmia is appropriately converted by the ICD shock
2. Activation of SVT discrimination algorithms would have prevented an ICD shock
3. A ventricular arrhythmia leads to the development of atrial fibrillation
4. There is 1:1 atrio-ventricular conduction during an atrial tachycardia leading to an ICD shock
5. An AV node dependent supra-ventricular tachycardia is appropriately terminated by the ICD shock

Answer:

1. A ventricular arrhythmia is appropriately converted by the ICD shock

The initial part of the tracing shows atrial tachycardia or flutter with atrial rates in excess of ventricular rates with irregular ventricular responses. Ventricular tachycardia begins from the 9th electrogram on the ventricular channel (see arrow). The electrograms during ventricular tachycardia are distinctly different from the preceding electrograms with an initial negative deflection as opposed to an initial positive deflection during conducted atrial arrhythmia (initial part of the trace) or during sinus rhythm (end of the trace). During the latter part of the trace, ventricular tachycardia cycle lengths (210 msec) are shorter than that of atrial tachycardia (230 msec) confirming ventricular tachycardia as the mechanism. Most SVT algorithms have an upper limit for SVT rates. The rate of this arrhythmia would have exceeded the SVT upper limit and classified this arrhythmia as ventricular tachycardia. There is no evidence for 1:1 relationship between the atrium and the ventricles.

This is an example of tachycardia induced tachycardia wherein an atrial arrhythmia with rapid ventricular rates induces ventricular tachycardia, Atrial fibrillation is well recognized as a trigger for both ventricular fibrillation and tachycardia even in the absence of a bypass tract.