Tachycardia detected by an ICD: What’s the mechanism?

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Abstract
This tachycardia was recorded by a dual chamber ICD. Is this a supraventricular or ventricular arrhythmia. Detailed analysis of this image provides grounds for discussion of the origin of this tachycardia.

Taquicardia detectada por un CDI: Cuál es el mecanismo?

Resumen
Esta taquicardia fue detectada por un cardiodesfibrilador doble cámara. Se trata de una arritmia supraventricular o ventricular? El análisis de esta imagen tiene por finalidad discutir el origen de esta taquicardia.

This event was recorded in a Medtronic (MN, USA) dual chamber implantable cardioverter-defibrillator (ICD) programmed to DDIR mode (low rate of 60/upper sensor rate of 110 bpm) and a paced AV delay of 300 ms.

The interval plot (Figure 1A) shows an atrial rhythm with alternating cycle length. There is a gradual acceleration into the ventricular tachycardia monitor zone (400 ms).

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Figure 1A. The interval plot shows an atrial rhythm with alternating cycle length. There is a gradual acceleration into the ventricular tachycardia monitor zone (400 ms). During tachycardia, the atrial (A) and ventricular (V) recordings display a “tramline” pattern with V intervals < 100 ms. The event terminates spontaneously.
Figure 1B. The initial half of the intracardiac tracings reveals alternating sensor determined VA intervals of 560 ms and 680 ms characteristic of a DDIR mode in order to avoid increasing the A rate. A ventricular premature complex (VPC) occurs coincidentally within 110 ms of an atrial paced (AP) beat (callipers) hence, Ventricular Safety Pacing (VSP) is evoked, resulting in ventricular pacing (VP). The second VPC conducts retrogradely with a short VA time (arrow). Tachycardia is initiated.

Figure 1C. During tachycardia the VA time is shorter than the antegrade A to V association (marker channel arrows) with apparent VA linking. Minor perturbations in V-V cycle length detection result in a VS event occurring later than the sensor determined interval of 360 ms and an AP (encircled annotations). All preceding atrial events occurred during blanking. The VS occurs within the 110 ms VSP window resulting in a VP. This phenomenon recurs. It is worth noting that the first AP event captures the atrium (encircled) and fails to interrupt the V-V cycle length (callipers) when evaluating the ventricular EGMs. The cycle length change in the marker channel is unreliable as it is dependent on when the device detects the signals.
CONCLUSION:

Tachycardia is characterised by a shorter VA than AV interval with VA linking. An AP event fails to interrupt the V-V cycles making AT and AVRT unlikely as this effectively dissociates A from V. An AP finally terminates tachycardia without conduction to the ventricle, making VT less likely. Also the V-EGM in tachycardia resembles the antegradely conducted morphology. By exclusion therefore, AVNRT seems to be the most likely diagnosis.