

What is the Diagnosis?

CASE PRESENTATION

Patient YB, 50 years old, female, with hypothyroidism, severe left ventricular dysfunction, uncompressed left ventricle and poorly tolerated ventricular tachycardia, submitted to implantation of a dual chamber implantable cardioverter defibrillator (ICD) in February 2012 (generator Secura DR Medtronic, 4076 Medtronic atrial electrode, and Sprint Quattro 6947 Medtronic ventricular electrode). Returns asymptomatic nine months after the implant for routine evaluation.

The initial interrogation evidenced electrophysiological measures. The device alert highlighted 700 episodes of short VV (intervals between QRS complex senses less than 200 ms) (Fig. 1). These episodes usually represent electrode noise, excessive sensitivity (double QRS count or cross-sensitivity of atrial events in the ventricle) or electromagnetic interference.

The telemetry of the device revealed episodes of cross-sensitivity through the ventricular channel of both sensed and stimulated atrial events (Fig 2). Such behavior is not usual in devices with correctly positioned bipolar electrodes. On chest radiography (Fig. 3), it was possible to confirm the adequate positioning of the atrial, ventricular and shock-spring electrodes.

However, after careful evaluation of the programming, it was observed that the ventricular sensitivity was programmed in a tip to coil, which increases the detection antenna and the possibility of cross-sensitivity, once the detection field becomes larger (Fig. 4). Thus, it was decided to program the sensitivity of the ventricle in bipolar, correcting the sensitivity dysfunction that motivated the short VV alarm. This correction is important because, given sinus tachycardia, this behavior could cause an inappropriate shock.

Parameter summary					
Mode	AAIR ↔ DDDR	Lower rate	60 bpm	Paced AV	180 ms
Mode Switch	171 bpm	Upper track	130 bpm	Sensed AV	150 ms
		Upper sensor	120 bpm		
Detection		Rates		Therapies	
AT/AF	Monitor	> 171 bpm		All Rx Off	
VF	On	> 222 bpm		ATP During Charging 35J × 6	
FVT	via VT	176-222 bpm		Burst(1), Burst(1), 20J, 35J × 6	
VT	On	162-222 bpm		All Rx Off	
Enhancements On: AF/Afl, Sinus Tach, VT Monitor					
Measured P/R Wave 1.5mV 4.4 mV					
Capture Threshold Atrial/Ventricular 0.375V @ 0.4ms					
Observations					
Sensing issue: 700 short V-V intervals since 18 June 2011 35:05					
Check for double-coupled R waves or lead fracture.					

Figure 1. Electrophysiological measures and initial interrogation of the implantable cardioverter-defibrillator.

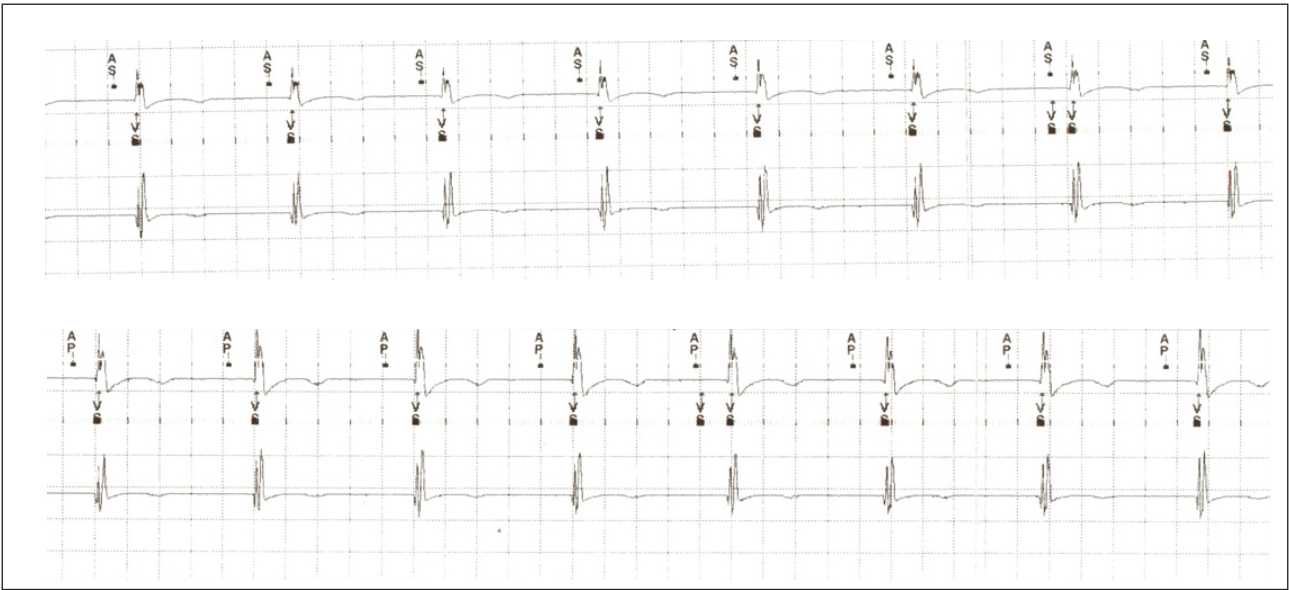


Figure 2. Cross-sensitivity through the ventricular channel of both sensed and stimulated atrial events.

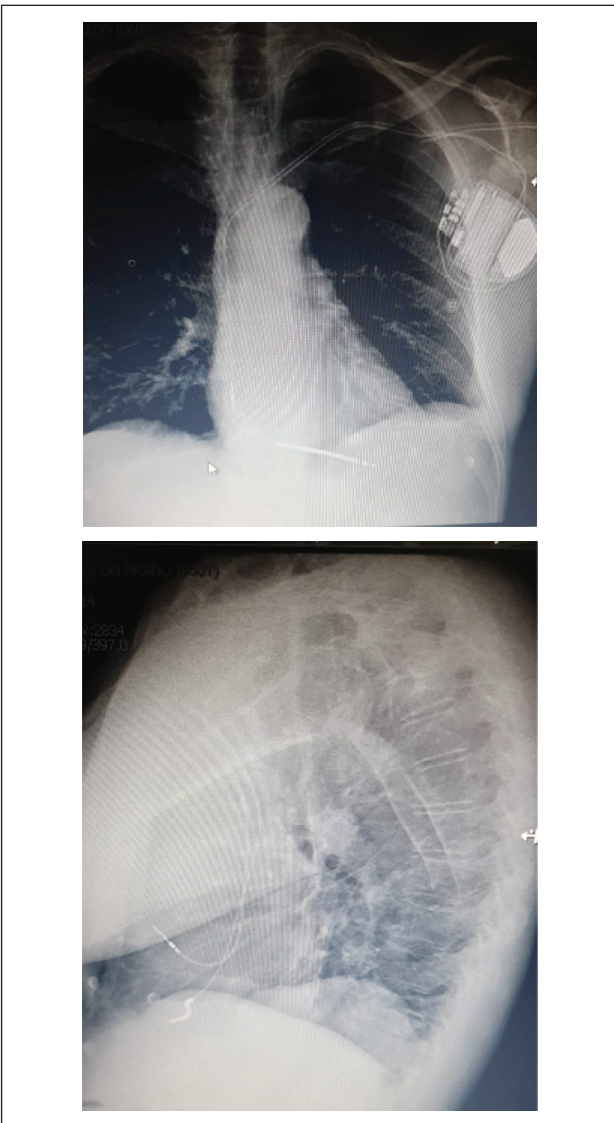


Figure 3. Chest X-ray PA/profile showing the correct positioning of the electrodes.

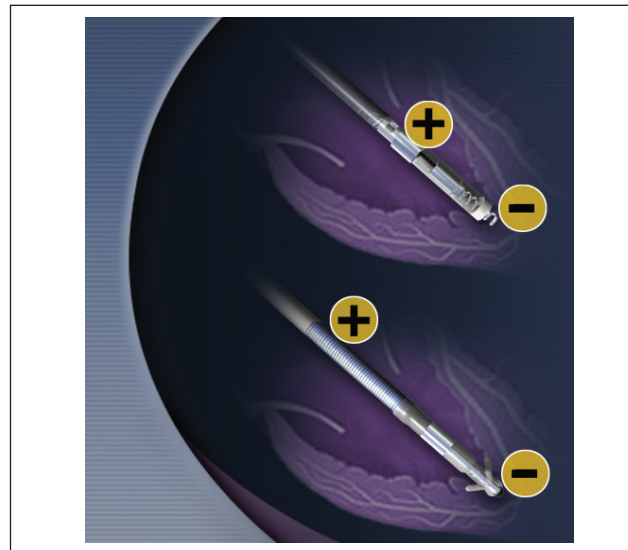


Figure 4. Bipolar sensitivity (above) and tip to coil (below). In this configuration, since the proximal portion (positive pole) of the right ventricular shock spring is close to the atrioventricular ring, this form of sensitivity increases the chance of cross-sensitivity of atrial events in the ventricular channel.

Device: Secura DR D234DRG
 Serial Number: PZc614420S

Final: Session Summary

Change this session	Session start	Current Value
FVT Rx 3 Energy	10 J	20 J
FVT Rx 4 Energy	20 J	35 K
RV Sense Polarity	Tip to Coil	Bipolar ←

Figure 5. Change in the programmed sensitivity pattern of the right ventricle from tip to coil to bipolar, correcting cross-sensitivity. Patient in follow-up for more than four years.

ANSWER

In patients with ICDs and low sensitivity thresholds (<5 mV), the increase of the detection antenna by programming, converting the operation of a true bipolar electrode into integrated bipolar, is an important resource. However, it should be noted that by increasing the detection antenna of these devices, patients are exposed to a greater risk of excessive sensitivity of cardiac and non-cardiac events that occur outside the ventricles.

REFERENCES

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