T-wave oversensing during exercise one year after cardioverter defibrillator implantation for Brugada syndrome

Surdétection de l’onde T à l’effort un an après implantation d’un défibrillateur implantable pour un syndrome de Brugada

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A 56-year-old man was hospitalized for a recent episode of syncope. The electrocardiogram (ECG) revealed a permanent type-I Brugada syndrome (figure 1). An electrophysiological study induced ventricular fibrillation. A Saint Jude Medical Atlas VR defibrillator was implanted connected to a double defibrillation coil “true” bipolar lead. The R-wave amplitude was 16 mV, the threshold stimulation 0.6 V, and the threshold of defibrillation was less than 15 J.

One year later, several shocks occurred during the patient’s normal daily activities. The R-wave amplitude was 7 mV. Although no oversensing was noted at rest, stored endocardial electrograms revealed inappropriate shocks due to T-wave oversensing (figure 2). An exercise stress test reproduced T-wave oversensing (figure 3), with a reduction in R-wave and an increase in T-wave amplitudes responsible for double counting of ventricular activity. No lead dislodgment was observed on chest X-ray.

A reprogramming of “starting threshold” and “decay delay” suppressed T-wave oversensing during an exercise stress test. However, induced ventricular fibrillation showed undersensing of ventricular activity. Repositioning of the defibrillation lead was attempted without success due to adherences of the proximal coil. Therefore a ventricular lead for sensing and pacing was positioned at a distance of the defibrillation lead. The R-wave amplitude was then 12 mV.

A new exercise stress revealed no T wave oversensing. There was no undersensing during an induced ventricular fibrillation. At 1 year, there was neither inappropriate shock nor T wave oversensing during exercise stress test. We conclude that T-wave oversensing should be suspected in Brugada syndrome because of spatial and temporal variations in the T wave. We suggest that a physical exercise test should be performed systematically and repeatedly for these patients after implantation of a cardioverter defibrillator.

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Figure 1. Surface ECG with V1, V2 and V3 leads showing type-I Brugada syndrome.
Figure 2. Stored endocardial electrograms showing (A) T-wave oversensing during exercise: reduction of R/T ratio responsible for double counting of ventricular activity (R); and (B) inappropriate shock after continuous T-wave oversensing.

* = charge; F = ventricular fibrillation; HV = high-voltage therapy
Figure 3. Exercise stress test with (A) surface ECG, and (B) endocardial ventricular electrogram. Confirmation of T-wave oversensing before device reprogramming with an unfavourable R/T ratio.