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Case Report

Inappropriate mode switching clarified by using a chest radiograph

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ABSTRACT

An 80-year-old woman with a history of paroxysmal atrial fibrillation and atrioventricular node disease status post-dual chamber pacemaker placement was noted to have abnormal pacing episodes during a percutaneous coronary intervention. Pacemaker interrogation revealed a high number of short duration mode switching episodes. Representative electrograms demonstrated high frequency nonphysiologic recordings predominantly in the atrial lead. Intrinsic pacemaker malfunction was excluded. A chest radiograph showed excess atrial and ventricular lead slack in the right ventricular inflow. It was suspected that lead–lead interaction resulted in artifacts and oversensing, causing frequent short episodes of inappropriate mode switching.

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1. Case report

An 80-year-old woman with underlying coronary artery disease, paroxysmal atrial fibrillation, and atrioventricular nodal disease status post pacemaker placement was noted to have episodes of abnormal pacing during an elective coronary angiogram and percutaneous coronary intervention. She had not experienced any palpitations or syncope. Five years previously, the patient had undergone placement of St. Jude (Sylmar, CA, United States) dual-chamber Victory XL Model 5816 pacemaker at another institution for symptomatic bradycardia. Pacemaker interrogation revealed an unusually high number (over 9000 episodes) of mode switching (DDDR-DDIR with detection rate 180 beats per minute). All these episodes lasted < 30 s and the total burden was 1.3%. Analysis of the electrogram (Fig. 1) from a representative event demonstrated very high frequency nonphysiologic recordings (750–1000 bpm), predominantly in the atrial lead, but in both leads simultaneously. The intrinsic P wave was 2.6 mV, and sensitivity was set at 0.5 mV. Atrial lead impedance was 485 Ω and had not recently changed, making lead fracture or

dislodgement unlikely as a potential cause. Pocket manipulation, as well as directed positional changes in the patient, failed to reproduce any of the artifacts. Review of the chest radiograph (Fig. 2) demonstrated both the atrial and ventricular leads had significant excess slack overlapping in the right ventricular inflow tract. It is suspected that lead–lead interaction in this area resulted in artifacts and oversensing. The patient will require generator replacement within the next 6 months owing to normal battery depletion. As the patient was not having bradycardia-related symptoms and was not pacemaker dependent, plans were made to revise the leads at the time of generator change.

2. Discussion

A sensed atrial high rate episode (AHRE) triggers mode switching in contemporary dual chamber pacemakers to prevent tracking of an atrial tachyarrhythmia such as atrial fibrillation, atrial flutter, or atrial tachycardia at high ventricular rates. Mode switching has eliminated the relative contraindication of a dual chamber pacing device in patients with paroxysmal atrial tachyarrhythmias and has proven to increase both exercise time as compared to VVIR and quality of life as compared to VVIR or DDDR without mode switching [1]. More recently, an association of increased stroke risk with asymptomatic AHRE with a detection limit of > 190 beats per minute (i.e. subclinical atrial fibrillation or atrial flutter) as

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