DEVICE THERAPY

UNIQUE IMAGE REVIEW

Device Rounds: The “Reel” Intracardiac Electrogram

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Introduction

An 82-year-old woman underwent device interrogation 2 months after implantation of a dual-chamber pacemaker for sick sinus syndrome (Guidant (Indianapolis, IN) S606 Altrua 60 EL D; Guidant Fine line II Sterox leads: atrial 4469 Poly/Fixed Screw, ventricular 4456 Sterox Bipolar IS-1 Passive), Figure 1. She was being evaluated for recent onset of fatigue, dizziness, and an intermittent “heart beat” in her right upper quadrant.

Figure 1: (a) On January 16, there are no atrial sensed electrograms. (b) On the same date there are two recorded V-tachy events. In addition, another V-tachy event was recorder four days prior. (c) Intracardiac electrogram recordings during the last V-Tachy event. The upper channel is atrial and the lower channel is ventricular. Note the non-sustained ventricular tachycardia (recorded as PVCs) with concomitant inhibition of pacing in the atrial channel followed by resumption of atrial pacing.
What is the explanation?

The original implant was uncomplicated and post-procedure chest radiograph and device interrogation were normal. Two months later, she expressed concerns to her physician that the wound may have become infected. Evaluation demonstrated no evidence of wound erythema, exudates, or tumescence, and no systemic signs of infection. She continued to voice concerns about her wound, requesting referral to a plastic surgeon for revision, but the repeat wound check remained normal.

On the current evaluation, the wound remained normal to examination. The device interrogation was concerning, revealing three ventricular tachyarrhythmia episodes occurring between January 12 and January 16 (Figure 1b). Additionally, the atrial sensing logbook demonstrated loss of atrial sensing on or after January 16 (Figure 1a). Intracardiac electrograms during the January 16 episode revealed non-sustained ventricular tachycardia (recorded as premature ventricular complexes), followed by resumption of atrial pacing (Figure 1c).

Commentary

The initial clinical concern was atrial lead perforation and subsequent phrenic nerve stimulation. Loss of atrial sensing after the sentinel event suggests the atrial lead may have dislodged, but does not explain the ventricular tachycardia. The electrocardiogram (ECG) was consistent with dual-chamber pacing with atrial non-capture and retrogradely conducted P waves (Figure 2). However, the chest radiograph was diagnostic, revealing twiddled leads and atrial lead retraction into the superior vena cava, although the ventricular lead did not appear grossly dislodged (Figure 3).

The suspicion was that the patient had been manipulating her generator. Ultimately, this led to atrial lead dislodgement, at which moment (logged in Figure 1) concurrent pull on the adjacent ventricular lead created PVCs due to the mechanical stretch of the ventricular lead leading to irritation of the right ventricular myocardium. Atrial lead retraction into the superior vena cava...
cava coincided with both phrenic nerve capture, thus "heart beat" in the right upper quadrant, and atrial non-capture. Fatigue may have resulted from pacemaker syndrome due to ventriculoatrial conduction.

On direct questioning, she denied device manipulation. However, she reported that her habitual position during sleep involved hyperextension of her left arm. The device was reprogrammed to VVI to avoid phrenic nerve capture, immediately resolving the intermittent "heartbeat" sensation in the abdomen, and she was brought to the electrophysiology laboratory for atrial lead repositioning.

Lead exposure confirmed extensive braiding. The right ventricular lead revealed normal impedance, sensing, and capture, and had a stable fluoroscopic position. Attempts at repositioning the right atrial lead were unsuccessful due to tissue adherence to the screw, and, therefore, it was extracted with gentle traction. A new right atrial extendable–retractable active fixation lead was implanted via the cephalic vein and screwed into the right atrial appendage. A retention suture securing the pulse generator to the pectoralis muscle was placed to limit mobility of the device in the pocket. She was counseled to minimize touching the left pectoral area and to place her arm inside her shirt during sleep to avoid hyperextension of the left arm.

Twiddler's syndrome is an uncommon cause of pacemaker failure which results from manipulation of the generator.1 Some patients may have obsessive compulsive behavior related to the device or pocket.2 Although such lead dislodgement has been attributed to intentional or subconscious pocket manipulation, the newer term "reel syndrome" may be preferred to "twiddler’s syndrome" for patients who deny "twiddling."3 This was a unique case in which we captured an intracardiac ECG at the time of the sentinel "reel" event, after which the atrial lead dislodged and the patient developed phrenic nerve stimulation.

References