Remote detection of incessant slow VT with an ICD capable of home monitoring

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In this case report, we present a 57-year-old patient who suffered from incessant slow ventricular tachycardia because of a change in therapy 2 weeks after the implantation of an implantable cardioverter defibrillator (ICD) with Home Monitoring (HM). HM is a fully automatic and wireless system capable of transmitting device data including episode counters. The patient had mild symptoms with only short episodes of dizziness and would not have contacted the primary care centre. Due to HM, the arrhythmia was detected before the next routine follow-up, and the patient was seen the next day. HM made it possible to adjust the dosage of the newly established beta-blocker treatment in an outpatient setting and avoid hospitalization. HM yields the potential for remote detection of arrhythmias in ICD recipients, allowing alterations in device programming or medication.

KEYWORDS
Home Monitoring; ICD

Introduction

Due to expanding prophylactic indications,1,2 the number of patients receiving an implantable cardioverter defibrillator (ICD) has been growing in recent years. In the light of an increase in patients and the development of complex devices, effective outpatient management is mandatory. Telemedicine is one approach to optimize patient surveillance. Home Monitoring (HM) is a new diagnostic tool, which provides daily information about system integrity parameters as well as arrhythmia occurrences. HM consists of a fully automatic and wireless system capable of transmitting device data including episode counters. Technical aspects of HM have been reported in detail elsewhere.3 The type of information that is transmitted daily to the physician includes battery status, lead impedance, and counters of detected and treated episodes.

The latest studies show that telemonitoring of ICD recipients for routine follow-ups is feasible.4 In addition, HM is capable of reducing costs by preventing up to two routine follow-ups at an outpatient clinic.5 Whether HM is capable of reducing the number of hospitalizations and providing remote management of ventricular arrhythmias is unclear.

Case presentation

A 57-year-old patient came to the emergency room with sustained ventricular tachycardia (VT) and one syncopal episode. Invasive diagnostic evaluation revealed dilated cardiomyopathy. The electrophysiological study reliably reproduced a monomorphic VT. Therefore, the patient received a single-chamber ICD with HM (Biotronik Lexos VR-T, Berlin, Germany) and was discharged with a drug regimen including a beta-blocking agent. Due to bronchospastic side effects, the patient stopped taking the beta-blocker 2 weeks later without contacting the implanting centre. Two days later, he experienced repetitive slow VT, which was adequately detected and treated with overdrive stimulation (ATP) by the device. During the next 3 days, the number of these slow VT episodes dramatically increased. Because of the immediate re-induction of VT after the initial successful termination by ATP, the patient started to experience incessant VT (Figure 1). HM sent the episode counters to the implanting centre; the patient was contacted and seen the next day. The patient experienced only very short episodes of dizziness, which did not prompt him to seek medical care. Interrogation of the device showed 277 episodes of monomorphic VT (CL 450 ms), which were always effectively terminated by ATP. A few beats after the termination, VT reoccurred. The patient refused to undergo recommended catheter ablation.
To prevent VT from reoccurring, the cardioselective beta-blocker nebivolol was administered (2.5 mg per day), and the patient remained under observation by HM. HM permitted monitoring of the therapeutic efficacy of the new drug regimen on a daily basis without directly interrogating the device. One day after starting nebivolol, VT stopped (Figure 2). Follow-up during the next 2 weeks showed only a few more episodes of slow VT, and the patient was asymptomatic without side effects of nebivolol in the prescribed dosage.

Discussion

In general, ICD recipients have routine follow-ups of their device every 3–6 months. Routine follow-ups include the interrogation of the ICD for arrhythmia episodes and markers of device and lead integrity, such as battery voltage, sensing, pacing impedance, and stimulation threshold. This intermittent form of patient surveillance has the disadvantage that arrhythmic events or device dysfunction between two routine follow-ups might be missed or at least might remain undiscovered for up to 3 months. This gap in patient surveillance could be closed by telemedicine. HM, a new diagnostic feature, is capable of sending daily device data on lead integrity and episode counters. The automatically transmitted data enable the physician to monitor device integrity on a daily basis and to decide about the necessity of device reprogramming or changes in medical treatment between two routine follow-ups. The clinical relevance of this diagnostic tool is still in research. In a retrospective study, the effectiveness and reliability of HM in implantable devices could be demonstrated by measuring and reporting the burden of atrial fibrillation as well as the associated chamber rates.6 In one case, HM allowed early detection of a lead fracture due to Twiddler’s syndrome.7

This case report describes how a minimally symptomatic but severe arrhythmia was detected early by HM. Without HM, arrhythmia detection would have been delayed because of limited patient symptoms. Thus, early therapeutic intervention was possible. Furthermore, hospitalization was avoided because HM enabled the physician to monitor the efficacy of the change in therapy. Reduction of VT was checked on a daily basis without directly interrogating the device. Therefore, HM seems to have preventive function in patients with arrhythmias as well as the capability of remote monitoring after adjusting the medical treatment.

In this case report, incessant VT occurred after cessation of beta-blocker therapy. After re-establishing beta-blocker treatment with nebivolol in low dose, ventricular arrhythmias decreased after 1 day. Although additional factors might contribute to the occurrence and cessation of VT, acute myocardial ischaemia, electrolyte disturbance, or thyrotoxicosis were excluded at the time this case was presented. It seems that in this individual patient even a low dose of beta blockade was effective in suppressing VT. The findings
in this case correspond with other published data. Kettering et al.\textsuperscript{8} reported similar efficacy of metoprolol and sotalol in preventing VT or ventricular fibrillation in ICD recipients.

**Conclusion**

HM yields the potential for remote detection and management of arrhythmias in ICD recipients. HM seems to be an ideal tool to monitor patients with VT cluster. This report illustrates that beta-blocker therapy, even in a low dose, is an essential part of anti-arrhythmic therapy for VT.

**References**


