Breast tissue expanders and implantable cardioverter-defibrillator: An unusual interaction

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Introduction

Implantable cardioverter-defibrillators (ICDs) are devices that are implanted in patients who are at risk for sudden cardiac death due to potential fatal arrhythmias such as ventricular fibrillation or ventricular tachycardia.[1,2] Although potentially lifesaving, ICD systems (pulse generator and leads) are subject to both mechanical and electrical faults.[3,4] In particular, electromagnetic energy can cause varying levels of interference with these devices.[5–8]

Case report

A 53- year-old woman with a history of right-sided breast cancer diagnosed 11 years ago developed a recurrence at the same site 1 year prior to admission (PTA). After recurrence, she underwent right mastectomy, followed by placement of a breast tissue expander (BTE; Dermaspan Low Pole Expander, Surgical Specialty Products Inc, Victor, MT) and chemotherapy. A few months later, a prophylactic left mastectomy was performed, followed by placement of a similar BTE with plans to undergo a simultaneous bilateral second-stage breast reconstruction with implant exchange and revision in about 6 months, per usual practice. Three months PTA, she presented with shortness of breath and fluid overload. She was found to have a severe dilated cardiomyopathy with an ejection fraction of 15%. This was believed to be most consistent with a chemotherapy-induced cardiomyopathy. One month PTA, a single-chamber ICD (Medtronic Evera XT VR, Medtronic Corp, Minneapolis, MN) was implanted in the left infraclavicular position after multiple sudden syncopal episodes and recurrent runs of nonsustained

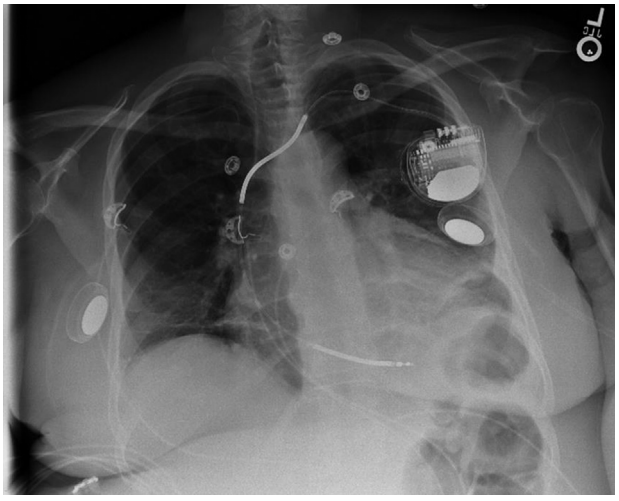

Figure 1 Chest x-ray film, anteroposterior view, showing the relative position of the implantable cardioverter-defibrillator and breast tissue expander.

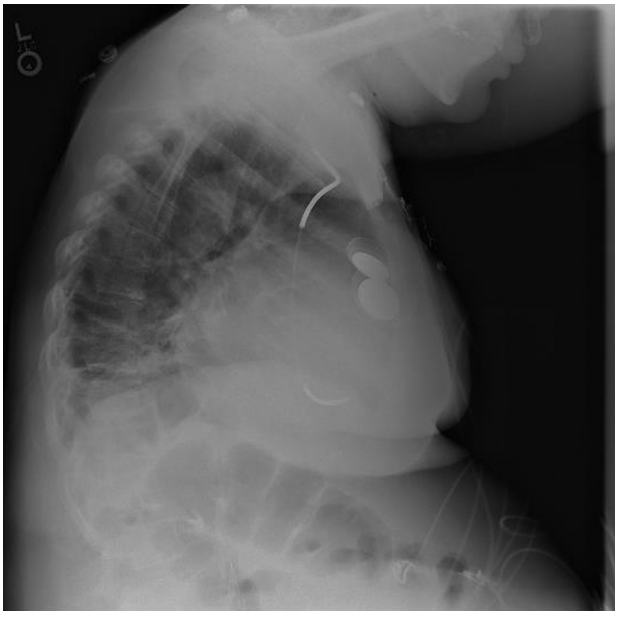

Figure 2 Chest x-ray film, lateral view, showing the relative position of the implantable cardioverter-defibrillator and breast tissue expander.

KEYWORDS Breast tissue expander; Implantable cardioverter-defibrillator; Magnetic injection port; Interaction; Magnet mode conversion

ABBREVIATIONS **BTE** = breast tissue expander; **ICD** = implantable cardioverter-defibrillator; **PTA** = prior to admission

(Heart Rhythm Case Reports 2015;1:167–168)

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http://dx.doi.org/10.1016/j.hrcr.2015.01.005

KEY TEACHING POINTS

- Electromagnetic energy can cause varying levels of interference with implantable cardioverter-defibrillators (ICDs).
- There can be a potentially dangerous interaction of interference between a magnetic injection port locator in a breast tissue expander (BTE) and an ICD. This interaction may be difficult, if not impossible, to recognize at the time of implant because it may not occur with the patient in the supine position.
- Because ICDs provide lifesaving therapy, it is imperative that patients who have BTEs with magnetic ports be switched to the nonmagnetic type.
- Patients should undergo prompt ICD interrogation whenever the device emits an unusual tone.

ventricular tachycardia. At the time of implantation, a subcutaneous ICD was not available at our institution or in our region. She was not compliant in taking her heart failure medications and was admitted to the hospital with signs and symptoms of anasarca, severe exertional dyspnea, and orthopnea. A diagnosis of acute-on-chronic biventricular heart failure was made. She also had complaints for at least 3 weeks of a peculiar high-pitched sound that lasted for few seconds coming from the left side of her chest whenever she leaned forward or raised her left arm. ICD interrogation revealed all functions were within normal limits, and no alerts or sustained arrhythmias were noted. However, when the programmer head was placed over her device, the sound she had been hearing was reproduced exactly. The sound is the magnet tone of her ICD. The magnetic injection port in her BTE was determined to be interacting with her ICD when she leaned forward or moved her arm (Figures 1 and 2). Both movements brought her BTE and ICD in closer proximity to one another, causing a magnet mode conversion tone. When this occurred, the device not only toned, but all antitachycardia therapies (antitachycardia pacing and shocks) were temporarily suspended.

Ultimately, after initial postponing her second-stage reconstruction due to her heart failure, her BTEs were replaced with silicone implants after optimization of her cardiac status. She was subsequently transferred to a long-term acute care hospital for further rehabilitation.

Discussion

This case demonstrates a potentially dangerous interaction of interference between a magnetic injection port locator in a breast tissue expander and an ICD. Because this interaction did not occur when the patient was in the supine position, it may be difficult, if not impossible, to recognize this event at the time of implant. Because ICDs provide lifesaving therapy, it is imperative that patients who have BTEs with magnetic ports be switched to the nonmagnetic type. In addition, patients should undergo prompt ICD interrogation whenever the device emits an unusual tone.

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