IMPLANTABLE DEFIBRILLATION THERAPY

UNIQUE IMAGE REVIEW

Intrathoracic Impedance Measurement Abnormality as a Consequence of ICD Pocket Abscess: A New Differential Diagnosis

NISHAKI MEHTA, MD¹, AMY FRENCH, MD², ADELQUI PERALTA, MD³ and PETER HOFFMEISTER, MD³

¹Division of Clinical Cardiac Electrophysiology, Brigham and Women's Hospital, Boston, MA

²Division of Cardiology, Boston University Medical Center, Boston, MA

³Division of Clinical Cardiac Electrophysiology, Veterans Affairs Hospital, West Roxbury, Boston, MA

ABSTRACT. Intrathoracic impedance monitoring is used to guide management of congestive heart failure. We describe a marked shift in intrathoracic impedance because of a pocket abscess. A 69-year-old male with an active pectoral implantable cardioverter-defibrillator (ICD) (Medtronic, Minneapolis, MN), an abandoned 23-year-old abdominal ICD, and a tunneled transvenous lead from the abdomen through the ipsilateral subclavian vein contiguous with both devices presented with frank abdominal ICD infection and epicardial patch infection. The abdominal system and epicardial leads were removed by abdominal incision and sternotomy, and the aforementioned transvenous lead was cut below and left to retract into the pectoral pocket. The patient was treated with a course of antibiotics and discharged. Four months later he presented with persistent swelling and drainage from his pectoral ICD pocket. The patient underwent explant of the device and extraction of the existing three transvenous leads, with the discovery of frank pus and an abscess cavity in the device pocket. Device interrogation showed an abrupt and persistent decrease in the intrathoracic impedance (OptiVol®, Medtronic, Minneapolis, MN) correlating with the time of abdominal device removal. There were no signs or evidence of congestive heart failure. All other impedance measurements (right ventricle [RV], RV high voltage [HV], superior vena cava [HVI]) were unchanged. Given that the intrathoracic impedance is measured between the ICD generator and the RV coil and can be impacted by fluid in the device pocket, we hypothesize that the finding of decreased intrathoracic impedance was a consequence of a pocket abscess. We considered that the change could have been a result of the sternotomy but dismissed this because of the absence of any other changes in lead impedance measurements. Intrathoracic impedance is typically used for monitoring of heart failure, but a pocket abscess should be considered in the differential diagnosis in the setting of device infection and associated symptoms.

KEYWORDS. Intrathoracic impedance, lead management, pocket infection.

Case presentation

A 69-year-old Caucasian man presented with implantable cardioverter-defibrillator (ICD) pocket infection with

drainage and swelling of the left pectoral site. Four months prior, he had presented with septic pericarditis in the setting of an abandoned 23-year-old abdominal ICD with epicardial patches and an old tunneled transvenous pace/sense lead from the abdominal pocket through the left subclavian vein, and an active left pectoral ICD with more recently placed transvenous leads. The abdominal system and epicardial leads were removed through the abdominal incision and sternotomy, and the tunneled transvenous lead was cut below

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Address correspondence to: Nishaki Mehta, MD, Brigham and Women's Hospital, 75 Francis Street, Boston, MA 02115.

E-mail: drnishakimehta@gmail.com

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Figure 1: Decrease in intrathoracic impedance values corresponding to likely onset of pocket fluid collection.

and left to retract into the pectoral pocket; the patient was treated with a course of antibiotics. At follow-up, diagnosis of an ICD pocket abscess was made and the patient underwent a complete system extraction.

Interrogation on presentation showed the intrathoracic impedance (ITI) had significantly decreased around the time of the abdominal extraction surgery and correlated with an increase in the OptiVol[®] index (Medtronic, Minneapolis, MN) (Figure 1).

The presentation of cardiac implantable electronic device infection may pose a significant challenge with insidious presentation and a high degree of suspicion is required.¹ Transvenous lead extraction is a Class I indication for lead infection.² Early detection of device infection can correlate with decreased long-term mortality.³

ITI monitoring quantifies impedance changes but is not a direct measure of fluid status. The reference impedance is designed to capture and follow the slow changes in impedance and is used to quantify the impedance reduction. The fluid index is a measure of the impedance reduction (measured in ohms) and the sustainability of the reduction (measured in days), and is reported in ohm-days. Routine outpatient surveillance of the ITI date from implanted devices has been shown to significantly reduce the currently high rates of hospital admission/readmission for patients with heart failure.⁴

Although ITI is classically thought to correlate with heart failure status, it can change in conditions like pneumonia, pleural effusion, pocket revision, lead dislodgement, and following intravenous infusion.

The pocket fluid is within the measurement pathway for ITI estimation. Fluid will accumulate in the pocket after the initial implant or a revision secondary to inflammation.

Hence, ITI can reflect pocket fluid status as described by Wang.⁵

We report a case of pocket abscess that was unrecognized prior to the development of overt symptoms. In this instance, there was a change in the ITI readings after the abdominal extraction surgery. We postulate this was secondary to abscess fluid in the pocket. The readings could have also resulted secondary to postoperative changes; however, the continued and stable decrease in ITI suggests that this is not the case. As electrophysiologists, we are learning to interpret and meaningfully utilize the ITI readings outside the context of heart failure alone. Given the high mortality with lead infection and the need for urgent surgical extraction, this report emphasizes the need for careful scrutiny of ITI readings, and the examination of trends in the appropriate clinical setting.

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