Defibrillator lead migration and delayed presentation of right ventricular perforation

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A 70-year-old female patient with a history of nonischemic cardiomyopathy (ejection fraction of 20%-25%) underwent placement of a cardiac resynchronization therapy with defibrillator device at an outside hospital. Implantation was uneventful, and the patient was discharged home on postoperative day 1 with normal electrical parameters (0.8-volt threshold, R-wave 5.6 mV, and impedance 716 ohms) and radiograph of the chest (CXR) (Figure E1).

That evening, the patient had an electrical sensation in her left chest and presented to outside emergency department, where she was discharged home after reassuring findings on electrocardiogram and CXR. Her symptoms persisted, and she presented to our center the next day, where device interrogation demonstrated no right ventricular (RV) lead capturing. The CXR (Figure 1) and transthoracic echocardiogram (Figure E2) demonstrated RV lead migration with perforation of the RV. was confirmed on computed tomography of the heart (Figure 2, A-F).

It was determined at our interdisciplinary high risk heart conference that the patient undergo open, off-pump, lead exchange. Intraoperatively, the RV lead extended through the RV and into intercostal muscle, requiring blunt reduction (Video 1 and Figure 3). The RV lead was exchanged, perforation oversewn (Figure 4), and the patient was discharged home on hospital day 4 (Figure E3). Institutional review board approval was not required, given that this was a single patient case report. The patient provided informed written consent for the publication of this report’s data.

CENTRAL MESSAGE
Perforation of the right ventricular wall following lead placement can present in delayed fashion. Patient symptoms, device interrogation, and imaging are critical factors in evaluation and management.

See Commentary on page XXX.
FIGURE 1. Radiograph of the chest 2 days after cardiac resynchronization therapy with defibrillator placement. Apical migration of the right ventricular lead is seen compared with the postoperative film and in reference to the coronary sinus lead. Of note, there is no pleural effusion.

FIGURE 2. CT of the heart protocol with 4-dimensional reconstruction. A and B, Scout films showing RV lead mispositioning. C, Axial view of initial CT demonstrating lead penetration through the RV into chest wall. This is more clearly depicted on the reconstructed (D) sagittal and (E) axial images. F, The RV lead can be seen penetrating the right ventricle near the left anterior descending artery. CT, Computed tomography; RV, right ventricular/ventricle.
VIDEO 1. Intraoperative video of RV perforation. The lead perforated the RV at the apex near the left anterior descending artery. There was scant serosanguinous fluid in the pericardium, and the puncture site before lead removal was hemostatic. Video available at: https://www.jtcvs.org/article/S2666-2507(22)00474-6/fulltext.

FIGURE 3. Still image from Video 1. The lead perforated the right ventricle at the apex near the left anterior descending artery.

FIGURE 4. Right ventricular repair after lead removal. The perforation was oversewn with PROLENE sutures (Ethicon) following lead removal.
FIGURE E1. Initial radiograph of the chest after cardiac resynchronization therapy with defibrillator placement. Placement of Gallant HF generator with leads in the right atrium (46-cm Lead Tendril STS), coronary sinus (86-cm 1458q Quartet lead), and right ventricle (65-cm 8-French lead defibrillator permanent bipolar retractable helix fixation Novus) (St Jude Medical, model numbers CDHFA500Q, 2088TC46, 1458Q86NC, LDA210Q65).

FIGURE E2. Transthoracic echocardiogram apical 4-chamber view. As indicated by the white arrow, the right ventricular lead can be seen perforating the right ventricle and into the chest wall. Of note, there is no pericardial effusion.

FIGURE E3. Postoperative CXR. Postoperative CXR demonstrates normal lead positioning. CXR, Radiograph of the chest.