Multimodality imaging of right ventricular perforation secondary to pacing lead migration

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A 69-year-old male with an implantable cardiac defibrillator (ICD) in situ for ischaemic cardiomyopathy was transferred to our institute following a ventricular tachycardia storm and repeated shocks from his ICD. Shortly following his arrival, he developed acute pulmonary oedema and was transferred to our intensive care unit.

After stabilization, a chest X-ray was performed. This demonstrated cardiomegaly and protrusion of the right ventricular (RV) ICD lead tip beyond the boundary of the heart with appearances suggestive of perforation (Panel A). Although a transthoracic echocardiogram confirmed an extension of the pacing wire beyond the pericardium, the precise point of perforation could not be ascertained (Panel B). Accordingly, a chest computed tomography (CT) scan was performed, which confirmed RV perforation and also the anatomical point to be the free wall. After careful consideration, the lead was extracted without complication, using a hybrid laser lead extraction and the thoracotomy procedure under general anaesthesia.

Cardiac chamber perforation is a recognized a serious complication of ICD implantation (0.6–5.2%) and is associated with the use of steroids and anticoagulants, pacemaker lead design and placement, and also patient age, sex, and body habitus. The identification of lead perforation may be initially suggested by a chest X-ray, although additional information with chest CT is now emerging as a useful adjunctive tool by virtue of its three-dimensional isotropic imaging capabilities.

The current case firstly demonstrates the multimodality imaging findings of RV ICD lead perforation and secondly the clinical utility of chest CT to confirm not only the presence, but also the precise anatomical point of pacing lead perforation.

(A) Chest X-ray demonstrating protrusion of the ICD lead tip (closed arrow) extension beyond the pericardium (open arrow). (B) Transthoracic echocardiogram (parasternal short-axis view) showing the ICD lead tip extending anteriorly beyond the pericardium with the ICD lead tip (arrow) visualized anteriorly. (C) Curved multi-planar reformatted CT image demonstrating the extension of the pacing lead perforation beyond the pericardium and up to the anterior chest wall. (D) Volume rendered 3D chest CT image demonstrating the site and extent of the RV lead perforation. Ao, aorta; RV, right ventricle, and LV, left ventricle.

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