



First use of a rotating mechanical dilator sheath to extract an epicardial defibrillator lead from the pericardial space

Vishal S. Mehta ^{1,2*}, Mark K. Elliott^{1,2}, William Regan³, Jonathan M. Behar¹, Eric Rosenthal³, and Christopher A. Rinaldi ^{1,2}

¹Department of Cardiology, Guy's and St Thomas' NHS Foundation Trust, London, UK; ²School of Biomedical Engineering and Imaging Sciences, St Thomas' Hospital, King's College London, London SE1 7EH, UK; and ³Department of Paediatric Cardiology, Evelina London Children's Hospital, London, UK

*Corresponding author. E-mail address: vishal.mehta@kcl.ac.uk

A 39-year-old male presented with a device infection. A secondary prevention transvenous implantable cardioverter defibrillator (ICD) was implanted when the patient was 14 years old following ventricular fibrillation.

Transvenous systems were complicated by high defibrillation thresholds and repeated extractions of failing leads. When his fourth system failed 20 years later, rather than a

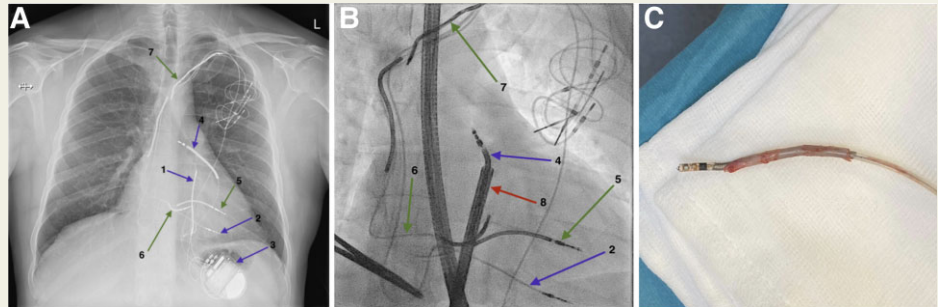
further extraction, he had a subcutaneous ICD (Emblem, Boston Scientific, Marlborough, MA, USA) implanted. This was complicated by persistent myopotential sensing so a decision was made to implant a new system. After a percutaneous subxiphoid puncture, an epicardial system with a single-coil transvenous lead (Sprint Quatro, Medtronic, MN, USA) was placed in the posterior pericardium and attached to the atrial epicardium, a single coil (Transvene, Medtronic, MN, USA) placed subcutaneously and parasternally, and a Capsurefix 5076 (Medtronic, MN, USA) pace-sense lead placed via a subclavian puncture, were all tunnelled to a new generator (Évrea, Medtronic, MN, USA) in a subrectus pocket.

Two years later, positron emission tomography (PET)/computed tomography (CT) imaging confirmed infection of the abdominal generator with extension to the proximal portions of the pericardial shock lead and transvenous lead (*Panel A*). A decision was made to perform a staged extraction, with the initial removal of the infected material as identified on PET-CT, with further extraction of the remaining transvenous material later.

To avoid a sternotomy, the infected leads were explanted in a hybrid operating theatre using a minimally invasive approach alongside the cardiothoracic team. A subxiphoid incision was performed and the generator removed. The parasternal coil and endocardial pacing lead were removed by manual traction. Blunt dissection enabled direct visualization of the pericardial space and the pericardial lead was inspected using a Convergent introducer sheath (Atricure, West Chester, OH, USA) and thoracoscope. The tip was not visualized due to adhesions within the pericardial space. Manual traction alone failed to remove the lead. A rotating dilator sheath (13F 545-513 Tightrail, Spectranetics, CO, USA) under direct visualization was used to successfully extract the pericardial lead (*Videos S1–S3*) with evidence of dense fibrous adhesions around the distal coil (*Panel C*). There was no evidence of peri- or myocardial trauma. The patient had an extraction of the two remaining ICD leads in the right ventricular apex and Coronary Sinus (CS), with some fragments remaining in the brachiocephalic vein, and successful implantation of a new transvenous ICD device (see [Supplementary material online, Figure S1](#)).

This is the first description of an epicardial shock lead extracted with a rotating mechanical cutting tool. Direct visualization with a thoracoscope allowed removal of this lead using a Tightrail sheath without complication, whilst avoiding a more invasive sternotomy, mini-thoractomy, or thoracoscopy. As this was a complex case with an off-label use of the Tightrail sheath, this should be performed in high-risk settings, such as the hybrid operating theatre, with cardiothoracic support. Although the ICD lead had only been *in situ* in the pericardium for 2 years, dense adhesions prevented removal with manual traction, demonstrating the risk of encapsulation even with shorter lead dwell periods.¹ This is particularly important in the paediatric and younger adult population who are more likely to have epicardial leads.²

This case highlights the utility of specialized extraction tools for the removal of leads in the pericardial space, thereby preventing the need for sternotomy and avoiding myocardial or coronary artery injury.



Supplementary material

Supplementary material is available at *Europace* online.

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