

## EP CASE REPORT

# Successful percutaneous lead extraction 15 years after a failed extraction attempt

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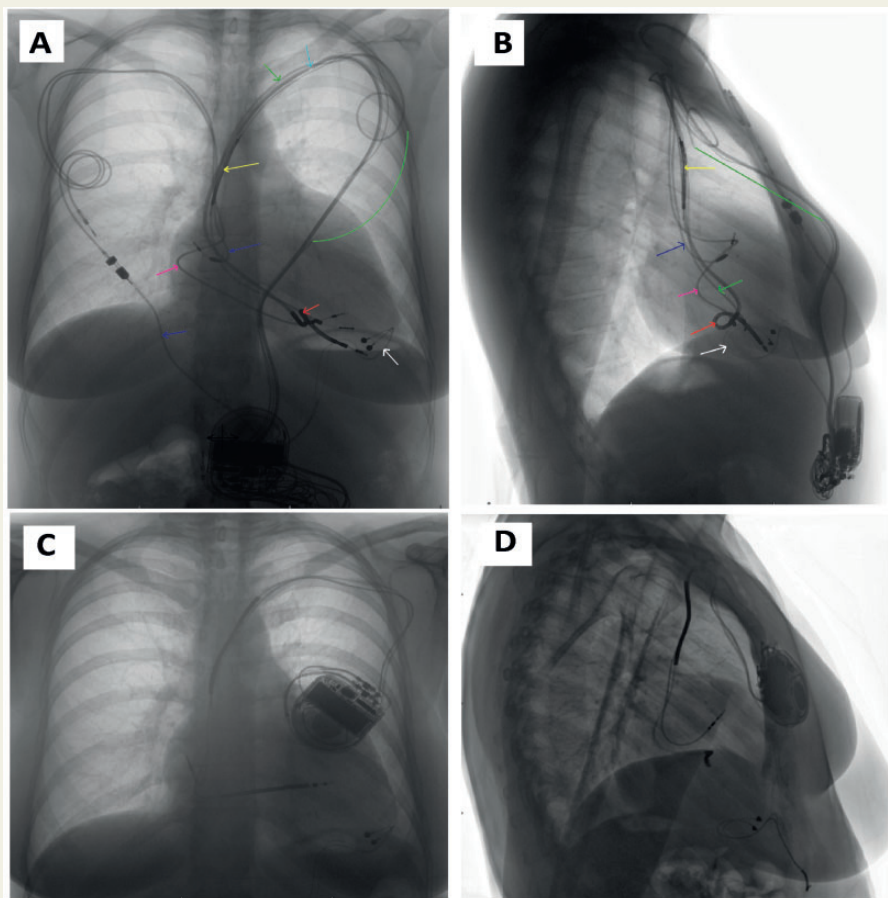
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### Case report

A 50-year-old woman developed increased impedance on the high-voltage component of her dual chamber implantable cardioverter-defibrillator (ICD). She was referred for a complete system extraction because of multiple redundant leads and suboptimal performance of all of the leads in use. Her initial ICD implantation for ventricular tachycardia and arrhythmogenic right ventricular cardiomyopathy had been performed at 26 years of age. A single coil lead had been placed in the right ventricle via the left cephalic vein and the generator implanted in an abdominal pocket. After a failed defibrillation test, a superior vena cava (SVC) coil was added during the same procedure. At 1 week after implantation, the ventricular sensing deteriorated, so a right ventricular pacing and sensing lead was inserted via the left subclavian vein and tunneled to the abdominal pocket.

At 29 years of age, the patient developed symptomatic sinus bradycardia. As the ICDs then available were not capable of dual chamber pacing, a separate dual chamber pacing system was implanted in a right pectoral position, the leads entering the subclavian vein. The threshold on the ventricular lead of this system increased progressively so at ICD generator substitution 5 years later, this lead was abandoned, and the atrial lead of this system was tunneled to the abdominal pocket where a dual chamber ICD was implanted. The following year the ventricular threshold on this also became unmanageable. After a failed attempt to extract the



**Figure 1** Radiograph of chest and upper abdomen in posteroanterior and lateral projections before the extraction (A and B; respectively) and after the extraction and left sided ICD reimplantation (C and D; respectively). (A and B) The pre-procedure radiograph shows the right-sided atrial lead (blue arrow), left-sided ICD lead (red arrow), epicardial pacing lead (white arrow), and left-sided SVC coil (yellow arrow), all connected to abdominal ICD generator. There is damage to the ICD lead (cyan arrow). The left-sided ventricular pacing lead (green arrow) had been disrupted (green arch) during the previous extraction attempt. The right-sided ventricular pacing lead (magenta arrow) had been capped and buried.

pacingsensing lead from the left side using a locking stylet and a powered sheath (Perfecta Electrodiathermy System, Cook Medical, Bloomington, IN, USA), this lead was abandoned and an epicardial pacing lead was added using a sub-xiphoid incision.

At the time of successful extraction, the patient had five endovascular leads including the coil. The epicardial lead was found to have disrupted insulation so was cut before being capped and abandoned, sutured to the floor of the abdominal pocket. The left side pace-sense lead was found to contain a locking stylet; the lead was extracted using a lead extender (Bulldog, Cook Medical) and rotational dissecting sheath (9F, then 11F shortie bidirectional Evolution followed by 11F 1st-generation Evolution Cook Medical). All other leads were extracted ([Supplementary material online, Video S1](#)) using a combination of the same Evolution sheaths with locking stylets (Liberator Beacon Tip, Cook Medical) and compression coils (One-Tie, Cook Medical). The access route left by extracting the defibrillation lead was used to implant a new dual coil lead and an atrial pacing lead ([Figure 1C and D](#)) which continue to function satisfactorily at 9 months. No complication occurred and echocardiography at 9 months post-procedure shows only moderate tricuspid regurgitation, unaltered from before extraction; no symptomatic venous obstruction has occurred.

## Discussion and conclusions

This case illustrates the improvements in lead extraction equipment and techniques in the past decade.<sup>1</sup> In the past, many centres struggled to achieve high rates of success with mechanical techniques and had to resort to the use of laser sheaths with their attendant risk of lethal SVC injury. With current mechanical tools, complete success can be achieved even in exceptionally difficult cases.<sup>2</sup>

## Supplementary material

[Supplementary material](#) is available at *Europace* online.

**Conflict of interest:** MG has acted as a consultant for, and has received research funding from Medtronic and Johnson and Johnson.

## References

1. Domenichini G, Gonna H, Sharma R, Conti S, Fiorista L, Jones S *et al*. Non-laser extraction of pacemaker and ICD leads: a decade of progress. *Europace* 2017;**19**:1521–6.
2. Gonna H, Domenichini G, Gallagher MM. Successful transvenous lead extraction after a failed open surgical attempt. *Europace* 2016;**18**:130.