At the first follow-up consultation, interrogation of the device revealed an asymptomatic episode of non-sustained ventricular fibrillation (VF) lasting 5 s occurring during recreational exertion, while the patient was still on levetiracetam, and preceded by an increase in heart rate and ventricular bigeminy. The patient was then treated by quinidine before receiving an implantable cardioverter defibrillator (ICD).

Although idiopathic VF episodes have been documented using loop recorders, to the best of our knowledge, this is the first reported documentation of spontaneous VF by a loop recorder in a patient implanted for syncopes associated with an ECG pattern of ER. This case highlights the need for careful and long-term monitoring for such patients, particularly in case of syncope of unknown origin and/or familial case(s) of unexplained sudden cardiac death. The ECG pattern presented here is an additional reason for such a strict monitoring, while ICD implantation as a first choice therapy for ER cannot be currently recommended. The prevalence of ER pattern is high in the normal population[2,3] and risk stratification in this setting remains problematic. Recently, the presence of horizontal or descending ST segment in the inferior or lateral leads has been shown to be associated with arrhythmic death in patients with ER,[2] while fragmented QRS complexes have been correlated to malignant ventricular arrhythmic events in patients with early repolarization.[4]

Conflict of interest: none declared.

References

1. Corrado D, Pelliccia A, Heidbuchel H, Sharma S, Link M, Basso C *et al.* Recommendations for interpretation of 12-lead electrocardiogram in the athlete. *Eur Heart J* 2010; **31**:243–59.
2. Tikkanen JT, Anttonen O, Junttila MJ, Aro AL, Luttinen S, Kerola T *et al.* Early repolarization: electrocardiographic phenotypes associated with favourable long-term outcome. *Circulation* 2011;**123**:2666–73.
3. Haïssaguerre M, Derval N, Sacher F, Jesel L, Deisenhofer I, de Roy L *et al.* Sudden cardiac arrest associated with early repolarization. *N Engl J Med* 2008;**358**:2016–23.
4. Liu X, Hocini M, Derval N, Shah A, Myiazaki S, Jadidi A *et al.* Fragmented QRS complexes as a predictor of ventricular arrhythmic events in patients with idiopathic ventricular fibrillation and early repolarization (abstract). *Heart Rhythm* 2010;**7**,S175:P02–P120.

CASE REPORT

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A modified subcutaneous implantable cardioverter–defibrillator implant in a patient with a previous left ventricular epicardial defibrillation patch

Paresh A. Mehta*, Julian Bostock, and Christopher A. Rinaldi

Guys and St Thomas' Hospital Foundation NHS Trust, Westminster Bridge Road, London, SE1 7EH, UK

* Corresponding author. Tel: +447825908885; fax: +447825908885, Email: Paresh.Mehta@gstt.nhs.uk

We describe a case of subcutaneous implantable cardioverter–defibrillator (ICD) implant in a patient with an existing epicardial defibrillation patch. Potential issues with shock vector shielding were overcome by a modification of the generator implant site and poor sensing were successfully managed by programming a sensing vector which excluded the generator.

Case

A 46-year-old woman with arrhythmogenic right ventricular (RV) cardiomyopathy and prior ventricular fibrillation (VF) arrest underwent implantation of a left pectoral endocardial implantable cardioverter–defibrillator (ICD) in 1998. This was complicated by device-related infection requiring system extraction. Surgical implantation of an abdominal ICD with epicardial atrial and right ventricular pace/sense leads and a single left ventricular (LV) epicardial defibrillation patch to the lateral wall of the LV was performed [Guidant CPI (UK) A76]. Subsequently, a fracture of the RV lead occurred, which was capped, and an endocardial RV pace/sense lead was placed via the right subclavian vein and tunnelled to the abdominal generator. Further ICD generator changes occurred in 2004 and 2010. A routine ICD check in 2011 demonstrated a significant increase in defibrillation patch impedance from 68 to $>200\ \Omega$ and electrical noise on the 'far-field' patch-can electrogram during provocation testing. Impedance trends demonstrated the rise had occurred 1 month after the last generator change. These indicated a conductor break in the ICD shock circuit. Surgical exploration found no visible fault with the lead connections and the leads were capped and generator was removed.

As a consequence of previous endocardial device infection and absence of a pacing indication, we elected to implant a subcutaneous ICD (S-ICD) (Cameron Health SQ RX 1010)[1] with a tunnelled S-ICD lead (Cameron Health QTRAK 3010) (*Figure 1*). This device has three available sensing vectors: 'Primary' vector from the proximal parasternal sensing electrode to device, 'Secondary' vector from the distal parasternal sensing electrode to device, and 'Alternate' vector from distal to proximal parasternal electrode ('cold-can'). A pre-procedure sensing check using a patient screening tool (Cameron Health) was satisfactory in all vectors. There was a concern regarding electrical shielding of the S-ICD shock vector by the existing epicardial defibrillation patch. We therefore opted to position the generator in a lower-than-customary left lateral position (eighth intercostal space mid-axillary line) for the shock vector to avoid

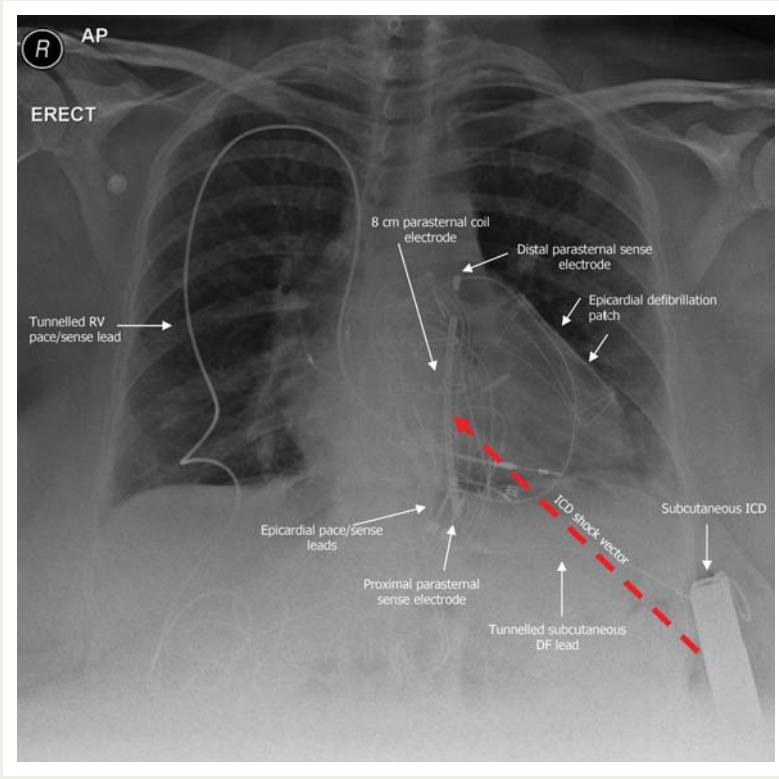

Figure 1 Subcutaneous ICD implant in a low left lateral position in a patient with a left ventricular epicardial defibrillation patch.

the existing defibrillation patch. VF induction (using 50 Hz burst pacing) was successful at the first attempt with a 65 J ICD shock in the 'primary' sense vector position.

Within a day of implant she suffered two inappropriate shocks and interrogation showed poor R wave sensing, followed by sensing of baseline noise as tachycardia. On re-testing using the patient screening tool, a low-amplitude R wave was found in the 'Primary' vector position. The 'Secondary' vector had a larger R wave but unacceptably large amplitude T waves. The 'Alternate' vector had acceptable R wave amplitude with smaller T waves. The device was reprogrammed to this 'Alternate' (cold-can) vector removing the device from the sensing circuit with no further inappropriate therapy.

The optimal S-ICD device configuration has been demonstrated to be a parasternal-positioned electrode and left lateral thoracic pulse generator[1] although numerous configurations have been modelled.[2] There is an interplay between a successful shock vector across the left chest between the can and parasternal coil and the most appropriate sensing vector as two of the three possible sensing vectors include the device can. To our knowledge this is the first-reported case of S-ICD implant in a patient with an existing LV epicardial defibrillation patch. In this case the shock vector was unconventional due to the low left lateral position of S-ICD to avoid potential shielding from the epicardial patch. This case highlights two important issues. First, the ability to overcome the potential risk of electrical shielding by placing the generator in a lower position and, secondly, the resulting sensing problems in such a case, which were overcome by programming a sensing vector which excluded the generator.

Conflict of interest: none declared.

References

1. Bardy GH, Smith WM, Hood MA, Crozier IG, Melton IC, Jordaens L *et al.* An entirely subcutaneous implantable cardioverter–defibrillator. *N Engl J Med* 2010;**363**:36–44.
2. Jolley M, Stinstra J, Tate J, Pieper S, Macleod R, Chu L *et al.* Finite element modeling of subcutaneous implantable defibrillator electrodes in an adult torso. *Heart Rhythm* 2010;**7**:692–8.