

IMAGES IN ELECTROPHYSIOLOGY

Subcutaneous Implantable Cardioverter-Defibrillator and Left Ventricular Assist Device



A Safe and Effective Approach for Refractory Heart Failure

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A 57-year-old man with dilated cardiomyopathy underwent single-chamber implantable cardioverter-defibrillator (ICD) implantation for primary prevention in March 2008. Because of device infection, mechanical lead extraction was performed without complications in April 2011. Subsequently, we decided to implant a subcutaneous ICD (S-ICD) (SQ-RX 1010-A, Cameron Health, Bromham, Bedfordshire, United Kingdom). At implantation, a satisfactory position of the subcutaneous lead was achieved, with appropriate sensing in all 3 vectors, and ventricular fibrillation was induced and successfully terminated by a 65-J shock (15-J safety margin). A shock zone ≥ 240 beats/min and a conditional shock zone ≥ 180 beats/min was programmed.

In April 2015, the patient underwent left ventricular assist device (Jarvik 2000, Jarvik Heart, New York, New York) as a bridge to heart transplantation for refractory heart failure. Chest radiograph after implantation confirmed the correct position of the S-ICD and its correlation with the Jarvik 2000 (Figure 1A). There was no interference in sensing or shock delivery from the S-ICD both in the supine and sitting posture, after he had awakened and sensing was appropriate in all 3 vectors. The system chose the alternate vector (Figure 1B). One month later, an episode of ventricular fibrillation with very low amplitude waves was correctly detected and treated, although only a few waves were under sensed and discarded by the S-ICD algorithms (Certification and Decision Phase).

The 80-J full charge was accomplished after 19 seconds. After 6 months of follow-up the patient was asymptomatic, the incisions healed well, and both devices were functioning normally. At device interrogation, we found stable sensing without interferences and an episode of polymorphic ventricular tachycardia self-terminated correctly detected.

The precise clinical role of S-ICD in patients with left ventricular assist device is not well established because of the paucity of data about the risk of interference leading to inappropriate shocks and the lack of data about the efficacy for the termination of spontaneous ventricular arrhythmias. Our report demonstrates that S-ICD is a safe and effective alternative to conventional ICD in terminating ventricular arrhythmias without evidence of mechanical interferences.

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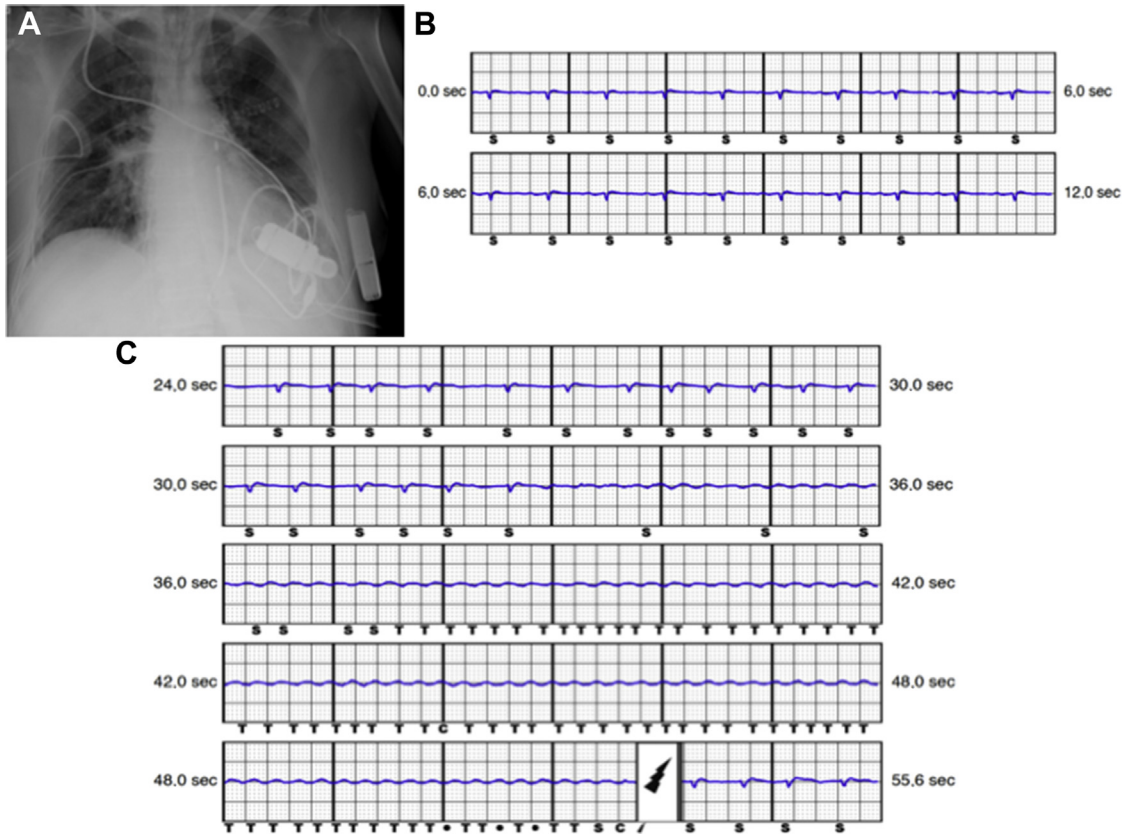
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KEY WORDS lead extraction, lead infection, left ventricular assist device, subcutaneous implantable cardioverter-defibrillator, ventricular arrhythmias

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FIGURE 1 Left Ventricular Assist Device and Subcutaneous Implantable Cardioverter-Defibrillator



(A) Chest radiograph illustrating the Jarvik 2000 left ventricular assist device and subcutaneous implantable cardioverter-defibrillator in situ (posteroanterior view). (B) Electrogram recorded by the subcutaneous implantable cardioverter-defibrillator after left ventricular assist device implantation showing appropriate sensing without any noise in the alternate vector (tip electrode to ring electrode). (C) Electrogram showing an episode of ventricular fibrillation with very low amplitude waves correctly detected and treated. The device initiated tachycardia detection (T) and started the capacitor charging (first C). The 80-J full charge was accomplished after 19 s (second C). Of note, only a few beats were discarded (marked with a dot) by the subcutaneous implantable cardioverter-defibrillator algorithms.