

documented cause of infarction¹ in conventional coronary artery fistulas, although our patient had angina, not infarction. It is also important to stress the accuracy of multidetector CT in precisely defining the abnormal origin and path of the anomalous coronary arteries and their relationship with other structures,⁶ because it is sometimes difficult to visualize the course of the coronary arteries though conventional coronary angiography. CT can be considered the diagnostic method of choice in cases of clinical angina that are not explained by coronary artery lesions and which could be secondary to congenital abnormalities of the coronary artery. Nevertheless, we consider the use of coronary angiography to be appropriate because, in addition to confirming the diagnosis of a fistula, this technique provides complementary information about its connections, the bidirectional nature of the flow, and the coexistence of other tracts that escape the spatial resolution of CT, either due to their reduced diameter or to their omission from the sample volume imaged.

The use of image-based ischemia detection, whose usefulness would probably have been enhanced by the administration of vasodilator stress agents, could also have provided useful information on the presence of ischemia and its location and severity.

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Totally Subcutaneous ICD Implantation as an Alternative to the Conventional ICD in a Patient With a Congenital Cardiopathy

Implante de un DAI completamente subcutáneo como alternativa al DAI convencional en un paciente con una cardiopatía congénita

To the Editor:

Implantable cardioverter-defibrillators (ICD) are the standard treatment to prevent sudden death from ventricular arrhythmias.¹ Traditional devices require vascular access for electrode implantation, with the consequent risk of complications such as electrode dislodgement or fracture, thrombosis, or infection.^{2,3} However, vascular access can prove difficult or even impossible in certain patients, such as those with certain congenital conditions that limit the use of traditional devices.

The subcutaneous ICD (S-ICD, Cameron Health, San Clemente, California, USA) avoids the need for intracardiac electrode implantation, facilitates the removal procedure, and does not require fluoroscopic guidance.

We present the clinical case of a man aged 32 years with a single-ventricle congenital heart disease, with transposition of the great arteries, atrial septal defect, and pulmonary stenosis. In 1998 he underwent a De Leval right subclavian pulmonary fistula⁴ and, in July 2001, complete cavopulmonary shunt and closure of the fistula.

Since 2009 he had experienced several sudden episodes of syncope. Echocardiography revealed a dilated left ventricle with very depressed systolic function (30% ejection fraction) and right ventricular hypoplasia. The aorta was dilated, with wide interventricular septal defect override and substantial pulmonary artery hypoplasia. We found no flow through the valve but did observe distal venous flow proceeding from the bidirectional cavopulmonary shunt.

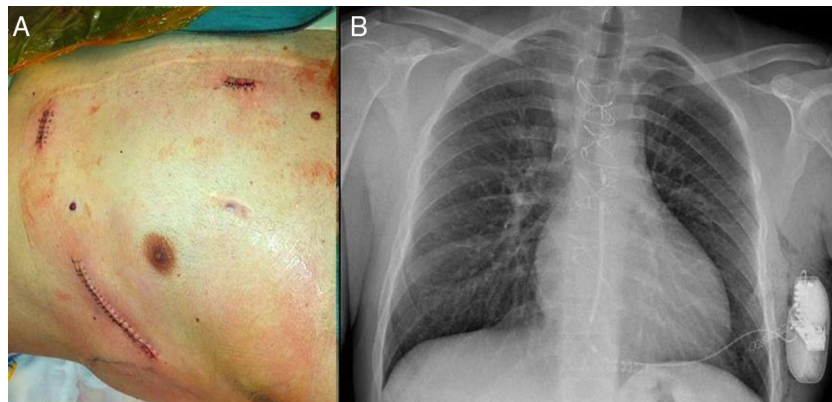


Figure 1. View of the patient's chest after implantation of the automatic subcutaneous implantable device (A) and anteroposterior X-ray at 24 h post-implantation (B).

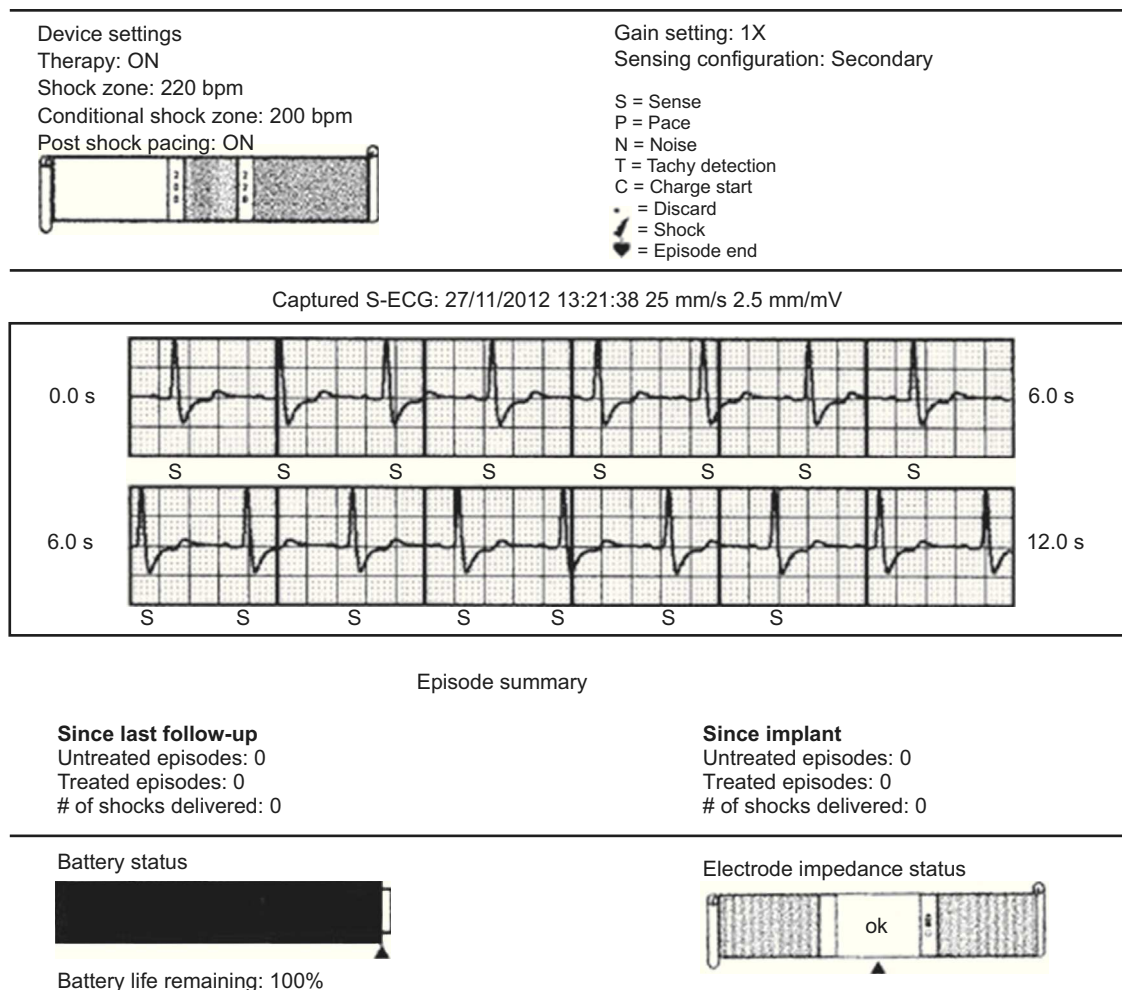


Figure 2. Device interrogation and programming parameters. S-ECG, subcutaneous electrocardiogram.

In 2009 the patient underwent electrophysiologic study of the systemic ventricle by retrograde arterial access. Sustained ventricular arrhythmias were not induced nor were conduction abnormalities observed. A subcutaneous episode recorder was implanted, which later detected nonsustained ventricular tachycardias coinciding with presyncopal episodes.

Given the high risk of sudden death in this patient (class IIa indication for ICD therapy) and the fact that transvenous electrode implantation was impossible, it was decided to implant a subcutaneous ICD.

With local anesthesia and conscious sedation, an incision was made at the level of the xiphoid process and left midaxillary region (fifth left intercostal space, a location that has proved the most efficacious in previous studies⁴), after which we dissected by planes and constructed the pocket to deploy the generator. We then advanced the electrode until reaching the incision in the xiphoid process, and fixed it to the fascia. Next, taking the distal tip of the electrode as a reference, we made a third incision at this level, 1 cm to the left of the midsternal line. We introduced the electrode and fixed the distal tip to the fascia. Finally, we connected the generator to the electrode, fixed it to the muscle plane, and then sutured by plane (Fig. 1).

At the end of the procedure, we performed a defibrillation test. To do so, we defined a zone at 170 bpm and programmed a 65 J shock.

After three induction attempts with alternating current, we induced only one correctly-sensed nonsustained ventricular tachycardia. Finally, given that inducing sustained ventricular fibrillation was impossible, we opted for the conventional polarity configuration, which can revert episodes of induced ventricular fibrillation in 93% of patients⁵ and administered a 10 J manual shock. We programmed a conditional therapy zone at 200 bpm and the therapy zone at 220 bpm (Fig. 2).

At 2 months follow-up, the patient has presented no complications and no significant events have been recorded.

The subcutaneous ICD can be the only alternative available to prevent sudden death in patients with complications derived from transvenous electrodes, venous occlusion, and anatomic abnormalities that prevent vascular access. One recent multicenter study⁶ shows the efficacy and safety of the subcutaneous ICD by comparison with conventional ICDs, and a current randomized multicenter study will enable us to compare both devices.

The disadvantages of the subcutaneous ICD include its slightly larger size and the fact that it does not facilitate anti-bradycardia stimulation or anti-tachycardia overstimulation therapy. At the time of writing (February 2013), the subcutaneous ICD is not yet commercially available for extensive use in Spain.

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