

CASE REPORT

Subcutaneous defibrillator implantation as a bridge until left ventricular function normalizes

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Case Report

The abuse of recreational drugs is known to cause adverse effects on the heart. These include various cardiovascular complications, such as myocarditis, dilated cardiomyopathy, heart failure, and sudden cardiac death [1]. Some of these effects may be either permanent or transient, depending mostly on patient compliance and the duration of illicit drug use. However, the arrhythmic risk might be increased only temporarily; that is, as long as the proarrhythmic conditions persist, left ventricular ejection fraction (LVEF) remains low, or heart failure prevails. This raises the question of the appropriateness of implantable cardioverter–defibrillator (ICD) implantation when the indication for a defibrillation device is not maintained over time and there is uncertainty regarding patient compliance.

We present the case of a young man, a habitual user of recreational cocaine and alcohol, who was referred to our hospital for symptomatic dyspnea. Diagnostic examination revealed a very low LVEF (<15%) on

Key Clinical Message

Patients with reversible cardiac impairment may be, at least temporarily, at high risk of SCD and may go unprotected for considerable time. A less-invasive definitive or bridge solution is the implantation of a subcutaneous cardioverter–defibrillator (S-ICD). The less invasiveness of this procedure ensures easy removal of the system without exposing the patient to the risk of complications.

Keywords

Recreational substance abuse, reversible cardiac impairment, S-ICD, sudden cardiac death.

echocardiography, which was confirmed on cardiac magnetic resonance imaging, with no sign of scarring. Coronary angiography did not reveal significant stenosis. Hypothesizing reversible cardiac impairment due to drug abuse or myocarditis of unknown origin, we decided to implant a subcutaneous cardioverter–defibrillator (S-ICD). The patient stopped using cocaine and alcohol, and his LVEF normalized over time. After about 2 years, the patient suffered a thoracic trauma. The patient presented a thoracic lesion, with pocket erosion and slight exposure of the device can, which subsequently became infected. We performed a curative strategy that included a first aid of the pocket, a generator evaluation (including a system functioning and diagnostic evaluation) and an antimicrobial administration. We re-evaluated the cardiac function by echocardiography and cardiac stress test in order to verify the absence of any residual risk of SCD (on the basis of ICD guidelines), and we have also verified a full patient's recovery from any alcohol or drug abuse through blood test and the completion of a proper detoxification path. We proposed to the patient a solution that

included the explant of S-ICD device and we verified his understanding and his preference for the entire removal of the device. Considering the improvement in LV function and the absence of arrhythmic episodes, we decided to explant the device without re-implantation. The procedure was easily performed without complications. A year later, the patient remained free from any indication for defibrillator implantation.

Patients with reversible cardiac impairment may be, at least temporarily, at high risk of SCD and may go unprotected for considerable time [2]. The invasive nature of the ICD implantation procedure, the potential complications related to an intravascular system, and the hypothesis that cardiac function will be resumed could make the S-ICD a new prophylactic strategy for patients who are at significant risk of VT/VF and do not have a definite course from temporary-to-permanent ICD indication. Current ESC guidelines suggest that patients on the waiting list for heart transplantation or ICD implantation, those with peripartum cardiomyopathy, active myocarditis, or severe early postinfarction arrhythmias should be potential candidates for a wearable cardioverter-defibrillator (WCD) [3]. Similarly, a temporary ICD should be advised when the definitive indication for an ICD is not yet established or when ICD implantation needs to be deferred in patients with surgical contraindication (e.g., infection, vascular obstruction, treatable comorbidities) [3].

Given that the WCD may be an appropriate “bridge therapy” for the primary prevention of SCD in patients with newly diagnosed and potentially reversible cardiomyopathy during the early period after initial diagnosis, the question of how long a prespecified appropriate “bridge period” should be remains unanswered. How long does the protection period need to be in order to consider a patient free from arrhythmic risk if no therapy is delivered and LVEF has normalized? This aspect is particularly important when we are not able to completely discern the cause of cardiac impairment.

Notably, the first major obstacle to the use of the WCD is its very high cost [2], particularly when the device remains in service for a long time. Moreover, in a study by Opreanu *et al.* [4], the main reason for WCD end of use was definitive ICD implantation, and only in 17% of cases did LVEF improve. This leads to an additional, nonrefundable, cost of this therapy. In addition, patient compliance remains a major concern. Indeed, a recent European survey showed that only half of the centers involved reported acceptable patient compliance rates [2]. This must be considered in the case of fragile patients.

In our case, we were not able to definitely diagnose the cause of cardiac impairment at the time of implantation;

the patient’s compliance was uncertain and the time frame of possible LVEF improvement was undefined. For these reasons, we decided for a less-invasive definitive solution, that is implantation of an S-ICD. The patient’s LVEF improved over time and he definitively lost any indication for ICD implantation.

The S-ICD is now an established alternative to a transvenous defibrillator for the prevention of SCD, particularly when access to the heart via the vascular system is difficult, in young patients with a long-term need for ICD therapy and after device-related infections [3, 5-6]. The less invasiveness of the S-ICD ensures easy removal of the entire system with a reduced risk in extracting this device, compared to an intravascular ICD, even in the case of concomitant trauma or infection. It may also be a useful solution in patients who are at high risk of ventricular arrhythmia and need temporary-to-permanent protection from SCD.

Authorship

SDB, AB, and GSP: provided cardiology supervision during implantation and follow-up and drafted the manuscript. LC, CC, and MM: provided technical data from S-ICD device functioning, reviewed the literature and critically reviewed the manuscript. GB: provided additional supervision and critically reviewed the manuscript. All authors: read and approved the final manuscript.

Conflicts of Interest

L. C., C. F., and M. M. are Boston Scientific employees; no other conflicts of interest exist.

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