Fitness, body weight loss and inappropriate shocks of subcutaneous-implantable cardioverter-defibrillator – a case report.

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Abstract

The subcutaneous implantable cardioverter-defibrillator (S-ICD) is a well-established method for the prevention of sudden cardiac arrest and an alternative to the transvenous implantable cardioverter-defibrillator (TV-ICD). It is preferred mainly for young patients with long life expectancy, high risk of transvenous lead complications or history of previous endocarditis, or device infections. For both S-ICD and TV-ICD, inappropriate therapies are possible. For S-ICD, the most common cause of inappropriate shocks is T wave oversensing (TWOS), while in TV-ICD – supraventricular tachycardia. We present the case of a 38-year-old patient who reported a shock during physical exercise - crunches.

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Short title: S-ICD: inappropriate shock.

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Abstract

The subcutaneous implantable cardioverter-defibrillator (S-ICD) is a well-established method for the prevention of sudden cardiac arrest and an alternative to the transvenous implantable cardioverter-defibrillator

(TV-ICD). It is preferred mainly for young patients with long life expectancy, high risk of transvenous lead complications or history of previous endocarditis, or device infections. For both S-ICD and TV-ICD, inappropriate therapies are possible. For S-ICD, the most common cause of inappropriate shocks is T wave oversensing (TWOS), while in TV-ICD – supraventricular tachycardia. We present the case of a 38-year-old patient who reported a shock during physical exercise - crunches.

Indroduction

The S-ICD is an established therapy for prevention of sudden cardiac death and an alternative to TV-ICD in selected patients. These types of devices are especially recommended for young patients with long life expectancy, lack of venous access for TV-ICD implantation or high risk associated with leads or history of previous endocarditis or device infections. The first S-ICDs were introduced in 2009. Since then, improvements have been made to reduce the device's size, increase battery life and upgrade detection algorithms to prevent inappropriate shocks (1). The rate of inadequate shocks ranges from 4 to 25%, and it's similar to a TV-ICD – 20-30%. However, the mechanism is different. For S-ICD, up to 80% is caused by TWOS, particularly in selected patient populations (i.e. congenital heart disease, Brugada and long QT syndrome). In intravenous devices, TWOS presents up to 20% of cases (2-5). In the case of high risk of TWOS, it is worth considering performing an exercise test after the implantation to properly program the sensory vector (6). Changing the sensitivity of the device and sensing vector often helps to solve the problem (7). In addition, about 5 to 10% of the inappropriate shocks can be caused by noise related to myopotential oversensing (4). For an TV-ICD, the most common cause of inappropriate discharges is supraventricular tachycardia (8).

Case reports

A 38-year-old man with implanted S-ICD, visited the ambulatory clinic of implantable devices due to a shock of the device a few days earlier. The patient had a history of: implantation of S-ICD in secondary prevention (2017), dilated cardiomyopathy, chronic heart failure in NYHA II class, paroxysmal atrial fibrillation, pulmonary vein isolation (2019), obesity. Since cardiac arrest the patient has changed his lifestyle dramatically, started regular physical activity and lost about 20 kg. Being in good general condition, without signs of exacerbation of heart failure, a few days ago the patient had got a shock. The patient did not lose consciousness. There were no prodromal symptoms.

The current follow-up revealed an episode detected by the device as ventricular fibrillation and then a high-energy discharge. Shock zone was programmed from 220 bpm and conditional shock zone 200 bmp. Battery status was 64%. On the basis of the recording from the device it was difficult to clearly determine whether it was an artifact and an inappropriate shock (Figure 1). The patient admitted that he was doing physical exercise – sit ups when it was a shock. Therefore, a provocative test was performed in the laboratory. The patient was asked to lie down on the couch and perform exercises such as during the episode. The myopotential oversensing of the device during the exercise was confirmed (Figure 2). The patient was advised to avoid such and similar exercises.

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