"Life-saving" inappropriate implantable cardioverter-defibrillator shocks in a cancer patient

Piotr Futyma, MD[1,2], Marek Płoszczyca, MD[3], Ryszard Głuszczyk, MD[1], Jerzy Kuźniar, MD, PhD[1]

[1] Department of Cardiology, St. Queen Jadwiga District Hospital No. 2, Rzeszow, Poland
[2] Invasive Cardiology Department, St. Joseph's Heart Centre, Rzeszow, Poland
[3] Rev. Bronislaw Markiewicz Subcarpathian Oncology Centre, Brzozow, Poland

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ABSTRACT

Impaired left ventricular ejection fraction (LVEF) in patients with cancer can disqualify them from targeted antineoplastic treatment. We present the case of 63-year-old male with gastric cancer treated palliatively, with concomitant dilated cardiomyopathy, atrial fibrillation (AF) and after implantation of a cardioverter-defibrillator (ICD), in whom inappropriate ICD discharges caused unexpected return of sinus rhythm and significant LVEF improvement, what subsequently led to reclassification to targeted chemotherapy. In conclusion, unexpected return of sinus rhythm in cancer patients with AF and reduced LVEF may lead to LVEF recovery and enable the use of antineoplastic treatment with improved prognosis.

KEY WORDS: implantable cardioverter-defibrillator, inappropriate shocks, unexpected return of sinus rhythm

Correspondence:
Piotr Futyma, MD
St. Joseph's Heart Centre
35-623 Rzeszów, ul. Anny Jagiellonki 17
e-mail: piotr.futyma@gmail.com

INTRODUCTION

The use of an implantable cardioverter-defibrillator (ICD) is a recognized method for preventing sudden cardiac death (SCD) in patients with significantly reduced left ventricular ejection fraction (LVEF). ICDs sometimes deliver inappropriate shocks (IS), which are painful, reduce the patient's quality of life, and have adverse prognostic significance [1, 2]. We present a case of a patient in whom numerous ISs led to an improvement of clinical condition, causing significant changes to the further therapeutic decision-making process.

CASE DESCRIPTION

A 63-year-old patient with dilated cardiomyopathy and chronic NYHA class II heart failure, following implantation of a single-chamber ICD at a different centre as part of SCD primary prevention, suffering from an inoperable gastric cancer treated palliatively and disqualified from chemotherapy due to a significantly reduced LVEF, was admitted to the department of cardiology because of the numerous ISs in the course of permanent atrial fibrillation (AF) with accelerated ventricular rhythm. Immediately upon admission, due to recurrent ISs, amiodarone was administered intravenously at the total dose of 900 mg, in order to control the ventricular rhythm. ICD interrogation showed numerous ISs followed by the return of sinus rhythm (SR) (fig. 1). The ICD was reprogrammed, with the detection zone at 240 ms in order to prevent ISs reccurence. During further hospitalization, there was no AF or IS recurrence. A follow-up echocardiogram performed in stable sinus rhythm on day 5th of hospitalization (fig. 2), revealed a significant improvement of LVEF – up to 45% (tab. 1). As previously impaired LVEF was the main reason for the earlier disqualification from chemotherapy, the patient was referred for reconsultation on further oncological treatment. Three weeks later, further improvement of LVEF was observed (up to 50%), and the patient was initiated on chemotherapy with 5-fluorouracil and L-folinic acid. In 20-month follow-up no IS occurred, the patient has received 6 cycles of chemotherapy, and remains in a good general condition.

FIGURE 1.
ICD's intracardiac electrocardiogram. An inappropriate intervention in the course of rapid atrial fibrillation restores the sinus rhythm.

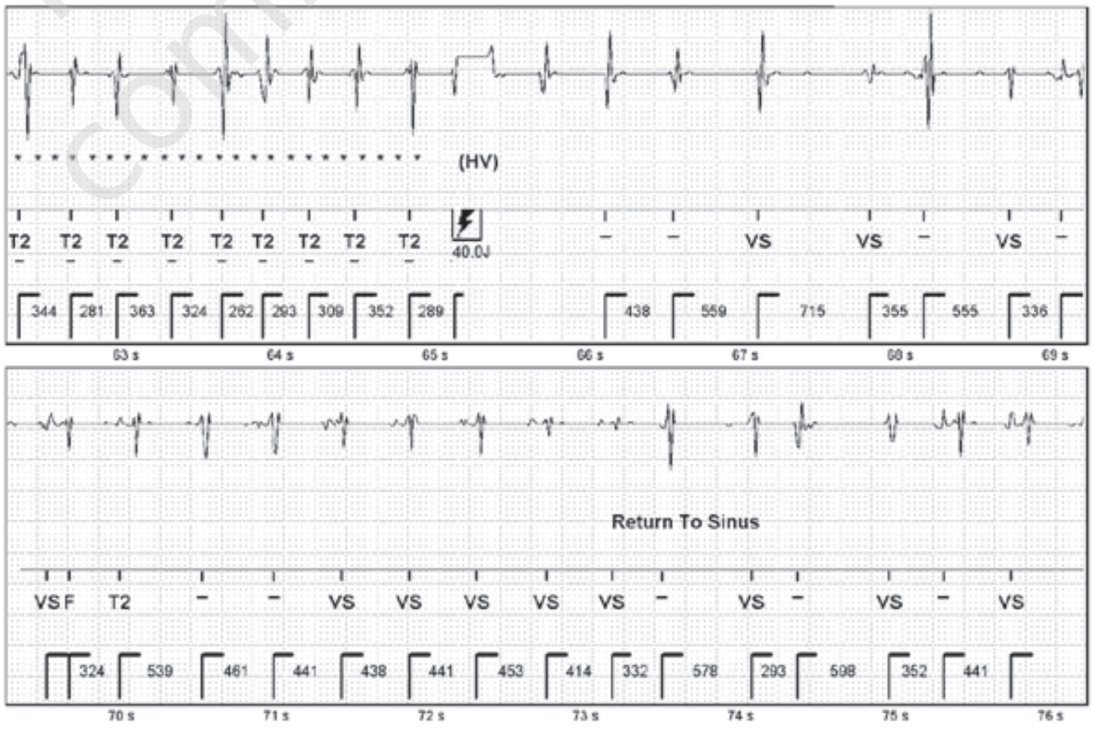

FIGURE 2.
Persistent regular sinus rhythm (5th day of hospitalization).

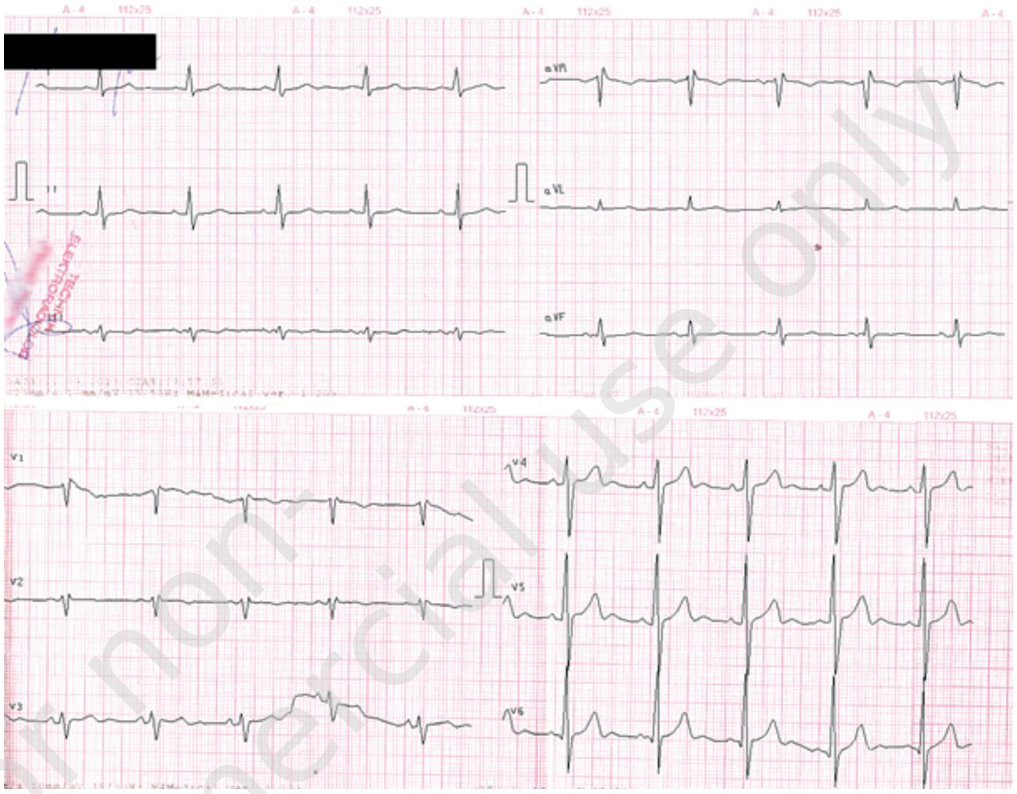

TABLE 1.
Comparison of selected echocardiography parameters during atrial fibrillation (at cardioverter-defibrillator implant) and during sinus rhythm (5 days after inappropriate shocks).

	AF	SR
LVEF (%)	30	45
LVEDd (mm)	74	67
LVESd (mm)	63	44
LA (mm)	50	41

AF – atrial fibrillation; LA – left atrium; LVEDd – left ventricular end-diastolic diameter; LVEF – left ventricle ejection fraction; LVESd – left ventricular end-systolic diameters; SR – sinus rhythm.

DISCUSSION

The most frequent cause of ISs is supraventricular tachyarrhythmia with high ventricular rates. The ICD device mistakenly recognizes it as a potentially dangerous ventricular arrhythmia and initiates treatment with anti-arrhythmic stimulation or electroshock. ISs involve a series of important consequences for the patient: are often associated with sensation of pain, reduce the device's battery life, leading to its earlier replacement . They may also lead to serious proarrhythmia, and are associated with adverse prognosis. However, ISs in patients with AF may lead to an unexpected return of the sinus rhythm. This phenomenon, apart from the risks related to the potentially unsuccessful antithrombotic treatment [1–4], may recover the systolic function of the left ventrice, with subsequent circulatory improvement, and significant clinical implications [5].

In the case of our patient, inappropriate shocks restored SR, and led to LVEF recovery, which was not immediately associated with an improvement of his general clinical condition, though. The mechanism was different: previously, the patient was disqualified from oncological treatment of gastric cancer because of the abnormal LVEF. Once the AF was managed, and sinus rhythm was restored, the improved LVEF led to a modified decision on further oncological therapy. Palliative treatment, aimed at an alleviation of the symptoms, with no chance of recovery, was replaced with chemotherapy, aimed at eradicating the disease, and thus associated with better prognosis.

One should also pay attention to the criteria based on which the patient had previously been qualified for ICD implantation. The available medical records and history-taking suggested that the patient had never undergone electrical cardioversion for AF in

the past. Such management is consistent with current guidelines, allowing AF to be considered as permanent, and ifrate control strategy is accepted [6]. One of the parameters which impacted the decision on classifying AF as permanent (apart from the LVEF), might have been the enlarged left atrium (LA) (tab. 1). On the other hand, a factor which was conducive to the return of SR during IS was intravenous administration of amiodarone for rate control [7]. Sinus rhythm caused an improvement in LVEF as well as LA reduction to the dimensions with rather good prognosis of sinus rhythm maintenance (tab. 1). LVEF rcovery in SR implies a tachyarrhythmic component of the presented cardiomyopathy. The previously reduced LVEF had an impact on ICD placement, and led to disqualification from a therapy offering a chance of recovery from the neoplastic disease. Following inappropriate ICD shocks, LVEF improved to a level that made it possible to initiate oncological treatment impacting the patient's prognosis.

This case demonstrates that in patients with impaired LVEF and concomitant AF cardioversion should be considered, even despite their relatively good tolerance of arrhythmia. Subsequently, in order to maintain the sinus rhythm, antiarrhythmic drugs may be administered or preventive ablation may be offered [6].

CONCLUSIONS

In patients with AF and an implanted ICD, inappropriate shocks may lead to the return of SR, and to an improvement of LVEF, which may be essential for further therapeutic decisions, not necessarily linked to the direct cardiovascular therapy.

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Piotr Futyma: 30%
Marek Płoszczyca: 20%
Ryszard Głuszczyk: 20%
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