CLINICAL VIGNETTE

Combined therapy with cardiac contractility modulation and subcutaneous implantable cardioverter-defibrillator: the first experience in Poland

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A 65-year-old woman with highly symptomatic (New York Heart Association [NYHA] class III/IV), non-ischaemic cardiomyopathy with severe systolic left ventricular dysfunction (left ventricular ejection fraction [LVEF] of 18%), and not fulfilling the criteria for cardiac resynchronisation therapy (CRT) underwent an implantation of a cardiac contractility modulator (CCM) (Model Optimizer IVs; Impulse Dynamics, Orangeburg, NY, USA) in October 2015. The device was placed typically in the right subclavian position. Three intracardiac leads were inserted via right axillary vein: one to the right atrium and two to the right ventricle (in low and medial septal positions). After the implantation, heart failure (HF) symptoms decreased significantly (to NYHA class II) and remained stable in the following two years; however, no important increase of LVEF was observed. Due to a considerable improvement of HF symptoms the patient rejected the proposal of implantable cardioverter-defibrillator (ICD) implantation. In June 2018 she was hospitalised due to HF symptom worsening (NYHA class III/IV). Comprehensive examinations did not reveal any correctable pathologies. After optimal functional recovery the patient was once again offered an ICD implantation, which she accepted this time. Because the patient had no indication for permanent pacing and there were already three leads in the superior vena cava, a totally subcutaneous ICD (S-ICD) was selected as an optimal treatment option. The patient successfully passed typical electrocardiographic screening for S-ICD sensing, with CCM pacing on and off, both in a horizontal and vertical positions. Implantation of the S-ICD (Model 1010 SQ-RX; Boston Scientific, Marlborough, MA, USA) was performed under general anaesthesia with a two-incision technique. Components of the S-ICD system were placed typically: a generator in the left lateral position over the fifth intercostal space and a defibrillation lead along the left parasternal line (Fig. 1). Periprocedural S-ICD programming with CCM pacing on was unsuccessful due to failure of the sensing configuration. After switching the CCM device off, successful programming was possible. Afterwards, S-ICD sensing was re-checked (with CCM pacing on and off) with excellent results. Eventually, a defibrillation threshold test was performed. The S-ICD successfully sensed and discriminated ventricular fibrillation and terminated the arrhythmia with 65-J shock (Fig. 2). The follow-up period was uneventful. CCM is a relatively new form of therapy dedicated to patients with symptomatic HF with reduced LVEF and QRS duration not fulfilling the criteria for CRT. Until now the device has required implantation of three electrodes and has not included functionality of cardiac pacing or defibrillation. As in the presented case, many patients referred for CCM implantation have LVEF ≤ 35%; therefore, implantation of an ICD is also indicated. S-ICD is an alternative to transvenous ICD in the prevention of sudden cardiac death in patients with no need for cardiac pacing or resynchronisation therapy [1]. S-ICD can be particularly useful in patients with no or complicated venous access because it does not require insertion of transvenous leads. In the presented case, implantation of another intracardiac lead for a transvenous ICD device would have increased the risk of electrode-related complications, such as central venous thrombosis, lead dysfunction, or infectious endocarditis. In the literature we can find few descriptions of single cases or small groups of patients treated with a combination of S-ICD and CCM [2, 3]. Recently the first study including long-term follow-up has been published by Röger et al. [4]. In a group of 20 patients, a total of six episodes of sustained ventricular tachycardia were observed, all successfully treated with the first S-ICD shock; no CCM-related inappropriate shocks were reported. Our case also suggests that the S-ICD may be considered as a potential and effective treatment option in patients with a previously implanted CCM device.

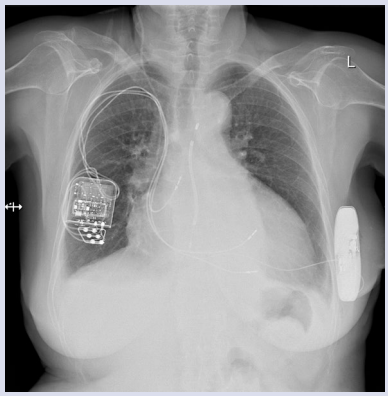

Figure 1. Chest radiograph with antero-posterior view of the cardiac contractility modulator and subcutaneous implantable cardioverter-defibrillator systems

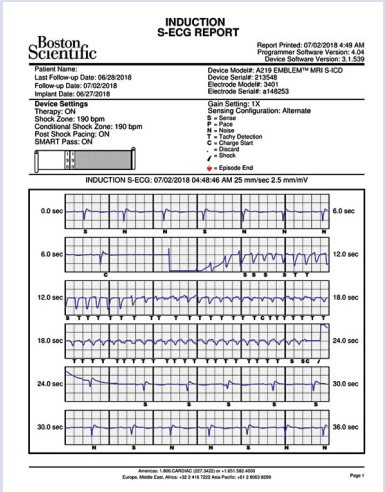

Figure 2. Subcutaneous implantable cardioverter-defibrillator report from a successful defibrillation threshold test (65 J)

References

1. Ptaszyński P, Grabowski M, Kowalski O, et al. [Subcutaneous implantable cardioverter-defibrillator in prevention of sudden cardiac death in Poland - opinion paper endorsed by the Polish Cardiac Society Working Group on Heart Rhythm]. Kardiol Pol. 2017; 75(10): 1057–1060, doi: 10.5603/KP.2017.0196, indexed in Pubmed: 29057442.
2. Kuschyk J, Stach K, Tülümen E, et al. Subcutaneous implantable cardioverter-defibrillator: First single-center experience with other cardiac implantable electronic devices. Heart Rhythm. 2015; 12(11): 2230–2238, doi: 10.1016/j.hrthm.2015.06.022, indexed in Pubmed: 26073595.
3. Röger S, Borggrefe M, Kuschyk J. Heart Failure With Reduced Ejection Fraction And A Narrow QRS Complex: Combination Of A Subcutaneous Defibrillator With Cardiac Contractility Modulation. J Atr Fibrillation. 2015; 8(3): 1081, doi: 10.4022/jafib.1081, indexed in Pubmed: 27957197.
4. Röger S, Rudic B, Akin I, et al. Long-term results of combined cardiac contractility modulation and subcutaneous defibrillator therapy in patients with heart failure and reduced ejection fraction. Clin Cardiol. 2018; 41(4): 518–524, doi: 10.1002/clc.22919, indexed in Pubmed: 29697870.

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