

Cardiac contractility modulation: a new treatment option for chronic heart failure in Poland

Modulacja kurczliwości mięśnia sercowego: nowa metoda leczenia niewydolności serca w Polsce

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We present a 64-year-old patient successfully implanted with a cardiac contractility modulation (CCM) system. The patient had chronic obstructive pulmonary disease, arterial hypertension, and a few years' history of chronic heart failure (HF) due to non-ischaemic cardiomyopathy with severe systolic dysfunction (left ventricular ejection fraction [LVEF] 25%). Due to persistent severe HF symptoms (NYHA class III/IV) resistant to pharmacotherapy, the patient was referred for implantation of a CCM system as a first-line cardiac device treatment. The patient did not fulfil criteria for cardiac resynchronisation therapy (CRT) due to narrow QRS (Fig. 1A). A deltopectoral incision and blunt preparation of tissues were performed under local anaesthesia. Three active pacemaker leads (Saint Jude Medicals, Tendril STS) were implanted into the heart via the right cephalic and axillary vein. The first lead was actively attached in the lower part of interventricular septum, the second one approximately 3 cm above, and the last one in right atrium appendage (Fig. 2). A pulse generator (Optimizer IV, Impulse Dynamics, Stuttgart, Germany) was positioned in the right subclavian region. Efficient CCM pacing was proven using a programmer and electrocardiography tracings (Fig. 1B). No complications occurred during the procedure nor during the entire hospital stay. The CCM device was programmed for 7 h of pacing daily with stimulus energy of 7.5 V and 22 ms. The patient reported neither discomfort nor unpleasant sensation related to CCM pacing. Six months' follow-up was uneventful. The electrical parameters of the CCM system were within the normal range. The LVEF remained unchanged; however, symptoms of HF diminished significantly (from NYHA class III to I/II) and the patient improved in exercise tolerance (6-min walking test distance increased from 265 m to 415 m). Due to improvement in symptoms the patient rejected an offer of implantation of a permanent cardioverter-defibrillator (ICD). CRT is one of the most spectacular device treatments in HF, but it is reserved for patients with wide QRS, preferably with left bundle branch block. Patients with low LVEF, HF symptoms, and narrow QRS are referred for an ICD implantation. Such therapy gives no relief in their symptoms of dyspnoea, fatigue, and poor exercise tolerance. Therefore, intensive investigations are focused on potential therapies that could significantly reduce HF symptoms. CCM is one of the very few options for HF patients not suitable for CRT due to narrow QRS. The complex mechanism of action of CCM is based on the assumption that ventricular pacing with a relatively high current during the refractory period of the ventricles may have an impact on molecular regulation in cardiomyocytes, which is associated with beneficial cellular reverse remodeling. This process leads to improvement of myocardial contractility. Despite still being controversial, the CCM concept is gathering more and more clinical evidence. The CCM system may be considered in patients who progress in HF despite all optimal treatment. This device is already available in Poland, but it is not refunded by the public health system yet.



Figure 1. Surface 12-lead electrocardiogram with cardiac contractility modulation system off (A) and on (B)



Figure 2. Chest X-ray views after the cardiac contractility modulation (CCM) system implantation

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Conflict of interest: K. Kaczmarek, P. Ptaszyński — medical consultant for Impulse Dynamics.

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