History
A 56 year old man, presented first time to our emergency department with localized chest pain, mainly during the night, for the last two weeks. The symptoms always stopped spontaneously after approximately seven hours. His medical history revealed an ischemic cardiomyopathy with a left ventricular ejection fraction of 25%. The ECG showed a sinus rhythm with stimulation spikes during QRS complexes (Figure 1). The duration of QRS complex was physiological. There were no ST-elevations. Moreover there was no increase of myocardial enzymes in repeated blood tests. On demand the patient handed out his ICD identification card. During interrogation of the ICD (Biotronik, Lumax 540 VR-T DX) a stimulation percentage of 0% was seen, with a physiological heart rate histogram. The ICD showed all over good electrical parameters. The clinical examination showed an ICD scar and second scar on the right side of the thorax. The patient reports on demand about a further implanted device. Further information he can’t give. Two weeks ago the device had been interrogated in another hospital. Do you think the ICD-device is defect? What is your differential diagnosis?

Treatment and course:
To exclude an ICD malfunction, such as lead dislocation, an X-ray of the thorax was made. The X-Ray showed two implanted devices (Figure 2). On the left side the known ICD (Biotronik Lumax 540 VR-T DX), on the right side there was a Cardiac Contractility Modulation Device ((CCM) Impulse Dynamics, Optimizer IV). The leads are located at the typical septal position. CCM is a minimally invasive implantable device designed to treat patients with chronic heart failure and a physiological QRS duration. The aim of a CCM device is to increase the cardiac output. The efficacy has been proven in studies1. It influences myocardial contractility by modulating the regulation of calcium cycling. It senses the hearts electrical activity and delivers CCM signals via two electrodes placed in the heart’s right ventricle during the absolute refractory period, with a typical duration of seven hours per day2. The output of 7.5 Volt has resulted in chest discomfort or pain in few cases. There is therefore no defect of the ICD. The electrocardiogram showed a normal function of the CCM with stimulation spikes during the refractory period. The patient had received the CCM one year ago having a highly reduced ejection function without a left bundle branch block. In the follow-up two weeks before, the output was set up from 5.0 V to 7.5 V to achieve a particularly good therapeutic success. After the output was reduced, the patient got free of symptoms. Since the CCM stimulates triggered on the R-wave, there is no interference to be expected with the implantable defibrillator. In ventricular fibrillation or ventricular tachycardia the CCM is inhibited.
X-Ray with an ICD (Biotronik, Lumax 540 VR-T DX) on the left side and a CCM device (Impulse Dynamics, Optimizer IV) on the right side. The two leads of the CCM are placed in the typically position at the septum.

**Summary:**
This case demonstrates impressively that the device therapy can be very complex. A striking electrocardiogram can not only reveal a defective device but also hide a second device. Carefully examination of ECGs in combination with a physical examination can lead the way in such cases.

**References**

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