Atypical position of subcutaneous implantable cardioverter-defibrillator as a solution in hypertrophic cardiomyopathy patient with initially negative electrocardiographic screening

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A 35-year-old female with hypertrophic cardiomyopathy was admitted due to malfunction of an implantable cardioverter-defibrillator (ICD). The device was implanted 9 years ago after successfully resuscitated ventricular fibrillation (VF). A failure of a defibrillation lead, probably due to crush syndrome, was diagnosed. Additionally, an occlusion of the left subclavian vein was revealed. As the patient refused an extraction of the lead with reimplantation of the ICD, a subcutaneous implantable cardioverter-defibrillator (S-ICD) was proposed as an alternative option. An electrocardiographic (ECG) screening disclosed that none of screened vectors had acceptable profile (Panel A). An atypical position of S-ICD was suggested as a possible solution. The ECG rescreening was performed for S-ICD pulse generator placed more dorsally and the lead along the right instead left parasternal line. One vector (Lead I—corresponding to the alternate S-ICD vector) appeared to be acceptable (Panel B). This was also confirmed in ECG screening during treadmill exercise test (TET). Finally, we decided to implant S-ICD in this atypical position (Panels B and C). During the procedure, all sensing vectors were positively evaluated and the alternate vector was chosen as the optimal one (Panel D). The sensing after induction of VF was appropriate and shock of 65J restored sinus rhythm. The post-procedural vector evaluation was positive in lying and standing. The TET performed after 2 weeks revealed appropriate sensing by S-ICD (Panel D).

In patients with hypertrophic cardiomyopathy, the modified placement of S-ICD may be an alternative option in cases when ECG screening precludes standard device position.

Panel A. Pre-implantation electrocardiographic screening for leads equivalent of subcutaneous sensing vectors (standard and modified leads positions). A, F—smallest and largest screening profile frames. None of the leads matched to the screening profile for standard leads positions. In Leads I and II, high QRS amplitude fell out the acceptable limit, and in Lead II the QRS was too low. Only one lead (Lead I) matched to the screening profile for modified leads positions. Recorded at 25 mm/s, 5 mm/mV.

Panel B. The devices (implantable cardioverter-defibrillator and subcutaneous implantable cardioverter-defibrillator) and the leads on computed tomography scans. Subcutaneous implantable cardioverter-defibrillator lead atypically placed along the right parasternal line.

Panel C. Computed tomography scan shows subcutaneous implantable cardioverter-defibrillator pulse generator implanted dorsally (posterior axillary line) between serratus anterior muscle (sam) and latissimus dorsi muscle (ldm).

Panel D. Electrograms of the three subcutaneous implantable cardioverter-defibrillator vectors (1, primary; 2, secondary; 3, alternate) recorded at rest. Additionally, the alternate vector registered at maximum effort during the treadmill exercise test (4). Recorded at 25 mm/s.