Absence of shock therapy related to improper sensing of noise on the defibrillation test during the subcutaneous implantable cardioverter-defibrillator implantation

Shota Tamura  
Masanori Matsuo  
Hisashi Katayama  
Tomotaka Yoshiyama  
Hiroaki Tatsumi  
Atsushi Doi  
Yasuhiro Izumiya  
Minoru Yoshiyama

**Introduction:** The subcutaneous implantable cardioverter–defibrillator (S-ICD) represents an efficient alternative to a transvenous device in patients who do not require pacing. The intraoperative defibrillation test (DFT) is recommended at implant of an S-ICD to confirm appropriate sensing and successful 65-J termination of induced ventricular fibrillation (VF). However, a few worrisome cases of noise oversensing inhibiting the therapies were reported. Our case is the first report on recording the noise in two different vectors during the DFT.

**Methods:** N/A

**Result:** We report the case of a 50-year-old man with a history of cardiopulmonary arrest due to VF who underwent a S-ICD implantation for secondary prevention of sudden cardiac death. He did not have a family history of sudden death. The 12-lead electrocardiogram after return of spontaneous circulation showed J wave (1mm, notch type) in II and aVF leads. The thoracic echocardiogram indicated good ventricular function and no valve disease. The coronary angiogram did not include significant stenosis. From these results, our diagnosis was VF due to J wave syndrome, so that we decided to implant the S-ICD (EMBLEM, Boston Scientific, Marlborough, MA). A surface electrocardiogram screening test passed in all vectors [primary (proximal electrode ring to can), secondary (distal electrode ring to can), or alternate (distal to proximal electrode) vector]. Immediately after implantation of the S-ICD, there was no sensing failure and noise in all vectors. To perform DFT, we induced VF using a 50-Hz burst via the programmer. Although VF was induced, shock was not appropriately delivered because of a sustained diagnosis of noise (repeated noise markers) with visualization of fine noise on the EGM superimposed over the fast ventricular events, then an external rescue shock was needed. We changed the sensing vector into secondary from primary vector and induced VF. Then, the S-ICD could deliver an appropriate shock 17 seconds after the induction of VF and successfully terminated VF at 65J without noise marker. During the 2nd DFT, one back-up pacing was delivered after the shock, then sensing vector automatically switched from secondary to alternate vector. Noise marker was also detected in alternate vector with visualization of fine noise on the EGM superimposed over the sinus rhythm.

**Conclusion:** We reported a case which is absence of shock therapy related to improper sensing of noise on the DFT during the S-ICD implantation.