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IMAGE

Inappropriate Shock Due to Myopotential Oversensing in a Patient With Subcutaneous Implantable Cardioverter-Defibrillator

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The subcutaneous implantable cardioverter-defibrillator (S-ICD) is an effective therapy in preventing death in high risk patients and may reduce the rate of transvenous implant-related complications such as pneumothorax, lead fracture and venous complications [1]. However, it has a higher risk of inappropriate therapy (approximately 7% per annum), mostly due to T-wave oversensing, particularly in patients with hypertrophic cardiomyopathy or a history of atrial fibrillation [1,2].

We describe a 25-year-old man with a history of aborted sudden cardiac death. Extensive investigations including echocardiography, coronary angiography and cardiac magnetic resonance imaging found no structural heart disease and he underwent S-ICD (EMBLEM^{TM} A209, Boston Scientific, Marlborough, MA, USA) implantation. He presented 2 months later after receiving a shock during exercise (lifting weights). The presentation was not associated with any chest pain, shortness of breath, syncope or palpitations.

Interrogation of the S-ICD system revealed normal implantable cardiac defibrillator (ICD) function with satisfactory sensing. The stored electrogram (EGM) showed low amplitude signals obscuring the normal QRSs with no ventricular arrhythmia, thus was an inappropriate shock (Figure 1). Given the event occurred when the patient was lifting weights, we suspected oversensing of myopotentials was the likely source of electrical noise. Therefore, we had the patient perform the same activity and the low amplitude signals were reproduced (Figure 2). It proved the device delivered an inappropriate shock because it recorded low amplitude signals related to myopotentials from weight lifting activity, and detected it as ventricular arrhythmia inappropriately and treated it.

To avoid this problem, we changed the sensing vector from secondary (distal electrode ring to can) to primary sensing vector (proximal electrode ring to can), in order to achieve a better sensitivity and avoid myopotential oversensing. With this new configuration, no noise was detected on weight lifting.

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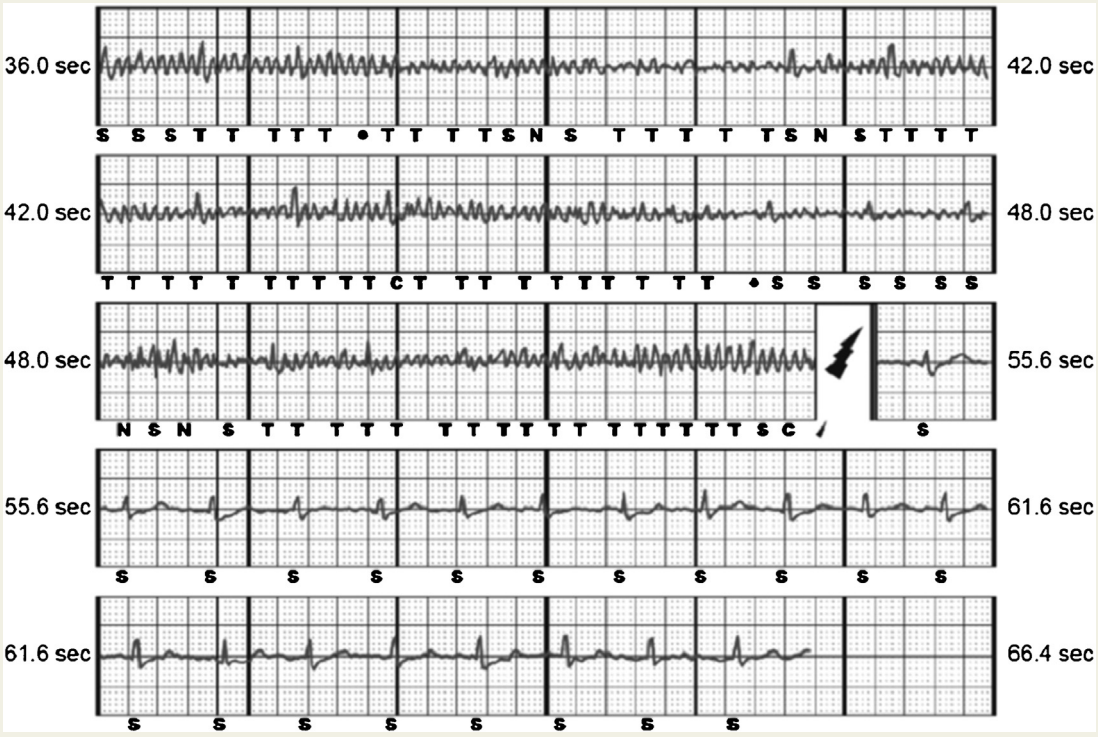

Figure 1 Stored EGM of the inappropriate shock. The analysis revealed low amplitude signals interspaced between and obscuring the normal QRSs, detected as ventricular arrhythmia inappropriately and followed by a shock.

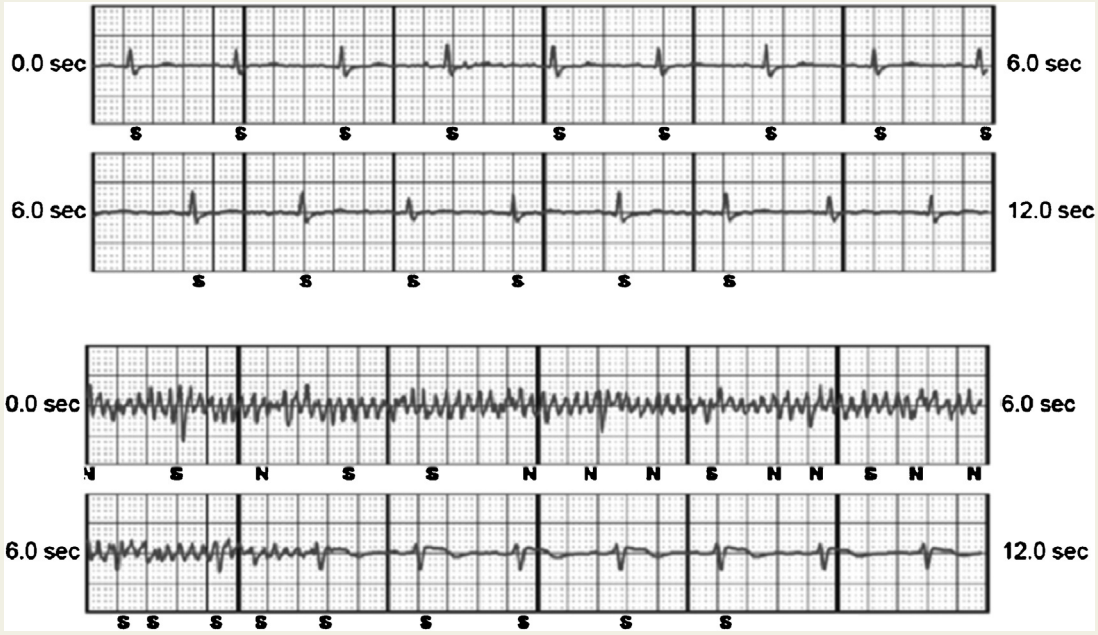

Figure 2 Upper panel: EGM shows QRSs of normal sinus rhythm in sitting position.
Lower panel: Reproduction of myopotential signals during the device interrogation. While the patient is performing weight lifting, EGM shows rapid irregular low amplitude signals due to myopotentials oversensing.
Abbreviation: EGM, electrogram.

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None.

Disclosures

The authors declare no conflicts of interest.

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