

CRT-D or CRT-P in CRT-indicated patients?

To the Editor,

Cardiac resynchronization therapy with defibrillator (CRT-D) has demonstrated advantages over implantable cardioverter defibrillator (ICD) in terms of morbidity, symptom reduction, and survival. But there is no exact data indicating benefit of adding an ICD in CRT-indicated patients, despite theoretically decreased risk of death due to arrhythmia with this combination (1). Despite the lack of evidence, CRT-D is preferred over cardiac resynchronization therapy with pacemaker (CRT-P) without any strict recommendation. Here we would like to share our experience, which also favors CRT-D over CRT-P, but for another reason: pacing site-dependent arrhythmia.

Pacing site-dependent arrhythmia, first described by Medina-Ravell et al. (2) in 2003, can be defined as an arrhythmia due to non-physiological, simultaneous pacing of right ventricle (RV) endocardium and left ventricle (LV) epicardium. Normal ventricle activation starts at the endocardium and spreads through the myocardium to the epicardium. Due to longer duration of action potential of endocardium; repolarization wave starts at the epicardium and ends in the endocardium. This sequence of activation and repolarization makes an upright T wave with the same polarity as the QRS (3). LV epicardial pacing alters ventricle activation and repolarization dynamics, which in turn ends up with prolongation of QT interval, leaving ventricle vulnerable to extrasystoles that result in R on T phenomenon, Torsades des Pointes (TdP), or non-sustained or sustained polymorphic ventricular tachycardia (VT). The basic mechanism of formation and progression of TdP and polymorphic VT is the same as long QT syndromes. The incidence of this condition was reported to be between 3.4% and 4% and most were ischemic cardiomyopathy patients (4).

As a tertiary cardiovascular hospital, our institution has performed more than 250 CRT implantations over the course of 10 years. During this time, we observed 1 incessant electrical storm in TdP patient (5), and 2 monomorphic ventricular tachycardia (MMVT) patients soon after starting biventricular pacing (BiVP) mode with CRT. The first patient was a 59-year-old woman, suffering from ischemic cardiomyopathy who went from functional class I to III (New York Heart Association) over time and had electrocardiogram of sinus rhythm with left bundle branch block morphology and QRS duration of 160 ms. Decreased ejection fraction (EF) to 20% with increased functional class led us to consider CRT for symptom relief and ICD for primary prevention (no prior episodes of syncope or tachycardia). When CRT was activated in the operating room, incessant electrical storm of TdP started. After failed anti-tachycardia pacing attempts, defibrillation was used to stop the TdP. Device was switched off and considered a possible cause since this patient had not experienced tachycardia attack before. Pacing from RV endocardium and right atrium did not trigger the arrhythmia, but every attempt to pace

BiVP or LV epicardial mode ended in TdP. Insertion of coronary sinus lead to another vein was recommended to the patient but she elected not to pursue it. She was followed with CRT switched off but ICD on and no tachycardia attack was observed. Second and third patients demonstrated MMVT after CRT-D activation.

CRT-D can be selected instead CRT-P when a patient meets CRT indications. First, nearly every CRT-indicated patient already has ICD indication for primary prevention due to CRT criteria of EF below 35%. Second, as we described in our paper, device-related tachyarrhythmia may occur as frequently as in 4% of cases. This means 4% of CRT implant patients could die soon after device implantation due to device-related arrhythmia if left untreated.

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