Impact of optimal implantable cardioverter-defibrillator programming using delayed detection on reduced inappropriate shock

Introduction: Inappropriate shocks are associated with increased mortality among patients who have implantable cardioverter-defibrillators (ICD). Randomized controlled trials have shown that optimal ICD programming reduces inappropriate shocks and mortality rates. However, there are a few real-world data regarding the impact of optimal ICD programming on these patients.

Methods: We retrospectively investigated 83 patients who underwent ICD implantations in a tertiary medical center. Class I consensus statement recommendations include slowest tachycardia zone between 185 and 200 bpm or rate of ventricular tachycardia (VT) minus 10 (if VT is documented and target tachycardia rate should be less than 200 bpm), delayed arrhythmia detection duration (6-12 seconds or 30 intervals before detection) and VT morphology discrimination (coverage tachycardia faster than 200 bpm up to 230 bpm).

Result: During 48.6±19.2 months, 14 patients (16.9%) experienced more than one inappropriate shock. The common causes of inappropriate shocks were sinus tachycardia (n=6) which was followed by atrial fibrillation (n=5) and noises caused by external origins (n=3). Kaplan-Meier analysis showed that subjects with delayed detection of tachycardia significantly reduced the rate of inappropriate shocks free survival compared to those with no delayed detection (Figure 1; log-rank p=0.05). In the multivariate Cox regression model adjusted by beta-blockers, antiarrhythmic drug, age, atrial fibrillation and dual vs. single-chamber ICD, only delayed detection remained as a variable that was significantly associated with a lower risk of inappropriate shock (HR 0.106, 95% CI 0.14-0.826; p=0.032). Four (4.8%) patients experienced syncope following appropriate shocks. However, the incidence of syncope was not different between the delayed detection group and no delayed detection group. There was no mortality or morbidity related to under-sensing of VT or ventricular fibrillation events.

Conclusion: This real-world data demonstrated that ICD programming with delayed detection for therapy was associated with reductions in inappropriate shocks and no adverse events.