The change of QRS duration in patients upgrading to cardiac resynchronization therapy from a pacemaker or implantable cardioverter defibrillator

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Introduction: Heart failure patients with a pacemaker or implantable cardioverter defibrillator (ICD) have frequently undergone upgrade operation to cardiac resynchronization therapy (CRT). The characteristics of electrocardiograms in such patients have not been established.

Methods: We enrolled 15 patients who were upgraded to CRT from a pacemaker and a control group of age- and gender-matched patients (15 patients with pacemakers). We also enrolled 17 patients who were upgraded to CRT-defibrillators (CRT-D) from ICDs and a control group of age- and gender-matched patients (17 patients with ICDs). We evaluated the QRS duration and QTc duration of all patients at baseline and at CRT implantation or at the exchange of the generator.

Result: Among the patients with a pacemaker, the QRS duration and QTc duration were significantly higher in the upgrade group compared to the control group (QRS duration: 175±37 vs. 141±29 msec, p=0.013, QTc duration: 504±39 vs. 470±31 msec, p=0.015). Among the patients with an ICD, the QRS duration was significantly higher in the upgrade group compared to the control group (163±28 vs. 134±40 msec, p=0.026), but the QTc duration was similar in both groups (p=0.35). The change of QRS was similar between the upgrade group and control group among the patients with a pacemaker (6.7±14.1 vs. 3.3±28.8 msec, p=0.68) and among the patients with an ICD (8.3±44.0 vs. 6.5±25.8 msec, p=0.91). The change of QRS was associated with a decrease in QRS duration after CRT implantation among the patients with CRT-D from ICDs (r=0.65, p=0.012).

Conclusion: Prolongation of the QRS duration at baseline, but not the QRS change, was associated with upgrading to CRT. If the QRS duration of a patient with a pacemaker or ICD is wide, CRT implantation might be considered.