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±28.8msec, p=0.68) and among the patients with an ICD (8.3±44.0 vs. 6.5±25.8msec, 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.