The utility of a novel approach to quantify dyssynchrony by multidetector computed tomography

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Background: Quantification of left ventricular (LV) dyssynchrony is of great interest for resynchronization therapy (CRT). Recently, cardiac computed tomography (CCT) is feasible for evaluation of dyssynchrony. Our aim was to assess a novel simplified approach using CCT to quantify LV dyssynchrony.

Methods: We studied 346 consecutive patients with a wide range of QRS width and ejection fractions (EF). Electrocardiogram-gated contrast-enhanced 256-slice multidetector CT (Brilliance 256 iCT, Philips Medical Systems) was performed before CRT. After CCT scan, the LV endocardial boundaries from short-axis images reconstructed at 5% increments of cardiac cycle were automatically detected, and a time from R-wave to maximal wall motion was calculated for each of the 16 standardized segments for all slices using software "Myocardial Contraction Map" (Argus, Inc Ehime, Japan). The standard deviation of all segments modified by mean heart rate (%SD) was respectively calculated as the global parameter of dyssynchrony. LVEF was also measured using MDCT.

Results: %SD was feasible in all patients, respectably. %SD was significantly different between the different QRS duration groups; narrow QRS (<120ms): 9 ± 5%, relatively wide QRS (120-150 ms): 11 ± 6%, and significantly wide QRS (>150 ms): 14 ± 7% (p <0.001). Moreover, there was significantly difference in %SD between the different morphology groups; normal: 9 ± 7%, Non-left bundle branch block (Non-LBBB): 10 ± 6%, LBBB: 17 ± 7% (p <0.001).

Conclusion: This novel simplified approach by CCT can quantify dyssynchrony in different QRS duration and morphology groups. This method has promise for clinical applications to the evaluation of patients for CRT.

Abstract Figure.