European Heart Journal (2023) 44 (Suppl 2)
Arrhythmias and Device Therapy – Device Therapy, Cardiac Resynchronisation Therapy (CRT)

Associations of 2013 and 2021 ESC definitions of left bundle-branch block with mechanical dyssynchrony and CRT-induced reverse remodeling

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Funding Acknowledgements: Type of funding sources: Public grant(s) – EU funding. Main funding source(s): European Union's Horizon 2020 research and innovative program under the Marie Sklodowska -Curie grant agreement

Background: In 2021, a new and stricter ECG-based definition of LBBB was proposed and implemented in the European Society of Cardiology (ESC) guidelines on cardiac pacing and cardiac resynchronization therapy (CRT).

Aim: To investigate the association between the 2021 and the 2013 LBBB definitions with CRT-induced left ventricular (LV) reverse remodeling, as well as mechanical dyssynchrony.

Methods: CRT patients (n=191) were retrospectively investigated. Pre-CRT digitally stored ECGs were analyzed and categorized according to the LBBB definition of 2013 (LBBB-2013) and the 2021 (LBBB-2021). Mechanical dyssynchrony (Dyss) was assessed pre-CRT using 2D-echocardiography and was defined as the presence of apical rocking and/or septal flash. CRT-induced LV reverse remodeling was measured as the relative change of left ventricular end systolic volume (LVESV) at 12 $\pm$ 6 months after CRT compared to baseline.

Results: Patients' characteristics were as follows; age 70 $\pm$ 10 years, 69% males and NYHA class 2.7 $\pm$ 0.5. QRS width was 156 $\pm$ 18 ms and LVEF 33 $\pm$ 11%, and 52% had ischemic etiology. Dyss was present in 59% of the population.

The percentage of the cohort that was considered to have LBBB was considerably lower according to the LBBB-2021 than according to the LBBB-2013 (18 vs. 57% respectively). Similarly, percentages of patients with LBBB+Dyss were 16 and 46% according to LBBB-2021 and LBBB-2013 respectively, with a respective Kappa coefficient of 0.16 and 0.47 (Figure A).

At CRT follow up, LBBB-2013 patients showed significantly more LV reverse remodeling compared to non-LBBB patients ($P < 0.001$), while there was no significant difference between patients with LBBB-2021 and non-LBBB ($P = 0.09$, Figure B).

Conclusion: The LBBB definition proposed in the 2021 ESC guidelines excludes many patients from a class I indication for CRT. It is less associated with mechanical dyssynchrony and with CRT-induced LV reverse remodeling than the 2013 LBBB definition. Therefore, the new LBBB definition appears to be counterproductive with regards to selection of CRT patients.