

Assessment of mechanical dyssynchrony can improve the new ESC-2021 guidelines for cardiac resynchronization therapy

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Background: In 2021, new guidelines for cardiac resynchronization therapy (CRT) were published by the European society of cardiology (ESC-2021), where the different classes of recommendations were based on a new ECG-based definition of left bundle branch block (LBBB). However, its association with reverse LV remodeling and additive prognostic value remain unknown.

Aim: To investigate (1) the association between the ESC-2021 CRT guidelines and reverse LV remodeling at follow up, and (2) the additive prognostic value of baseline assessment of mechanical dyssynchrony to the ESC-2021 guidelines.

Methods: We investigated 244 heart failure patients in sinus rhythm treated with CRT in two European centers. 70% of the population were males. Mean age was 69 ± 10 years, QRS duration: 154 ± 24 msec. Mechanical dyssynchrony at baseline was defined as the presence of apical rocking or septal flash (ApRock/SF) in 2D transthoracic echocardiography. LV volumes were measured at baseline and at 12 ± 6 months after CRT, where the amount of CRT induced reverse LV remodeling was calculated as the percent change of LVESV at follow-up compared to baseline.

Results: Applying the ESC-2021 LBBB definition, only 18% (n=45) of patients had LBBB. Applying the guidelines, only 14% (n=35) had class I recommendation (LBBB + QRS ≥ 150 msec), 44% (n=107) had class IIa (LBBB + QRS 130-149 msec or non-LBBB + QRS ≥ 150 msec), 29% (n=70) had class IIb (Non-LBBB + QRS 130-149 msec), and 13% (n = 33) were not recommended according to the ESC-2021 because of having baseline QRS duration between 120 and 129 msec. On the other hand, ApRock/SF was evident in 57% (n=140) of the patients.

There was non-significant difference in the relative decrease in LVESV at follow up between patients with LBBB and non-LBBB applying the new LBBB definition (44% [IQR: 32-63], vs. 39%, IQR [20-57], $P = 0.08$, panel A).

Similarly, there was no significant difference in the relative decrease in LVESV at CRT follow up among the four guideline recommendation classes, panel B.

We combined presence of mechanical asynchrony at baseline with each of the guideline recommendation classes. The combination of ApRock/SF with classes IIa and IIb improved the prediction of reverse LV remodeling significantly ($P < 0.001$ and < 0.01 respectively), while adding mechanical asynchrony did not significantly improve prediction in the class I and the not-recommended subgroups. However, results of these last 2 may have been impacted by a small number of patients, panel C.

Conclusion: The new ESC-2021 definition of LBBB is associated with few patients with LBBB and consequently small number of patients with class I recommendation according to the new guidelines. There was weak association between the new ESC-2021 guideline classes of recommendation and reverse LV remodeling after CRT. However, baseline assessment of ApRock and SF can significantly improve the guidelines in predicting CRT outcome.

