Development and validation of a clinical index to predict survival after cardiac resynchronisation therapy

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To the Editor: We read with interest the paper presented by Leyva et al. and feel that it is most worthy of comment. The authors describe the development and internal validation of a clinical index to predict survival after cardiac resynchronisation therapy (CRT) in 148 patients with heart failure. They focus predominantly on the ability of the development and internal validation of a clinical index to predict survival after cardiac resynchronisation therapy (CRT) in 148 patients with heart failure. They focus predominantly on the ability of the DSC score in this group, which typically are more challenging to assess. Alternatively, two-dimensional strain imaging is a Doppler-independent technique that allows beat to beat assessment of strain dysynchrony parameters; and in our cohort of 41 patients, including those with atrial fibrillation, we found that dysynchrony from circumferential strain rate was a powerful predictor of reverse remodelling.

2. Although the authors clearly illustrated that the group with a high DSC index are less likely to survive, they did not consider measures of quality of life in this cohort who may have shown important improvements. CARE-HF revealed mortality and morbidity benefits of CRT, and it would be interesting to quantify these effects in the groups.

3. Although the authors used techniques to confirm the calibration and validity of the model, it was not externally appraised. External validation using remote cohorts could reveal suboptimal discriminatory performance. If so, the authors would be challenged with either acknowledging that the DSC is not generalisable or recalibrating the model for each new cohort that would make the model less applicable to clinicians.

Nonetheless, we congratulate the authors on developing a parsimonious model with the ability to powerfully predict mortality after CRT.

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Competing interests None.

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The DSC score

The authors’ reply. We thank Drs Artis and Gale for their careful review of our study on the dysynchrony, scar and creatinine (DSC) index as a predictor of outcome after cardiac resynchronisation therapy (CRT). We shall deal with each point in turn.

We agree that atrial fibrillation often makes imaging more challenging, particularly when the ventricular response is uncontrolled. This applies to both cardiovascular magnetic resonance and echocardiography. In our experience, however, prospective gating permits adequate visualisation of the left ventricular endocardium as well as derivation of the cardiovascular magnetic resonance tissue synchronisation index. The authors allude to their findings from a study using two-dimensional strain imaging, in which dysynchrony from circumferential strain was a predictor of reverse LV remodelling. This study which to our knowledge, has been published only as an abstract, adopts reverse remodelling as a surrogate of outcome. There are several limitations with this approach. First, reverse LV remodelling has not confidently been shown to be a reliable surrogate marker of outcome. One of the few validations of reverse remodelling against outcome showed that a reduction in left ventricular end-systolic volume (LVESV) ≥9.5% predicted all-cause mortality with a sensitivity of 70% and a specificity of 70%, and cardiovascular mortality with a sensitivity of 57% and a specificity of 69%. This means that 30% of patients who benefit prognostically from CRT are wrongly classified as “non-responders”, whereas a specificity of 69% means that 31% of patients who do not benefit prognostically are wrongly classified. Importantly, no studies on reverse LV remodelling in CRT have used statistical methodologies of internal and external validation. Moreover, it is well recognised that reverse remodelling is not a surrogate of symptomatic response and that the full symptomatic response to CRT takes longer than 6 weeks. It is on this basis that we have been keen to adopt clinically meaningful measures, such as mortality and hospitalisations, in validating the DSC index.

We agree that patients in the highest risk category of the DSC score could have derived a symptomatic improvement from CRT. Accordingly, we stated that a high DSC index “should not be used to deny CRT to patients who satisfy current guideline criteria.” Our aim in this study was to validate the DSC index against mortality and morbidity.

As stated in the Limitations section, external validation is required before adoption of the DSC index in clinical practice. We remain committed to encouraging other units to adopt the same approach of external validation of diagnostic measures, the lack of which has undoubtedly contributed to the emerging confusion about the role of echocardiography in CRT.

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