SCAR AND DYSYNCHRONY CHARACTERISTICS OF THE PACED MYOCARDIAL SEGMENTS PREDICT CLINICAL RESPONSE TO CARDIAC RESYNCHRONIZATION THERAPY

ACC Poster Contributions
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Background: Cardiac Resynchronization Therapy (CRT) has been shown to improve quality of life and decrease mortality in heart failure patients. Up to 40% of patients fail to respond to this therapy. Validation of a response prediction model incorporating both myocardial scar and dyssynchrony of the paced myocardial segments would allow for a targeted approach to CRT lead delivery.

Methods: Patients planned for CRT under standard indications were prospectively enrolled. Cardiac MRI was performed to determine segmental dyssynchrony (time to maximal radial strain (Trs)) using serial short-axis tagged cine imaging and applied to a 16-segment model (InTag, OsirX). Delayed enhancement MR images were blindly interpreted using a visual scoring system (0 to 4) to determine segmental scar. Cardiac gated CT was used to accurately localize CRT lead tips. Echocardiography was performed at baseline and 3 months post-implantation to determine LVESV, where a 15% reduction was considered to be “clinical response”. Three response prediction rules were tested against clinical response, as follows: 1) LV lead tip placed on a dyssynchronous segment (Trs > 130msec), 2) LV lead tip placed on a viable segment (scar score <2), 3) RV lead tip placed on a viable segment (scar score <2).

Results: Forty consecutive patients were enrolled with a mean age and ejection fraction of 67.0 ± 8.6 years and 25.6 ± 6.6%, respectively. Twenty four patients (60%) met clinical response criteria with a mean reduction in LVESV of 20.5 ± 16.5% compared to an increase of 1.4 ± 6.3% in non-responders (p<0.001). A strong correlation was present between the number of prediction rules met and clinical response. In patients with 3, 2, 1 and 0 rules met, the response rates were 100%, 92%, 58% and 40%, respectively (p<0.001). A strong correlation was also seen between the number of rules met and the mean reduction in LVESV (28%, 14% and 5% reduction in those with 3, 2 and 1 rules met, respectively (p=0.002)).

Conclusions: A simple 3-rule prediction model incorporating the scar and dysynchrony characteristics of the paced myocardial segments appears to be highly predictive of clinical response to CRT, and may be valuable for the selection of optimal pacing targets.