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ENDOCARDIAL PACING, HIS BUNDLE PACING AND LEFT BUNDLE BRANCH AREA PACING ACHIEVE SUPERIOR LEFT VENTRICULAR ELECTRICAL RESYNCHRONIZATION COMPARED TO CONVENTIONAL CARDIAC RESYNCHRONIZATION THERAPY

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Background: Endocardial and conduction system pacing are novel methods to deliver CRT and may improve electrical resynchronization over conventional epicardial CRT (CRT-epi). A direct comparison of electrical resynchronization for all the methods of CRT delivery has not yet been performed.

Objective: To compare LV electrical resynchronization during CRT-epi, endocardial pacing (CRT-endo), His bundle pacing (HBP) and left bundle branch area pacing (LBBAP) using electrocardiographic imaging (ECGi).

Methods: 7 patients underwent a temporary CRT and ECGi study. Reconstructed epicardial electrograms from ECGi were used to calculate LV activation time (LVAT) and LV dyssynchrony index (LVDI) [Fig 1A]. Relative changes from baseline were compared using repeated measures ANOVA and post-hoc Tukey’s tests.

Results: Mean patient age was 71 ± 6.6 years and 57% were male. 2 patients had ischemic heart disease, 1 patient had AF and mean LV ejection fraction was 28.7 ± 6.0%. Baseline rhythm was LBBB (4 patients) or RV-pacing (3 patients) with mean QRS duration 157 ± 20 ms. Compared to CRT-epi, there were greater reductions in LVAT during CRT-endo (-48.1 ± 13.1% vs -23.6 ± 11.3%; P = 0.009) and LBBAP (-44.3 ± 12.6%; P = 0.025) and a non-significant trend towards greater LVAT-reduction for HBP (-40.9 ± 13.0%; P = 0.088) [fig 1B]. There were greater reductions in LVDI versus CRT-endo during CRT-endo (-61.0 ± 15.5% vs -20.3 ± 20.0%; P = 0.002), HBP (-47.4 ± 17.7%; P = 0.045) and LBBAP (-55.3 ± 15.3%; P = 0.005) [fig 1C]. There were no differences in LVAT or LVDI between CRT-endo, HBP or LBBAP (P > 0.05).

Conclusion: CRT-endo, HBP and LBBAP provide superior LV electrical resynchronization compared to CRT-epi. Performance was comparable between the novel CRT techniques.

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MULTI-SITE PACING FOR CARDIAC RESYNCHRONIZATION THERAPY: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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Background: Multi-site pacing (MSP) may provide more rapid LV activation by employing two LV leads during CRT. Randomized studies of MSP have shown conflicting results.

Objective: To perform a systematic review and meta-analysis of RCTs comparing MSP with conventional CRT.

Methods: A literature search was performed up to October 2021 using keywords “multi site pacing”, “triventricular pacing” and “triple site pacing”. Exclusion criteria included observational trials, studies with acute response metrics only, and those where CRT was performed with 2 RV leads + 1 LV lead. 251 unique records were identified, of which 5 met inclusion criteria. Meta-analysis was performed using the Stata 16 software package. Heterogeneity was assessed by the I² index and was considered low, moderate, and high for I² < 30%, 30-60% and >60% respectively.

Results: There was no difference between MSP and conventional biventricular CRT in LV end-systolic volumes at follow-up (mean difference [MD] -1.76 ml, p = 0.80, I² = 0.0%) [fig 1A]. Similarly there was no difference between groups in LV ejection fraction (MD 1.58%, p = 0.50, I² = 72.2%) [fig 1B], or in the proportion of patients in New York Heart Association Class III-IV at follow-up (log odds [OR] ratio 0.21, p = 0.67, I² = 64.4%) [fig 1C]. Mortality rates were comparable between groups (log OR 0.14, p = 0.71, I² = 0.0%) [fig 1D].

Conclusion: This meta-analysis does not support the use of MSP for CRT. However, sub-group analyses were not reported for all studies, and it is possible that MSP may provide benefit in specific patient cohorts.