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Optimal fusion vs. biventricular pacing in cardiac resynchronization therapy: long-term results of 540 consecutive patients

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Background: Right ventricular (RV) stimulation induces supplemental dyssynchrony in case of left bundle branch block (LBBB) patients. Isolated left ventricular (LV) pacing has been proven superior to biventricular pacing (BiV) in terms of acute hemodynamic response.

Purpose: We sought to determine whether an optimised isolated LV pacing algorithm called "optimal fusion" (OFu) produces better and sustainable effects when compared to BiV in the long term.

Methods: 540/760 (reasonable data collection) consecutive patients implanted with CRT in CEHB were analysed. The follow-up included 7 hospital visits for each patient (between baseline and 3 years). Demographics, risk factors, usual serum levels, pre-procedural planning factors, clinical, ECG, TTE and biochemical markers were recorded. Statistical analysis was performed using software. Data were reported as either p-values from crosstabs (discrete) or mean differences, p-values and confidence intervals from t-tests (continuous). A p-value of .05 was chosen for statistical significance (SS).

Results: The overall group consisted of 51% OFu (275) and the rest BiV patients. Subjects in OFu were younger (-4.379 ys; <.001; (-7.028;-1.729)), more often females (40.9 vs. 24.9%; <.002), more obese (40.1 vs. 29.6%; <0.40) and had more structural disease other than ischaemic scar burden (10.8 vs. 2.7%; <.005). Procedures in OFu were mainly "de novo" (93 vs. 73.4%; <.000), more often CRT-Ds (58.2 vs. 42.9%; <.005) and more frequently in sinus rhythm (99.4 vs. 62.3%; <.000) and with typical LBBB (77.2 vs. 45%; <.000). Baseline PR interval was shorter in OFu (-32.20 msec; <.033; (-61.58;-2.58)). Notably, OFu patients started from a lower EF (-3.29%; <.001; (-5.156;-1.441)), had more dyssynchrony as evaluated by Pitzalis' index (34.32 msec; <.017; (6.132;62.522)) and poorer initial mechanical performance by dP/dt (-104.83 mm Hg/sec; <.012; (-185.301;-24.366)). There was no SS difference in clinical parameters at 3 years. Mean EF was higher in OFu (38.59 vs. 34.82%; NS; (4.183;-4.755)) while both EDVs (170.40 vs. 161.40 ml; NS; (-82.40;100.40)) and ESVs (115.36 vs. 102.67 ml; NS; (-82.65;108.03)) were lower. When looking at absolute Δs, OFu performed much better in the long term: EF (+15.81 vs. +8.86%; NS; (-17.06877;3.17710)), EDV (-46.07 vs. – 10.1 ml; NS; (-19.88;102.60)) and ESV (-55.91 vs. -17.46 ml; NS; (-39.88;124.71)). The cumulated super-responder/responder (SR/R) percentage at 1 year was much higher in OFu (83.43 vs. 57.75; <.040).

Conclusions: The benefit of OFu is definitely sustainable in the long term. Structural response is constantly superior with OFu when compared to BiV although the current data set did not yield SS when comparing absolute means. However, parameter Δs are clearly in favor of OFu which produced a SS higher cumulated rate of SR/Rs over 3 years of follow-up.