Improving atrioventricular coupling in heart failure patients with PR prolongation, the ReachPR Trial

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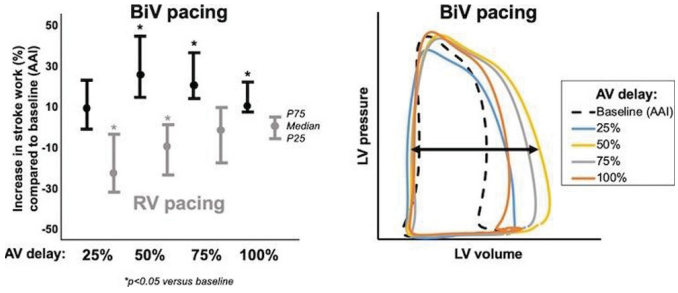
Background: PR prolongation is associated with poor hemodynamic performance and may contribute to heart failure (HF). There is some evidence that in HF patients, normalization of atrioventricular (AV) coupling can attenuate HF.

Purpose: To investigate acute hemodynamic effects of restoration of AV coupling by atrio-biventricular (BiV) pacing in patients with HF and PR prolongation, but without evident ventricular dyssynchrony.

Methods: Nineteen patients underwent BiV pacemaker implantation. An invasive hemodynamic pacing protocol was performed during BiV and right ventricular (RV) pacing with four paced AV delays (100, 75, 50 and 25% of patient's PR interval during baseline AAI pacing). All patients had symptomatic HF, left ventricular ejection fraction (LVEF) $<$35% and PR interval $\geq$230 ms, without evident prolonged QRS duration $>$150 ms or left bundle branch block. Acute hemodynamic response was assessed by invasive left ventricular (LV) stroke work measurements (conductance catheter technique).

Results: At baseline, PR interval was 255±22 ms, QRS duration 122±19 ms and LVEF 29±6%. Reducing AV delay to 50% of patient's intrinsic PR interval by BiV pacing resulted in a median 25% increase ($p<0.05$) in LV stroke work relative to baseline (figure, left panel). This increase in LV stroke work was mainly determined by an increase in LV stroke volume (figure, right panel). In contrast to BiV pacing, reducing AV delay by RV pacing did not improve LV stroke work (figure, left panel).

Conclusion: In patients with HF and PR prolongation, BiV pacing can be used to improve AV coupling that leads to hemodynamic improvement. These results suggest that BiV pacing may also be beneficial in this subset of HF patients that are currently not indicated for CRT.



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