Abstract: 923

Acute electrical and hemodynamic effects of CRT pacing using a micro-catheter guided LV lead in the preclinical setting - the Axone European project.

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Topic(s):
Cardiac Resynchronization Therapy

Citation:

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Background/Introduction
Better delivery of cardiac resynchronization therapy (CRT) may contribute to better response. A multipolar micro LV lead, small enough (1 French, 0.3mm; figure, left panel) to be advanced from one coronary vein into another through venous collaterals, provides a novel approach for extended pacing options.

Purpose
In the first stage of this European project, we investigated in a porcine CRT model the acute electrical and hemodynamic effects of pacing from single and dual LV sites using various strategies enabled by this new micro lead.

Methods
Experiments were performed on 8 pigs. Left bundle branch block (LBBB) was created by radiofrequency ablation or by right ventricular (RV) free wall pacing. Two multi-electrode bands were placed around the ventricles for pacing and mapping (measuring total activation time (TAT) and interventricular electrical delay (IVED)). Hemodynamic effect was quantified as change in LV dP/dtmax. Per experiment, six different combinations of 4 electrodes were predefined, mimicking deployment of the micro lead. For each combination, RV pacing was combined with each of the 4 single sites (=conventional biventricular pacing) and with all possible dual LV site pacing combinations.

Results
Using single LV pacing the change in LV dP/dtmax varied widely between individuals as well as intra-individually with a total range of -4 to +17% (figure, right panel). This change in LV dP/dtmax correlated with the reduction in TAT. Overall, dual LV pacing did not further reduce TAT, but IVED decreased from 42 ± 5 (LBBB) to 4 ± 8 (single LV) and -1 ± 8 ms (dual LV) (p<0.05 for both single and dual). The change in LV dP/dtmax between single and dual LV pacing was small, but significantly better at large than at small interelectrode distances (0-2 vs 5-10 cm: -1 ± 2 vs. +0.3 ±2 % (p<0.05)).

Conclusion
The largest benefit of this micro lead with wider electrodes positioning may be the potential to choose the LV pacing site that provides the optimal hemodynamic CRT benefit. In this study on healthy pigs, the additional benefit of dual LV site pacing was limited.
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Single site LV pacing compared to LBBB

Δ LVdP/dt max [%]

#1 #2 #3 #4 #5 #6 #7 #8

Worst
Best

0 5 10 15 20