Intrinsic vs left ventricular paced activation in heart failure and LBBB - do they tell the same story...?

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Introduction: Left ventricular (LV) pacing sites are optimized by late activation and/or avoidance of conduction barriers attributed to scar. While most operators target the site of latest electrical activation for optimal LV lead placement, some reports suggest that LV paced effects may be a stronger predictor of CRT response. However, little is known about the relationship between intrinsic and paced electrical activation within an individual patient. The goal of the present study is to assess correlation of intrinsic left ventricular conduction gradients with LV paced activation time in heart failure patients with LV electrical dyssynchrony.

Methods: In pts with LBBB receiving CRT with quadripolar (span 47 mm) LV leads for standard indications, we measured the activation interval (qLV) at both the proximal and distal bipole during intrinsic conduction. Then during left ventricular pacing, the interval between the distal (and proximal) LV pacing stimulus to the RV sensed iEGM (LVp-RVs time) was determined. Correlation analysis was performed between the intrinsic and paced activation times at each bipole. Patients with ischemic and non-ischemic cardiomyopathy were contrasted.

Result: Among CRT recipients (n=120, 68±11 yrs, EF 25±6 %, 63% male, 33% ischemic; QRSd 162±19 ms) the mean qLV was 129 ± 28 ms or 79 ± 14% of the intrinsic QRS duration suggesting placement at a terminally activated site. LVp-RVs time was longer than qLV in both ischemic and non-ischemic patients (178 ± 31 ms and 160 ± 27 ms, respectively; both P < 0.05 vs qLV) and showed poor correlation in both ischemic (R² = 0.219) and non-ischemic (R² = 0.322) patients.

Conclusion: Intrinsic conduction and paced electrical delays are largely unrelated, even in the presence of ischemic scar, and reflect independent electrophysiologic properties. Paced effects are unpredictable and should evaluated independently of qLV, with important implications for programming to improve CRT response.