Device Therapy - Cardiac Resynchronisation Therapy (CRT)

Impact of pacing configuration and right ventricular lead location on dynamic atrioventricular delay optimization

Thibault B.[1]; Chow A.[2]; Mangual J.[3]; Badie N.[3]; Waddingham P.[2]; Mcspadden L.[3]; Betts T.[4]; Calo L.[5]; Leyva F.[6]

[1]Montreal Heart Institute, Montreal, Canada
[2]Barts Health NHS Trust, London, United Kingdom of Great Britain & Northern Ireland
[3]Abbott, Sylmar, United States of America
[4]John Radcliffe Hospital, Oxford, United Kingdom of Great Britain & Northern Ireland
[5]Polyclinic Casilino of Rome, Rome, Italy
[6]Aston Medical School, Birmingham, United Kingdom of Great Britain & Northern Ireland

Funding Acknowledgements: Type of funding sources: Private company. Main funding source(s): Abbott

Introduction: Automatic adjustment of atrioventricular delay (AVD) with SyncAV has been shown to improve electrical synchronization. However, the effect of pacing configuration and right ventricular (RV) lead location on SyncAV programming is unknown.

Purpose: Evaluate the effect of pacing configuration and lead location on SyncAV optimization during biventricular (BiV) and LV-only pacing, with and without MultiPoint Pacing (MPP).

Methods: Patients with LBBB and QRS duration (QRSd) ≥ 150 ms scheduled for CRT-P/D device implantation with quadripolar LV lead were enrolled in this prospective study. RV lead location was classified at implant by the operator via fluoroscopy. QRSd was measured post-implant from 12-lead surface ECG by blinded experts during the following pacing modes: intrinsic conduction, BiV (BiV = RV + LV1), MPP (MPP = RV + LV1 + LV2), LV-only single-site (LVSS = LV1 only), and LV-only MPP (LVMPP = LV1 + LV2). For each mode, SyncAV was enabled (e.g. BiV + SyncAV) with the patient-tailored SyncAV offset that minimized QRSd. For BiV and LVSS, LV1 was the latest activating LV cathode; for MPP and LVMPP, LV1 + LV2 were the two LV cathodes with the widest possible separation (≥30mm). All modes used minimal RV-LV and LV1-LV2 delays.

Results: Fifty-three patients (68% male, 36% ischemic, 26% ejection fraction, 169 ms intrinsic QRSd) completed device implant and QRSd assessment. RV leads were implanted in either the septum (48%) or apex (52%), according to implanting physician preference. Relative to intrinsic conduction, BiV + SyncAV and MPP + SyncAV reduced QRSd by 23% and 27%, respectively ($p < 0.01$). LVSS + SyncAV reduced QRSd by 22% ($p < 0.01$ vs BiV + SyncAV), and LVMPP + SyncAV reduced QRSd by 25% ($p < 0.05$ vs MPP + SyncAV). RV apex or septum lead location did not have a significant impact on QRS reduction for each pacing configuration. As a percent of PR interval, optimal SyncAV offsets were similar for BiV + SyncAV and MPP + SyncAV (16% vs 13%, $p = 0.05$), and for LVSS + SyncAV and LVMPP + SyncAV (18% vs 21%, $p = 0.46$), but were significantly higher for LV-only settings vs. corresponding BiV/MPP settings ($p < 0.05$ for both pairs). For BiV + SyncAV, apical vs septal RV leads required greater SyncAV offsets (22% vs 11%, $p < 0.05$). SyncAV offsets also tended to be higher in apical vs septal RV leads for MPP (21% vs 11%), LVSS (20% vs 15%), and LVMPP (25% vs 16%), but without statistical significance.

Conclusion: SyncAV improves acute electrical synchronization in CRT patients with LBBB, particularly with patient-specific SyncAV programming. Pacing configuration (RV + LV or LV only, with or without MPP) and RV lead location (apex or septum) could potentially influence optimal SyncAV programming.

Abstract Figure.