Long-term Performance of Left Bundle Branch Pacing in Patients with Left Bundle Branch Block

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Introduction: Recently, left bundle branch pacing (LBBP) has been demonstrated its feasibility and safety in patients indicated for ventricular pacing and cardiac resynchronization therapy (CRT). However, there is lack of long-term clinical benefits assessment. This study sought to assess the long-term clinical benefits of LBBP in left bundle branch block (LBBB) patients.

Methods: A total of four LBBB patients who met the criteria of LBBP with a more than 3-years follow-up were included. The following criteria were applied to confirm left conduction system capture: 1) RBBB paced morphology in V1 lead with terminal R wave with shape dV/dt; 2) Output-dependent morphology changes between septal myocardial and nonselective-LBBP, or selective-LBBP and nonselective-LBBP; 3) Abrupt shortening of the stimulus to peak left ventricular activation time (LVAT) with increasing output or shortest and constant stimulus to peak LVAT with capture and higher output. 4) Direct recording of Purkinje potentials during escape rhythm or ectopic beats or during His corrective pacing in those with a two-lead implantation technique. The implanted characteristics and clinical outcomes were assessed.

Result: The QRS morphology was changed from intrinsic LBBB pattern with duration of 159.5 ± 17.5 ms to the paced right bundle branch block pattern with duration of 101 ± 3.9 ms. Output dependent selective and nonselective LBBP were achieved in three patients. The stimulus-LVATpeak remained constant at threshold and higher output (78 ± 3.9 vs. 77.5 ± 4.8 ms, P = 0.391). The average R-wave amplitude was 7.7 ± 2.1 mV. The mean follow-up duration was 38.1 ± 2.6 months. The threshold for LBB capture was 0.56 ± 0.12 V/0.5 ms at acute and remained stable of 0.69 ± 0.23 V/0.5 ms at 3 years follow up (P = 0.182). LVEF increased from baseline of 38.7 ± 6.1% to 64.1 ± 2.2% (P = 0.016) and LVESV decreased from baseline of 142.7 ± 91.3 ml to 33.7 ± 10 ml in those three patients with baseline LVEF < 50% at 3 years follow up. NYHA function class improved from baseline of 3.3 ± 1 to 1.3 ± 0.5 (P = 0.016). Cardiothoracic ratio decreased significantly from 0.64 ± 0.01 to 0.57 ± 0.02 (P = 0.01). No macro lead displacements, infections, embolism, deaths or heart failure hospitalizations were observed during follow-up.

Conclusion: Left bundle branch pacing is a feasible and effective method for achieving electromechanical resynchronization of left bundle branch block with resultant improvements in left ventricular structure and function.