

Wireless LV Endocardial Stimulation for Cardiac Resynchronization: Initial Experience from the SELECT-LV Study

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Introduction: Patients indicated for CRT may remain untreated due to difficulties with CS access, lead placement/dislodgement, exit block, high pacing threshold, phrenic nerve stimulation, deteriorating HF, or risk to ICD/pacemaker upgrades. The Wireless Cardiac Stimulation System, WiCS-LV (EBR Systems Inc), is comprised of an implanted battery-powered ultrasonic transmitter and a leadless pacing electrode implanted directly to the LV endocardium. The system detects an RV pacing pulse from a co-implanted pacemaker/ICD and delivers ultrasonic energy to the electrode which transduces the energy to an electrical pacing pulse to stimulate the LV synchronously with the RV. This LV pacing system is being evaluated in the SELECT-LV study.

Methods: In this study, we enrolled the initial 14 pts indicated for CRT but untreated due to difficult CS access/anatomy (n=9), lead dislodgement (n=1), high pacing threshold (n=1), or phrenic nerve stimulation (n=3). TTE screening defined the intercostal space (ICS) location for transmitter implantation. Electrode implantation at the LV mid-lateral free wall was performed using a steerable sheath via a retrograde aortic approach, guided by fluoroscopy and ICE (to identify LV wall thickness at the target locations).

Results: There were adequate ICS windows for transmitter implantation in 12/14 (86%) pts. Baseline characteristics of the implanted pts: NYHA 2.3±0.5; age 70±7 yrs; QRS 176±33ms; RV-Paced QRS 188 ±24 ms; EF 28±5.9%; etiology ICM-7/NICM-2/both-3; AF in 5 pts. Transmitter was placed at ICS #5 (n=1), #6 (n=6) or #7 (n=5). The distance and angle from transmitter to electrode were 8±1.8cm and 34±6.3°; implant times were 69±14 min for the transmitter and 68±27 min for the LV electrode. There were no intra-operative AEs. CRT was achieved in all 12 pts at 1 week follow-up with QRS shortening by 60±24 ms (vs RV pacing). There were 3 post-op AEs: pocket hematoma, femoral pseudoaneurysm, and a CVA in an AF pt in whom warfarin was interrupted.

Conclusions: Wireless endocardial LV pacing provides an alternative approach to CRT. Further studies are required to assess the clinical benefit of this potentially more physiological pacing strategy.