Feasibility and safety of his bundle pacing and left bundle branch area pacing in atrial fibrillation patients in need of pacing

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Introduction: Studies have indicated the feasibility of his bundle pacing (HBP) in atrial fibrillation (AF) patients with potential long term right ventricular pacing (RVP) irrespective of left ventricular ejection fraction (LVEF). Left bundle branch area pacing (LBBAP) is a new pacing approach and also produces narrow QRS duration. This study explores the feasibility of his bundle system pacing (HBSP) including HBP or LBBAP in AF patients in need of RVP.

Methods: A total of 16 pacing-necessary AF patients were prospectively enrolled. Patients with AF and atrial ventricular block (AVB) \( n = 14 \) or patients with tachycardia AF combined with atrial ventricular nodal (AVN) ablation \( n = 2 \) were attempted to undergo both HBP and LBBAP in our center. Electrocardiogram characteristics, pacing parameters, pacing sites, and safety events were assessed at implantation and 3 months. New York Heart Association (NYHA) functional class, echocardiography, QRS duration \( QRS_d \), use of diuretics and lead parameters were measured at baseline and at the 3 months-follow-up.

Result: All 16 AF Patients (mean age 71.2 ± 5.7 years; male 68.8%) were attempted with HBSP successfully in our center. 13 patients \( 13/16 \) underwent both HBP and LBBAP successfully. Another three were attempted to LBBAP \( n = 1 \) or HBP \( n = 2 \) with routine RVP successfully. Electrocardiogram pattern during LBBAP showed right bundle branch conduction delay. In patients with narrow QRSd \( n = 15 \), the native QRSd was 91.00 ± 10.00 ms. The QRS duration was 100.67 ± 9.04 ms in HBP group and was 112.80 ± 6.88 ms in LBBAP group \( P = 0.005 \) for HBP vs. LBBAP). One patient had left bundle branch block (LBBB) with native QRSd 168 ms, and got QRSd corrected to 92 ms by HBP and to 112 ms by LBBAP respectively. Ten of 16 patients had edema of extremity before the procedure and 7 of 10 patients got their diuretics reduced or stopped at 3 months follow up. One patient with LBBB correction by HBP got his LVEF increased and the left ventricular end-diastolic diameter (LVEDD) improved. The pacing parameters were stable in LBBAP and this kept stable during the follow up though the paced QRSd was wider in LBBAP than in HBP. One patient was shifted to LBBAP mode because of increased...
HBP threshold one month after AVN ablation. After the 3 months’ follow-up, 7 Patients had their diuretics reduced or stopped with improvement of symptoms and NYHA class with down trend in LVEDD without significance of LVEF. No perforation or dislodgement happened in our study.

**Conclusion**: This study demonstrates the clinical feasibility and application of both HBP and LBBAP in patients of AF in need of pacing. LBBAP had better parameters though wider QRS duration than HBP and could be a new pacing physiological strategy. Our preliminary study indicates physiological pacing by LBBAP could be another option in patients of AF pacing needed or AF patients with LBBB.