Feasibility, safety, electrophysiological characteristics and mid-term outcomes of Selective Left bundle branch pacing – Indian perspective

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Abstract

Background: His bundle pacing (HBP) has evolved as the most physiological form of pacing but associated with limitations. Recently left bundle branch pacing (LBBP) is emerging as an effective alternative strategy for HBP. Objectives: Our study was designed to assess the feasibility, efficacy, electrophysiological parameters and mid-term outcomes of LBBP in Indian population Methods: All patients requiring permanent pacemaker implantation for symptomatic bradycardia and heart failure were prospectively enrolled. Echocardiography, QRS duration, pacing parameters, Left bundle(LB) potentials, paced QRS duration and peak left ventricular activation time (pLVAT) recorded. Results: LBBP was successful in 93 out of 99 patients (94% acute success). Mean age 62.6 ± 13 yrs. Male 59%, diabetes 69%, coronary artery disease 65%. Follow up duration 4.8 months (range1-12 months). Indication for pacing were atrioventricular (AV) block 43%, cardiac resynchronization therapy 40%, AV node ablation 4%. LB potential noted in 37 patients (40%). QRS duration reduced from 144.38 ±34.6ms at baseline to 110.8 ±12.4ms after LBBP (p value 0.0001). Pacing threshold was 0.59 ± 0.22V and sensed R wave 14.14 ± 7.19 mV and it remained stable during follow up. Lead depth in the septum was 9.62 mm. LV ejection fraction increased from 44.96 % to 53.3 % after LBBP (p value 0.0001). One died due to respiratory tract infection on follow up Conclusion: LBBP is a safe and effective strategy (94% acute success) of physiological pacing. The pacing parameters remained stable over a period of 12 months follow up. LBBP can effectively overcome the limitations of HBP

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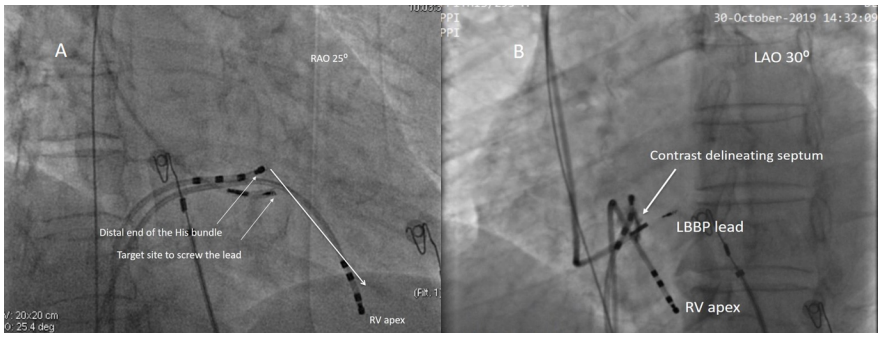
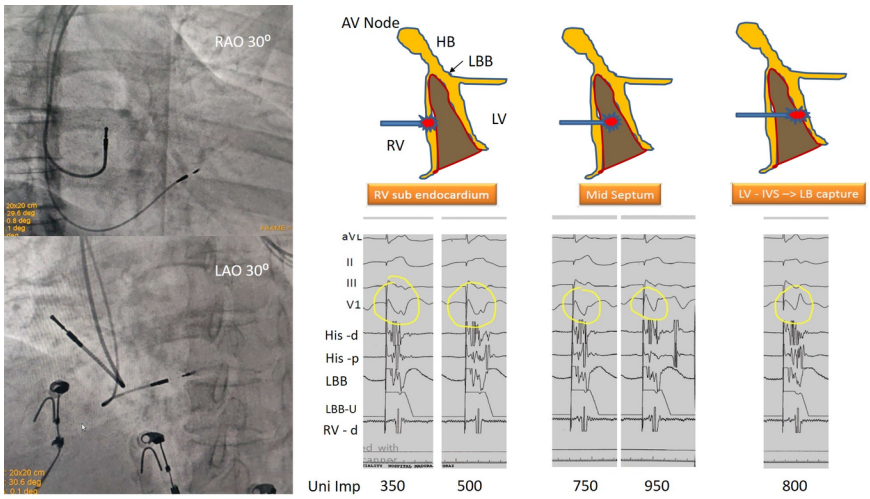
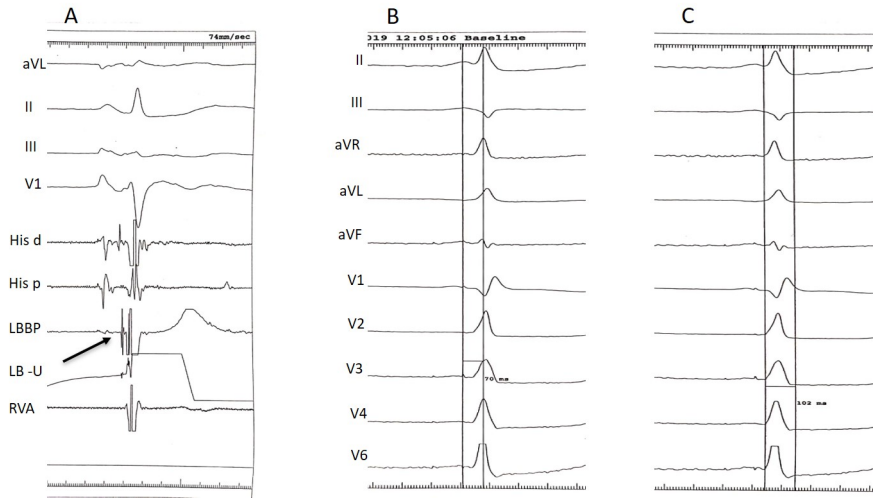
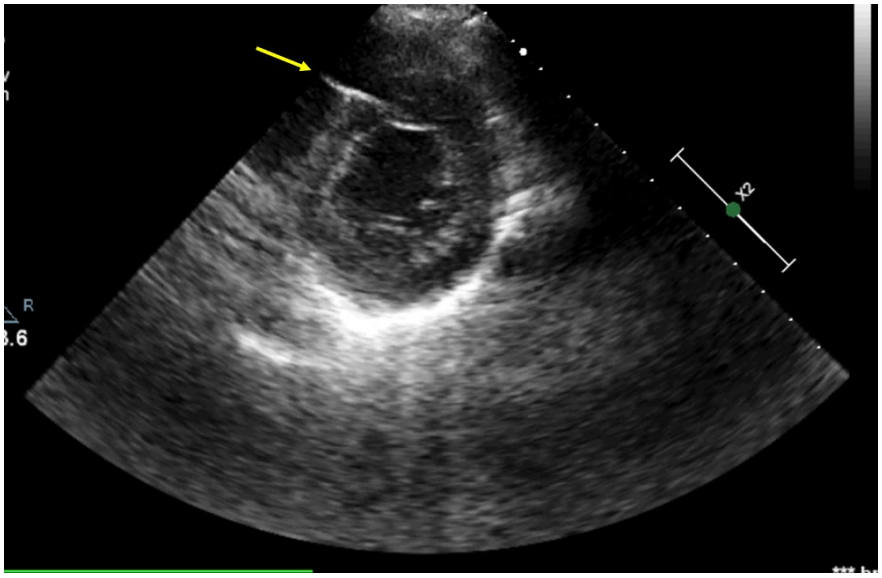
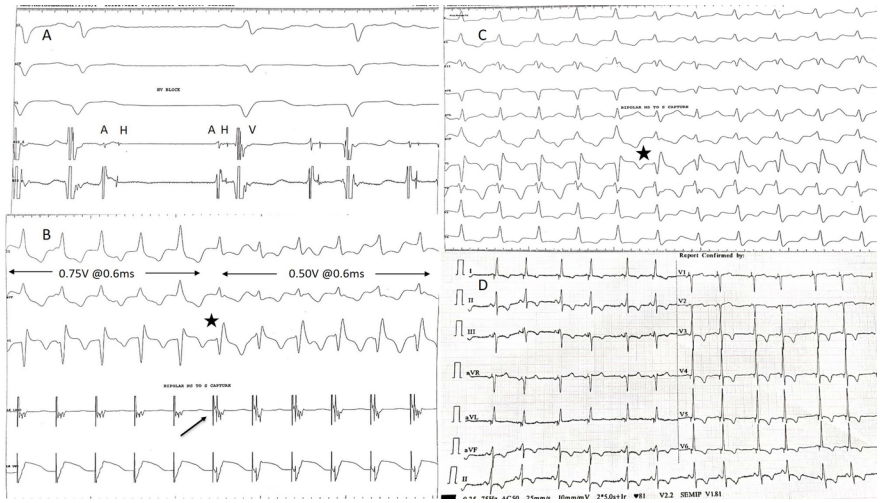




- Quadripolar His catheter from FV → Quick mapping to know the distal extent
- 3830 lead with C315 sheath → 1-1.5cm below the His catheter along the imaginary line in RAO view
- LAO 30° View → Rapid 4-5 turns monitoring the lead tip – based on septal thickness
- Measure QRS, unipolar impedance (≥ 500ohms), pLVAT(<75-80ms)
- Contrast Angiography using 2-3ml in LAO 30° View to assess the lead depth
- Peel away the sheath







Total number of Patients	99 patients
Successful LBB Pacing	93 Patients (94%)
Follow up (months)	4.8 months(range 1-12 months)
Age (yrs)	62.6 ± 13.1
Men Women	55 (59%) 38 (41%)
Hypertension Diabetes Mellitus Coronary artery disease Atrial fibrillation LV dysfunction (EF <50%)	61% 69% 65% 6% 58.1%
Pacing Inducations Sick sinus Syndrome AV block Cardiac resynchronisation therapy Atrial fibrillation with FVR/AVJ ablation Pacing induced Cardiomyopathy	 8 (9%) 40 (43%) 37 (40%) 4 (4%) 4 (4%)
Procedure Characteristics LBBP fluoroscopy time (mins) Total fluoroscopy time (mins) Sheath Angiography	 22.94 ± 11.7 28.59 ± 13.3 56 Patients (61%)
Baseline ECG QRS duration LBBB morphology RBBB morphology IVCD	 144.38 ± 34.6ms 38 12 7

Electrophysiology parameters	
Left bundle potential	37 patients (40%)
LB potential -QRS duration (ms)	24.9 ± 0.49 ms
LB paced QRS duration (ms)	110.8 ± 12.4 ms
pLVAT (ms)	72.5 ± 10.8 ms
Pacing Parameters	
Threshold (unipolar) @0.6ms PW	0.59 ± 0.22 V
Anodal threshold @0.6ms PW	2.02 ± 0.3 V
Sensed R wave (mV)	14.14± 7.19 mV
Unipolar pacing impedance (ohms)	679.4 ± 123.7 ohms
Echocardiographic Parameters	
Baseline LVEF (%)	44.96 ± 14.6%
Septal Thickness (mm)	10.73 ± 1.56mm
Lead depth (mm)	9.62 ± 1.01mm
Worsening of LVEF	Nil
Safety Parameters	
Acute Lead dislodgement	Nil
Late lead dislodgement	Nil
Late raise in threshold by >1V	Nil
Thromboembolic complication	Nil
Mortality	1 (non cardiac)

	At implantation	Follow up (1-12 months)	*P Value*
Pacing Parameters			
Threshold (Unipolar)	0.59 ± 0.22 V	0.57 ± 0.12 V	0.245
R wave (mV)	14.14± 7.19 mV	13.68 ± 5.2 mV	0.199
Pacing Impedance (ohms)	679.4 ± 123.7 ohms	607.7 ± 83.5 ohms	0.0012
ECG – QRS duration (Pre and Post)	144.38 ± 34.6 ms	110.8 ± 12.4 ms	0.0001
Echocardiographic Paraemters			
LV ejection Fraction	44.96 ± 14.6%	53.3 ± 10.9%	0.0001
Worsening of Tricuspid regurgitation	---	Nil	