Left Bundle Branch Pacing: Bench to Bedside and beyond

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Abstract

Cardiac pacing is the only effective therapy for patients with symptomatic brady-arrhythmia. Traditional right ventricular apical pacing causes electrical and mechanical dyssynchrony resulting in left ventricular dysfunction, recurrent heart failure and atrial arrhythmias. Physiological pacing activates the normal cardiac conduction thereby providing synchronized contraction of ventricles. Though His bundle pacing (HBP) acts as an ideal physiological pacing modality, it is technically challenging and associated with troubleshooting issues during follow up. Left bundle branch pacing (LBBP) has been suggested as an effective alternative to overcome the limitations of HBP as it provides low and stable pacing threshold, lead stability and correction of distal conduction system disease. This paper will focus on the implantation technique, troubleshooting, clinical implications and a review of published literature of LBBP

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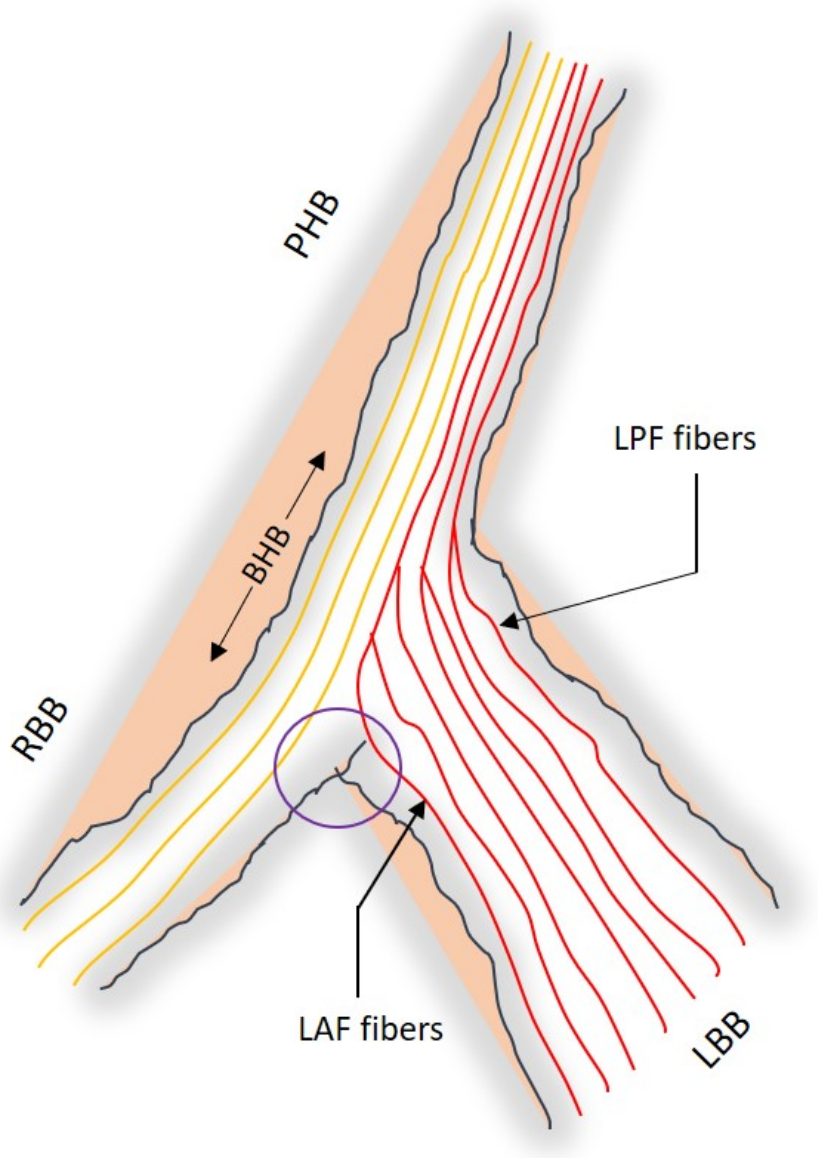
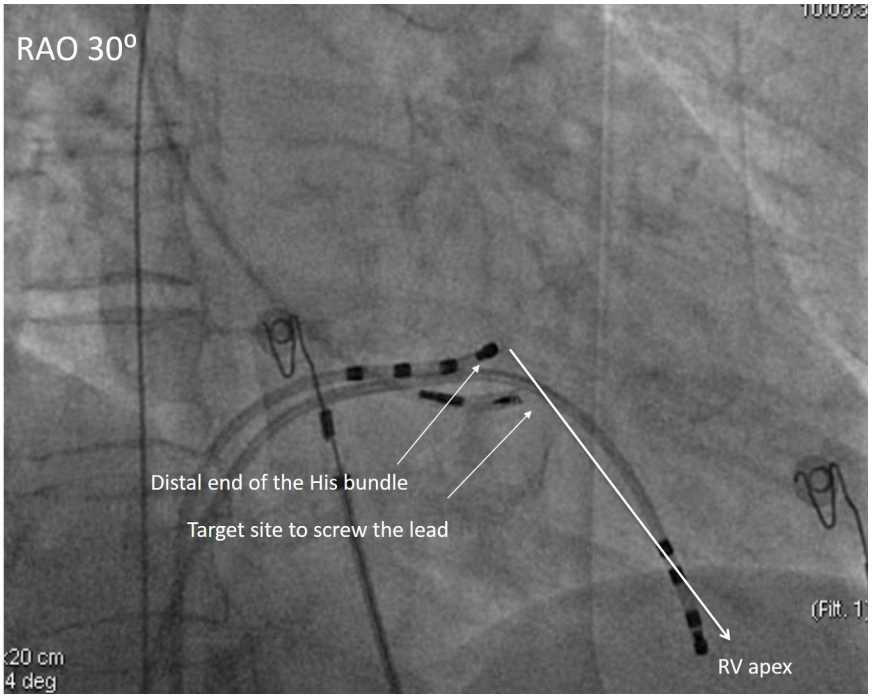
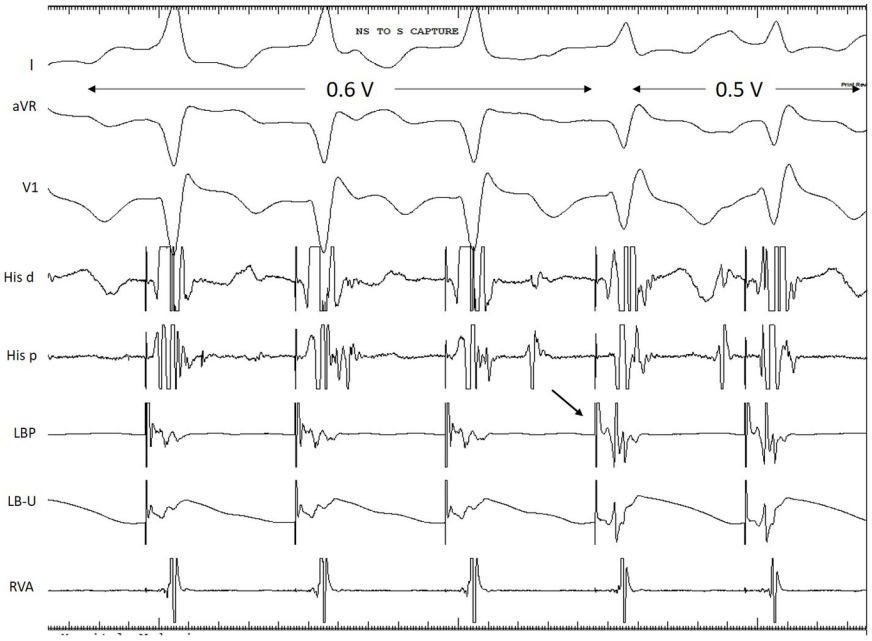
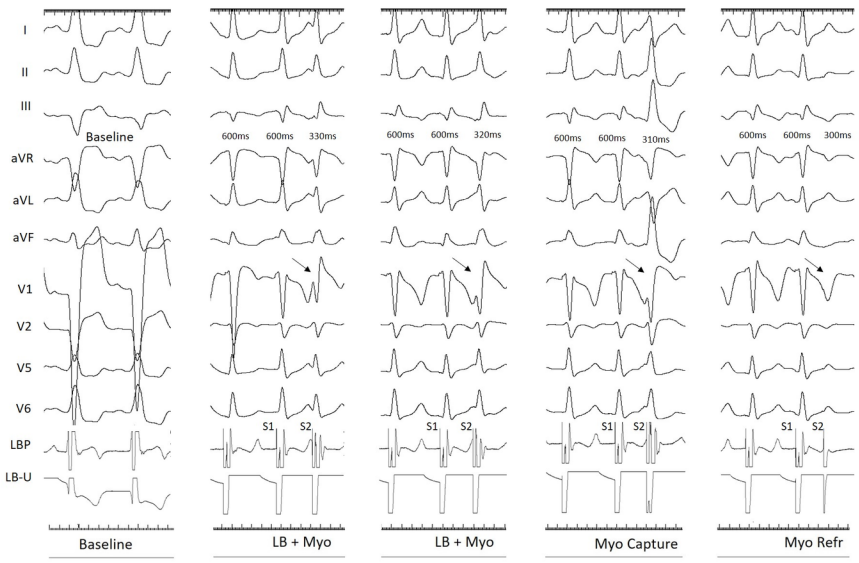
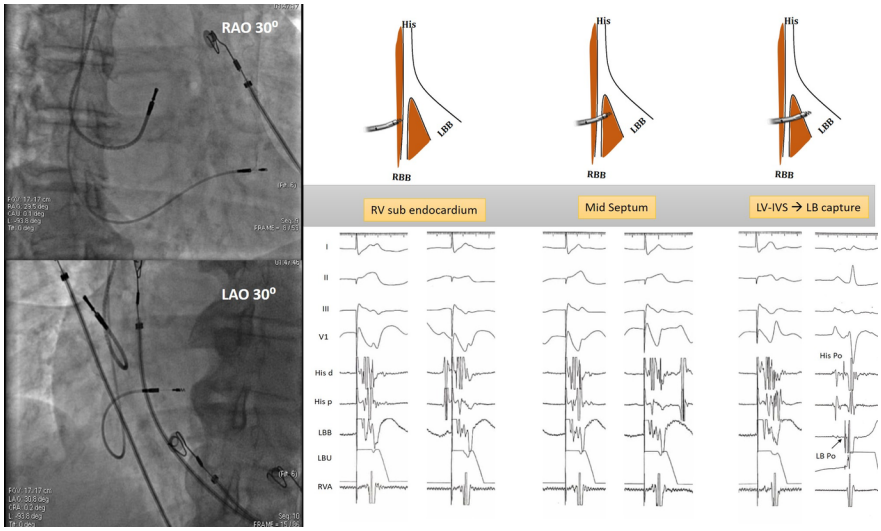
`LBBP review for JCE.docx` available at https://authorea.com/users/309818/articles/451221-left-bundle-branch-pacing-bench-to-bedside-and-beyond

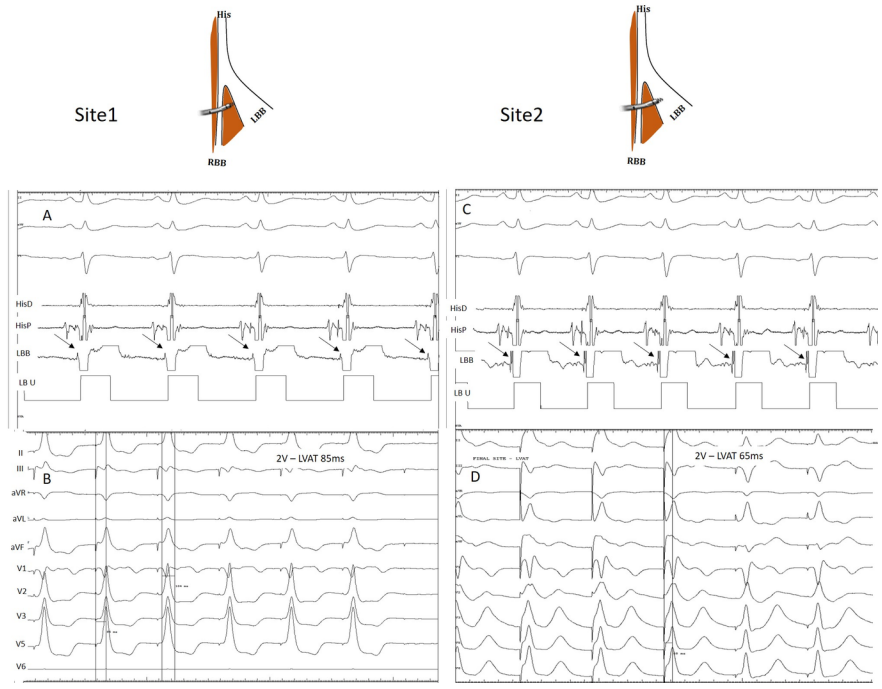


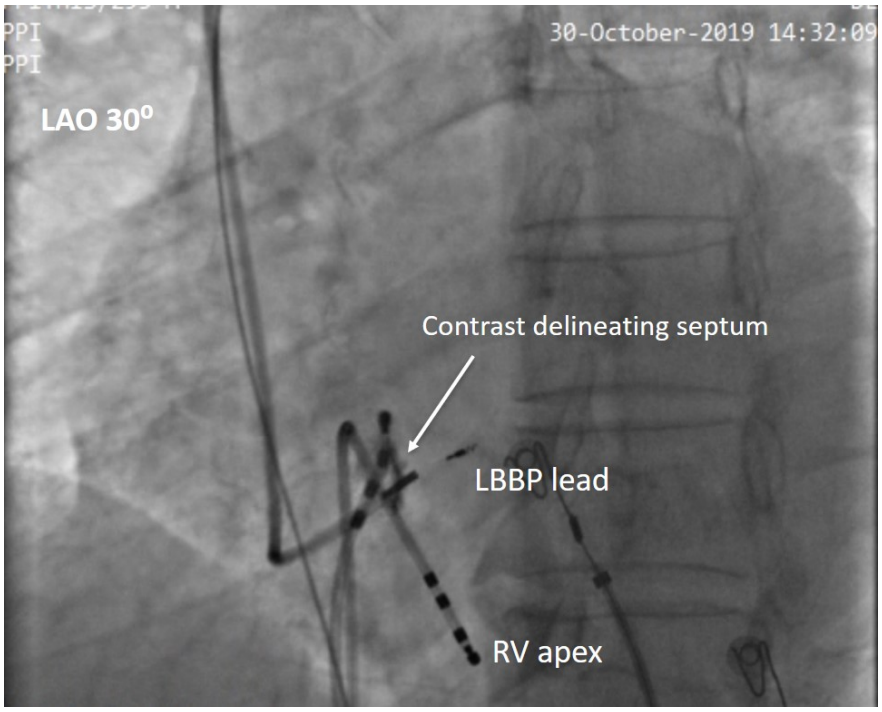


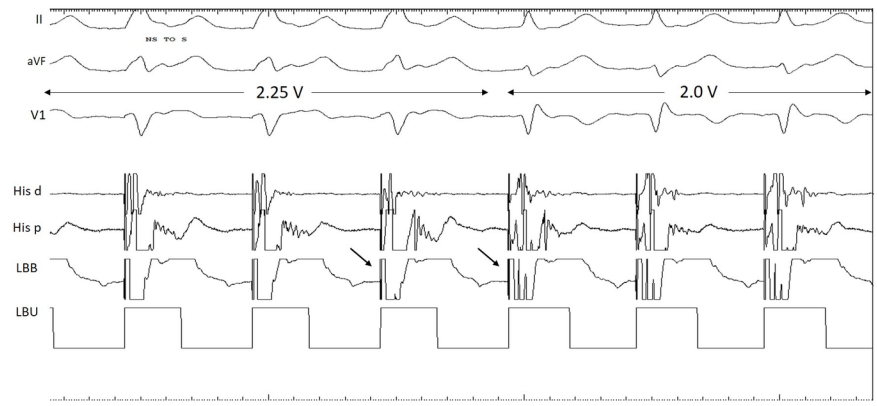


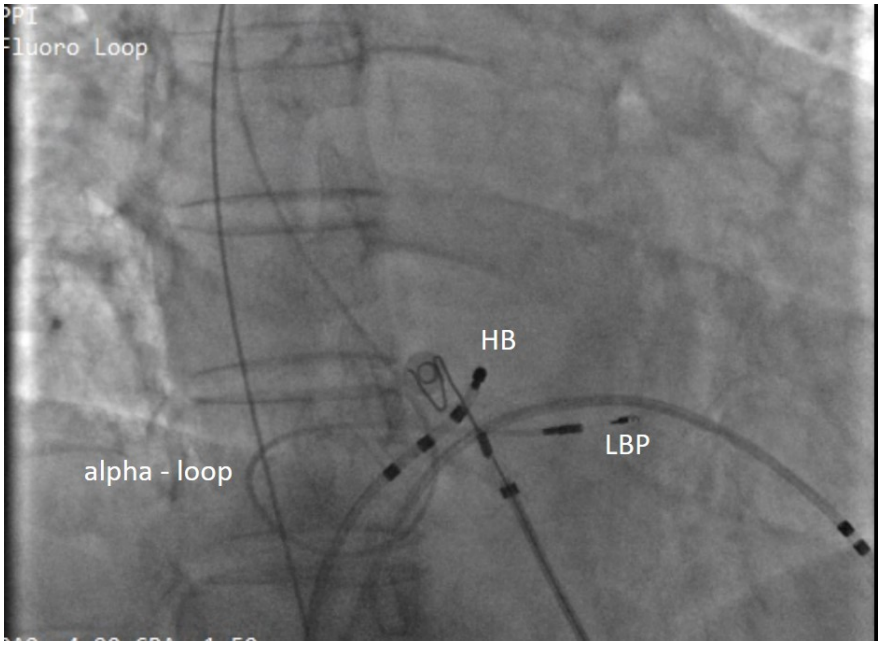


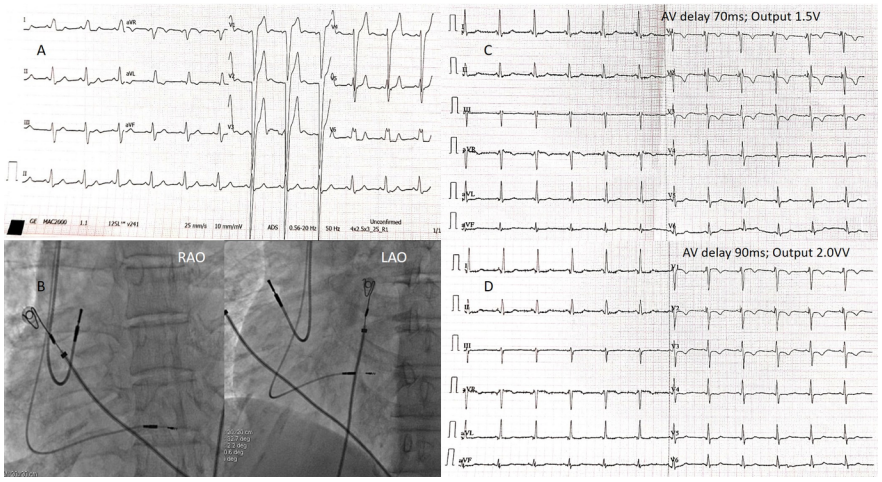












Sl. No	Study	Number of patients[n]	Implant success rate[%]	Paced QRS[ms]	Threshold At implant V@0.5ms	R wave at implant[mV]	Lead revision rates	Objective of the study
				LBBP for Bradycardia				
1	Vijayaraman et al [12]	100	93%	136±17	0.6 ± 0.4	10 ± 6 mV	3 % (3)	Prospective study in patients requiring pacing for bradycardia or heart failure indications
2	Li et al[17]	87	80.5%	113.2 ± 9.9	0.76 ± 0.22	11.99±5.36	0	Prospective study in patients requiring pacing for bradycardia indications
4	Hou et al [18]	56	NR	117.8 ± 11.0	0.5±0.1	17±6.7	0	Prospective study assessing LV synchrony in HBP vs LBBP vs RVP
5	Li et al [14]	33	90.9%	112.8 ± 10.9	0.76 ±0.26	14.4	3.03 (1)	Prospective study of LBBP in AV block
6	Zhang et al[16]	23	95%	112.6 ± 12.14	0.68±0.2	9.28 ± 5.00	0	Prospective comparative study of LBBP over RVP in 44 consecutive patients
7	Hasumi et al [25]	21	81%	116 ± 8.3	0.77 ± 0.07	9.1 ± 1.4	0	Retrospective study assessed the feasibility of LBBP in failed HBP for AV block
8	Chen et al [26]	20	NR	111.8 ± 10.7	0.73 ± 0.2	NR	0	Prospective study to compare the feasibility and ECG patterns during LBBP vs RVP
9	Jastrzebski et al [10]	143	NR	111.9 ± 15.1	0.6 ± 0.3	9.0 ± 5.1	NR	Prospective study to analyze the programmed deep septal stimulation in regard to diagnosis of LBB capture
10	Su et al [27]	115	NR	111.4 ± 10.3	0.6 ± 0.2	11.3 ± 5.4	0	Retrospective study to assess LB current of injury in LBBP
11	Cai et al (23)	40	90%	101 ± 8.7	0.49 ± 0.22	11.7 ± 5.3	0	Prospective study to assess the cardiac synchrony in SSS patients undergoing LBBP Vs RVP
12	Wang et al [22]	66	94%	121.4 ± 9.8	0.94 ± 0.21	12.1 ± 3.6	4.5%(3)	Prospective randomized study to compare the depolarization and repolarization measures between LBBP Vs RVP
13	Vijayaraman et al (24)	28	93%	125 ±15	0.64 ± 0.3	14 ± 8	0	Retrospective study to assess the feasibility of HPCSP pacing after TAVR (LBBP and HBP)
				LBBP for CRT				
1	Zhang et al[19]	11	NR	129.09 ± 15.9	0.83 ±0.16	9.1 ± 3.4	0	Study assessing clinical outcomes of LBBP in patients with HF, reduced LVEF and LBBB
2	Wang et al [28]	8	94.5%	NR	0.79 ± 0.18	NR	NR	Retrospective study assessed the efficacy of HPCSP + AVJ ablation in patients with AF and ICD
3	Huang et al [15]	63	97%	118 ± 12	0.5 ± 0.15	11.1 ± 4.9	0	Prospective study to assess the feasibility and efficacy of LBBP in LBBB with NICM
4	Wu et al [29]	32	100%	110.8 ± 11.1	0.49 ± 0.13	11.2 ± 5.1	0	Prospective study to compare CRT efficacy of LBBP, HBP and BiV pacing.
5	Jiang et al (21)	73 (63+10)	Atypical BBB – 30% (3) Typical BBB – 82.5% (52) 75.3%	133 ± 14 118 ± 14	0.6 ± 0.2	13.6 ± 7.6	0	Retrospective study to assess whether typical use of strict criteria to define BBB predicts LBBP success
6	Vijayaraman et al [30]	325	85%	137 ±22	0.6 ±0.3	10.6 ± 6	2.5 % (7)	Retrospective study assessed the feasibility and outcomes of LBBP in CRT eligible patients
	Total	***1244***	***90.65%***	***117.9***	***0.626***	***11.58***	***1.28% (14)***	