

Evaluation of Unipolar and Bipolar Left Bundle Branch Area Pacing

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Introduction. Left bundle branch area pacing (LBBAP) recruits the cardiac conduction system from the left interventricular septum. LBBAP output can be programmed in unipolar or bipolar for some devices. In contrast to unipolar pacing, bipolar pacing can additionally recruit the right side of the septum. The objective of this study is to compare differences in paced ECG with unipolar vs. bipolar LBBAP and compare with traditional right ventricular pacing (RVP).

Methods. We retrospectively reviewed 288 patients who underwent a LBBAP lead implantation between 2020-2023 and 172 RVP controls from 2018-2019 at The University of Kansas Medical Center. These patients routinely get ECGs with unipolar and bipolar pacing polarity. We compared the paced QRS duration, left ventricular activation time (LVAT), and V6-V1 interpeak time between unipolar and bipolar LBBAP, and also with bipolar RVP controls.

Results. Compared to RVP controls, LBBAP was associated with shorter paced QRS duration (118.9 ± 16.8 ms vs. 143.2 ± 23.2 ms, $p < 0.01$) and LVAT (73.7 ± 18.1 ms vs. 87.5 ± 23.9 ms, $p < 0.01$). LBBAP leads had a lower threshold ($p < 0.01$) immediately after implant, though the difference in threshold disappeared by three months ($p = 0.52$). The sensing was higher with LBBAP than traditional RV at three months ($p = 0.007$). There were no statistical differences in the QRS duration, LVAT, and V6-V1 interpeak times with unipolar vs. bipolar LBBAP.

Conclusions. LBBAP has better ECG synchronization than traditional RVP. There was no difference in QRS duration, LVAT, or V6-V1 interpeak time with unipolar vs. bipolar LBBAP.