The clinical application value of current of injury in left bundle branch pacing

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Introduction: Left bundle branch pacing (LBBP), a new transvenous technique for LBB pacing using a transseptal approach has been used for the development of conduction bundle pacing. Although the primary criteria of capture bundle have been refined recently, it still needs measurements and verification repeatedly, especially for those with insufficient experience performers. Several studies have demonstrated that current of injury (COI) of His bundle pacing is associated with the lower capture threshold and long-term stability. The aims of this study were to explore whether COI of LBB can predict 1) LBB capture directly, 2) lead long term stability.

Methods: This study was a single-center, retrospective registry. The patients were included from September 2018 to March 2019 if they met the criteria of pacemaker indications and QRS<120ms. LBBP was performed using the 3830 lead with C315His sheath. LBB potential electrogram (EGM) was recorded in a unipolar vector from the lead tip using PSA and electrophysiology recording systems. The criteria of LBB capture was defined as paced RBBB pattern, recorded LBB potential and at least one of criteria as follow: constant and shortest pacing stimulus to left ventricular activation time (stim-LVAT) or abruptly shortened stim-LVAT, selective or nonselective LBBP. Parameters and complications were documented at implant and during the F/U of 6 months.

Result: 77 patients tried LBBP and recorded LBB potential. LBB COI was recorded in 54 (70%) patients while 23(30%) patients did not recorded LBB COI. The conduction bundle was captured below 3V/0.5ms in all patients with COI, which is significantly higher than patients without COI (100% VS 82.6%, p=0.002). COI sensitivity for capture was 74% and specificity was 100%. Selective LBBP is more common in patients with COI than patients without COI (48.1% VS 5.3%, P<0.001). The immediate capture LBB threshold were lower in patients with COI compared to patients without COI (0.45±0.15V VS 0.6±0.17V, P<0.001). 67 patients (47 COI; 21 no COI) finished 6 months F/U and there was no significant difference in parameters including impedance and V wave amplitude between the two groups. The thresholds in the COI group became the same as that in the group without COI after 6 months F/U (0.61±0.19V VS 0.6±0.15V, P=0.767). LVEF and LVEDD improved in two groups without significant growth differentials. There were neither perforation nor dislocation in both groups.

Conclusion: 1. COI of LBB can be recorded during LBBP in 70% of population, which is more than HB COI reported in the literature. 2. LBB COI can be a bonus marker of LBB capture and more common in selective LBBP at implantation. 3. No serious complications and parameters are safe in both groups during 6 months F/U.