Lower intercostal spaces depicted better final r wave than V1 at left bundle branch pacing implant attempts

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Background: Left bundle pacing lead positioning implies screwing the lead until a final 'r' wave is seen in V1 ECG lead (unipolar pacing), depicting the left part of the septum has been reached. That final vector should be better seen if V1 is placed parallel rather than perpendicular to the lead tip, so we used lower intercostal spaces for V1, to test this hypothesis. Failure to see the 'r' wave could increase the screwing efforts owing to perforation.

Methods: Leads V1 to V5 were positioned from 2nd to 6th right sided intercostal spaces during implants. Fluoroscopy was used to ascertain the lead most parallel to the final tip position. Inferior leads were used to confirm anterior, mid or posterior implants. A ratio between the 'r' wave amplitude and the QRS amplitude was used to compare the intercostal space depicting better the final 'r' wave.

Results: 19 patients were implanted using this new set-up of precordial leads (see figure 1); 32% were female; mean age at implant was 77.6 +/- 8.04 years (range 58.3-90.6 years old); all but two were Medtronic 3830 leads. Regarding the position 26%, 32% and 42% of the leads ended in the posterior, mid or anterior septum respectively. Mean unipolar pacing QRS was 126ms +/- 18.2ms and mead LVAT was 76ms +/-19ms. Only 31% of patients had the lead placed parallel to the 4th intercostal space; 13% had the lead parallel between the 4th and the 5th space; and 56% of implants, had the 5th or 6th space as the most parallel to the lead tip. Finally in a consistent way, mean ratios of 'r'/QRS amplitude were increasing at every intercostal space from: 0.12/2nd; 0.24/3rd; 0.3/4th; 0.35/5th and 0.45/6th (except for most posterior implanted leads where ratios varied less); this finding was even greater for anterior implanted leads (see figure 2).

Conclusion: Final 'r' wave is better depicted when V1 is lowered to 5th or 6th intercostal space, as the leads are mostly implanted parallel to these observation sites; but the septum is also a 3-D structure and when the leads are implanted too anterior, there is almost no way to see the final 'r' wave in usual 4th space V1, as the vector is directed mostly in the opposite direction (posteriorly and downward), while a lower placed V1 allows some of that vector to be depicted anyways. Placing V1-V3 leads in 4th-6th intercostal spaces could prevent excessive screwing and reduced perforation rates specially in anterior implanted leads.

LAO: V1 to V5 placed 2-6 R intercostal
'r' not seen until 5th-6th R intercostal