

Variation in Optimal Haemodynamic Atrio-ventricular Delay of Biventricular Pacing with Different Endocardial Left Ventricular Lead Locations using Precision Haemodynamics

Butcher CJT¹, Emily Cantor¹, Sohaib SMA¹, Matthew Shun-Shin², Ross Haynes¹, Habib Khan¹, Kyriacou A³, Rui Shi¹, Zhong Chen¹, Shouvik Halder¹, John Cleland², Wajid Hussain¹, Vias Markides¹, David Jones¹, Lane RE¹, Mason MJ¹, Zachary Whinnett², Darrel Francis², and Wong T¹

¹Royal Brompton and Harefield Hospitals

²Imperial College London

³Sheffield Teaching Hospitals NHS Foundation Trust

June 16, 2022

Abstract

Background: It is not known whether the optimal Atrioventricular delay (AV_{opt}) varies between left ventricular (LV) pacing site during endocardial biventricular pacing (BiVP) and may therefore needs consideration. **Methods:** We assessed the haemodynamic AV_{opt} in patients with chronic heart failure undergoing endocardial LV lead implantation. AV_{opt} was assessed during atrio-biventricular pacing (BVP) with a “roving LV lead”. Up to four locations were studied: mid lateral wall, mid septum (or a close alternative), site of greatest haemodynamic improvement and LV lead implant site. The AV_{opt} was compared to a fixed AV delay of 180ms. **Results:** Seventeen patients were included (12 male, aged 66.5 +/- 12.8 years, ejection fraction 26 +/- 7%, 16 left bundle branch block or high percentage of right ventricular pacing (RVP), QRS duration 167 +/-27 ms). In most locations (62/63), AV_{opt} increased systolic blood pressure during BiVP compared with RVP (relative improvement 6 mmHg, IQR 4-9mmHg). Compared to a fixed AV delay the haemodynamic improvement at AV_{opt} was higher (1mmHg, IQR 0.2-2.6mmHg, $p<0.001$). Within most patients (16/17), we observed a difference in AV_{opt} between pacing sites (median paced AV_{opt} 209 ms, IQR 117-250). Within this range, the haemodynamic impact of these differences was small (median loss 0.6 mmHg, IQR 0.1-2.6mmHg). **Conclusion:** Within a patient, different endocardial LV lead locations have slightly different haemodynamic AV_{opt} which are superior to a fixed AV delay. The haemodynamic consequence of applying an optimum from a different lead location is small.

Hosted file

AVOpt_Manuscript_JCE.docx available at <https://authorea.com/users/489504/articles/573209-variation-in-optimal-haemodynamic-atrio-ventricular-delay-of-biventricular-pacing-with-different-endocardial-left-ventricular-lead-locations-using-precision-haemodynamics>