Triple-site pacing for cardiac resynchronization in permanent atrial fibrillation – Acute phase results from a prospective observational study

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Abstract
Introduction and Aim
Multi-site pacing is emerging as a new method for improving response to cardiac resynchronization therapy (CRT), but has been little studied, especially in patients with atrial fibrillation. We aimed to assess the effects of triple-site (Tri-V) vs. biventricular (Bi-V) pacing on hemodynamics and QRS duration.

Methods
This was a prospective observational study of patients with permanent atrial fibrillation and ejection fraction <40% undergoing CRT implantation (n=40). One right ventricular (RV) lead was implanted in the apex and another in the right ventricular outflow tract (RVOT) septal wall. A left ventricular (LV) lead was implanted in a conventional venous epicardial position. Cardiac output (using the FloTrac™ Vigileo™ system), mean QRS and ejection fraction were calculated.

Results
Mean cardiac output was 4.81±0.97 l/min with Tri-V, 4.68±0.94 l/min with RVOT septal and LV pacing, and 4.68±0.94 l/min with RV apical and LV pacing (p<0.001 for Tri-V vs. both BiV). Mean pre-implantation QRS was 170±25 ms, 123±18 ms with Tri-V, 141±25 ms with RVOT septal pacing and LV pacing and 145±19 with RV apical and LV pacing (p<0.001 for Tri-V vs. both BiV and pre-implantation). Mean ejection fraction was significantly higher with Tri-V (30±11%) vs. Bi-V pacing (28±12% with RVOT septal and LV pacing and 28±11 with RV apical and LV pacing) and pre-implantation (25±8%).

Conclusion
Tri-V pacing produced higher cardiac output and shorter QRS duration than Bi-V pacing. This may have a significant impact on the future of CRT.

Keywords
Cardiac resynchronization therapy, Multi-site pacing, Triple-site pacing, Heart failure, Atrial fibrillation, Cardiac output, QRS duration, Ejection fraction