

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 ($30 \pm 11\%$) vs. Bi-V pacing ($28 \pm 12\%$ with RVOT septal and LV pacing and 28 ± 11 with RV apical and LV pacing) and pre-implantation ($25 \pm 8\%$).

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