

## Arrhythmias and interventional therapy

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### THE ADVANCED EXPERIENCE IN COMBINING BIV-PACING WITH AVN-FIRST FOR IMPROVING EFFICIENCY FROM CRT

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**Background and objectives** Cardiac resynchronisation therapy (CRT) is now an established non-pharmacologic therapy for advanced congestive heart failure (CHF) with electro-mechanical delay. However, lack of a favourable response in about 1/3 patients remains a challenge to cardiologists. This study evaluated the impact of biventricular (biv-) with atrio-ventricular node (AVN) preference pacing on patients with CHF after CRT.

**Methods** From January 2008 to December 2009, 44 patients (34 male, mean aged  $62.11 \pm 9.03$ ) were included in the study. All patients met IA CRT indications, with sinus rhythm and normal AV conduction. Patients were randomly treated by either traditional biv-pacing or biv with AVNP (AVNP) pacing mode for at least 1 month, and then transferred to another mode. AVNP pacing was performed by titrating AV delay and VV delay under ECG monitoring until the ventricles were activated by both pacemaker and AVN, and the narrowest QRS complex appeared. Patients in traditional biv-pacing mode were optimised using echocardiography. QRS duration, echocardiography, NYHA classification, 6 min walk test, Minnesota Living with Heart Failure Questionnaire (MLHFQ) and cardiac events during follow-up were compared between 2 modes. Patients were programmed in the mode with most benefit at the end of study.

**Results** 44 patients received CRT-P/D successfully. Compared with baseline, all patients experienced improvements in symptoms, exercise tolerance and quality of life as well as performance in ECG and echocardiography at the end of the study. There were no deaths, rehospitalisation and cardiac events. The AVNP pacing succeeded in all patients. Patients under AVNP mode had shorter QRS duration ( $118.35 \pm 21.59$  vs  $146.35 \pm 5.31$  ms,  $p < 0.0001$ ), longer AVd ( $164$  vs  $128$  ms,  $p < 0.001$ ) compared to traditional mode. At the end of follow-up, the LVFS ( $17.41 \pm 5.9$  vs  $15.66 \pm 4.90$ ,  $p = 0.019$ ), LVEF ( $35.50 \pm 9.72$  vs  $32.68 \pm 9.74$ ,  $p = 0.048$ ) and peak aortic valve velocity ( $115.00 \pm 20.93$  vs  $106.80 \pm 20.87$  m/s,  $p = 0.002$ ) were larger in AVNP mode than traditional mode. The NYHA classification ( $1.82$  vs  $1.98$ ,  $p = 0.008$ ), 6 min walk test ( $372.51 \pm 80.88$  vs  $328.66 \pm 108.89$  m,  $p = 0.0001$ ) and MLHFQ scores ( $12.48 \pm 6.56$  vs  $18.16 \pm 12.25$ ,  $p = 0.0001$ ) were higher in AVNP mode compared to traditional mode.

**Conclusions** Ignoring AVN in the traditional biv-pacing mode would lead to wider QRS waveform, this might be one reason of non-response. The AVNP pacing combined resynchronisation and physiological pacing by multisite activation. In our study, patients experienced more benefits in symptom, cardiac function and quality of life under biv with AVNP pacing mode compared to traditional mode. For patients with sinus rhythm and normal AV conduction who did not response well to CRT, the new biventricular with AVNP pacing may improve benefits and increase the response rate.