Right atrial pacing impairs cardiac function during resynchronization therapy: acute effects of DDD pacing compared to VDD pacing

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OBJECTIVES: We aimed to compare the hemodynamic effects of right-atrial-paced (DDD) and right-atrial-sensed (VDD) biventricular paced rhythm on cardiac resynchronization therapy (CRT). BACKGROUND: Cardiac resynchronization therapy improves hemodynamics in patients with severe heart failure and left ventricular (LV) dyssynchrony. However, the impact of active right atrial pacing on resynchronization therapy is unknown. METHODS: Seventeen CRT patients were studied 10 months (range: 1 to 46 months) after implantation. At baseline, the programmed atrioventricular delay was optimized by timing LV contraction properly at the end of atrial contraction. In both modes the acute hemodynamic effects were assessed by multiple Doppler echocardiographic parameters. RESULTS: Compared to DDD pacing, VDD pacing resulted in much better improvement of intraventricular dyssynchrony assessed by the septal-to-posterior wall motion delay (VDD 106 +/- 83 ms vs. DDD 145 +/- 95 ms; p = 0.001), whereas the interventricular mechanical delay (difference between onset of pulmonary and aortic outflow) did not differ (VDD 20 +/- 21 ms vs. DDD 18 +/- 17 ms; p = NS). Furthermore, VDD pacing significantly prolonged the rate-corrected LV filling period (VDD 458 +/- 123 ms vs. DDD 371 +/- 94 ms; p = 0.0001) and improved the myocardial performance index (VDD 0.60 +/- 0.18 vs. DDD 0.71 +/- 0.23; p < 0.01). CONCLUSIONS: Our findings suggest that avoidance of right atrial pacing results in a higher degree of LV resynchronization, in a substantial prolongation of the LV filling period, and in an improved myocardial performance. Thus, the VDD mode seems to be superior to the DDD mode in CRT patients.