

Atrioventricular Interval Optimization after Biventricular Pacing: Echo/Doppler vs. Impedance Plethysmography

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Introduction

Optimization of the atrioventricular interval (AVI) is crucial when pacing for hemodynamic improvement in patients with congestive heart failure.

The most widely used technique for determining optimal AVI, Doppler/echocardiographic techniques, is operator dependent, requires multiple carefully obtained measurements, and may be time consuming and costly.

Methods

We have previously reported on AVI optimization in patients with standard dual-chamber pacemaker by Doppler echocardiography vs. impedance plethysmography.

To further validate this method of AVI optimization, we simultaneously performed impedance plethysmography and Doppler echocardiography in 12 patients with Class III or IV congestive heart failure following implant of a P-synchronous biventricular pacing system.

Results

The optimal AVI ranged from 60 to 120 ms. By impedance plethysmography the optimal AVI was the AVI that yielded the highest cardiac output. In 8 patients (67%) the optimal AVI by Doppler echocardiography and impedance plethysmography was identical.

In another patient the optimal AVIs were different by only 10 ms between the two techniques and a cardiac output difference of only < 0.2 L/min. In the remaining 3 patients the optimal cardiac output by impedance plethysmography differed minimally, < 0.2 L/m, from the cardiac output obtained at the AVI that correspond to the optimal AVI by Doppler echocardiography.

Summary

- Optimal AVI by Doppler echocardiography and impedance plethysmography yielded identical results in 67% of patients.
- The small difference observed in the remaining patients may be a result of variation in the impedance plethysmography technique itself and the observed cardiac output plateau at AVIs near the optimal AVI.
- Impedance plethysmography appears to be a viable technique for AVI optimization.