
BACKGROUND: Previous studies of pacing therapy for dilated congestive heart failure (CHF) have not established the relative importance of pacing site, AV delay, and patient heterogeneity on outcome. These variables were compared by a novel technique that evaluated immediate changes in hemodynamic function during brief periods of atrial-synchronous ventricular pacing.

METHODS AND RESULTS: Twenty-seven CHF patients with severe left ventricular (LV) systolic dysfunction and LV conduction disorder were implanted with endocardial pacing leads in the right atrium and right ventricle (RV) and an epicardial lead on the LV and instrumented with micromanometer catheters in the LV, aorta, and RV. Patients in normal sinus rhythm were stimulated in the RV, LV, or both ventricles simultaneously (BV) at preselected AV delays in a repeating 5-paced/15-nonpaced beat sequence. Maximum LV pressure derivative (LV+dP/dt) and aortic pulse pressure (PP) changed immediately at pacing onset, increasing at a patient-specific optimal AV delay in 20 patients with wide surface QRS (180+/-22 ms) and decreasing at short AV delays in 5 patients with narrower QRS (128+/-12 ms) (P<0.0001). Overall, BV and LV pacing increased LV+dP/dt and PP more than RV pacing (P<0.01), whereas LV pacing increased LV+dP/dt more than BV pacing (P<0.01).

CONCLUSIONS: In this population, CHF patients with sufficiently wide surface QRS benefit from atrial-synchronous ventricular pacing, LV stimulation is required for maximum acute benefit, and the maximum benefit at any site occurs with a patient-specific AV delay.