Letters to the Editor

Is Acute Hemodynamic Response a Predictor of Long-Term Outcome in Cardiac Resynchronization Therapy?

In a recent issue of the Journal, Duckett et al. (1) published a study indicating that the acute hemodynamic response ([AHR], assessed by \( \text{LVdP/dt}_{\text{max}} \), the maximum rate of rise of left ventricular pressure) predicts reverse remodeling ([RR], which is the decrease in left ventricular end-systolic volume) in recipients of cardiac resynchronization therapy (CRT). At first glance, these results seem long-awaited and fit with physiological ideas about the action of CRT. In an editorial comment, Bozkurt and Ramasubbu (2) mention that “whether a nonresponse to early surrogate testing will identify the chronic nonresponder to CRT, with respect to hard clinical endpoints, remains to be answered.” Recently, we investigated the relation between \( \text{LVdP/dt}_{\text{max}} \) and survival in the majority of CRT patients treated in 2 centers over a 5-year period \((n = 285)\) (3). Absolute \( \text{LVdP/dt}_{\text{max}} \) at baseline predicted 1-year mortality (hazard ratio: 0.79), but the change in \( \text{LVdP/dt}_{\text{max}} \) upon CRT had no relation to outcome. As frequent users of LVdP/dt\(_{\text{max}}\) considering the possibility of \( \Delta\text{LVdP/dt}_{\text{max}} \) as a predictor of outcome, we were initially surprised and disappointed by these findings. However, the data are strong and consistent with a recent Japanese study (4). Therefore, we think that there is stronger evidence against than in favor of a relation between AHR and long-term outcome. The apparently contradictory findings by Duckett et al. (1) may be (in part) explained by several limitations of their study: 1) its sample size was small \((n = 32)\), explaining why adjusting the cutoff value for percentage of change in \( \text{LVdP/dt}_{\text{max}} \) from 10% to 11.1% (a small difference, considering the ~8% baseline drift in \( \text{LVdP/dt}_{\text{max}} \)), increased specificity from 64% to 86%; 2) switching from natural sinus rhythm to atrial pacing caused an unusually large (~11%) increase in \( \text{LVdP/dt}_{\text{max}} \); 3) it is not mentioned whether these patients were a selected subgroup or consecutive patients; 4) the relation between AHR and RR was only evaluated by dichotomously separating responders and nonresponders, without showing a scatter plot or linear regression; and 5) it was not reported whether absolute baseline \( \text{LVdP/dt}_{\text{max}} \) related to RR. Because baseline \( \text{LVdP/dt}_{\text{max}} \) strongly determines percentage of change in \( \text{LVdP/dt}_{\text{max}} \), it may seem that the percentage of change in \( \text{LVdP/dt}_{\text{max}} \) relates to RR, although it is actually the absolute baseline value. Summarizing, we think that there are some questions regarding the reported relation between AHR and RR (1) and that there is even less evidence to support using AHR to predict long-term outcome in CRT.

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2. Bozkurt B, Ramasubbu K. Guiding left ventricular lead positioning and refining ability to predict response and nonresponse to cardiac resynchronization therapy using \( \text{dp/dt}_{\text{max}} \) killing 3 birds with 1 high-fidelity wire? J Am Coll Cardiol 2011;58:1137–9.

Reply

We thank Dr. Prinzen and colleagues for their interest in our study (1). They comment that our results fit with physiological concepts regarding cardiac resynchronization therapy but are not supported by their findings that baseline rather than change in (the maximum rate of LV pressure rise \( \text{LVdP/dt}_{\text{max}} \)) predicted survival (2).

We acknowledge that our study was limited by a small sample size and that our patients were a selected group meeting criteria for an inclusive research protocol. We used a 10% rise in \( \text{LVdP/dt}_{\text{max}} \) to define acute response, which was supported by the receiver-operator analysis giving a cutoff of 11.1%, although this small increase did change the specificity to 86% from 64%. We found a moderate correlation between percentage rise in \( \text{LVdP/dt}_{\text{max}} \) and extent of remodeling \((r = 0.6)\) but no relationship between baseline \( \text{LVdP/dt}_{\text{max}} \) and remodeling. We used baseline atrial pacing to account for heart rate changes causing a rise in \( \text{dp/dt}_{\text{max}} \) as described previously and our baseline \( \text{dp/dt}_{\text{max}} \) was comparable to the reported study (2).

We note the findings of Bogaard et al. (2) and would like to highlight several important differences between studies. Their patient population was different and predominantly ischemic: 56% versus 36% in our study. It is well described that cardiac resynchronization therapy response is worse in ischemic cardiomyopathy and 70% of their patients with events had ischemic cardiomyopathy (2). Importantly, we used \( \text{LVdP/dt}_{\text{max}} \) to guide left
ventricular lead placement, whereas Bogaard et al. measured dp/dtmax after implantation and a guided approach may explain differences in remodeling and outcome. In keeping with our results, optimal left ventricular lead positioning produces marked variation in acute dp/dtmax (3), better remodeling, and reduced events (heart failure hospitalizations/death) (4). It is also important to appreciate that remodeling may not always correlate with clinical outcome especially in ischemic cardiomyopathy patients.

Bogaard et al. (2) reported clinical outcome and remodeling or hospitalization for heart failure. Data were not consistently available or reported (nearly 50% of deaths were noncardiac or unknown) and they state that whether acute improvement in dp/dtmax correlates to morbidity still needs to be determined (2).

In summary, we are in agreement with Prinzen et al. that a prospective randomized controlled study will be needed to confirm a favorable effect of LVdp/dtmax-guided therapy on prognosis and functional status after cardiac resynchronization therapy.

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__ACCF and AHA Presidents’ Letter on MEDCAC__

On January 25, 2012, the Centers for Medicare and Medicaid Services (CMS) convened a meeting of the Medicare Evidence Development and Coverage Advisory Committee (MEDCAC) to review the evidence on the management of patients with carotid atherosclerosis with particular reference to revascularization. We are gratified that MEDCAC’s recommendations reflect those in the ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/SAIP/SCAI/SIR/SNIS/SVM/Guideline on the Management of Patients With Extracranial Carotid and Vertebral Artery Disease (1).

The MEDCAC decision reaffirms the utility and validity of the multidisciplinary guideline that has been endorsed by these organizations as a sound basis for clinical practice.

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