

## EDITORIAL

# Device Therapy in Heart Failure

The management of patients with heart failure incurs a substantial economic burden and hospitalization is responsible for more than 50% of this expense.<sup>1</sup> There have been intensive efforts to develop device-based therapies aimed at improving cardiac reserve and optimizing pump function to meet metabolic requirements. Currently available devices for heart failure are cardiac resynchronization therapy (CRT) and left ventricular assist device (LVAD). Resynchronization therapy (CRT) is available with two different functions; CRT-Pacemakers (CRT-P) and CRT-Implantable cardioverter defibrillator (CRT-D). The clinical effects of long-term CRT have been evaluated in a large number of randomized multi-centre trials with crossover or parallel treatment assignment.<sup>2-8</sup> The usual study enrolment criteria were: NYHA function class III or IV despite optimal pharmacological treatment, LVEF  $\leq 35\%$ , sinus rhythm (SR), left ventricular (LV) dilatation but with varying definitions, and QRS duration  $\geq 120$  ms. On average, NYHA function class decreased by 0.5–0.8 points, the 6 min walk distance increased by 20%, and peak oxygen consumption increased by 10–15%. The functional benefits and quality of life improvements were sustained.<sup>9,10</sup> Apart from this CARE-HF and COMPANION trials showed considerable improvement in morbidity and mortality (unplanned hospitalizations for major cardiovascular events by 39% and all-cause mortality, relative risk reduction: 36%),<sup>11,12</sup> There is 15% absolute reduction in LV end-diastolic diameter and an up to 6% increase in LVEF following CRT.<sup>13,14</sup> In ambulatory patients in NYHA IV, CRT showed considerable morbidity benefit. A baseline typical left bundle branch block (LBBB) pattern predicted a favorable outcome, whereas prolonged PR interval and right bundle branch block (RBBB) were the only predictors of non-favorable outcome.<sup>14</sup>

The role played by CRT in patients presenting with no or only mild manifestations of HF, a depressed LVEF and a wide QRS complex, in other words the patients were in NYHA class I and II. It was evaluated in MIRACLE ICD II,<sup>6</sup> MADIT CRT<sup>15</sup> and REVERSE<sup>16</sup> trials. All these trials demonstrated reduced morbidity. Improvement was primarily seen in patients with QRS  $\geq 150$  ms and/or typical LBBB. Women with LBBB demonstrated a particularly

favorable response. In MADIT-CRT the extent of reverse remodeling was concordant with and predictive of improvement in clinical outcomes.

At present most of the randomized studies of CRT has been almost exclusively restricted to patients in sinus rhythm. In Europe approximately one-fifth of patients receiving CRTs have permanent atrial fibrillation (AF). This group is not addressed in guidelines and only small number of randomized trials was conducted in recent past. It is seen in these patients if AV node ablation is done after CRT implantation.<sup>17</sup> These patients are benefited most.

In patients with conventional indications for pacemaker implantation and LV dysfunction, chronic RV pacing will increase the dyssynchrony. Initiation and up titration of  $\beta$ -blocker treatment, indicated in patients with symptomatic heart failure, may reduce heart rate and increase pacemaker dependency. Patients with a CRT will better tolerate increased pacing time. This may permit initiation of  $\beta$ -blocking treatment or dosage increase in those patients who are already on therapy.<sup>18-20</sup> This will benefit clearly this sub group.

Patients with end-stage heart failure have a poor quality of life, a very high mortality rate, and are potential candidates for implantation of a left ventricular assist device (LVAD). Although cardiac transplantation is associated with high 1- and 10-year survival rates, organ supply is limited. The technical improvements and proven success of implantable LVADs have made it a reasonable treatment option in these patients, either as a bridge to cardiac transplantation or as destination therapy. Patient selection for LVAD is crucial. These patients are mostly on continuous inotropic support. Patients with severe renal, pulmonary, or hepatic dysfunction as well as patients with active infection or cardiogenic shock should not be considered as candidates.<sup>21</sup> There are two types of LVAD; one with continuous flow and other with pulsatile flow. Most of these patients are in NYHA function class IIIB/IV with an LVEF of  $\leq 25\%$ . The available evidence suggests that a continuous flow device is superior to a pulsatile flow device.<sup>22</sup>

Lastly, we would like to say that patient selection is moving beyond the QRS. There are several expanding indications into the realm of patients who are mildly symptomatic, and

who have a narrow QRS. In our country number of patients with heart failure is increasing day by day due to the advancement in the therapeutic options for acute cardiac emergencies e.g. acute myocardial infarction. This group of patients is suffering a lot due to repeated hospitalization and poor quality of life. They will be benefited most if these devices are used for them. However physicians should understand that choosing longevity with potential tradeoffs in device related complications and quality of life is a personal decision that must be individually tailored to patient preference. It is very important that we should be honest with the data, so that we can be honest with our patients.

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