Predictors and Treatment Response with Cardiac Resynchronization Therapy in Patients with Heart Failure: Long Term Follow Up

Miry Blich, Mahmoud Suleiman, Ibrahim Marai, Tawfiq Zeidan Shwiri, Monther Boulos

Department of Cardiology, Division of Pacing and Electrophysiology, Rambam Medical Center, Haifa, Israel

Background: Cardiac resynchronization therapy (CRT) is an established treatment for patients with advanced heart failure. Nevertheless, about 20-30% of patients in randomized trials do not respond clinically, part of that most probably due to incorrect patient selection.
Objectives: 1) To estimate the effectiveness and safety of CRT in our routine practice, outside of clinical trials. 2) To find predictors of favorable response to CRT.
Methods: Retrospective analysis of all patients underwent CRT in our hospital from February 2003 until December 2007. Clinical and echocardiographic parameters were assessed before and after CRT implantation. Patients that improved in one class and two classes of New York heart association (NYHA) were defined as responders and highly responders respectively.
Results: During the study period, 56 consecutive patients (73.2% men, age 66.3 ± 10.2 years) with left heart failure (LHF) (ischemic cardiomyopathy 60.7%) received CRT and were followed for a mean of 27 months. After the implantation the mean functional capacity improved from NYHA class 3 to class 2. Mean number of hospital admissions due to LHF exacerbation at one year follow up reduced by 79% (1.9 versus 0.4). Echocardiographic parameters as mean ejection fraction (EF) improved by 31% (19.5% versus 25.6%) and mean diastolic dysfunction improved by one class (from moderately- severely reduced to mildly – moderately reduced). Complication rate was 7.1% at the implantation and 16.1% at the follow up. Twenty one patients (37.5%) died during the follow up, on average 13.6 months after the implantation. According to their clinical improvement, eleven patients were non responders, fifteen patients were responders and nine patients were highly responders. Responders and highly responders had higher number of hospitalizations due to LHF prior to implantation ($p=0.02$). After the implantation highly responders had less events of acute LHF decompensation, better diastolic function, better ejection fraction, milder mitral regutgitation (MR) and no cardiac death, compare to non responders and responders. Factors predictive of highly responders to CRT were treatment with angiotensin receptor blocker ($p=0.007$) and positive inotropic therapy prior to implantation ($p=0.06$). Significant improvement in severity of MR was an important predictor of high responsiveness ($p=0.004$).
Conclusions: CRT is an effective therapy in long term follow up of symptomatic patients with LHF in real world practice. Patients with more events of acute LHF decompensation and positive inotropic teraphy will more benefit from CRT. One of the main factors that predict clinical improvement is significant reduction in MR. Understending the mechanism of MR in each LHF patient and the role of mechanical dyssynchrony as a pathophysiological determinant of MR will allow better selection of patients for CRT.