P322
Is physiologic preservation of microcirculation important for functional recovery after CRT?

G. Nikcevic1; A. Djordjevic-Dikic2; SU. Pavlovic1; A. Milasinovic1; M. Zivkovic1; B. Kircanski1; N. Radovanovic1; G. Milasinovic1
1Clinical center of Serbia, Pacemaker Center, Belgrade, Serbia. 2Clinical center of Serbia, Clinic of cardiology, Belgrade, Serbia

Background: Cardiac implantable electronic devices changed the treatment of patients with systolic heart failure. Although, CRT has become a mainstay in heart failure management, 40% of patients failed to respond to therapy.

Purpose: The aim of the study was to assess predictive significance of residual coronary flow reserve (CFR) as the marker of preserved microcirculation, and existing or provoked functional dysynchrony, for an improvement of left ventricular function after cardiac resynchronization therapy (CRT).

Methods: The study was prospective and enrolled 51 consecutive patients meeting the recommended criteria for cardiac resynchronization therapy, with or without ischemic heart disease. Before CRT, functional dysynchrony (apical rocking and septal flash as the most robust and most easily to parameters used) was assessed at rest and at peak dobutamine stress (20 mcg/kg/min). CFR was measured noninvasively with transthoracic echocardiography during hyperemia induced with adenosine (140mcg/kg/min for 1 min). The patients were followed up over a 12 month period, after CRT implantation. Responders were defined as the patients showing improvement in quality of life at least 1 NYHA class, and an increase in EF greater than 5%, as established by objective measurement.

Results: After a 12 months follow up, out of 51 patients enrolled in our study, there were 50 responders (58.8%) and 21 nonresponders (41.2%). Based on the univariate regression analysis, the most significant predictors of responders are: the cardiomyopathy type (ischaemic or non-ischaemic dilated), p = 0.027, presence of LBBD (p = 0.005), apical rocking at rest and during DSE (AR (p = 0.025 and ARdob 0.002), septal flash during DSE (SF dob p = 0.040), a delta variation of WMSI rest-stress > 0.20 (WMSI > -0.20 p = 0.003) and CFR before CRT implantation (CFR before CRT p = 0.001). Multivariate regression analysis identified apical rocking during DSE (ARdob p = 0.001) and CFR before CRT implantation (CFR before CRT p = 0.001) as independent predictors of recovery. By applying ROC analysis, the CFR ≤ 1.79 measured before the cardiac resynchronization pacemaker implantation identifies responders with sensitivity of 82% and specificity of 78% (area under the curve – 0.78; 95% CI 0.620-0.938; P < 0.002).

Conclusion: Based on our results, it may be concluded that mechanical dysynchrony, as septal flash and apical rocking at rest and/ or provoked with low dose dobutamine indicate the patients most likely to improve with resynchronization. Furthermore, patients with severely compromised coronary flow reserve, CFR ≤ 1.79, show no significant recovery of left ventricular function. Our results demonstrate that, preserved coronary microcirculation as demonstrated by adequate CFR response is significant physiological prerequisite for functional recovery after CRT treatment.

P323
Response to cardiac resynchronization therapy is determined by intrinsic electrical substrate rather than by its modification

M. Stiek1; S. Pioux2; P. Hunjenc3; A. Fronten4; R. Eschalier5; P. Dubois2; P. Ritter2; N. Kloot2; M. Haissaguerre3; HGJM Crul4; FW. Prinzen2; P. Bertalan4
1Maastricht University, CARIM, Department of Physiology, Maastricht, Netherlands. 2Haut-Lévêque Hospital, Centre Hospitalier Universitaire de Bordeaux; LIRYC institute, Bordeaux-Pessac, France. 3Centre Hospitalier Universitaire Clermont-Ferrand, Clermont-Ferrand, France

Background: In systolic heart failure patients, electrocardiographic mapping (ECM) can be used to express electrical activation by magnitude and direction of the activation delay vector (ADV). The aim of the present study was to investigate to what extent the response to cardiac resynchronization therapy (CRT) is determined by intrinsic ADV (considered as the electrical substrate), ADV modification by biventricular and left ventricular (LV) pacing and by optimization of LV pacing site.

Methods and Results: ECM was used to acquire electrical activation maps in 79 systolic heart failure patients (4 RBBB, 12 QRS <120ms, 23 non-conduction delay [NCD]) and 40 left bundle branch block [LBBB], 67 patients (QRS-120 ms) underwent CRT implantation and in 26 patients multiple LV pacing sites were tested. ADV was calculated from locations and depolarization times of 2000 virtual epicardial electrodes. CRT response was defined as ≥10% LVEF/MPmax increase (24/57 acute responders) and a composite clinical score at 6 months (36/65 chronic responders). During intrinsic conduction, ADV direction was similar in patients with QRS-120 ms, NCD and LBBB, pointing towards the LV free wall, while ADV magnitude was larger in LBBB patients (117±25 ms) than in patients with NCD (70±29 ms, P=0.05) and QRS-120ms (52±14 ms, P=0.05). Intrinsic ADV accurately predicted the acute (AUC = 0.93) and chronic (AUC 0.90) response to CRT. In contrast, the change in ADV by CRT only moderately predicted response (highest AUC 0.76). LV pacing site optimization had limited effects on acute response.

Conclusion: The baseline electrical substrate, adequately measured as ADV, strongly determines acute and chronic CRT response, while the extent of its modification by conventional CRT or by varying LV pacing sites has limited influence.

Funding Acknowledgements: Dutch Heart Foundation [2015ST061]

Abstract P321 Figure. Echo changes in pts with CRT-D, 1y

Abstract P323 Figure.
Conclusions: In patients with ischemic cardiomyopathy, LV lead position in relation to scar and delayed contraction significantly influences echocardiographic response to CRT. Furthermore, total scar burden also effects response to CRT. This fully MRI-based study shows that MRI is a powerful tool for guiding LV lead implantation. Hereby we overcome difficulties induced by combining data from different imaging modalities.

P326
Clinical and echocardioographic response and decrease of NT-proBNP levels at one year predict long term outcome after cardiac resynchronization therapy T. Roubicek1; D. Wichterle2; J. Stros1; P. Kucer3; J. Cerny1; R. Polasek1
1Regional Hospital Liberec, Cardiology, Liberec, Czech Republic; 2Institute for Clinical and Experimental Medicine (IKEM), Department of Cardiology, Prague, Czech Republic

Introduction: Approximately 30% of patients fail to respond to CRT. There is still substantial interest in early identifying determinants and predictors of future clinical events.

Purpose: Our study was designed to evaluate the long term prognostic value of short term CRT response (clinical, echocardiographical and NT-proBNP changes).

Methods: Data from a prospective database of CRT patients implanted between 2005 and 2013 in one center were analyzed. Echocardiographically measured left ventricle (LV) reverse remodeling, NYHA class and NT-proBNP levels were assessed one year after CRT implantation and their link to heart failure (HF) hospitalizations and mortality (HF and all-cause) were analysed.

Results: 328 CRT patients with LBBB or IVCD were included. 13 patients were excluded because of death within the first year. During the follow-up period of 4.8±2.1 years 35.2% patients died from cardiac (19.5%) or non-cardiac (15.9%) causes and 82 patients (26%) were hospitalized for HF after the 12 months visit. The most significant parameter in univariate Cox regression analysis for all clinical end-points was echocardiographically assessed reversal remodeling of LV; relative change of the LV end-systolic diameter (LVESD) >15% (median value) with RR 3.2 (CI 2.0-5.2, p<0.0001) for HF hospitalization, RR 8.7 (CI 3.7-20.7, p<0.0001) for HF death and RR 2.9 (CI 1.9-4.4, p<0.0001) for all-cause death. NYHA class change ≥2 had RR 2.3 (CI 1.4-3.7, p<0.0006) for HF hospitalization, RR 5.9 (CI 2.8-10.9, p<0.0001) for HF death and RR 2.0 (CI 1.3-3.1, p<0.0007) for all-cause death. BNP relative difference ≥-43% (median value) had RR 2.6 (CI 1.6-4.1, p<0.0001) for HF hospitalization, RR 1.9 (CI 1.5-3.7, p<0.04) for HF death and RR 2.2 (CI 1.5-3.4, p<0.0001) for all-cause death. Event-free survival curves for LV reversal remodeling (LVEsDs) are shown in Fig 1.

Conclusion: Reversal remodeling of the left ventricle is (compared to NYHA class change and decrease of NT-proBNP values) the most significant predictor of future clinical events in CRT patients.