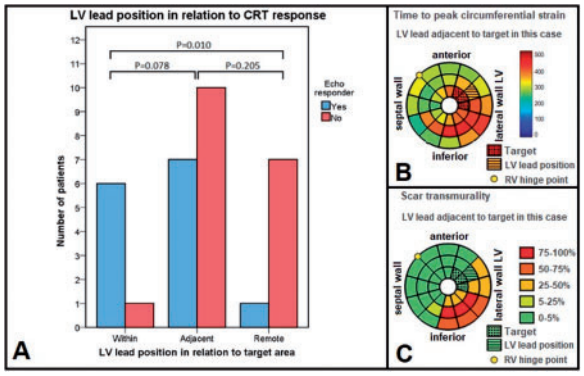
Conclusions: In patients with ischemic cardiomyopathy, LV lead position in relation to scar and delayed contraction significantly influences echocardiographic response to CRT. Furthermore, total scar burden also effects response to CRT. This fully MRI-based study shows that MRI is a powerful tool for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



Abstract P324 Figure.

P325

Validation of time-to-battery depletion (remaining longevity) algorithms in modern cardiac resynchronization therapy defibrillators (CRT-Ds)

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Background: Maximizing generator longevity has been an important goal in Cardiac Resynchronization Therapy (CRT). Its importance has particularly heightened as patient indications expanded from later stage New York Heart Association (NYHA) Class III/IV patients to populations at an earlier stage of disease with a substantially longer life expectancy. Manufacturers invested in longevity enhancing technologies that ultimately minimize replacements. Such improvements include circuitry efficiencies, anti-inflammatory agents on electrodes, algorithms that appropriately withhold pacing, inappropriate shock avoidance and advanced battery chemistries combined with increased capacity. Nevertheless, newer battery chemistries (e.g. hybrid CFx lithium/silver vanadium oxide currently used) present new challenges. Previously, battery voltage could straightforwardly be used to estimate time to Recommended Replacement Time (RRT). Such measurements are no longer reliable. Manufacturers have consequently developed separate models to predict remaining time to RRT from device data. The validity of these predictions has not been adequately investigated in real-life patients.
Purpose: Assess the predictive value of the remaining longevity estimate in newer CRT-D devices.
Methods: Using the European Medtronic Data Warehouse, we identified CRT-Ds that are at RRT or within 6 months of it. Frequency and impact of programming changes across newer technology devices (devices commercialized post-2012) were assessed. Time intervals immediately after a device programming change and right before the subsequent one were identified. Criteria based on magnitude of programming changes were defined to isolate devices with re-programmings of little impact.
Results: 11,041 devices, included in the European Medtronic Data Warehouse, were screened. 6,801 devices (29 months mean follow-up), had enough information to characterize the impact of changes. 13,180 re-programmings were identified; 4,915 resulted in a mean increase of 2.9 months; and, 8,265 resulted in a decrease of 5.16 months. By 11/2017, 154 of all devices were at, or within 6 months of estimated RRT. 129 had enough data for the interval analysis. 444 intervals were defined. With a mean interval duration of 183 days, the model underestimated the actual time later realised by 0.5 days. The validity of the model projections 6-months post-implantation was also examined. When isolating generators with e.g. less than 0.75V change in the amplitude of any lead, the models overestimated actual longevity by 0.313% (projected service life was on average 3.39 days longer than the realised 1082.78 days).
Conclusions: Models estimating time to depletion using CRT-D device data are reliable in the absence of substantial programming changes. Changes are likely to result in a decrease of remaining service life. Updated estimates generated immediately after a change accurately reflect remaining service life until the next change.

P326

Clinical and echocardiographical response and decrease of NT-proBNP levels at one year predict long term outcome after cardiac resynchronization therapy

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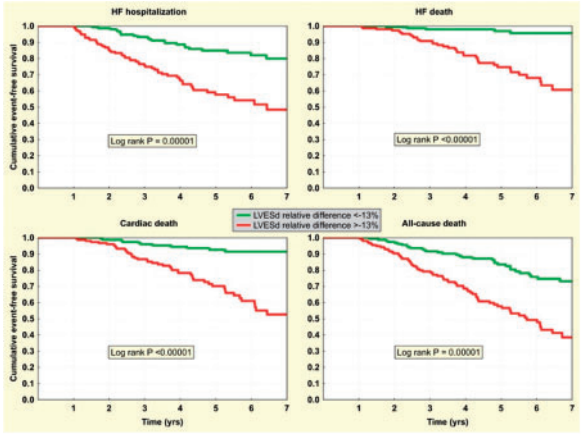
Introduction: Approximately 30% of patients fail to respond to CRT. There is still substantial interest in early identifying determinants and predictors of future clinical events.
Purpose: Our study was designed to evaluate the long term prognostic value of short term CRT response (clinical, echocardiographical 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 (19.3%) 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 endpoints was echocardiographically assessed reversal remodeling of LV: relative change of the LV end-systolic diameter (LVESd) >-13% (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 ≥0 had RR 2.3 (CI 1.4-3.7, p=0.0006) for HF hospitalization, RR 5.5 (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 1.0-3.7, 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 (LVESd) 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.



Abstract P326 Figure.

P327

Long-term clinical outcome of patients after cardiac resynchronization therapy upgrade: a high volume, single center experience

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Background: Due to the chronic right ventricular pacing, more than 20% of patients with prior implantable cardiac defibrillator (ICD) or conventional pacemaker (PM) develop heart failure and might be CRT candidates. However current guidelines do not provide a comprehensive recommendation for upgrade.
Aims: We evaluated the long-term outcome of patients who were upgraded to CRT from a conventional PM or ICD and compared to de novo implantations in our high-volume, single-centre experience.
Methods: Symptomatic (NYHA II-IV class) heart failure patients with decreased ejection fraction (EF≤ 35%) and wide QRS (≥120 ms) were collected in a retrospective registry from 2004 to 2017. Primary endpoint was all-cause mortality, secondary endpoint was echocardiographic response. Kaplan-Meier and Cox regressional analyses were performed.
Results: From 1336 (288 upgraded vs. 1048 de novo CRT implanted) patients 701 reached (176 CRT-upgrade, 525 de novo CRT) the primary endpoint during the mean follow up time of 3.6 years. Patients in the upgrade group were older (71 vs. 67 yrs;