MODERATED POSTER SESSION 11 - CONTROVERSIES IN CRT

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Using left bundle branch block in cardiac resynchronisation practice; do we all agree?
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Background: Left bundle branch block (LBBB) morphology is strongly associated to a positive response to cardiac resynchronisation therapy (CRT) and hence an important criterion in current guidelines. There are, however, several definitions for LBBB that require subjective evaluation of the ECG. This may lead to large variation in clinical classification of LBBB, with discrepancies to the LBBB definitions used in landmark trials and guidelines.

Objective: To evaluate the inter- and intra-observer variability in clinical judgement of LBBB and use of different LBBB definitions. And to evaluate the correlation between these different methods of LBBB classification.

Methods: 12-lead ECGs of 100 randomly selected CRT patients were used. Four non-implanting observers judged the ECGs based on established LBBB-definitions (ESC, ACCF/AHA/HRS, MADIT, and Strauss). Four implanting cardiologists scored the same 100 ECGs for the presence of LBBB based on their clinical judgement. In order to assess intra-observer variability, the observers assessed the ECGs twice.

Results: The probability of classifying an ECG as LBBB by clinical judgement and available definitions varied considerably (0.38 - 0.67). Panel A shows this variation. Standard deviations result from inter-observer variability. Inter-observer variability was highest for clinical judgement and AHA definition (0.81), indicating that 1 in 5 ECGs will be classified differently by another cardiologist. For LBBB definitions, inter- and intra-observer variability seemed to depend on complexity of the definition. Overall the correlation between clinical judgement and the LBBB definitions was poor (Panel B).

Conclusion: Clinical judgement of LBBB shows considerable inter-observer variability. Moreover, it shows only little correlation to LBBB classification according to established definitions. These results raise questions about patient selection and applicability of study data to daily CRT practice.

Abstract 681 Figure.

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Variations of myocardial contractility measured by the SonR sensor during spontaneous rhythm are consensual with LV ejection fraction changes in CRT patients.

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Introduction: The SonR signal amplitude, derived from an hemodynamic sensor real-ized within the tip of a dedicated atrial pacing/sensing lead, robustly correlates with myocardial contractility expressed as LVSP or dP/dt max. It’s not been clarified whether the absolute SonR signal amplitude can be used to track or describe the current status of left ventricular (LV) performance. Moreover, there is lack of information about the relationship between SonR signal amplitude and cardiac reverse remodeling, as a marker of resynchronization (CRT) effectiveness. Recently it was shown that the variations in SonR signal during isometric effort in CRT patients (pts) are able to likely identify responders during follow-up (FU).

Purpose: The aim of this pilot study was to evaluate the SonR signal amplitude during spontaneous rhythm, as a marker of reverse remodeling, in heart failure pts undergoing CRT.

Methods: Sixteen pts - 13 males, 68 ± 8 years, LVEF (ejection fraction) 28 ± 5%, all in sinus rhythm - were implanted with a CRT-defibrillator equipped with SonR sensor. At baseline (pre-implant, 6-month, and 12-month FU visit, the device was temporarily programmed in VVI pacing mode at 40 bpm. Each patient underwent at rest two hemodynamic assessments: a) a beat-to-beat measurement of SonR signal in spontaneous rhythm (average, min and max values over 3min continuous recording); b) LVEF by echocardiography (2D-Simpson’s rule). Pts were considered responders if a reduction of the LV end-systolic volume (LVESV) of ≥ at least 15% occurred (6M-FU vs. baseline).

Results: At 6-month FU, out of 16 pts, n=12 were labeled as CRT responders (75%) and n=4 pts as CRT non-responders. Among responders, the considered values of SonR signal increased from baseline in 11 pts (92%), with a significant increase only for the maximum value (p = 0.048; see Figure, right panel) mimicking the trend of LVEF (see Figure, left panel). Similarly, the considered values of the signal decreased in all non-responders (no statistical significance met for any of the SonR values due to too small sample size). In the n=5 responders who already had the 12-month FU visit done, all of them did show a further increase in the maximum SonR amplitude.

Conclusions: At 6-month FU, SonR signal variations are consensual with LVEF changes during spontaneous rhythm in the vast majority of CRT pts. First data from 12-month FU are totally in line with this trend. According to the limited amount of recordings carried-out, the max value of SonR seems to be the most reliable parameter to track cardiac reverse remodeling.

Abstract 682 Figure. Abstract Ducceschi

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Effects of cardiac resynchronization therapy pacemaker versus cardiac resynchronization therapy implantable cardioverter defibrillator. Long term follow up

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Background: Cardiac resynchronization therapy (CRT) is commonly used to manage heart failure, yet published guidelines do not distinguish between recommendations for pacemakers (CRT-P) and defibrillators (CRT-D). There is currently no strong scientific evidence indicating that a cardiac resynchronization therapy implantable cardioverter defibrillator (CRT-D) must be offered to all candidates for CRT.

Purpose: To analyze baseline clinical, echocardiographic and electrocardiographic characteristics according to the type of device CRT-P vs CRT-D, to evaluate long term survival and examine the factors that predict greater response to the CRT.

Methods: Prospective cohort study from 345 consecutive patients undergoing CRT from 17 May 2012 to 21 December 2016, 202 of whom (58.6%) were CRT-P and 143 (41.4%) were CRT-D.

Results: The mean age were similar in both groups. The group of CRT-D had more ischemic cardiomyopathy (58.3% vs 27.2%, p = 0.001), used more antiarrythmics (16.7% vs 8.5%, p = 0.023). Atrial fibrillation was similar in both groups. Hospital admissions were more frequent in the CRT-D group due mainly to heart failure, after left ventricular lead migration and transient ischemic accidents. Deaths were similar in both groups (41% vs 39.6%, p = 0.325) due mainly heart failure, the infection and neoplasms. The CRT-D suffered more transplants significantly. The survival is better in CRT-D group but it is not significantly. In patients with dilated cardiomyopathy, there was an overlap of both curves over the 14 years (Log rank p = 0.230).

Conclusion: The CRT-D group had more hospital admissions. Heart failure was the main motive of hospital admissions and death in both groups. The ischemic cardiomyopathy, the age and men were factors that predict greater response to the CRT-D.

Abstract 683 Figure.

Abstract Dorthea

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The CRT-P can be an alternative to dilated cardiomyopathy.

Abstract 683 Table. Factors that predict better response to TRC-D

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Abstract 683 Figure. Survival type device and dilated heart

684 Efficacy and safety of CRT epicardial leads

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Background: Minimal invasive surgical technique for implantation of common epicardial pacing lead to stimulate left ventricle (LV) lateral wall is one of the established rescue approaches in cardiac resynchronization therapy (CRT) when coronary sinus is inaccessible or veins suboptimal. Data on efficacy and safety of epicardial leads in longer follow up period is still needed.

Purpose: We aimed to assess efficacy and safety in one year follow up period of CRT epicardial leads implanted in our institution from October 2014 to May 2016.

Methods: In terms of efficacy, patients with an increase in left ventricle ejection fraction (LVEF) of 5%, or decrease in end-systolic volume (ESV) of 15% were considered as the echocardiographic responders and patients who improved at least one NYHA class or 6 minute walk test by 10% as the clinical responders. All complications were collected on consecutive way. In all patients epicardial lead Medtronic 4968 CapSure was implanted. The leads were sutured in all patients on LV lateral wall, in the angle between LAD andCx coronary artery.

Results: In 19 months follow up window was implanted 174 CRT-PD devices. Out of all, in 14 patients (8.0%), mean age 64.9±10.3 years (9.643%) male surgical epicardial approach was needed due to unsuccessful endovenous LV lead implantation (10 patients) or suboptimal LV stimulation position (4 patients) which ended in 6 months follow up period with no echocardiographic or clinical response. The average time of surgical epicardial lead implantation was 71.4±14.3 minutes. During follow up only one complication connected with epicardial lead was noticed (the pericarditic fracture of epicardial lead a day after the surgery). Mean LVEF before epicardial lead implantation was 25.2±7.4%. Nine patients (64.3%) were responders (two of them were previously with transvenous LV lead non-responders). Among responders, the average increase in EF was 8.1±2.9%, decrease in ESV 23.6±7.4%, and improve ment in 6 minute walk test 22.6±9.3%. One year mortality was 21.4%, 2 non-responders died due to terminal heart failure, and one (with CRTp) because of sudden cardiac death. Pacing parameters in epicardial leads were unchanged during entire follow up period.

Conclusion: Although not very often needed in CRT, epicardial LV lead implantation with minimal invasive surgical technique is a safe and effective alternative to transvenous LV lead implantation. The echocardiographic and clinical response in surgically implanted LV lead is similar to transvenous lead on optimal LV wall position.

685 Hemodynamic evaluation of univentricular versus biventricular stimulation in left endocardial cardiac resynchronization therapy

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Traditionally, cardiac resynchronization therapy (CRT) with the left ventricular (LV) lead in the coronary sinus requires permanent biventricular (BiV) stimulation. Since this generates higher energy consumption, selective left ventricular stimulation (SLVE) was previously tested, showing non-inferiority to biventricular stimulation. However, evaluation of SLVE in eCRT patients has not been previously done.

Objectives: To assess the hemodynamic performance of SLVE as compared to BiV eCRT, using non-invasive systolic time intervals as hemodynamic markers.

Methods: We included 14 patients with eCRT indicated according to traditional criteria for CRT, with endocardial LV lead using the previous published Jatishram procedure (femoral-transapical approach). All patients were considered clinical responders at least 6 months after implant based on an improvement of 1 or more NYHA functional class (FC), improvement of quality of life according to the Minnesota test (MLHFQ) and survival-free of hospitalizations. We compared non invasive hemodynamic parameters in both stimulation modes (BiV eCRT vs. SLVE eCRT) using Systocor, a cardiac function analyzer that estimates systolic time intervals (pre ejec tion period, PEP, left ventricular ejection time, LVET, and systolic function index- LVI) derived from pulse power analysis, allowing estimation of LV ejection fraction. A detailed explanation and method validation have been previously published. Both pacing modes were compared after optimizing AV interval and averaging at least 20 beats in each mode. We considered as significant those changes >-1%, with a P value <-0.01.

Results: We included 14 patients, (11 male), with mean age of 60.4±9 years, and a mean follow up time of 42 months (range 9-78). Forty-three percent had idiopathic dilated cardiomyopathy, 43% ischemic and 14% idiopathic dilated cardiomyopathy. All patients had previous anticoagulation (57%), failure of coronary sinus implant (29%) and patient choice (14%). Pre-implant NYHA FC was III and post implant I in all patients. The MLHFQ test improved in all patients and there were no post-implant hospitalizations for heart failure. All patients were on anticoagulant therapy. Four patients (29%) had similar or better hemodynamic parameters with SLVE as compared to BiV eCRT.

Conclusions: SLVE eCRT was similar or better than BiV eCRT in nearly one third of patients. Non-invasive measurement of systolic intervals was useful to identify patients for SLVE, which may benefit them by increasing device longevity. Prospective studies are needed to further validate the described methods.

686 Automatic AVD Programming by SyncAV Improves Electrical Synchronization in a Multicenter Study of CRT Patients

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Introduction: SyncAV, a new CRT feature that continually programs atrioventricular delay (AVD) shorter than the intrinsic AV conduction time (by a default or programmable offset), may improve electrical synchrony by fusion of intrinsic, LV-paced, and RV-paced activation wavefronts. However, it is not known how the degree of synchronization achieved depends on the LV pacing vector selected.

Objective: Evaluate the electrical benefit of SyncAV by late- vs. early-activated LV pacing vectors.

Methods: Ninety patients (74% male, 44% ischemic, 62% LBBB, 32%-9% ejection fraction) post-CRT implant (23-28 months) using a quadripolar lead (Quartet™, Abbott) were enrolled prospectively. QRS durations (QRSms) were measured by a blinded observer from 12-lead ECG during intrinsic conduction, biventricular pacing (BiV) + SyncAV™ OFF (sensed/paced AV offset 140/100 ms), BiV + SyncAV™ ON (nominal 50 ms offset), BiV + SyncAV™ ON (offset minimized to optimize QRSd), RV-only pacing, and LV-only pacing + SyncAV™ ON (nominal 50 ms offset). Each BiV pacing configuration used simultaneous V-V and was compared using the LV electrode along a quadripolar lead with the latest (BiVLateLV) vs. earliest (BiVEarlyLV) during RV pacing.

Results: Conduction delay from RV pacing to LV sensing was significantly longer at the BiVLateLV cathode than the BiVEarlyLV cathode (74±29 vs. 54±13 ms, p=0.001). The QRSd associated with intrinsic conduction (155±29 ms) was narrowed by BiVLateLV + SyncAV OFF to 138±27 ms (9=20% reduction, p=0.001). Further QRSd narrowing to 133±25 ms (13=14% reduction, p=0.05 vs. BiV + SyncAV OFF) was achieved by BiVLateLV + SyncAV ON (nominal offset). The greatest QRSd narrowing to 123±22 ms (20=10% reduction, p=0.001 vs. BiV + SyncAV ON (nominal offset)) was achieved by BiVLateLV + SyncAV ON (optimized offset). However, there was no statistical difference between the QRSd narrowing achieved by BiVLateLV vs. BiVEarlyLV using either SyncAV offset (p=0.4-0.9). The optimal SyncAV offsets resulted in an AVID of 81.1-9.4% of the intrinsic AV interval, much longer than what