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Improved Clinical Outcome in Patients Followed in a Hospital-Based Heart Failure Center

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Background: Patients with heart failure (HF) have a poor prognosis. Heart failure centers (HFC) may improve prognosis. We evaluated this at a HFC operating in a tertiary referral hospital during the last three years.
Objectives: To evaluate the clinical outcome of patients with HF treated at the HFC of Hadassah University Hospital, Jerusalem.
Methods: We evaluated all patients followed at the HFC with HF for clinical outcome. Principles governing the management of the patients included specialized nurse supervised implementation of care and careful implementation of all management guidelines.
Results: 330 patients were included and followed at the HFC. Mean age was 72±1 and 58% were in New York Heart Association (NYHA) class III-IV. 58% had reduced left ventricular function. 54% had ischemic heart disease, 74% hypertension, 44% diabetes, 79% hyperlipidemia and 27% had atrial fibrillation. Mean creatinine was 138±7 μmol/L and mean hemoglobin 11.9±0.1 g/dL. The median follow-up was 792 days (Inter-quartile range 760 to 823 days). The estimated cumulative survival rate at 1 and 2 years was 87±2% and 79±2% respectively. Survival was influenced by NYHA class (Log rank P<0.01). The estimated cumulative survival rate at 1 year and 2 years were 91±2% and 88±3% in NYHA I-II and 84±3% and 73±4% in NYHA III-IV. Comparing to a similar HF control group from the same hospital before the establishment of the HFC (N=362), demonstrated an improved 2-year survival rate in the HFC: 79±2% vs 55±3%, P<0.001, Figure 1. Cox regression analysis after adjustment for significant predictors demonstrated that treatment in the HFC was a significant predictor of increased survival (Hazard ratio 0.52, 95% confidence interval 0.37-0.73, P<0.0001).
Conclusions: Survival rates of patients followed in a tertiary hospital HFC, including those with severe chronic heart failure, were better than a comparable control group. HFC should be part of the standard treatment of patients with symptomatic HF.
<IMAGE03>

Predictors and Importance of Improving Ejection Fraction In DCM

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Contemporary heart failure therapies improve the prognosis and the left ventricular (LV) function. We examined the prevalence, clinical features and therapies associated with improvement of the LV ejection fraction (EF) in patients with an established diagnosis of dilated cardiomyopathy (DCM).

Detailed clinical data and echo-doppler follow-up (at least 6 months apart) were available in 188 patients treated in Sheba Heart Failure Clinic. Improved EF (IEF), was defined as an increase by at least 10% points. It occurred in 87 (46%) in whom EF increased from 26±7 to 48±10% vs. a decrease from 30±9 to 27±10 in the "noIEF" group. IEF was associated with a reduction in the LV end systolic dimension (46±9 to 35±9 mm, $p<0.001$), left atrial size and pulmonary artery pressure. Patients with IEF experienced an improvement in the severity of mitral and tricuspid regurgitation, right ventricular function and the NYHA functional class.

Univariate associations with IEF were shorter disease duration, absence of familial cardiomyopathy, older age on diagnosis, relationship to chemotherapy or pregnancy; lower initial EF, dyspnea, gallop but a normal ECG on presentation. Utilization of evidence based drug therapies and cardiac resynchronization were not associated with IEF in our cohort. However, there was a positive effect of a higher dose of beta blockers. Multivariate logistic regression identified disease duration, lower initial EF, normal ECG and a higher beta blocker dose as independent predictors of IEF. Over a mean follow up of 23 months, only 1 patient from the IEF group reached the end-point of death or transplantation, compared with 13 from the control group ($p=0.03$). We conclude that a considerable proportion of DCM patients are expected to improve their EF with contemporary therapy.

Optimal medical therapy + close observation are recommended in appropriately selected patients prior to committing to surgical or device implant interventions.

The Cardiac Activity Simulator (CAS) - A Non-Invasive Tool for Management of Heart Failure Patients

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Aim: Understanding the hemodynamic measures in heart failure patients found to be crucial in the management and optimizing the treatment in advanced disease.
Objective: The Cardiac Activity Simulator (CAS) is a novel non-invasive diagnostic tool, allowing complete hemodynamic assessment (pressure and flow in all cardiac chambers) from structural information and pressure measured in a single chamber. The CAS uses a computer simulation based on basic principles of cardiovascular physiology and flow equations.
Methods: Echocardiographic data was obtained from patients who underwent right and left heart catheterization. Thirty one patients from two medical centers were evaluated and 5 were excluded due to incomplete data. For the current analysis simulated LV pressure (based on RV pressure and echocardiographic data) was compared to actual LV pressure curve (catheterization data). Accuracy of the simulation was based on the standard error of the difference between the actual and the simulated pressures.
Results: Typical LV pressure curve morphology (systolic and diastolic components) was obtained from simulation in all patients
Accuracy of 89% was obtained by comparison to actual LV data. Similarly when LV pressure was used as input data for the CAS the accuracy of the simulated RV pressure was 81%.
Conclusions: CAS is a promising technique that can accurately characterize the complete hemodynamic condition from single chamber measured data. The CAS can be helpful during cardiac catheterization (obtaining complete hemodynamic assessment from single chamber data). Alternatively this system can be extremely useful to analyze pressure data from implanted cardiac pressure sensor.

Cardiac Function and Biomarkers in Patients with Recoverd Peripratum Cardiomyopathy

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Background: Peripartum Cardiomyopathy (PPCM) is a rare cardiomyopathy and many questions regarding pathophysiology remain unanswered. Altered endothelial function and heightened oxidative stress in pregnancy may contribute to the development of PPCM. In addition, LV recovery does not guarantee normal function at subsequent pregnancies. We attempted to evaluate whether residual myocardial injury may be detected by comprehensive echo techniques like Tissue Doppler (TDI) and 2D Strain (2DS) imaging in post PPCM subjects.
Methods: We evaluated 13 women (age 36±6 years) 11 of whom with complete LVEF recovery. Both LV and RV function assessment using standard echo, TDI, 2DS and stress echo were evaluated. The number of EPCs (CD34 and CD34/KDR), VEGF, hsCRP, IL 6, and Ox LDL antibody serum levels were quantified. Stress echo was performed in 9 patients. All biomarkers where compared to 11 age-matched controls.
Results: The mean LVEF at presentation was 32.5±8.8%, at follow-up (3 2±20 months) was 58.6±3.5 %. Compared to controls, patients with PPCM had a trend for lower systolic velocities on TDI (lateral 7.9± 2.0 vs. 9.5±1.9, ρ=0.07, septal 10.1±1.9 vs. 11.2±2.2 ms, ρ=0.08) and decreased global longitudinal strain (-20.5±2.3% vs. 22.8±2.2%, ρ=0.07). No significant changes in the rest TDI indexes or circumferential strain were obtained. Circulating VEGF levels were significantly lower in PPCM group (1.41±0. 06 vs.1.47±0.03 pg/ml, ρ=0.008) compared to controls with no significant differences in EPCs, IL 6 and Ox LDL antibodies.
Conclusions: In this pilot study TDI and 2DS were able to identify some residual myocardial injury in patients post PPCM. This finding may lead to consider the use of these techniques to assess LV recovery when a subsequent pregnancy is desired. Attenuated production of VEGF even after the initial insult provides further insights into the pathophysiological mechanisms in PPCM, suggesting the contribution of endothelial dysfunction in the acute setting.

Facilitation of Left Ventricular Recovery Post Percutaneous Coronary Intervention by Levosimendan

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Background: Efficiency of percutaneous revascularization and the utility of levosimendan for advanced ischemic heart failure (HF) is unclear. We examined the efficacy of revascularization and levosimendan on left ventricular ejection fraction (LVEF) and mortality of patients admitted with acute decompensated HF and severe left ventricular dysfunction.
Methods: A prospective case control study that enrolled 84 patients with ischemic decompensated HF with LVEF<35% and preserved LV wall thickness. Group A: 42 patients whose LVEF improved post percutaneous coronary intervention (PCI). Group B1: 22 patients whose LVEF did not improve post-PCI alone but improved after levosimendan. Group B2: 20 patients whose LVEF did not improve neither post-PCI nor post levosimendan.
Results: LVEF increased in group A from 22+5 to 29+5% post PCI and continued to improve at the 6 months follow-up (36+4%). In group B1 LVEF did not improve after PCI, but increased after levosimendan from 23+4% to 32+4% and remained constant at 6 months. In group B2 LVEF 26+4% did not change following both interventions. Reverse remodeling with a decrease in end-diastolic and end-systolic diameters was observed only in groups A and B1. Group B2 had a dismal prognosis with 36% in-hospital and 43% six months mortality. Groups A and B1 had a lower in hospital (4.7%, 4.5%) and mid term (11%, 11%) mortality.
Conclusion: Improvement of LV size and function with better prognosis can be expected in the majority of patients undergoing PCI for decompensated ischemic HF. Levosimendan enhanced the recovery of LV function post PCI.

Temporary Coronary Venous Pressure Elevation through PICSO in Patients with Chronic Heart Failure

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Objectives: Pressure-controlled intermittent coronary sinus occlusion (PICSO) has been shown to alter cellular signaling pathways. To assess the possibility of SAFE (survivor activating factor enhancement) - pathway induction, interleukin-6 (IL-6) levels were measured in patients with chronic heart failure with PICSO treatment.

Methods: 32 patients undergoing cardiac resynchronization therapy (CRT) by device implantation (diagnosis: predominantly ischemic and dilated cardiomyopathy) were included into a prospective non randomized study, (8 interventional / 24 control group). PICSO was performed for 20 minutes by introducing a balloon catheter into the coronary sinus and after positioning of the left ventricular electrode. Hemodynamic data were obtained through the LIDCO System and PICSO catheter (coronary sinus pressure (CSP)). Coronary venous blood samples were taken and IL-6 and NT-proBNP measured before and after PICSO. Mean patients follow up was 34 months.

Results: IL-6 secretion increased significantly after PICSO in comparison to controls (p=0.006). There was no significant linear correlation between the percentage increase of IL-6 and hemodynamic data including the maximal developed coronary venous pressure during PICSO. In long term follow up, we assessed a mortality risk reduction by 80 percent (RR = 0.199, CI (95%) = 0.002-1.642, p = 0.302). Also a trend towards a survival benefit was observed. This benefit particularly included severly diseased patients with NT-proBNP levels above 1500 pg/ml (p=0.080).

Conclusion: These results indicate the initiation of mechanotransduction and are in accordance with prior experimental analyses showing enhanced expression of vascular endothelial growth factor and heme oxygenase 1. Hence, this intervention could be the link to molecular corresponding factors that improve survival, reduce the risk for reinfarction and decrease adverse cardiac events after myocardial infarction as observed in previous trials.

Readmissions Following Implantation of Axial Flow Left Ventricular Assist Devices

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Based on the REMATCH experience, readmissions following left ventricular assist devices (LVAD) implantation are thought to be frequent. We sought to determine the occurrence and causes of readmissions in our single center population.

We retrospectively analyzed readmissions to our facility in a cohort of 99 patients, of whom 34 were bridge to transplant, implanted between February 2007 and June 2011 with the Heartmate II axial flow LVAD.

The patients were followed for 1.3±0.8 years. There were 179 readmissions in 68 patients with a readmission rate of 1.1 (0, 2.5) [median (25%, 75%)] per patient/year follow-up. Patients spent 6.2 (0, 15) days in the hospital per patient/year follow-up. Timing of readmission was 142 (56, 327) days after LVAD implant. Leading defined causes of readmission were gastrointestinal bleeding (40 returns in 25 patients), infections unrelated to pump (20 in 17 patients), ventricular arrhythmias (19 in 12 patients), other non-LVAD cardiac related readmissions (18 in 16 patients), other bleeding including cerebral bleeding (15 in 14 patients) and hemolysis (10 in 9 patients). Less frequent causes included biliary complications, pump parameter abnormalities, thromboembolic events, pacing device complications, supraventricular arrhythmias, pleural effusion, trauma and device infection.

In conclusion readmission rates for recipients of axial flow LVAD are low. The leading cause is gastrointestinal bleeding followed by sepsis and cardiac (non-LVAD) complications.

Near Normal ECG in Hypertrophic Cardiomyopathy

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Normal ECG is rare in hypertrophic cardiomyopathy (HCM) and is associated with favorable prognosis. However a substantial minority of HCM patients have only minor ECG abnormalities such as P-mitrale or non-specific ST-T changes. These patients do not have typical pathological ECG changes such as LVH, Q waves, T-wave inversion or conduction defects. We studied the clinical associations of a near normal ECG (nnECG) in a well characterized cohort of HCM patients from our cardiomyopathy clinic. Results were evaluated in comparison to other subgroups and the entire cohort by chi-test and ANOVA.

Our database comprised 210 patients diagnosed according to the established criteria; 14 were excluded from the analysis because of paced rhythm. nnECG was found in 39 (19%) patients. This subgroup was characterized by an older age on disease onset (45±14 compared to 37±18 yr, in the entire cohort, p=0.02), 62% male sex, 51% family history of HCM and a higher prevalence (36% vs 26%, p=0.03) of family history of sudden death. The left maximal left ventricular wall thickness was lower in nnECG, 18±3 vs 20±5. Concentric hypertrophy was present in 52% of patients with nnECG compared to 31% prevalence in the entire cohort ($p<0.001$). The mean LVEF was 62±8, 51% had outflow obstruction, and 16% had severe diastolic dysfunction, p=NS) but the prevalence of hypokinetic transformation was lower in this subgroup (3 vs 8%, p=0.003).

There were no significant differences compared to general HCM population in the prevalence of atrial or ventricular arrhythmia, angina, NYHA functional class, stroke, device implantations or invasive procedures. We conclude that a nnECG pattern is more common in late onset disease with concentric LVH but otherwise these patients have similar characteristics and complications compared to a typical HCM population.