

Analysis and Prediction of Percutaneous Intervention Cost Using a Complexity Score

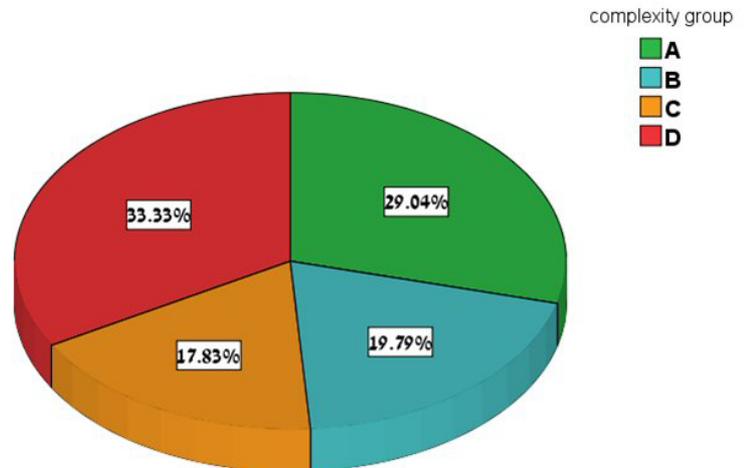
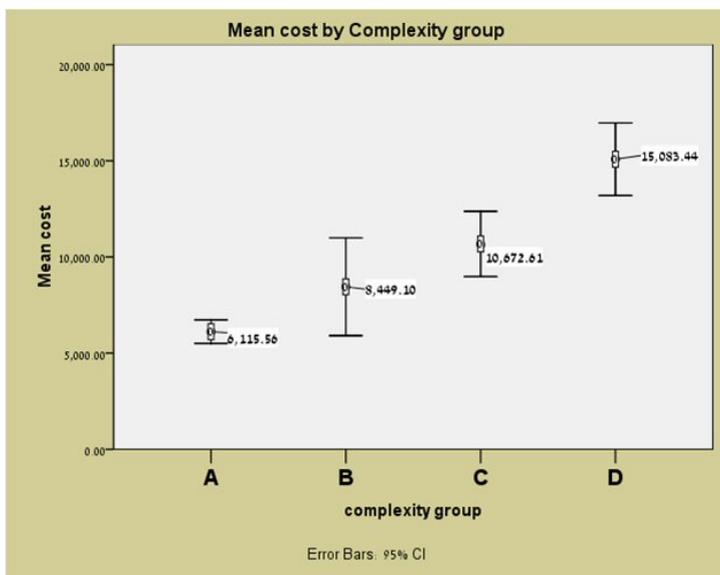
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Background: There is a large variability of the costs of percutaneous coronary interventions (PCI). Catheterization laboratories have to account these costs to the hospital management.

Methods: We sought to devise a scoring system in order to analyze and possibly predict the costs of PCI's. Using a custom made program, we collected data regarding the technical complexity of PCI's in patients undergoing PCI at our institution between 1/1/2009 and 31/10/2009. The complexity elements were STEMI, Non-STEMI, chronic total occlusion (CTO), bifurcation, Multivessel PCI, Long lesions, PCI in SVG, heavy calcification, Left main, general difficulty and use of intracoronary imaging. Using univariate and multivariate analysis we defined the contribution of these elements and their combinations to the actual cost of the procedures. A scoring system was devised, defining 4 levels of complexity. **Results:** Data was based on the analysis of 1071 PCI's. 29.04% were in complexity group A, with a mean cost of 6115 NIS and comprising 17.1% of the total expenditure, 19.8% were in complexity group B, with a mean cost of 8449 NIS and comprising 16.1% of the total expenditure, 17.8% in group C, with a mean cost of 10672 NIS and comprising 18.3% of the total expenditure and 33.3% in group D , with a mean cost of 15083 NIS, comprising 48.5% of the total expenditure.

Figures: distribution of the complexity groups; mean cost by complexity group

Conclusions: About 70% of the procedures performed at our center involve at least one technical complexity, 33% of them being very complex, with a high cost per procedure. This data should be considered when evaluating the running costs of a cardiac catheterization laboratory.



Unprotected Left Main Stenting: An Israeli Perspective.

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Background: The most recent ACC/AHA guidelines focused update has for the first time endorsed PCI as an alternative to CABG surgery in suitable patients with unprotected left main coronary artery disease (ULMCA).

Aim: To describe the practice and outcomes of a contemporary Israeli cohort of consecutive patients undergoing PCI to ULMCA over a five years period.

Results: Stenting of ULMCA was performed in 74 patients: 73% were male; average age was 73±12 (range 40-95 years); 34% were ≥ 80 years and 30% were < 65 years. Past medical history included: Hypertension in 73%; diabetes in 48%; active malignancy in 12%; and severe COPD in 7%. CAD was known in 36% of patients. Half the patients presented with UAP/NSTEMI; 26% with stable coronary disease; and 12% with STEMI. Nine patients (12%) had no LM disease but underwent LM stenting following treatment of adjacent LAD or LCx disease. Isolated LM stenosis or LM and 1 vessel disease was found in 14% and 22% respectively, whereas 64% had multivessel disease. Stenosis involved the ostium or body of the LM in 2/3 of the patients and was distal in 1/3. Drug eluting stents were implanted in 54%. IVUS guidance was used in 2 patients and glycoprotein IIb/IIIa antagonists were used in 26% of procedures. IABP was used in 6 patients (all were in cardiogenic shock). There was one procedure related death in a severely ill and inoperable patient. Routine angiographic follow-up was performed in patients under 80 years. Others underwent nuclear imaging. Angiographic follow-up was available for 44 patients. In-stent restenosis (>50% narrowing) was present in 7 patients (9%): One underwent POBA alone, 4 underwent repeat stenting (all DES) and 2 were referred for CABG surgery.

Conclusion: Angioplasty of ULM as performed at our centre results in favourable clinical and angiographic results. Adverse outcomes do not seem to be related to ULMCA treatment itself but rather to the patients' high-risk profile.

An Early Experience with the MGuard Stent: A Promising Device to Prevent Distal Embolization

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Background:

Lesions containing large mass of thrombus or atheroma, as in degenerated SVG and in patients with ACS, are at high risk for distal embolization.

Methods:

Early angiographic analysis and long-term clinical outcomes were evaluated in 38 patients who underwent MGuard stent implantation between 11/2008 –11/2009 in Hadassah University Hospital. Patients with bifurcation and calcified lesions were excluded.

Results:

Consecutive patients were treated by MGuard system in native arteries (Group A, n= 26), and to vein grafts (Group B, n= 12). Clinical indications were: STEMI (n=17), NSTEMI and Unstable AP (n=12) and elective (n=9).

Procedural success was achieved in all patients. Final TIMI III flow was documented in 22(86%) pts from group A and in 12(92%) patients from group B. There were no cases of in-stent thrombosis, procedure related MI or mortality during hospitalization.

Clinical follow-up at a mean of 5 ±2.3 months revealed a mortality rate 2.6%, restenosis 8%, 2.6% rate of TLR due to restenosis, and rehospitalization rate of 16%.

			Group A (n=26)	Group B (n=12)
Indication	STEMI	ALL	15 (58%)	2 (17%)
		Primary PCI	12 (46%)	1 (8%)
	NSTEMI and Unstable AP		7 (27%)	5 (42%)
	Elective		4 (15%)	5 (42%)
Procedural	TIMI before	0	11 (42%)	1 (8%)
		I	5 (19%)	2 (17%)
		II	7 (27%)	7 (58%)
		III	3 (12%)	2 (17%)
	TIMI final	0 - I	0	0
		II	4 (15%)	1 (8%)
		III	22 (86%)	12 (92%)
	Side branches arising from culprit		29	
	Side branch closure		5 (17%)	
	Ostial side branches compromise		8 (28%)	
Follow up	Mortality		0	1 (8%)
	Coronary angio follow-up		5 (19%)	3 (25%)
	Restenosis rate		2 (8%)	1 (8%)
	TLR		1 (4%)	0

Conclusion: Use of the MGuard stent for treatment of patients with a large thrombus/atheroma lesion achieves very high success rates with relatively low distal embolization rate, and is associated with good medium-term clinical result.

Early Revascularization in Elderly Patients ≥ 80 years-Old Presenting with Acute Myocardial Infarction and Cardiogenic Shock

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Background: The benefit of early revascularization in cardiogenic shock is well established. However, the efficacy of an invasive strategy in shock pts ≥ 80 years-old is controversial. **Methods:** We retrospectively identified 35 pts ≥ 80 years-old with cardiogenic shock due to acute MI in whom a primary coronary intervention strategy was implemented. Clinical characteristics and survival were analyzed. **Results:** Mean age was 85 ± 3 (range 80-97) years. Mean symptom-to-admission and door-to-balloon times were 319 ± 343 (range 46-1540) and 126 ± 76 (range 30-448) minutes, respectively. Eighteen (51%) had anterior infarction, 13 (37%) were mechanically ventilated, 24 (69%) received intra-aortic balloon pump and 11 (31%) needed a temporary pacing. Mean SYNTAX and TIMI STEMI risk scores were 28 ± 16 (range 5.0-58.5) and 10.7 ± 1.5 (range 8-14) points, respectively. Overall, 2 patients died before revascularization, 27 underwent PCI, 4 underwent emergency CABG and 2 were treated medically following diagnostic angiography. Mortality rates were 14% during the first day, 48% in-hospital, 51% at 30 days and 60% at 1 year. In univariate analysis, anterior infarction predicted increased mortality ($p=0.018$), whereas the RCA as culprit vessel was associated with lower mortality ($p=0.005$). Increased TIMI STEMI risk score predicted mortality ($p=0.002$) but SYNTAX score did not. Interestingly age, symptom-to-admission and door-to-balloon times did not predict outcome. **Conclusion:** Cardiogenic shock complicating acute MI in pts ≥ 80 years-old carries a high mortality rate. Following early urgent revascularization half the pts were alive at 1 month and 40% at 1 year. Policy regarding health care resource allocation for intervention and intensive cardiac care in these patients should be made at an institutional and societal level.

Age (years): (Mean \pm SD)	85 \pm 3
Female sex: n (%)	14 (40)
Diabetes: n (%)	7 (20)
STEMI: n (%)	32 (91)
NSTEMI: n (%)	3 (9)
Time from symptoms to admission (minutes): (mean \pm SD)	319 \pm 343
Time from Door to balloon (minutes): (mean \pm SD)	126 \pm 76
Cardiopulmonary resuscitation: n (%)	9 (26)
Intra-aortic balloon counterpulsation: n (%)	24 (69)
Temporary pacing: n (%)	11 (31)
SYNTAX score: (mean \pm SD)	28 \pm 16
TIMI RISK score: (mean \pm SD)	10.7 \pm 1.5
PCI: n (%)	27 (77)
CABG: n (%)	4 (11)
24 hour mortality: n (%)	5 (14)
In-hospital mortality: n (%)	17 (49)
30-day mortality: n (%)	18 (51)

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When it is Hazardous to Utilize an Internal Mammary Artery for Coronary Revascularization in Patients with Severe Peripheral Vascular Disease!

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Background: The use of the internal mammary arteries for coronary revascularization has become the standard of care in coronary artery bypass grafting (CABG). However, in patients with aortoiliac disease, the internal mammary arteries may become a major collateral route to the lower extremities. This study aimed to characterize the clinical and angiographic characteristics of patients with collateralization from the internal mammary artery to the iliac artery.

Methods: We have collected 15 cases of patients admitted for diagnostic coronary angiography in whom we observed collateral flow from one or both internal mammary arteries to an occluded or stenotic iliac artery.

Results: The mean age was 63.2 ± 11.2 years; 8 were men (53.3%). Coronary angiography was done as a peri-operative evaluation for peripheral vascular surgery in 3 patients (20%) and was done because of cardiac symptoms or a positive thallium scan in 2 (80%). The finding that the mammary artery collateralized the iliac artery led to major treatment changes in all patients 7 (46.6%) who required CABG. In 5 patients (33%), use of one or both internal mammary artery(ies) for coronary grafts was avoided. In one patient, CABG was deferred and in another patient, percutaneous intervention in both iliac arteries preceded CABG using both mammary arteries. There was no incidence of post-operative acute lower extremity ischemia.

Conclusions: Selective angiographic visualization of the internal mammary artery is an essential part of the pre-operative evaluation in patients with severe peripheral vascular disease undergoing CABG.

Contrast Induced Nephropathy Post Percutaneous Coronary Intervention: What is the Right Definition?

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Background: Several definitions have been used to assess rates of contrast-induced nephropathy (CIN) in patients undergoing percutaneous coronary intervention (PCI). Whether the definition influences observed rates of CIN is unclear.

Objectives: The Oxilan Registry was the first prospective analysis of the efficacy and safety of ioxilan (low-osmolar and low-viscosity contrast medium), including rates of CIN assessed by multiple definitions, in PCI.

Methods: From July 2006 to June 2007, consecutive patients undergoing PCI using ioxilan were enrolled. Serum creatinine (SCr) and estimated glomerular filtration rate (eGFR) were assessed at baseline and 3 to 5 days after PCI. CIN was defined by 1 of 4 definitions: (1) absolute increase in SCr ≥ 0.5 mg/dl over baseline, (2) relative decrease in eGFR and $\geq 25\%$ from baseline, (3) relative increase in SCr $\geq 25\%$ over baseline, and (4) a composite of the preceding 3 definitions.

Results: Of 400 patients (age 62 ± 11 years), 19% were women, 37% were diabetic, 22% were anemic, and 8% had a history of congestive heart failure. Baseline SCr was 1.12 ± 0.3 mg/dl and 24% had an eGFR < 60 ml/min. CIN rates were 3.3% (SCr increase ≥ 0.5 mg/dl), 7.6% (eGFR decrease $\geq 25\%$), 10.2% (SCr increase $\geq 25\%$), and 10.5% (composite). Hospitalization was prolonged in 3.4% of patients with CIN and none required dialysis. There were no deaths or severe allergic reactions. Non-CST-elevation myocardial infarction and repeat revascularization each occurred in 0.8%.

Conclusions: In this unselected population undergoing PCI, CIN ranged in frequency from 3.3% to 10.5% depending on the definition used and was not associated with in-hospital mortality or substantial morbidity, such as dialysis. The wide variation in CIN and its lack of association with adverse outcomes underscore the need for a standardized, clinically relevant definition.

Myocardial gap junction channel protein, connexin-43, most likely modulates susceptibility of the heart to lethal arrhythmias.

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Functional electrical and metabolic cell-to-cell communication via gap junction connexin (Cx) channels ensures myocardial synchronisation while defects in Cx expression and/or distribution are thought to be arrhythmogenic facilitating occurrence of lethal arrhythmias. We examined topology and expression of myocardial Cx43 as well as susceptibility of the isolated working heart to ventricular fibrillation (VF) in hypertensive, hyperthyroid and diabetic (type 1) rats and diabetic rats treated with thyroid hormone and compared to healthy rats. All diseased hearts exhibited myocardial Cx43 remodelling that was most pronounced in hypertensive rats. Total Cx43 and its phosphorylated forms were significantly decreased in hypertensive and hyperthyroid while increased in diabetic rat hearts comparing to controls. However, treatment of diabetic rats with thyroid hormone suppressed both expression and phosphorylation of Cx43. Hypertensive and hyperthyroid rats were much prone to develop VF compared to healthy controls unlike diabetic rats that were much less. However, treatment of diabetic rats with thyroid hormone increased their vulnerability to VF. These findings indicate that Cx43 is most likely involved in modulation of cardiac susceptibility to malignant arrhythmias, i.e. up-regulation of Cx43 is associated with decrease while down-regulation with increased vulnerability. Further studies are needed to examine whether currently used cardio-protective drugs exhibiting antiarrhythmic potential (statins, ACEI, sartans) affect Cx43 expression and/or distribution.

Insulin-resistant diabetic rats benefit from omega-3 fatty acids supplementation due to up-regulation of connexin-43.

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Goal of this study was to investigate whether myocardial transcript and protein expression of connexin-43 (Cx43), which ensures direct cell-to-cell communication, are altered in insulin-resistant diabetic rats and whether they may benefit from omega-3 fatty acids supplementation. Experiments were conducted on spontaneously diabetic rats and age-matched healthy rats. They were divided into un-treated and treated for 2-month with omega-3 FA (200mg/kg/day). Biometrical and biochemical parameters were registered. Left ventricular heart tissues were used for determination of Cx43 mRNA and protein expression as well as for protein kinase C (PKC) expression and myocardial ultrastructure examination. Blood glucose, cholesterol and triglycerides were increased in diabetic rats and significantly reduced due to treatment with omega-3 FA while body and heart weights were not affected. Myocardial Cx43 mRNA level was higher in diabetic than non-diabetic rats and omega-3 FA caused its marked increase in both groups. Ratio of phosphorylated to non-phosphorylated form of Cx43 protein was lower in diabetic versus healthy rats and enhanced upon omega-3 FA that was associated with increased expression of PKC epsilon. Moreover, subcellular integrity of cardiomyocytes and their junctions was improved due to omega-3 FA treatment. It is concluded that rats with type-2 diabetes benefit from omega-3 FA supplementation because of suppression a risk markers for CVD and particularly due to up-regulation of myocardial connexin-43 and preservation of ultrastructure. Consequently, it may improve heart function and decrease susceptibility to malignant arrhythmias.

Chronic and acute antiarrhythmic effects of atorvastatin and omega-3 fatty acids documented in rats suffering from hypertriglyceridemia (HTG).*Bacova, B¹; Knezl, V²; Radosinska, J³; Barancik, M¹; Karas, S⁴; Tribulova, N¹**¹Institute for Heart Research, Bratislava, Slovakia; ²Institute of Pharmacology, Bratislava, Slovakia; ³Comenius University Faculty of Medicine, Bratislava, Slovakia; ⁴Institute of Measurement, Bratislava, Slovakia*

Atorvastatin (Ato) and omega-3 FA exhibit antiarrhythmic effects in clinic but underlying mechanisms are not elucidated yet. This study was aimed to examine whether these compounds exert antiarrhythmic effects upon chronic and acute administration and whether intercellular connexin (Cx) channels, which ensure electrical coupling and myocardial synchronisation, are implicated. Experiments were conducted on VF prone HTG rats that were treated with Ato (0.5mg/kg/day) and omega-3 FA (400mg/kg/day) for 2mth. VF inducibility was tested on isolated working heart preparation using electrical stimulation. In acute experiments the hearts were perfused with 1.5, 7, 15 μ mol atorvastatin and omega-3 FA, i.e. EPA and DHA during 10 min prior el. stimulation. Prolonged application of Ato and omega-3 FA was accompanied by reduction of plasma triglycerides and resulted in significant increase of stimulation threshold for VF to 40+0.2 mA and 45+0.2 mA vs 15+0.1 mA. HTG rats were characterized by abnormal elevation of phosphorylated forms of Cx43 compared to healthy rat hearts, while omega-3 FA and atorvastatin significantly decreased it. Acute application of Ato, EPA and DHA reduced VF incidence to 33%, 71.4% and 80% in male and to 60%, 75% and 60% in female rats. Bolus of either EPA or DHA (150 μ mol) administered directly to fibrillating heart defibrillated it. It is concluded that chronic administration of atorvastatin and omega-3 FA resulted in antiarrhythmic effects that were associated with beneficial Cx43 alterations. It is very likely that modulation of connexin-43 channels function is implicated in acute effects. Findings point out the role of intercellular communication in pleiotropic effects of statins and non-pharmacological approaches in prevention of malignant arrhythmias.

Systemic Administration of 5-Azacythidine Improves Cardiac Remodeling and Infarct Vascularization after Myocardial Infarction in Rat

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BACKGROUND: Attempts have been made to induce transdifferentiation of fibroblasts to cardiomyocyte-like cells with 5-azacythidine (5-Aza). These attempts have been successful in some aspects in vitro. 5-Aza is a general demethylating agent, leading to unmasking of genes that are not expressed due to promoter hypermethylation. We tested the hypothesis that systemic administration of 5-Aza could convert infarct fibroblasts in situ and improve remodeling and function after myocardial infarction (MI) in rat.

METHODS & RESULTS: The optimal dose and safety of 5-Aza administration was determined in a pilot study in normal rats. Subsequently, 29 rats were subjected to permanent left anterior descending coronary artery occlusion and anterior MI. Seven days after MI rats were randomized to 7-day treatment with 5-Aza (50 mg/m²/d, n=15) or saline (n=14). Cardiac remodeling and function were assessed by echocardiography before and 30 days after initiation of treatment. Total RNA was extracted from the scar tissue and remote myocardium to determine spatial gene profile by DNA array analysis 30 days after MI. Serial echocardiography studies showed that systemic administration of 5-Aza attenuated left ventricular systolic and diastolic dilatation compared with controls (p<0.05). Moreover, 5-Aza treatment improved the number of vessels in the scar tissue (p=0.008). Immunostaining of scar tissue revealed positive staining for the myogenic transcriptional factor MyoD in 4 of the 11 animals treated with 5-Aza vs. 0 of 9 in control hearts (p=0.09). Gene expression analysis in the infarct and remote myocardium revealed upregulation of genes associated with regeneration and repair in 5-Aza treated animals.

CONCLUSIONS: Our study suggests, for the first time, that administration of 5-Aza after MI can improve left ventricular remodeling and infarct vascularization in rat. Our findings suggest a new strategy for infarct repair and regeneration by reprogramming fibroblasts in situ.

Apoptotic Progenitor Cells: Potential Determinants of Atheromatous Plaque Size and Phenotype

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Background: Initiation, progression and rupture of the atheromatous plaque is a complex process in which metabolic hormonal and inflammatory effectors have contributory roles. Bone marrow derived stem cells are the origin of subsets of circulating stem cell populations some of which differentiate to the endothelial lineage. We have recently detected a subset of apoptotic CD34 progenitors which is significantly increased in patients with acute coronary syndrome.

Methods and results: We sought to investigate the prevalence and effects of apoptotic progenitor cells in atherosclerosis prone ApoE KO mice.

Apoptotic CD34 cells are increased in old ApoE knockout mice that exhibit experimental atherosclerosis compared to young ApoE or wild-type C57BL/6 littermates. The higher percentage of the apoptotic progenitors correlated with a higher titer of antibodies to oxidized LDL measured in the old ApoE mice, reflecting the extent of oxidative stress.

Interestingly adoptive transfer of apoptotic Sca-1 positive cells caused a significant reduction of plaque size in the aortas of 4-month old ApoE KO mice compared to aortas of litters injected with non-apoptotic Sca-1 positive cells or with vehicle-control only.

Conclusions: The levels of apoptotic progenitor cells are increased in atherosclerotic mice. However transfer of this sub-population reduces plaque size in the aortas of ApoE KO mice. Further experiments are needed to elucidate the possible role of apoptotic Sca-1-positive cells in the pathogenesis of atherosclerosis.

A Dominant Role of the Generates Force in Modulating the Cardiac Action Potential, in Rat TrabeculaeYael, Y¹; Landesberg, A²¹Technion - IIT, Haifa, Israel; ²Technion IIT, Haifa, Israel

Background: Mechanical inhomogeneities can elicit arrhythmias by triggering after-depolarization or generating spatial electrical disparity. The prevalent hypothesis relates the phenomenon to stretch-activated channels. An alternate hypothesis postulates that mechanical perturbations affect calcium dissociation from troponin, and the ensuing changes in the intracellular free calcium concentration ($[Ca^{2+}]_i$) alter the action potential duration (APD). Methods: These stretch- and calcium-mediated hypotheses were investigated in trabeculae ($n=7$) isolated from rat right ventricle, by separately controlling sarcomere length (SL) and $[Ca^{2+}]_i$. SL was controlled by a rapid servomotor. $[Ca^{2+}]_i$ was clamped by utilizing tetanic contractions at different extracellular calcium concentrations ($[Ca^{2+}]_0$). Tetanus was achieved by 8 Hz stimulation in the presence of cyclopiazonic acid. APD was evaluated by the voltage-sensitive dye Di-4-ANEPPS. SL was measured by laser diffraction and force by strain gauge. Results: Sarcomere lengthening from 1.85 to 2.2 μ m at constant $[Ca^{2+}]_0 = 3$ mM decreased the APD₉₀ from 90.7 \pm 4.1 to 62 \pm 1.5 msec. However, an increase in $[Ca^{2+}]_0$ from 1.5 to 4.5 mM, at the same SL (2 μ m) decreased the APD₉₀ from 84.6 \pm 3.8 to 69.2 \pm 1.6 msec. Interestingly, a consistent identical inverse relationship between APD₉₀ and force was obtained, and identical APD₉₀ was observed at similar force with different pairs of SL and $[Ca^{2+}]_0$. The APD₉₀ decreased from 89.8 \pm 2.1 to 62 \pm 1.3 msec as the force increased from 6.5 \pm 0.9 to 100.1 \pm 10.6 mN/mm². Conclusions: These conspicuous observations are readily explained by calcium-dependent reverse excitation-contraction coupling, where the cross-bridges determine the affinity of troponin for calcium and calcium extrusion via the Na⁺-Ca²⁺-exchanger affects the APD.

Fibrinogen Related Homologous C-Terminal Peptides (Haptides) Modulate Systemic Blood Pressure by Mast Cells Activation

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Background: We described a family of homologous short peptides from the C-termini of fibrinogen β and γ chains (Haptides C β and preC γ , respectively). These Haptides induced significant transient coronary artery vasoconstriction in isolated perfused rat hearts accompanied by temporary decrease in hemodynamic functions.

Aims: Assessment of systemic effect of intravenously administered Haptides, as reflected by modulation of blood-pressure.

Methods & Results: Intravenous administration of Haptides in non-sedated rats caused immobilization of the animals with a shock-like behavior. Intra-arterial monitoring in sedated rats showed that low concentrations (35-560 $\mu\text{g}/\text{kg}$ rat) caused transient decrease in the systolic and diastolic blood pressure by up to 55% ($p < 0.05$) in a dose dependent manner, accompanied by minor increased in heart rate. Randomly scrambled sequences of the Haptides had no such effect, suggesting a specific receptor mediated effect. Intravenous administration of anti histamine-receptor agents before Haptides administration attenuated this effect.

Furthermore, in vitro incubation of Haptides with human cord blood derived mast cells, or with isolated rat peritoneal mast cells caused degranulation and activation of the mast cells.

Conclusions: Our data suggest that Haptides C β and preC γ activate mast cells, resulting in histamine release, causing a steep decrease in blood pressure, comparable to an anaphylactic shock. Thus, it is suggested to concenter an anti histaminic regimen in pathological condition of intensive fibrinolysis.

Characteristics and outcome of patients with acute coronary syndrome and normal/near normal coronary angiography.

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Introduction: The incidence of normal/near normal coronary angiography (NONCA) in patients with acute coronary syndrome (ACS) is reported between 1-12%. Conflicting results were reported regarding the nature and outcome of these patients. We utilized ACSIS -a biannually, nationwide ACS survey, as a source of unselected population for the characterization of these patients. Methods: by using 2004, 2006 and 2008 surveys, we identified 2903 eligible patients with ACS. 142 (4.9%) were identified as NONCA and were compared to patients with obstructive coronary artery disease (OCAD). Results: A higher incidence of chronic anticoagulants usage was noted in NONCA group (5.6% vs. 2.0% in OCAD, $p=0.04$). One third of the NONCA patients presented with ST elevation on ECG as opposed to nearly half in the OCAD group (27.5% vs. 52.3% $p<0.001$). Most of the NONCA patients presented with normal or preserved LV function in echocardiography compared to OCAD patients (77% vs. 45.5%, $p<0.001$). NONCA patients were less likely to be treated with the recommended therapy for ACS and this trend continued upon discharge. By stratifying the OCAD patients according to the number of diseased vessel, NONCA patients had similar mortality rate after one year as patients with 1-2 vessels OCAD (3.0 vs. 3.8, $p=0.920$). Conclusion: This study explored patients with NONCA presented as ACS. In discordance with common knowledge, NONCA patients share similar risk factors and outcome to patients with 1-2 vessels OCAD, but tend to be undertreated during, and even more importantly after the acute episode.

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Left Ventricular Thrombus Formation and Bleeding Complications During Continuous In-Hospital Anticoagulation for Acute Anterior Myocardial Infarction

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Background: The reported 20-60% occurrence of post-AAMI LVT decreased with thrombolysis and further with primary percutaneous coronary intervention (PCI) to 10-20%. We reasoned that prolonged anticoagulation following primary PCI will even further reduce the incidence of LVT.

Methods: Our practice for patients who undergo PCI for ST-segment elevation MI (STEMI) is to continue heparin anticoagulation for 48 hours, followed by adjusted doses of low molecular weight heparin for 5 days. The admission echocardiogram is repeated before discharge for patients with an AAMI. We reviewed the records of all patients with an AAMI admitted between January 2006 and November 2009 for the presence of LVT and for the occurrence of bleeding complications

Results: 278 consecutive patients (mean age 61 ± 13 years, range 29-92; 82% male) were included. The first echocardiogram was performed within 1.2 ± 0.9 days of admission and the second after 5.8 ± 3.6 days. Their mean admission LV ejection fraction was $41 \pm 6.0\%$ (range 20-60%). LVT was already demonstrated on the initial echocardiogram of 6 patients (2%). Evidence of LVT on the second echocardiogram of another 6 patients yielded an LVT rate of 2.2% (6/272) on our prolonged anticoagulation protocol. There were six major bleeding episodes (requiring blood transfusion), two on day 1, one on day 4 and one each on the 11th, 14th and 30th day from admission. Ten patients had minor bleeding.

Conclusion: Primary PCI followed by continuous anticoagulation therapy throughout hospitalization markedly reduced the occurrence of LVT in patients presenting with AAMI-STEMI.

Abbreviations:

LVT - left ventricular thrombus

AAMI - acute anterior myocardial infarction

STEMI- ST-segment elevation MI

PCI - percutaneous coronary intervention

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Impact of Intensive Insulin Treatment on Glycemic Control and Clinical Outcomes in the Cardiac Surgery Intensive Care Unit and Ward

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The impact of intensive insulin treatment on the clinical outcomes of patients hospitalized in intensive care units (ICU) is highly controversial. The objective of the present study was to test the efficacy and safety of a protocol based on intensive insulin therapy in a surgical ICU and ward and to assess its impact on clinical outcomes.

All patients undergoing cardiac surgery with diabetes or a blood glucose >150 mg/dl were treated in the ICU with intravenous insulin based on dynamic algorithms of insulin administration, followed by an intensive multi-injection protocol consisting of 4 Glargine/Aspart insulin injections in the ward. The control group consisted of all patients admitted to the Cardiac Surgery ICU and ward during a similar period immediately prior to the implementation of the protocol. Glucose measurements were analyzed to assess glycemic control and the risk for hypoglycemia. Infectious and cardiovascular complications were retrieved from a computerized database of all patients admitted to Cardiac Surgery.

During a 9-month period, 203 patients were admitted to the department of Cardiac Surgery. During the intervention, mean blood glucose was 151.0 ± 19.3 mg/dl and 156.9 ± 32.5 mg/dl in the ICU and ward, respectively vs 166.0 ± 26.7 mg/dl and 184.0 ± 46.4 mg/dl in the controls ($p < 0.001$). Intensive insulin treatment decreased the risk for infection by 56% ($p = 0.018$), mainly by reducing the incidence of leg wound infection (64% reduction, $p = 0.034$). The overall risk to develop any complication was decreased by 19% ($p = 0.058$). Importantly, the incidence of hypoglycemia (blood glucose <60 mg/dl) was low (~3% of all patients) and was not increased by intensive insulin therapy.

Intensified insulin regimen can be safely used in surgical ICU and wards, with no increase in the incidence of hypoglycemia. Direct ICU and ward-based implementation of the protocol by the nursing staff result in improvement of glycemic control and decreased risk for infection.

Lactate as a Predictor of Morbidity and Mortality After Cardiac Surgery.

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Background: The objective of this study was to determine a connection between the values of lactate and the outcome of adult patients after cardiac surgery.

Patients and Methods: We analyzed prospectively collected data of 533 patients that underwent cardiac surgery. Patient's lactate level was checked first at the admission to cardiac intensive care unit (CICU) and then every hour or less, depending on the patient's condition. We divided patients into three groups according to their peak lactate value: Group 1 (G1) - peak lactate above 4.44 mmol/L, Group 2 (G2) - peak lactate below 4.44 mmol/L and Group 3 (G3) - normal lactate values in first 24 postoperative hours during their hospitalization in the CICU. Both preoperative and postoperative parameters were compared. Sex, Mortality, Postoperative and Preoperative renal failure were analyzed by Chi Square test ($p < 0.005$). Bypass time, Operation time, Cross clamp time, Bleeding during operation and first 24 hours, ICU length of stay, Postoperative hospital stay and Total hospital stay were analyzed by ANOVA and Post-Hoc Scheffe tests ($p < 0.005$).

Results: We found that 387 (72.6%) of patients had an elevated lactate levels during first 24 hours after admission to CICU. First abnormal lactate was measured after 1.99 ± 2.27 h, peak lactate values were measured after 3.43 ± 2.73 h and vast majority of patients returned to normal values in the following 6.21 ± 5.57 h after reaching peak value. Statistically significant results are shown in the table.

	Group 1, G1 (n=141)	Group 2, G2 (n=246)	Group 3, G3 (n=146)	P value
Sex (male/female)	84/57 (59.6%/40.4%)	170/76 (69.1%/30.9%)	111/35 (76%/24%)	0.011 , G1>G2, G3
Bypass time, min	109 (± 52)	90 (± 38)	86 (± 38)	0.001, G1>G2,G3
Operation time, min	282 (± 84)	263 (± 62)	252 (± 61)	0.001, G1>G2,G3
Cross-clamp time, min	74 (± 34)	65 (± 29)	62 (± 29)	0.02, G1>G2,G3
Bleeding during operation and first 24 h, ml	535 (± 415)	444 (± 320)	460 (± 347)	0.008, G1>G2,G3
Preoperative renal failure	38 (27%)	44 (17.9%)	23 (15.8%)	0.036 , G1>G2,G3
Postoperative renal failure	30 (21.3%)	26 (10.6%)	22 (15.1%)	0.016, G1>G2,G3
ICU length of stay, h	89 (± 143)	46 (± 41)	42 (± 42)	0.001 , G1>G2,G3
Postoperative hospital stay, d	9 (± 8)	7 (± 4)	6 (± 3)	0.001 , G1>G2,G3
Total hospital stay, d	12 (± 9)	9 (± 5)	9 (± 5)	0.001, G1>G2,G3
Hospital mortality	11 (7.8%)	1 (0.4%)	1 (0.7%)	0.001 , G1>G2,G3

Results are presented as average \pm SD or percentage

Conclusions: Patients with peak postoperative lactate values above 4.44 mmol/L showed higher morbidity and mortality rate than patients with peak postoperative lactate values below 4.44 mmol/L and those with postoperative lactate values within the normal range.

Treating Ischemic Stroke in Cardiology Department: One Year Experience

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Introduction: Most community hospitals in Israel lack a stroke unit but almost all have cardiology departments with non invasive and invasive facilities capable for evaluating and treating pts with ischemic stroke (IS).

Aim: To report a one year experience of treating IS in a cardiology department. Material & Methods: Each year almost 800 pts are admitted to our hospital with different clinical varieties of IS. Last year 14 pts (1.8%): 11M, 3F, mean age $60 \pm$ year with IS were treated by iv rt-PA based on guideline criteria. 11/14 (79%) suffered from hypertension, 10/14 (71%) had hyperlipidemia and 8/14 (57%) had coronary artery disease. All pts underwent brain CT and TTE. 4/14 (29%) underwent cerebral angiography: 3 diagnostic and 1 therapeutic; stenting of acute left internal carotid thrombosis,

Results: Mean time from symptom onset to rt-PA infusion was 150 ± 15 min. Mean national institute of health score scale (NIHSS) at admission was 6 ± 4 . Only 5/14 (36%) showed neurological improvement by decrease in NIHSS > 4 points, 7/14 (50%) had no improvement and 2 pts (14%) died. One pts (7%) suffered from intracranial hemorrhage which resolved with a conservative approach. 3/12 were discharged home and 9/12 were sent to rehabilitation centers. Mean modified Rankin score at discharge was 3 ± 2 . One pts died during mean follow up of 6 months. Cause of death was suicide.

Conclusions :I. IS is an under treated clinical entity. II. Public education for early hospital arrival is strongly recommended. III. Cardiology departments especially in community hospitals experienced with coronary and carotid therapeutic procedures should be involved both in lytic and catheter based therapy among patients with IS.

The importance of new RBBB in acute extensive anterior ST elevation wall MI

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Background: Extensive anterior (EA) MI may be complicated by alterations in the conduction system (CS). A new LBBB in the ECG indicates EA MI. Alterations in the CS may affect the QRS and ST-T segment. We sought to investigate the prevalence of CS abnormalities in these patients and the effect of reperfusion therapy (RT)

Methods: We identified 82 pts with EA STEMI between Jan05–Oct07. ECG was performed upon admission and after RT. An echo was performed after the PCI in all

Results: Of the 82 pts (65 males, 25-85 y), 24 patients (29%) had previous CAD. LVEF after PCI ranged between 20-60%. 30 (36.5%) had CS alterations: 4 (4.8%) had LBBB, LVEF 25-40%; catheterization: mid LAD occlusion in 2 patients and before the 1st septal (SP) and 1st diagonal (DG) in the other 2. In 2/4 LBBB persisted after RT. 15 (18.3%) had RBBB - LVEF 20-45%, LAD was occluded before the 1st DG and the 1st SP in 12 and after the 1st SP and before the 1st DG in 3. In 7/15 RBBB remained after RT. In 7 (8.5%) IRBBB was observed - LVEF 25-60%, in 6 LAD was occluded before the 1st DG and the 1st SP and in one, after the 1st SP and before the 1st DG. In 5/7 IRBBB persisted after RT. In 3 patients (3.6%) LAHB was present, LVEF 30-40%, in all of them LAD was occluded after the 1st DG and before the 1st SP. In 2/3 LAHB persisted after RT. In 1 (1.2%) RBBB+LAHB were present and it persisted after RT with LVEF 30%; CAVB occurred in 1 patient - LVEF 25%. In both LAD was occluded before the 1st SP and the 1st DG. Hospital mortality occurred in 5/82 (6%), two with RBBB, one with LBBB, one without CS alteration and one with IRBBB

Conclusions: CS alterations in pts. with EA STEMI are more frequent than previously recognized. Their presence, and in particular their persistence after RT is associated with worse prognosis. RBBB is the most common conduction system alteration in extensive acute MI. A new RBBB with ST elevation indicates very extensive MI The persistence of RBBB after PCI is a sign of worse prognosis

The Demographic, Clinical Characteristics And Early and Late Mortality of Patients Treated with IABP in the Coronary Care Unit

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Background: IABP is a common intervention in acute heart failure. The objectives of this study were determination of demographic, clinical characteristics and mortality predictors of these patients.

Patients and methods: The data of patients treated with IABP between 2001 and 2009 were collected from the electronic database at our institution.

Results: Overall, 224 patients have been treated with IABP: 79% were males, mean age was 64 (range 29 – 102), 36% had DM; 67% were in cardiogenic shock, 42% had pulmonary edema; 92% underwent cardiac catheterization. PCI was performed in 74%, IIB IIIa antagonists were given in 59%. Echocardiography was performed in 194. Mean LVEF was 35.2%, EF of 30% or less was in 42%; mitral regurgitation in 45%; mean SPAP was 42.15 mm HG, SPAP of 45% or more was present in 41%.

Twenty six percent of patients died within 1 month, 31.5% after 3 months, 34% after 1 year. During the follow-up (up to 8 years) total mortality was 40%. Early (30 days) mortality was significantly ($p < 0.05$) associated with advanced age, female sex, diabetes, cardiogenic shock, and pulmonary edema. LVEF did not affect early mortality.

Late mortality was significantly associated with the same factors as the early one, but also by hypertension, low (30% or less) EF, and mitral regurgitation. A borderline ($p = 0.07$) association was found between elevated (45 mm Hg or more) SPAP and mortality. Performance of cardiac catheterization, PCI, and treatment with IIB IIIa antagonist had a significant protective effect on both early and late mortality.

Conclusion: The majority of patients treated with IABP were males, 2/3 developed cardiogenic shock. Age, female sex, and poor hemodynamic status were associated with both early and late mortality. Low EF and MR were associated only with late mortality. Performance of cardiac catheterization, PCI, and treatment with IIB IIIa antagonists may be life saving. Patients surviving 3 month have a good chance of prolonged survival.

Our Preliminary Results with Hemofiltration in the Coronary Care Unit

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Continuous veno-venous hemofiltration (CVVH) has gained wide acceptance within intensive care units as a method of renal replacement therapy. Small and medium sized molecules are removed by convection and replacement fluid is infused, thus preserving hemodynamic stability. Hemofiltration is most suitable in patients with cardiogenic shock and renal failure, where conventional hemodialysis may cause hemodynamic instability. It may also be used in patients with severe heart failure complicated with edema, fluid accumulation and renal failure and in patients after out of hospital cardiac arrest. Hemofiltration has been shown to be effective in preventing the deterioration of renal function due to contrast-agent-induced nephropathy after coronary interventions. We recently started a project of hemofiltration in our ICCU patients. The results of our first 35 patients treated with hemofiltration are as follows:

Eleven patients came with ventricular fibrillation, eight of them(72%) regained consciousness. Of 6 patient with asystole or PEA, two regained consciousness. Thirteen patients came with Shock and renal failure, 4 recovered and 9 died. Five patients with high creatinine were treated after coronary angiography. Two of them deteriorated to continuous hemodialysis.

We conclude that hemofiltration may be highly effective in patient with out of hospital sudden death in addition to hypothermia, and it may help some of the patients with shock and renal failure.

The Cerebral Blood Flow as Assessed by The Transcranial US Doppler in Patients Treated with IABP in the Coronary Care Unit

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Background: IABP is a common therapeutic intervention in patients with acute heart failure. It influences the coronary blood flow by changing hemodynamics in the ascending aorta. There is insufficient data about the effects of IABP on the cerebral blood flow. The objective of this study was the determination of such effects.

Patients and methods: The cerebral blood flow of patients treated with IABP in our institution was assessed by TCD. In this ongoing study 8 patients have been recruited so far. We obtained a written informed consent from all conscious patients. Patients unwilling to participate, patients with unstable hemodynamics (inability to wean from IABP) and patients with an abnormal pattern of cerebral blood flow were excluded. Peak velocities of blood flow in left and right middle cerebral and left and right vertebral arteries were assessed without and with IABP augmentation. Blood pressure, pulse and saturation were also recorded.

Results: Of the 8 patients 7 were males, mean age was 70 (range 27 – 88, SD 11.9). Without IABP counterpulsation, the average peak flow velocity in LMCA was 89 m/sec, in RMCA was 73, in LVA was -39, and in RVA was -42 m/sec. Average blood pressure was 133/66 mm Hg, HR was 85 bpm. With full IABP support the average peak flow velocity in LMCA was 91 m/sec, in RMCA was 86, in LVA was -47, and in RVA was -42 m/sec. Average blood pressure was 137/70 mm Hg, HR was 83 bpm.

The mean differences between the measurements with and without IABP were 2.4 m/sec for LMCA, 12.7 for RMCA, -7.6 for LVA, 0.4 for RVA; 3.6/4.3 mm Hg for blood pressure, and -1.3 bpm for HR. The differences measured in blood velocities in RMCA and LVA reached significance ($p=0.04$ & 0.05).

Conclusion: This pilot study demonstrated that IABP counterpulsation significantly influences cerebral blood flow independently from the changes in blood pressure in stable patients without baseline significant cerebrovascular anomalies. More studies are in progress.

Immunological Response may affect the clinical outcome in Acute Vascular Stroke

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Background and Purpose – activation of endothelial cells is an important mediator of atherothrombosis. Markers of endothelial cells such as soluble adhesion molecules can be measured in plasma and reflect the activity of the endothelium and the inflammatory system. We hypothesized that patients with acute ischemic stroke would have a dynamic change in their markers of inflammation over time, primarily reflecting activation of endothelial cells and the immunological ability to respond to an acute brain insult. We also believed that the acute inflammatory response in the first 72 hours may affect the short and long term clinical outcome.

Methods – We conducted a prospective case study of 27 patients that were admitted with acute ischemic stroke during the years 2005-2007. All were examined clinically using the National Institute Neurological Scale [NIHNS] and a brain computed tomography (CT) scan was done in the first 24 hours. Blood was drawn for levels of E-selectin, intracellular adhesion molecule 1 (ICAM-1), and vascular cellular adhesion molecule 1 (VCAM-1) on admission and 48 hours later by ELISA methods. The blood was separated and the serum was frozen at -80oC until analyzed as one batch.

Results - Mean blood concentrations of soluble E-selectin, intracellular adhesion molecule 1 (ICAM-1), and vascular cell adhesion molecule 1 (VCAM-1) were measured on admission and 48 hours later. Clinically there were 3 groups – 6 patients with transient ischemic attack [TIA] (58±12 years old, 3 women and 3 men), 8 patients with cerebrovascular accident [CVA] without recovery (75±18 years old, 4 women and 4 men), and 13 patients with CVA who recovered clinically (70±13 years old, 6 women and 7 men). There was a significant increase in E-selectin level in the second measurement (from 27.5±21.6 ng/mL to 38.7±19.6 ng/mL; Z=-1.997, p=0.046) in the TIA group. An inverse correlation was found between E-selectin level and age among TIA patients on admission (r=-0.913, p=0.011) and 48 hours later (r=-0.850, p=0.032). A positive correlation between E-selectin level and age was found among CVA patients with clinical recovery – on admission (r=0.576, p=0.050) and 48 hours later (r=0.567, p=0.054). A correlation between ICAM-1 and VCAM-1 levels was found 48 hours post admission (r=0.436, p=0.026).

Conclusions – We have demonstrated a significant increase in E-selectin level within 48 hours among patients with TIA. In the TIA group there was an inverse correlation between age and E-selectin level. This may suggest that younger patients can protect their ischemic brain more efficiently due to a more competent immune system, and that the immune system may have an important role in ischemic brain injury.

Spousal Support and Cardiac Patients' Distress: The Moderating Role of Attachment Orientation

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Based on the Person-Environment Fit Model, the current prospective study explored the effect of the interaction between spouses' ways of providing support and patients' attachment orientations on the patients' levels of psychological distress six months after experiencing a first Acute Coronary Syndrome (ACS). One hundred and eleven patients completed the Experiences in Close Relationships Scale during hospitalization, while their spouses completed the Ways of Giving Support Questionnaire one month later. The outcomes measured were the patients' depression and anxiety six months after their ACS. As predicted, whereas active engagement decreased the anxiety of anxiously attached patients, it increased the anxiety of patients low on this orientation. Avoidant patients did not benefit from support regardless of the manner in which it was provided. These results show that the effects of support may depend on the delicate interplay between providers' support and recipients' personalities. The implications of these conclusions for attachment theory and the study of dyadic coping are discussed.

Relationship between Hemodynamic and Cardiopulmonary Indices as Measured in Cardiac Patients by two Separate and Specific Tests

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Background: Direct non-invasive hemodynamic evaluation becomes more and more familiar by the relative new impedance cardiography (ICG) test. On the other hand, the cardiopulmonary exercise test (CPET) is well known as a reliable physiological test for indirect hemodynamic evaluation through CPET indices and the Fick formula.

Aim of Study: To correlate and cross-match between direct and indirect hemodynamic indices as measured by the two tests, the ICG and the CPET, separately.

Material and Methods: 30 cardiac patients (pts) who underwent both, ICG and CPET separately and up to two weeks apart, were included in the study. Linear correlations were done between all the indices of both tests. Values of $R > 0.6$ and $P < 0.05$ were considered statistically significant.

Results: Significant correlations were found between peak-HR of the CPET and the following ICG indices: to peak-CI(Cardiac Index) – $R=0.74$, $P < 0.0001$; to peak-CO(Cardiac Output) – $R=0.72$, $P < 0.001$; to delta-SI(Stroke Index) – $R=0.75$, $P < 0.005$. Other crossover correlations between peak-HR of the ICG test and the CPET indices were: to peak-O₂-Pulse(O₂P) – $R=0.62$, $P < 0.005$; peak-O₂-Consumption(VO₂) – $R=0.74$, $P < 0.001$. Other specific correlations were shown between peak-CI and peak-VO₂: $R=0.82$, $P < 0.001$; peak-CO and peak-VO₂: $R=0.72$, $P < 0.001$; peak-SI and peak-O₂P: $R=0.76$, $P > 0.001$; peak-SV and peak-O₂P: $R=0.76$, $P < 0.001$.

Conclusions: Such crossover significant correlations between the indices of both above tests may validate the ICG indices as reliable non-invasive hemodynamic evaluation and may further establish the CPET indices for similar, though indirect, physiological assessment.

The Incidence and Hemodynamic Significance of Gas Emboli During Operative Hysteroscopy: a Prospective Echocardiographic Study

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Aims: Operative hysteroscopy is associated with complications including the development of gas embolism. The aim of this study was to utilize continuous echocardiographic imaging during operative hysteroscopy to assess the extent and the hemodynamic effects of gas embolism in these patients.

Methods and results: Women undergoing operative hysteroscopy under general anesthesia without a history of organic cardiac disease were eligible. Transthoracic echocardiography was performed continuously in all study participants with assessment of the extent and frequency of gas embolism, right ventricular function and pulmonary hypertension. 23 women (mean age 48.0 ± 9.4 years) participated in the study. All subjects had evidence of bubble embolism in the RA and 20 of 23 (85%) had evidence of continuous flow of bubbles. Estimated pulmonary artery systolic pressure was 19.1 ± 3.7 mmHg prior to the procedure and 23.3 ± 3.4 following the procedure, a statistically significant difference ($p < 0.05$). There were no significant changes between the two groups in right ventricular end-diastolic area, end-systolic area or fractional area change.

Conclusions: Our study demonstrates a high frequency of continuous gas embolism during hysteroscopy which is associated with a small but statistically significant increase in pulmonary artery systolic pressure without affecting right ventricular function.

Aspirin Failure Is Associated with Worse Clinical Outcome but without Inadequate Platelet Response to Aspirin in Acute Myocardial Infarction patients

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Background: The occurrence of acute coronary syndrome despite aspirin use is coined as aspirin failure. This phenomenon is associated with a higher cardiovascular risk profile and worse prognosis. The issue whether this phenomenon is a manifestation of patients' characteristics or failure of adequate platelet inhibition by aspirin (aspirin resistance) has never been studied.

Methods: We evaluated 176 consecutive patients who presented with an acute myocardial infarction. Patient's baseline characteristics were recorded and platelet function in response to arachidonic acid (AA) and ADP was studied by light transmitted aggregometry upon discharge. Patients were followed for a period of 6 months for MACE (Death, Re-myocardial infarction, Re-angina).

Results: 118 (67%) patients were aspirin "naive" and 58 (33%) were on prior aspirin treatment. Patients on prior aspirin therapy were older (63 vs. 58 years P=0.003), more likely to be hypertensive (69% vs. 41%, p<0.01), hyperlipidemic (67% vs. 34%, p<0.01) and to have a prior cardiovascular event and/or procedure (35% VS. 6%, P<0.01). During a 6 month follow up period, "aspirin failure" was associated with a higher incidence of MACE (p=0.048). Patient with prior aspirin use eventually had lower platelet function, both in response to AA (32±24 vs. 45±30, P=0.0041) and ADP (57±19 vs. 62±18, P=0.097).

Conclusions: Our results suggest that "aspirin failure" is merely a marker of a higher risk profile of patients and not a manifestation of inadequate platelet response to aspirin therapy.

STent Thrombosis Related Acute Myocardial Infarction (SThAMI) In Changing Geomagnetic (GMA) And Cosmic Ray (CRA) Neutron Activity. PCI Data.

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Background. Acute myocardial infarction (AMI) may be caused by blood coagulation, inflammation, and atheroma rupture-fissuring, all of which are affected by environmental physical activity.

The aim of this study was to investigate if the occurrence of AMI due to stent thrombosis (SThAMI) is related to geomagnetic (GMA) and cosmic ray activity (CRA) on the day of the event.

Methods. The study group consisted of 1616 patients who underwent invasive coronary interventions for AMI in 2000-2008. Bare-metal stents were used in 1352 patients and drug-eluting stents in 191; 73 patients were treated without stenting. SThAMI developed in 60 of these patients (3.64%) who were treated by repeated PCI on the day of the event. The timing of the SThAMI events was investigated by levels of GMA (graded Io to IVo) and CRA (measured indirectly by neutron activity) on the same day. The physical data were derived from space science institutions in the USA, Russia, and Finland.

Results. There was a significant inverse correlation between SThAMI and daily GMA ($r=-0.98$, $p=0.018$). SThAMI was associated with relatively higher CRA. The ratio of lesions in the left anterior descending to right coronary arteries was inversely related to GMA. Drug-eluting stents were associated with more frequent SThAMI events than bare-metal stents ($p<0.0001$), though with a significantly longer time between first stenting and SThAMI ($p=0.017$).

Conclusion. The timing of SthAMI appears to be related to cosmophysical activity. Specifically, SThAMI events tend to occur on days of lower GMA and higher CRA, similar to primary AMI.

Effect of Transradial Approach on Quality of Life after Percutaneous Coronary Interventions

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The transradial approach (TRA) for percutaneous coronary interventions (PCI) is associated with a lower incidence of vascular complications and improved patient comfort. Its effects on quality of life after PCI was not investigated. Objectives: To assess quality of life of TRA versus transfemoral approach (TFA) after PCI. Methods: Single center prospective study performed by the nursing staff. Access site was determined by the operator preference. Patients were examined at 1 day and at 1 week after PCI for complications. Quality of life was measured with visual analog scales (VAS) immediately and 1 day after PCI. Results: 300 patients, mean age 59.1±10.9 years, 20% females. Indications for PCI: 209(69.7%) acute coronary syndrome and 91(30.3%) stable angina. Pretreatment: Aspirin and clopidogrel 262(87.3%), Enoxaparin or heparin 128(42.7%) and IIb/IIIaGP antagonists 50(16.7%). All patients received weight adjusted heparin during catheterization. Access site: 227(75.7%) TRA and 73(24.3%) TFA. Baseline characteristics, indications for PCI and medications were similar in both groups. Crossover to alternative access site was observed in TRA only, 6 (2.6%), $p=0.316$. TRA significantly reduced hematoma area ($2.33\pm 11.19\text{cm}^2$ vs $17.40\pm 51.15\text{cm}^2$, $p<0.0001$). Pseudoaneurysm, $n=3$ (2 needed intervention) and blood transfusion, $n=2$, were observed in TFA only ($p=0.002$). TRA significantly reduced mean time to ambulation (7.13 ± 10.10 vs 19.3 ± 9.74 hours, $P<0.0001$). Over the first day after the procedure, measures of bodily pain, back pain, walking ability and self-care ability favored the TRA ($P < 0.01$ for all comparisons). Conclusion: Among patients undergoing PCI, TRA leads to improved quality of life and to decreased vascular complications after the procedure.

Treatment of Internal Carotid Artery Originated Stroke by Interventional Cardiologists

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Extra cranial large vessel originated stroke is poorly responsive to IV rt-PA and generally associated with early and late poor prognosis. We present 2 cases of ischemic stroke secondary to acute and sub acute left Internal carotid artery (LICA) occlusion treated by urgent catheter based technique.

Case No 1: A 48 years old male was admitted with dense right hemiparesis after left sided carotid endarterectomy. NIH stroke scale at admission was 16 and brain CT was normal. Ten hours after IV rt-PA following clinical deterioration the patient underwent cervical angiography. A total blockage of LICA was detected. Using 6F right guiding catheter and a .014" wire we crossed the lesion, aspirated thrombotic material and implanted a 7X40 mm self expandable stent. After procedure the extra cranial TIMI grade flow improved dramatically. The Anterior Cerebral Artery (CA) was clearly seen but the first segment of Middle CA was still occluded due to distal embolization. Unfortunately the patient died one week after LICA stenting due to left cortical and brainstem dysfunction.

Case No 2: A 52 years old male was hospitalized due to transient left eye blindness. Cervical vessel angiography was undertaken due to repeated clinical episodes under aggressive antiplatelet therapy. A subtotal thrombotic occlusion of LICA was detected. Using 6F Multipurpose guiding catheter we crossed the lesion with .014" wire, dilated a critical narrowing by 2x20 mm coronary balloon and stented the lesion under distal protection device. Post procedure left sided extra and intracranial circulation improved. Dual antiplatelet therapy was recommended for one month. No blindness episodes were reported after 6 month of follow up. Conclusions: In community hospital carotid artery originated stroke can and should be handled by invasive cardiologists familiar with both coronary and carotid therapeutic techniques. Upgrading towards intracranial therapeutic procedures is urgently needed.

Predictors of long term clinical outcome following percutaneous intervention using DES for in-stent restenosis.

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BACKGROUND: In patients with in-stent restenosis (ISR) inside bare metal stents, drug-eluting stents [DES] might be the preferred therapy.

OBJECTIVES: The effects of demographic, procedural, and angiographic variables on long-term clinical outcomes following ISR treatment were determined.

METHODS: A series of 265 consecutive patients with ISR lesions treated with DES implantation [Cypher 80%, Taxus 12%] were evaluated. Major adverse cardiac events (MACE) were defined as death, myocardial infarction, and the need for target lesion revascularization were analyzed at 24 months.

RESULTS: The mean age was 64±11 years and 74% were males. DM was present in 50% of pts and 67% presented as acute coronary syndrome. The mean time from BMS implantation to ISR was 19.5±2.5 months. 33% of lesion was diffuse or total occlusion and 12.7% was a second ISR episode. Presence of DM ($r=.0.13$; $p = 0.03$) and prior coronary bypass ($r=0.24$; $p = 0.001$) independently predicted increased TVR at 24 months follow-up.

CONCLUSIONS: The use of DES in patients undergoing PCI for ISR within bare metal stent is clinically safe and feasible. Prior coronary bypass and diabetes predicted adverse long-term outcomes.

Outcome	N=265
Procedural success	98.5%
24 month death	3.9%
24 month MI	5.3%
24 month Stent thrombosis	2%
24 month TVR	16%
24 month TLR	14%
24 month CABG	4.2%
24 month MACE	22.3%

Drug eluting Stenting of Bifurcation lesions: A Systematic Approach towards Stenting

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Background: Recent studies show improved short- and mid-term clinical and angiographic results obtained with PCI of de novo coronary artery bifurcation lesions using drug-eluting stenting [DES] of the main vessel only. A systematic coronary stenting approach for bifurcation lesion using DES is therefore needed. A strategy of using two DES may be preferred if the side branch is of adequate size and heavily diseased, while in other cases a 'simplified' approach of stenting the main vessel only, with optional ("provisional") stenting of the side branch may be more appropriate.

Objective: The strategy of systematic coronary stenting in bifurcation lesions was evaluated in a large single-center observational study during a two-year inclusion period. We also aimed to evaluate the long-term outcomes of a modified "mini-crush" technique for treating bifurcation lesions.

Methods & Results: The study included 308 patients with a mean age of 64±12 years, 77% male, and 77% with acute coronary syndromes. The LAD/diagonal bifurcation was involved in 62% of cases. Anti GP 2b/3a drugs were used in 65% of cases. In 56% of cases sirolimus-eluting stents [Cypher] were used. Initial two stents strategy was used in 101 pts [33%], while in 207 pts the strategy was stenting of the main branch with provisional stenting of the side branch, of whom 9 crossed to side branch stenting also due to procedural indications [dissection or unsatisfactory angiographic results].

	Six months [n=308]	One year [n=308]	Two years [n=255]
Death	1.3%	3.2%	5.6%
MI	3.9%	4.2%	5.9%
Definite Stent thrombosis	1%	1%	1.2%
TVR	5.2%	7.5%	13.1%
CABG	2.9%	3.2%	4.7%
MACE	9.1%	13.6%	22.6%

Conclusions: Our results would indicate that a systematic approach towards PCI in bifurcation lesions with careful attention to procedural technique and using DES is associated with favorable long-term clinical results.

Transcatheter Aortic Valve Implantation: New challenges for the nursing staff

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Background: The current and recommended treatment of choice for patients with severe symptomatic aortic stenosis is surgical aortic valve replacement (AVR). Recently, a novel transcatheter aortic valve implantation (TAVI) was introduced and is used for the treatment of high risk and inoperable patients. We report the nursing challenges and perspectives following our first year with TAVI.

Methods and Results: From September 2008 to October 2009, nineteen patients underwent percutaneous AVI in our cathlab. Mean age was 77.5 ± 7.5 years, with 69% females. 18 procedures were performed via the transfemoral route while a single procedure was performed via the subclavian route. All procedures were performed under general anesthesia. Procedural success was 100% with no mortality at 30 days. Mean in-hospital stay was 12 ± 7 days. Two dedicated nurses underwent specific training prior to the acquisition of procedure and have taken part in all of them. Special nursing challenges included acquaintance with the new equipment and techniques while working together with a larger medical and anesthesiology team. Special protocols for post-procedural care were developed and implemented in the CCU with emphasis on possible complications including tamponade (16%) and complete heart block that warranted permanent pacemaker implantation (37%).

Conclusions: Transcatheter aortic valve implantation is a safe and effective therapy for high-risk patients that suffer from severe aortic stenosis. The procedure presents new challenges for the nursing team including the acquaintance of new equipment and techniques. New protocols and routines are required for optimal patient care.

Drug Eluting Stents vs. Bare Metal Stents for the treatment of Proximal-LAD Artery*Orvin, K; Ran, K; Shimrit, O; Abid, A**Rabin medical center, petach tikva, Israel*

Background: Drug-eluting stents (DES) have reduced the rate of in-stent restenosis compared with bare-metal stents (BMS), but long term results may be associated with an increased risk of late stent thrombosis. Therefore, the risk-benefit ratio of DES may be limited.

Goal: To compare a 2-year outcome of DES vs. BMS in proximal LAD based on a retrospective analysis.

Methods: This study assessed the long-term outcomes of patients treated with either a DES (Cypher 75%) or a BMS of proximal LAD. A total of 261 consecutive patients who underwent DES implantation were clinically followed for 2 year and compared to 99 patients who were treated with BMS. Only pts surviving more than one month after the index procedure were included and pts with prior CABG were excluded.

Results:

	DES 261 patients	BMS 99 patients	P-value
Age (years)	62±12	65±13	0.03
Male (%)	76	72	0.4
Diabetes mellitus (%)	32	22	0.07
ACS (%)	56	36	0.01
LVEF %	52±11	48±9	0.008
2 Vessel disease	43	52	0.04
Pre PCI TIMI 2/3 (%)	81	66	0.003
Post PCI TIMI 3 (%)	98	96	0.2
Lesion length (mm)	14.5±6.4	13.9±5.9	0.5
Diameter stenosis (%)	87±12	90±12	0.05
Reference vessel diameter (mm)	3.0 ±0.4	3.2 ±0.5	0.03
One year Death (%)	1.2	4	0.08
One year Myocardial infarction (%)	3.1	10	0.01
One year TVR (%)	3.8	23	0.00
One year Stent thrombosis (%)	0	5	0.002
One year CABG	1.5	7	0.006
One year MACE (%)	6.5	30	0.000
Two years Death (%)	1.5	10	0.002
Two years Myocardial infarction (%)	2.7	10	0.003
Two years TVR (%)	6.1	25	0.000
Two years Stent thrombosis (%)	0	5	0.002
Two years CABG	2.3	8.1	0.01
Two years MACE (%)	8.8	34	0.001

By multivariate analysis adjusted to the baseline differences [p value < 0.05 in univariate], propensity score for selecting DES and DES use, the DES use was a borderline significant independent risk for two years mortality [OR= 0.25; 95%CI= 0.06-1.1, P=0.06].

Conclusion: Drug eluting stent decrease revascularization rates in proximal LAD lesions without increased risk of stent thrombosis. The two years mortality benefits seen in our analysis needs more studies

DES-Related In Stent Restenosis (ISR) – Treatment Modalities and Outcomes

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Background: The best therapeutic alternative for patients suffering from ISR after DES implantation remains to be established.

Goal: To explore the clinical outcome of pts with DES failure according to different treatment options.

Methods: A total of 141 Consecutive pts had restenosis after DES deployment. Demographic, Clinical and angiographic data were collected. We analyzed the pts outcomes after six month.

Results: The majority of our pts had Cypher stents restenosis (74%) followed by Endeavor stents 16%. The mean time to restenosis was 15±13 months. Unstable angina was the clinical presentation in 61% of pts, 12% had STEMI while 27% had stable angina syndrome. Mean age was 64±11 years, 75% were male, and 60% had diabetes mellitus. 76% had two/ triple vessel coronary artery disease. Mean artery diameter was 3.0±0.4mm and total stents length was 22±7.7mm. Focal restenotic pattern was found during angiography in 70% of cases. Pts outcomes according to the treatment options are presented in the Table:

6 Month Outcomes	Stent (N=90)	PTCA (N=32)	CABG (N=13)	Conservative (N=6)
Death(%)	1.1	0	0	17
MI(%)	4.4	6.3	0	0
TVR(%)	13	16	0	17
MACE(%)	17	19	0	33

Outcomes were similar for re-stenting versus balloon angioplasty focal ISR cases after 6-12 months.

Conclusion: DES-related ISR is relatively infrequent but remains a major clinical challenge. There were no differences in outcomes whether the treatment was PTCA or re-stenting for focal ISR angiographic pattern.

Outcomes of Patients Undergoing Primary PCI for Acute Myocardial Infarction due to Saphenous Vein Graft Occlusion

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Background: Primary PCI for Acute Myocardial Infarction (AMI) due to saphenous vein graft (SVG) occlusion have been associated with poor outcomes.

Goal: This study aimed to evaluate the intermediate-term clinical outcomes among our patients (pts) who underwent primary PCI for AMI due to SVG occlusion.

Methods: We used our database of patients treated by primary PCI for STEMI between 1/2001 and 6/2009 excluding pts with cardiogenic shock and late arrival (>12 hours). 21 pts had MI related to SVG occlusion. A control group of 63 pts with native vessel occlusion was selected by 3:1 ratio and adjustment according to the same patient's age and the same area of myocardial infarction.

Results: There were more pts with previous MI in the SV group compared to pts in the control group (67% vs 19%; $p=0.0001$). Only 2% of pts from the control group underwent CABG surgery in the past. No-reflow was documented in 30% of pts vs. only 2% in the matched control group ($p=0.001$). TIMI III flow was achieved in 86% of patients compared to 98% in the control group ($P=0.05$). Six months rates of death were 14% vs. 8% but without statistical significance ($P=0.4$). MACE rates were similar in both groups (29% vs. 24% in control group; $P=0.6$).

Conclusion: The prognosis of primary PCI for AMI in SVG occlusion is similar to that of native lesions despite somewhat more unfavorable procedural outcomes.

A Third Generation Ultra-Thin Strut Cobalt Chromium Stent: Histopathological Evaluation in Porcine Coronary Arteries

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Objectives: The present study was designed to evaluate a novel 'third-generation' bare-metal stent (BMS) comprised of an ultra-thin-strut, cobalt-chromium platform with fixed geometry, uniform cell size, and superior surface finish in a porcine coronary artery model.

Methods: A total of 47 BMS of two types were implanted in pig coronary arteries using QCA to optimize stent apposition: a commercially available cobalt alloy thin-strut stent (91µm) as control (Driver; n=17), and an ultra-thin-strut (65µm) cobalt-chromium stent (Protea; n=18).

Animals underwent angiographic restudy and termination 1-week and 1-month post-implant for coronary artery histology. In addition, 12 overlapping Protea stents were analyzed at 1-month.

Results: At 1-week, comparable thin neointima and mild inflammation were observed in both groups. At 1-month, Protea demonstrated significantly lower angiographic % stenosis (2±1% vs. 17±5%, p=0.006), intimal thickness (0.11±0.01mm vs. 0.23±0.03mm, p=0.003), and histologic % area stenosis (19±2% vs. 32±3%, p=0.003). Mean stent strut injury scores were low and similar between groups. Angiographic % stenosis, intimal thickness, and histologic % area stenosis of overlapping Protea stents were 3±1%, 0.13±0.01mm, and 22±2%, respectively, and similar to the single Protea group. Stable fibrocellular neointimal incorporation, with complete endothelialization and minimal inflammation, were observed at 1-month in all stents, including overlapped Protea segments.

Conclusions: When compared to a commercially-available cobalt alloy BMS, the new third-generation Protea stent demonstrated favorable coronary arterial response with significant reduction of neointimal formation in the porcine model. Our results support the notion that apparently small improvements in basic but fundamental aspects of the BMS technology can result in actual biological benefits and ultimately pave the way to better DES platform.

Right Ventricular Septal Pacing: The Success of Stylet-Driven Active-Fixation Leads

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Background: The detrimental effects of right ventricular (RV) apical pacing on left ventricular function has driven interest in alternative pacing sites and in particular the mid RV septum and RV outflow Tract (RVOT). RV septal lead positioning can be successfully achieved with a specifically shaped stylet (fig.1) and confirmed by the left anterior oblique (LAO) fluoroscopic projection (Fig.2). Such a projection is neither always used nor available during pacemaker implantation. The aim of this study was to evaluate how effective is the stylet-driven technique in septal lead placement guided only by posterior-anterior (PA) fluoroscopic view.

Methods: 100 consecutive patients with an indication for single or dual chamber pacing were enrolled. RV septal lead positioning was attempted in the PA projection only and confirmed by the LAO projection at the end of the procedure.

Results: The RV lead position was septal in 90% of patients. This included mid RV in 56 and RVOT in 34 patients. There were no significant differences in the mean stimulation threshold, R-wave sensing and lead impedance between the two sites (Table.1). In the RVOT, 97% (34/35) of leads were placed on the septum, whereas in the mid RV the value was 89% (56/63).

Conclusions: The study confirms that conventional active-fixation pacing leads can be successfully and safely deployed onto the RV septum using a purposely-shaped stylet guided only by the PA fluoroscopic
projection

	RVOT Septum	RV Mid-Septum	P value
R Wave (mV)	17.5 7.6 ± ₁	14.9 8.7 ± ₁	0.304
Threshold (Volts)	0.8 0.3 ± ₁	0.70 0.3 ± ₁	0.178
Impedance (Ohms)	721 ± 148	756 177 ± ₁	0.528

fig.1 pre-shaped stylet

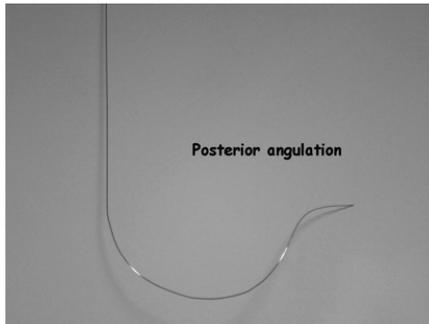
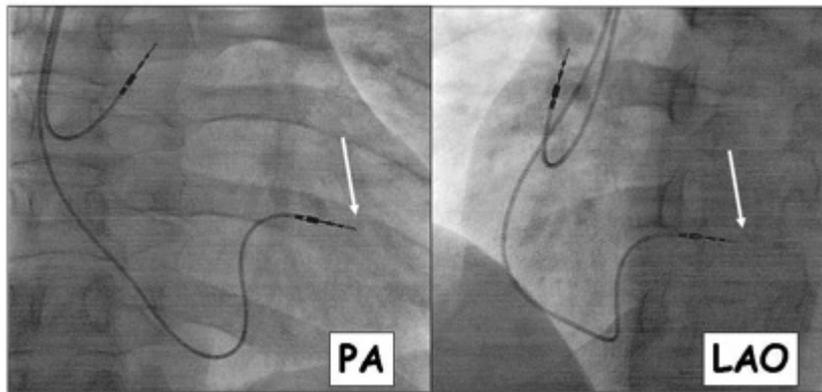


fig.2 PA and LAO 40° view showing septal localization



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Effects of Tilt-Table Testing on the QT Interval.

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Background. The QT interval shortens in response to sympathetic stimulation and the response of the QT interval to epinephrine infusion in healthy individuals and patients with long QT syndrome has been thoroughly studied. Head-up tilt-table (HUT) testing is an easy way to achieve brisk sympathetic stimulation. Yet, little is known about the response of the QT interval to HUT.

Methods. We reviewed the electrocardiograms of HUT tests performed at our institution and compare the heart rate, QT and QTc obtained immediately after HUT with the rest values.

Results. The study group consisted of 27 females and 14 males aged 23.9 ± 8.4 years. Head-up tilting led to a significant shortening of the R-R interval (from 825 ± 128 msec at rest phase to 712 ± 130 msec in the upward tilt phase, $p < 0.001$) but only to a moderate shortening of the QT interval (from 363.7 ± 27.9 msec during rest to 355 ± 30.3 msec during upward tilt, $p = 0.001$). Since the R-R interval shortened more than the QT interval, the QTc actually increased (from 403 ± 21.5 msec during rest phase to 423.2 ± 27.4 msec during upward tilt, $p < 0.001$). The QTc value measured for the upward tilt position was longer than the resting QTc value in 33 of 41 patients. Of those, 4 male patients and 2 female patients developed upward-tilt QTc values above what would be considered abnormal at rest.

Conclusions. During HUT the QT shortens less than the RR interval. Consequently, the QTc increases during head-up tilt.

Beneficial Effect of Bradycardia Tachycardia Response (BTR) Algorithm on VT Detection in the Presence of Rate Smoothing

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Background: We have previously shown that rate smoothing (RS) algorithms despite their obvious advantages may potentially affect ventricular tachycardia (VT) detection by ICDs in certain programming settings. A recently developed algorithm named Bradycardia Tachycardia Response (BTR), is designed to solve this problem

Objective: The aim of this study was to assess how effective BTR is in preventing VT underdetection in the presence of RS.

Methods: Two ICD models (model 1 and model 2) bearing identical rate smoothing algorithms were connected to a VT simulator. Of these two, only model 2 has the BTR feature. Both devices were programmed to detect VT at 160 bpm and were tested with simulated VT at a rate starting from 160 and increasing by 10 bpm every 10 seconds, with 125 different combinations of AV delay, rate smoothing down and upper rate limit being programmed. The rate at which VT was detected served as a measure of appropriate prompt detection of arrhythmia.

Results: Device model 2 detected all VTs at a rate of 170bpm i.e. as soon as their rate exceeded the programmed detection rate. Device 1 had delayed detection in 71/115 cases and was able to detect only when VT reached rates of 180 (17.4%), 190 (11.3%), 200 (12.2%), 210 (9.6%), 220 (6.1%), 230 (3.5%), 250 (1.7%). Conclusion: The BTR algorithm effectively counteracts delayed VT detection in the presence of Rate Smoothing.

Comparison of Cardiac Resynchronization Therapy characteristics between Israel and Other ESC member Countries: Data from European CRT-SURVEY

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Aim: The European CRT-Survey described the current clinical practice of CRT implantation in Europe. The aim of our study was to describe CRT implantation characteristics in Israel, compared to other European countries, based on that survey.

Methods: All centers implanting CRT devices in 13 European countries were invited to participate in this web-based survey. A total of 141 centers responded, of which six were Israeli centers. All patients who had CRTD/P devices implanted or upgraded to CRT between November 2008 and June 2009 were included in this survey.

Results: A total of 2438 patients were studied, of whom 195 (8.0 %) were from Israel. Israeli patients differed significantly from their European counterparts, having a higher percentage of ischemic etiology (71.8% vs. 48.8%) a higher incidence of diabetes and they underwent more coronary revascularization. 26.2% of Israeli patients had normal baseline ECG compared to only 9.9% in Europe and they had significantly shorter QRS duration (145 ± 34 ms) compared to European patients (159 ± 31 ms). Israeli compared to European patients had significantly lower LVEF ($25\% \pm 7$ versus $27\% \pm 8$), and 17.5% of Europeans had LVEF > 35% compared to only 10.1% among the Israelis. CRTD was implanted in 80.5% among Israelis compared to 72.5% in other European patients. While most implantations were performed by electrophysiologists (96.9%) in Israel, only 73.5% were performed by electrophysiologists in the other European countries. The rate of periprocedural complications did not differ between the 2 groups, except for bleeding which was higher among Israeli patients.

Conclusion: There are several differences between CRT practice in Israel compared to other European countries. These differences should be taken into account when extrapolating data acquired in Europe versus Israel.

Can we Predict Early Deterioration after CRT from Patients' Baseline Characteristics?

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Background: Two thirds of pts treated by CRT will show clinical improvement. Few pts may deteriorate . The aim of this study was to analyze clinical and echocardiographic parameters as predictors of clinical or echo deterioration following CRT.

Methods: We reviewed our CRT database for pts with implanted CRT/D since 1998. Clinical deterioration was defined by a combined score of the change in NYHA class, QoL score and 6-minute walk (6MW) between baseline and follow up at one year. Each component was classified as improved (+1), unchanged (0), or worsened (-1). Deterioration was defined as a combined score of ≤ -1 or death or heart transplantation during follow-up. Echo deterioration was defined by a combined score (≤ -1) of absolute reduction in LVEF by $\geq 5\%$ and relative increase LVESV by $\geq 10\%$.

Results: A total of 509 pts were implanted with CRT/D during this period. 52 pts were excluded due to incomplete data. Of the 457 pts analyzed, 67 (14.7%) clinically deteriorated. Pts with ischemic CMP had a trend toward higher incidence of clinical deterioration, as did those with higher LVESV and LVEDV ($p = >0.05$). Among those who clinically deteriorated, only 22.2% had a significant reduction in LVEF compared to 8.6% in the other group ($p = 0.005$). 83 pts (18.2%) had evidence of echocardiographic deterioration, of whom only 47 (56.6%) clinically deteriorated. 36 patients (7.9%) had evidence of echocardiographic but not clinical deterioration. None of the baseline parameters were significant predictors of either clinical or echocardiographic deterioration.

Conclusions: In this cohort of CRT pts approximately 15% and 18% of pts exhibited clinical and echo deterioration during the first year after implantation. There was poor correlation between echocardiographic and clinical deterioration. Using baseline clinical and echocardiographic parameters we were unable to characterize those patients who were prone to deterioration

Does Early LV Mechanical Resynchronization Affect the Clinical and Echocardiographic Outcome among CRT Patients?

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Background: CRT through Biventricular pacing aims to restore intraventricular [IntraV] synchronization in pts with advanced heart failure. Recent publications questioned the value of baseline dyssynchrony in prediction of response to CRT.

The aim of this analysis was to evaluate the relation between early resynchronization, and both clinical and echocardiographic outcome.

Methods: We evaluated all pts who were successfully implanted with CRTP/D devices at our heart center since 1998. All pts with evidence of IntraV dyssynchrony at baseline were included in this analysis. Mechanical resynchronization, as detected by tissue doppler imaging during the first year of follow up was achieved, if there was 30% or more reduction in either lateral to septal delay or Yu score [12 segment standard deviation]. Clinical and echo were analyzed.

Results: A total number of 458 pts were implanted successfully since 1998. 254 pts were excluded due to incomplete data or absence of baseline dyssynchrony. 204 pts were included in this analysis. 52% of these pts showed evidence of resynchrony. There was no difference between the baseline characteristics of both groups except for baseline 6MW and QoL. More severe IntraV dyssynchrony predicted early resynchronization. There was no difference in clinical and echo outcome between the groups with and without resynchronization

Conclusion: Only half the patients with baseline dyssynchrony achieve mechanical resynchronization after CRT. No baseline clinical or echo parameters predicted resynchronization. There is no correlation between early resynchronization and clinical or echo outcome. This finding adds to the debate regarding the value of TDI dyssynchrony parameters.

Long-Term Effectiveness of Beta Blocker and Calcium Blocker Combination Therapy in Patients with CPVT

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Introduction: The mainstay of therapy for catecholaminergic polymorphic ventricular tachycardia (CPVT) is maximal doses of β -blockers (BB). However, recent data suggests that the 10-year risk for cardiac arrest despite β -blocker therapy approaches 10%. Since the ventricular arrhythmias in CPVT are caused by calcium overload, we speculated that the combination of verapamil plus BB (V+BB) would be more effective than BB alone for suppressing ventricular arrhythmias. Indeed, we recently reported that V+BB effectively suppresses exercise-induced ventricular arrhythmias in patients refractory to BB alone. In the present study we report the long-term clinical follow-up of our original series. **Methods:** Six patients with CPVT who had exercise induced ventricular arrhythmias despite maximally tolerated doses of BB received V+BB. The combination therapy resulted in significant reduction of exercise-induced ventricular arrhythmias: (1) 3 patients had nonsustained ventricular tachycardia (VT) on β -blocker, and none of them had VT on V+BB. (2) The number of ventricular ectopics during the whole exercise test went down from $7859 \pm$ beats to $68 \pm$ beats. The patients were follow-up every 6 months and in case of recurrent symptoms.

Results: During a mean follow up of $376 \pm$ months, three patients experienced recurrent arrhythmic symptoms including recurrent syncope in one, cardiac arrest in the second and appropriate ICD therapy in the third.

Conclusion: Despite a more effective suppression of exercise induced ventricular arrhythmias with V+BB, this combination therapy failed to prevent clinically significant ventricular arrhythmias during long-term follow-up. Suppression of exercise induced ventricular arrhythmias is a poor surrogate of long-term effectiveness of medical therapy in CPVT.

Right Ventricular Septal Pacing:A Comparative Study of Outflow Tract and Mid Ventricular Sites.

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Background: Prolonged right ventricle (RV) apical pacing is associated with left ventricle dysfunction due to dysynchronous ventricular activation and contraction. RV septal pacing allows a narrower QRS compared to RV apical pacing which might reflect a more physiological and synchronous ventricular activation. The purpose of this study was to compare the QRS morphology, duration and suitability of RV outflow tract (RVOT) septal and mid RV septal pacing.

Methods: 17 consecutive patients with indication for dual chamber pacing were enrolled in the study. Two standard 58cm active fixation leads were passed to the RV and positioned in the RVOT septum and mid RV septum using a commercially available septal stylet (model 4140, St.Jude Medical). QRS duration, morphology and pacing parameters were compared at the two sites. The RV lead with less satisfactory electrical parameters was withdrawn and deployed in the right atrium.

Results: Successful positioning of the pacing leads at the RVOT septum and mid RV septum was achieved in 15 patients (88.2%). There were no significant differences in the mean stimulation threshold, R-wave sensing and lead impedance between the two sites. The QRS duration in the RVOT septum was $15114 \pm$ ms and in the mid RV septum $14513 \pm$ ms ($P=0.150$).

Conclusions: This prospective observational study shows that septal pacing can be reliably achieved both in the RVOT and mid RV with active fixation leads using a specifically shaped stylet. There are no preferences in regard to acute lead performance or paced QRS duration with either position. fig.1 Radiographic views of the two leads on the RV septum. The superior lead is in the RVOT and the inferior lead in the mid RV. PA and LAO 40° Table.1 Pacing parameters at RVOT septum and Mid RV septum

The Long Term Effect of Cardiac Resynchronization Therapy

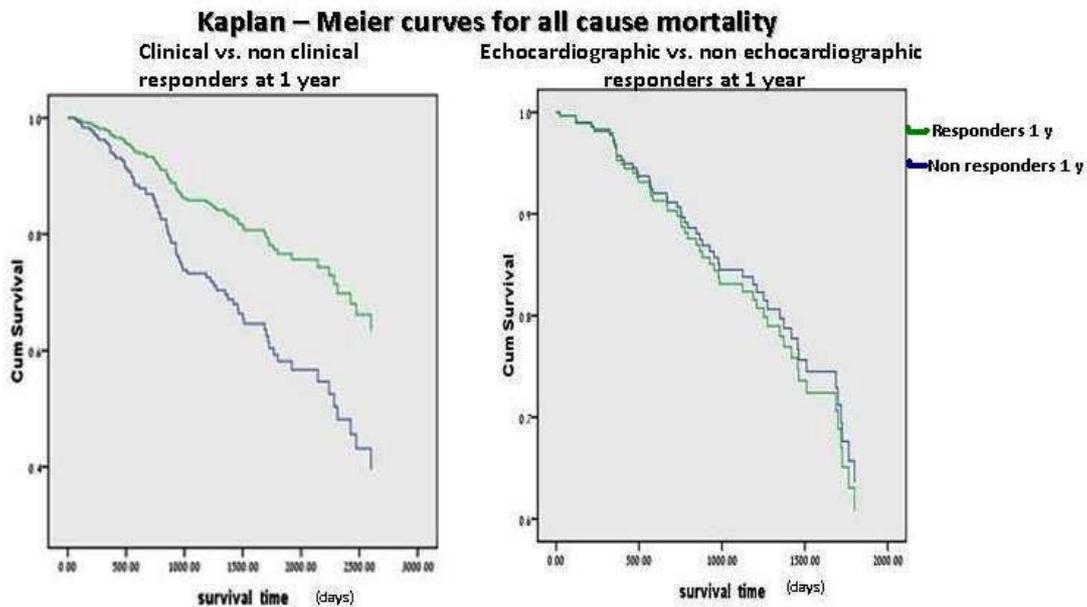
Nof, E; Abu Shama, R; Kuperstein, R; Gurevitz, O; Luria, D; Bar-lev, D; Granit, H; Eldar, M; Feinberg, M; Glikson, M
Sheba Medical Center, Ramat Gan, Israel

Background: Little is known about the long term effect of cardiac resynchronization therapy (CRT) and whether those who respond in the short term maintain their clinical benefit status through long term follow up (FU).

Methods: Consecutive pts (n=149) implanted with a CRT device that had FU period of at least 36 months were included. All parameters [NYHA class, quality of life questionnaire (QOL), 6 minutes walk (6MW), left ventricular (LV) ejection fraction (EF) and end systolic volumes (ESV)], were recorded at baseline, at 1 year, at 3 years and up to 8 years post implantation. Clinical response to CRT was defined by a combined score of improvement in NYHA class, QOL and 6MW (<-1/0/>1). Echocardiographic response was defined as a combined score of absolute increase in LVEF \geq 5% and relative decrease in LVESV \geq 10% (<-1/0/>1). Responders had to have a combined score of \geq 1 and alive at 12 months post implantation. All cause mortality was analyzed by Kaplan- Meier method and was compared between responders and non responders.

Results: One year after implantation 89/149 (60%) had a clinical response to CRT and 29/ 56 (52%) had an echocardiographic response. Of those who responded, 56 (63%) maintained their clinical response and 24 (83%) maintained their echocardiographic response after 3 years of CRT. In the long term, the hazard ratio (HR) for mortality was 2 times higher (95% C.I.:1.30-3.20; p= 0.002) for those who did not have a clinical response to CRT after 1 year of therapy compared to responders (figure) . However, echocardiographic responders and non responders at 1 year had similar mortality rates (HR of 0.9; 95% C.I.: 0.5- 1.6; p= 0.7).

Conclusions: Most clinical and echocardiographic CRT responders at 1 year maintain their benefit over the long term. Clinical response at 1 year but not echocardiographic response predicted significant long term survival benefit.



Tricuspid Valve Regurgitation after Orthotopic Heart Transplantation – Prevalence and Etiology

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Background: Tricuspid valve regurgitation (TR) after orthotopic heart transplantation (OHT) is common and has been linked to various preoperative, intraoperative and postoperative variables. The aims of this study were to determine the short and long term prevalence of TR after OHT, to examine the correlation between its development and the above mentioned variables and to determine its outcome. *Methods:* All 140 OHT patients who were followed-up at the heart transplant clinic at the Sheba Medical Center between 1991 and 2008 for a minimal period of 12 months were divided into those with no TR/mild TR and those with at least mild-moderate TR. The average follow up period was 8 ± 4.9 years. The two groups were compared regarding preoperative hemodynamic variables, surgical technique (biatrial vs bicaval anastomosis), number of endomyocardial biopsies (EMBs) and acute cellular rejections (defined as ISHLT grade 2 or higher), incidence of graft vasculopathy and right heart failure and clinical outcome. *Results:* The prevalence of significant (at least mild-moderate) TR was 30.2%, 10.8%, 9%, and 12.1% - immediately after OHT, at 3 months, at 1 year and at the end of the follow-up, respectively. Pretransplant high pulmonary vascular resistance and high mean pulmonary arterial pressure were found to be significantly correlated with the development of early TR ($p<0.02$). The development of late TR was found to be significantly correlated with a higher total number of EMBs ($p<0.02$), the biatrial surgical technique ($p<0.04$), and the presence of graft vasculopathy ($p<0.001$). No correlation was found between TR and the number of acute graft rejections. TR development was found to be correlated with symptoms of right heart failure and with need for tricuspid valve surgery, but not with mortality. *Conclusions:* The incidence of TR after OHT may be reduced in part by avoiding the biatrial anastomosis technique during surgery and reducing the number of EMBs to an absolute minimum.

1550642

In Quest of Predictors of Response to Cardiac Resynchronization Therapy (CRT/D)

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Background: Up to 30 % of CRT/D recipients implanted according to guidelines do not respond to this therapy. Despite more than a decade of CRT experience, there are still contradictory data on the value of various baseline parameters as predictors of response to CRT.

Methods: We reviewed our prospectively collected institutional CRT/D database of 509 pts implanted with CRT/D since 1998. 353 pts had complete baseline and follow up data and they formed the study population. All parameters were assessed at baseline and 6- 12 months post implantation. Clinical response to CRT was defined by being alive with a combined score of improvement in NYHA class, QOL and 6mw ($<-1/0/>1$). Echocardiographic response was defined as a combined score of absolute increase in LVEF $\geq 5\%$ and relative decrease in LVESV $\geq 10\%$ ($<-1/0/>1$). Responders had to have a combined score of ≥ 1 . Multiple baseline clinical and echocardiographic parameters were analyzed as predictors of clinical and of echocardiographic response

Results: The clinical response rate was 59.5%. The only significant predictor of clinical response was higher NYHA class ($p=0.002$). The echocardiographic response rate was 50.8%. Significant predictors of echocardiographic response included prior RV pacing, BBB as compared to normal and IVCD ECG pattern. The following baseline parameters were not predictive of any type of response: age, gender, etiology of cardiomyopathy, atrial fibrillation, pulmonary artery pressure, septal to lateral delay, YU score, QRS Width, QOL, 6mw, LVEDD, LVEDV, LVESV, LVESD, and LVEF.

Conclusions: In this large CRT pts cohort, the only predictor of clinical response to CRT/D was worse NYHA functional class at implantation, and the only predictors of Echo response were RV pacing and QRS morphology. Other commonly used clinical and echocardiographic measures failed to predict clinical response. New parameters should be sought in order to better predict response to CRT.

1550646

Non Inducible VT – Long Term Outcome.

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Background:

These days there is an expanding population of Defibrillator (ICD) recipients for primary prevention. The new guidelines cause a significant economic burden and some of the health care providers still demand a positive VT study for approval of device implant in primary prevention recipients. We evaluated the long term out come in all the patients who underwent a VT study in our institution and did not receive an ICD.

Methods:

The study group included 165 patients who underwent a VT study in the last 10 years, since January 2000, at our institution. We excluded all patients who received an ICD. The study protocol we use is induction attempts at 2 RV sites, apex and outflow. In each site we pace in 3 drive trains up to S4 and tightest RV bursts down to refractoriness.

Results:

The study group included 51 (31%) patients who did not receive a device. The mean age at study 64 ± 9 (33-82 years), LV Ejection fraction $38 \pm 11\%$ (20-62 %), 9 (18%) were woman. The mean follow up was 46 ± 23 month. 36 (71%) had ischemic heart disease, 21 (58%) had undergone coronary artery bypass prior to the study. Altogether 10 died in follow up (7/10 with IHD), at least 3 did not die suddenly.

Conclusions

As expected there is significant mortality over the years in this group of patients. Although not necessarily arrhythmic. The arrhythmic survival maybe better than expected possibly due to the fact that our protocol is more aggressive than protocols used in large trials such as MADIT / MUSTT.

The outcome of patients with Left Ventricle Dysfunction Implanted with CRT-P vs. CRT-D

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Background : Cardiac resynchronization therapy (CRT) is an established modality that improves heart failure symptoms. Implantable cardiac defibrillator (ICD) improves survival in patients with severe heart failure. It is not absolutely established if patients who need CRT-P implantation should be implanted CRT-D routinely to improve their survival.

Methods: The aim of this study is to evaluate the prognosis of patients who underwent CRT-P vs CRT-D implantation. A retrospective cohort analysis of 124 consecutive patients older than 18 that were implanted CRT-P or CRT-D during hospitalization between 1/ January 2005 and 1/ January 2008. Two groups were compared: those with CRT-D and those with CRT-P. The primary outcome was one-year mortality. The secondary end-points were readmission and complication rate after pacemaker implantation.

Results: There were 53 patients with CRT-D and 71 patients with CRT-P. Baseline characteristics did not differ except a higher rate of men, smokers, and patients with COPD in the CRTD group. In addition CRTD group had a lower EF and larger end systolic and end diastolic left ventricle diameters.

Overall one-year mortality rate in the CRT-D group was 15% vs 17.6% in the CRT-P group, P=0.8. We did not find any difference in the readmission rate (43% vs 49 %, P=0.59) and the rate of procedure or 1-year device related complications (7.5% vs 8.5% %, P=1) between the two groups.

Conclusions: In our study CRT-P and CRT-D patients had similar one-year mortality, readmission and complication rates.

Quality of Life and Quality of Sleep Among Congestive Heart Failure Patients Aged 65 or Above

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Introduction: Congestive heart failure (CHF), a prevalent disease among elderly, can affect life quality and sleep quality.

The aims of this study were: (1) to evaluate the quality of life and sleep among older CHF patients and the correlation between the two; and (2) to assess the influence of CHF severity, demographic, and different health variables on the quality of life and sleep.

Methods: Ninety CHF patients ≥ 65 years were recruited: 50 male and 40 females, mean age 77 ± 7 . The patients were hospitalized in the Internal Medicine Division at Hadassah. Socio-demographic and medical data were collected by a questionnaire; quality of life by the Minnesota Living with Heart Failure Questionnaire; and sleep quality by the Pittsburg Sleep Quality Index (PSQI). Patients were classified according to disease severity using NYHA classification.

Results: Patients' distribution according to NYHA was: class I -19%, class II - 39% and classes III+IV - 42%. 89% of the subjects reported sleep disturbance (>5 points on the PSQI). A statistically significant correlation was found between sleep quality and life quality ($r=0.32$, $p<0.003$), emotional life quality ($r=0.36$, $p<0.001$), and physical life quality ($r=0.28$, $p=0.015$). Quality of life, both physical and emotional life quality, and sleep quality significantly decreased with NYHA class ($p<0.0001$, $p<0.0001$, $p<0.0001$, $p=0.042$, respectively). Among patients in NYHA I, males reported better life quality, physical, and emotional life quality than did females ($p=0.0481$, $p=0.0139$, $p=0.017$, respectively), and better sleep quality ($p=0.0218$). Among patients in NYHA I and NYHA III+IV, those treated with beta-blockers had better sleep quality than those that were not ($p=0.0265$, $p=0.0495$, respectively), and those that used sleeping pills had worse quality of sleep than those that did not ($p=0.0475$, $p=0.0115$, respectively).

Conclusions: Sleep disturbance is prevalent among older CHF patients. There is a positive correlation between life quality and sleep quality. Severity of CHF influences both. The impact of socio-demographic and health variables on life and sleep qualities is different in each NYHA class. Comprehensive approach to an older CHF patient should include assessment of qualities of life and sleep, and appropriate interventions.

1545765

Gender Differences among Heart Failure Patients

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Background - The effects of BMI, ankle-brachial index (ABI), and abdominal circumference (AC) on the prognosis of heart failure patients are controversial. Our purpose was to examine the possibility that gender difference could explain the conflicting results on BMI and heart failure outcome.

Methods - 86 heart failure patients (46 females and 40 males) were enrolled to the study. Their BMI, ABI, AC, ejection fraction, and NYHA class were evaluated. **Results** - No gender difference was observed: age (73.9 years \pm 14.3 [men] vs. 77.1 years \pm 10.1 [women] [p=NS]), ejection fraction (53.3% \pm 13.7 [men] vs. 56% \pm 13.4 [women] [p=NS]), NYHA class (2.4 \pm 0.9 [men] vs. 2.4 \pm 1.0 [women] [p=NS]), ABI (0.9 \pm 0.2 [men] vs. 0.9 \pm 0.2 [women] [p=NS]), AC (105.1cm \pm 21.9 [men] vs. 108.8cm \pm 24.1 [women] [p=NS]).

Conclusions - No difference in age, cardiac, metabolic, or vascular parameters between genders could explain the controversies and the "weight paradox" of heart failure patients.

Appropriateness and complications of the use of Aldospirone in patients treated in a Heart Failure clinic.

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Background Aldospirone (ALDO) has been reported (RALES trial) to decrease morbidity and mortality in patients NYHA class III and IV heart failure (HF). With widespread use of ALDO in patients with HF side effects and complications were reported. To examine tolerability and safety of ALDO in clinical practice, we analyzed a cohort of patients treated by a dedicated HF team.

Methods and results Overall 157 patients with appropriate laboratory (1,3,6,12 months) and clinical follow-up (3-6 months and 1year) of at least for 1 year were included. Data of 100 patients who received ALDO were analyzed retrospectively. The incidence of the complications following ALDO use, were defined as development of the following: a) hyperkalemia with serum potassium ≥ 5.2 or serious hyperkalemia ≥ 6.0 mEq/l; b) serum creatinine ≥ 2.0 mg/dl; and c) hyponatremia with serum Na ≤ 135 mEq/l, d) hypotension and side effects including gynecomastia and abdominal pain. The baseline characteristics are presented in the table. At 1 year follow-up 6 patients developed hyperkalemia ($K > 5.2$, mean 5.6 ± 0.3 , range 5.3-5.9 mEq/l), 4 of them had $K > 5.5$. Two patients developed hyponatremia ($Na < 134$ mEq/l). Six patients stopped ALDO for: 1-gynecomastia, 2- worsening renal failure and hyperkalemia, 2- hyperkalemia (5.9 mEq/l), 1 patient due to bradycardia. There was increase in mean creatinine level at 1 year (1.12 ± 0.35 vs. 1.21 ± 0.38 mg/dl, $p = 0.02$), however, no significant changes were found in GFR (99.9 ± 33.5 vs. 65.7 ± 27.7 mL \cdot min⁻¹ \cdot 1.73 m⁻², $p = ns$) and potassium (4.5 ± 0.4 vs. 4.6 ± 0.5 mEq/l). We found improvement of creatinine clearance by $>10\%$ in 19 patients and worsening by $>10\%$ in 38 patients. No significant changes in BP or HR were observed. No patient had been admitted or needed urgent treatment for ALDO side effect.

Conclusion Appropriate ALDO use and close follow-up by HF team is safe and can minimize the risk for adverse events and complications.

Long Term Medical Art Therapy: Influence on Quality of Life, Functional Capacity and Compliance in Advanced Heart Failure Patients

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Background: Medical Art Therapy (MAT) enables sick people to express in art their mental state. Loss of hope and feelings of frustration, fear and anxiety, common in heart failure (HF), negatively affect pts' quality of life and compliance.

The Aim of the present study was to evaluate the influence of MAT on quality of life, functional capacity, anxiety, depression and compliance to medical therapy of pts with advanced HF.

Methods: Between December 2007 and July 2008, ten advanced HF pts were assigned to 24 weekly MAT sessions guided by a MAT therapist (N.S.).

The following parameters were recorded at baseline, after 12 and 24 weeks: the Ulman Personality Assessment Procedure (a MAT diagnostic tool), the Minnesota Living with HF questionnaire score, The European HF self-care Behavior Scale (measuring compliance), Hospital Anxiety and Depression Scale (HADS), and Six Minuets Walk Test.

From the ten pts, one patient died, one underwent heart transplantation, one was hospitalized for more that a month due to acute decompensated HF and one pt dropped out due to personal problems between weeks 12 and 24. Data obtained at 12 weeks is presented.

Results: In response to MAT, the Ulman score significantly improved (from 97.6 ± 13 to 133 ± 12 , $p < 0.05$) and there was a trend towards improvement in pts' compliance as manifested by the improvement in the European HF self-care Behavior Scale (from 35 ± 6.7 to 30 ± 4.6 , $p = 0.06$).

The changes in Minnesota Living with HF questionnaire score (from 72 ± 15 to 67 ± 14), the HADS score (from 27 ± 6.5 to 30 ± 3.4), and six minute walk test (from 413 ± 38 to 490 ± 55) did not reach statistical significance.

Conclusions: Even the very sick pts with advanced HF may improve their MAT skills. Long term MAT tends to improve compliance to medical therapy and should be a part of the therapeutic arsenal in every HF clinic.

The influence of MAT on quality of life, functional capacity, anxiety and depression of pts with advanced HF needs to be assessed in larger studies.

Modifying Self-Care Behavior in Patients with Heart Failure: Impact of the HF Dedicated Nurse Intervention.

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Background: Optimizing self-care behavior related to heart failure (HF) including adherence to medical therapy, keeping appropriate diet, daily weighing, exercise training and seeking professional assistance when needed is considered essential for improving outcomes in patients (pts) with HF.

The aim of the study was to describe the impact of an intervention by a HF dedicated nurse on the self-care behavior pattern of pts with HF. Methods: Between March and September 2006, 42 advanced HF pts, 81% males, mean age 66.1±13 years, New York Heart Association, class III-IV were referred to an outpatient clinic, in a tertiary care teaching hospital, by their treating cardiologists or GP's. On arrival, pts completed the European Heart Failure Self-care Behavior Scale (EHFScBS).

After filling the questionnaire, pts were examined and interviewed by the HF dedicated nurse. Data regarding their habits, socioeconomic status, supportive system, quality of life and their knowledge about their disease were recorded. Pts were thoroughly instructed and an illustrated educational booklet on HF was supplied. Availability of the HF dedicated nurse for advice and guidance was promised. The EHFScBS was repeated within 12±4 weeks.

Results: The median EHFScBS score was 38 and 26 at baseline and after 12±4 weeks of follow up, respectively ($p<0.05$). From the whole group, 11 (28 %) pts did not improve (less than 10% improvement from baseline). Among the non-responders, 7 (64%) were males, 3 (27%) were divorced or widowed and 8 (73%) were from a low socioeconomic status.

Conclusion: Intervention by a HF dedicated nurse has the potential of modulating the self-care behavior pattern of pts with advanced HF. The EHFScBS is an effective tool for assessing self-care and helps further case management.

What Do the French Do Better?*Horowitz, I¹; Zeller, L²; Liel-Cohen, N²; Ilia, R²; Kobal, S²**¹Ben Gurion University, Beer-Sheva, Israel; ²Soroka University Medical Center, Beer-Sheva, Israel*

Background: Cardiovascular remodeling is an expected phenomenon in professional soccer players, who are considered high dynamic athletes. However, national characteristics like genetics, race, frequency and intensity of training can influence the degree of cardiac adaptation. Using echocardiography we assessed professional Israeli soccer players (PISPs) who participate in the Premier League and compared our findings to data from professional French soccer players (PFSPs) from the same division.

Results: Eighteen active Israeli soccer players underwent an echocardiographic study. Echocardiographic values above the upper normal limits were absent in the all PISPs population except for one participant who had LV end-diastolic diameter of 58mm. The echocardiographic results comparing PISPs and PFSCs are presented in the table. Average LV mass and LV mass index were significantly higher among PFSPs. LV hypertrophy defined as an LV mass index $>116 \text{ g/m}^2$ was present in 1/18 (6%) of the PISPs and in 13/29 (44%) of the PFSPs.

Conclusions: Cardiac remodeling identified by echocardiographic values above the normal limits is rare among professional Israeli soccer players. The considerable differences between Israeli and non-Israeli players involved the same sport discipline may be explained, at least partially, by differences in the intensity of the training. This point must be proven in future studies.

Parameters	PIPS (mean \pm SD)	PFPS (mean \pm SD)	ρ
Age (years)	25.6 \pm 4.5	25.3 \pm 3.8	0.92
Posterior wall (mm)	9 \pm 1.3	10 \pm 1.6	0.59
Septal/posterior wall ratio	1.0 \pm 0.2	1.0 \pm 0.1	1
Left ventricular end-diastolic diameter (mm)	50.8 \pm 3.3	51.9 \pm 3.9	0.71
Left ventricular end-systolic diameter (mm)	30.4 \pm 2.8	35.7 \pm 4.5	0.09
Left ventricular mass (gr)	161.9 \pm 33.8	230.5 \pm 47.6	< 0.0001
LV mass/body surface area (gr/m ²)	84.6 \pm 16.7	119 \pm 22.7	< 0.0001

1550925

Ischemic Severe Mitral Regurgitation With Pulmonary Hypertension Post Coronary Artery Bypass Surgery : Therapeutic Challenge ?

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Background :

The development of severe ischemic mitral regurgitation after bypass surgery is not uncommon. This situation poses to the clinician a difficult therapeutic challenge

Aim :

To study outcome of patients who developed severe ischemic mitral regurgitation (IMR) complicated with pulmonary hypertension (HTP) a long time after bypass surgery .

Methods :

From 2005 to 2009 , 34 patients who have undergone bypass surgery developed ischemic mitral regurgitation without no aortic disease, no mitral stenosis, no hypertrophy cardiomyopathy and no previous valve surgery or transplantation. All these patients were symptomatic with at least one episode of cardiac failure . Twelve patients had chronic renal failure . Three patients underwent a surgical revascularization completed for only one patient by mitral valve repair. Five patients underwent one or several stent implantation. One patient whose stent restenosed after a short period of time was revascularized surgically. One patient suffered from occlusion of a stent to diagonal artery and was treated medically.

Results ;

All patients after complete revascularization are feeling well and returned to unlimited activity. The patients after stent implantation returned to current life with some limitation , while majority of patients under medical treatment only, deteriorated. Eleven patients died from refractory cardiac failure precipitated by infection. The fatal event occurred most often in the first year after the diagnosis of severe IMR with severe HTP.

Conclusion ;

On top of an optimal medical treatment, an aggressive approach with coronarography and angioplasty should be recommended. The optimal surgical revascularization seems to give the best results . However both clinicians and surgeons are reluctant because of the inherent risk of a redux and complex procedure. The development of percutaneous mitral valve repair could represent a great hope for these patients whose prognosis seems so bad.

Increased RNA Editing in Children with Cyanotic Congenital Heart Disease-a New Epigenetic Mechanism Affecting Postoperative Course

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Objectives: Cyanotic infants undergoing cardiac surgery often demonstrate a complex post-operative course, partly dictated by the expression of inflammatory and cardiac genes. Some of these genes undergo epigenetic regulation, such as A-to-I RNA editing, which may emerge as a global post-transcriptional modification. We hypothesized that A-to-I RNA editing is altered in cyanotic children with congenital heart disease (CHD) and thus may affect their postoperative recovery.

Methods: RNA was extracted from blood samples collected from 37 CHD patients, pre-operatively and eight hours after cardiac surgery. Patients were divided into a cyanotic group and an acyanotic group. Each patient sample was analyzed for A-to-I RNA editing in an intronic segment of the MED13 gene, shown to play a role in cardiac disease. RNA expression levels of the enzymes responsible for RNA editing, ADAR1 and ADAR2, were examined using quantitative real time (RQ) PCR.

Results: A-to-I RNA editing was significantly higher among the cyanotic CHD patients (n=19) than among the acyanotic ones (n=18) both before and after surgery. This was manifested by the average editing at the seven most highly edited sites (27.4% ±8.5% vs. 20.8%±10.2%; p=0.038) and editing at specific sites, e.g. position 14 (20.2% ± 5.1% vs. 14.5% ± 5.2%; P = 0.002). Cyanotic patients exhibited a more complicated postoperative course than acyanotic patients (longer pediatric intensive care unit stay, more mechanical ventilation days, and elevated inotropic scores). ADAR2 RNA levels were significantly lower among cyanotic patients, suggesting a possible adaptation to hypoxia.

Conclusions: Children with Cyanotic CHD manifest significantly higher rates of RNA editing both before and after surgery. Post-transcriptional RNA changes may influence the cyanotic pathophysiology and influence surviving hypoxia and difficult peri-operative conditions.

Transcatheter Closure of Ruptured Non-Coronary Aortic Sinus Fistula to Right Ventricle

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We present a case of rupture of Non-coronary sinus aneurysm to RV. The treatment of choice is surgical. In this case we present an alternative treatment approach of transcatheter closure. For patients with untreated aortic sinus Valsalva aneurysm rupture, the mean survival time after diagnosis has been estimated at 3.9 years. The tissue at the aortic aspect of the fistula is frequently friable and difficult to manage and repair during surgery and transaortic repair may cause sinus of Valsalva distortion and aortic regurgitation. The 10 year survival in surgical treated patients is about 60 percent. We discuss the various anatomical variations of this rare anomaly. Its clinical presentation and we present our experience in detail for no-surgical treatment.

1549872

Isolated Left Ventricular Apical Hypoplasia: A New Congenital Cardiac Anomaly

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background:

Isolated left ventricular apical hypoplasia, also described as non apex forming left ventricle, with no mitral or aortic obstruction, is a newly described anomaly . It was described so far in 5 adult patients, 3 with mild symptoms, 1 with pulmonary edema and one with fatal presentation.

Patients:

We present for the first time, a prenatal echo diagnosis of the anomaly and the post natal echo, clinical presentation and treatment of a patient with this anomaly.

Results:

After birth the patient developed signs of CHF and severe persistent pulmonary hypertension and at the age of 2 month she underwent a stage 1 hypoplastic LV type palliation with a Sano and later on bidirectional glenn shunt and atrial septectomy.

conclusions:

Isolated left ventricular apical hypoplasia is a new rare anomaly with variable severity of LV systolic and diastolic dysfunction. Diagnosis may be done prenatally and counseling should be done accordingly.

Intraperitoneal Catheters Improve Ventilatory Status in Neonates after Open Heart Surgery

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Introduction: Postoperative fluid balance in neonates undergoing open heart surgery is extremely difficult due to the inability of the immature kidneys concentrate urine, and due to the obligatory volume overload associated with heart surgery. Furthermore, ascites raises the intra-abdominal pressure and limits ventilation. Since 2006 we have been liberal in intraperitoneal catheter insertion in neonates, postulating that draining the ascites would improve post operative fluid balance and benefit ventilation. The purpose of the present study was to present our experience with intraperitoneal catheter insertion (IPCI).

Methods: Retrospective analysis of charts of all neonates that underwent peritoneal catheter insertion at Schneider Hospital from January 2006 through March 2009.

Results: During this 26 month period 959 patients underwent heart surgery at Schneider Children's Medical Center, out of them 190 (20%) were neonates. 11 patients (6%) required IPCI. There were no procedure related complications. Mean age and weight was 7 days (median-9, range 6-11 days) and 3.3 kg (range 2-4.2 kg) respectively. Mean amount drained upon insertion was 54cc±47 (range 20-165). Catheters were maintained for a median of 5 days (mean -5, range 1-11 days) and drained an average of 140±106cc per day (range 24-324cc). Although ventilatory settings did not change significantly prior and post catheter insertion (respiratory rate 31 vs.30 P=0.57, Inspiratory pressures 26.3 vs 26.2 p=0.83), CO₂ values decreased significantly (42±5.8 vs. 38±4.7 p=0.01).

Conclusions: Peritoneal draining catheters are a valuable adjunct in the treatment of neonates after open heart surgery improving ventilatory status and facilitating post operative fluid balance management.

Cardiac MRI in pediatric population – Do we really need sedation?

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Background: Cardiac MRI (CMR) is an essential tool in the assessment of congenital heart disease and other cardiac pathologies. Yet, the acquisition of CMR is complicated and requires full cooperation of the patients, which is difficult especially with children who often require full sedation and ventilation. The aim of the current study is to describe our experience in practicing a special child oriented preparation protocol.

Methods: From February 2009 to October 2009 twenty five consecutive patients under the age of 16 were included. Patients were instructed to report to the clinic an hour ahead of their scheduled time. Upon arrival the children and the parents were taken to a MRI simulator where they received full explanation on the procedure by the supervising physician and trained breathing instructions. Parents were encouraged to join their children during the study. During the acquisition, breathing and other instructions were given in the child's mother tongue.

Baseline characteristics, study data and study quality were recorded.

Results: The mean age was 11 ± 4 (4m-16y). There were 19 (76%) males. Of the patients, 17 (68%) Spoke Arabic, 7 (28%) spoke Hebrew and one (4%) spoke English. The indication for the study was assessment of right ventricle in 17 (68%) patients, investigation of cardiomyopathy in 7 (28%) patients and investigation of aborted sudden death in one (4%). Only two patients (8%) underwent sedation and intubation (the first was 4 months old and the second was diagnosed with severe retardation). The average acquisition time was $1:01h \pm 21m$ (21m-1:40h). Study quality was good in 16 (64%) patients, fair in 7(28%) and poor in 2(8%). All the studies were interpretable and provided information about the referral clinical query.

Conclusion: High quality CMR can be obtained in the vast majority pediatric patients without need for sedation and intubation when using a special child oriented preparation protocol.

Predictors of response to Clopidogrel in Patients with ACS

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Objectives: Many studies have demonstrated a significant individual variability in platelet response to clopidogrel, with up to one third of patients (pts) being non-responders. Unresponsiveness to clopidogrel, as measured by platelet reactivity, is associated with worse prognosis. Defining predictors of response to clopidogrel may be of clinical importance. In pts with stable coronary artery disease (CAD), smoking, diabetes mellitus (DM) and elevated body mass index (BMI) were shown to impact the response to clopidogrel. Nevertheless, the predictors in pts with acute coronary syndrome (ACS) are unknown.

Methods: The study comprised 245 consecutive acute myocardial infarction (AMI) pts. On the third day platelet aggregation (conventional aggregometry using 5- μ mol/l adenosine diphosphate -ADP), hs C-reactive protein (CRP), platelet count and mean platelet volume (MPV) were determined for all pts. Pts with ADP platelet aggregation > 70% were considered clopidogrel resistant (CR) pts.

Results: Eighty four pts (34%) were CR (ADP aggregation: $81 \pm 17\%$ vs. $49 \pm 17\%$, $p < 0.001$). No difference was found regarding male gender and age between CR and responders (80% vs. 83% $p = 0.5$; 61 ± 10 vs. 60 ± 8 yrs $p = 0.12$, respectively). Prior ACS, coronary revascularization, hyperlipidemia, family history of CAD, smoking, DM, BMI, hypertension and prior aspirin use, were all of no significant difference between the two groups. CR pts were more likely to present with ST elevation M.I but the differences did not achieve statistical significance (84.3% vs. 77.9%, $p = 0.11$). CRP and platelet count also did not differ between the study groups. However, CR as compared to responders had significantly higher MPV (9 ± 1.2 fl vs. 8 ± 1 fl, $p = 0.0017$).

Conclusions: Among pts with ACS, pts' epidemiologic characteristics did not predict response to clopidogrel, however, increased MPV which is associated with platelet activation, strongly predicted unresponsiveness to clopidogrel.

Is there a risk for ventricular fibrillation in non ST-elevation MI?

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Background: Ventricular fibrillation (VF) is the main cause of death during AMI. While VF is a well-known complication of ST elevation myocardial infarction (STEMI), its incidence in NSTEMI has not been well studied. The risk of VF among patients presenting with NSTEMI might impact their triage and need for a monitored bed.

Methods: We identified all patients admitted to the coronary care unit between 10/02 and 10/09 with a diagnosis of STEMI or NSTEMI, who initially presented with or later developed primary VF. The primary endpoint was 30-day mortality. Among patients with NSTEMI and VF we identified those who had an EKG prior to the development of VF, as opposed to those who presented with VF, in whom the diagnosis of NSTEMI was based on the absence of ST elevation on subsequent tracings. We excluded patients who developed VF during percutaneous coronary intervention.

Results: 5265 patients were admitted with AMI (STEMI & non-STEMI, 55% and 45%, respectively). VF occurred in 126 of 2888 STEMI patients (4.4%), vs. 9 of 2377 NSTEMI patients (0.4%), $P < 0.001$. Among 126 STEMI patients who developed VF, 51 (40%) presented with VF and aborted sudden death, with subsequent ST elevation on post resuscitation EKG. Among the 9 NSTEMI patients who developed VF 8 presented with aborted sudden death and had no EKG prior to arrhythmia. Four of those had chest pain prior to VF. When patients presenting with sudden death were excluded, the incidence of in hospital VF was 75/2888 (2.6%) and 1/2377 (0.04%) among patients with STEMI and NSTEMI, respectively ($p < 0.001$). None of the NSTEMI patients with VF died during 30-day follow-up. Conclusions: In contrary to STEMI patients, VF in patients presenting with NSTEMI is extremely rare. This observation might have important implications regarding triage.

Immediate vs. Delayed Percutaneous Coronary Intervention for Spontaneously Reperfused ST Elevation Myocardial Infarction

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Introduction: Primary percutaneous intervention (PCI) in patients with ST elevation myocardial infarction (STEMI) has been shown to improve clinical outcomes. Appropriate timing for PCI in STEMI patients presenting with clinical features of spontaneous reperfusion (SR) is not well established.

Method: All STEMI patients admitted to our hospital during 2008 were included and divided into 3 subgroups: Patients who underwent primary PCI and had TIMI 3 flow in infarct related artery (IRA) on initial angiogram defined as SR-immediate PCI. Patients with clinical and ECG features for SR in whom PCI was delayed, defined as SR-delayed PCI. Patients who underwent primary PCI and had TIMI flow <3 in IRA, defined as non-SR. We compared 3 groups for procedural success (defined as TIMI 3 and Myocardial Blush Grade 3 at the end of the procedure), peak troponin T levels, in-hospital and 30 days MACE (composite of death, MI, or urgent revascularization).

Results: 128 patients were included, 26 in SR-immediate PCI group, 33 in SR- delayed PCI group and 69 in the non-SR group. There were no significant differences in baseline characteristics among subgroups. Procedural success rate was significantly lower ($p=0.023$) in non-SR group, 78% compared to 96% in the SR-delayed PCI group and 93% in the SR-immediate PCI group ($p=0.123$ for comparison between the SR groups). Mean peak troponin T value was significantly higher in the non-SR group (6.6ng/ml, $p<0.001$) but no difference between SR groups (2.2ng/ml vs. 2.6ng/ml, $p=0.559$). No significant differences in in-hospital and 30 days MACE were noted between SR groups (3.8% vs. 3%, $p=0.866$). Conclusion: For STEMI patients with spontaneous reperfusion, procedural success rates or clinical outcomes are not different whether PCI is performed immediately or delayed. It seems that postponing PCI in those patients is valid approach that entails very low rates of urgent interventions. Larger studies and longer follow up are needed to confirm our findings.

Incidence of left ventricular thrombus (LVT) in patients with anterior infarct undergoing primary PCI

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The prevalence of left ventricular (LV) thrombus in STEMI pts ranges from 5-20%. As primary PCI is expected to reduce LV impairment it may also reduce the incidence of LVT.

Aim: To determine the incidence of LVT in pts with anterior STEMI undergoing primary PCI, compared with pts not undergoing primary PCI.

Methods: Between 1995-2008, 1390 pts were admitted with anterior STEMI. Of these, 742 underwent echo-doppler studies during hospitalization. LV dysfunction was divided into 6 subgroups: none, mild, mild to moderate, moderate, moderate to severe and severe. Primary PCI was performed in 348 pts and the remaining were treated conservatively or with deferred intervention. Until 2003 most pts were treated medically while today all acutely presenting STEMI pts undergo primary PCI, unless a contraindication exists.

Results: LVT was detected in 89 pts (12%). There was a low frequency (3.7%) of LVT in pts with no or mild LV dysfunction (LVD), while in pts with mild to moderate LVD or worse frequency of LVT was 17.6%. ($p < 0.001$)

		LVD and Thrombus with and without PCI		
LV Function	Total (n)	Thrombus n (%)	Primary PCI n (%)	No Primary PCI n (%)
Normal	84	1(1.2)	56 (14.2)	27 (7.8)
Mild	210	9 (4.3)	98 (24.9)	112 (32.2)
Mild-Moderate	136	31 (22.8)	57 (14.5)	79 (22.7)
Moderate	264	41 (15.5)	151 (38.3)	113 (32.5)
Moderate-Severe	21	3 (14.3)	13 (3.3)	8 (2.3)
Severe	28	4 (14.3)	19 (4.8)	9 (2.6)
Total	742	89 (12.0)	394	348

There was no difference in LV function between pts who did or did not undergo primary PCI. Primary PCI pts had prevalence of thrombus 14.4% in pts undergoing primary PCI versus 9.9% ($p=0.06$) in those not undergoing primary PCI.

Conclusions: LVT is frequent in pts with anterior STEMI undergoing PCI with a significantly higher incidence in pts with worse than mildly impaired LV function. Pts undergoing primary PCI did not have reduced frequency of LVT. Echo should be performed in all anterior STEMI pts during hospitalization.

Transferring STEMI patients to PCI center for Primary PCI: Is it valid approach in real world?

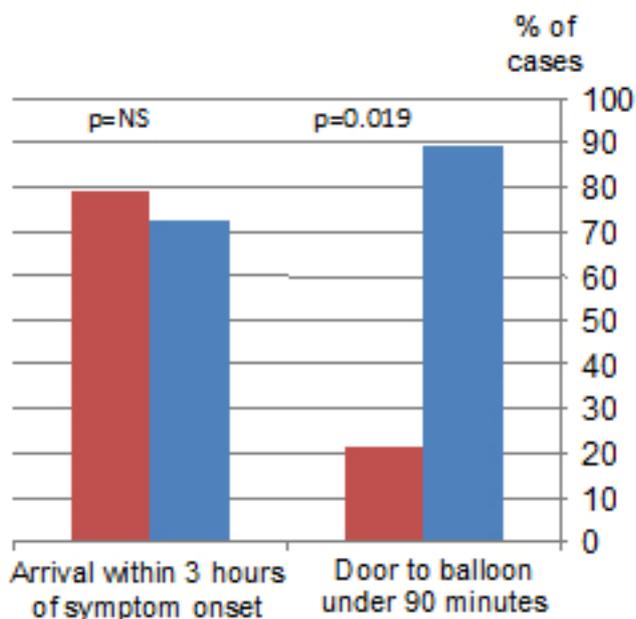
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Background: Patients presenting with ST elevation myocardial infarction (STEMI) undergo primary reperfusion either with thrombolysis or by primary percutaneous intervention (PCI). PCI is preferable if performed within 90 minutes from first medical contact. Hadassah Mount Scopus (HMS) is a primary care hospital without catheterization lab in which STEMI patients are transferred to Hadassah Ein-Kerem (HEK) for primary PCI, facilitated with Eptifibatide infusion. Our aim was to assess whether transferring patients to HEK is efficient and entails outcome differences. **Methods:** All STEMI patients admitted to HEK and HMS during 2008 were analyzed. Demographic and clinical data, time to reperfusion, in-hospital and 6 months clinical outcomes (death, recurrent MI or revascularization and stroke) were compared between two groups.

Results: 128 patients with STEMI were treated in HEK of whom 38 were transferred from HMS. The baseline characteristics are presented in the table. Ten patients (26%) transferred from HMS and 23 (25.5%) who presented to HEK had evidence of spontaneous reperfusion and PCI was delayed ($p=0.86$). Time from onset of pain to admission was similar in both groups while door to balloon time was significantly longer for patients admitted to HMS (figure). Mean time from HMS admission to HEK arrival was 102 ± 59.8 minutes and mean time from HEK arrival to reperfusion was 33 minutes. Clinical outcomes were not significantly different between two groups as well as peak CPK (2,635 vs. 2,642 U/L)

Discussion: A door-to-balloon time of less than 90 minutes was achieved only in small minority of patients transferred from HMS despite good communication system between centers, short distance and short response within HEK. The outcome of transferred patients was not significantly different from those admitted directly to HEK probably due to small sample size. The policy of transferring STEMI patients for PCI must be reconsidered in view of real-world delays

Characteristic	Mount Scopus (n=38)	Ein Karem (n=90)	P value
Mean age (years)	56.1±13.1	56.6±12.3	0.74
% males	84%	87%	0.29
Smokers - n(%)	29(76%)	48(53%)	0.003
Diabetes - n(%)	9 (24%)	26 (29%)	0.21
Prior MI - n(%)	9 (24%)	21 (23%)	0.93



Is Aspirin Resistance Dependent on the Clinical Scenario?

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Background: Low response or "resistance" to the anti-platelet effects of aspirin has been associated with adverse clinical outcome. However, a wide range of aspirin resistance rates has been reported - from 5% to 45%. We hypothesized that part of the wide range may be related to the clinical setting in which patients (pts) were tested. For instance, percutaneous coronary intervention (PCI) can be associated with platelet hyper-reactivity and thus affect aspirin response. We, therefore, aimed to test the frequency of aspirin resistance in pts with stable coronary artery disease (CAD) vs. pts undergoing PCI.

Methods: We examined 2 cohorts of pts, both taking aspirin 75-150 mg for at least a week prior to enrollment. The first consisted of 485 pts with stable CAD (at least 6 months from any interventional procedure) and the other 150 pts undergoing non-urgent PCI (for various indications). Pts were tested for aspirin response using the VerifyNow Aspirin assay and platelet aggregation in response to arachidonic acid (AA) and ADP. Aspirin resistance was defined by at least 2 of 3 criteria: VerifyNow score \geq 550, 0.5 mg/ml AA-induced aggregation \geq 20%, and 10 μ M ADP-induced aggregation \geq 70%.

Results: The 2 cohorts had similar clinical characteristics, except for a higher proportion of women in the PCI cohort (31% vs. 17%, $P=0.0001$), a higher rate of hypertension in the PCI cohort (74% vs. 64%, $P=0.03$), but a higher rate of hyperlipidemia in the stable CAD cohort (89% vs. 71%, $P=0.0001$). Among pts undergoing PCI, 19 of the 150 (12.7%) had fulfilled the criteria for aspirin resistance vs. 30 out of 485 pts (6.2%) with stable CAD ($P=0.02$). VerifyNow Aspirin score was higher among the pts undergoing PCI than the pts with stable CAD (457.7 ± 81 vs. 433.3 ± 47 , $P=0.001$).

Conclusions: Pts undergoing PCI had a higher propensity to exhibit resistance to aspirin compared to pts with stable CAD. This difference may be attributed to platelet hyper-reactivity in the peri-PCI period

Temporal trends in the management and outcome of patients with STEMI presenting with cardiogenic shock

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Background: Acute ST-elevation myocardial infarction (STEMI) presenting with cardiogenic shock is associated with dismal prognosis. In the recent decade significant advances have been made in both catheter-based reperfusion techniques and adjunctive pharmacological treatment. It is not clear whether these advances have any impact on the prognosis of patients (pts) with STEMI who present with cardiogenic shock. Our aim, was to assess the outcomes of these pts during the past decade and identify major factors that impact the prognosis.

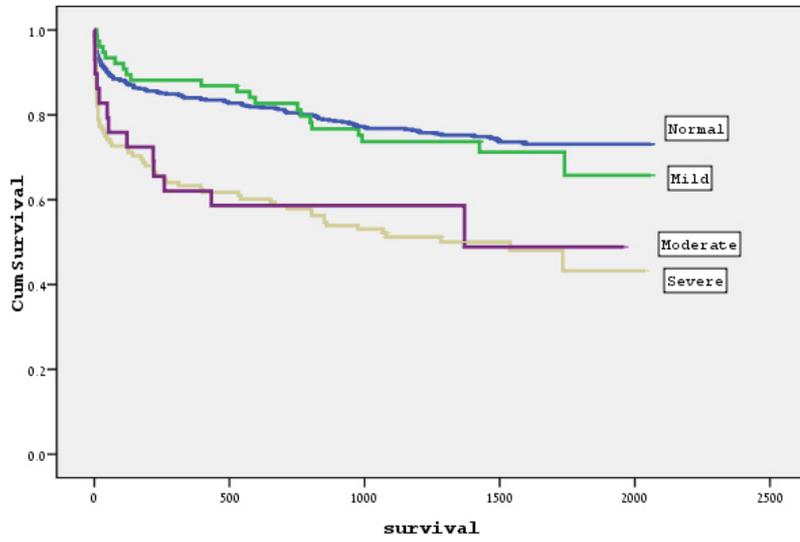
Methods: We employed our primary PCI registry, which includes all pts with STEMI who underwent primary PCI between 2001 and 2008 in the Rabin Medical Center. We identified 131 pts who presented with cardiogenic shock and underwent primary PCI. Pts were allocated into 2 groups based on the period of presentation: 1st period: 2001-2004 (n=70), and 2nd period: 2005-2008 (n=61). Clinical and angiographic characteristics as well as outcome up to 6 months were evaluated.

Results: Clinical characteristics and outcome are shown in the Table. Despite the younger mean age, lower proportion of patients with renal failure and higher rates of stent use, mortality did not differ and remained high in both periods (>50% at 6 months). Use of intra-aortic balloon pump (IABP) did not differ between the periods (72-77%). In a multivariate analysis model, factors which were associated with 1 month mortality were: diabetes (OR=4, CI 1.3-13, P=0.02), LVEF<40% (OR=1.8, CI 1.2-2.8, P=0.009), GFR<60 ml/min/m² (OR=1.8, CI 1.2-2.6, P=0.002) and trend for the use of glycoprotein (GP) IIb/IIIa inhibitors (OR=0.4, CI 0.1-1.05, P=0.07).

Conclusion: Despite changes in the clinical characteristics and management of pts with STEMI presenting with cardiogenic shock and treated with primary PCI during the past decade, the prognosis remains poor. It is possible that further use of measures such as IABP or GP IIb/IIIa inhibitors may improve outcome.

Variable	1st Period, n=70	2nd Period, n=61	P value
Age (years)	70±12	64±13	0.002
Male (%)	64	72	0.3
Diabetes (%)	31	23	0.3
GFR<60ml/ min/m ² (%)	57	38	0.04
Anterior Wall MI (%)	50	63	0.2
LVEF<40% (%)	83	80	0.7
Multi-vessel disease (%)	77	79	0.9
Stent Deployment (%)	89	98	0.03
Intra Aortic Balloon Pump use (%)	77	72	0.5
GP IIb/IIIa inhibitor use (%)	57	54	0.7
1 month stent thrombosis (%)	1.4	1.6	0.9
1 month re-infarction (%)	6	5	0.8
1 month death (%)	53	43	0.2
6 month death (%)	59	52	0.4

Survival Functions



1550915

Impact of Pulmonary Hypertension on Long Term Survival in Patients with Acute Myocardial Infarction

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Aim: The aim of this study was to assess the prevalence and long term prognostic significance of pulmonary hypertension (PH) diagnosis in the early phase of hospitalization for acute myocardial infarction (AMI).

Methods: We prospectively studied 1694 consecutive patients admitted with AMI who had echocardiographic examination 24 – 48 hours from admission and pulmonary arterial pressure (PAP) was measurable. The mean follow-up period was 29 months. Logistic regression was used to evaluate the relationship between PH and long term survival.

Results: Normal PAP, mild, moderate and severe PH were diagnosed in 1341 (79.2%), 134 (7.9%), 178 (10.5%) and 41 (2.4%) patients respectively. Long term mortality according to PH strata was 16.0%, 24.6%, 46.6% and 39.0% respectively ($p < 0.0001$). According to Kaplan-Meier survival curves (fig. 1), similar behavior was observed in groups with normal and mild PH as well as moderate and severe PH. The odd ratios for mortality in patients with moderate or severe PH as compared with those with normal or mild PH was 3.02 (CI 2.17-4.22; $p < 0.0001$). After adjusting for age, gender, left ventricular function, right ventricular function and estimated creatinine clearance, moderate and severe PH remained a strong predictor for mortality (OR 1.61 [CI 1.12-2.37; $p < 0.01$]).

Conclusion: The presence of moderate or severe PH in the early phase of hospitalization due to AMI is strongly related to a worse long term outcome.

1546056

Prevalence of Cardiovascular Disease in Vitamin D Deficiency in Israel: Data from a Large Health Maintenance Organization

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Background: Accumulating data in the past years suggests that vitamin D deficiency has an adverse effect on cardiovascular health and that its prevalence is significantly higher among patients with cardiovascular diseases and risk factors, contributing to the pathogenesis of CVD.

Methods: We have analyzed a relatively large database of a health care maintenance organization. Included were individuals 18 years and older for whom a vitamin D sample was obtained for any reason during the years 2001 and 2008. Odd ratio for physician entered CVD diagnoses were calculated using defined cut off concentrations of vitamin D.

Results: Included were 34,874 individuals, of whom 26,699 were females at a mean (SD) age of 55 (15) and 8175 males aged 55 (17). Vitamin D deficiency prevalence was similar to previous reports. Significant age adjusted odds ratios for CVD related diagnoses of the study population were found. These included the presence of hypertension, diabetes mellitus, dyslipidemia, obesity and peripheral vascular disease for females, and the presence of all the above except hypertension in males

Conclusion: Vitamin D deficiency is significantly prevalent among patients with cardiovascular disease and risk factors of both genders. The prevalence of Vitamin D deficiency in Israel is similar to the prevalence found in less sunny regions.

GP's Compliance with Computerized Recommendation for Cardiovascular Prevention. Lesson From Computerized Community Cardiovascular Control (4C-N)

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Background: Treatment gap is a major obstacle to deliver cardiovascular disease (CVD) prevention. Computerized decision support systems may improve guidelines adherence depending on physician's compliance.

Aim: To evaluate physician compliance with computerized recommendations. Methods: Computerized primary care data were processed by a computerized automatic risk-profile identify patients with or at high-risk for CVD using the European Score and the Framingham indexes. Clinical recommendations were generate for patients, aged 30-74 years, who visited one of 50 largest primary care clinics in the southern district. The responses to recommendations were evaluated.

Results: During 15 months period 108,636 patients were evaluated by 4C-N processor. 12.4% of the patients were considered as having CVD or being at high cardiovascular risk, of which 70% were enrolled to the 4C intervention. Only 8% of patients did not require any recommendations. 92% of patients required preventive measurements. GP's adopted recommendations in 55% of cases. The GP perform lab tests/adopted pharmacotherapy recommendations in 20%/23% for hypertensive, 24%/34% for dyslipidemic, and 36%/13% for diabetics patients accordingly. However, alternative measures were taken by GP's.

Conclusions:

The 4C-N system detected a considerable amount of patients that requires further cardiovascular evaluation by the GP. Only 8% of high risk patients achieved target levels in all parameters. In over 55% some 4C recommendations were being applied. GP's non-adherence is a major obstacle for effective prevention.

High Dose Atorvastatin for Reduction of Post-Pericardiotomy Syndrome after Cardiac Surgery

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Objective. Post-pericardiotomy syndrome (PPS) is a potential complication of open heart surgery. This syndrome presents as a delayed pleural or pericardial reaction, characterized by fever, chest pain, and a friction rub. We investigated the effect of high-dose atorvastatin as a drug for reduced PPS.

Methods: The study was an unmatched retrospective cohort study. Over a two-year period (2005-2006) and a one-year period (2008), 455 and 363 patients, respectively, underwent cardiac surgery. Uni-variant analysis was performed, exploring the relationship between high atorvastatin use and PPS development. Patients in the first group (2005-2006) had been taking low-dose statins (<40 mg), while the second group (2008) had been taking high-dose atorvastatin (80 mg). The primary end-point was incidence of PPS.

Results: Of the 818 patients, 53 (6%) had PPS after surgery. older age >71 years and smoking affected the incidence of PPS. Also high-dose atorvastatin was found to be associated with a reduction in the incidence of PPS: high-dose (9/363 -2.5%) vs. low-dose (44/455 - 9.7%), (OR=0.24, P<0.001).

To adjust for the effects of the factors (age, smoking) known to affect PPS, logistic regression models were created to control for possible sources of bias. Smoking was found to be associated with an increased incidence of PPS (OR=0.1.97, P<0.001), while high-dose atorvastatin was found to be associated with a reduction in PPS incidence (OR=0.22, P<0.001).

Conclusions: In our study, patients who had been treated with high-dose atorvastatin had a reduced incidence of PPS, ranging from 11-47%.

Neighborhood Socioeconomic Status and Long-Term Stroke Incidence After Myocardial Infarction

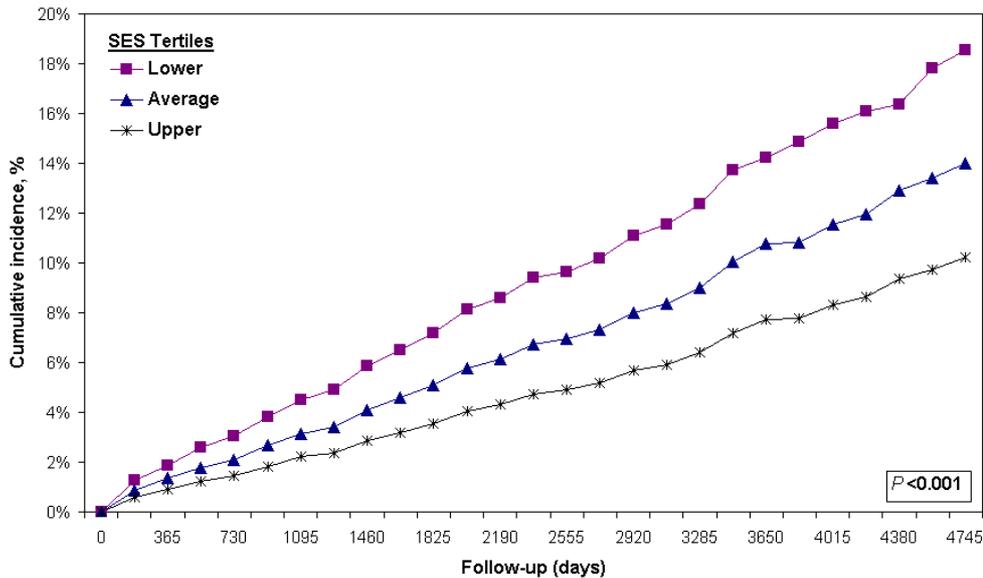
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Background: Neighborhood socioeconomic status (SES) has been suggested to affect cardiovascular disease incidence and outcome over and above individual SES measures. However, data linking neighborhood SES to stroke risk after myocardial infarction (MI) are lacking. We examined long-term stroke incidence according to neighborhood SES in a cohort of patients hospitalized with a first acute MI.

Methods and Results: Consecutive patients aged 65 years or less discharged from 8 hospitals in central Israel after incident MI in 1992-3 were followed through 2005. Individual demographic, socioeconomic, and clinical data were obtained at study entry. Neighborhood SES was estimated through a composite census-derived index developed by the Israel Central Bureau of Statistics. During a median follow-up of 13.1 years, 200 incident strokes occurred in 1410 patients. Accounting for death as a competing risk, patients residing in disadvantaged neighborhoods had a higher stroke incidence (Figure). The age-, sex-, and origin-adjusted hazard ratio (HR) for stroke in the lower vs. upper neighborhood SES tertile was 2.07 (95% CI: 1.40-3.04, $P < 0.001$), and 1.56 (95% CI: 1.01-2.40, $P = 0.045$) after further adjustment for cardiovascular risk factors, comorbidity, MI characteristics, and individual SES measures.

Conclusions: Neighborhood SES is strongly associated with stroke risk after MI. The association is partly, but not entirely, attributable to individual SES measures and other potential confounders. Prevention efforts should be targeted toward MI patients residing in poor neighborhoods.

Cumulative Incidence of Stroke by Neighborhood SES With Death Considered a Competing Risk



GFR in the normal range is related to coronary artery disease severity

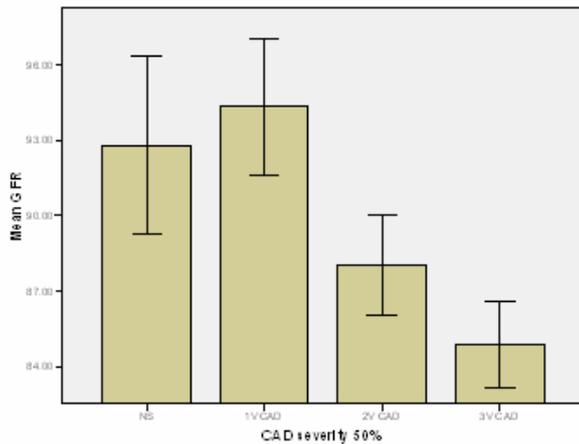
*Arbel, Y; Finkelstein, A; Zltonik, M; Halkin, A; Berliner, S; Keren, G; Banai, S
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Introduction: Chronic renal failure (CRF) is an independent risk factor for coronary artery disease (CAD). Although microalbuminuria is associated with increased cardiovascular risk, little information exists concerning the association between renal function and CAD severity among individuals with renal function within normal limits. We evaluated the association between renal function, assessed by the estimated glomerular filtration rate (e-GFR), and CAD severity in a large number of individuals with normal e-GFR who underwent coronary angiography at the Tel-Aviv Sourasky Medical Center.

Methods: e-GFR was calculated according to the MDRD formula and the Cockcroft-Gault formula. CAD severity was assessed in a blinded manner by the interventional cardiologist who performed the angiography. Chronic renal failure is considered as GFR below 60; therefore, we included patients with e-GFR above 60.

Results: We prospectively analyzed 1811 consecutive patients with a mean age of 61.1 ± 10.6 . Strong correlation was found between CAD severity and e-GFR ($r = -0.14$, $p < 0.0001$), even after controlling for different inflammatory biomarkers (CRP, WBC) and metabolic (HDL, LDL, total cholesterol, triglycerides, HbA1c and glucose).

Conclusions: e-GFR is related to CAD severity even in patients without known kidney disease and with normal renal function.



Alpha Defensins: a Strong Evolving Biomarker for Coronary Atherosclerosis and Acute Coronary Syndromes

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Background: Increased neutrophil activation is known to be associated with atherosclerosis severity and acute coronary syndrome (ACS). Neutrophil peptides defensins are essential elements of the innate immunity and are presented in atherosclerotic plaques in humans. They are negatively involved in lipoprotein metabolism and fibrinolysis, enhance endothelial dysfunction, activate platelet aggregation/adhesion and are a potential regulator of neovascularization. We sought to investigate the relationship between neutrophil activation and atherosclerosis/thrombosis via measuring alpha-defensin levels.

Methods: Defensin was immunohistochemically quantified in skin biopsies taken from 137 ACS patients (age 55±12) immediately prior to coronary angiography. Established biomarkers for coronary artery disease (CAD) and accepted clinical risk factors were obtained concurrently; including questionnaire for infectious/inflammatory status. We examined the correlation between defensin score and CAD severity score.

Results: Using McNemar's chi square analysis a correlation was found between the defensin score and the severity of CAD, P<0.0001.

	Defensin Score				
CAD Score	0	1	2	3	Total
0	7(A)	11(B)	20(C)	0(D)	30
1	4(B)	12(A)	12(B)	2(C)	30
2	3(C)	10(B)	10(A)	2(B)	25
3	5(D)	15(C)	16(B)	8(A)	44
Total	19	48	58	12	137
A: 37					
B: 55					
C: 40					
D: 5					

Conclusions: These data suggest high alpha-defensin score as a strong biomarker for atherosclerosis severity in patients with ACS that might become applicable for atherosclerosis/thrombosis screening. Our ongoing study will address the validity of defensins as to traditional risk factors and the inflammatory milieu.

Vitamin E Reduces Cardiovascular Disease in Individuals with Diabetes Mellitus and the Haptoglobin 2-2 Genotype

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Introduction. Individuals with both Diabetes Mellitus (DM) and the Haptoglobin (Hp) 2-2 genotype are at increased risk of cardiovascular disease. As the antioxidant function of the Hp 2-2 protein is impaired we sought to test the pharmacogenomic hypothesis that antioxidant vitamin E supplementation would provide cardiovascular protection to Hp 2-2 DM individuals. Methods and Results. We determined the Hp genotype on DM participants from two trials (HOPE and ICARE) and assessed the effect of vitamin E by Hp genotype on their common prespecified outcome, the composite of stroke, myocardial infarction and cardiovascular death. Data was analyzed with a fixed-effect model. These results were input into a simulation model, the Evidence Based Medicine Integrator, in order to estimate their long term implications in a real-world population from Kaiser Permanente. Meta-analysis of the two trials demonstrated a significant overall reduction in the composite endpoint in Hp 2-2 DM individuals with vitamin E (odds ratio 0.58 (95% CI 0.40-0.86) p=0.006). There was a statistically significant interaction between the Hp genotype and vitamin E on the composite endpoint. In these trials, Hp typing of 31 DM individuals and treating with vitamin E those with the Hp 2-2 prevented one myocardial infarct, stroke or cardiovascular death. Lifelong administration of vitamin E to Hp 2-2 DM individuals in the Kaiser population would increase their life expectancy by three years. Conclusions. A pharmacogenomic strategy of screening DM individuals for the Hp genotype and treating those with Hp 2-2 with vitamin E appears to be highly clinically effective.

Diagnosis of Coronary Disease by the Noninvasive OATH (Our Approach To Health) Technique

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Background Coronary artery disease (CAD) is a complex process involving the vessel wall, blood constituents and blood flow. Sensitive diagnostic tools are important in CAD prevention and management. Coronary angiography (CA) is widely used to determine vessel lumen narrowing and to treat focal stenoses. However, angiography is weak in assessing vessel wall pathology including plaque vulnerability, endothelial function and inflammatory determinants. Thus, CA may underestimate true patient risk. Reliable and accessible tools for early diagnosis and distinction between low- and high-risk patients are needed. We evaluated the OATH (Our Approach To Health) system in diagnosing the severity of CAD and estimating patient risk.

Methods Thirty patients referred to diagnostic CA due to suspected CAD were enrolled in this study. OATH diagnosis was performed prior to CA, based on blood pressure, urine and saliva analysis, wet and dry blood analysis, heart rate variability, body mass index, skin electrical impedance and habitual patterns. A prediction of CAD severity and overall risk based on the OATH algorithm was compared to CA findings of CAD extent and severity.

Results OATH noninvasive method predicted the presence of significant coronary stenoses at 76% accuracy. When combined with ischemic parameters, OATH prediction of CAD stenosis/ischemia risk achieved 96.6% accuracy.

Conclusions OATH correlated with CA findings, predicting the presence of CAD in addition to overall ischemic risk. The OATH system is a new noninvasive approach to define significant levels of ischemia and contributing pathological findings, and may add valuable data as for underlying cardiovascular risk.

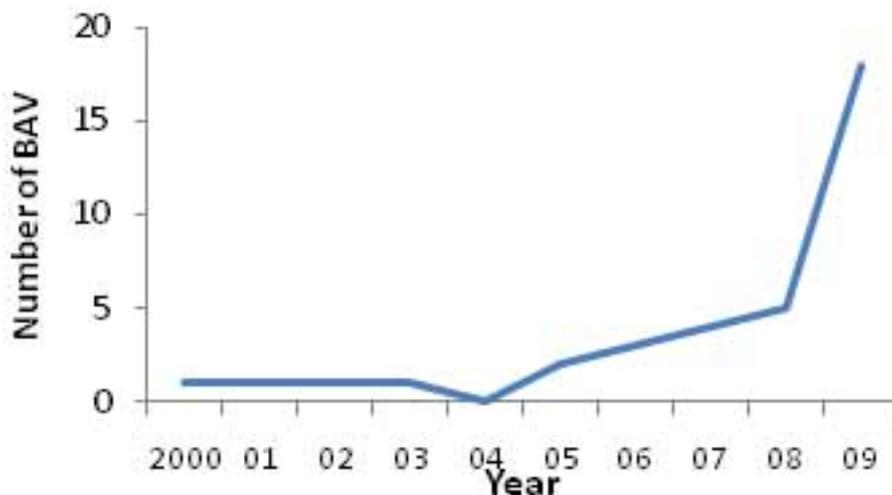
Revival of aortic balloon valvuloplasty: A single center 10-year experience

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Background: Balloon aortic valvuloplasty (BAV) is a catheter-based palliative option for nonsurgical patients with severe aortic stenosis (AS). BAV fell from favor due to perceived procedural complexity, suboptimal initial results, and high restenosis rate. Recent progress in therapy of high-risk AS patients revived the use of BAV as well. This single center registry reports our 10-year temporal changes in BAV.

Results: Thirty-four patients underwent BAV in our center during the last decade. All patients were declined of surgery at the time BAV was performed. Indications for BAV included cardiogenic shock in 36%, refractory pulmonary edema in 46%, recurrent syncope in 9% and preparation for non-cardiac surgery in 9% of our patients. In contrast to 1-2 procedures/year performed from 2000-2005, and 3-4 during 2006-2008, we performed 18 BAVs in 2009. Mean age (\pm SD) was 79 ± 10.7 (range 62-95 years), 60% females. Mean valve area pre-BAV was 0.57 ± 0.15 cm² which increased to 0.9 ± 0.13 cm² post-BAV. Echo-estimated maximal and mean gradients across the AV prior to and after BAV were 66.2 ± 20.2 / 41.2 ± 13.7 mmHg and 33 ± 10.4 / 20.6 ± 7.3 mmHg, respectively. Peak to peak gradient in the cathlab decreased by 32.8 ± 11.9 mmHg following BAV. Thirty-day mortality rate was 9%, of whom two peri-procedural deaths were related to ventricular arrhythmia and refractory hemodynamic collapse during the procedure.

Conclusions: BAV is an effective procedure for the stabilization of severe AS patients in which definitive valve procedure is declined due to critical hemodynamic status. Since the introduction of transcatheter aortic valve implantation (TAVI) we are witnessing a steep increase in the number of patients undergoing BAV. The option of TAVI and the acquisition of vascular and valvular techniques opened the door for the revival of BAV.



Transcatheter aortic valve implantation: are there any limits?

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Objectives: Aortic valve replacement is the therapy of choice for patients who suffer from severe symptomatic aortic Stenosis (AS). Approximately one third of these patients are declined surgery due to high surgical risk. Transcatheter aortic valve implantation (TAVI) aims at treating those high surgical risk patients. In this study we assessed the clinical characteristics and appropriateness for TAVI with the CoreValve system.

Methods and Results: Between 7/2008-9/2009 we screened 30 consecutive patients with severe and symptomatic AS that were declined surgery due to high surgical risk. All patients underwent meticulous clinical and functional evaluation that included coronary, supra-aortic and femoral angiography and echocardiography. CT angiography was performed in selected cases. Out of 30 screened patients 23 (77%) were found suitable for TAVI. Seventeen underwent successful TAVI. Four patients are currently awaiting TAVI. One screened patient died while awaiting TAVI. One patient underwent coronary angioplasty and TAVI was deferred. Seven patients were declined of CoreValve TAVI due to the following reasons: valvular anatomical limitations in 2 patients, dilatation of the ascending aorta (4.5 cm) in one patient, severe organic mitral regurgitation in 1, tortuous and calcific vasculopathy in two patients and general medical condition in one. One patient that was declined of TAVI was referred back to surgery. Patients declined of TAVI were older than the implanted patient cohort, 84 ± 4 years vs. 81 ± 4 ($p=0.07$) and of higher Logistic Euroscore 26 ± 6 vs. 22 ± 4 ($p<0.05$).

Conclusions: TAVI with an expandable valve is a promising new therapy for the majority of patients at high risk for surgical AVR. However, there are still a considerable number of patients who cannot be treated with the current CoreValve technique. Further developments and combination of all transcatheter and surgical modalities are advised for the optimal treatment of complex AS patients.

Percutaneous Implantation of the Self-Expandable CoreValve for High-Risk Patients with Severe Aortic-Valve Stenosis: Early Israeli Experience.

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Background: The prevalence of aortic stenosis increases with advancing age. Once symptoms occur the prognosis in patients with severe AS is poor. The current and recommended treatment of choice for these patients is surgical aortic valve replacement (AVR). However, many patients, mainly the very elderly and those with major co-morbidities, are considered to be at high surgical risk and are therefore declined treatment. Recently, a transcatheter alternative to surgical AVR has emerged.

We report the first year experience and 30-day outcome of transcatheter aortic self-expandable CoreValve implantation in Israel.

Methods & Results: Transcatheter aortic valve implantation (TAVI) using the Corevalve system has been performed in Israel since September 2008. During this year 55 patients underwent corevalve TAVI in four Israeli centers. Mean age was 81.7±7.1 years, 35 females and 20 males. The mean valve area by echo was 0.63±0.16 cm². The calculated mean logistic Euroscore was 19.3±8%. Procedural success was 98%. Following TAVI mean transvalvular gradient decreased from baseline levels of 51±13 to 9±3 mmHg. Symptomatic improvement was evident in most patients with reduction in functional capacity grade from 3.2±0.6 at baseline to 1.4±0.7. One patient died on the first day post procedure (1.8%) and all-cause 30 day mortality was 5.5% (3 of 55 patients). One patient had a significant post procedural aortic regurgitation of > grade 2. The most common post-procedural complication was complete heart block which necessitated permanent pacemaker implantation in 37% of patients.

Conclusions: The Israeli first year experience of transcatheter aortic valve implantation using the CoreValve self-expandable system presents an effective and safe procedure for the treatment of severe aortic stenosis in patients at high-surgical risk.

1550160

Improvement of Mitral Regurgitation After Trans-Catheter Aortic Valve Implantation

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Introduction: Functional mitral regurgitation (MR) may be increased secondary to a high afterload. The regression of MR following the relief of aortic stenosis (AS) is uncertain. We examined the effect of trans-catheter aortic valve implantation (TAVI) in patients with significant functional MR.

Methods: Eighteen patients underwent TAVI in our department, in 8 there was significant (moderate or severe) MR. We compared their pre-procedure and post-procedure echocardiograms to identify any change in MR. The severity of mitral regurgitation was graded on a scale of 1-4.

Results: There were 4 males, and mean age was 82 ± 7 years. The peak aortic gradient was 80 ± 19 mmHg, and aortic valve area was 0.5 ± 0.07 cm². Mitral regurgitation improved by at least 1 degree in 6, and by 2 degrees in 4 patients. The pre and post-procedure values respectively were: mean MR grade 3.2 ± 0.5 and 2 ± 1 ($p=0.01$); vena contracta 0.6 ± 0.3 and 0.3 ± 0.2 cm ($p=0.03$); and jet area 8.2 ± 3.3 and 4.8 ± 3.7 cm² ($p=0.07$). The tricuspid regurgitation gradient decreased from 43 ± 7 to 31 ± 11 mmHg ($p=0.03$). We did not observe any reduction in LV dimensions or mitral annulus dimensions.

Conclusions: Significant early improvement in the severity of MR can be expected in patients with aortic stenosis and functional MR following TAVI. Long-term follow-up in a larger series of patients is needed to identify a clinical benefit.

Peripheral Vascular Complications following transcatheter aortic valve implantation: new challenges to the interventional cardiologist.

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Background: Percutaneous trans-catheter aortic valve implantation (TAVI) has emerged as a therapeutic alternative for high-risk surgical patients with severe aortic stenosis. TAVI requires the delivery of massive catheters and devices through the vascular system. The use of these high caliber devices in old and frail patients is often associated with vascular complications that may require immediate and urgent corrections. We studied the incidence and nature of major vascular complications in two medical centers that perform TAVI with the CoreValve self-expandable system.

Methods & Results: TAVI using the CoreValve system was performed in 46 patients. Mean patient age was 80,±6.8 years, 32 females and 14 males.

Significant peripheral vascular complication requiring intervention occurred in 11 patients (24%). Iliac or CFA perforation occurred in 6 patients (13%), five patients were treated with covered stents (11%), and one patient suffered a CFA rupture that required surgical repair. One patient with iliac perforation died. This was directly related to significant blood loss and subsequent multi-organ failure. Stenosis of the common femoral artery (CFA) at the puncture occurred in 5 patients (11%) iV all were successfully repaired by balloon dilatation.

Conclusions: TAVI using the CoreValve self-expandable system is associated with a significant rate of peripheral vascular complications. Interventional cardiologists that perform TAVI should perform comprehensive vascular work-up prior to procedure and be familiar with new devices and techniques for the diagnosis and emergency treatment of major vascular complications.

Pulmonary Hypertension in Patients with Aortic stenosis: Clinical Profile, Prognostic Implication and response to Trans-Catheter Aortic Implantation

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Background: The incidence, predictors and prognostic implication of pulmonary hypertension (PH) in patients(pts) with severe aortic stenosis (AS) are unclear. This study aimed to investigate the impact of Trans catheter aortic valve implantation (TAVI) on (PH) in pts with severe AS

Methods: We studied 396 pts with severe AS who were referred for TAVI Pts with mitral stenosis, severe mitral regurgitation/mechanical valve or known PH were excluded. The cohort studied according to the degree of the pulmonary pressure (PP): group 1 124(31.3%) with PP < 40mmHg, group 2 149(37.6%) with PP 40-60mmHg, and group 3 123 (31.0%) with PP >60mmHg

Results: The mean age was lower in the severe PP group. Pts with severe PH had higher STS/Euroscore, creatinine level, CRP level, left atrium diameter, lower ejection fraction (EF) and smaller aortic valve area. The predictor for PH were STS, Euro score, NYHA class, renal failure, lower EF and aortic valve area. Multivariable analyses identify aortic valve area as the strongest predictor for PH. In 53 pts who underwent TAVI. There was no significant change in PH immediately after the procedure and at one year, however in 23 pts with PP >50mmHg there was significant decrease in PP during median follow up of 13 days (64.9± 14.2 vs. 52.1±13.4mmHg, p<0.001) at 1 year the PP remained low 48.2±6.4mmHg

Conclusion: Pts with severe AS tend to have high incidence of PH which is associated with high mortality rate. TAVI is an effective treatment for these pts and resulted with significant reduction of PH

	Normal pulmonary pressure (N=124)	Mild-moderate pulmonary hypertension (N=149)	Severe pulmonary hypertension (N=123)	P
Age (years)	81.9±7.7	82.5±8.2	79.7±9.2	0.01
Male (%)	57(46)	69(46.3)	53(43.1)	0.8
STS score (%)	9.9±5.8	11.9±5.4	13.2±7.5	<0.001
Logistic Euro score (%)	27.5±20.9	40.7±20.7	48.8±22	<0.001
Creatinine (mg%)	1.2±0.5	1.3±0.6	1.7±1.5	<0.001
CRP (mg/dl)	9.7±16.9	14.3±22.3	25.4±42.4	0.01
Aortic valve area (cm ²)	0.74±0.2	0.72±0.15	0.68±0.18	0.03
Ejection fraction (%)	54.1±15.7	49.6±15.9	45.0±18.9	<0.001
Pulmonary vascular resistance (Wood)	2.0±1.5	2.3±2.2	4.0±2.6	<0.001
Left atrium diameter (mm)	4.1±0.68	4.5±0.72	4.7±0.6	<0.001
Died (%)	23(18.5)	52(34.9)	53(43.1)	<0.001

Transfemoral and Transapical Transcatheter Aortic Valve-implantation: The Israeli experience using Edwards-Sapien Valve System

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Background: Transcatheter aortic-valve implantation (TAVI) was introduced as an alternative for surgery in patients with severe symptomatic aortic-stenosis at high surgical risk. We describe the first year experience with transfemoral and transapical TAVI in Israel using the Edwards-Sapien device.

Methods: TAVI procedures with an Edwards-Sapien valve system have been performed in Israel since July 2008. So far, 25 patients have undergone these procedures (18 transfemoral and 7 transapical) in 3 Israeli centers. The patient group (52% women) was characterized by relatively older age (65-88 years, mean 81.9±5.2 years), and high prevalence of severe comorbidities (60% diabetes mellitus, 32% post sternotomy, 65% chronic renal failure, 30% chronic pulmonary disease). The calculated logistic EuroSCORE was relatively high (7-59.9%, mean 21.5±15%).

Results: The rate of procedural success was 95%. Although no patient died within 30-days after the procedure, one patient suffered from debilitating major stroke (4%) and died 32 days following the procedure. Permanent pacemaker implantation was required in only 1 patient (4%). The median length of hospital stay was 5 days. After the procedure the mean valve area increased from 0.59±0.14 cm² to 1.65±0.25 cm² (p<0.001) and the mean valve gradients decreased from 88/51mmHg (peak/mean) to 15/5 mmHg (p<0.001). There was no significant (grade≥2) post-procedural aortic-regurgitation. At follow-up symptomatic improvement was evident in almost all patients with improvement in functional capacity grade from NYHA class 3.2±0.6 at baseline to 1.4±0.7 (p<0.001).

Conclusions: The first-year Israeli experience with TAVI using the Edwards-Sapien system suggests that this is an effective and safe procedure for the treatment of severe aortic stenosis in suitable carefully screened patients at high-surgical risk.

Effects of Transcatheter Aortic Valve Implantation on Coronary Blood Flow in Patients with Severe Aortic Stenosis

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Background: In patients with severe aortic stenosis and normal coronary angiography the coronary flow is reduced. Doppler evaluation of proximal coronary flow is feasible using transesophageal echocardiography (TEE) Aim: To assess the change in coronary flow in patients undergoing Trans-catheter Aortic valve implantation (TAVI) for severe aortic stenosis.

Methodes: The left main coronary artery was visualized using TEE in 23 patients (19 patients undergoing percutaneous TAVI and 4 trans-apical TAVI). The peak systolic and diastolic velocities of the coronary flow and the time-velocity integral were obtained before and after TAVI using pulsed wave Doppler.

Results: The mean age was 82.8 ± 4.7 years. Mean aortic gradients decreased from 53.2 ± 14.3 mmHg before TAVI to 4.7 ± 2.6 mmHg after ($p < 0.001$). The aortic valve area increased from 0.62 ± 0.3 cm² to 1.89 ± 0.6 cm² ($p < 0.001$). Cardiac output increased from 3.1 ± 1.5 to 3.5 ± 1.1 l/min ($p < 0.001$). The aortic systolic pressure did not change significantly — 133.1 ± 22.2 mmHg before and 136.5 ± 18.6 mmHg after valve implantation ($p = 0.8$). Left ventricular end-diastolic pressure decreased significantly from 22.2 ± 3.9 mmHg before to 14.9 ± 6.0 mmHg after TAVI ($p = 0.03$). The following coronary flow parameters (median [25th, 75th interquartiles]) increased significantly after TAVI: peak systolic velocity 26.7 cm/sec [18.25-36.5] to 38.25 cm/sec [25.25-49.3] ($p < 0.001$); peak diastolic velocity 51.0 cm/sec [39.9-67.6] to 59.3 cm/sec [44.1-89.8] ($p = 0.002$); total velocity time integral 24.5 cm [17.1-30.1] to 31.1 cm [22.1-37.4] ($p = 0.001$); and systolic velocity time integral 6.1 cm [5.6-9.1] to 10.1 cm [8.8-12.7] ($p = 0.001$). Diastolic time velocity integral increased from 18.1 cm [11.7-25.3] to 22.3 cm [17.2-27.2] ($p = 0.01$).

Conclusion: After TAVI, there is a significant increase in coronary flow as measured by peak systolic velocity, diastolic velocity, and velocity time integral using pulsed wave Doppler by TEE

Phosphate transporter inhibitor reduces renal failure associated aortic valve calcification

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Introduction: Hyperphosphatemia is a major risk factor for aortic valve calcification (AVC) in renal failure population. Previously, we demonstrated that in- vitro inhibition of phosphate transport abolishes mineralization in valvular myofibroblasts. We sought to assess the in vivo effect of Fosarnet (phosphate transporter inhibitor) using our unique animal model of AVC induced by a uremia-inducing diet.

Methods: Aortic valves were obtained from three groups of rats (n=9 each): control valves (group A), Calcified valves- from rats fed with the uremic diet for 7 weeks (group B), and valves from rats fed with the same diet and also received Fosarnet administered intraperitoneal 5mg/kg (group C). Valves were examined using multislice computed tomography (MSCT), histology assessment, and antigen and gene expression analyses.

Results: Histological evaluation of diet group's calcified valves revealed positive staining for calcium deposits and osteoblast's markers.

MSCT of Fosarnet treated rats (group C) showed significant decrease in valve calcification compared with group B (Agatston score 21 ± 5 vs. 34 ± 4 $p < 0.05$). The reduction in AVC due to Fosarnet treatment was confirmed by histology, however valvular osteoblast markers were similar in groups B and C.

Conclusions: Phosphate plays a crucial role in the pathogenesis of AVC. Inhibition of phosphate uptake by fosarnet reduces calcification with no effect on osteoblast transformation; therefore the pro- calcific effect of phosphate is physicochemical and independent of cellular activity. The results are important in the study of renal failure associated ectopic calcification.

Cardiac magnetic resonance imaging of myocardial infarction and left ventricular remodeling in rats using a clinical 3.0 T scanner

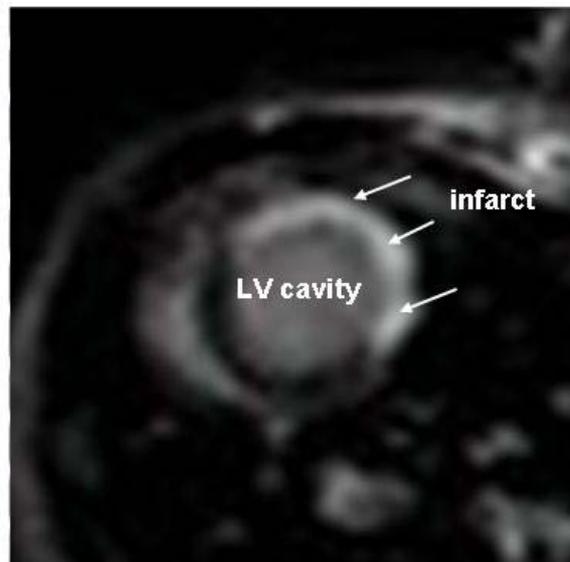
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Background: Small rodents (mice and rats) are the most widely used species for animal studies of cardiovascular disease. Cardiac magnetic resonance (CMR) imaging can provide noninvasive, high resolution images of heart anatomy, viability, perfusion, and function. However, the implementation of clinical CMR imaging protocols for small rodents has been limited due to the small heart size and rapid heart rates. Therefore, most CMR studies in small rodents have been performed on non-clinical, high-field MR magnets. Because such high-field systems are not readily available at most institutions, the technical aspects that are needed to perform CMR on clinical 3.0 T MR scanners are presented here.

Methods and Results: CMR protocols for (a) cine imaging of left ventricular function and (b) imaging contrast-enhancement of the infarct zone were developed and optimized for the rat infarct model (n=20) with and without thermosensitive injectable biomaterial therapy. Scanning was performed on the 3T MR system (GE healthcare) using a dedicated rat radiofrequency coil. During MRI, rats were anesthetized using isoflurane, kept warm using hot water, and ECG monitored. For contrast-enhanced imaging of infarct scar, an ECG-gated inversion-recovery gradient-echo sequence was used. Cine images and contrast-enhanced images were analyzed using a dedicated workstation (ADW4.3 GE advanced workstation). Cardiac volumes, ejection fraction, wall thickness, and wall thickening were readily calculated from the cine images, and infarct or scar size can be computed from the contrast-enhanced images (Figure).

Conclusions: CMR performed on a clinical 3.0 T scanner is a valuable imaging modality for studying cardiovascular diseases noninvasively, in small rodents. CMR provides accurate assessment of LV function and remodeling and infarct size in a rat model of myocardial infarction. This method can be successfully used for evaluation of novel preclinical therapies.



CMR imaging of a rat heart 4 days after extensive anterior MI. Late enhancement of infarct 45 min after IP gadolinium injection.

1550434

Resident Cardiac Stem Cell from the Left Atrial Appendage

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The concept of the heart as a terminally differentiated or post-mitotic organ unable to regenerate working myocytes has been at the center of cardiovascular research and therapeutic developments for the last fifty years. However, in the past few years, compelling evidence has accumulated suggesting that the heart has at least some regenerative potential, and its reaction to pathologic loads can be accompanied by myocyte proliferation. This has been demonstrated to be dependent on age and co-morbid conditions. Given the fact that tissue stem cells exist in many organs throughout an organism's lifetime, it seems likely that these cells are involved in the pathogenesis of many diseases. As it is likely, inferring from other organs, that niches of stem cells are to be found mainly in crypt-like areas, the left atrial appendage (LAA) is a very likely place to find stem cells.

Methods: Isolated murine LAA tissue was cut into small pieces, digested three times with trypsin and collagenase IV. The explants were then cultured in CEM. After a period of 3 weeks, a layer of cells is generated from adherent explants.

Results: We isolated undifferentiated cells that grow as self-adherent clusters-cardiospheres from explants of adult LAA from murine hearts. We verified that these cells express stem cell markers/antigens (cKit and SCA1) and can spontaneously differentiate, express cardiomyocyte markers (GATA4 and MEF2c) and even spontaneously contract in culture. These cells form colonies, and self-renew. Implants from LAA tissue on ventricular myocardium showed migration of donor cardiomyocytes into receptor tissue.

Discussion: The LAA can potentially be used as a "biological Band Aid" to assist in infarction limitation and repair. These cells could also be relevant in understanding the mechanisms driving endogenous cardiomyocytes to reenter the cell cycle and the search for strategies to transplant cardiac progenitor cells.

Angiotensin II Impedes the ability of the lungs to clear edema

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Background and Aims: Pulmonary edema is a life threatening condition of various etiologies. Active alveolar fluid clearance (AFC) is important in keeping the airspace free of edema. AFC is mediated via the alveolar active sodium transport, a process by which Na⁺ is extruded out of the alveolar airspace by epithelial transport proteins, including apical Na⁺ channels and basolateral Na,K-ATPases with water following isosmotically. Angiotensins contribute to the pathogenesis of hypertension, arterial disease, cardiac hypertrophy and heart failure. However, little is known about the direct effects of Angiotensin II on alveolar epithelium and AFC. Thus, we aimed to investigate the physiologic role of Angiotensin II in alveolar fluid clearance in rats and conceivably the molecular basis of the angiotensin effects on AFC.

Results: The rate of AFC in control rats was 0.48±0.02 ml/h (all values are Mean ± SEM) and decreased by 36%, 48% and 60% in rats treated with 10⁻⁶ M, 10⁻⁷ M and 10⁻⁸ M (P = 0.003). The angiotensin receptor blocker (ARB), losartan, prevented the inhibitory effect of angiotensin effects and brought back AFC to baseline levels. The movement of large solutes across the alveolar-capillary barrier was not different among the study groups compared to control rats indicating that the alveolar-capillary barrier was not disrupted.

Conclusions: Angiotensin has a direct adverse effect on lung epithelium manifested by decreasing alveolar fluid clearance. This effect maybe reversed by ARB therapy.

Effective Stable Isolated Moderate Bilateral Cerebral Hypothermia Achieved with an Intravascular Approach*Meerkin, D¹; McKemie, S¹; Lieber, G²; Solar, R²**¹Shaare Zedek Medical Center, Jerusalem, Israel; ²ThermopeutiX Inc, San Diego, USA*

Background: The neuroprotective effects of mild hypothermia following cardiac arrest have been clearly established. Limitations in clinical practice include rapidity in achieving target temperature and adverse cardiac effects <32°C. We assessed the ability of a self-insulating cooling system to achieve rapid isolated moderate (28-30°C) bilateral cerebral hypothermia. Methods: From the femoral artery, a catheter-in-catheter system was positioned with the inner lumen in a single common carotid artery and the outer lumen in the aortic arch in 9 pigs (60-64kg). Blood from the aorta, was cooled and reperfused into the carotid artery using a dialysis machine. Initial pump flow rates were 100cc/min and modified in accordance with target temperature. Warming blankets were placed beneath all animals. In 4/9, warming blankets were placed both above and below the animals. Thermistors were placed at a depth of 1-1.5 cm in each cerebral hemisphere, and a rectal probe was used for systemic temperature. Cooling was performed for 3 hrs, with a target ipsilateral temperature of 28-30°C. Results: The catheter was successfully deployed in all animals. Target temperatures of <30°C in both cerebral hemispheres was achieved in all animals. Time to target temperature (<30°C) was 31±13 and 44±18 mins in the ipsilateral and contralateral cerebral hemispheres respectively. An ipsilateral hemispheric temperature of <34°C was achieved in 4/9, 8/9 and 9/9 animals within 5, 15 and 30 mins respectively. Pump flow rates were 89±49 cc/min (range 50-250 cc/min). Contralateral hemispheric temperature reached equivalence to the treated side within 60 mins in 8/9 cases. Systemic temperatures fell by 3.9±1.9°C to 34±1.6°C. In the 4 animals that were more aggressively heated, systemic temperatures fell by only 2.0±1.0°C, to 35.5± 0.9°C. Conclusions: Isolated moderate cerebral hypothermia was rapidly achieved and maintained with a novel self insulating catheter system at low flow rates.

Optimization of Cardiac Function after Acute Infarction, by Pacing at Various Sites, in Acute Sheep Model.

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Background: Many patients with inhomogeneous ischemic heart do not exhibit improvement with cardiac resynchronization therapy. The study suggests that lead position should be optimized in the inhomogeneous heart, and the optimal excitation sites should be defined based on energetic considerations. Methods: The study investigated the local and global effects of opposing strategies: pacing in vicinity of ischemic zone or at a remote site. Infarction was created in the anteroseptal region, in sheep (n=8). LV volume and regional shortening were measured by sonocrystals. Local pressure-segment length loops and global LV functions were assessed at baseline and after infarction, during three pacing modes: normal sinus, anteroseptal and remote lateral pacing. Coronary flow and arterial-venous oxygen difference were measured to assess cardiac energetics. Results: The infarction extended the segment's end-diastolic length (8%, $p=.001$), stretched the weak region during systole, decreased the local work (-49.6%, $p<.001$) and yielded overt post-systolic shortening (PSS, 5.4%, $p<.005$). Pacing in the vicinity of the ischemic region eliminated the systolic stretch, decreased the work of the ischemic region (-26.4%, $p<.005$) and diminished the PSS work (-38.6, $p<.02$). Remote lateral pacing slightly increase the ischemic region work and increased the PSS work. Conclusions: The study introduces the energetic concept of "workload redistribution" rather than the conventional electrical or mechanical resynchronization. Pacing in the ischemic region shifts the workload from the ischemic region, improves the balance between the regional demands and energetic capabilities and improves diastolic function by reducing the wasted PSS work.

Affinity Binding Alginate Biomaterial for the Sustained Delivery of Cardiovascular-Protective Proteins

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Background and Aims: We developed a novel injectable alginate biomaterial that affinity-binds and presents, at a sustained manner, a variety of heparin-binding proteins, in a similar fashion to extracellular matrix. Here, we aimed to test whether the sustained delivery of hepatocyte growth factor (HGF) from such system would enhance its therapeutic properties.

Methods and Results: Mass spectrometry showed that the affinity-binding of HGF to alginate-sulfate protects HGF from proteolysis. When the bioconjugate was incorporated in alginate hydrogel (creating the affinity-binding hydrogel), HGF release rate was significantly slower compared to conventional hydrogel (p , interaction <0.0001 , two-way ANOVA). The released HGF maintained bioactivity as confirmed by ERK1/2 activation as well as protection from apoptosis induced by H_2O_2 , in cardiac cell cultures ($p < 0.05$ vs. control). In rat MI model, the affinity-binding hydrogel significantly prolonged HGF tissue retention and bioavailability, compared to unmodified hydrogel or soluble HGF ($p < 0.0001$, F test). Importantly, sustained delivery of HGF significantly improved tissue blood perfusion in mice hindlimb ischemia model, as compared to saline, soluble-HGF and empty alginate ($41.5 \pm 1.7\%$ vs. $26.3 \pm 3.1\%$ vs. $19.3 \pm 3.2\%$ vs. $27.5 \pm 3.0\%$, respectively; $p < 0.05$ compared to saline), evaluated by Laser Doppler. Compared with saline, soluble-HGF and empty alginate, HGF in affinity-binding alginate significantly increased blood vessel density (41.4 ± 2.3 vs. 18.9 ± 1.2 vs. 25.7 ± 2 vs. 23.8 ± 2.1 vessels/ mm^2 , respectively; $p < 0.05$), evaluated by α -smooth muscle actin staining.

Conclusions: Bioconjugation with alginate-sulfate resulted in protection, prolonged tissue exposure and increased availability of HGF in hostile environments, such as the ischemic heart and limb. The prolonged factor action induced angiogenesis in severe limb ischemia model, suggesting the use of this system as a promising approach for cardiovascular regenerative therapy.

Immunomodulation of Cardiac Macrophages by Phosphatidylserine-Presenting Liposomes Preserves Chamber Size after Myocardial Infarction in Rat

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A major challenge in modern cardiology is to optimize infarct healing and repair after myocardial infarction (MI). The common outcome after MI is scar formation and reduction in heart contractility, which are the final stages of an inflammatory event cascade. Primary players in this process are macrophages (M Φ) which constitutes classically-activated, pro-inflammatory M Φ (M1) and alternatively-activated, anti-inflammatory M Φ (M2). Here, we tested a novel hypothesis that manipulating M Φ on site, using phosphatidylserine (PS)-presenting liposomes to control excessive inflammation, would minimize MI-induced damages. This approach mimics natural body mechanism of clearing apoptotic cells by M Φ , while altering them into their anti-inflammatory phenotype.

Methods and Results

Rats (SD) underwent MI and 48h later were injected via the femoral vein with PS-presenting liposomes (10 μ mol/300 μ L; n=5) containing iron oxide (2mg/mL) or saline (n=3). Four days later, MRI and immunohistology revealed that M Φ , accumulated at the infarct, engulfed the PS-presenting liposomes. In functional experiments, rats were subjected to MI and 48h later were injection via the femoral vein with PS-presenting liposomes (10 μ mol/150 μ L; n=10), PS-lacking liposomes (10 μ mol/150 μ L; n=10) or saline (150 μ L; n=10). Echocardiography was performed 24h and 4 weeks after MI. Expansion index (0.59, 0.81 and 1.43; p=0.0037) and scar thickness (0.65, 0.59 and 0.33; p=0.007) as well as left ventricle end systolic (p=0.096) and diastolic (p=0.004) areas were significantly improved in PS-presenting liposomes-treated rats compared to PS-lacking liposomes or saline. Additionally, PS-presenting liposomes-treated rats showed greater vessel density compared to PS-lacking liposomes or saline (51, 35 and 31 #/mm²; p=0.037).

Conclusions

Our findings suggest that uptake of PS-presenting liposomes contribute to the healing process modification after MI. These favorable effects may be related to activation of reparative M Φ (M2).

Vagal Paroxysmal Atrial Fibrillation: Prevalence and Ablation Outcome in Patients without Structural Heart Disease.

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Introduction: the prevalence of vagal and adrenergic atrial fibrillation (AF) and the success rate of pulmonary vein isolation are not well defined. We investigated the prevalence of vagal and adrenergic AF and the ablation success rate of antral pulmonary vein isolation (APVI) in patients with these triggers compared to patients with random AF.

Methods and Results: 209 consecutive patients underwent APVI due to symptomatic drug refractory paroxysmal AF. Patients were diagnosed as vagal or adrenergic AF if >90% of AF episodes were related to vagal or adrenergic triggers. Otherwise a diagnosis of random AF was made. Clinical, ECG and Holter follow up was every 3 months in the first year and every 6 months afterward and for symptoms. Of 209 patients, 57 (27%) had vagal AF, 14 (7%) adrenergic AF and 138 (66%) random AF. Vagal triggers were sleep (96.4%), post-prandial (96.4%), late post-exercise (51%), cold stimulus (20%), coughing (7%) and swallowing (2%)(fig.2). At APVI 94.3% of patients had isolation of all veins. Twenty five (12%) patients had a second APVI. At a follow up of 21±15 months, the percentage of patients free of AF was 75% in the vagal group, 86% in the adrenergic group and 82% for random AF (p=0.51)(fig.1 and table.1).

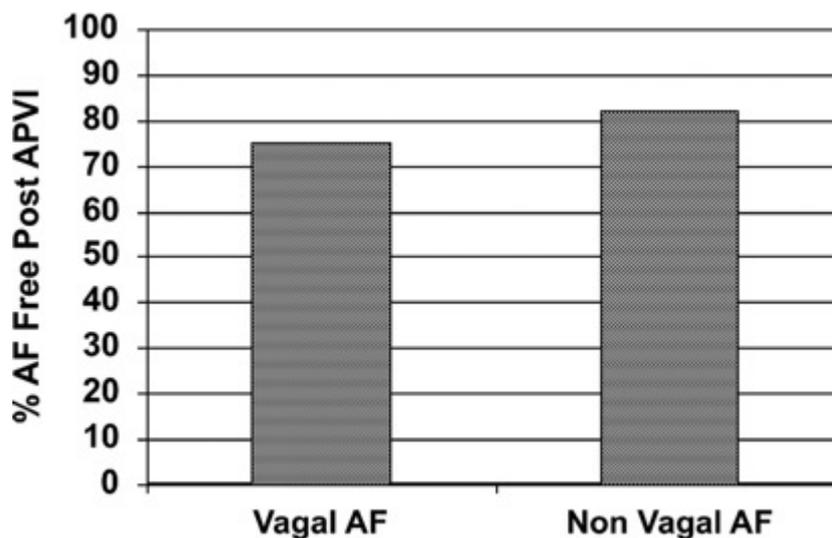
Conclusion: in patients with PAF and no structural heart disease referred for APVI, vagal AF is present in approximately one quarter. APVI is equally effective in patients with vagal AF as in adrenergic and random AF.

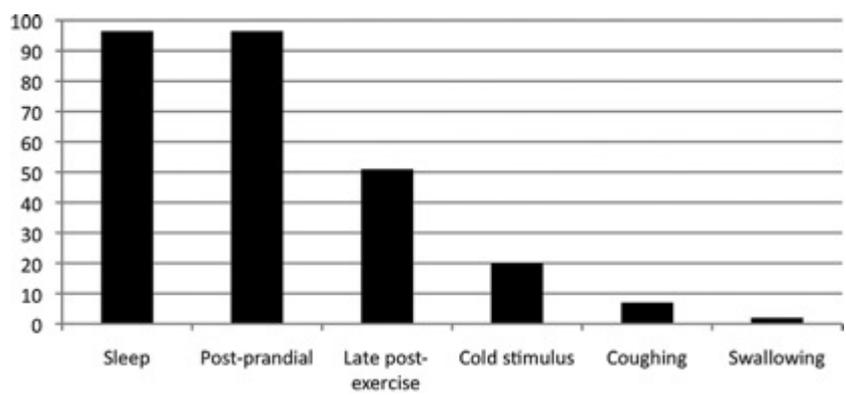
fig1: success rate in Vagal AF vs non-Vagal AF (P=0.33)

Fig.2: distribution of vagal triggers

TABLE I
Clinical Characteristics and Outcome of patients with vagal, Adrenergic, and Random AF

	Vagal AF	Adrenergic AF	Random AF	P value
Number (%)	57 (27)	14 (7)	138 (66)	
Mean age (years)	58 ± 10	57 ± 10	56 ± 10	0.69
Gender (male/female)	43/14	13/1	104/34	0.33
Hypertension (%)	13 (22.8)	3 (21.4)	40 (29.0)	0.61
Left atrium size (cm)	4.1 ± 0.7	3.9 ± 0.4	4.1 ± 0.6	0.82
Mean duration of AF (months)	112 ± 81	120 ± 100	100 ± 62	0.68
Number of AAD (n)	1.5 ± 0.7	1.2 ± 0.6	1.5 ± 0.7	0.34
Patients requiring second procedure (%)	7 (12)	1 (7)	17 (12)	0.85
Number of procedures (n)	1.2 ± 0.4	1.1 ± 0.3	1.2 ± 0.4	0.81
Mean follow-up (months)	21 ± 15	21 ± 13	22 ± 15	0.92
Freedom from AF (%)	43 (75)	12 (86)	113 (82)	0.51
Freedom from AF on AAD (%)	12 (21.9)	2 (16.7)	34 (30.1)	0.62





Incessant Focal Atrial Tachycardia: ECG and EP Characterization and Occurrence of Cardiomyopathy

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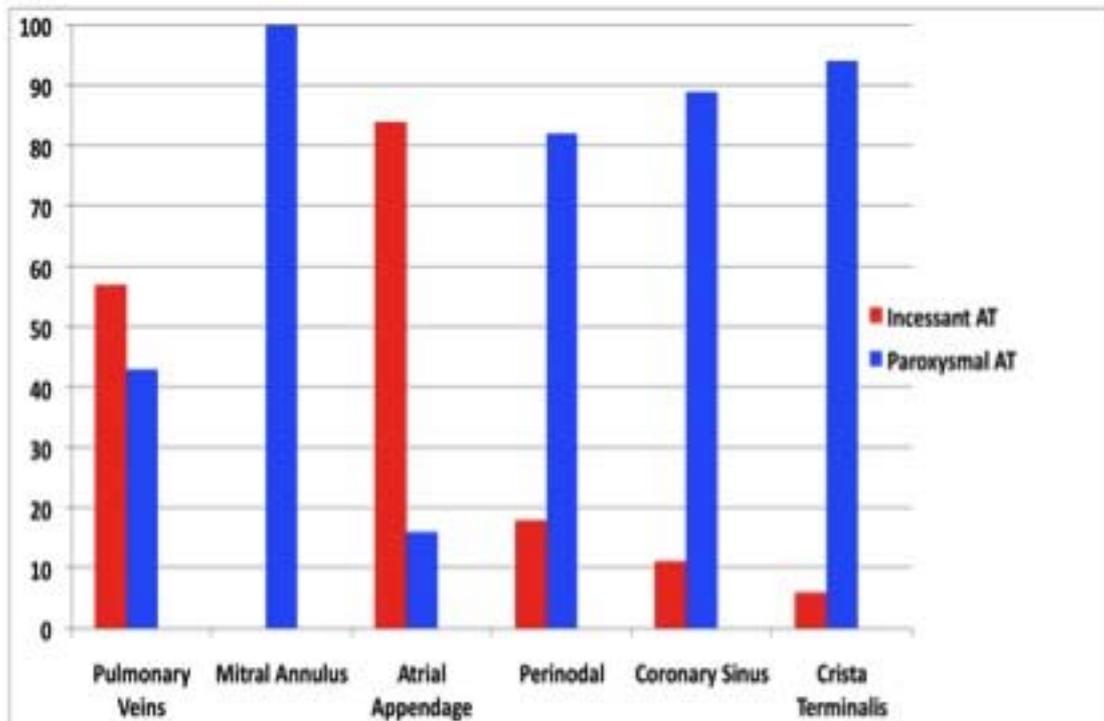
BACKGROUND: Incessant focal atrial tachycardia(AT) is rare but may be complicated by left ventricle dysfunction. The aim was to characterize the electrophysiological features of incessant focal AT and identify predictors of tachycardia mediated cardiomyopathy (TCM).

METHODS: 82 of 345(24%)patients with focal AT presenting for RFA between 1997-2008 were incessant. Patients characteristics, anatomic site of origin, and tachycardia characteristics of incessant pts were analysed.

RESULTS: Mean age was 42 ± 20 y and 57% pts were male. Mean symptom duration was 5 ± 7 y having failed a mean 1.5 ± 1.3 AADs. TCM (EF <50%) was present in 30/82(37%). Patients with incessant AT and TCM were younger (mean 39 ± 22 y v 45 ± 18 y $p=0.02$); have a slower tachycardia cycle length(TCL) ($502\text{ms}\pm 131$ v $446\text{ms}\pm 106$ $p=0.05$) and mean HR in tachycardia ($117\text{bpm}\pm 21$ v $132\text{bpm}\pm 33$ $p=0.05$) than incessant pts without TCM (table). Incessant tachycardia was more frequent from atrial appendage(AA, 84%) and pulmonary veins(PV, 59%) compared to other locations (combined,15%) ($p<0.001$)(Fig 1). AA and PV sites were associated with a higher incidence of TCM (AA:42%pts; PV:18%pts; other:6%, $p=0.008$). RFA was successful in 76/82(93%) pts. Recovery of LV function occurred in 29/30(97%) pts at mean of 3 months.

CONCLUSION Incessant tachycardia is complicated by TCM in 37% pts. Atrial appendage and pulmonary vein foci were more likely to be incessant and complicated by TCM. Incessant tachycardia and TCM was characterized by a slower TCL and mean heart rate than pts with non incessant AT. Slower AT may result in fewer/absent symptoms, possibly delaying clinical presentation and diagnosis.

	Incessant AT (n:82)	Paroxysmal AT (n:263)	P Value
Age (yrs)	39±22y	45±18y	0.02
Male Sex (n,%)	45 (55%)	92 (35%)	<0.001
Symptoms Duration (yrs)	4.8±6.6	6.0±7.8	0.2
Anti-arrhythmic drugs failed	1.5±1.2	1.4±1.2	0.6
TCL (ms)	502±131	446±106	0.05
HR (bpm)	117±21	132±33	0.05
TCM (n,%)	30 (37)	0 (0)	<0.0001



Circumferential Pulmonary Vein Isolation for Paroxysmal Atrial Fibrillation: Five Years Cure Comparable to One Year Cure

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Introduction The late atrial fibrillation (AF) recurrence rate in long term follow-up of circumferential pulmonary vein isolation (CPVI) for paroxysmal AF is not well-documented. **Methods** 100 consecutive pts (mean age 54 ± 10 y, males 79) with drug refractory PAF were analysed. Mean LA size was 4.2 ± 0.6 cm, mean LVEF was $59 \pm 5\%$. 26% of pts had hypertension. AF ablation strategy consisted of CPVI. Ablation endpoint was pulmonary vein isolation confirmed with lasso catheter at first and repeat procedures. Clinical, ECG and Holter follow up was performed 3 to 6 monthly and for symptoms. Recurrence of AF/AT was defined as any episode of tachycardia lasting more than 1min.

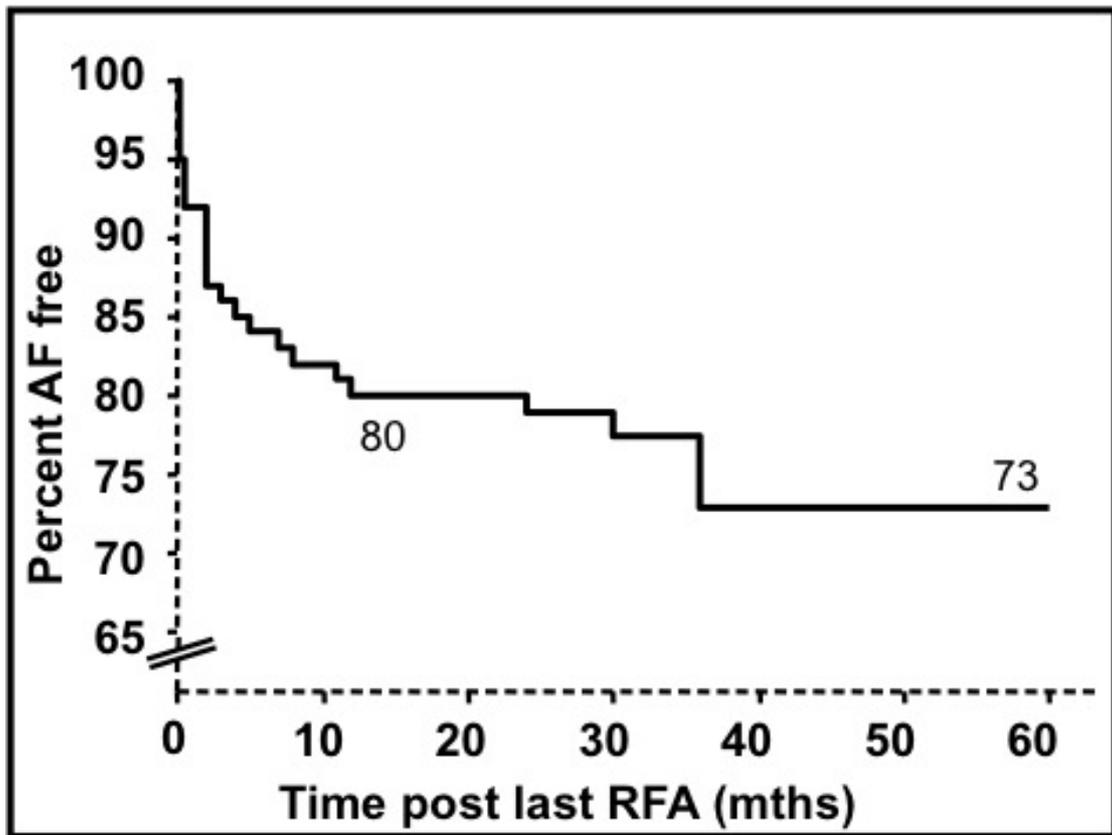
Results Isolation of all 4 veins was successful in 93% pts with 3.9 ± 0.4 veins isolated/pt. Follow up after the last RF procedure was at a mean of 35 ± 10 mth (range 19-60 months). Sinus rhythm (SR) was maintained at long-term f/u in 80% pts including pts on AADs. Long-term success rate without AADs was 51% (table 1). A total of 21% pts had 2 procedures and 3% pts had 3 procedures. Most (65%) AF/AT recurrences occurred <1 year after the first procedure. Mean time to recurrence was 7 ± 11 months (Fig.1). Kaplan Meier analysis showed cure rate of 80% at 1 year and 73% at 5 years (Fig.2). There were no major complications.

Conclusion CPVI is an effective strategy for the prevention of AF in the majority of pts with PAF. Maintenance of sinus rhythm requires repeat procedure or continuation of AAD in a significant proportion of pts. After maintenance of SR 1 year post CPVI, the late recurrence rate is low.

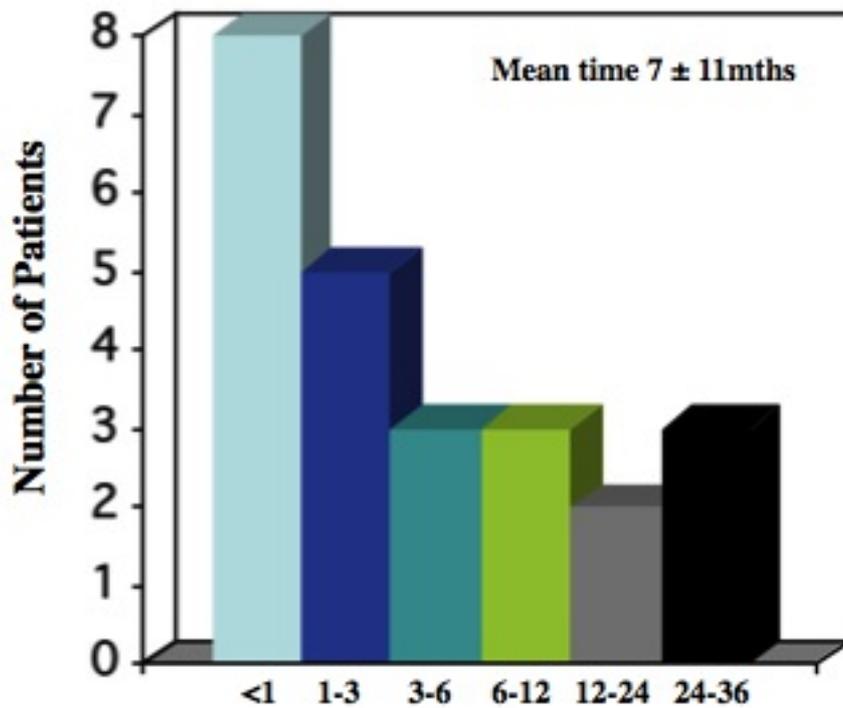
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PROCEDURE RESULTS

PV's isolated per patient (n)	3.9 ± 0.4
RF time (mins)	45 ± 15
Fluoroscopy time (mins)	67 ± 17
Follow-up (mths)	35 ± 10
Follow-up (range) (mths)	19-60
Sinus Rhythm at 1 yr, AAD free (%)	51
Sinus Rhythm at 1 yr, including AAD (%)	80
Second CPVI (%)	21
Third CPVI (%)	3



Time to Recurrence of AF (mths)



1550114

Post Modified MAZE Arrhythmias: Identification, Mechanism and Therapy

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Background: Identification of the atrial rhythm in patients after radiofrequency ablation (RFA) modified Maze III procedure could be challenging.

Methods: We examined a 12-lead ECG of 220 consecutive patients who underwent modified Maze. If atrial rhythm could not be determined we developed a 3 step algorithm. First we increased the ECG amplitude from 10 to 40mv. If still undetermined we proceeded with esophageal recording and if still doubtful we proceeded with endocardial recording.

Results: During follow up (1 y), in 17 pts (8%) atrial rhythm could not be identified by ECG due to invisible P waves. In 6, increasing the ECG scale was enough to demonstrate SR. In another 2, SR was established by esophageal recording and in 5 others only endocardial recordings identified SR (2 of them with intra atrial block). In 3 other esophageal recording demonstrated left atrial rhythm, dissociated from the ventricle (driven by high right atria I rhythm). In another, esophageal recording demonstrated an atrial flutter (AFL). At all, 30 patients (13.6%) were diagnosed as having atypical AFL. Twenty were either converted to SR by drugs, direct cardio- version or with rate control drugs. Ten patients underwent invasive electrophysiology study. The mechanism of the AFL was: 1- Rt. sided isthmus dependent, 2- mitral annulus reentry, 1- Lt. pulmonary veins reentry, 1- Rt. free wall reentry, 1- Rt. septum and low Rt. atrium reentry and 4- Lt. atrial flutter but exact location could not be localized. RFA was attempted in 6 pts. Of these, only the pt with the Rt. sided isthmus was cured. Four patients eventually underwent AV nodal ablation and implantation of a permanent pacemaker.

Conclusions: Standard ECG may not enable determining atrial rhythm in patients following Maze surgery. Invasive recordings proved to be helpful and should be used whenever in doubt. Post Maze AFL are only rarely due to be cava-tricuspid isthmus dependent and have a very low rate of RFA success.

The One Step Electrophysiological and Surgical Approach for Treatment of Atrial Fibrillation

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Background: The treatment of longstanding paroxysmal or persistent atrial fibrillation (AF) on the beating heart is still challenging, whether it is performed endocardially by the electrophysiologist or epicardially by the surgeon. Shortcomings of both techniques has lower success-rates due to the inconsistent transmuralty of the lesions for the endocardial approach and the lack of electrophysiologic (EP) endpoints for the surgical approach. We therefore combined a thoracoscopic surgical approach with a percutaneous transseptal EP procedure to overcome each procedure limitations.

Methods: Sixteen patients with AF refractory to medical therapy had a single step hybrid procedure (11 patients persistent AF and 5 patients paroxysmal AF). A right-sided thoracoscopic box-lesion was obtained with a monopolar radiofrequency catheter, Cobra Adhere, Estech. Immediately after the surgical procedure, a percutaneous endocardial ablation was performed to complete the box-lesion and/or to isolate the pulmonary veins (PV). Procedural endpoints were PV isolation and conduction delay > 200 msec while pacing in the box.

Results: There was no mortality. One patient had a late tamponade treated by pericardiocentesis and one patient had a endotracheal bleeding due to intubation. At 3 and 6 months follow-up, 13/16 (81%) and 11/16 (68%), respectively, were in sinus rhythm with 6 days Holter monitoring..

Conclusion: In patients with AF, a combined thoracoscopic surgical and percutaneous electrophysiological approach is feasible and could overcome their respective limitations if performed as a single procedure. It has the potential to correct the ablation strategy towards a patient tailored approach, increase success-rate and reduce complication rates.

Implantation of Cardioverter Defibrillator for 1ry and 2ry Prevention of Sudden Death With and Without Defibrillation Treshold Testing 3Year Follow Up

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BACKGROUND:

DFT testing at the time of ICD implantation is considered as an implant criterion. This practice has been put into reconsideration, due to the growing amount of evidence that DFT testing may not reproduce the natural conditions of arrhythmias and therefore may not constitute a good predictor of outcome. It has been proven that DFT is not free of complications and finally long-term survival may not necessarily be affected by DFT testing.

AIM OF STUDY:

We compared the outcome of ICD recipients who underwent defibrillation threshold testing (DFT) with that of patients in whom no testing was performed.

METHODS:

A total of 231 subjects with primary or secondary prevention indication received ICD's between Jan 2007 and Oct 2009 in our department. DFT was performed in 93 patients (86% men; mean age 59 years (at the date of implantation); 30% primary prevention; 5.3% right side implantation; 55.9% VVI, 30% DDD, 35.8% CRTD some were upgrade from VVI or DDD to CRTD; 72% with ischemic CM (DFT group), while DFT was not performed in 138 patients: 85.5% men; mean age 66.2 years; 44.9% primary prevention; 3.6% right side implantation; 44.% VVI, 33.% DDDR, 30.4% CRTD, some were upgrade from VVI or DDD to CRTD; 77.5% with ischemic CM (no-DFT group).

RESULTS:

We compared total mortality, appropriate and inappropriate shocks and ATP therapy during an average follow up of 20 months. Comparing the DFT and no-DFT groups, we found an overall mortality rate of 9.6% versus 10.2%. There was no difference in mortality between groups regarding primary or secondary indication. In the DFT group 51% had at least one episode of ATP or shock; 56% of the shocks were appropriate and 44% inappropriate. In the Non DFT group, 29% had at least one episode of ATP or shock; 67.5% were appropriate and 32.5% inappropriate.

CONCLUSIONS:

No significant differences in the incidence of clinical outcomes considered emerged between DFT and no-DFT groups. These results should be confirmed in larger prospective studies.

Pacing to Enable Antiarrhythmic Treatment of Paroxysmal Atrial Fibrillation in Sick Sinus Syndrome – Justified or Futile?

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¹Sheba Medical Center, Tel Hashomer, Ramat Gan, Israel; ²Tel Hashomer, Tel Aviv, Israel

Background: In some patients (pts) with Sick Sinus Syndrome (SSS) and very symptomatic Paroxysmal Atrial Fibrillation (PAF), pacemakers (PM) are implanted to enable continuation of antiarrhythmic therapy (AARx). Information is scarce about natural course of these pts following PM implantation (I), mainly regarding maintenance of sinus rhythm and PM use over time.

Aim: We sought to explore the natural history of pts with SSS paced to enable effective AARx for symptomatic PAF.

Methods: Baseline and follow up data of 188 subjects with PAF and SSS implanted and followed at our institution (1992 to 2007) with DDD PM in order to enable AARx, were retrospectively analyzed. Major end point was time to development of permanent AF. The predictive value of several baseline parameters for development of permanent AF was also analyzed

Results: 188 subjects were followed for 51±34 months (range 0-168 months) following PM implantation. 52 (28%) developed permanent AF 37±31 months following implantation (range 0-135 months). 70 patients died. Of pts who developed permanent AF 46% became PM dependent. Predictors of development of permanent AF included the use of class 1A anti arrhythmic drugs (n= 27, P=0.05), Angiotensin Receptor Blockers (ARBs) (n= 42, P=0.036) and electrical cardioversions during the year before PMI (n= 31, P=0.009). None of these variables had a predictive value strong enough to be used in decision making on PMI. Time to death was shorter in pts who did not develop permanent AF (P value= 0.003).

Conclusions: Our data suggest that in the majority of pts with symptomatic PAF and SSS, judged to need rhythm control, PMI to enable AARx is justified, as the majority maintain sinus rhythm, time to development of permanent AF is long and is difficult to predict, and many of those developing permanent AF still use their PMs. Patients with permanent AF lived longer. The significance and mechanism of this observations remains to be studied.

Electronic Repositioning in CRT devices – Results of the ELECTION Trial On Behalf of the ELECTION Investigators

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Background:

Phrenic stimulation (PNS) and high pacing thresholds (PT) are important deterrants to maintenance of CRT. The Election study sought to investigate the effects of pacing configuration change (electronic repositioning (ER) on PNS and PT in CRT patients (pts) .

Methods:

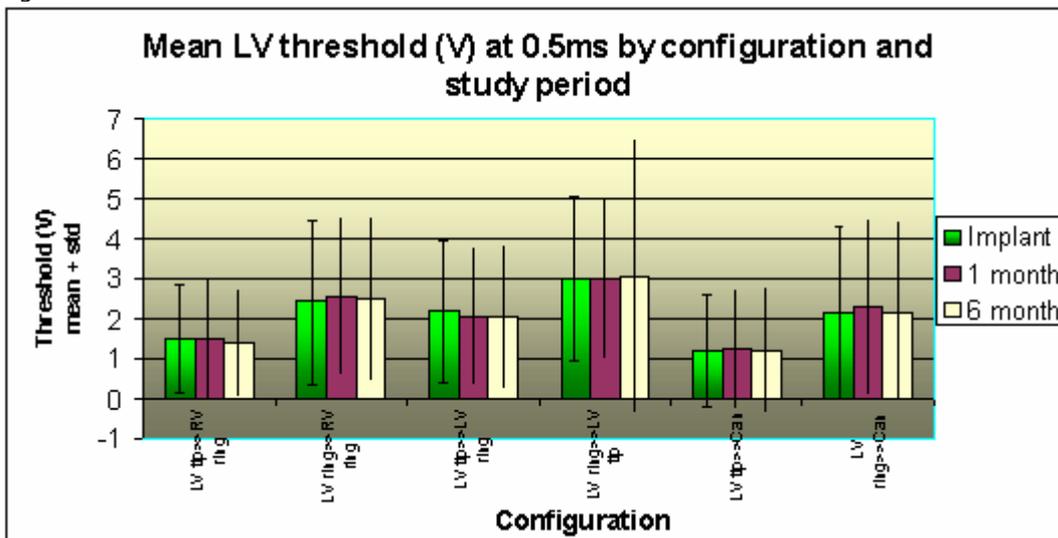
From 10/2004 to 10/ 2008, 228 pts(64 CRTP, 164 CRTD) pts were enrolled at 15 Centres in Canada, Israel, Denmark and Sweden,. A long term phrenic nerve stimulation sub-study was completed with 48 (of the 228) patients. Patients were followed at implant, 1 month (m) and 6m visits.

Results:

Pts age was 67.7 ± 10.5yrs, 76% males, NYHA class 3/4 in 82% and 3% respectively. EF was 24.6 ± 7.7%, with ischemic and idiopathic CMP in 57% and 43 of pts. Average PT are depicted in figure 1. With LV tip to LV ring as the nominal configuration (NOM) , 35.1%, 26.3% and 22.8% had a significantly lower (>1V) PT in another configuration at implant, 1m and 6m respectively. In 94.1%, 76.5% and 84.6% a problem of very high (>5V) PT at NOM could be resolved by ER, at implant, 1m and 6m respectively. For sub-study patients (n=48) PNS ranged from 2.1% to 18% at different configurations at different times. At 1 m, 3/5 (66%) of pts with PNS at NOM could be resolved by ER. At 6m one pt could be resolved with ER, the other had PNS in all configurations . During the period of FU (1m, 6m) there were 7 and 1 cases of ER. In 100% of the cases, ER was judged to have prevented repositioning replacement or abandonment of the LV Lead

Conclusions: ER is an important tool in management of CRT pts which may help to lower thresholds, avoid PNS and to prevent unnecessary reoperations or abandonment of the LV pacing.

Figure 1.



Aortopathy Is Prevalent in Relatives of Bicuspid Aortic Valve Patients

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Objective :

This study aimed to determine the prevalence of dilation and abnormal elastic properties of aortic root in first-degree relatives (FDRs) of bicuspid aortic valve (BAV) patients.

Background:

Evidence indicates that BAV is a genetic disorder. Although FDRs of affected individuals have increased prevalence of BAV, their risk of aortic root abnormalities is unknown. Methods We studied dimensions as well as the elastic properties of the ascending aorta in 48 FDRs with morphologically normal tricuspid aortic valves, 54 BAV patients, and 45 control subjects using 2-dimensional echocardiography.

Results:

The prevalence of aortic root dilation was 32% in FDRs and 53% in BAV patients, whereas all control subjects showed normal aortic dimensions ($p < 0.001$). The FDRs and BAVs had significantly lower aortic distensibility ($1.7 \pm 1.4 \times 10^{-3}$ mm Hg and $1.4 \pm 2.0 \times 10^{-3}$ mm Hg vs. $2.5 \pm 1.6 \times 10^{-3}$ mm Hg, $p < 0.001$) and greater aortic stiffness index (26.7 ± 25.8 and 55.92 ± 76.8 vs. 18.7 ± 40.1 , $p < 0.001$) compared with control subjects. This difference remained significant in subjects without aortic root dilation or hypertension ($p = 0.002$ and $p = 0.004$, respectively).

Conclusions:

The aortic root is functionally abnormal and dilation is common (32%) in first-degree relatives of patients with BAV. Screening of FDRs by transthoracic 2-dimensional echocardiography should be considered for detection of aortic valve malformation and dilated ascending aorta.

Regression of Pulmonary Hypertension Following Mitral Valve Surgery in Patients with Severe Mitral Regurgitation.

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Introduction – Chronic mitral regurgitation is often complicated by secondary pulmonary hypertension. The aim of this study was to assess the changes in pulmonary pressure following MVR. In addition, we examined clinical and echocardiographic predictors that might influence changes in pulmonary pressures.

Methods – A retrospective case control study design was employed. All consecutive patients undergoing mitral valve surgery during the period 2005-2009 were considered. Patients with significant aortic or mitral valve stenosis, previous mitral valve surgery, endocarditis, myxoma, hypertrophic cardiomyopathy, or acute mitral regurgitation were excluded. The pre-operative echocardiogram had to demonstrate pulmonary hypertension – an estimated pulmonary artery pressure above 30 mmHg. A significant reduction in pulmonary arterial pressure was considered if pulmonary pressure post surgery dropped greater than 7 mmHg.

Results- A total of 276 patients underwent mitral valve surgery. 160 patients were excluded due to the co-existing conditions mentioned earlier. Of the remaining 116 patients, 84 had a retrievable pre-operative echocardiogram. Pulmonary hypertension was noted in 61 patients (72.6%). Only 27 patients had an available echocardiogram post surgery. Post operative death occurred in 7 patients with documented pulmonary hypertension (mortality = 11.5%). The mean pre-operative TR gradient of 42 ± 11.1 mmHg decreased to a post-operative value of 36.9 ± 11.7 mmHg ($P < 0.05$). No association was noted between the reduction in pulmonary hypertension and factors such as age, congestive heart failure, MR etiology, LV function and mortality. However, the baseline TR gradient was positively associated with the extent of decrease in TR gradient, especially in patients with ischemic MR.

Conclusion- Secondary pulmonary hypertension is a common finding among patients with severe MR. This condition may regress following mitral valve surgery, especially in patients with ischemic MR.

Clinical Profile and Outcomes of Patients with Severe Aortic Stenosis at High Surgical Risk: Evaluation According to Treatment Assignment.

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Rabin Medical Center, Petach-Tikva, Israel

Background: Many patients with severe symptomatic aortic-valve stenosis (AS) are considered high surgical risk and therefore are either treated conservatively or undergo balloon valvuloplasty (BV). Some of them may benefit from transcatheter aortic-valve implantation (TAVI). The aim of the study was to evaluate the clinical profile and outcome of high-risk patients with severe AS according to type of treatment assigned.

Methods: A prospective observational design was used. Potential candidates for TAVI attending a tertiary medical center from July 2008 to October 2009 were evaluated by clinical and laboratory parameters and assigned for treatment accordingly. Test results and patient outcomes were compared.

Results: The study group consisted of 102 patients, 42.4% male, of mean age 82.2 ± 8 years. NYHA class III/IV was documented in 96%. Mean valve area measured 0.63 ± 0.19 cm², and maximum/mean gradients, $61.2 \pm 35.4/38 \pm 22.6$ mmHg. Mean Logistic EuroSCORE (LES) was $26\% \pm 16\%$, and mean Society of Thoracic Surgery (STS) risk score, $8.7\% \pm 4.5\%$. Rates of significant co-morbidities were high: ischemic heart disease 72%, previous sternotomy 30.8%, renal failure 49.4%, COPD 24.4%. Eleven patients were treated surgically with aortic valve replacement (AVR; LES, $21.4\% \pm 16.2\%$; STS, $8.1\% \pm 3.7\%$). Seventeen patients underwent BV (LES, $30.2\% \pm 21.6\%$; STS, $10 \pm 6.6\%$). Eleven patients underwent transfemoral TAVI (4 Edwards-Sapien valve, 7 CoreValve) (LES, $17.9\% \pm 6.8\%$; STS, $8.1\% \pm 3.2\%$). Average follow-up was 172 days (7-505 days). The respective 30- and 180-day all-cause mortality rates were as follows: conservative treatment, 4% and 13.8%; AVR, 8.2% and 44%; BV, 9.1% and 26.7; TAVI, 0% for both.

Conclusions: Our preliminary experience shows that many patients with severe symptomatic AS are ineligible for TAVI. According to our small series high risk patients have an excellent outcome after TAVI. Whereas those excluded from TAVI have a worse outcome regardless of the alternative treatment selected.

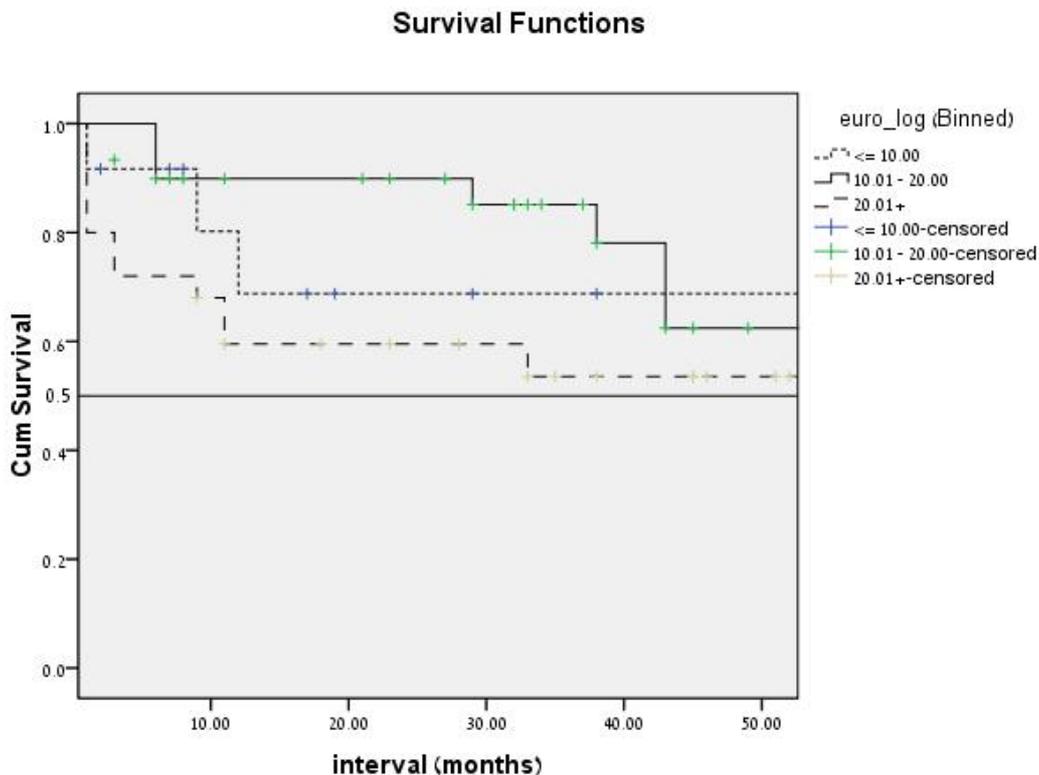
Aortic Valve Replacement in Octogenarians in the Era of Percutaneous Aortic Valve Intervention: Utility of Risk Stratification With EuroSCORE

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Background: With the advent of percutaneous valve implantation, an increasing amount of interest is being expressed in outcomes of conventional aortic valve replacement (AVR) in elderly patients. We evaluated characteristics and outcomes of elderly patients undergoing isolated AVR with a particular focus on the European System for Cardiac Operative Risk Evaluation (EuroSCORE) risk stratification.

Methods: All patients aged 80 years or older ($n = 73$) undergoing isolated AVR between October 2003 and September 2009 were reviewed according to logistic EuroSCORE risk stratification. Surgical risk was defined as low risk (score 10% [$n = 16$]), moderate risk ($10\% < \text{score} < 20\%$ [$n = 30$]), and high risk (score 20% [$n = 27$]). Patients age was 82 ± 1.1 years (low risk), 83.8 ± 2.1 years (moderate risk), and 83.4 ± 1.9 years (high risk), respectively ($p = 0.04$). Mean EuroSCORE predicted risk of mortality was $8.4\% \pm 1.2\%$ (low risk), $14.3\% \pm 2.8\%$ (moderate risk), and $38\% \pm 3.5\%$ (high risk; $p < 0.001$).

Results: In-hospital mortality was 0 (low risk), 3.3% (moderate risk), and 18.5% (high risk; $p = 0.045$). One-year survival was 78%, 90%, and 59%; 5-year survival was 70%, 63%, and 53% ($p = 0.23$), for low-, moderate-, and high-risk patients, respectively (figure). Independent predictor for in-hospital mortality was preoperative renal dysfunction. Cox regression predictors of medium-term survival were urgent indication for surgery, and preoperative renal dysfunction. **Conclusions:** In the modern era, octogenarians with low and moderate risk have excellent short- and long-term results after open AVR. High risk patients carry high early mortality. However, survivors, even in this high risk group, have life expectancy approaching that of age matched general population. Comparisons of less invasive techniques for AVR should rely on outcomes based in the modern era and decisions regarding surgical intervention in patients requiring AVR should not be based on age alone.



Bioprosthetic Mitral Valve Thrombosis: Transesophageal Echocardiographic Features and Treatment

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Introduction: Mitral bioprosthetic valve thrombosis is occasionally found on pathologic examination, but preoperative diagnosis is rarely suspected.

Methods and results: Between 2001-2008, 103 pts underwent mitral valve (MV) replacement with a bioprosthesis. All had post-operative trans-thoracic echocardiograms (TTE).

Transesophageal echocardiography (TEE) was performed in 28 (27%) of them, with clinical or echocardiographic criteria of prosthetic valve malfunction at 11±3 months post surgery. In 6 we detected homogenous and echodense masses, attached to the ventricular surface of the mitral bioprosthetic cusps, compatible with valve degeneration or pannus formation. 4 of the 6 pts underwent repeat surgery to replace their valve. In only 1 of these pts a pannus was found while in 3, pathological examination revealed that the artificial valve was covered with a thrombotic layer. In the other 2 pts with similar TEE findings, a trial of intravenous heparin followed by oral warfarin was initiated. On repeat TTE following 1 week of heparin treatment, the gradient across the MV diminished significantly and the clinical condition improved. Repeat TEE performed 78±16 days after warfarin treatment demonstrated complete disappearance of the echogenic masses and normal leaflet mobility. MV prosthetic mean gradient decreased from 21±4mmHg to 6.1±2.1mmHg, TI gradient decreased from 62.5mmHg to 41.5mmHg and MV area increased from 1.13±0.3 to 1.72±0.6cm. Clinical follow-up at 22±5 months showed symptomatic improvement.

Conclusions: MV bioprosthetic thrombosis is an underdiagnosed entity. In our study it occurred in 18% of cases with suspected valve malfunction. Echocardiography cannot always differentiate between the various causes of valve malfunction. Anticoagulation is effective in resolving bioprostheses thrombosis, and should be the first line of treatment before considering surgery.

Loss and Regain of Compensatory Mechanics in Severe Aortic Stenosis Patients with Left Ventricular Systolic Dysfunction and Aortic Valve Replacement

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Background: We have recently shown that left ventricular (LV) longitudinal (LONG) function is reduced and circumferential (CIRC) function is elevated in patients with severe aortic stenosis (AS) and preserved LV ejection fraction (LVEF), compared to normal subjects, and that aortic valve replacement (AVR) normalized LV mechanics. The objective of our current study was to characterize cardiac mechanics (LV deformation, strain) before and early after AVR in patients with severe AS and variable degrees of LV systolic dysfunction.

Methods: Paired echocardiographic studies before and early [7±3 days] after AVR were analyzed in 64 patients with severe AS, 32 with normal LVEF (≥50%), 16 with mild-to-moderate LV dysfunction (LVEF 36-50%), and 16 with severe LV dysfunction (LVEF<36%). LONG myocardial function was assessed from 3 apical views (average of 18 segments) and CIRC function was assessed at mid and apical levels (averaging 6 segments per view). LV strain and apical rotation were measured using the 2-dimensional Velocity Vector Imaging software (Siemens, CA).

Results: Baseline LV mechanics differed according to LVEF. LONG strain and mid and apical CIRC strain correlated with EF ($R^2=0.61$, 0.77 , and 0.67 , respectively, $p<0.001$). Apical rotation was higher in patients with LV dysfunction, mainly in patients with moderate LV dysfunction.

Following AVR LVEF increased and mechanical abnormalities partially reversed (Table). The percent change from baseline after AVR was progressively higher in patients with lower LVEF.

Conclusions: The compensatory mechanisms to AS observed in patients with preserved LVEF (decreased LONG function with a compensatory increase in CIRC function) are lost in patients with reduced LVEF, in whom both LONG and CIRC functions are reduced. AVR partially reverses these changes in patients with baseline LV dysfunction

	LVEF≥50%			36≥LVEF<50			LVEF<36		
	Pre AVR	Post AVR	Change (%)	Pre AVR	Post AVR	Change (%)	Pre AVR	Post AVR	Change (%)
Peak aortic valve gradient (mmHg)	96±28	39±14		94±36	29±9		75±28	31±11	
AVA (cm ²)	0.8±0.2	1.6±0.3		0.7±0.2	1.7±0.3		0.8±0.2	1.7±0.4	
LV EF (%)	67±6	65±4		43±4	56±8		28±8	41±9	
Strain (%)									
LONG	-13±2	-16±3	+23±15	-11±3	-13±2	+18±30	-7±2	-9±2	+22±40
CIRC - Mid	-27±5	-22±5	-21±17	-14±4	-18±5	+30±33	-10±3	-14±4	+50±75
CIRC - apex	-33±7	-31±7	-3±3	-22±9	-27±7	+45±64	-10±4	-19±5	+160±180
Apical Rotation (÷)	3.2±2.0	4.5±1.9		8.5±3.9	6.6±2.7		6.4±2.9	4.8±2.9	

Change(%) = absolute change (post vs. pre- AVR) in percentages.

All pre -AVR differences between groups significant ($p<0.05$), except AV gradient and valve area.

All pre vs. post -AVR paired differences are significant ($p<0.05$), except EF and apical strain for the normal EF group.

Pitfalls in Assessment of Tricuspid Valve Gradients in Patients After Mitral Valve Replacement and Tricuspid Valve Annuloplasty

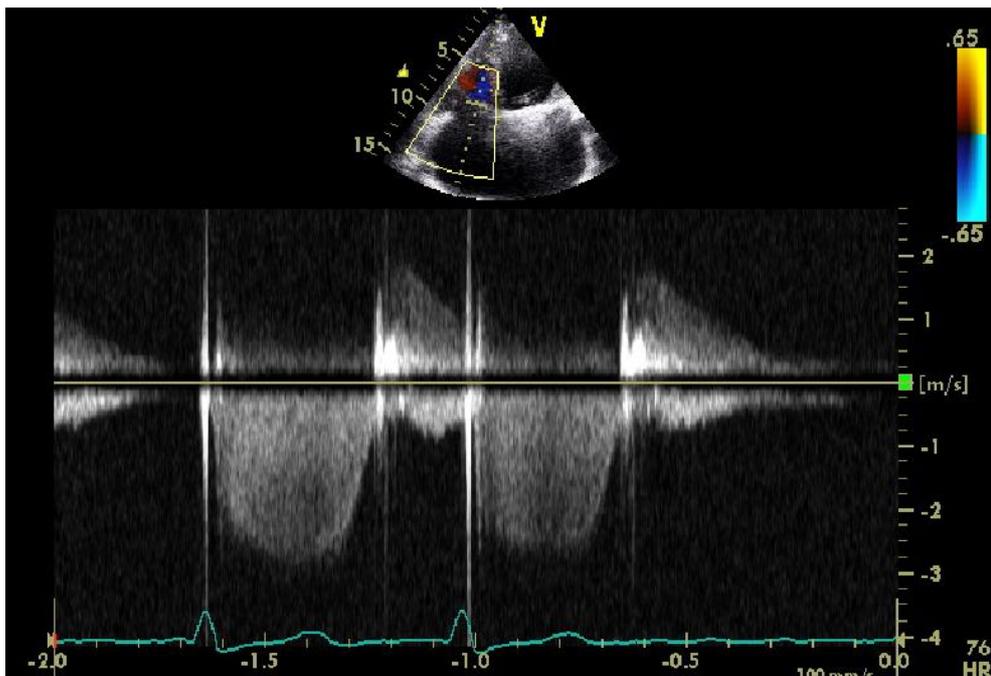
Orlov, G; Merkin, M; Kobal, S; Wolak, A; Liel-Cohen, N
Soroka University Medical Center, Beer Sheva, Israel

Tricuspid valve (TV) evaluation from multiple views is part of echocardiography after TV repair. In patients with concomitant mitral valve replacement (MVR) the signal from the LV inflow over the valve is intense. We have noticed superimposition of 2 signals in continuous wave Doppler (CWD) with the cursor oriented over the TV in 4 chambers (4CH) view (figure).

We hypothesized that the higher signal is reflected from the mitral prosthesis, and will be similar to mitral velocity and is not indicative of the true flow over the TV which is lower as measured from other views.

Methods: Echocardiographic images of patients after MVR and TV repair from 1/2007 to 10/2009 were evaluated. CWD measurements over the TV were repeated [parasternal long right ventricular (RV) (PLRV) inflow, short axis (SHA), 4CH, RV apical inflow (RVA)]. CWD over the mitral inflow in 4CH view was traced. 6 patients with clear overlap of traces over the TV in 4CH were used to exemplify the phenomenon. 19 patients with TV peak velocities (PVs) >1 meter per second (m/s) from any view, with no obvious overlap were included. 42 patients with TV PV <1m/s from all views were excluded. ANOVA was used to calculate differences between groups and Pearson's method to determine the degree of correlation. **Results:** There was a correlation between the PVs, peak and mean gradients over the mitral and TV in 4CH view ($r=0.5$ for all comparisons, $p<0.05$) and between the TV PLRV and SHA ($r=0.9$ for all comparisons, $p<0.01$). **Conclusion:** TV flow by CWD in 4CH view may falsely detect higher velocity because of the intense signal from the flow over the prosthetic mitral valve. Therefore cautious is imperative in order to avoid false measurement of increased gradients over the TV. It is essential to evaluate and compare the TV measurement from multiple views.

CWD values (mean+SD)	MV	TV	TV	TV	TV
Group 3 (n=19)	4CH	4CH	PLRV	SHA	RVA
Peak velocity	1.91+0.33	1.64+0.20	1.14+0.31	1.13+0.33	1.29+0.39
Peak gradient	15.1+5.2	10.8+2.6	5.6+3.5	5.5+3.4	7.3+4.7
Mean gradient	5.0+1.7	3.8+0.7	1.9+1.5	1.9+1.2	2.3+1.3
P<0.01 for all comparisons					



1550800

Coaptation Length and Clinical Outcome in Degenerative Mitral Valve Repair

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Objectives:

Coaptation between valve leaflets is one of the key points of MV repair, and the importance of coaptation length has also been recognized in regulating MR. Although no reports to date have described the optimal length of coaptation in degenerative MV repair, it has been shown that coaptation length may affect repair durability in patients with ischemic MR.

Methods:

Between 2004, 467 patients underwent MV repair. Valve pathology was degenerative in 291 patients (62%), which were included in the study. Valve repair techniques included leaflet resection (59%), artificial chordal (44%), and edge-to-edge repair (3%), annuloplasty (98%). All late follow-up examinations that were performed in our institution echo-lab were re-reviewed by a single examiner blinded to the surgical technique. Measurements included: anterior posterior diameter, coaptation length and annulus to coaptation point.

Results:

There were 2 hospital deaths (1%). Mean follow up was 24.5 ± 16 months. Freedoms from reoperation and from moderate or severe mitral regurgitation were 97% and 95%, respectively. In the 87 examinations that were re-reviewed, mean coaptation length was 7.9 ± 2.4 mm (range 1-14). Patients with closed semi rigid annuloplasty had significant longer line of leaflet coaptation (9.1 ± 2.7 mm) as compared with open band annuloplasty (7.1 ± 1.9 mm), $p < 0.01$. Patients with closed semi rigid annuloplasty has tendency for less residual significant MR. Correlation model, found the following predictors for increased coaptation line: use of closed annuloplasty ($p < 0.01$), use of artificial chorda ($p = 0.03$) and repair without resection of the posterior leaflet ($p = 0.09$).

Conclusions:

Patients with closed semi-rigid annuloplasty rings and repair with artificial chorda, demonstrated a significantly longer line of leaflet coaptation and a tendency towards better echocardiographic mid-term results than patients with open bands, and may therefore benefit from improved repair durability.

Heart Failure, Peripheral Arterial Disease (PAD), and Weight - Is There a Mechanistic Association?

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Background - Recent studies demonstrated the "weight paradox" in heart failure. In order to understand it we studied the association between PAD, basal metabolic index (BMI) and some physical basic characteristics. Methods - 86 heart failure patients were enrolled (46 women and 40 men). PAD, ABI, age, gender, ejection fraction, smoking habits and abdominal circumference (AC).

Results - Pearson test showed that there is an association between ABI and BMI ($Z=0.278$, $p=0.01$), between AC and ABI ($Z=0.301$, $p=0.005$), with no relation to age, ejection fraction, NYHA class, or smoking. Patients with PAD ($ABI < 0.9$) had a negative association between ABI and BMI ($Z=-0.277$, $p=0.011$), while heart failure patients with normal ABI ($ABI > 0.9$) had a positive association with BMI ($Z=0.321$, $p=0.003$).

Conclusions - Heart failure patients who have high BMI have less PAD and have a better prognosis. However, heart failure patients with PAD, the higher the BMI the worse the PAD (and a worse prognosis related to peripheral arterial disease outcome). We may partially explain the "weight paradox" in heart failure patients.

Reverse Remodeling In DCM: Preliminary Report*Arad, M¹; Nussbaum, T²; Feinberg, M²; Shechter, M¹; Freimark, D¹**¹Heart Institute, Tel Hashomer, Israel; ²Sheba Hospital, Tel Hashomer, Israel*

Contemporary heart failure therapies improve the prognosis and may even recover the left ventricular (LV) function in some patients. We examined the prevalence, the clinical features and therapies associated with reverse LV remodeling (RR) in a large cohort with nonischemic dilated cardiomyopathy (DCM). Detailed clinical data and echo-doppler follow-up (at least 6 months apart, mean 32±24) were available in 187 patients comprising 80% of our DCM registry. RR was defined as an increase in the LV ejection fraction (EF) by at least 10% units and a decrease in the LV end diastolic dimension (EDD) by at least 10%. RR occurred in 26% of the patients. RR was accompanied by a significant reduction in the LV end systolic dimension (49±9 to 34±8 mm, $p<0.001$), improvement in the diastolic function, mitral and tricuspid regurgitation, and normalization of pulmonary artery pressure (39±10 to 30±6, $p<0.001$). Among the others, 27% improved their EF but not their LV dimensions. NYHA functional class improved in RR group (2.5±0.8 to 1.7±0.8, $p<0.001$) but did not change in 'noRR'. RR was uncommon in patients with familial DCM ($p<0.01$) and in those with an intra-ventricular conduction defect on ECG ($p<0.05$). It was more prevalent with prior exposure to chemotherapy ($p=0.06$) and in patients who presented with congestive failure symptoms like dyspnea or edema ($p<0.05$). Evidence based drug therapies and cardiac resynchronization (15% in RR vs. 9% in 'noRR', $p=0.24$) were not associated with RR in this cohort. Over a mean follow up of 23 months, 20 patients from the 'noRR' group died or underwent heart transplantation as compared to none from the RR group ($p<0.01$). We conclude that a considerable proportion of DCM patients are expected to improve with contemporary therapies. Close observation is recommended prior to committing to surgical or device implant interventions. Further study is needed to identify the patients expected to undergo RR and to define their long-term prognosis.

Functional Assessment Tests and Mortality in Heart Failure: Which One is The Best Predictor?

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Background: Functional assessment is a key in the evaluation of heart failure (HF) patients, caring important prognostic implications.

Objectives: In the current study we compared between several methods of patients' functional classification (FC), in order to define which of these has the best risk-stratification ability for mortality.

Methods: We evaluated 500 consecutive patients examined in their first visit at the HF clinic, grading them via several FC: (1) NYHA Class (I-IV); (2) Six-Minute Walk Test (meters); (3) number of hospital admissions/E.R visits in the preceding year. We analyzed the relative importance of each of the three parameters as a predictor for mortality in a mean follow-up period of 2 years.

Results: Mean NYHA grade was 2.8 ± 0.9 , 34% of patients had NYHA III, and 24% NYHA IV. NYHA grade was significantly worse in patients who died during the follow-up period ($p < 0.001$). Six-minute walk distance was significantly reduced in patients who died during follow-up (142 ± 114 vs. 223 ± 149 meters; $p < 0.001$). Number of prior hospital admissions/E.R visits was also significantly higher in patients who died during follow up (2.8 ± 2.7 vs. 1.7 ± 2 ; $p < 0.001$). However, in a multivariate analysis, the six-minute walk distance of less than 300 meters was the most significant FC test in predicting mortality ($p < 0.0001$, H.R 3.65, 95% C.I 1.89-7.08), Figure-1:

Conclusions: Several methods of FC are useful in predicting mortality in HF patients at their first visit in the HF clinic. However, the Six-minute walk test has the strongest association with mortality, even when comparing with the traditional NYHA class or a history of recent recurrent hospital admissions. Accordingly, we suggest, that clinics specialized in HF should poses the ability to perform the Six-minute walk test at their facility and execute it as part of the routine initial evaluation in their patients.

The Impact of a Nurse-supervised Heart Failure Clinic Program on Compliance and Functional Capacity of Patients with Chronic Heart Failure

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Background: Patients with heart failure (HF) suffer from significant disability due to limited functional capacity. Heart failure centers (HFC) in which management is supervised by dedicated specialized nurses has been proposed to improve compliance and functional capacity.

Objectives: To evaluate the change in compliance and functional capacity in patients with HF treated at the Heart Failure Center of Clalit Health Services in Jerusalem and Hadassah University Hospital.

Methods: HF patients followed at the HFC with at least 3 visits in the clinic filled out a detailed clinical assessment form.

Results: A total of 78 patients followed at the HFC during a mean period of 380±227 days were included in this study. Mean age was 73±11 and 53% were males. Treatment at the HFC resulted in a significant increase in all measures of compliance. The most remarkable increase was in adherence to a low-salt diet. 79% of the patient increased their adherence directly due to supervision in the HFC. Only 4% of the patients did not keep any low-salt diet after supervision as opposed to 40% before supervision (P<0.001). Adherence to an appropriate diet as recommended also increased significantly from 66% to 88% (P<0.05). There was a remarkable improvement in functional capacity during follow-up. The New York Heart Association (NYHA) class improved from a mean of 3.1±0.1 to 2.6±0.1 after treatment (P<0.0001). 60% of the patients reported that their functional capacity had increased due to supervision in the HFC. 60% of the patients reported that their well being and mood had improved as a result of the treatment in the HFC. 89% reported that supervision in the HFC had increased their sense of security and had improved their health.

Conclusions: Supervision by dedicated specialized nurses in a HFC increased compliance and improved functional capacity and well-being in patients with HF. This program seems to definitely improve perceived quality of life of patients with debilitating HF.

Impact of Diastolic Dysfunction on the Development of Heart Failure in Diabetic Patients after Acute Myocardial Infarction

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Background: Diabetes is often associated with an abnormal diastolic function. However, there is no data regarding the contribution of diastolic dysfunction to the development of heart failure (HF) in diabetic patients after acute myocardial infarction (AMI).

Methods and Results: 1513 patients with AMI (417 diabetic) underwent echocardiographic examination during the index hospitalization. Severe diastolic dysfunction was defined as a restrictive filling pattern (RFP) based on E/A ratio >1.5 or deceleration time <130 msec. The primary endpoints of the study were readmission for HF and all-cause mortality.

The frequency of RFP was higher in patients with diabetes (20 vs. 14%; P=0.005). During a median follow up of 17 months (range, 8 to 39 months), 52 (12.5%) and 62 (5.7%) HF events occurred in patients with and without diabetes, respectively (P<0.001). There was a significant interaction between diabetes and RFP (P=0.04), such that HF events among diabetic patients occurred mainly in those with RFP (Figure). The adjusted hazard ratio for HF was 2.77 [95% CI 1.41-5.46] in diabetic patients with RFP and 1.21 [95% CI 0.75-1.55] in diabetic patients without RFP. A borderline interaction (P=0.059) was present with regard to mortality (adjusted hazard ratio 3.39 [95% CI 1.57-7.34] vs. 1.61 [95% CI 1.04-2.51] in diabetic patients with and without RFP, respectively).

Conclusion: Severe diastolic dysfunction is more common among diabetic patients after AMI and portends adverse outcome. HF and mortality in diabetic patients occur predominantly in those with concomitant RFP.

The Prognostic Significance of Right Ventricular Function in Chronic Heart Failure

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Background: Patients with heart failure have a poor prognosis. While prognosis is usually presumed to be related to left ventricular function (LVF), right ventricular function (RVF) may also have a significant impact on prognosis.

Objectives: To evaluate the predictive value of RVF on clinical outcome in patients with chronic heart failure.

Methods: We prospectively evaluated 298 patients hospitalized with a definite clinical diagnosis of heart failure based on typical symptoms and signs. Qualitative echocardiographic data of RVF was analyzed. Patients were followed for a mean of 6.5 years for clinical outcome.

Results: Echocardiography showed that 111 of the patients (37%) had some reduction in RVF. A third (32) of these patients had severely reduced RVF. Age, gender, ischemic heart disease and risk factors in patients with reduced RVF were not significantly different from patients with normal RVF. However, a higher proportion of patients with reduced RVF had reduced LVF (75% vs 58%, $P < 0.01$) as well as more patients had mitral regurgitation (MR), (Severe MR: 22% versus 11%, $P < 0.05$). Pulmonary hypertension was also higher on average in these patients estimated by tricuspid inflow pressure gradient (45 vs 37 mmHg, $P < 0.01$). The long term survival rate in patients with reduced RVF by Kaplan-Meier survival curve was lower than in patients with preserved RVF (16% vs. 28%, respectively $P < 0.05$). RV size was also a predictor of reduced survival (16% vs. 26%, respectively $P < 0.05$). Severely reduced RVF was a significant independent predictor of mortality by Cox regression analysis (HR 1.87, 95% CI 1.22-2.89, $P = 0.004$) after adjustment for clinical characteristics, risk factors, as well as LVF, MR and pulmonary hypertension (Figure). Pulmonary hypertension was not an independent predictor of survival.

Conclusions: Poor RVF has significant prognostic impact in patients with chronic heart failure. This impact was independent of LVF, MR and pulmonary hypertension.

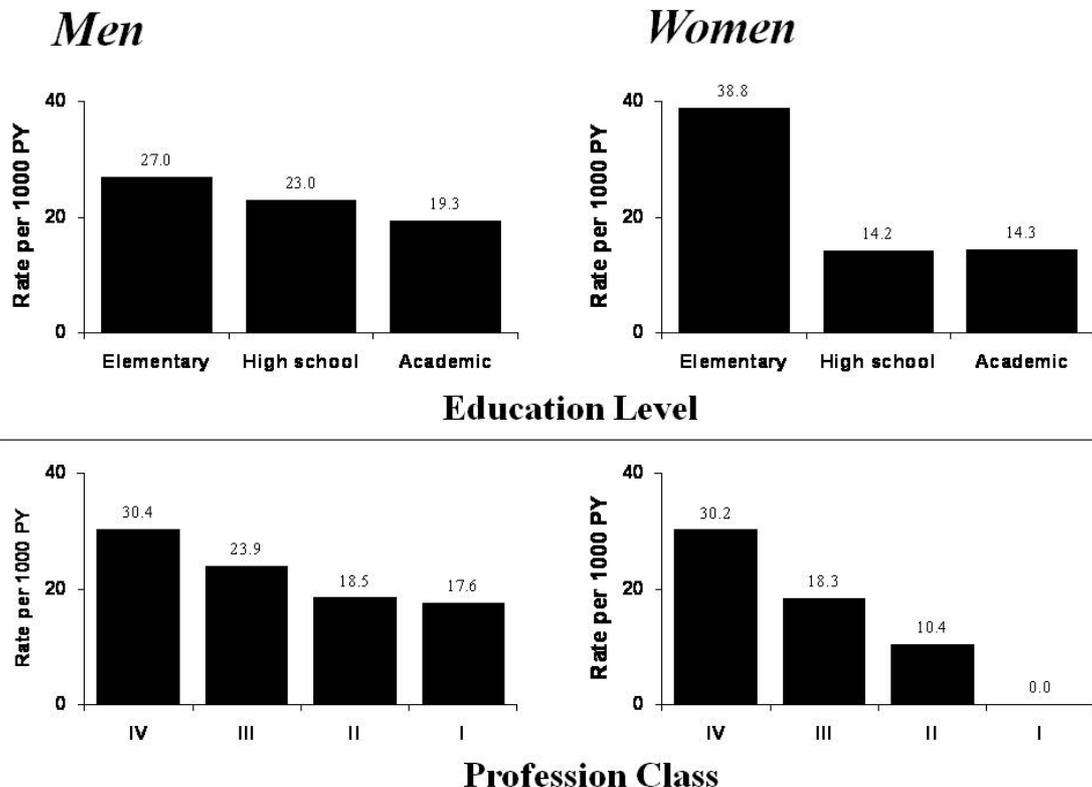
Education and Profession are Associated with Incidence of Congestive Heart Failure among Men and Women with Coronary Heart Disease

Benderly, M¹; Haim, M²; Boyko, V³; Goldbourt, U⁴

¹Israel Society for the Prevention of Heart Attacks, Sackler Faculty of Medicine, Tel Aviv University, Israel; ²Rabin Medical Center, Petach Tikva, Israel; ³Gertner Institute for Epidemiology and Health Research Policy, Ramat-Gan, Israel; ⁴Sackler Faculty of Medicine, Tel Aviv University, Tel-Aviv, Israel

Background: Congestive heart failure (CHF) is associated with poor outcome among patients (pts) with coronary heart disease (CHD). Little is known about the association of socioeconomic status (SES) and CHF among CHD pts. Education and profession are good indicators of SES.

Methods & results: 2922 pts included in the BIP study without CHF at baseline (2672 men 250 women) were followed for a median of 8 year; Profession was classified by decreasing level of education or skill required as: I. Free profession, management, teaching; II. Desk-job, trade, or Technical, services, industry job with more than elementary education; III. Blue-collar profession; IV. Housewives & pensioners. During the study 459 (17%) men and 50 (20%) women developed CHF. Pts who had CHF were slightly older (61.6 vs. 60.7) compared to counterparts who did not ($p < 0.0001$). after age adjustment, pts who developed CHF were more likely to have past MI (85 vs. 75%), PVD, diabetes (9 vs. 13%), hypertension, higher pulse pressure, functional limitation, or obesity (22 vs. 12%) at baseline. Additionally, CHF occurred more frequently among pts who had MI during follow-up. CHF rate/1000 PY gradually decreased with education level and profession class (Figure). Adjusted for: obesity, number of MIs, history of diabetes, hypertension, peripheral vascular disease, NYHA class, treatment with lipid lowering drug, and baseline pulse pressure, CHF hazard compared to elementary education among men was 0.95 (95% CI:0.77-1.16) for high school education, and 0.83 (0.62-1.09) for academic education. The corresponding hazards for women were 0.31 (0.15-0.66) and 0.37 (0.08-1.66). Similarly, compared to housewives and pensioners, highest classes 1 & 2 were associated with 33% decreased CHF risk (0.53-0.86) among men and a similar 69% decrease among women (NS). **Conclusion:** Academic education and higher profession class are associated with decreased risk of CHF onset among male and female CHD pts.



Inflammation and Heart Failure Incidence in Patients with Stable Coronary Heart Disease. Data from the Bezafibrate Infarction Prevention (BIP) study

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¹Rabin Medical Center, Petah-Tikva, Israel; ²Neufeld Cardiac Research Institute, Tel Hashomer, Israel

Background: Heart failure incidence is increasing and carries a poor prognosis in patients (pts.) with coronary heart disease (CHD) despite advances in medical and non-medical therapy. Inflammation predicts recurrent cardiovascular events in pts with CHD. It is currently not known whether increased levels of inflammatory markers can predict congestive heart failure (CHF) incidence in these pts.

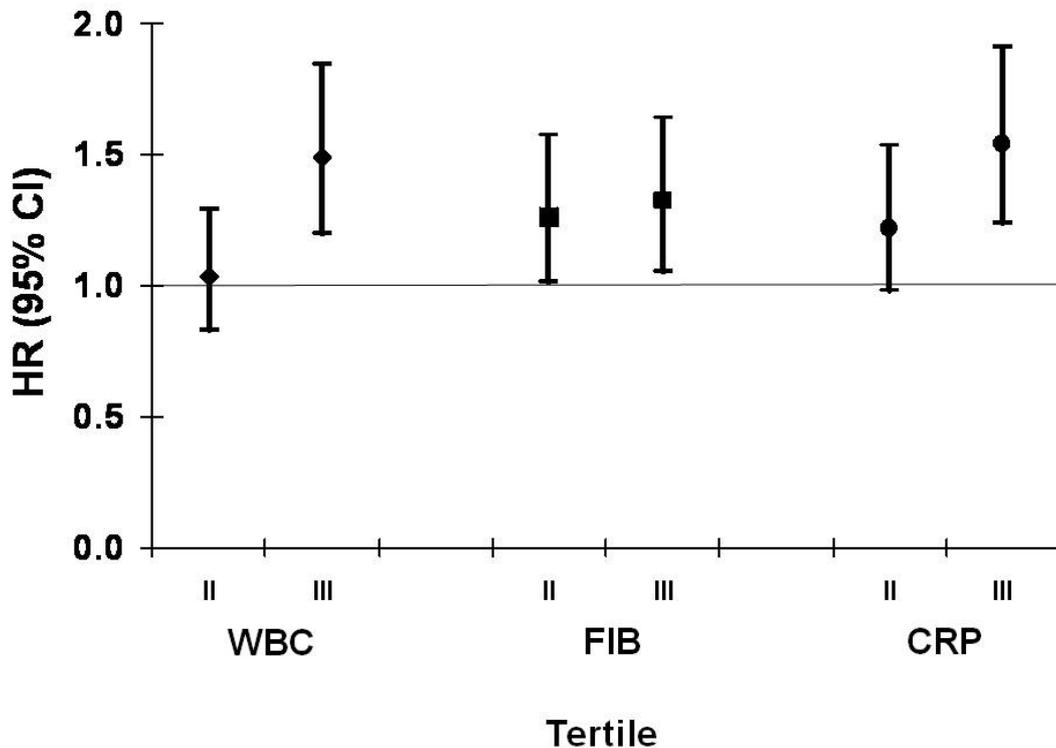
Aim: To evaluate levels of inflammatory markers and incidence of CHF.

Methods and Results: Analysis comprises 2922 pts. with stable CHD and no CHF at baseline. White blood cells (WBC) count, C reactive protein (CRP) and fibrinogen were measured at baseline.

Five hundred and nine pts. (17.4%) developed CHF during 8-year of follow-up. Pts. who developed CHF during follow-up were older, had more often previous myocardial infarction, diabetes, hypertension, and peripheral vascular disease. In addition, baseline levels of CRP, fibrinogen and WBC were significantly higher in pts that developed CHF compared to those without CHF. Age adjusted rates and risk of incident CHF were related to levels of inflammatory markers. After adjustment for multiple confounding variables: increased levels of CRP, fibrinogen and WBC were significantly and independently related to the incidence of CHF (Figure).

In pts with MI during the study follow-up period, only CRP was predictive of future CHF. However in pts without MI during follow-up, all three markers of inflammation were independently associated with incident CHF during follow-up. **Conclusions:** Increased levels of CRP, fibrinogen and WBC are independently related to the incidence of CHF in pts with stable CHD. The independent association in pts without MI during follow-up may suggest a mechanism independent of infarction by which inflammation is related to CHF.

Figure: Multivariate adjusted Hazards Ratio of CHF in Tertiles of Inflammatory markers (reference=tertile I)



Myocardial Bridging Does Not Increase Cardiac Risk in Patients With Chest Pain But no Obstructive Coronary Disease: A 64 Slice Coronary CTA Study

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Background: Isolated reports have associated coronary myocardial bridging (MB) with adverse cardiac events. However, the clinical significance of MB in unselected pts with chest pain remains unclear. We explored the relation between the presence of MB and subsequent adverse cardiac events in symptomatic pts referred for coronary CT angiography (CCTA).

Methods: 350 pts with chest pain but no known coronary artery disease (CAD) underwent CCTA (Brilliance 64, Philips). 16 pts with obstructive CAD on CCTA (>50% narrowing) were excluded from analysis. Pts were followed for cardiovascular (CV) death or myocardial infarction (MI) over 4.2±0.4 years. Outcomes were compared between pts with MB (intra-myocardial segment of a major epicardial coronary artery) vs pts with non-obstructive/no atheroma and no MB using Cox models.

Results: 334 pts were studied (age: 57±13 years, 43% female). 117/334 (35%) had MB on CCTA. CV death or MI occurred in 11 patients (incidence of 0.8%/year), in 5/117 (4%) pts with MB, and in 6/217 (2.8%) pts without MB (p=NS). Univariate predictors of CV death or MI were: non-obstructive coronary atheroma (HR=4.2, p=0.02), diabetes mellitus (HR=5.9, p=0.007), and hypertension (HR=18, p=0.0001). MB was not associated with increased risk of events. The association of non-obstructive coronary atheroma and of hypertension with adverse CV events remained statistically significant after controlling for other variables.

Conclusions: 1. MB is common among pts with chest pain, but without obstructive CAD undergoing CCTA. 2. MB was not associated with increased risk for CV death or MI during 4 years of follow-up. 3. Non-obstructive coronary atheroma and hypertension were independent predictors of adverse outcomes.

Tri-dimensional Fusion Image Helps Refining the Coronary Diseases Diagnoses

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Introduction: The purpose of this study was to obtain in a non-invasive manner a tri-dimensional (3D) fusion image of the myocardial perfusion by integrating a single-photon emission computed tomography (SPECT) with a multidetector 64-slice-computed tomography coronary angiography (64-CTCA).

Methodology: A 3D fusion image was performed in 45 patients with myocardial perfusion defect. As a first step, the myocardial perfusion defect was detected through Thallium 201 SPECT stress-rest, via images made by Infinia Hawkeye 4g and computed by a Xeleris workstation (GE Healthcare Technologies, Milwaukee, Wis). As a second step, a 64-CTCA (Light Speed VCT, GE) was performed on the same patients (Advantage Workstation, GE Healthcare Technologies). As a third step, 3D fusion images (Advantage Workstation, GE Healthcare Technologies) were obtained by integrating SPECT and 64-CTCA. The results of these images were compared to coronary angiographic segments which: were undamaged, had a stenosis (> 50%), had atherosclerotic plaque or had a stent.

Results: 540 coronary angiographic segments were examined in 45 patients; 494 were evaluated while 46 segments were excluded from further analysis caused by a lack of visibility and/or poor quality images.

	Sensibility	Specificity	PPV	NPV
64 CTA *	87%	76%	60%	94%
3D Fusion *	93%.. +++	98% +++++	91%	98%
*: average segments	PPV: Positive Prevalence Value	NPV: Negative Prevalence Value	+++ = P < 0.009	++++ = P < 0.0001

Conclusion: When using 3D SPECT/64-CTCA fusion images, an improvement of the sensibility, specificity, PPV and NPV were observed. We believe that this methodology offers an incremental diagnostic and represents a new an important step that combines images and myocardial perfusion in coronary artery diseases. The use of this method could potentially allow the carrying out of an earlier and more efficient treatment.

The Diagnostic Performance of Myocardial Perfusion Imaging -Results from a Single Hospital Registry between the Years 1997-2008

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Background: A major limitation in assessing the diagnostic accuracy of SPECT MPI is referral bias that must be taken into account when estimating the true sensitivity and specificity. A systematic assessment of the diagnostic performance of SPECT MPI and an estimate of referral bias have not yet been described in an Israeli nuclear cardiology laboratory.

Methods: Using the heart institute computerized database we identified all consecutive SPECT MPI studies between October 1997 and October 2008. We also identified all catheterizations before or following MPI. Demographic, clinical, MPI and catheterization data were extracted. Subjective quantitative assessment of 10-segment, 4-grade system was used to calculate modified sum stress score (SSS). A cutoff of $SSS > 2$ was defined as abnormal. Significant coronary artery disease was defined as stenosis $\geq 70\%$.

Results: We identified 40502 studies. The average patients' age was 64 ± 12 years, 60% were males, the rate of diabetes, hypertension, dyslipidemia, smoking and history of coronary artery disease was 26%, 53%, 57%, 14% and 48%, respectively. The median number of risk factors was 2. We found 6705 patients that underwent both MPI and catheterization within 180 days (3567 before and 3659 after). In 1579 patients there was no history of coronary disease. Of this group 656 studies were done- 60 following the MPI. For these studies the provocation was exercise in 291(44%) and Technetium was used in 319 (48%), the sensitivity was 362/404 (90%, CI 86-92%) and the specificity was 88/252 (35%, CI 29-41%). Among 15383 patients with normal study only 328 (2%) were referred to catheterization demonstrating substantial referral bias. There were 1988 normal studies among 2247 very low risk patients giving a normalcy rate of 89%.

Conclusions: MPI gives excellent diagnostic performance with robust sensitivity and good specificity as reflected by the high normalcy rate. The referral bias is substantial.

Improved efficiency of myocardial perfusion SPECT with prone and half time imaging

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Background: Prone imaging during myocardial perfusion SPECT imaging has been shown to improve specificity. However it requires an additional set of images that is time consuming. Recently, half time imaging (HT) has allowed to halve time acquisition.

Objectives: To compare image quality between prone HT imaging and prone regular (R) imaging in a selected population, to recognize predictors of reduced soft tissue attenuation by prone imaging.

Methods: Patients weighting up to 90 Kg who underwent one day stress rest imaging with Tc 99m sestamibi and needed prone imaging for soft tissue attenuation correction were enrolled. Prone imaging following supine gated imaging was performed, in regular time acquisition in 46 patients and in HT protocol and in 100 patients. Summed stress score (SSS) was visually assessed and compared between prone and supine imaging. Image quality was rated between 1 (suboptimal) to 4 (excellent). A SSS > 4 was considered as an ischemic scan and SSS 4 as an equivocal scan.

Results: Total time acquisition for supine and prone stress HT acquisition was 11 minutes Vs 22 minutes for the R group (p<0.001). Image quality was good or excellent, for prone imaging, in 80% of HT Vs 86% of R patients (p=0.55). Prone imaging changed the diagnosis from equivocal to normal, ischemic to normal, ischemic to equivocal and reduced the amount of ischemia in 37(25%), 29(20%), 6(4%), 13(9%) whereas in 56(38%) patients it had no impact on diagnosis. Patients whose diagnosis was changed by prone imaging were significantly taller 172.5 cm Vs 164.5 cm, heavier 85.2kg Vs 73.5kg and likelier to be men (79 %Vs 62%) or to have a large belly. By logistic regression only the height was associated with any change in diagnosis while using prone imaging

Conclusions: HT is associated with a similar image quality as R acquisition for prone imaging in patients weighting up to 90kg. Prone imaging has significant impact on the diagnosis of IHD especially in taller patients.

Perfusion Defects Identified on Cardiac CT after Acute Myocardial Infarction are Related to Degree of Ventricular Remodeling

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Residual perfusion defects (PD) following acute myocardial infarction (AMI) are a sign of myocardial damage and, if still present late after contrast injection, a sign of no-reflow. We aimed to evaluate the relationship between residual PD and ventricular remodeling.

Methods: In 20 patients admitted with AMI who underwent primary angioplasty, CT was performed within 4 days and contrast echocardiography within one week and again at 4 months post-AMI. Perfusion defect area was measured on the first pass "coronary" scan (early PD) and on a late scan 6 minutes after contrast injection (late PD). Left ventricular end-diastolic (EDV) and end-systolic (ESV) volumes and ejection fraction (EF) were calculated from the 4- and 2-chamber views and differences calculated between baseline and 4 months.

Results: 15 patients had early PD and 7 late PD on CT. Late PD area was significantly related to both ESV and EF at 4 months ($p < 0.05$) but not at baseline. Early PD area was significantly related to both baseline and 4 month ESV and EF.

By multivariate analysis, including baseline values of EDV, ESV and EF in the model, change in EDV was significantly related to late PD area ($r = 0.79$), as was change in ESV ($r = 0.61$). Change in EF, on the other hand, was inversely related to early PD area ($r = 0.63$).

Conclusions: Early and late PD size on CT correlate better with 4 month than with baseline ventricular volumes and EF by univariate analysis. Multivariate analysis identifies a significant relation between early and/or late PD size and parameters of ventricular remodeling, suggesting that CT PD size may have important prognostic significance in post-AMI patients.

Improved Computed tomography angiography accuracy through optimal patient selection and analysis technique

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Background: Computed coronary tomography angiography (CCTA) suffers from reduced accuracy especially in high risk patients. Artifact due to motion or blooming by calcium are the main responsible for this reduced specificity.

Objective: To improve specificity by selection of low-intermediate risk patients with a low atherosclerotic burden, by optimizing heart rate control and by combining independent coronary analysis by two complementary techniques.

Methods: 155 consecutive patients hospitalized for chest pain underwent CCTA . Coronary anatomy was consensually assessed by a radiologist using curved maximal projection rendering (MPR) and a cardiologist using axial data, double oblique as well as MPR.

Results: 85% of the patients were at low to intermediate risk and only 15% were at high risk for obstructive coronary disease according to Duke criteria. 88 (58%) were males, aged 52 + 11 years. The median coronary calcium score was 1 AU (0.0 to 5.3). Mean heart rate was 60 \pm 9 bpm. Normal coronaries (by CCTA) was found in 72 patients (46.5%) , < 50% stenosis (non significant) in 48 (31.0%), 10 patients(6.5%) had 50-70% stenosis whereas 17 (11.0%) had a significant coronary disease (>1 vessel with(>70 %)). Eight patients (5.2%) had 1 at least one non diagnostic segment. 28 (18%) patients were sent to invasive angiography after CCTA . On a patient basis, including patients catheterized because of a non diagnostic test (considered positives), the sensitivity was 94.7%, the specificity 71.2% the positive predictive value of 87.4% and a negative predictive value of 86.3%. Of note, 13/17 patients (76%) sent to invasive angiography for >50% stenosis by CCTA and 10/11 (91%) of patients with a >70% stenosis underwent PCI .

Conclusion: These initial results suggest that by selecting mainly low to intermediate risk patients, less than 20% will need invasive angiography and more than 75% of patients with >50% stenosis will undergo coronary revascularization.

Relation of Coronary Artery Plaque Composition Assessed by Cardiac CT and Serum Level of C-reactive Protein in Patients With Acute Chest Pain

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Background:

The role of inflammation in atherosclerosis is well established, but data emphasizing the correlation of coronary plaque components to serum levels of high-sensitivity C-reactive protein (hs-CRP) are lacking. Since multidetector computed tomography (MDCT) is a non-invasive technique that permits the detection and characterization of coronary plaques, we sought to investigate the relation between coronary plaque composition and the serum levels of hs-CRP in patients with acute chest pain (ACP) and non obstructive coronary artery disease (CAD).

Methods:

28 patients (20 male, mean age 52 ± 10 y) with ACP underwent MDCT (Brilliance 64, Philips Medical Systems, Cleveland, Ohio). Serum level of hs-CRP was determined in all patients. Atherosclerotic plaques were analyzed for the presence of calcified, mixed, and non-calcified (NC) components. MDCT data sets were used to calculate the total plaque volumes as well as the volumes of calcified, mixed, and NC components in every plaque using dedicated software.

Results:

Fourteen patients were free of CAD and in the remaining 14 patients with non obstructive CAD we analyzed 28 plaques which had excellent image quality. Of the 28 plaques, 27 had calcified and mixed components and one plaque had mixed and NC components. Plasma hs-CRP was significantly higher in patients with CAD than in patients who were free of CAD (4.07 ± 3.3 vs. 1.3 ± 1.0 , respectively; $P = 0.006$); however, there was no correlation between plasma hs-CRP level and the total plaque volume ($r^2 = 0.02$, $P = 0.9$) as well as between hs-CRP and calcified ($r^2 = -0.1$, $P = 0.7$) and mixed ($r^2 = 0.2$; $P = 0.35$) plaque components.

Conclusions:

This ongoing study demonstrates the ability of plasma hs-CRP to identify patients with (non obstructive) and without CAD. However, hs-CRP did not differ between calcified and mixed plaques in patients with non obstructive CAD presenting with ACP.

Direct Comparison of 3.0 Tesla MRI and 64-Slice CT for Detection of Coronary Artery Stenosis: A Prospective Two Center Study

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Background: Magnetic resonance imaging (MRI) and multislice computed tomography (CT) have emerged as potential noninvasive coronary imaging modalities. The objective of the present study was to directly compare the diagnostic accuracy of the two modalities for detection of clinically relevant coronary artery lesions compared to conventional coronary angiography as the gold standard.

Methods and Results: One hundred twenty consecutive patients (65.1 ± 8.2 years) with suspected or known coronary artery disease (CAD) prospectively underwent 3.0 Tesla MRI and 64-slice CT at two different centers before elective x-ray angiography. The diagnostic accuracy of the two modalities for detecting clinically relevant coronary stenosis (≥ 50% luminal diameter stenoses) was compared using invasive coronary angiography as the reference standard. MRI and CT angiography were successfully completed in 110 patients. In the patient-based analysis MRI and CT angiography showed similar diagnostic accuracy 82% (95% CI, 73 to 88) and 88% (95% CI, 80 to 93); P = 0.18, sensitivity 84% (95% CI, 73-90) vs. 88% (95% CI, 78-93); P = 0.55, specificity 79% (95% CI, 64-88) vs. 88% (95% CI, 75-95); P = 0.34, positive predictive value 86% (95% CI, 75-92) vs. 92% (95% CI, 82-96); P = 0.39 and negative predictive value 76% (95% CI, 61-85) vs. 83% (95% CI, 69-90); P = 0.45, for a disease prevalence of 61%. In the patient-based analysis MRI and CT angiography were similar in their ability to identify patients who subsequently underwent revascularization: the area under the receiver operating characteristic curve was 0.76 (95% CI, 0.67 to 0.85) for MRI and 0.81 (95% CI, 0.73 to 0.90) for CT angiography.

Conclusions: The present study demonstrates the ability of MRI and CT angiography to similarly identify clinically relevant coronary stenosis and to predict subsequent revascularization in patients with suspected or known CAD scheduled for elective coronary angiography.

Impedance-guided Treatment Prevents Acute Heart Failure in the Course of Acute Myocardial Infarction. Proof of Concept

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Objective To determine whether repetitive non-invasive measurement of lung impedance (LI), a measure of lung electrical resistance, reliably reflects changes in lung fluid content (LFC) and predicts the evolution of AHF, and whether it enables early effective therapy.

Background Patients sustaining an acute myocardial infarction (AMI) frequently develop acute heart failure (AHF) during hospitalization, and are treated only after the appearance of overt signs of lung fluid overload. Ongoing monitoring of the status of LFC in AMI patients may enable prediction of impending AHF and prompt early therapy thus precluding AHF and improving outcomes.

Method and Results 619 patients admitted for AMI, with no radiological signs and clinical manifestations of AHF underwent LI monitoring for 94±42 hrs. 423 patients did not develop AHF. Their maximal LI decrease from baseline during monitoring was 5.8±3.2 % (p<0.01 compared to normal subjects). 135 patients developed overt AHF. Patients were asymptomatic when their LI decreased by 14%. LI decreased from baseline by 18.2% (p< 0.001) at the onset of overt AHF and by 35.8% (p<0.0001) at peak AHF. Early therapy was evaluated in 61 other patients and initiated in the absence of symptoms when LI decreased by 13.6±0.6%. AHF developed in only 15% of them. Compared to conventional therapy in AMI patients with AHF, LI-guided therapy reduced hospital stay 1.4-fold (p<0.01), re-admissions during 1-year 1.6-fold (p<0.01) and 4-year mortality 3.3-fold (p<0.01).

Conclusion Monitoring of LI in AMI patients reliably reflects LFC and predicts AHF. Early therapy in these patients prevents clinical AHF in 85% of patients, and improves outcomes.

Isl1 Gene Therapy For the Infarcted Heart – Preservation of Cardiac Function through Enhancement of Angiogenesis

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The LIM-homeobox transcription factor *Isl1* plays a crucial role during heart embryogenesis. Embryonic *Isl1*⁺ precursors give rise to over two-thirds of the heart and to its subsequent lineages: cardiac muscle, smooth muscle and endothelium. Interestingly, a subset of *Isl1*⁺ progenitors remains embedded in the postnatal heart. We have previously shown that *Isl1* forced expression in endothelial cells and mesenchymal stem cells enhances their angiogenic and vasculogenic properties.

In the current study, we investigated whether *Isl1* is expressed in progenitors of adult bone marrow stem cells (BMSCs) and spleen, and whether *Isl1* expression varies after acute myocardial infarction (MI). Additionally, we examined whether intramyocardial gene transfer of naked DNA encoding *Isl1* could promote a functional recovery after MI.

We used the transgenic mice *Isl1/cre/Z/EG*, in order to detect *Isl1* expression in BMSCs and spleen of adult mice. At 4 and 14 days after MI induction, *Isl1* expression was assessed in heart, bone marrow and spleen of FVB mice by qRT-PCR and immunostaining. Furthermore, intramyocardial injection of plasmid encoding *Isl1* to mice after ligation of the LAD has been performed. We report for the first time, that *Isl1* gives rise to sub populations of progenitors in the bone marrow and spleen, and that *Isl1* is reexpressed in the spleen and left ventricle following MI. Moreover, intramyocardial gene transfer of *Isl1* to the borderzone of infarcted heart resulted in partial salvage of left ventricular function, enhanced vascularization, and reduced myocardial fibrosis.

Thus, the *Isl1* gene appears as an attractive target for future gene therapy for regenerative myocardial dysfunction.

The Role of Mutant Protein Degradation in Catecholamine Dependent Polymorphic Ventricular Tachycardia (CPVT)

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Humans with recessively inherited CPVT and genetically engineered mice develop arrhythmia, which may arise due to malfunction or degradation of calsequestrin (CASQ2) protein. We investigated the relation between protein level and arrhythmia severity in CASQ2^{D307H/D307H} (KI), compared to CASQ2^{Δ/Δ} (KO) and wild type control (C) mice.

CASQ2 expression and Ca²⁺ transients were recorded in cardiomyocytes isolated from hearts of neonatal (7 days) or adult (40 weeks) mice. *In vivo* arrhythmia was studied using heart rhythm telemetry at rest, exercise and after epinephrine injection (0.1 μg/g IP).

CASQ2 protein was absent in KO heart. Neonatal KI and C hearts expressed similar amounts of CASQ2 protein which were significantly lower (~60%, p<0.05) than the level in the adult C. A severe form of spontaneous Ca²⁺ release, Ca²⁺ oscillations, was present in 67% of KO cardiomyocytes but in a significantly lower proportion of either WT or KI cells (15%, p<0.01).

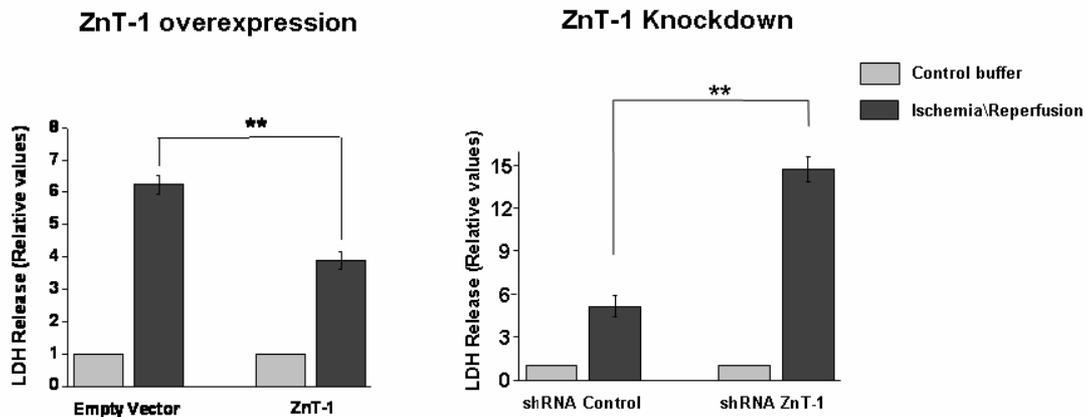
Heart of adult KI mice expressed only 15% of CASQ2 protein found in C. Cardiomyocytes from adult mutant mice had increased susceptibility to spontaneous Ca²⁺ release (KO: 82%, KI 63% compared to 12% in WT, p<0.01). KO cells had more Ca²⁺ oscillations CPVT was comparably prevalent in KO (100%) and KI mice (83%), but arrhythmia was more severe and resistant to therapy in KO. We then treated mice with proteasome inhibitor, bortezomib (B, 1 μg/g IV on days 1, 4, 8, 11) trying to inhibit CASQ2^{D307H} degradation B increased CASQ2 expression in KI hearts by ~50% (p<0.05). B-treated KI mice had lower CPVT prevalence during rest and exercise and less abnormal ventricular beats during peak exercise (30% instead of 95%, p<0.05). No benefit against arrhythmia was observed in B-treated KO mice or KI mice treated with saline. We conclude that some physiological function is preserved in CASQ2^{D307H} protein. Preventing the degradation of mutant protein should be explored as a possible therapeutic strategy in appropriate CPVT patients.

ZnT-1 Protects Cardiac Myocytes from Ischemia\Reperfusion Injury through the activation of Raf-1/MEK/MAPK signaling pathway

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BACKGROUND: ZnT-1 is a protein that confers cellular resistance from heavy metal toxicity, but its function in the myocardium is not clear. Our group recently demonstrated that ZnT-1 regulates calcium influx into cardiomyocytes by interacting with the regulatory β -subunit of the L-type calcium channel. In addition, in non-cardiac cells ZnT-1 was found to interact with Raf-1 kinase leading to downstream activation of MEK/MAPK signaling. In the present study we investigated the role of ZnT-1 in myocardial ischemia\reperfusion injury (I\R). **METHODS AND RESULTS:** Cultured cells of cardiomyocyte origin (HL-1 cells) were exposed to ischemic conditions for 60 min using sodium cyanide and 2-Deoxy Glucose, followed by 60 min of washout mimicking reperfusion. I\R injury was detected by measuring LDH release and staining for pro-apoptotic proteins activation (caspase 3 and 7). Overexpression of ZnT-1 reduced the LDH release following I\R injury to 50.1 ± 2.5 % of control ($n=6$, $p<0.01$) and markedly reduced caspases staining. Consistently, ERK phosphorylation was increased in the ZnT-1 transfected cells to 266 ± 27.8 % of control ($p<0.01$). Knockdown of endogenous ZnT-1 by shRNA blocked the phosphorylation of ERK and markedly augmented LDH release following I/R injury to 287.4 ± 36.9 % of control ($n=5$, $p<0.01$). The protective effect of ZnT-1 following I\R injury was apparent following pretreatment of HL-1 cells with the L-type calcium channel blocker nifedipine ($1 \mu\text{M}$). In contrast, pretreatment with the MEK inhibitor PD98059 ($10 \mu\text{M}$) completely abolished the protective effect of ZnT-1 following I\R injury ($n=3$). Moreover, a mutated form of ZnT-1 lacking the ability to bind Raf-1, failed to protect HL-1 cells from I\R injury ($n=3$). **CONCLUSIONS:** ZnT-1 confers cellular resistance from I\R injury through its ability to interact with Raf-1 and its ability to stimulate the Raf/MEK/MAPK signaling pathway. Our findings suggest an important new role for ZnT-1 in the myocardium.



Hair Cortisol and the Risk for Acute Myocardial Infarction

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Background: The role of chronic stress in developing acute myocardial infarction (AMI) is inconclusive, mainly due to the lack of an objective and quantitative marker for chronic stress. We have developed a method to measure the stress hormone cortisol in hair, which allows longitudinal assessment of cortisol levels prior to an acute event. Several reports have demonstrated an association between high hair cortisol levels and chronic stress in both animal models and in humans. We aimed to examine whether chronic stress, evidenced by elevated hair cortisol, is a risk factor for AMI.

Methods and results: A prospective case-control study including 60 patients admitted to hospital with AMI and 60 control patients, admitted to internal medicine wards for other indications. An enzyme immunoassay technique was used to measure cortisol in the most proximal 3cm of hair, representing the most recent 3 months of exposure. Median hair cortisol levels (range) were 295.3 (105.4-809.3)ng/g in AMI patients and 224.9 (76.58-949.9)ng/g among controls ($p=0.006$). After controlling for other risk factors of AMI using multiple logistic regression, hair cortisol remained the strongest predictor ($p=0.004$). When we divided the entire study population into quartile according to the hair cortisol concentrations, the occurrence of AMI increased with hair cortisol concentration, escalating from 32% to 68% from the first (lowest hair cortisol levels) to the fourth quartile (highest hair cortisol levels) ($P<0.01$).

Conclusions: We demonstrated elevated hair cortisol concentrations in patients with AMI, suggesting that chronic stress, as assessed by increased hair cortisol in the 3 months prior to the acute event, may be a contributing factor for AMI.

Transgenic System for Conditional Induction and Rescue of Cardiac Remodeling Provides New Insights into the Remodeling 'Point of No Return'

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Cardiac Remodeling is the final common pathway for several cardiac diseases and considered a target for treatment in prevention of heart failure. Remodeling can be developed following cardiac dysfunction *per se* without cell death. Further, when myocyte viability is preserved (a state known as Myocardial Hibernation) remodeling is reversible. Rahimtoola *et al* have argued that there is an early 'golden time' where revascularization can reverse remodeling, an opportunity which may decline at later stages. Yet, the potential benefit of revascularization on reversing remodeling at its late stages has not been experimentally tested. We have recently developed a VEGF-based mice model system for Myocardial Hibernation. In this model, we inhibit cardiac VEGF and decrease capillary density thus inflicting progressive cardiac ischemia, without cell death. Further, we have shown that VEGF-mediated revascularization fully restores myocardial functioning. We harnessed this model system for studying cardiac remodeling and its potential reversibility. We show that left ventricle dilatation and fibrosis precedes ventricular hypertrophy and that interstitial fibrosis is progressive and upon reaching a critical level survival declines. At early stages, remodeling could be reversed by VEGF-mediated neovascularization, as well as by pharmacological inhibitors of the Renin-Angiotensin system. The latter, even in face of a remaining perfusion deficit and a compromised cardiac function. Ability to revascularize and restore contractile function were preserved even months later. However, despite rectifying its underlying causes, remodeling was no longer reversible at its end-stage, thereby demonstrating a definitive 'point-of-no-return' for heart remodeling. This study suggests that, while revascularization therapy might be beneficial even at more progressive stages of ischemic heart disease, its utility for reversing remodeling might be mostly useful if applied at earlier stages.

Differential Angiotensin II Signaling in the Left and Right Atria*Hasin, T¹; Elhanani, O²; Kehat, I³; Hai, T⁴; Yokoyama, K⁵; Aronheim, A²**¹Tel-Aviv University and Sheba Medical Center, Tel-Hashomer, Israel; ²Technion-Israel Institute of Technology, Haifa, Israel; ³Technion-Israel Institute of Technology, Cincinnati Children's Hospital Medical Center, Cincinnati, USA; ⁴Center for Molecular Neurobiology, Ohio State University, Columbus, OH, USA; ⁵RIKEN BioResource Center, Kaohsiung Medical University, Tsukuba, Ibaraki, Japan*

The atria respond to various stimuli including pressure and volume overload as well as neuro-hormonal stimulation. Such stimulation can induce beneficial physiological reactions (modification of compliance, production of reactive substances) or pathological processes (atrial remodeling and arrhythmia). The left atrium is known to differ from the right for both reactions. Angiotensin II is a key mediator of cardiac hormonal response. We focused our attention on ATF3, an immediate early gene found at the receiving end of multiple stress and growth stimuli including angiotensin II. Angiotensin II injection (1.0 mg/Kg I.P.) induces ATF3 RNA and protein expression levels. We localized ATF3 protein to cardiomyocytes using immuno-histochemistry. Pre-treatment with an angiotensin receptor blocker (losartan) inhibits the response. Using ATF3 promoter constructs we demonstrate that ATF3 expression is regulated by angiotensin-receptor-mediated signaling at the transcriptional level in vitro (in a blood pressure independent manner). Whereas acute beta-adrenergic (isoproterenol 2.5mg/Kg) stimulus induces ATF3 expression in both atria and ventricles, acute exposure of mice to angiotensin II results in ATF3 expression only in the left atrium and ventricles but not in the right atrium. Conversely, continuous exposure (either 2 weeks osmotic pump or repeated injections) of mice to angiotensin II results in ATF3 expression specifically in the left atrium. The spatial regulation of ATF3 expression is probably post-receptor and may involve STAT3 signaling and helix-loop-helix protein inhibitors. The differential response to angiotensin II may explain differential responses of the right and left atria and since most pathological processes occur in the left atrium this may pose a potential target for altering atrial remodeling.

Asymptomatic Individuals with Vitamin B12 Deficiency Have a Higher Incidence of Homozygosity to MTHFR C677T Mutation and Homocysteinemia

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Background: Although homocysteinemia is associated with a higher risk for cardiovascular disease, treatment of homocysteinemia with folic acid did not result improved outcome. We have shown that homozygotes to MTHFR C677T have higher incidence of B12 deficiency associated with endothelial dysfunction, and could be a better target for clinical trials. The aim of this study was to determine whether subjects with B12 deficiency are more likely to be homozygous for C677T mutation, and whether it is associated with endothelial dysfunction. Methods: We enrolled 100 asymptomatic volunteers with B12 deficiency (<150pM, age 41±12, 48 males). DNA from whole blood was analyzed for MTHFR C677T mutation, and homocysteine measured. Forearm endothelial function using high-resolution ultrasound was performed in 12 homozygotes for C677T before and after treatment with B12 and folic acid, and in 10 non-homozygous controls.

Results: Frequency of homozygosity for the C677T mutation in asymptomatic subjects with B12 deficiency was 28/100 (28%), compared with 47/313 (15%) in a previously published cohort of volunteers with normal B12 levels (p=0.005). Homocysteine level was 21.2±16±M in homozygotes with B12 deficiency compared to 12.3±5.6µM in heterozygotes or subjects without the mutation (p=0.008). After treatment with B12 and folic acid homocysteine decreased to 9.1±2.8µM (p=0.005). Flow mediated dilatation (FMD) of the brachial artery was 5.8±3.1% in homozygotes vs. 5.2±5.7% in non-homozygotes (p=0.8). After treatment with B12 and folic acid, FMD was 6.39±3.5% in homozygotes (p=0.8 vs. baseline).

Conclusions: Asymptomatic subjects with B12 deficiency have a significantly higher incidence of homozygosity to MTHFR C677T mutation and homocysteinemia (28% vs. 15%). In the small group tested, endothelial function of heterozygotes was similar to controls and did not change after treatment. Larger studies are needed to determine whether this group could benefit from treatment with folic acid

Endovascular Non Thermal Irreversible Electroporation Attenuates Post-Angioplasty Luminal Loss and Neointimal Formation in New-Zealand White Rabbits*Maor, E¹; Ivorra, A²; Mitchell, J³; Rubinsky, B²**¹Sheba Medical Center, Tel-Hashomer, Israel; ²University of California, Berkeley, USA;**³Angiodynamics, Queensbury, USA*

Using fundamental principles of electroporation and computer simulations of temperature and electrical fields we developed a novel endovascular ablation approach - non thermal irreversible electroporation (NTIRE), which selectively destroys cellular components of the arterial wall without affecting the extracellular scaffold. METHODS: Computer simulations were used to demonstrate that NTIRE does not induce thermal damage to the arterial wall. Using an endovascular approach, a custom made device was used in-vivo to apply ninety NTIRE pulses to the right iliac arteries of eight New-Zealand white rabbits. Evaluation at 7 and 35 days included H&E, Masson's trichrome, elastic Von Gieson, smooth muscle actin, proliferating cell nuclear antigen, Von Willebrand, and S-100 antigen. In addition, 24 iliac arteries of 12 additional animals were used to evaluate the effect of NTIRE on luminal loss at 35 days in a rabbit model of balloon angioplasty. RESULTS: One week after NTIRE, normal iliac arteries experienced complete transmural and circumferential cellular ablation, minimal damage to extra-cellular components and re-endothelialization. After five weeks there was no evidence of vascular smooth muscle cells (VSMC) regeneration and. In angioplasty-damaged arteries, results at 35 days demonstrated the ability of NTIRE to significantly reduce post-angioplasty luminal loss. Compared with controls, NTIRE-treated arterial segments were wider (0.85 ± 0.18 vs. 0.58 ± 0.22 cm², $p = 0.001$), experienced less luminal loss ($18\% \pm 19\%$ vs. $38\% \pm 24\%$, $p < 0.001$), demonstrated wider point of maximal stenosis (0.21 ± 0.09 cm vs. 0.11 ± 0.06 , $p = 0.004$), and showed less neointimal formation (3.91 ± 1.39 vs. 2.64 ± 2.29 mm², $p < 0.001$). The results suggest that NTIRE can ablate cells with minimal damage to extra-cellular components, minor inflammatory response and limited VSMC regeneration. NTIRE holds the potential to treat restenosis and cardiac arrhythmias.

Endothelial C-Reactive Protein Increases Platelet Adhesion Under Flow Conditions

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Background: While data regarding the pathogenetic role of C- reactive protein (CRP) in atherothrombosis is accumulating it is still controversial whether local CRP secretion is of any pathobiological significance. The present study examined whether endothelial-derived CRP modulates an autocrine prothrombotic activity.

Methods and Results: Endothelial cells were isolated from hearts of mice transgenic to human CRP (CRPtg) and grown in primary cultures. Human CRP expression was confirmed in these cells as compared with no expression in cultures derived from wildtype congenes. Adhesion of human platelets to endothelial cells was studied in the "cone and plate" flow system. Platelet adhesion to cells expressing CRP was significantly increased as compared with controls (n=6, p<0.01). The pro-adhesive effect of CRP was significantly suppressed in mouse heart endothelial cells and in human umbilical vein endothelial cells following treatment with SiRNA for human CRP. Adhesion was modulated by an increase in p-selectin; blocking P-selectin with neutralizing antibody significantly decreased the adhesion of platelets to CRP-expressing cells (40.4±10.5 to 9.4±6.9 platelets / high power field , n=5-6, p<0.01).

Conclusions: human CRP that is locally produced in endothelial cells increases platelet adhesion to endothelial cells under normal shear flow conditions. These findings support the notion that the presence of CRP at the "scene of the crime" can indicate "evidence of guilt"; ie, CRP exerts a local effect on endothelial cells, via p-selectin expression that promotes platelet adhesion and subsequent thrombus formation.

1550205

Expression of miR-17~92 Family of miRNA Clusters in Experimental Atherosclerosis

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Background

MicroRNAs (miRs) are small non-coding RNAs that regulate a wide range of physiological and pathophysiological processes. miRNAs regulate gene expression by interacting with target mRNAs at their 3' untranslated region, leading to translational repression or mRNA degradation.

The polycistronic microRNA cluster miR-17~92 comprises seven mature micro-RNAs and has two closely related paralogs: miR-106a~363 and miR-106b~25. Studies revealed a critical role of these miR clusters in heart and lung development, tumor angiogenesis, hematopoiesis, immune functions and postnatal vascularization.

We sought to investigate the expression profile of individual genes from the miRNA family: miR-17 and miR-25, in experimental model of atherosclerosis.

Methods

For detection of miRNAs levels, quantitative Real-time PCR was performed. RNA was isolated from aortas of 9 month old ApoE knockout mice, which harbor heavy atherosclerotic lesions. Six weeks old ApoE mice served as control.

Results

In experimental atherosclerosis, miR-25 showed a >10 folds down-regulation in the aortas of old ApoE knockout mice compared with young ApoE knockout mice, whereas miR-17 showed no comparable change in expression.

Conclusions

Marked down-regulation in miR-25 expression is associated with the progression of atherosclerotic lesions in ApoE knockout mice. Further experiments are needed to elucidate the possible role of miR-17~92 cluster and its paralogs in the initiation and progression of atherosclerosis.

Exposure to Platelets Affects the Function of Endothelial Progenitor Cells

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Background: Endothelial progenitor cells (EPC) are bone marrow-derived cells that are mobilized into the circulation in response to tissue or vascular injury. Recent evidence suggests that EPCs have an important role in repair following vascular injury, and that platelets mediate their recruitment to sites of injury. Platelets and EPCs can interact directly via P-selectin – PSGL1 binding, however, the effect of platelets on EPC function remains unclear. Therefore, in this study we aimed to assess the in-vitro effect of platelets on the capacity of EPCs to form colonies, differentiate, migrate and proliferate.

Methods: Human EPCs were isolated from donated Buffy coats and purified on a magnetic separation column specific for CD133 antigen. They were incubated either on traditional fibronectin matrix, or co-incubated with washed platelets (isolated from healthy volunteers), for 7 days. Number of EPC colony forming units (CFU) was quantified, and endothelial cell lineage confirmed by immunostaining with antibodies directed against VEGFR-2, CD31 and Tie-2. Functional properties of the cultured cells were evaluated by MTT - proliferation assay and migration assay using the Boyden chamber.

Results: Co-incubation of EPCs with platelets compared to incubation of EPCs alone (on fibronectin matrix) resulted in a higher number of CFUs after 7 days of culture (6.5 ± 1.3 CFUs/well vs. 3.5 ± 0.5 CFUs/well, respectively, $P < 0.05$). In addition, co-incubation of EPCs with platelets vs. incubation of EPCs alone was associated with higher proportion of living cells, tested by the MTT assay (0.2 ± 0.01 vs. 0.12 ± 0.04 MTT 570nm respectively, $P < 0.05$), and higher number of migrated EPCs, assessed by the migration assay (14 ± 2.12 vs. 5.8 ± 1.8 migrated cells $\times 10^4/20000$ cells, respectively, $P < 0.001$)

Conclusion: In-vitro exposure to platelets promotes the capacity of EPCs to form colonies, proliferate and migrate. Therefore, the interaction with platelets appears to augment EPC functional properties.

The Effect of Intensive Glycemic Control on Endothelial Progenitor Cells Level and Function in Patients with Diabetes

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Background: Vascular injury has a central role in the pathogenesis of cardiovascular complications of diabetes. Recent evidence has shown that endothelial progenitor cells (EPCs) have an important role in the repair process following vascular injury. However, in patients (pts) with diabetes EPC number and function are significantly reduced. Intensive glycemic control can reduce diabetic complications, but it is not known how such management affects EPC number and function. We aimed to examine whether intensive glycemic control can improve EPC number and function in pts with uncontrolled diabetes.

Methods: Fifteen pts with treated diabetes and HgA1c level $\geq 8.5\%$ were included. Pts were tested at baseline and after 3 months of intensive glycemic control. The treatment goal was to reach HgA1c level of 7%. Circulating EPC levels were assessed by flow cytometry as the proportion of peripheral mononuclear cells co-expressing VEGFR2, CD133 and CD34. The capacity of the cells to form colony forming units (CFUs) was quantified after 1 week of culture on fibronectin-coated plates. Functional properties of the cultured cells were evaluated by the MTT proliferation assay, and migration assay.

Results: Pts (n=15) had a mean age of 59.5 ± 10 years, 16 ± 9 years from diagnosis, BMI of 31 ± 7 , 18% were women. All pts were treated with aspirin, and statins. Baseline HgA1c was $9.5 \pm 1\%$. After 3 months of intensive control HgA1c decreased to $8.2 \pm 1\%$. Circulating EPC levels increased after the intensive control period (VEGFR2+CD34+: $0.45 \pm 0.6\%$ at baseline vs. $1.3 \pm 0.8\%$ post, $P=0.02$; VEGFR2+CD133+: $0.4 \pm 0.6\%$ at baseline vs. $0.9 \pm 0.7\%$ post, $P=0.06$). The number of CFUs (mean 2.5-2.6 CFUs per well) did not change significantly after the intensive control period, nor were there changes in the functional assays.

Conclusions: In this preliminary study, tight glycemic control was associated with an increase in the levels of circulating EPCs, without improvement in the functional properties of the cells

1548295

Successful Treatment of Infected Intracardiac Thrombi in Adolescents with Recombinant Tissue Plasminogen Activator (tPA)

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Background: Infective endocarditis caused by microbial infection is virtually always fatal if not treated. High dose and long term antibiotic treatment is required to eradicate microorganisms. Surgical removal is indicated in persistent cases or when there is deterioration with embolic phenomenon. Combined treatment with antibiotics and tPA has been reported to be successful in preterm babies and pediatric patients, however there is a dearth of data regarding adolescents.

Methods: We describe 4 adolescents who were treated successfully with combined treatment of antibiotic and tPA for infective thrombi/endocarditis. Results: Four adolescent patients, 3 boys and 1 girl (mean age 13.3 years) were treated. Small perimembranous VSD was detected in 2 patients, a normal heart in the other two who were in different stages of anticancer treatment for lymphoma. All the masses were located in the right heart: 1- tricuspid valve, 2 in the right atrium and one extended from the SVC to RA and to the RV. Resolution of thrombus was achieved following 2-4 days of treatment with Tpa. No side effects were reported.

Conclusion: Recombinant tissue plasminogen activator combined with antibiotic may be used as an initial treatment protocol in adolescents with infective thrombi. We hypothesize that tPA facilitates penetration of antibacterial treatment of infective thrombi which contributes to the success of the treatment.

1548452

Percutaneous VSD Closure by the Nit-Occlud® L₁ VSD Spiral Coil: Early Short-Term Rambam Experience

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Introduction: Percutaneous closure of VSD represents a substantial technical challenge. The experience with the Amplatzer device to close a peri-membranous VSD resulted in high percentage of AV block immediately and late post the procedure due to mechanical effect of the stiff device which made the procedure an acceptable treatment choice in many centers. By modifying the Nit-Occlud® PDA Device the Nit-Occlud® L₁ VSD Spiral System was designed. Coil-based closure being less rigid with lower profile, offers potential advantages. Early experience with this coil resulted in acceptable closure rate of the defect with no heart block

Objectives: In this multicenter clinical investigation, feasibility, safety and performance of the new cardiac occluder will be evaluated. Patients & Method: 14 patients (9F, 5M), Most < 12 Yrs old All had significant Left to Right shunts, 12 Membranous + 2 Muscular VSD's. Follow up: 3.4 ± 1.8 Mo.

Results: in 8 patients the defect was completely closed within 6 months. In 5 patients a small residual shunt. One patient the coil was small and she had surgical closure and eventually. One patient has hemolysis and in one patient a moderate tricuspid regurgitation developed. New Aortic Valve regurgitation was not encountered.

Conclusions: VSD coil occlusion is a promising technique but further follow up and larger numbers of patients are warranted. The learning curve, in the hands of experienced interventionalists, is relatively short. There are numerous pitfalls that need to be recognized and real-time image-guidance is crucial

Pediatric Heart Transplantation: Schneider's children medical center of Israel

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Heart transplantation remains the only hope for children with terminal cardiomyopathys and some forms of complex congenital heart disease.

Objective : To review our experience with heart transplantation in the pediatric population.

Method: We reviewed medical records of children who underwent surgery for heart transplantation in our hospital, starting 2001 to this year.

Results: Between July 2001 and November 2009, 9 children underwent surgery for heart transplantation. There were 2 males, 7 females. Age at transplantation was mean of 8.1 y (range 13m-15y)

All patients are followed on regular basis in our outpatient clinic. All receive combination therapy including immunosuppressive, anti infectious (antivirals, antibiotics, antifungals) and supportive-therapy (vitamins and supplements). Follow up time range from 7m to 6.5y (median 3.2 y) Six out of 9 patients are currently alive. Among the 3 children who died: one developed acute rejection 6 years after first transplantation, and died 4 days after the second transplantation attempt; one developed primary CMV infection and died 7 month after transplantation; the third died 13 month after transplantation due to acute rejection and marginal family compliance.

Conclusion: Heart transplantation is nowadays the only solution to extend the life of children with terminal cardiac disease.

Catch-up growth and hemodynamic rehabilitation to normal childhood function status is the likely outcome.

Heart transplantation is merely an exchange of one disease for another, but it provides an important change in quality of life.

In small country like ours, the rate limiting step to making transplantation more widely available is donor availability. This should be taken into consideration when managing a child with end stage heart disease.

Midterm results of the Norwood-Sano Operation – The Schneider Experience

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Introduction: Since its introduction, controversy exists regarding the Norwood Sano operation as a treatment of choice for neonates with Hypoplastic Left Heart Syndrome (HLHS) and neonates with complex congenital malformations in need for serial palliation leading to Fontan solution. This is due to the high operative mortality (18-35%) left ventricular dysfunction (15-30%) and atrio-ventricular valvar regurgitation (8-30%) reported worldwide. Since January 2006 we have adopted this approach. The following report presents our mid term results.

Methods: Retrospective analysis of charts of all consecutive patients that underwent the Norwood Sano operation at Schneider Children's Medical Center between January 2006 to November 2009.

Results: 22 patients underwent the Norwood Sano operation during the 34 month period. There were 2 operative deaths (9% mortality). One patient required emergency ECMO cannulation 2 days after the operation due to pulmonary hypertensive crisis and was weaned within 2 weeks. Follow-up is 100% complete. There was one interstage mortality(4%) 7 months after the initial operation due to a febrile disease and dehydration. One patient (5.5%) has moderate ventricular dysfunction and 2 patients (11%) have moderate atrioventricular valve regurgitation. 11 patients (60% of survivors) underwent successful Glenn procedures. One patient died 4 months after the Glenn procedure due to an embolic event to the brain. 8 patients are currently waiting for Glenn Procedure.

Conclusion: The Norwood Sano operation can successfully be applied to neonates with HLHS variants. Hospital mortality is low and midterm results are encouraging. Out of hospital careful and close follow up and interstage monitoring are crucial for the success of the program.

1550609

The Added Value of ECG Gated CT for Complex Congenital Heart Disease in Infants.

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Background:

Trans-thoracic echocardiography is limited in imaging congenital heart disease (CHD). ECG gated CT of the chest might help in the anatomic delineation of CHD in infants. The purpose of this study is to evaluate the added value of gated cardiac CT in infants with complex CHD.

Methods:

A total of 34 scans were performed in 29 children; mean age: 58 d (1-270); (18 males; 12 females); mean weight 3.5 Kg (1.8-8) mean heart rate (HR) 129 bpm (99-160). CHD malformations: Truncus Arteriosus (N= 8), Tetralogy of Fallot (N= 6), AV canal (N=2), transposition of great arteries (N=1) interrupted aortic arch (N=1), Aortic coarctation (N=2), Williams's syndrome (N=1) hypoplastic Lt heart (N=3), double outlet right ventricle (N=3), anomalous LAD from PA (N=1), pulmonary atresia (N=1).
Scanners: 64 and 128 MDCT (Brilliance 64, ICT SP Philips); retrospective ECG gating; whole chest included. All patients were sedated to achieve full sedation. Respiration, saturation, blood pressure and HR were monitored. Non ionic contrast (Iomeron 350) was administered intravenously (2.5-3ml/Kg). Effective radiation dose was recorded per patient.

Results:

Good to excellent diagnostic quality was demonstrated in 22/34 of the scans. Catheter angiography was performed only in 7/34 (20%) of the cases. 31/34 (92%) scans added important information and helped plan further care accordingly. Average radiation exposure was calculated as 3.6 mSv.

Conclusions:

Imaging of CHD using ECG gated CT is non invasive, fast, feasible and of diagnostic quality. The related radiation exposure is relatively low. Important features for successful scanning include: sufficient contrast (3ml/Kg), adequate IV access and appropriate sedation. ECG gating, in spite of high HR, is a key factor for successful studies, in order to demonstrate CHD in detail. Important clinical information was added in 92% of the cases, thus contributing to the comprehensive assessment of complex CHD in very young children.

1550817

Percutaneous Closure of Clinically and Hemodynamically Important Atrial Septal Defects in the Elderly

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Aim: to outline patient characteristics and procedural success of percutaneous closure in adults over 60 years of age with secundum atrial septal defects treated in the adult congenital heart unit over a 10 years period.

Patients: 54 patients, 29 female, mean age 68.6 ± 5.5 , range 60-86 years. All had clinically important shunts with dilated right heart chambers and suitable anatomy for percutaneous closure confirmed by TEE.

Catheterization data: all patients had a diagnostic evaluation while awake, and device closure under general anesthesia and TEE monitoring except for one patient who had local anesthesia and intracardiac echo.

Results: mean Qp/Qs = 2.5 ± 0.8 , pulmonary artery systolic pressure 45 mmHg, diastolic pressure 18 mmHg and mean pressure 27 mmHg. Mean right atrial pressure 10 mmHg, RVEDP = 14 mmHg. Mean left atrial pressure 11 mmHg.

ASD closure was performed with Amplatzer septal occluder in 51 patients. Mean device diameter was 26.2 ± 7.8 , range 12-38 mm. One patient had a multifenestrated atrial septum occluded with two Amplatzer cribriform devices (35 + 25 mm), one with Solysafe 20 device, and one Occlutech 24 mm ASD device. Four patients had concomitant coronary arteriography, one had PCI performed during the ASD closure procedure.

There were no procedural complications, and most patients were discharged home the following day, after an echocardiographic confirmation of procedural success.

Conclusions: elderly patients with longstanding shunt and significant hemodynamic burden on the right heart can have safe and successful percutaneous device ASD closure.

A New Modular Embolic Protection Device First In Man Experience

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Aims: The use of Embolic Protection Devices (EPD) in Carotid Artery Stenting (CAS) procedures has shown to lower the periprocedural rate of major adverse cardiac and cerebrovascular events (MACCE). Current EPDs are complex and difficult to use.

We present a First In Man study in patients undergoing CAS to evaluate a new distal filter EPD delivered in a stent-like delivery system

Methods and Results: The GARDEX EPD (Gardia Medical Ltd.) is a new rapid-exchange pre-crimped distal filter EPD delivered in standard stent-like delivery system. The GARDEX EPD can be used over any 0.014" guide wire (according to physician preference), after the guidewire was positioned across the lesion in a standard fashion. Its modular stand-alone filter unit can be locked anywhere along the guide wire to optimize filter location.

Twenty (n=20) consecutive patients with a mean age of 69 yrs were enrolled. Four patients were symptomatic and 16 were asymptomatic. The lesions treated (n=20) had average stenosis of 83.8% and residual stenosis post CAS of 6.0%. After guide wire was positioned across the lesion the Gardia EPDs were passed across the lesion and positioned in a pre determined location, regardless of lesion severity or vessel tortuosity.

Device and Angiographic Success were achieved in all cases (100%). One patient had transient neurological deficiencies which resolved within 12hrs. No other Major Adverse Events were recorded up to 30 days follow up.

Conclusions: The use of the GARDEX EPD in CAS is encouraging. The GARDEX system is very simple to use and require very limited learning curve. The system is has excellent deliverability and can be locked on any commercially available guide wires, to optimize position distal to the treated lesion. Early clinical experience suggests that the device functions well in a variety of challenging lesions and vessel's anatomies. Clinical outcomes are favorable. The full role of the GARDEX EPD needs to be further confirmed in a larger patient population study and other clinical applications (e.g. SVGs, STEMI).

Feasibility and Safety of Transulnar Approach for Coronary Angiography and Angioplasty

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The transradial approach (TRA) for cardiac catheterization has been accepted as a safe and effective alternative to femoral approach due to fewer access site complications and improved patient comfort. Recently preliminary reports on small numbers of patients have suggested that the transulnar approach TUA is a useful alternative to TRA to preserve the radial artery as a potential coronary bypass graft. Objectives: To assess the feasibility and safety of TUA for coronary angiography and angioplasty. Methods: Single center, case series study. Catheterization data and outcomes during and post catheterization were collected prospectively. The access site determined by the operator preference. Results: From November 2005 through October 2009, 4479 patients were screened for TRA or TUA: In 32/388 (8.2%) patients screened for TUA, there was no palpable ulnar artery or ineffective palmar arch collateral support, compared to 61/4091 (1.5%) patients screened for TRA, $p < 0.0001$. TUA was performed in 356 (8.1%) and TRA in 4030 (91.9%) patients. Mean age (60.6 +/- 11.6 years), women (37.2%) and baseline characteristics were similar in both groups. Coronary angioplasty was performed in 47% of patients in both groups. Procedural failure and crossover to alternative access site were 7.3% in TUA versus 3.8% in TRA (OR 1.08, 95% CI 1.02 to 1.15, $p = 0.003$). The most frequent reason for access site failure in TUA were inability to introduce guiding wire despite good arterial flow (57.7% of all failed procedures) and failure to puncture the artery (30.8%). Fluoroscopy time (minutes) was 10.7 +/- 9.3 in TRA versus 11.6 +/- 10.7 in TUA ($p = 0.084$). There were no significant access site complications in TUA versus 0.07% in TRA (OR 1.0, 95% CI 0.99 to 1.00, $p = 0.27$). Conclusion: Transulnar approach is a feasible and safe, alternative to the TRA, for coronary angiography and angioplasty, to reduce vascular complications. However, it is more manual demanding and has higher access site failure rates.

A Propensity Score Matched Comparative Analysis of 4 Different Drug Eluting Stents Versus Bare Metal Stents

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Background: Drug eluting stents (DES) have different properties, which could influence their efficacy and safety.

Methods: From a consecutive cohort of 6583 patients undergoing PCI at our institution between 1/4/2004 and 31/12/2008, we identified 2179 patients who were treated using a single type of DES (Sirolimus, Paclitaxel, Zotarolimus and Everolimus eluting stents). By using propensity score matching, we created four cohorts of matched BMS-treated patients and those DES patients. We compared total mortality, myocardial infarction (MI), repeat target vessel revascularization (TVR) and event-free survival up to 1 year in each of these cohorts.

Results: Propensity score matching balanced well all pre-PCI and procedural variables (age, gender, diabetes mellitus, hypertension, prior heart failure, known moderate to severe LV dysfunction, smoking, dementia, malignancy, prior anticoagulation, hemoglobin, Platelet count, creatinine, prior CABG, PCI for ST elevation MI, PCI for MI or ACS, severe state, number of vessel disease, territories and lesions treated, stent size). Cumulative 6 month and 1 year event rates are presented in the table.

	BMS	Sirolimus	BMS	Paclitaxel	BMS	Zotarolimus	BMS	Everolimus
n	1381	1381	325	325	445	445	218	218
6 month death	4.13%	1.09%	2.77%	2.46%	4.49%	5.39%	4.58%	1.38%
1 year death	5.94%	2.33%	4.37%	3.74%	6.37%	7.7%	5.1%	1.94%
		p<0.001		p=0.69		p=0.33		p=0.065
6m death/MI/TVR	10.93%	4.2%	8.31%	4.92%	11.69%	10.11%	9.63%	4.13%
1y death/MI/TVR	15.02%	6.98%	12.15%	8.12%	14.73%	14.49%	13.26%	5.27%
		p<0.001		p=0.28		p=0.56		p=0.005

Conclusions: We noted a difference in the clinical performance of the 4 types of DES, with apparently better outcomes in patients treated with Sirolimus and Everolimus eluting stents

The long-term clinical outcomes [3 years] among STEMI patients treated with primary PCI: Mortality insights from a large single-center registry

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Background and Aims: Cumulative evidence has demonstrated that rapid primary percutaneous coronary intervention (PPCI) is the most effective reperfusion strategy for acute STEMI. However, the long-term benefits of PPCI have not been known exactly. The goal of this study was to examine the long clinical outcomes after PPCI.

Methods: Our registry consisted of consecutive 1102 patients with STEMI treated with PPCI. Three-year follow-up evaluation was performed. All pts treated using primary PCI for STEMI within 12 hours of chest pain were included.

Results: Median time to death 56 [5-462] days.

	1-year	2-year	3-year
Death	14%	17%	19%
Re-MI	7.1%	7.6%	8.3%
Stent thrombosis	3.3%	3.7%	3.7%
TVR	12%	15%	16%
CABG	5.5%	5.9%	6.2%
MACE	28%	32%	35%

After multivariate analysis including all factor associated with 3- year mortality in uni-variate analysis [$p < 0.05$] the following factors were statistically significant factors predicting 3 year mortality:

	OR	95 % CI	P-value
Age > 65 y	1.5	1.1-2.2	0.04
GFR (<60 mL/min/1.73 m ²)	1.7	1.3-2.2	0.005
Killip class >1	1.9	1.5-2.5	0.00
Final TIMI3	0.4	0.2-0.95	0.04
LVEF <40%	1.4	1.2-1.7	0.003

Conclusions: Our results show that the majority of death occurs in the first year following STEMI. Older age, high killip class, impaired renal function, and depressed left ventricular function are significant factors associated with poor outcomes while successful angiographic PPCI improve this outcome.

Trends of Coronary Procedures among Patients with Acute Coronary Syndrome in Israel (ACSIS 2002-2008)

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Background: Data describing contemporary trends in utilization of interventional coronary procedures (ICP) in patients hospitalized with Acute Coronary Syndromes (ACS) are scarce. The objective of the present study was to examine the trend of use of ICP in Israel between 2002 and 2008 within 30 days hospitalization, based on the nationwide survey – Acute Coronary Syndrome Israeli Survey (ACSIS).

Methods and Results: The rate of coronary angiography increased from 78 to 91% from 2002 to 2008. In the same period PCI and CABG increased from 58 to 72% and from 7.5 to 9.2%, respectively. Among patients undergoing coronary angiography the rate of PCI (73 to 77%) and CABG (11 to 10%) remained stable. The proportion of early CABG (within 48 hrs) also remained stable during this period (12% in 2002 and 15% in 2008).

Conclusions: The rate of coronary angiography in patients with ACS increased greatly between 2002 and 2008. This was also true for PCI and even, but to a lesser degree, for CABG. Only a small proportion of CABG (10-15%) was urgent. The majority of CABG patients underwent the procedures after the second day of hospitalization. This study suggests an increased use of ICP among ACS patients in Israel. The proportion of PCI vs CABG in patients with ACS remained stable between 2002 to 2008.

Determinants of slow flow in patients with normal coronary arteries

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Introduction: Reduced myocardial perfusion assessed during angiography has been shown to be a negative prognostic sign in patients with myocardial infarction. It has been attributed to various reasons such as: distal embolization, hyperviscosity, endothelial dysfunction, coronary spasm or inflammation. In order to evaluate the factors associated with slow flow, we recruited patients that had normal coronaries per angiography in order to exclude distal embolization as a cause of coronary slow flow. In this study, we evaluated the factors affecting coronary blood flow

Methods: We recruited 128 consecutive patients who underwent angiography due to unstable angina or non specific chest pain and were found to have normal coronaries per angiography. Each patient's angiogram was evaluated by 2 blinded specialists who graded the patients' TIMI frame count, TIMI flow grade and Clearance scores.

Results: Corrected TIMI Frame Count which evaluates epicardial blood flow and Clearance Rate Score which evaluates the microcirculation blood flow were highly correlated ($r=0.6$, $p=0.0001$). Their range was 14 fold (10-143 frames) with 50% of the patients with slow coronary blood flow. These correlations persisted in all the different coronary arteries supporting the assumption that slow flow is a systemic problem and not a local problem due to spasm of a specific artery. No correlation was found between coronary blood flow and different biomarkers of inflammation (CRP, WBC), rheology (fibrinogen), endothelial dysfunction (ICAM, VCAM, E-selectin), or metabolic parameters (HDL, LDL, triglycerides, HbA1c). Current smoking was the only determinant correlated with slow flow ($r=0.24$, $p=0.007$).

Conclusions: In patients with normal coronary arteries, coronary blood flow velocity is highly correlated between different blood vessels and the different measuring techniques. Slow flow is highly correlated to current smoking

Telemedicine for Diagnosing and Managing Paroxysmal Atrial Fibrillation in Outpatients. The Phone, not the Pill, in the Pocket

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BACKGROUND

Individuals who experience paroxysmal atrial fibrillation (PAF) are at risk of several serious sequelae, including stroke. PAF episodes usually occur in the out-of-hospital setting, and patients seek emergency services for differential diagnosis and treatment.

METHODS

The medical records of all subscribers with one or more episodes of recurrent PAF and managed by the call center between 2/2002-8/2009 were retrieved. Treatment protocol consisted of initial electrocardiographic (ECG) confirmation of PAF and repeat ECGs within 24 hours. Management was exclusively by telephonically transmitted recommendations (Group A) or also included intervention by the attending physician of a 'SHL'-Telemedicine mobile intensive care unit (Group B).

RESULTS

A total of 649 cardiac patients (1886 PAF episodes) were enrolled. The leading complaint was palpitation (57%). The 576 Group A patients had 1667 objectively documented PAF episodes, of which 1326 (79.5%) were converted into sinus rhythm by following telephonically delivered instructions. Their mean heart rate decreased from 85±15 to 66±10 beats per minute (bpm) (P<0.001). Heart rate remained unchanged (86±15 bpm) for those who remained in PAF. The 160 Group B patients (218 PAF episodes) had a conversion rate of 70% (153/218). The heart rate in converted cases decreased from 92±24 bpm to 68±21 bpm compared to a decrease from 90± 21 bpm to 87±21 bpm for those whose arrhythmia persisted (P<0.001).

CONCLUSIONS

Telemedicine for rapid out-of-hospital diagnosis and provision of objective documentation and instructions for appropriate management of PAF is feasible and could avoid potential PAF-associated complications and unnecessary emergency room visits and hospitalizations.

Improving the Specificity of Exercise Testing in Women by High-Frequency QRS Analysis

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Background: Exercise testing (ETT) in women with suspected coronary artery disease (CAD) has limited specificity, leading to an excessive rate of unnecessary angiographies. Analysis of high-frequency QRS (HFQRS) components was recently shown to be more accurate than ST changes in identifying stress-induced ischemia, independent of gender. The aim of this study was to evaluate the diagnostic value of HFQRS in women referred to angiography.

Methods: Analysis was performed in 25 women (age 62±10 yo) referred to non urgent angiography, which served as the gold standard for comparison. Pts underwent ETT using the HyperQ system, which provides both conventional ECG and HFQRS signals. HFQRS diagnosis was determined by computerized analysis, measuring the stress-induced reduction in HFQRS intensity. The diagnostic performance of HFQRS was compared to ST segment analysis and clinical symptoms during ETT.

Results: Angiographically significant CAD was found in 13 pts (52%). Clinical ETT interpretation was abnormal in 22 pts and inconclusive in 3 pts. Ischemic ST changes and chest pain observed during exercise were sensitive but highly non-specific for CAD diagnosis (Table). HFQRS analysis provided significantly higher specificity of 83% ($P < 0.05$ vs ST changes), with similar sensitivity of 77%.

Conclusions: HFQRS analysis improved the specificity of ETT in assessing CAD, while retaining high sensitivity. Thus, HFQRS may reduce the number of unnecessary angiography procedures in women.

	Sensitivity (N=13)	Specificity (N=12)	Accuracy (N=25)
HFQRS	77%	83%*	80%
ST changes	85%	25%	56%
Chest pain	77%	58%	68%
Clinical diagnosis	92%	17%	56%

*P<0.05 vs. ST changes

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Fast Track Evaluation of Patients with Acute chest Pain – Results of a Large Scale Israeli Chest Pain Unit.

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Background: Numerous patients present to the emergency department (ED) with chest pain. While in most patients chest pain represents benign complaints, in some underlie life threatening illness.

Objective: To show the utilization of a large scale cardiologist based chest pain unit (CPU) and the use of different non invasive imaging modalities in the day to day routine evaluation of patients presenting to the ED with acute chest pain.

Methods: We evaluated the records of 1055 consecutive patients which presented to the ED with complaints of chest pain and were admitted for evaluation in the CPU. Patients were evaluated according to the attending cardiologist's decision by either myocardial perfusion scintigraphy (MPS), Multidetector computed tomography (MDCT), or stress echocardiography after an observation period.

Results: 108 patients did not go non-invasive evaluation and were either admitted (58 patients) or discharged (50 patients) after an observation period. Four hundred and forty five patients underwent MDCT, 444 MPS, and 58 underwent stress echocardiography. A total of 907 patients (86%) were discharged from the CPU. At average period of 236 ± 223 days 25 patients (3.1%) of the patients have been re-admitted due to a suspected cardiac origin of chest pain and only 8 (0.9%) suffered a major adverse cardiovascular event.

Conclusions: Utilization of a cardiologist based CPU enabled patients to receive a quick, thorough, and complete evaluation for their primary complaint, thus saving precious hospitalization costs and occupancy on one hand and avoiding misdiagnosis on discharged patients on the other.

The Efficacy of Cardiac Shock Wave Therapy in the Treatment of Refractory Angina: A Prospective, Randomized, Double-blind Trial

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Background: Medical therapy for refractory angina not amenable to revascularization is limited. Animal studies have demonstrated that the use of low-energy extracorporeal shock waves (ESW) can contribute to angiogenesis and potentially improve symptoms of angina. The objective of this prospective study was to evaluate the efficacy of ESW therapy in patients with refractory angina.

Methods: Patients with refractory angina on medical therapy and ischemia on thallium testing with coronary disease not amenable for revascularization were eligible for the study. Patients with acute coronary syndromes, PCI or CABG within three months were excluded. All candidates underwent exercise treadmill testing on a modified Bruce protocol prior to beginning treatment. Patients were randomly assigned in a double-blind manner to active or sham treatment in a 2:1 ratio. ESW treatment directed at the ischemic areas on thallium testing was performed over a two month period in nine sessions with 300-500 low-energy shocks used in each session. Exercise testing was repeated at one and three months after completing the protocol. The primary endpoint of the study was change in exercise time as compared to baseline.

Results: 18 patients have been enrolled in the study (mean age 66.1 ± 18 yrs. ; 17 male) and 15 have completed at least 1 month follow-up exercise testing. The 9 patients receiving active therapy had an average significant improvement in exercise tolerance at one-month follow-up with a mean improvement of 150.2 ± 162.7 seconds, p-value < 0.02. The 6 patients in the placebo group had a non significant change of 57.8 ± 161.8 seconds, p-value < 0.42. There were no side effects or complications noted in any of the subjects.

Conclusion: Non-invasive, extracorporeal shock wave therapy is safe and appears to be efficacious in the treatment of refractory angina. Our initial findings warrant further and larger studies of ESW efficacy in patients with ischemic heart disease.

Echocardiography-based Pleural Ultrasound for The Eeduction of Unnecessary Pleural Interventions in Post Cardiac Surgery Patients

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Purpose

Pleural effusion is a common post cardiac surgery complication, the evaluation of which using physical examination and chest x-rays is frequently misleading. Since ultrasonography (US) has been established as valuable in such cases, we attempted to use the in-ward echocardiography system to evaluate the pleural space in selected patients.

Methods

GE Medical, Vivid 3 echocardiography system with a 3S probe (1.5–3.6 MHz) was used (shares technical specifications similar to the routine US system) for the study.

From March to September 2009, all post cardiac surgery patients planned to undergo thoracentesis or drainage according to clinical findings and chest x-rays were included in the study.

Based on the pleural-echo examination, a decision was taken whether to perform US-guided thoracentesis or drainage, or whether follow up would be sufficient. Patients were followed six weeks later in our outpatient clinic.

Results

Of 323 patients who underwent open heart surgery, pleural intervention was considered according to routine indications in 70 (22%) patients.

A total of 98 US examinations were performed on these patients, followed by 35 thoracenteses and 13 drainage procedures, all US-guided.

Fifty examinations led to repeated follow-up only. The calculated intervention rate was 49%. At the outpatient follow up, 11 of 26 (42%) patients treated with thoracentesis and 1 of 12 (8%) patients treated with pleural drainage had recurrent pleural effusion.

Of the 32 patients who had no intervention, one (3%) had significant effusion.

Conclusions

The use of routine US decreased the intervention rate by 51%.

Only one patient who had no intervention performed suffered from effusion at the postoperative visit, emphasizing the accuracy of the technique.

The use of the echocardiography system as "*echopleurography*" has changed and improved our decision-making and precision in treating postoperative pleural effusion.

Incidence, and Correlated of Nuisance Bleeding Following Anti-Platelet Therapy for Patient with Drug Eluting Stent

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Background: Superficial or nuisance bleeding following dual antiplatelet therapy (DAT) is not well characterized despite its potential to impact patients(Pts) compliance. The aim of our study was to evaluate the incidence to detect correlates of nuisance bleeding

Methods: The study consisted of 2948 pts undergoing successful DES implantation who were discharged on DAT for 12 month. A new bleeding calcification was used alarming bleeding, Internal bleeding, Nuisance bleeding to allow a better covering the entire spectrum of bleeding complication. Pts were contacted at 30 days 6 and 12 months and annually and the data regarding bleeding complications and clinical events were collected prospectively.

Results: After excluding Pts with alarming bleeding 9 (0.3%) and internal bleeding 128 (4.3%) the 2811 Pts were divided into two groups with or without nuisance bleeding 812(28.8%) and 1999 (70.3%) respectively. Pts with nuisance bleeding were significantly younger 63.0 ± 11.4 yeas vs. the group without bleeding 65.2 ± 11.6 , $p < 0.001$, had more Caucasians (82.0% vs. 69.6%, $p < 0.001$) and lower BMI (29.2 ± 6.1 vs. 29.8 ± 6.0 kg/m², $p = 0.01$). The prevalence of diabetes was significantly lower in the nuisance bleeding group 25.5% vs. 34.8%, $p < 0.001$. Clopidogrel was discontinue in 94(10.1%) of the Pts with alarming and nuisance bleeding. In the nuisance bleeding group 46(5.7%) stoped one or both anti-platelet therapy, with 35(4.3%) discontinue clopidogrel, 16(2.0%) stopped aspirin and 5(0.61%) stopped both as a result of the reported nuisance bleeding. All Pts without nuisance bleeding were on DAT. Multivariate analysis detected younger age, lower BMI, Caucasian race, and non diabetes as correlates associated with nuisance bleeding while on DAT.

Conclusion: Nuisance bleeding is common in Pts on prolonged DAT post PCI with DES implantation and can impacts on compliance. Nuisance bleeding should be added to the safety endpoints of clinical trials assessing new antiplatelet agents.

Clinical Results of Consecutive CTO Percutaneous Revascularization

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Background: Chronic total occlusion (CTO) plaques are the most challenging lesions in interventional cardiology.

Goal: To explore the angiographic, technical and clinical results of percutaneous CTO revascularization at our center.

Methods: Consecutive CTO interventional cases, supplying a viable myocardial region, were recorded into a Database from January 2007 to November 2009. Clinical, angiographic and procedural results of 202 patients (mean age 63 yrs, 85% males and 45% diabetics) and 207 CTO lesions were reported and filed and all events were adjudicated for procedural results and long-term adverse events (death, MI, target vessel revascularization, stent thrombosis and need for CABG). Results: Successful CTO revascularization was achieved in 167 (83%) of attempted cases. Procedural complications included dissection (10%), coronary 'wire exit' or self-limited perforation (2.5%) but no event of pericardial tamponade (0%). Drug eluting stents were utilized in 76% of successful cases.

Six month results following successful CTO recanalization are presented in Table:

	Successful CTO N=167
Death	4 (2.5%)
Myocardial infraction	2 (1.2%)
Coronary artery bypass surgery	1 (0.6%)
Target vessel revascularization	7 (4.4%)
Stent thrombosis (within one months)	1 (0.6%)
Major adverse cardiac events (hierarchical)	11 (6.8%)

Conclusion: In carefully selected cases of percutaneous CTO procedures, the technical and clinical results are reasonable and associated with a durable intermediate-term revascularization and overall good clinical results.

Long-term safety and efficacy of Drug-Eluting Stents in STEMI

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BACKGROUND: Meta-analysis of randomized trials showed superior efficacy and similar safety of Drug-eluting stents (DES) over bare metal stents (BMS) in acute ST-elevation myocardial infarction (STEMI) patients. However, long-term relative outcomes of DES vs. BMS have not been fully evaluated.

OBJECTIVES: This study investigated the long-term [3 years] safety and clinical efficacy of patients with STEMI treated with DES or with conventional BMS.

METHODS: Primary PCI was performed with DES in 109 patients [SES-60%, PES-33%]. The control group included 642 patients who were treated using BMS.

Propensity-score analyses were based on clinical and procedural information collected at the time of the index procedure. Patients with cardiogenic shock were excluded. The incidence of death, reinfarction, definite stent thrombosis and repeat revascularization was assessed up to three years.

Results: are shown in the Table.

	BMS(N=642)	DES (N=109)	P
Age (yrs)	61±13	59±12	0.09
Male	81%	87%	0.1
Anterior AMI	47%	64%	0.007
DM	27%	25%	0.7
2/3 Vessel disease	57%	64%	0.4
Post PCI TIMI 3	96%	94%	0.4
Cadillac score	4.5±3.7	4.2±3.3	0.5
One year			
Death	7.7%	5.5%	0.4
Re-MI	8.2%	0%	0.002
Stent thrombosis	4%	0.9%	0.1
TVR	18.2%	5.5%	0.009
MACE	28%	15%	0.004
3 years			
Death	14%	6.6%	0.04
Re-MI	10%	4.6%	0.07
Stent thrombosis	4.6%	4.6%	0.9
TVR	21%	13%	0.04
MACE	35%	22%	0.006

Between one and 3 years 4/642 (0.62%) additional stent thrombosis events occurred in the BMS group as compared to 3/109 (2.75%) in the DES group [p=0.001]. By multivariate analysis adjusted to the CADILLAC score, propensity score and DES use, the CADILLAC score was a significant independent risk for three years mortality while the DES use was not.

CONCLUSIONS: In patients with STEMI, treatment with DES might be related to decreased 3-year unadjusted mortality rates and is associated with a reduction in the need for TVR as compared with BMS treatment. These beneficial results is associated with increased risk of late stent thrombosis between one and 3 years

Survival after Coronary Catheterization and Intervention in Nonagenarian Patients

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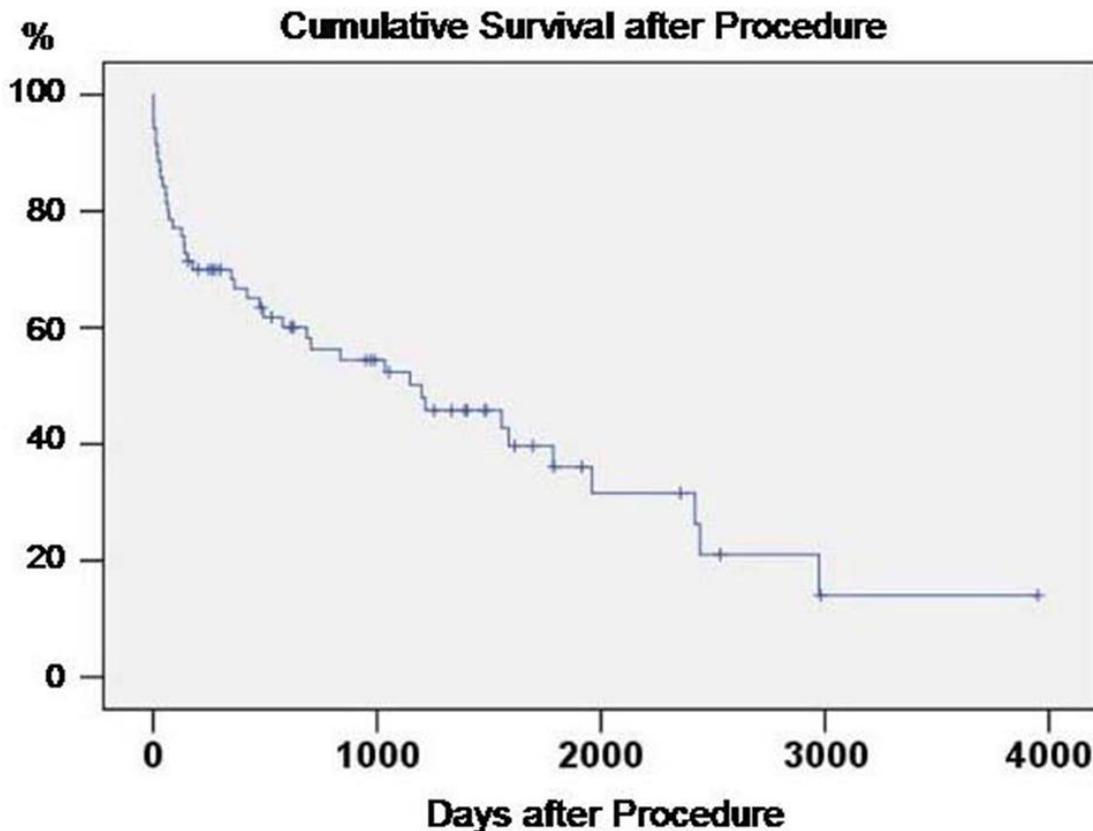
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Background: The benefit and safety of an invasive strategy in very elderly pts with angina pectoris referred for coronary angiography is unclear.

Methods: We retrospectively searched the Lady Davis Carmel Medical Center cardiac catheterization database and identified 70 pts aged ≥ 90 yrs undergoing cardiac catheterization and/or coronary intervention during a 10 year period (1999-2009). Clinical characteristics and survival were analyzed.

Results: Mean pt age was 92 ± 2 (range 90-98) yrs, 15 (22%) were female, 14 (20%) were diabetic and logistic Euroscore was $26 \pm 18\%$ (range 7-79). Sixty-six (94%) had ACS, 22 (31%) had ST-elevation MI, 7 (10%) were in cardiogenic shock, intra-aortic balloon was inserted in 6 (9%), 4 (6%) required mechanical ventilation and 2 patients arrived at the catheterization laboratory in critical condition but died prior to catheterization. The remaining 4 (6%) underwent elective procedures for stable angina. Twenty-seven (40%) had triple-vessel disease and 15 (22%) had left main stenosis $>50\%$. Forty-nine pts (70%) received revascularization: 46 (66%) PCI, 3 (4%) coronary bypass surgery and 1 pt who underwent both procedures. Over 10 years of follow-up [median 579 ± 781 days (range 0-2973)] 44 pts (63%) died. Total 1-week mortality was 10% and 1-month mortality was 14%. Pts surviving early period of risk had meaningful mid-term survival (graph).

Conclusion: In this retrospective single-center registry a strategy of aggressive coronary revascularization in a population of high-risk nonagenarian pts was feasible and associated with relatively low early mortality and meaningful mid-term survival. Advanced age in itself should not preclude catheterization and intervention in selected patients when these procedures are clinically indicated.



Coronary Angiography Using 4French Catheters: The End of the Radial Approach Era?

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Diagnostic coronary angiography using 4 French (Fr) introducer sheath in femoral approach reduces vascular complications and permits earlier post-procedures ambulation.

On the other hand, the use of small-size diagnostic catheters may result in suboptimal imaging quality, and thus may require in-procedure upsizing of sheath. Moreover, transition of the procedure to PCI requires this change too. In the real life it reduces operator's enthusiasm to begin angiography with small- size sheath. AIM: To clarify volume of 4 Fr catheters procedures at our institution and to learn pitfalls.

METHOD: Retrospective study based on data record of coronary angiography at our department from January 2007 to October 2009.

RESULTS: From Jan. 2007 to Oct. 2009 the total number of 4 Fr procedures was 795.

621 of them were diagnostic only and were completed with 4 Fr - 78% of all 4 Fr procedures and 38% of the total number of diagnostic procedures that were performed at our department in this period. In 148 (19%) 4-Fr procedures the sheath was upsized in order to treat, in 18 (2%) diagnostic angiographies were continued to PCI with replacement to 6.5 Fr SheathLess Guiding catheter, all of them were completed successfully. The SheathLess Guiding catheter is generally designed for radial approach, while using it via femoral access- is the invention of our department.

Only in 8 (1%) procedures upsizing was performed because of poor image quality in order to complete diagnostic angiography.

There were 22 cases of serious bleeding complication according to records, only 1 of them was after 4 Fr.

CONCLUSION: " poor quality image" –is not a future of 4 Fr catheter. Minimal bleeding complication rate, early ambulation, easiness of upsizing or replacement with SheathLess system (aimed to continue procedure to PCI) make 4 Fr femoral approach attractive and put it in line with radial approach and possibly even stand it one step ahead.

Impact of Renal Failure on Outcomes in Elderly Patients (≥ 75 y) Undergoing Primary PCI for Acute Myocardial Infarction

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Background: Renal failure (RF) is associated with a worsened prognosis following acute myocardial infarction (AMI). However, the prognostic importance of RF in elderly patients (pts) undergoing primary PCI for AMI has not been well characterized.

Goal: This study aimed to evaluate the impact of RF in pts ≥ 75 yrs undergoing primary PCI for ST elevation myocardial infarction (STEMI). Methods: We used our database consisting of 1494 pts treated by primary PCI for STEMI between 1/2001 and 6/2009 excluding pts with cardiogenic shock and late arrival (>12 hours). We evaluated the clinical results of treated elderly pts distinguished according to two groups (46 pts with GFR <60 and 106 pts ≥ 60 l/min/1.73m²).

Results: Compared to pts without RF, pts with RF were more likely to be female (52% vs 39%; p=0.04) and diabetics (48% vs 27%; p=0.005). One year mortality was markedly increased in pts with vs. without baseline RF (42% vs 13%, P=0.001). The rates of re-MI (16% vs 7.4%, P=0.04) as well as of MACE (56% vs 28%, P=0.0002) were also prominently increased.

Conclusion: 1). Elderly pts with RF undergoing primary PCI for STEMI had three times mortality rate and twice the rate of Re MI and MACE, 2). These findings can be explained only in part by female preponderance and increased incidence of diabetes mellitus in pts with RF, 3). New approaches are needed to improve the very poor prognosis of elderly pts with RF and AMI.

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Emergency Coronary Bypass (CABG) after Primary PCI

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Background: Emergent CABG after primary PCI in acute coronary syndrome might be associated with significant morbidity and mortality.

Objectives: To evaluate the clinical characteristics, indications and outcomes of emergency CABG performed at our center

Methods: Using our database we explore all cases (N=36) who were referred for emergent CABG following primary PCI between 3.2006 and 4.2009.

Results: Mean patient age was 63 ± 12 , 83% were male and 25% had diabetes mellitus. Four pts (11%) were presented with cardiogenic shock and 26 pts (72%) had emergency CABG within 24 hour from primary PCI. Pts requiring surgery had LM and CAD in 56% of cases, while triple vessel coronary artery disease (CAD) was the indication for surgery in 44% of cases. One pts had stent fracture and failed catheter-based revascularization. 23 pts had diagnostic coronary angiography prior to the surgery while 13 pts had angioplasty in which 5 underwent balloon angioplasty or aspiration without stenting in order to restore coronary flow. Early CABG less than 24 hours confer high mortality rate (23%) and total mortality after one month was 17%.

Conclusion: The need for emergency CABG is low in the primary PCI era but when required it carries serious mortality risk.

Transthoracic Doppler Sampling of Left Main and Left Anterior Descending Coronary Artery Velocities

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Doppler trans-thoracic sampling of coronary artery velocities is possible, especially of the left anterior descending coronary artery. Left main coronary artery (MLCA) evaluation and velocity measurement is important.

Aim: Evaluate feasibility of Doppler sampling velocities of MLCA in addition to LAD.

Methods: Twenty five subjects were evaluated. MLCA Doppler sampling was achieved from apical five chamber views, while LAD velocities were recorded from modified short axis or apical two chamber views using adult echocardiographic transducer while the patient lying in a left decubitus position.

Results: Peak MLCA velocities in diastole 75.4 ± 32 cm/sec and in systole 45.6 ± 21.8 cm/sec, as well time velocity integrals in diastole 25.7 ± 12.3 cm and in systole 9 ± 5.8 cm were all at least twice the values in the LAD. Diastolic deceleration and pressure half times of the velocity curve of MLCA were similar to those of the LAD.

Conclusions: Transthoracic Doppler sampling of velocities of MLCA is feasible. MLCA velocities were higher than those of the LAD.

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Digital Automatic Chest Palpography Derived Mechanical Dyssnchrony Indices Increase with Right Ventricular Pacing

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QRS width and echocardiography derived indices are limited in the prediction of response to resynchronization therapy. We applied digital palpography using a new vibration resonance imaging technique to evaluate timing of mechanical events.

Aim: Evaluate and correlate parameters of mechanical dyssynchrony and left ventricular ejection fraction (LVEF).

Methods: Forty nine subjects were examined, 24 were normal controls, 18 subjects with right ventricular apical pacing 12 of them had reduced LVEF, and 7 subjects with reduced LVEF and narrow QRS. Digital measurement of QRS width was performed. Mechanical dyssynchrony was evaluated from digitally recorded chest palpogram using a matrix of 5x5 transducers. The interval between the onset of q-wave and the peak of the amplitude of vibration for each transducer was measured and a colored three dimensional map for the whole matrix of transducers was generated. Mean values (QE1) were measured. Mechanical vibration systolic dyssynchrony index (VSDI) for each subject was determined as the standard deviation of the difference between the median value and each transducer interval.

Results: Mechanical dyssynchrony indices were larger with pacing and reduced LVEF. QRS width correlated with QE1 ($r^2=0.75$).

Conclusions: Digital chest palpography derived dyssnchrony indices are larger with right ventricular pacing and reduced LVEF.

Lack of Gender Effect on the Evaluation of Asymptomatic Severe Aortic Stenosis Patients by Stress Echocardiography

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Background: The clinical manifestations of heart disease may be different between genders as in the case of coronary artery disease (CAD). The study aimed to determine whether gender affected the assessment of asymptomatic patients with severe aortic stenosis (SAS) by stress echocardiography.

Methods: Two groups of patients (58 males vs. 42 females) with asymptomatic SAS and good LV function underwent stress echocardiography using treadmill Bruce protocol with careful hemodynamic monitoring. The majority of the patients (63%) had been followed in our valvular clinic for an average period of 52 ± 34 months (similar in each gender).

Results: The two groups had similar baseline- and peak-exercise heart rates, blood pressures, aortic valve severity grade and prevalence of proven CAD. The females were older and achieved a lower exercise grade than the males (Table), nevertheless, 83% of each group performed significant exercise; 80% of the maximal heart rate. There were no significant differences between genders regarding customary exercise-related parameters for the definition of abnormal test in AS (Table). Seventeen females (40%) and 24 males (41%) underwent AVR within similar time periods from the stress echo study (4.5 ± 4.2 vs. 4.6 ± 5.4 months, respectively $p=0.9$).

Conclusions: The assessment of asymptomatic patients with SAS by stress echocardiography was unaffected by gender. This highlights the study as a useful tool for the assessment SAS patients of both genders.

	Males (n=58)	Females (n=42)	p value
Age (years)	67±12	72±8	0.02
Exercise time (min)	6.1±2.5	4.1±2.2	0.0001
Exercise capacity (METS)	7.5±2.6	5.1±1.6	<0.0001
Dyspnea (%)	31	38.1	0.46
Angina pectoris (%)	8.6	9.5	0.87
ST depression (%)	8.6	4.8	0.45
Abnormal blood pressure response to exercise (%)	60.3	47.6	0.17
ΔAV mean gradient ≥18mmHg post exercise (%)	17.2	9.5	0.33
Abnormal LV contractility in exercise (%)	15.5	7.1	0.2

Quantification of Myocardial Iron Deposition by Two-dimensional Speckle Tracking in Patients with β -Thalassemia Major and Blackfan-Diamond Anemia

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Background

Cardiac disease related to transfusional iron overload is the leading cause of death in patients with β -thalassemia major. Identifying early myocardial iron deposition is important since significant cardiac involvement may predate a decrease in left ventricular systolic function. Cardiac magnetic resonance (CMR) is currently the only noninvasive examination to quantitate iron deposition within the myocardium.

Methods

We retrospectively analyzed myocardial mechanics by echocardiography using two-dimensional speckle tracking in 26 chronically transfused patients with β -thalassemia major or Diamond Blackfan Anaemia and compared it to cardiac magnetic resonance T2 star (T2*) calculations. We divided our population in two groups: patients with an interventricular T2* value ≤ 20 msec (low T2*) and patients with >20 msec (normal T2*), which indicates a clinically insignificant degree of iron deposition. They were compared to a control group of 18 patients, age and gender matched, with a normal echocardiogram and no history of hemoglobinopathy.

Results

Patients with significant myocardial iron deposition (low T2*) had a uniform decrease in longitudinal and circumferential strain compared to normal controls ($-15 \pm 2\%$ vs $-19 \pm 2\%$ and $-20 \pm 5\%$ vs $-25 \pm 4\%$, respectively, $p < 0.007$). Furthermore, peak twist and peak apical rotation were significantly lower in low T2* vs either normal T2* or normal control patients. Conversely, no significant difference was observed when comparing normal T2* to normal controls. There was a strong and direct correlation between average global longitudinal strain and T2* values ($r = -0.75$, $p = 0.0001$). Using a cut-off of $< -17\%$, global longitudinal strain predicted a T2* value of less than 20 msec with a sensitivity of 92% and a specificity of 77%.

Conclusion

Myocardial mechanics, asensitive marker of myocardial dysfunction offers a simple alternative to cardiac MRI for assessing patients for significant myocardial iron dep

Pre-Operative Echocardiographic Predictors of Recurrent Mitral Regurgitation Post Mitral Annuloplasty and CABG for Ischemic Mitral Regurgitation

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Background: Ischemic mitral regurgitation (IMR) may become significant after remodeling of the ischemic left ventricle, and it is strongly associated with poor outcome.

Objectives: To evaluate echocardiographic (echo) predictors of recurrent mitral regurgitation after valve repair combined with CABG in patients with coronary artery disease and IMR.

Methods and Results: A retrospective chart review and echo. analysis of all patients who underwent ring annuloplasty and CABG for IMR and coronary artery disease between June 2002 and January 2009 was conducted. Pre and post operative echo. studies were collected in 30 patients; mean aged 67.7 ± 8.9 and mean follow up of 3.3 ± 2 years. Patients with intrinsic mitral valve disease were excluded.

Echo. measures of left ventricular ejection fraction (LVEF), MR grade, LV and LA dimensions were assessed. Recurrent MR at follow up was defined when patients had moderate or severe MR based on echo criteria. 9 (30%) patients were found to have recurrent MR. The pre operative echo. data are presented.

Echocardiographic parameters pre-mitral valve repair	Recurrent MR (n=9)	Non Significant MR (n=21)	P value
Infero-lateral MI	9 (100%)	5 (24%)	<0.0001
Mitral Annulus-mm	41 ± 2.3	38 ± 2.6	0.005
LVEDV-ml	185.3 ± 31.9	144.8 ± 34.4	0.008
LVESV-ml	118.2 ± 20.8	89.9 ± 19.4	0.002
LA Area-cm ²	27.2 ± 7.3	21.0 ± 3.0	0.028
LVEF -%	35.5 ± 13.0	39.8 ± 10.1	0.32

Conclusions:

Pre-operative left atrial and ventricular dilatation including inferolateral MI location were associated with recurrent MR after ring annuloplasty combined with CABG.

Intra- and Inter-Observational Variability Using Different Doppler Modalities in Echocardiographic Optimization of Cardiac Resynchronization Therapy

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Echocardiographic optimization in the setting of cardiac resynchronization therapy is routinely performed using the time-velocity integral (VTI) of the left ventricular outflow tract to assess changes in stroke distance at different settings. We sought to assess the intra-observational and inter-observational variability at different settings, and to assess if continuous wave Doppler reduces this variability.

Methods: We reviewed 45 optimizations performed between 2007 and 2009. Patients with prosthetic valves, hypertrophic obstructive cardiomyopathy, and incomplete measurements were excluded. Of the remaining 27 patients, 14 were performed with continuous wave Doppler and 13 with pulse Doppler. Each set of measurements involved the calculation of 3 VTIS at a given pacemaker setting, and for selected settings, more than one set of measurements was performed.

Results: The coefficient of variation for all samples was 5.9%, and was 5.2% in the continuous wave group and 6.5% in the pulse wave group, $p=.13$. Correlation between different sets of measurements performed at same setting but at a different time in the course of the study was high: 0.96 for continuous wave Doppler and 0.93 for pulse wave Doppler.

Conclusions: Echocardiographic measurement of VTI performed for optimization of biventricular pacemakers has a low coefficient of variation, suggesting that it is a robust and reproducible measure of stroke distance. Although no statistically significant difference was seen between optimizations performed with pulse Doppler vs. continuous wave Doppler in this small sample, this warrants further investigation.

Apical Ballooning Syndrome and Anterior Wall Myocardial Infarction: Differential Diagnosis by Echocardiography

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Apical ballooning (AB) is clinically indistinguishable from myocardial infarction. Diagnosis is classically made by cardiac angiography that shows regional wall abnormalities involving the mid and apical parts of the left ventricle (LV) with normal coronary arteries, while the diagnostic yield of echocardiography has not been assessed. In this study we evaluated the accuracy of echocardiography in differentiating between patients with AB or first acute anterior wall MI(AMI).

Methods: Sixty nine echocardiograms of patients with either AMI(n=39) or AB (n=30) were reviewed by a single observer blinded to the clinical diagnosis. Patients with LVEF>50% were excluded(n=8). LV dimensions, LV function (global and regional wall motion scoring-visual analysis), systolic motion of the basal septum and basal lateral wall on tissue Doppler imaging (TDI) were analyzed.

Results: Echocardiography correctly diagnosed 89% of anterior MIs and 83% of AB. We found no differences in LV dimensions(4.8 ± 0.4 vs 4.7 ± 0.5 cm), LVEF($34 \pm 6\%$ vs $33 \pm 8\%$) and in TDI parameters(6.1 ± 1.2 vs 5.9 ± 1.7 cm/s on septum and 7.3 ± 2.1 vs 7.5 ± 2.1 cm/s on lateral). Regional wall motion analysis showed major differences between the groups (table).

Conclusion: Echocardiography is highly accurate in differentiating between AMI and AB.

Abnormal motion of the basal septum, and basal anterior wall are more common in AMI while involvement of the mid inferior, posterior and lateral segments are common in AB.

	AS base	PW mid	S Base	LW mid	IW mid	AW basal
AMI	50%	8%	47%	27%	22%	28%
ABS	8%	48%	0%	56%	68%	4%
p	0.01	0.0007	<0.0001	0.03	0.0005	0.02

AS= anteroseptal, PW= posterior wall, S=septum, LW=lateral wall, IW=inferior wall, AW=anterior wall.

**Assessment of trans-mitral diastolic flow by pulsed vs. continuous wave Doppler:
What difference does it make?**

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Background: Pulsed wave Doppler (PW) is routinely used to interrogate the trans-mitral valve diastolic flow but continuous wave Doppler (CW) is used for analysis of trans-mitral diastolic flow in mitral stenosis.

Aim: To determine the differences between PW and CW for interrogation trans-mitral diastolic flow.

Methods: Consecutive patients in sinus rhythm referred to our echo lab underwent a routine echocardiographic study and in addition, trans-mitral diastolic flow was recorded by both PW and CW in the 4-chamber view. The PW sample volume was placed at the tips of the mitral leaflets and the CW cursor was placed through the leaflets to obtain the best quality recording. At least 2 high quality recordings with 3-5 cycles were analyzed online and saved for repeated analysis by another observer. Peak E and A velocities, their ratio, and E wave deceleration time (E-Decel-T) were measured.

Results: Sixty-one patients were studied. Their mean age was 65±16 years (range 32-94), 51% were male, left ventricular function was normal in 87%, diastolic function was normal / mildly impaired in 84%, left atrial size was normal in 59%, mitral regurgitation was < moderate in 97%. Table summarizes the results by both methods, as well as the absolute and percent difference between methods.

	PW Mean ± SD	CW Mean ± SD	Difference Mean %	P<
E Wave (cm/sec)	81.7±27.3	91.5±29.9	9.8 (12%)	0.03
A Wave (cm/sec)	74.3±23.8	79.3±22.4	5.0 (7%)	NS
E/A Ratio	1.269±0.89	1.263±0.65	0.006 (0.5%)	NS
E-Decel-T (sec)	191.6±56.9	214.4±61.6	22.8 (12%)	0.02

Although peak E and A velocities were higher by CW, they were increased proportionally so that the E/A ratio was not significantly effected. The E-Decel-T was significantly longer by CW.

Conclusions: Higher trans-mitral diastolic velocities are measured by CW that did not effect the E/A ratio but increased the E-Decel-T. A comparison of the accuracy of both methods for determination of stenotic mitral valves by the pressure-half-time method is warranted.

Late Echocardiographic Follow Up of Ischemic Mitral Regurgitation in Patients with STEMI undergoing Primary Percutaneous Coronary Intervention

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Background: Late Echo data related to ischemic mitral regurgitation (IMR) dynamics in pts undergoing primary PCI has not been fully defined.

Aim: To determine by Echo the timing of appearance, natural history and predictors of IMR dynamics in a long term follow-up (F/U).

Material & Methods Echocardiography was performed in 100 consecutive pts with STEMI eligible for PPCI. The presence and severity of IMR including LVEF were evaluated on admission, 24 hour, 1, 6 and 36 months post procedure.

On admission 27/100 (27 %) pts showed IMR.

IMR dynamics during first 6 month of F/U are presented:

Results:

	MR dynamics			
	No Change (N=11)	Deterioration (N=9)	Decrease (N=9)	P value *
Age	58±6	61±15	59±10	ns
Male Gender (%)	9 (81)	8 (89)	5 (71)	ns
TIMI flow: end of PPCI 0-I	1	0	0	ns
II	1	3	0	ns
III	9	6	7	ns
LVEF before PPCI	45±6	40±3	43±6	0.03
LVEF 24h post PPCI	44±7	40±6	44±5	ns
F/U at 180 days	56±10	43±7	51±5	0.005
LVEF (%Δ) during F/U	25±24	8±15	20±17	0.09

* Deterioration Vs other groups

Echo data > 6 months were obtained in 60/100 of the study group.

After 6 months of F/U no significant changes in LVEF and MR severity were detected in 24/27 (89%) pts presented with IMR. However of 36 patients with no MR on admission only 4 (11%) with significantly reduced LVEF (34±/-8 versus 53±/-9 p<0.013) developed late IMR.

Conclusions: Low ejection fraction at presentation with no improvement during f/u was found to be a significant predictor for IMR deterioration in the early and late period.

Is Aortic Dilatation Associated with Mitral Valve Prolapse?

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Background: In a previous study we suggested that the presence of aortic dilatation, among other factors, was associated with worsening mitral regurgitation (MR) in patients with mitral valve prolapse (MVP). Since an association between MVP and aortic dilatation has not been described for the general population, we designed a study to assess the existence of such a possible association.

Methods: Retrospective echocardiographic study, performed at a single referral center. Mitral valve prolapse was defined as prolapse of 2 mm or more above the mitral annulus. The aorta was considered dilated if the root diameter or ascending aorta diameter were > 37mm.

Results: From a database of 100317 patients who had echocardiographic studies, we identified 2492 patients with mitral valve prolapse (2.5%). Aortic dilatation was present in 240 of patients with MVP (9.6%) and in 8039 patients without MVP (8.95%), $p = 0.0002$. Bicuspid aortic valve (BAV) was present in 4.2% (10 patients) of those with MVP and aortic dilatation and in 4.6% (366 patients) of those with MVP but no aortic dilatation ($p=0.9$). Significant MR (moderate to severe or severe) was present in 29.6% of patients with MVP and aortic dilatation. Conclusion: Aortic dilatation was slightly but significantly more prevalent in patients with MVP than in patients without MVP. Further studies are warranted for the assessment of this association.

Echocardiographic Spectrum of Potential Cardiac Causes of Severe Pulmonary Hypertension

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Background: Estimation of pulmonary artery systolic pressure (PAP) and assessment of possible cardiac causes of pulmonary hypertension (PH) are feasible by echocardiography. The objective of our study was to determine the frequency and distribution of potential cardiac causes of severe PH in a large group of patients examined by echocardiography.

Methods: The echocardiographic laboratory computerized database was used to identify consecutive patients with severe PH, defined as a PAP ≥ 60 mmHg (determined by echocardiography). The echocardiographic reports of these patients were reviewed and they were grouped according to potential cardiac etiologies of PH: 1) moderate or severe left ventricular systolic dysfunction (LVSD) (left ventricular ejection fraction $<40\%$); 2) moderate or severe left ventricular diastolic dysfunction (LVDD) (pseudo-normal or restrictive left ventricular filling pattern); 3) any type of myocardial dysfunction (LVSD and/or LVDD), 4) significant valve disease (moderate or severe mitral stenosis, severe aortic stenosis, severe mitral or aortic regurgitation, and normal or abnormal mitral or aortic prostheses); or 5) combined myocardial and valve disease.

Results: Of 12,302 examinations performed during an 18 months period, 536 patients had severe PH in a total of 625 examinations (5.1% of all examinations; PAP = 70 ± 10 mmHg, range: 60-115 mmHg). LVSD, LVDD, myocardial dysfunction (LVSD or LVDD), valve disease (defined above), and combined myocardial and valve disease were evident in 165 (30.8%), 175 (32.6%), 262 (48.8%), 189 (35.3%), and 127 patients (23.7%), respectively. There was no obvious cardiac diagnosis in 175 patients with severe PH (32.6%).

Conclusions: Severe PH is a common finding in a high volume echocardiographic laboratory. Advanced myocardial dysfunction and/or valve disease are the potential cause of severe PH in $\sim 2/3$ of patients, whereas there is no obvious cardiac cause of PH in \sim a third of patients.

Referral to aortic valve replacement in young adult population

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Introduction: Aortic stenosis (AS) can be present among the younger age with congenital bicuspid aortic valve (BAV) or rheumatic heart disease (RHD). The data on the younger group is limited especially concerning echocardiographic follow up and predictors for referral to aortic valve replacement (AVR). We sought to identify clinical and echocardiographic parameters that may predict AVR in the young age group with AS.

Methods: Patients $f < 50$ years, with velocity of > 2 meters per second across the aortic valve, and at least 2 echocardiograms before surgery or during follow up period, were identified from the echocardiographic database. Logistic regression models were used to assess the associations.

Results: One hundred and fifty-one patients were included in the study, 70 with RHD, 54 with BAV and 27 others. Thirty-three patients (22%) were referred for AVR. The table depicts clinical and echocardiographic characteristics of the two groups of patients: those who underwent AVR and those who were free of surgery at the end of the follow up period. Age (@1st echo), sex, peak velocity (@1st echo) and peak gradient (@1st echo) each were found to be independent predictors for AVR.

Conclusion: age at first echo, male gender and peak velocity were independently associated with higher referral rate to aortic valve surgery.

	No surgery (118 patients)		AVR (33 patients)	
Age at first echo (years)	36.8+10.0		42.8+6.6	
Sex (male/female)	50/67		20/13	
Time of follow up (days)	1949+1194		1715+1259	
AV measurements	First echo	Last echo	First echo	Last echo
Peak Velocity (meter/second)	2.77+0.70	3.11+0.77	3.45+0.73	4.27+0.67
Peak Gradient (mm Hg)	32.9+18.5	40.6+21.0	48.9+22.2	74.4+22.9
Mean Gradient (mm Hg)	25.0+14.3	30.6+12.4	29.6+10.2	47.3+15.1

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Patient Satisfaction 3 years after Endoscopic Saphenous Vein Harvesting is Higher than after Open Harvesting

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Although arterial conduits to the left coronary system have been shown to have a higher patency rate in CABG patients, the Saphenous vein (SVG) is still frequently used as a graft to the right coronary system and in other high risk patients. Traditionally the SVG was harvested in an open, long incision technique. Since the introduction of Endoscopic Saphenous vein Harvesting (EVH) in 1998 over 1000 Patients had EVH in Carmel Medical Center and it has become the routine technique

Material and Methods: From this patient cohort, 108 patients that had EVH in the years 2005 or 2006 were randomly chosen. Those were compared to a control group of 35 patients that had undergone open vein harvesting (OVH) at the same time period. The patients answered an 11 questions telephone survey – 8 questions regarding the leg incision and 3 questions regarding the chest incision. The patients were asked to grade from 1 to 10 the extent of pain from the incisions, the discomfort from the incisions and scars and the cosmetic result. The patients were asked about three times periods: 1- Immediately after surgery, 2 – In the short period after discharge and 3 – At preset day – 2-3 years after the operation. They were also asked to score their general satisfaction and about occurrence of major complications. Results: Pain from the leg incision was statistically lower in the study group starting immediately post operative through out and until today. There was statistically less leg discomfort and mobilization difficulties during the 3 time periods. Chest pain was also statistically lower in the study group. There was no statistically difference in major complication rate between the two groups. Conclusion: EVH patients compared with OVH patients have less pain, less discomfort and a higher satisfaction post operative and 2 and 3 year after operation. Further study of the Patience rate of EVH is needed

Is Bilateral Internal Thoracic Artery Grafting Contraindicated in Patients with Severe Left Ventricular Dysfunction?

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Objective: Most surgeons are reluctant to use Bilateral Internal Thoracic artery (BITA) grafting in patients with severe left ventricular dysfunction (LVD). The purpose of this study is to compare long-term outcome of this subset of patients with that of patients with normal or moderately impaired left ventricular function.

Methods: Between 1996 and 2001 140 consecutive patients with LVD (EF < 35%) underwent skeletonized BITA grafting at our institute. They were compared with 1375 BITA patients with EF > 35%. After propensity score matching, two groups (134 patients each) were used to evaluate the effect of LVD on long term outcome.

Results: After matching, the two groups were similar except for increased prevalence of acute MI in patients with EF < 35%. Thirty days mortality, as well as occurrences of major morbidity events (perioperative MI, stroke and sternal infection) were similar in the two groups. Actuarial (Kaplan-Meier) 10 year survival of patients with EF > 35% was 65%, compared to 62% when 35% > EF > 25%, and 43% in patients with EF < 25% (p=0.064, Log-Rank test). EF < 25% was found to be an independent predictor of decreased survival (H.R. 1.92, 95% CI 1.04-5.26). Other predictors of decreased survival were age, diabetes and COPD.

Conclusion: BITA grafting in patients with LVD is safe and associated with long-term survival similar to that of patients with better LV function. However, patients with EF < 25% had decreased survival and prospective studies are required to evaluate the contribution of the second ITA to their late outcome.

Modification of surgical approach in BITA grafting and its influence on long-term outcome

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Background: Learning curve can affect early and long term outcome of surgical procedure. In order to evaluate the effect of learning curve on long term outcome of Bilateral Internal Thoracic Artery (BITA) grafting, we compared two cohorts of patients: those operated between 1996-1999 (early period) and those operated between 2000-2001 (late period).

Methods: 1163 consecutive patients underwent BITA grafting in the early period and 352 in the late period. Occurrence of acute MI, hypertension, two vessel disease and repeat operations was higher in the early period. On the other hand, peripheral vascular disease and prior percutaneous interventions were more common in the later period (propensity score was used). To account for preoperative risk factors after matching, two groups (342 patients each) were used for comparison between the early and late periods.

Results: The two groups were similar in all preoperative characteristics. However, more patients in the early period had sequential grafting. Saphenous vein grafts, right system revascularization and off-pump technique were more common in the later period. Operative mortality, occurrence of perioperative MI and strokes were similar in the two groups. However, sternal wound infection was more common in the later group (2% vs 0%, p=0.008). Seven years Cox adjusted survival in the later group was better (H.R. 6.1, 95% CI 1.26-29.4).

Conclusions: A greater surgical experience acquired over the years and the use of off-pump revascularization are probably related to better long term outcome in the later period.

Late outcome of bilateral ITA grafting for patients with acute MI

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Objective: Primary balloon angioplasty is currently the preferred method of myocardial revascularization in patients with acute myocardial infarction (AMI). However, a decade ago, many AMI patients underwent intravenous thrombolytic therapy and some of them were referred to surgical myocardial revascularization without or after lytic therapy. The purpose of this report is to describe long-term outcome of AMI patients who underwent myocardial revascularization with bilateral internal thoracic arteries (ITAs).

Methods: Between 1996 and 2001, 346 consecutive AMI patients underwent skeletonized bilateral ITA grafting. Of the 276 male and 69 female patients, 130 (37.6%) were >70 years of age, 102 (29.5%) had congestive heart failure, 50 (14.5%) had EF <35%, 92 (26.6%) had left main disease and 78 (22.5%) were emergency cases.

Results: Operative mortality was 5.2%. Early postoperative morbidity included: sternal infection (2.3%), cerebrovascular accident (3.5%) and perioperative myocardial infarction (2%). Multiple regression analysis showed emergency operation (odds ratio 6.9, 95% Confidence Interval (C.I.) 2.43-19.23), peripheral vascular disease (odds ratio 1.33-12.3) and aortic cross clamping time (O.R. 1.018, 95% C.I. 1.002-1.034) to be associated with increased risk of operative mortality. Follow-up ranged between 7-13 years. Cox adjusted 10 years survival was 76%, and MACE (Major Adverse Cardiovascular Events)-free survival was 70%. Decreased survival was related to age (H.R. 1.067, 95% C.I. 1.045-1.090), CHF (H.R. 1.71, 95% C.I. 1.16-2.51), Emergency Operation (H.R. 1.62-95%, 1.04-2.51) and PVD (H.R. 2.42, 95% C.I. 1.49-3.93).

Conclusions: Bilateral ITA grafting is associated with good long-term results in patients operated on within the first week of acute MI.

Carotid Stenting Followed by Immediate CABG in Patients with Unstable Angina; Early Experience and Mid Term Follow Up.

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Introduction: Carotid revascularization is sometimes needed before CABG in order to reduce post CABG neurologic complications. However the timing and mode of carotid revascularization before CABG has not yet been determined.

Aim: We tested a hybrid revascularization approach of carotid stenting (CAS) followed by immediate on- pump CABG in pts with triple vessel coronary artery disease presented with unstable angina. Post CABG immediate complications and 30 days follow up are presented. Matreial & Methods During the last years 41 pts underwent CAS in our institute. Among them 3 pts (mean age of 56±8 year with unstable angina needed urgent coronary revascularization. All pts showed TVD with significant (>80%) internal carotid artery narrowing. One patient suffered from a TIA. The other two were asymptomatic. CAS followed by CABG were performed according to the standard practice in a time interval of 24-48 hours. Post stenting anticoagulation regimen was LMWH (1mg/kg twice a day) and Aspirin (100mg/day).Clopidogrel 300 mg as a loading dose followed by 75 mg /day for 1 month was initiated 6 hours post surgery via gastric tube in the post -operative cardiac care unit.

Both cardiac and neurological status (modified Rankin scale) were evaluated daily after CABG until hospital discharge and every 3 month by a cardiologist or family practitioner.

Results: No death, acute MI, minor or major strokes were reported in hospital or during follow up.

Conclusions: Immediate CABG post CAS in pts with unstable angina is feasible and relatively safe. Large prospective studies are needed for verify this hybrid therapeutic approach.

1550390

Novel Technique for Tricuspid Valve Repair

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Repair of regurgitant tricuspid valve is very complex. Medical literature describes mainly repair of tricuspid valve in cases of Epstein's Anomaly and rheumatic heart disease. Repair of a tricuspid valve damaged by bacterial endocarditis or a tumor are rarely described. Tricuspid valve replacement has a very poor outcome, mainly due to the fact that the right atrium and ventricle function as a low pressure system. We would like to report a new technique for tricuspid valve repair that we have applied in three cases using pericardial membrane (PTFE) or pericard. In two of the cases, the valve was damaged by bacterial endocarditis and in one case by a tumor. The technique included adjustment of the free edges of the damaged valve leaflets in the coaptation zone, detachment of the leaflet at the annulus and completion of the missing tissue by PTFE or pericard. All three patients tolerated the procedure very well and recovered with trivial residual tricuspid regurgitation.

1550404

Box Lesion around Pulmonary Vein: Classic Lesion by Modern Technology

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Background: Maze procedure with a box lesion around pulmonary veins (PV) is a gold standard for atrial fibrillation (AF) ablation. We perform this lesion with bipolar radiofrequency (RF) ablator, abandoning the usual use of bipolar RF for bilateral epicardial isolation of pulmonary veins.

Methods: Between April 2004 and November 2009 we performed AF ablation in 224 patients using bipolar radiofrequency ablator and cryoprobe. The last 20 patients underwent the "Box" lesion. Patients' age was 63 ± 10 years. 70% of patients had persistent AF and 20% paroxysmal AF. Ablation lines were done by connecting left atriotomy to the incision left after amputated left atrial appendage by two epi- and endocardial ablation lines made with bipolar RF device. These lines were made along transverse and oblique sinus. Left atrial isthmus was ablated by bipolar RF and cryo.

Results: There were no complications related to box lesions. 18 patients (90%) were in sinus rhythm at the end of follow-up.

Conclusions: By performing box lesion around PV we achieve 3 goals: 1. Better transmuralty due to ablation of one layer of atrial wall epi- and endocardially, and not two layers like in epicardial PV isolation. 2. Isolation of whole posterior wall of the left atrium and not only PV. 3. No dissection around PV is needed. This dissection can be complicated especially with aberrant PV.

Efficacy of Surgical Ablation of Atrial Fibrillation in Patients with Rheumatic Heart Disease

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Background: Although atrial fibrillation (AF) ablation is efficient in many patient cohorts, its effect on rheumatic heart disease remains controversial. We describe a retrospective comparison of surgical ablation using the same technique in rheumatic versus non-rheumatic patients.

Methods: Between April 2004 and November 2009 we performed AF ablation in 204 patients using the "Hybrid Maze" technique, with bipolar radiofrequency ablator and cryoprobe. Patients were retrospectively allocated to: a rheumatic (77 patients, 38%) and non-rheumatic heart disease group (127 patients, 62%). Demographic parameters were similar in both groups, as well as the number of patients with permanent and persistent AF and long-standing AF in each group. Permanent AF was present in 39 (51%) and 51 patients (40%) in the rheumatic and non-rheumatic groups, respectively. Heart function and functional class were also similar, while more rheumatic patients had a severely enlarged left atrium (200-300 cc) ($p=0.02$).

Results: There were two peri-operative deaths. Post-operative complications were similar in both groups, with 51 rheumatic (66%) and 91 non-rheumatic patients (72%) in sinus rhythm at discharge. Total, complete, mean follow-up was 19 months after which 59 (77%) and 91 patients (72%) were in sinus in the rheumatic and non-rheumatic group, respectively, of whom 81% were without anti-arrhythmic medications. Ablation failure risk factors included: pre-operative permanent AF ($p=0.02$).

Conclusions: The efficacy of AF ablation proved similar in rheumatic and non-rheumatic patients, providing pre-operative AF type and duration were similar. Larger left atria in rheumatic patients did not influence ablation results.

1550780

Surgery for Ascending Aortic Aneurysm: Experience From A Low Volume Center

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Objective: Ascending Aortic Aneurysm is a potentially life threatening condition that is amenable to surgical correction. This condition was once considered the surgical domain of high volume referral centers specializing in this complex surgery. In recent years with evolving techniques it is being more commonly performed at low volume centers. We report our department's experience for this condition.

Methods: Between 1993-2009 60 patients underwent surgery for an Ascending Aortic Aneurysm.

Results: Fifty-six were operated on an elective basis and 4(7%) were operated on urgently. Mean Age was 59+/- 13 yrs. and 45(75%) were male. The Euroscore was 8+/-3(predicted Mortality13%). Seven pts. Underwent replacement of the Ascending Aorta Alone; 19 had a Bentall Procedure and 24 pts. Underwent Aortic Valve Replacement and replacement of the Ascending Aorta separately. CPB was 184+/-75 min.; XCT- 11+/-51 min. Operative mortality was 6(10%). One pt.experienced a CVA. Predictors of mortality by Univariate analysis were NYHA Class 3-4. We did not identify predictors by multivariate analysis.

Conclusions: Surgery for Ascending Aortic Aneurysms can be carried out safely at low volume centers. Surgical experience as well as proper myocardial and cerebral protection yield the best outcomes.

Post Mitral valve repair SAM: Does it have Long term clinical implication?

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Objectives:

The risk of SAM after MV repair is caused by anterior displacement of the leaflet coaptation point, secondary to excessive height or redundant tissue of the posterior leaflet. Post repair SAM with significant MR is unacceptable, and requires immediate re-repair or valve replacement. Mild SAM immediately post repair, is handled by fluid administration, inotropes withdraw and usually the MR is mild or less, and seems to have no clinical implication. We analyzed late clinical and stress echo results of all patients, in whom tendency to have SAM was noted by TEE, immediate post degenerative mitral valve repair.

Methods:

Between 2004 and 2009, 467 patients underwent MV repair. Valve pathology was degenerative in 291 patients (62%) which were included in the study. Valve repair techniques included leaflet resection (58%), artificial chordal (44%), and edge-to-edge repair (3%), annuloplasty (98%).

Results:

There were 2 hospital deaths (1%). Mean follow up was 25±16 months. Freedoms from reoperation and from moderate or severe mitral regurgitation for all patients, were 97% and 95%, respectively.

In 10 patients we had a second pump run, from which 3 were due to significant SAM. In those patients closed ring was replaced by an open band. In 27 patients SAM was identified immediately post valve repair. Fluid administration and inotropes were withdrawn, and none of the patients had significant MR (Mild+). Late echo results demonstrated 23 patients with no or trivial MR, 2 with Mild, and 2 with Moderate MR. Those patients with early SAM, underwent stress echo, which revealed 2 patients with SAM, from which only one patient had significant gradient in the LV outflow track with SAM related moderate MR.

Conclusions:

Late post operative stress echo revealed non significant incidence of SAM in patients with immediate post repair tendency to have SAM.

Novel Stitching Technique for Aortic Valve Replacement

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Background:

"NextStitch" (Teleflex Medical) is a double-stranded suture chain of linked horizontal mattress sutures which was developed to decrease the number of needle holes around the annulus during aortic valve replacement (AVR), thereby decreasing the cross-clamping time. In addition, it has the potential benefit of reducing para-valvular leaks due to the chain nature of pledges as compared to separate pledges in the conventional technique. In this study we evaluated our short-term experience with the "NextStitch" novel technology.

Methods:

Fifteen patient who underwent AVR only or AVR and coronary bypass (combined procedure) using the "NextStitch" technique were compared to 43 similar patients who were operated using the traditional technique. The variables compared were: cross-clamp time, bypass time, mean and peak pressure postoperative aortic valve gradients, and complications.

Results:

The total cohort was divided into three groups according to type of operation performed (Table 1). No significant statistical differences were found between the two groups in terms of cross-clamp and bypass times. The postoperative peak pressure gradient for the "NextStitch" group was 30.63 ± 8.29 , compared with 34.09 ± 12.02 for the traditional method ($P=0.92$). The mean peak pressure gradient for the "NextStitch" group was 16.5 ± 5.8 , compared with 21 ± 8.6 for the traditional method ($P=0.337$). The postoperative echocardiography images revealed no para-valvular leaks in either group.

Conclusions:

The "NextStitch" suturing technique was found to be safe and feasible. No reduction in cross-clamp time or in bypass time was documented (most probably due to the considerable learning curve required for this new suturing technique). The postoperative echocardiographic results were similar in terms of peak and mean pressure gradients. The potential advantages of using fewer needles, a shorter cross-clamp time and better sealing remain to be proved in the future.

	AVR			AVR + CABG x 1			AVR + CABG x 2		
	"NextStitch"	Traditional	P	"NextStitch"	Traditional	P	"NextStitch"	Traditional	P
No. of patients	4	15		6	13		5	15	
CC time	86 ± 3.6	91 ± 19.2	0.638	94 ± 10.5	101 ± 7.1	0.295	126 ± 18.2	122 ± 22.1	0.792
Bypass time	108 ± 5.3	113 ± 27	0.702	117 ± 10.6	124 ± 11	0.635	167 ± 15.5	169 ± 28.2	0.931

Nuclear Imaging Studies of the Typical Form of Takotsubo Cardiomyopathy at Different Time Points of Disease.

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BACKGROUND: Tako tsubo cardiomyopathy is characterized by a reversible regional, typically apical, systolic dysfunction. Previous single photon emission computed tomography (SPECT) studies conducted in small cohorts reported a characteristic time course related findings, ranging from fixed, large perfusion defects at the acute phase, to nearly normal or normal appearing studies during the recovery phase.

OBJECTIVE: To describe the nuclear imaging findings at different time points of the disease of patients diagnosed with Takotsubo cardiomyopathy during the years 2004-2009.

METHODS: Forty two consecutive patients were diagnosed with Tako tsubo cardiomyopathy due to the presence of chest pain during either emotional or physical stress, ST segment changes, suggestive echocardiographic findings, elevated Troponin I levels and coronary angiography with narrowing of <50% of the epicardial coronary arteries. Twelve of these patients (28%) (mean age 61.8 years, range 50-84 years, 91% female) underwent a rest/redistribution Thallium-201 SPECT imaging. The SPECT studies were conducted at different time points, ranging from 3 to 14 days from pain onset (mean 7.1 days).

RESULTS: In 8 out of 12 patients, (66%) SPECT imaging was performed during the acute and sub-acute phases, 2 to 7 days, (mean 4.6 days) from symptom onset and demonstrated a fixed perfusion defect, ranging from small to large in size. Their mean left ventricular ejection fraction (LVEF) was 31%. In the remaining 4 patients, the SPECT imaging was performed at a later time period (12 to 14 days, mean 13 days from symptom onset) and showed a normal perfusion scan in all. The mean LVEF at that time period was 57.2%.

CONCLUSIONS: SPECT perfusion studies of patients with Tako tsubo cardiomyopathy obtained at different time points from symptom onset demonstrate a typical pattern which is in accordance with previous reports and with the clinical and echocardiographic findings of these patients.

Fatty Liver and Presence of Visceral Fat are Associated with the Presence of Coronary Plaques Evaluated by Cardiac CT.

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Background: Liver and visceral fat accumulation are increasingly associated with metabolic syndrome, a condition carrying a high risk of coronary artery disease. The independent role of liver and visceral fat accumulation in cardiovascular risk remains unclear. Aim: To evaluate the association between liver and visceral fat accumulation, insulin resistance, coronary artery disease (CAD), and early atherosclerosis. Methods: 70 patients (age 53 ± 7) with excess of visceral fat, 30 patients with fatty liver (NAFLD, aged 50 ± 9) and 30 sex, age matched healthy individuals were recruited. Coronary artery disease (CAD) was defined as a stenosis of $>50\%$ in at least one major coronary artery by cardiac CT. Fatty Liver was defined by liver minus spleen density ≥ -10 (CT), Early atherosclerosis by Intimal-Media thickness of carotid artery (IMT) >7 men; >0.65 women) by Doppler ultrasound, Visceral fat area by CT. Biomarkers of insulin resistance (HOMA), inflammation (CRP) and oxidant- antioxidants (MDA-Paraoxonase) were measured. Results: Both patients with NAFLD and patients with high visceral fat area ($>330 \pm 99$ cm²) showed higher prevalence of coronary soft plaques (50% vs. 25%, $P < 0.001$), higher prevalence of coronary stenosis (30% vs. 11%, $P < 0.001$), Higher IMT (0.98 ± 0.3 Vs 0.83 ± 0.1 , $P < 0.01$), higher HOMA (4.0 ± 3.0 vs. 2.0 ± 3.2 , $P < 0.001$) and higher triglyceride levels (220 ± 80 vs. 150 ± 50 , $P < 0.005$) than healthy controls. Multiple logistic regression showed that fatty liver predicts coronary plaques (OR 2.7, 95%CI 2.3-5.9, $P < 0.001$) and predicts early atherosclerosis (OR 1.8, 95%CI 1.1-2.9, $P < 0.01$) independently by visceral fat accumulation (OR 1.4, 95%CI 1.2-2.8, $P < 0.003$). Subcutaneous fat has no prediction power. Conclusion: Liver fat accumulation is an independent risk factor for coronary artery disease and early carotid atherosclerosis. This condition may help to optimize the cardiovascular risk stratification.

1548290

Anatomic and Hemodynamic MRI Characteristics of Partial Anomalous Pulmonary Venous Return (PAPVR) with or without Sinus Venosus Defect (SVD)

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PURPOSE

To characterize the typical anatomic and hemodynamic findings in patients with PAPVR with and without SVD undergoing cardiac MRI

METHOD

During a 4-year period 16 patients with PAPVR were referred to our cardiac MRI unit. Scans were analyzed for the presence of an associated SVD, Lt/Rt ventricular volumes and function, Qp/Qs using phase contrast technique, anatomy of the remaining pulmonary veins, and the number and level of anomalous veins to SVC.

RESULTS

Six patients were referred with a questionable RVD, consisting 2.7% of a total of 224 patients referred for questionable RVD during the given period. Patients with a significant shunt (Qp/Qs \geq 1.5) showed an averaged 98% increase in RVEDV above the normal body surface area - corrected volume. RV ejection fraction was preserved in all patients (average 54%). Although in 14/16 of patients the RUL vein was missing on the LA wall, in 8 cases a small vein could be delineated draining independently the RML into the LA.

Nine patients had an associated SVD: when compared with patients without SVD (n=7), these patients showed a higher degree of shunt (average Qp/Qs = 2.5 Vs 1.7), a higher frequency of two abnormal pulmonary veins (4/9 Vs. 1/7) and a lower level of connection to the SVC in relation to its junction with the right atrium (average 14mm, range 6-20mm Vs. average of 27mm, range 20-35mm)

CONCLUSION

The presence of more than one abnormal pulmonary vein and a low level of drainage into the SVC (\leq 20mm) should increase the suspicion for an associated SVD and a significant L-to-R shunt

Correlation Between Ear Lobe Crease and Coronary Artery Disease as Assessed by Coronary CT Angiography

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Background: A 35 year debate concerning the association between ear lobe crease (ELC) and coronary artery disease (CAD) has not yet been settled, since advanced age is considered a confounding variable. Coronary CT angiography (CCTA) is a reliable non invasive modality for the detection of even mild atherosclerotic disease, which can be missed by other diagnostic tests. This study investigates the correlation between ELC and atherosclerotic plaques in a relatively young population without known CAD.

Methods: Subjects evaluated for CAD by CCTA, referred from a chest pain unit (CPU), were also evaluated for the presence of ELC. The study was concluded as positive for any atherosclerotic plaque detected, negative if none was found, and severe if stenosis over 50% was found. The subjects were divided into age groups for analysis.

Results: The study cohort included 196 subjects (131 males, age 50 ± 9 years); 95 (48%) had a positive ELC sign, 109 (56%) had atherosclerotic disease, and 11 (6%) had severe disease. The occurrence of ELC increased with age, from 24% in the third decade, to 75% in the sixth decade of life. The statistical parameters for the correlation between atherosclerotic disease and ELC were not significant. The negative predictive value of ELC was 97% for the presence of severe CAD disease.

Conclusion: No significant correlation can be found between ELC and the presence of atherosclerotic disease as detected by CCTA. However, a negative ELC sign seemed to negate the presence of a severe disease.

Intermediate Risk (Sub-massive) Pulmonary Emboli – Can Early CT Angiography Predict the Need for Escalation Therapy?

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Introduction: Intermediate risk (sub-massive) PE is defined as significant right ventricular dysfunction in hemodynamically stable patients. Thrombolysis in this group of patients is controversial. Identifying patients in whom the benefit of thrombolysis outweighs the risk of bleeding is challenging. The aim of this study was to identify CT Angiography (CTA) parameters which can predict which patients will need escalation therapy.

Methods: CTA parameters of 31 patients with intermediate risk PE were retrospectively reviewed for 10 different parameters: diameters of the right and left ventricle (RV and LV), the azygos vein, the main pulmonary artery (MPA) the aorta, the inferior and superior vena cava cross-section's area, the inter-ventricular septum (IVS) deviation, the IVC reflux, and clot load score (Quandli score). IVS deviation was divided into three subcategories, normal position, septal straightening and septal bowing towards the LV. CTA analysis was blinded regarding the treatment regimen.

Results: Thrombolysis was administered in 6 out of the 31 patients. Among all analyzed parameters, the diameter of the RV and interventricular septal deviation were significantly different between the two treatment groups. The RV diameter was 57.3 mm in the thrombolysis group compared with 49.2 mm in the no-thrombolysis group (t-test, $p < 0.01$). IVS deviation towards the LV appeared in almost all patients which needed thrombolysis (5/6) (chi-square test, $p = 0.01$).

Conclusions: RV diameter and septal deviation on admission CTA represent significant RV pressure overload which eventually lead to pump failure and the need of escalation therapy. Further studies are needed in these patients to examine the impact of this risk stratification approach on the outcome.

Radiation Exposure Reduction Using 128 VS 64 MDCT for Coronary Evaluation in A Chest Pain Unit Setup

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Introduction:

Coronary CT angiography (CCTA) is used daily in the triage of patients (pts) in the chest pain unit (CPU). However, the radiation entailed in CCTA is not negligible. CCTA using prospective ECG gating ("Step and shoot"- S&S) enables significant radiation reduction. The 128 multi-detector CT (MDCT) opens new scanning possibilities. The purpose of this work is to determine whether the routine use of 128 VS 64 MDCT can reduce the radiation exposure entailed with CCTA in the CPU.

Subjects and methods:

S&S was performed whenever possible. 128 MDCT inclusion criteria: stable heart rate (HR) < 70/min and weight < 140 Kg. 64 MDCT inclusion criteria: stable heart rate (HR) < 60/min and weight < 110 Kg.

The study comprised 232 consecutive patients; 116 pts scanned using 128 MDCT (mean age 49; 80 males; mean HR 57; mean weight 83 Kg) and a cohort of 116 consecutive patients; scanned using 64 MDCT, during the period immediately preceding the installation of the 128 MDCT scanner (mean age 50; 76 males; mean HR 59; mean weight 82 Kg); All 15 coronary segments were evaluated for image quality using a visual scale of 1-5. An estimated radiation dose was recorded.

Results

"Step and shoot" was performed in 84% of the 128 MDCT group as compared with 49% in the 64 MDCT group ($p < 0.0001$). The mean radiation dose exposure using 128 MDCT was 6.2 ± 4.8 mSv compared with 10.4 ± 7.5 mSv using 64 MDCT; P value = 0.008. The radiation exposure for each scanning technique including: "step and shoot", "step and shoot" with 5% tolerance, retrospective ECG gating and dose modulation, were lower for the 128 MDCT group. No significant differences were found in image quality scores (average score 4.6 ± 0.3 and 4.7 ± 0.1 for 128 and 64 MDCT, respectively,)

Conclusion

128 MDCT CCTA allows significant radiation dose reduction, without hampering image quality. This noteworthy exposure decrease is of major importance especially in the relatively young CPU population.

Apical Dilemmas - The Value of CMR in Detection of Suspected Apical Disease

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Background: Frequently trans-thoracic echocardiography (TTE) provides only limited visualization of the apical region. Although usually not clinically relevant, occasionally this limitation deprives crucial information. Cardiac MRI (CMR) is known for its excellent ability to demonstrate the apex. Therefore we sought to investigate the impact of CMR on the final diagnosis in a small group of selected patients with suspected apical process in TTE study.

Methods: Patients with an apical process that was not well demonstrated in TTE were referred to CMR study. Patients with cardiac disease involving the apex that was satisfactorily demonstrated using TTE and patients with contraindications for CMR were excluded. Patient's baseline characteristics, TTE, CMR data and final diagnosis were recorded.

Results: From March 2009 to October 2009 eleven patients were referred to CMR. The average age was 60 ± 8 ; there were 9 (82%) males and 2 (18%) females. The indication for CMR was suspected apical thrombus in 5 patients and suspected pseudoaneurysm in 3 patients. In 3 patients with severe left ventricular dysfunction due to ischemic heart disease CMR was performed to clarify apical morphology and viability prior to revascularization. CMR was able to rule out thrombus in all 5 patients (in 4/5 there was hypertrabeculation of the apex). All 3 cases of suspected pseudoaneurysm were found to be apical hypertrophy or concentric hypertrophy of the mid to distal ventricular wall and pseudoaneurysm was ruled out. Viability and no apical aneurysm were found in two patients who eventually underwent successful revascularization and transmural scar and aneurysm were found in one patient who was treated medically.

Conclusions: In a selected group of patients CMR provides robust diagnostic tool for resolving undetermined TTE results. In all of the patients the diagnosis made by the CMR guided further clinical conduct.

Non Obstructive Coronary Artery Disease upon Multidetector Computed Tomography in Patients Presenting with Acute Chest Pain - Does it Matter?

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Background: Multi-detector computerized tomography (MDCT) has emerged as an efficient tool for detection of significant coronary disease and assessment of patients with acute chest pain. MDCT may detect premature, non-obstructive atherosclerotic lesions which otherwise would have not been detected upon functional cardiac imaging tests. The clinical significance of these lesions in patients is unknown. In this study we prospectively analyzed the long term outcome of patients admitted to our chest pain unit (CPU) with findings of non significant coronary artery disease (CAD) in MDCT.

Methods: The study comprised 444 patients admitted to the CPU at Sheba medical center and were evaluated by MDCT. All MDCT scans were evaluated by 2 experienced readers. Studies were classified as: normal; Non significant CAD (defined as any narrowing < 50% diameter stenosis); and significant CAD (defined as narrowing of $\geq 50\%$ diameter stenosis).

Results: Comparing patients with non-significant CAD (n=115) vs. patients with normal coronaries (n=266) upon MDCT, the aforementioned were older, more likely to be male, and dyslipidemic. During a long term follow up (371 \pm 367 days). Rates of death, repeated ACS and need for revascularization were equally low between the 2 groups. However, patients with non-significant CAD had significantly higher rates of repeated chest pain (43% versus 19%, p<0.001) and of re-admissions due to chest pain (14% versus 2.4%, p<0.001).

Conclusions: Patients with non significant disease upon MDCT have a higher rate of recurrent chest pain and re-admission but yet a benign clinical outcome as patients with normal findings.

The Value of MRI in Diagnosing Cardiac Amyloidosis

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Background: Extracellular space infiltration and direct toxicity of amyloid proteins mediate heart wall stiffening, conduction disturbances, contractile dysfunction and arrhythmia in cardiac amyloidosis. Recent studies suggest improved outcome in this lethal disease with therapies suppressing production of the abnormal protein. Diagnosis of cardiac amyloidosis is complicated by high variability in clinical presentation and inadequate performance of various diagnostic measures. A characteristic diffuse subendocardial pattern of late gadolinium enhancement (LGE) using MRI was reported to characterize cardiac amyloidosis.

Methods and Results: Our cardiac amyloidosis registry comprises 29 patients, 90% of light chains (AL) type. We assessed the sensitivity and specificity of the characteristic LGE for diagnosing cardiac amyloidosis within cardiomyopathy patients undergoing MRI in Sheba Medical Center. Cardiac amyloidosis was diagnosed by endomyocardial biopsy or the presence of typical echo-doppler pattern and a positive Congo-Red in another tissue. Between 2007 and 2009, 13 of our patients with cardiac amyloidosis underwent MRI. The sensitivity of MRI for the diagnosis of cardiac amyloidosis was 85%. Among patients with other cardiomyopathies, such an MRI pattern was encountered only in 1 patient with familial dilated cardiomyopathy caused by LMNA mutation, giving a specificity of 99%.

Conclusion: MRI may facilitate the diagnosis of cardiac amyloidosis. While a negative study cannot rule out cardiac involvement, a positive result is highly suggestive of the disease. We suggest that in a suitable patient, a combination of monoclonal gammopathy and characteristic MRI findings are sufficient to establish the diagnosis and helps initiate early chemotherapy.

Treatment, reflection of guidelines and outcome in hospitalized patients with atrial fibrillation

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Introduction: There is paucity of data about treatment and outcome of hospitalized patients with atrial fibrillation (AF). We sought to these aspects, using a retrospective disease registry.

Method: Records of patients hospitalized to the Sheba Medical Center, with the diagnosis of AF, during the 2006 year were analysed. The collected data included type of AF, symptoms on admission, medical history and way of restoration of sinus rhythm.

Results: There were 511 AF patients. Medical history included HTN (67%), IHD (40%), DM (25%), and CHF (15%). Most of patients were admitted with complains of palpitations (30%) and chest pain (14.5%), but 26% were asymptomatic. During 1 year, there was at least one recurrent hospitalization in 45% of patients. MI occurred in 16 patients (3.13%), CVA in 14 (2.7%) and death in 26 (5.08%).

Of the 63 patients with chronic AF (CAF), 95% were discharged with ongoing fibrillation, while only 26% of the paroxysmal AF and 36% of the new-onset AF (NAF) the AF remained. More than half of the patients with NAF resume sinus rhythm spontaneously.

Anti-arrhythmic drugs were used in half of the patients. Among patients with hypertrophy of left ventricle per echo, 34% were treated with propafenon or sotalol. Of patients with known coronary disease, 20% were treated with propafenon or flecainide. Of patients with CHF, 24% were treated with sotalol or propafenon. Coumadin was given to 311 patients, but 36 (12%) had a CHADS2 score of 0. Out of the 200 patients who were not treated with coumadin, 133 (66%) had CHADS2 score of 2 or more.

Conclusions: Most AF patients admitted to the hospital are of the non-CAF group. Major clinical outcomes were different between CAF and non-CAF patients, with non-CAF patients having much higher rate of CVA and death. A poor correlation was demonstrated between CHADS2 score and a decision about starting of the anticoagulant therapy. Most patients were given anti-arrhythmic treatment according to the clinical guidelines.

Prevalence of Statin-Related Muscular Complications Among Patients with Coronary Artery Disease in Israel

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HMG-CoA reductase inhibitors (statins) improve survival in patients with coronary artery disease (CAD). Muscular complications are the most common reason for statin discontinuation, occurring in up to 5% of statin-treated patients. The exact mechanism leading to statin-related muscular complications is unclear but underlying genetic factors may play an important role.

Methods: We retrospectively examined the prevalence of muscular complications [myalgia or appearance of a new creatine kinase (CK) elevation] among Jewish CAD patients, men and women, treated with statins. The patients' demographic and clinical data and data on CK level were obtained from patients' files. CK elevation was defined as statin-related only if it occurred after initiation of statin therapy, did not occur during an admission for acute coronary syndrome and was not accompanied by increase in troponin or transaminase levels.

Results: The sample group consisted of 323 unselected patients attending our coronary clinic (230 men). A total of 130 patients (40%) had at least 1 muscular complication. An elevated creatine kinase (CK) level (CK>180 IU/L), transient or persistent, was found in 92 men and 20 women (40% vs 21%, $p=0.002$, 2-tailed Fisher's exact test). CK elevation of >300 IU/L was observed in 42 men and 6 women (18% vs 6%, $p=0.009$) and CK levels of >500 IU/L were observed in 21 men and 1 woman (9% vs.1%, $p=0.007$). Ten patients (3%) had CK levels >1000 IU/L. A total of 34 patients (10.5%) reported of myalgia. There was no difference in the prevalence of myalgia between men and women (10% vs. 12%, $p=0.8$).

Conclusions: Among Jewish CAD patients, both myalgia and CK elevation develop very commonly during statin therapy. CK elevation is more common among men. No sex difference was found in the prevalence of myalgia.

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Carotid Atherosclerosis: Ultrasound and Doppler Findings in the Setting of Acute Coronary Syndrome

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Carotid atherosclerosis is associated with coronary atherosclerosis. Moreover, the culprit ruptured and unstable atherosclerotic plaque causes other unstable remote coronary plaques as shown by intra-coronary Ultrasound.

Aim: Prospective evaluation of carotid ultrasound and Doppler findings in patients presenting with Acute Coronary Syndrome.

Methods: 90 consecutive Patients, presenting with Acute Coronary Syndrome were evaluated.

All had carotid Ultrasound and Doppler examination and complete echocardiogram, laboratory blood tests were undertaken. 90 subjects had 72 coronary angiography/

Results: Intima-media thickness was greater than normal (>0.6 mm.) in 80% (n-72).

Plaques, occupying more than 30% of the lumen were in 41% (n-37).

Peak systolic velocity greater than 125 cm/sec was found in 22% (n-20).Ratio of internal to common carotid systolic velocities >2 was found in 10% (n-9).Some criteria for carotid stenosis was found in 92% of whole group,96% of those with Left Ventricular Hypertrophy, 100% of those with 3 - Vessel Disease and 92% of Patients With Aortic Regurgitation.

Conclusion: Most patients with Acute Coronary Syndrome have increased intima-media thickness and fulfill some criteria for Carotid stenosis, 3- Vessel Disease and Left Ventricular Hypertrophy increase probability of carotid stenosis in these patients. Follow-up carotid evaluation is warranted.

Impact of Daily Folate Intake on Plasma Homocysteine and Folate Levels in Patients With Different Methylenetetrahydrofolate Reductase Genotypes

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Elevated plasma homocysteine level is associated with coronary artery disease (CAD). Homozygosity for the C677T mutation in the methylenetetrahydrofolate reductase (MTHFR) gene is typically associated with hyperhomocysteinemia. However, this association is inconsistent and may depend at least in part on the intake and plasma levels of folate, a co-factor in homocysteine metabolism. We examined the impact of daily intake of folate on plasma homocysteine and folate levels in CAD patients with different MTHFR genotypes.

Methods: Daily folate intake was assessed from 3-day food records in 99 patients with CAD: 35 with the T/T (homozygous mutant) genotype and 64 with the C/C or C/T (non-T/T) genotypes. **Results:** Patients with the T/T genotype had higher fasting plasma homocysteine levels (18.4±1.9 vs 12.6±0.6 µmol/L, p=0.01) and lower plasma folate levels (17.8±1.7 vs. 20.8±1.0 nmol/L, p=0.02). There were no differences between the genotype groups in energy-adjusted folate intake. In patients with non-T/T genotypes, higher folate intake was associated with higher plasma folate levels and lower plasma homocysteine levels. In T/T homozygotes there was an upper limit to the impact of folate intake on plasma folate and a lower limit to its impact on plasma homocysteine levels. Linear regression analysis showed that folate intake, the MTHFR genotype, plasma vitamin B12 levels, and the interaction between plasma folate level and MTHFR genotype, predicted elevated homocysteine levels (folate intake, p=0.04, MTHFR genotype, p=0.03, plasma folate, p=0.02, and plasma B12 level, p=0.004). The model explained only 29% of the variance in log-transformed plasma homocysteine levels. **Conclusions:** In T/T homozygotes, fasting plasma homocysteine is more sensitive to the combination of low folate intake, low plasma folate and B12 level, than in non-T/T genotypes. The variability in plasma homocysteine among T/T homozygotes is only partly explained by folate intake.

Alpha Defensins and traditional cardiovascular risk factors: is it more of the same or beyond?

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Background: There is extensive and growing evidence that inflammation is a key player in all stages of atherosclerosis. It is now believed that most coronary artery disease risk markers have a pro-inflammatory component. Neutrophil peptides defensins are essential elements of the innate immunity and are presented in atherosclerotic plaques in humans. We recently showed high alpha-defensin score to be strongly related to coronary atherosclerosis severity in patients with ACS (unpublished data).

In the present study, we sought to assess the relationship between alpha-defensin and classic cardiovascular risk factors.

Methods: Defensin was immunohistochemically quantified in skin biopsies taken from 338 ACS patients (age 55±12) immediately prior to coronary angiography. We concurrently obtained established cardiovascular risk factors, including age, gender, blood pressure, smoking habits, serum lipids, diabetes status, BMI and family history. We also examined blood levels of novel markers of inflammation including wrCRP, hsCRP, fibrinogen, Hb1c and 2-microglobulin. Finally, a comprehensive questionnaire for infectious/inflammatory status, puberty onset and socioeconomic background was conducted.

Results: Does alpha-defensin have any additional/additive value in coronary disease risk prediction beyond already known CV risk factors?!!

We are currently doing a statistical multivariate analysis in order to address the study questions mentioned above. The complete results will be presented at the congress.

The MGuard Coronary Stent in Degenerated and Thrombotic Lesions.

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Background: MGuard was designed as a plaque trapping stent to treat atherothrombotic lesions in saphenous vein grafts (SVG) and native coronary vessels.

Objective: To explore the clinical results of using the MGuard mesh-covered stent. Methods: The MGuard stent was utilized in 27 patients (28 vessels, 39 stents). The mean age was 72.1 yrs and 85% were males. 22/28 patients had degenerated SVG lesions and 6/28 had a native stenotic RCA vessel. The clinical presentation was ACS (UAP/NSTEMI/STEMI) in 70% of patients, 59% patients had diabetes and 26% sustained some degree of renal insufficiency. The average graft age (n=27 SVGs) was 14 yrs (range 3-21). The mean stent length was 41±25 mm in vessels with a mean diameter of 3.5±0.8 mm. In 3 cases (11.1%) distal filter was used in addition to the MGuard stent.

Results: Device related success was obtained in 37/39 cases (95%). Failure to deliver the MGuard stent into the culprit lesion occurred in 2 cases (7.4%) where another stent (i.e. non MGuard) was successfully implanted. Procedural success was obtained in 27/28 cases (96.4%) and TIMI 3 flow grade was achieved in 27/28 (96%) of the treated vessels.

Clinical Outcomes are shown in the Table.

	One month	6 months
Death	0	3.7%
Cardiac Death	0	3.7%
MI	3.7%	7.4%
Stent Thrombosis	3.7%	3.7%
TVR	3.7%	7.4%
MACE	7.4%	11.1%

Conclusion: In suitable patients within SVG and/or native coronary vessels, the MGuard stent seems to be a viable treatment strategy in the percutaneous management of lesions that are particularly rich in athero-thrombotic material.

A Propensity Score Matched Comparative Analysis of Major Clinical Outcomes Using Drug-Eluting Stents Versus Bare Metal Stents

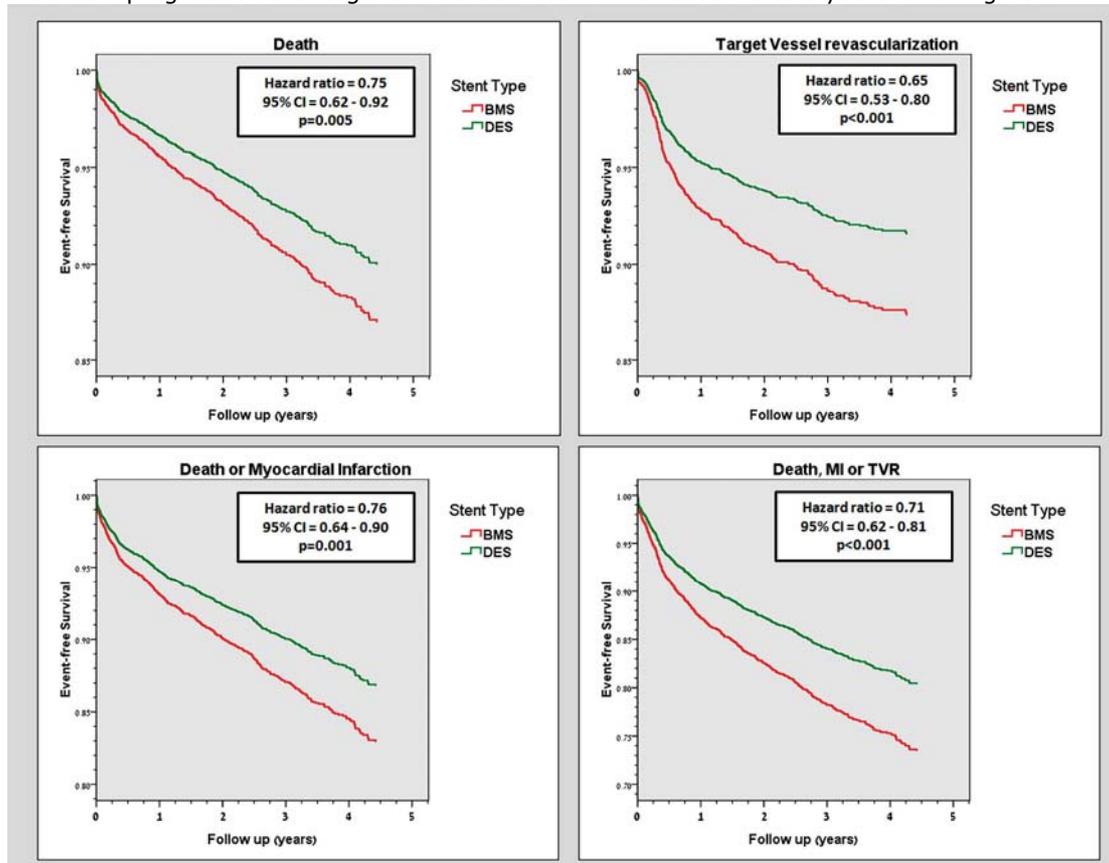
Bental, T¹; Assali, A¹; Vaknin-Assa, H¹; Lev, E¹; Brosh, D¹; Fuchs, S²; Battler, A¹; Kornowski, R¹
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Background: Concerns still exist about the long-term safety of drug eluting stents (DES) during routine clinical practice among large population cohorts.

Methods: We report the outcomes of a consecutive cohort of 6583 patients undergoing PCI at our institution between 1/4/2004 and 31/12/2008. We compared total mortality, myocardial infarction (MI), repeat target vessel revascularization (TVR) and coronary bypass operation (CABG) rates and event-free survival in 4398 propensity score matched patients, of whom 2199 were treated using drug eluting stents (DES group) and 2199 were treated using bare metal stents (BMS group). Follow up time was 6 months to 5.18 years (mean 3 years and median 3.25 years).

Results: Propensity score matching balanced well all pre-PCI and procedural variables (age, gender, diabetes mellitus, hypertension, prior heart failure, known moderate to severe LV dysfunction, smoking, dementia, malignancy, prior anticoagulation, hemoglobin, Platelet count, creatinine, prior CABG, PCI for ST elevation MI, PCI for MI or ACS, severe state, number of vessel disease, territories and lesions treated, stent size). After matching, patients in the DES group still had a higher rate of proximal LAD treated and a use of more/longer stents. The cumulative 5 year mortality was 12.85% in the DES group vs. 14.14% in the BMS group ($p=0.001$). Use of DES reduced the occurrence of MI (5.17% vs. 5.83% $p=0.046$), of clinically driven TVR (9.76% vs. 12.28%, $p<0.001$), of CABG (2.13% vs. 3.99% $p=0.001$) and of the composite endpoint of death/MI/TVR (23.38% vs. 26.07%; $p<0.001$), as shown in the figures.

Conclusions: Our risk-adjusted, propensity score matched event-free survival analysis would indicate a prognostic advantage for DES utilization which sustains to 5 years following PCI.



Drug eluting Stenting of Bifurcation lesions: Is there any evidence for a late catch-up phenomenon?

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Background: Recent studies showed improved short- and mid-term clinical and angiographic results obtained with PCI of de novo coronary artery bifurcation lesions with drug-eluting stenting [DES].

Objective: We aimed to evaluate the effectiveness of DES for bifurcation lesions in the long term.

Methods & Results: The study included 320 patients with bifurcation lesion who were treated with a single stent technique ('provisional' stenting) using either DES or BMS. Results are shown in the Table:

	BMS [n=127]	DES [n=193]	P-value
Age [year]	64±13	63±12	0.7
Male	81%	75%	0.2
ACS / AMI	76%	77%	0.5
DM	25%	33%	0.1
Renal failure	13%	11%	0.7
LAD/DIAG	47%	63%	0.001
One year TLR	15%	5.7%	0.005
One year MACE	22%	13.5%	0.05
2 years TLR	18%	12%	0.2
2 years MACE	30%	22%	0.2
3 years TLR	25%	18%	0.3
3 years MACE	40%	35%	0.4

Conclusions: The present study supports the mid-term effectiveness of DES for the treatment of bifurcation lesion but it shows that there might be a later 'catch-up' phenomenon. Whether the late 'catch-up' observed in repeat TLR is an incidental finding or not deserves further studies.

Planned simple one stent strategy for bifurcation lesions: Why do we cross to two stents?

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Background: A simplified approach, e.g. stenting of the main branch with provisional stenting of the side branch, is currently implemented in the majority of bifurcation PCI cases.

Objective: To investigate the causes for crossing to two stents strategy during PCI of bifurcation lesions in our "real world" practice.

Methods & Results: The study included 416 patients with bifurcation lesions who were planned for single stent strategy. In 61 pts [14.7%] the plan was crossed to stenting the side branch as well. We analyzed the causes for this change.

	One stent [n=356]	Crossed to 2 stents [n=61]	P-value
Age [year]	63±12	62±13	0.4
Male	78%	74%	0.5
ACS / AMI	78%	90%	0.01
DM	32%	31%	0.9
Renal failure	11%	7%	0.3
LAD/DIAG	56%	57%	0.4
True bifurcation	66%	74%	0.4
Y angle	71%	72%	0.8
SB RVD <2.5mm	57%	48%	0.2
SB - %DS	63±29	70±21	0.1
SB-Dilatation	45%	81%	0.001
One month results			
Death	0.6%	1.6%	0.4
MI	1.7%	6.6%	0.02
Stent thrombosis	1.7%	6.6%	0.02
TVR	0.7%	6.6%	0.02
MACE	2.8%	6.6%	0.1

Conclusions: Our data indicate that ACS/AMI presentation, dilatation of the side branch and greater diameter stenosis of the SB are altogether factors associated with increased risk of needing two stents in bifurcation stenting. Avoiding dilatation of the side branch is recommended when stenting of the main branch alone is planned.

Trans Catheter Aortic Valve Implantation Under Conscious Sedation Versus General Anaesthesia with Intubation

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Background: Trans catheter aortic valve implantation (TAVI) is currently being evaluated in a clinical trial for patients with severe aortic stenosis (AS), who are considered high-risk surgical candidates. Most TAVI using the Edwards SAPIEN valve have been done under general anaesthesia which carries the risk of respiratory complications. The present study aimed to examine the feasibility and safety of TAVI under conscious sedation and compare the clinical outcome to those patients who underwent general anaesthesia.

Methods: The analysis included 48 consecutive patients undergoing TAVI guided by trans-esophageal echocardiography using the Edwards SAPIEN transcatheter heart valve system via the trans femoral approach between July 2007 and July 2009. Conscious sedation was given by anesthesiologists in one of two protocol regimens: 10mg Ketamine with Propofol 10mcg/kg/min up to 75 mcg/kg/min or Dexmetomidine 0.3-0.7mcg/kg/hr. The crossover rate to general anaesthesia and the clinical outcome related to the anaesthesia were compared.

Results: The Edwards SAPIEN implantation was performed in 48 patients. 34 (70.8%) with conscious sedation, and 14 (29.1%) with general anaesthesia and intubation. The baseline characteristics of the two groups are summarized in Table 1. Of the patients with conscious sedation 4(11.7%) converted to general anaesthesia with intubation. The indications for crossover were hemodynamic compromise with shock after balloon valvuloplasty or valve deployment (n=3) and when high access retroperitoneal approach was required (n=1).
Conclusion: TAVI can be performed in the majority of the cases with controlled conscious sedation avoiding the necessity of general anaesthesia with low conversion rate to general anaesthesia. This leads to shorter procedure time, and may shorten the stay in the intensive care unit and in hospital.

	Conscious sedation (N=34)	General anaesthesia (N=14)	P
Mean age (years)	82.7±5.1	84.4±7.8	0.4
Female (%)	19(55.8)	4(28.5)	0.3
STS	11.6±3.5	10.9±4.3	0.5
Logistic Euro score	39.1±21.4	25.9±15.1	0.02
Ejection fraction (%)	53.1±16.0	53.2±15.1	0.9
COPD (%)	5(14.7)	1(7.1)	0.9
Aortic valve area (cm ²)	0.63±0.13	0.61±0.11	0.6
Surgical access (%)	21(61.7)	14(100)	<0.001
23mm valve (%)	23(67.6)	7(50)	0.25
Procedure duration (minutes)	136.6±56.3	213.7±93.0	0.01
ICU stay (hours)	61.3±58.3	70.0±52.4	0.6
Days from procedure to discharge (days)	7.6±4.8	10.7±9.3	0.2

Vascular Physiologic Responses Associated with DES: Evaluation of a Stent Eluting Sirolimus from an Absorbable Salicylate Polymer Coating

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Aim: To examine physiological and biochemical responses of conduit and microvascular arteries in the vasculature associated with a new DES device that elutes sirolimus from an absorbable salicylate based polymer coating.

Methods: A total of 36 stents of 4 different types (BMS, Cypher, polymer only, and polymer+sirolimus) were implanted in pig coronaries. Animals were euthanized at 30 and 90 days and stented vessels were disaggregated into single cell suspensions flow cytometric analysis of cellular phenotypes. Proximal, distal, and resistance arteries of stented arterial vessels were subjected to Western Blot analysis to determine expression of various inflammatory and pro-healing proteins.

Results: At 30d, there was a significant increase in CD31+ cells in the polymer only and poly+sirol compared to BMS and Cypher (P=0.05). By 90d, there were no significant differences detected in cellular infiltrates and proliferating cells between stent groups. At 30d, VCAM and TNF α expression were increased in the proximal Cypher, distal BMS, and poly+sirol stented segments. MnSOD expression was highest in the distal segment of the poly+sirol and the resistance arteries of the polymer only stented vessel. At 90d, VCAM expression was upregulated in the proximal and distal segments of the poly+sirol stented vessels. TNF α levels were highest in the proximal segments of Cypher, polymer only, and poly+sirol stented segments compared to the distal segments. MnSOD expression was observed in the resistance arteries of polymer only and poly+sirol stented segments.

Conclusions: This new polymer, either alone or together with sirolimus increases the number of endothelial-like cells to the luminal surface. Though proinflammatory markers such as VCAM and TNF α were unregulated, only implantation of the absorbable polymer led to an increase in antioxidant protective MnSOD. Therefore, this polymer may reduce vessel injury by increasing endothelial recovery and enhanced antioxidant proteins.

A Lesson of Vascular Biocompatibility: Titrating biodegradable polymer coating and drug

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Background: Our previous work demonstrated a sequence of medial necrosis, stent malapposition, and late neointimal thickening, with a moderate paclitaxel dose eluted from an erodible polymer. The use of slower releasing absorbable polymers with lower doses of paclitaxel, and modifying polymer/drug ratio are expected to minimize such adverse outcomes. Aim: To evaluate a new second-generation DES, comprising a slow release biodegradable PLGA polymer and low dose paclitaxel on a thin strut cobalt chromium stent platform.

Methods: Three types of stents were implanted in pig coronaries: BMS; absorbable, slow release polymer coated-only stents (POLY); and absorbable polymer-based paclitaxel eluting stents (PACL). The dose density of paclitaxel was 0.15µg/mm² with in vitro studies demonstrating a gradual elution over 12-16 weeks. Animals underwent angiographic restudy and were terminated at 1 and 3 months for histological analysis.

Results: At 1 month, angiographic % stenosis was significantly lower for PACL compared with BMS and POLY groups (2±2% vs. 12±4% and 11±10%, respectively, p<0.001); intimal thickness varied significantly according to stent type, with the lowest level for the PACL group compared with the BMS and POLY groups (0.06mm±0.02 vs. 0.17mm±0.07, 0.17mm±0.08, respectively, P<0.001); histological % area stenosis was 18%±4 for PACL compared with 27±7% for BMS and 30±12% for POLY, respectively (p=0.001). At 3 months, PACL showed similar neointimal thickness as BMS and POLY (0.09mm±0.05 vs. 0.13mm±0.10 and 0.11mm±0.03 respectively, P=0.582).

Conclusions: Favorable vascular compatibility and efficacy for a new DES that elutes paclitaxel from a slow release bioabsorbable polymeric surface coating were demonstrated. Our results furthermore suggest that the rate of release rather than the total drug load on the stent is the major factor which determines whether the mode of neointimal suppression is toxic or non-toxic in nature.

Fully Bioabsorbable Salicylate-Based Sirolimus-Eluting Stent: Evaluation of Stent Degradation by Optical Coherence Tomography

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Background: Fully biodegradable stents is an attractive alternative strategy for current permanent metallic stents.

Aim: We evaluated a novel, fully bioabsorbable sirolimus-eluting stent (8.3µg/mm stent) synthesized entirely from salicylic-acid polymer in a clinically relevant animal model.

Methods: Bioabsorbable balloon-expandable stents (n=33) were implanted in pig coronaries using QCA to optimize stent apposition. Animals underwent restudy and terminated at 1M, 3M, 6M, 9M, and 12M. Thickness and area of each strut (implantation: 1273 struts, 1M: 640 struts, 3M: 585 struts, 6M: 625 struts, 9M: 530 struts, and 12M: 319 struts) were measured by OCT and Intensity of each strut was measured as well.

Results: Average strut thickness and area at 1M were similar to post implantation (implant: 0.25mm and 0.14mm²; 1M: 0.26mm and 0.12mm²). Strut Thickness and area gradually decreased over time (3M: 0.23mm and 0.09mm²; 6M: 0.186mm and 0.07mm², 9M: 0.179mm and 0.066mm², 12M: 0.158mm and 0.055mm², respectively, P<0.0001). On the other hand, OCT signal intensity gradually decreased from 1M to 3M (1M: 6.06W, 3M; 5.92W, P<0.001) and then increased gradually from 3M to 6 M (6M: 6.16W, P<0.001). However, there were no significant differences between 6M, 9M, and 12M in terms of signal intensity (P=0.51 and P=0.31, respectively).

Conclusions: Degradation of a novel fully bioabsorbable salicylate-based stent was demonstrated very well by OCT. The size of this stent was remarkably decreased from 1M to 3M, 6M, 9M, and 12M. However, remarkable changes of signal intensity were not observed from 6M to 9M and 12M.

Lower Incidence of Persistent Intramural Thrombus in SES Coated with Absorbable Polymer Compared to Cypher: Angioscopic and Histological Evaluations

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Background: Chronic inflammation and hypersensitivity reactions induced by permanent polymers used in current drug-eluting stents (DES) may contribute to late thrombosis and restenosis. We evaluated a novel sirolimus-eluting stent coated with bioabsorbable salicylate-based polymer.

Methods: Durable polymeric sirolimus-eluting stent (Cypher, n=26) and bioabsorbable salicylic acid/adipic acid polymer coated metal stent containing sirolimus (SA/AA+S, n=32) were randomly implanted in pig coronary arteries using QCA to optimize stent apposition. Angioscopic and histological grading of intramural thrombus and intimal thickness were assessed at 1 and 3 months post implantation.

Results: At 1 month, there was no significant difference between Cypher and SA/AA+S in terms of angioscopic and histological intramural thrombus grading (P=0.100). Histological neointimal thickness was similar between the groups at 1 and 3 months (1M: Cypher 0.19±0.19mm, SA/AA+S 0.10±0.06mm, P=0.25; 3M: Cypher 0.33±0.20mm, SA/AA+S 0.36±0.27mm, P=0.79). From 1 to 3 months, the angioscopic grading of intimal thickness increased in both groups. Accordingly, the angioscopic grading of intramural thrombus beneath thick neointima was decreased in both groups. However, histology revealed that intramural thrombus was persist at 3 months without change from 1 month in Cypher group, while significantly decreased in SA/AA+S (P<0.001).

Conclusions: Sirolimus-eluting stent coated with novel bioabsorbable salicylate-based polymer showed lower levels of histological intramural thrombus at three months post implant compared to Cypher stent.

Takotsubo Cardiomyopathy Complicating PM Implantation

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Takotsubo Cardiomyopathy (TC) is a rare and reversible condition that was seldom described as a complication of pacemaker (PM) implantation (4 cases in Medline).- and always in pts with ventricular pacing.

Objectives: To describe a case of TC complicating PM implantation in a pt with sinus node disease and only atrial pacing.

Methods and Results: A 74 year old woman was admitted for PM implantation to allow medical rate control of her paroxysmal atrial fibrillation. Twelve hours after having a dual chamber PM impanation which was uneventful she complained of chest pain, shortness of breath and the ECG showed ST elevation and giant T wave inversion in the precordial leads. An urgent echocardiogram revealed apical dyskynesis and apical ballooning. An urgent coronary angiography was normal, but left ventriculography revealed findings similar to those seen in the echocardiogram. She was treated with beta-blockers, angiotensin converting enzyme inhibitors and fluids. within several hours her symptoms subsided and several days later the ECG normalized to baseline and so was her echocardiogram. Of interest previous cases of acute TC after PM implantation involved PM dependent pts with continuous right ventricular pacing. In contrast – in the present case only-the patient was exclusively paced in the right atrium.

Conclusions: TC is a very uncommon complication of PM implantation. However in pts presenting with the appropriate symptoms and electrocardiographic features it should be considered and followed by appropriate imaging and medical therapy. This case demonstrates that TC can occur even with PM with only atrial pacing.

The Cardio R® – a New Digital Loop Recorder for Improved Diagnosis of Patients with Suspected Symptomatic Arrhythmia. The 'SHL'-Telemedicine Experience

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Background: Loop recorders are often used to detect electrophysiological signals which may explain various symptomatic events that could potentially result in clinical and/or hemodynamic consequences. An inherent disadvantage is the waste of time from recording of an electrocardiogram (ECG) through establishing diagnosis to taking appropriate measures. The Cardio R® is a loop recorder which uses digital technology to transmit cardiac recordings via cellular communication whenever the user presses a designated button. Users can also choose from a list of complaints to describe symptoms.

Objective: To assess the utility of the Cardio R® device for early detection of electrical events which may account for symptoms.

Methods: Every recording arrives to 'SHL'-Telemedicine's call center where it is instantly displayed on a screen for immediate diagnosis by the on-duty medical team. According to the rhythm displayed in relation to the described symptoms, the protocol is to instruct the subscriber and/or notify his/her physician, or dispatch a mobile intensive care unit (MICU) to the scene.

Results: Between January-October, 2009, 7,170 ECG transmissions were received from 258 patients (age range 9-94 years).

Selected epidemiological and outcome data:

Parameter/reason for referral	Palpitations n=149 Calls=4471	Pre-syncope n=58 Calls=1561	Chest pain n=11 Calls=202	Unspecified n=40 Calls=936	Total n=258 Calls=7170
Age (mean ± 1 SD), y	57 ± 18	56 ± 22	56 ± 24	57 ± 20	57 ± 19
Male, %	40	48	55	54	45
Transmissions/patient	29 ± 41	27 ± 46	19 ± 16	24 ± 13	28 ± 43
Notifications to physicians (%)	23 (0.51)	30 (1.92)	1 (0.50)	13 (1.39)	66 (0.92)
MICU dispatches	5 (0.12)	0	0	1 (0.10)	6 (0.08)
Instructions to callers, n (%)	43 (0.96)	27 (1.73)	0	16 (1.71)	90 (1.26)
Relevant events (%) n	3018/4471 (68) 127	227/1561 (14) 23	84/202 (42) 6	103/936 (11) 18	3432/7170 (48) 174
Diagnostic real-time ECG findings (%)	2217/3018 (73)	203/227 (89)	57/84 (68)	73/103 (71)	2550/3432 (74)
Delay (days) until transmission of 1st symptomatic episode	3 ± 9	4 ± 7	1 ± 3	2 ± 3	2 ± 7

n = number of callers

Conclusions: The Cardio R® device enabled prompt ECG interpretations and interventions for cardiac-relevant complaints.

Supraclavicular Vein Approach: a Technique to Overcome Ipsilateral Chronic Subclavian Vein Obstruction when Implanting Pacemaker-ICD Leads

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Total subclavian vein occlusion represents a difficult obstacle when a lead has to be inserted into the ipsilateral vein. We report our experience with supraclavicular vein approach of subclavian vein puncture to overcome its ipsilateral chronic obstruction when implanting pacemaker-Implantable Cardioverter Defibrillator (ICD) leads. The subclavian vein obstruction was documented by venography. The skin was punctured by a 18 gauge needle, 1cm laterally to the lateral head of the sternocleidomastoideus muscle and 1cm cranially to the clavicle. The needle was directed closely under the clavicle pointing to the sternal notch. Once the vein was successfully punctured, medially to the obstruction, a 0.38 inch guide -wire was inserted into the venous bed. Subsequently a peel away sheath was indwelled using the Seldinger technique. The leads were placed in the standard fashion; they were secured by suture to the subcutaneous tissue of the fossa supraclavicularis major using a protective sleeve. The proximal portion of the lead was tunneled over the clavicle down to the device prepectoral pocket. Lead insertion was performed in 4 patients with total left subclavian vein obstruction; their mean age was 67 ± 10.5 years; an ICD was implanted previously in 3 patients, while it was a de novo implant in one patient. The mean follow-up was 2.25 ± 1.5 years. There were no complications of the surgical wound and the leads parameters remained stable. In our experience the supraclavicular approach of the subclavian vein puncture to overcome the ipsilateral total occlusion is feasible and safe

1548871

Clinical Experience with Implantable Loop Recorder - From Diagnosis to Treatment

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Background:

An arrhythmic mechanism underlying infrequent syncope is often difficult to detect using a Holter electrocardiogram or an external loop recorder. An implantable loop recorder (ILR) is an effective tool in these cases.

Objective:

To review our clinical experience with ILR and its efficacy.

Methods:

We reviewed patients' files implanted with ILRs between Dec 2006 and July 2009, including diagnostic work-up done, ILR findings and influence on treatment.

Results:

There were 39 patients (22M/17F), aged 27-96y (mean 70y). 19 had recurrent syncope, 17 had single syncopal episode, and 3 had pre-syncope. Follow up period was 2 weeks to 32 months (mean 10.4m). Tachyarrhythmias detected - supraventricular tachycardia (1), atrial tachycardia (2). Bradyarrhythmias detected - paroxysmal AV block (7), sinus arrest (4) and severe sinus bradycardia (1). 12 patients were paced, 2 weeks to 14 months (mean 1.3m) after ILR implantation. Patients with recurrent syncope were most likely to require a pacemaker, and those with pre-syncope were least likely to. Conduction disturbances were a moderate predictor for requiring a pacemaker, while neurological illnesses were a negative predictor. 12 patients complained of symptoms in the absence of documented arrhythmia, in 11 of them no arrhythmia was found throughout the follow-up and in 1 an arrhythmia requiring a pacemaker was eventually detected. By October 2009 15 arrhythmias were detected, 11 were excluded, 8 are under follow-up, and 5 ILRs were explanted without achieving a diagnosis.

Conclusion:

In our experience ILR is effective for detecting and excluding arrhythmias in patients with unexplained syncope.

1550337

The Clinical Significance of Rapid Atrial Pacing in Patients with Sick Sinus Syndrome

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Background

Sick Sinus Syndrome is one of the major indications for permanent pacemaker implantation.

Purpose

To evaluate the contribution of rapid atrial pacing in patients with Sick Sinus Syndrome to the clinical decision concerning permanent pacing and its category.

Methods

Sinus node recovery time was measured by the overdrive suppression technique in 21 patients having the clinical and electrocardiographic diagnosis of Sick Sinus Syndrome. Eleven patients were males and ten were females. Their ages ranged between 52 and 82 years. The average age was 68.

Seven had sinus bradycardia, five had sino-atrial block and nine had brady-tachycardia syndrome.

The underlying disorders were: ischemic heart disease in 13 patients, cardiomyopathy in one, thyrotoxicosis in one and idiopathic in six patients.

Results

Sinus node recovery time was prolonged in ten patients, and normal in eleven. The indication for permanent pacemaker was based on clinical criteria only. Permanent pacing was required in 10 of the patients, 4 showing prolonged sinus node recovery time and 6 showing normal times. Among the patients not requiring permanent pacing, 4 showed prolonged times and 7 showed normal times.

Conclusion

While sinus node recovery time may contribute to the diagnosis of sino-atrial node dysfunction, it is not found to be helpful in estimating the severity of the clinical syndrome, defined by the requirement for pacemaker therapy.

However, by examining the atrio-ventricular conduction at time of implantation, rapid atrial pacing can contribute to the decision whether to implant an atrial Vs. dual-chamber pacemaker (with a dedicated algorithm) in places and areas that distinction is considered.

B-type Natriuretic Peptide Level Predicts the Long-Term Risk of Ventricular Arrhythmia Among Patients with left ventricular dysfunction

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High serum B-type natriuretic Peptide (BNP) level is a risk factor for cardiac mortality. We have previously associated high BNP serum level with a short-term risk for ventricular arrhythmia. Here we examined the hypothesis that BNP level can predict the long-term risk of ventricular arrhythmias in patients with left ventricular dysfunction (LVD).

Methods: Consecutive, stable, ambulatory patients with moderate and severe ischemic LVD and an implantable cardioverter defibrillator (ICD) were studied. Plasma BNP level was obtained at baseline. Patients were evaluated every 3-6 months, and their devices interrogated for arrhythmias. The primary end point was the occurrence of malignant ventricular arrhythmia or sudden cardiac death (SCD).

Results: The cohort consisted of 94 subjects (6 women) with a mean (+SD) age of 69 (+10) years. ICD implantation indication was for primary and secondary prevention of SCD in 49% and 51% of subjects, respectively. Over a median follow up time of 3.5 years, a primary end point occurred in 42 patients (45%). Of those, 34 were classified as ventricular tachycardia, 5 as ventricular fibrillation, and 3 as sudden death. Median BNP level was 159 pg/ml (IQR 91-390 pg/ml) and was higher among patients who experienced an end point vs. those who did not (176 pg/ml vs. 143 pg/ml). Heart failure class, ICD implantation indication, LVD severity, and age were not significant predictors of events. However, the hazard ratio for experiencing an adverse outcome among the upper BNP quartile vs. all others was 2.2 (95%CI: 1.2-4.2).

Conclusions: These results suggest that abnormally high BNP level predicts the long-term risk of ventricular arrhythmias, and might serve as an aid for risk stratification in this patient population.

Rate of events in patients who underwent implantation of Internal Loop Recorder: A single center long term follow-up.

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Objective :

Implanted Loop Recorder (ILR) is one of the modalities used for evaluation of benign unexplained arrhythmia. The purpose of this report is to determine the diagnostic yield of ILR in a selected cohort from a single center.

Methods :

We retrospectively collected data from 25 consecutive patients who underwent Internal Loop Recorder (ILR) implantation between Jan 2000 to Sep 2009. Ten patients had Medtronic Reveal DX device, Eleven received Medtronic Reveal Plus device, and four got St. Jude Confirm device. Follow up done until recorded event was documented or explantation of device due to End of battery life (EOL).

Results :

During the period of nearly 10 years, 25 devices were implanted. Age at implantation ranged between 17 and 90 years, with median of 53.8+/- 24.6 years. Sixteen were Male (64%). Syncope was the primary reason for the implant in 22 patients (88%). Median follow up period was 16.1 +/- 4.8 month (range 1-39 month). Twelve of 25 had a negative electrophysiologic study prior to the implantation.

Fourteen (55%) had hypertension. Six (24%) had documented Ischemic heart disease, but none had bradycardic event (< 40 bpm) nor fast tachy-arrhythmias (> 160 bpm) None of the four patients with prior atrial fibrillation or flutter had documented bradycardic event.

Four patient (16%) had Asystolic events leading to implantation of permanent pacemaker. In 2 patients (8%) had syncope and the ILR revealed sinus tachycardia (negative result).

Conclusions :

In our group ILR was helpful in 24% of implanted patients (16% were diagnosed as having bradycardia as a cause for their symptoms and underwent permanent pacemaker implantation and 8% did not have significant arrhythmia during syncope). These results emphasize the yield of ILR , as compared to short term EKG Holter in a carefully selected group of patients. Large scale trial is recommended to determine the diagnostic yield of ILR when implanted according to current guidelines.

Atrial fibrillation related to concealed WPW. A new possible mechanism for paroxysmal atrial fibrillation independent of pulmonary vein foci*Rosenheck, S; Weiss, A; Banker, J; Sharon, Z**Hadassah Hebrew University Medical Center, Jerusalem, Israel*

Background. Atrial Fibrillation is a frequent arrhythmia in patients with overt WPW. The frequency and presentation of this arrhythmia in patients with concealed WPW have not been well evaluated. The purpose of this study is to present unusual presentation of atrial fibrillation in patients with concealed WPW.

Methods and Results. From among the last 100 patients with concealed WPW referred for RF ablation two patients had incessant atrial fibrillation immediately with insertion of an EP catheter in the right atrium and relived only with the removal of this right atrial electrode. The electrode was advanced into the right ventricular apex and an ablation electrode catheter was inserted into the left ventricle using the retrograde aortic method. No additional catheters were used. The accessory pathway location was determined with ventricular pacing and approached in the true mitral ring (Fig). After the successful RF application, ventricular pacing demonstrated complete VA block and electrode catheters were inserted into the right atrium. No tachycardia or atrial fibrillation was induced with aggressive atrial pacing.

In a third patient, the only clinical arrhythmia was atrial fibrillation and was referred for atrial fibrillation ablation. With insertion of the first electrode catheter into the right atrium the catheter induced atrial premature beats induced regular supraventricular tachycardia with long VA time and after ablation of a left postero-lateral concealed accessory pathway no tachycardia or atrial fibrillation could anymore induced.

Conclusions: These three patients demonstrated a direct correlation of a concealed accessory pathway with incessant atrial fibrillation with any atrial stimuli. The easily inducible atrial fibrillation was eliminated with successful ablation of the concealed accessory pathway. We suggest an additional possible mechanism for paroxysmal atrial fibrillation in young patients not related to pulmonary vein foci



Safety and feasibility of extra-thoracic puncture technique of axillary vein for venous access during cardiac devices implantation

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Introduction

Cardiac leads implantation is mainly achieved by subclavian vein access. This is performed by the blind puncture technique relying on anatomical landmarks. The technique is generally safe, but, major complications such as pneumothorax, arterial bleeding, and lead crush by costoclavicular ligaments may occur.

To reduce these potential complications, extra-thoracic puncture technique was proposed. This approach is based on accessing the axillary vein at the site where it enters the thorax. It is achieved by aiming the Seldinger needle to the first rib on its outer surface under fluoroscopic guidance.

Methods and results:

We report our experience with this technique in patients who had undergone device implantation between the years 2001 and 2008. This cohort includes 947 patients, 275 had automatic implantable defibrillator implantation while 673 had pacemaker implantation. Clinical data and complications are presented in the table. All veins were accessed successfully but one that was blocked due to venous spasm. No lead crush cases were seen.

Conclusion:

Extra-thoracic puncture technique of axillary vein is feasible and safe for leads implantation.

947 Patients	
Age	72±12.36 years
Female/ Male	350 / 597
Single lead / Multiple lead	203/744
Complications	
Pneumothorax: 3 cases.	A 54 years old male patient with pneumothorax related to aortic valve surgery preceded pacemaker implantation.
	A 94 years old male patient developed pneumo-mediastinum with right sided pneumothorax three days after left sided pacemaker implantation.
	A 95 years old female developed left sided pneumothorax after puncturing the lung by the Seldinger needle which crossed the very soft first rib.
Venous spasm: 8 cases.	Seven of them were managed conservatively, one case lead to puncture the contra-lateral axillary vein.
Axillary vein thrombosis: 2 cases .	A 69 years old female patient with prior stroke, who undergone a pacemaker implantation.
Axillary artery puncture: 130 cases.	All were managed successfully by manual compression on puncture site

1550872

T wave alternans in clinical practice- A single center experience

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Background: T wave alternans (TWA) was evaluated in several trials as a tool for risk stratification of patients with left ventricle dysfunction.

Methods: Analysis of 80 consecutive patients who underwent TWA for risk stratification of SCD. We compared the outcome of patients with negative TWA vs. patients with non-negative alternans.

Results: 39 pts. had a positive TWA result. Patients with positive TWA were older, had more often CHD, their LV function was poorer and they had more frequently coronary risk factors. The positive TWA cohort had an ICD implant more commonly than the negative TWA group. One year mortality rates did not differ between TWA positive vs. TWA negative patients.

Conclusions: In the present study TWA positive pts had more commonly ICD implantations as a consequence of their test result, but their mortality risk did not differ from pts with negative TWA test.

Gender related differences in outcomes in patients with cardiac resynchronization therapy.

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Background: There is only limited data available about a gender related differences in outcomes in patients with cardiac resynchronization therapy (CRT). The purpose of the study was to assess the gender related difference in patients with CRT.

Methods: A retrospective cohort analysis of 124 consecutive patients older than 18 that were implanted CRT during hospitalization between 1/ January 2005 and 1/ January 2008. Two groups were compared: male and female patients. The primary outcome was one-year mortality. The secondary end-points were readmission and complication rate after pacemaker implantation.

Results: There were 97 men and 27 women with CRT. Overall one-year mortality rate in the male group was 20% vs 3.8% in the female group, $P=0.07$. We did not find statistically significant difference in the readmission rate (51.7% vs 48 %, $P=0.9$) and the rate of complications (6.2% vs 14.8% % , $P=0.2$) between the two groups. Male patients were implanted more CRT-D compared to women (48.5% vs 22.2%, $P=0.027$) and had a significantly higher ischemic cardiomyopathy rate (80.9% vs 30.8%, $p<0.001$).

Conclusions: In our study we did not find statistically significant differences in one-year mortality, readmission and complication rates between male and female groups. Although there was a trend toward higher mortality rates in men and higher complication rate in women. Male patients were implanted more CRT-D than women, that may reflect a higher ischemic cardiomyopathy rate in this group.

Acute Decompensated Heart Failure Precipitated by Acute Coronary Syndromes versus Other Causes – Lessons from HFSIS 2003

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Background: Acute decompensated heart failure (ADHF) is a common complication of acute coronary syndromes (ACS). ADHF registries and trials have not distinguished ADHF precipitated by ACS vs. other causes.

Aim: To determine whether the outcome of ADHF is impacted by ACS as its principal cause vs. other causes.

Methods: We examined in a prospective, nationwide hospital-based survey the adjusted short- and long-term outcomes of pts whose ADHF was precipitated primarily by ACS vs. other causes.

Results: Of the 2336 pts with ADHF, 923 (39.5%) had ACS as the principal cause. These patients were younger, more likely to be males, to have risk factors for atherosclerotic disease, and to be admitted in Killip class III-IV. While in-hospital, these pts were more likely to receive IV inotropes, IV vasodilators, to undergo coronary angiography, and revascularization, but less likely to receive IV diuretics. At discharge, ACS pts were more likely to be treated with antiplatelet agents, beta-blockers, angiotensin converting enzyme antagonists and statins, and less likely with diuretics, aldospirone, digoxin, calcium antagonists, and oral anticoagulants. The unadjusted in-hospital, 30d, 1y, and 4y mortality rates for ADHF pts with or without ACS were 6.5% vs. 5.0% (p=0.13), 10.3% vs. 7.5% (p=0.02), 26.6% vs. 31.0% (p=0.02), and 55.3% vs. 63.3% (p=0.0001), respectively. In multivariate analysis, the adjusted odds/hazard (95% confidence intervals) for mortality for pts with ACS at the respective time points were 1.46 (0.99-2.10), 1.67 (1.22-2.30), 1.02 (0.86-1.20), and 0.93 (0.82-1.04).

Conclusions: ACS accounted for a significant proportion of admissions due to ADHF. ACS pts were treated differently while in-hospital and thereafter. The unadjusted mortality in pts whose ADHF was precipitated by ACS was significantly worse in the short-term, but better in the long-term. The adjusted mortality in pts whose ADHF was precipitated by ACS was significantly worse only in the short-term. Thus, the outcomes of ADHF registries and trials, especially those focusing on short-term outcomes, should be interpreted accounting for the relative proportion of ACS pts in the cohort.

Long Term Clinical Outcome of Heart Failure and Preserved Left Ventricular Function

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Background: Patients with heart failure (HF) have a poor prognosis. The proportion of patients with HF and preserved left ventricular function (LVF) is increasing. The long term prognosis of HF with preserved LVF may not be so benign. **Objectives:** To evaluate the long term clinical outcome of patients with HF and preserved LVF compared to patients with reduced function.

Methods: We prospectively evaluated 362 consecutive patients hospitalized with a definite clinical diagnosis of HF based on typical symptoms and signs. They were divided into two subsets based on echocardiographic LVF. Patients were followed for a mean of 6.5 years for clinical outcome.

Results: More than a third (36%) of the patients had preserved systolic LVF. These patients were more likely to be older, female and have less ischemic heart disease. The long term survival rate in this group was poor and not significantly different from patients with reduced LVF (28% vs 23% respectively, $P=0.2$). The adjusted survival rate by Cox regression analysis was also not significantly different ($P=0.15$). The event free survival from death or heart failure re-hospitalization was also low in both groups and not significantly different between patients with preserved vs. reduced LVF (12% vs. 10% respectively, $P=0.2$). Independent predictors of mortality in patients with preserved LVF were age, functional capacity, serum sodium and hemoglobin levels. Intraventricular septal thickness was also a strong independent predictor of survival in these patients; $IVS > 1.1$ cm (HR 3.21, 95% CI 1.55-6.65, $P=0.002$).

Conclusions: The long term clinical prognosis of patients with clinical heart failure with or without preserved LVF is poor and not significantly different.

Comorbidities in Heart Failure: How common? How bad?

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Background: The extent of comorbidities in Heart Failure (HF) patients is debatable. As many clinical studies in HF exclude HF patients with significant comorbidities, there is an underestimation of this important data. Recent registries suggested that the prevalence of significant comorbidities is higher than previously reported. Accordingly, the purpose of our study was to assess the nature and the prevalence of important comorbidities in our HF clinic patients. Methods: We assessed the records of 500 successive patients in our HF clinic, focusing on their medical background, and specifically on history of hypertension, diabetes mellitus, anemia, chronic renal failure, atrial fibrillation, peripheral vascular disease and malignancies. Result: Of the 500 patients, 355(71%) patients were males, mean age was 67±13. About 290 patients (58%) had ischemic etiology (53% old myocardial infarction and 34% CABG operation), and mean LVEF was 35±16. The patients' comorbidities are elaborated in Table-1:

Co-morbidities	No. (%)
h/o Hypertension	310 (62%)
h/o Diabetes Mellitus	232 (46%)
Insulin Treatment	79 (16%)
Atrial Fibrillation (permanent/persistent)	204 (41%)
Anemia (Hb<12gm/dl)	200 (40%)
Chronic Renal Failure (Cr≥1.5mg/dl)	154 (31%)
Dialysis Treatment	19 (4%)
Peripheral Vascular Disease	93 (9%)
Malignancies	20 (4%)

Conclusions: The prevalence of significant comorbidities is considerably high in HF patients, even when comparing to similar patients with coronary artery diseases. This complex medical background poses a challenge to the treating HF team and may require a multi-disciplinary approach in the care of HF patients.

Variation in the Cyp2d6 Genotype Is Not Associated With Carvedilol Dose Changes in Patients with Heart Failure

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Carvedilol is the standard of care for heart failure (HF) patients. Carvedilol is partially metabolized by the highly polymorphic enzyme, CYP2D6. To reach an effective dose while avoiding adverse drug reactions (ADR), testing of CYP2D6 genotype prior to carvedilol initiation should be considered. The objectives were to determine CYP2D6 metabolic genotypes in an Israeli cohort of HF patients and investigate the relationship between genotype, carvedilol dose, and number of ADRs in order to consider CYP2D6 genotyping prior to treatment initiation. Descriptive and inference statistics were performed followed by correlation and regression analyses. 93 Patients on carvedilol were CYP2D6 genotyped and classified as poor, intermediate, extensive, or ultra-rapid metabolizers. UM, n=6, 6.5%; IM n=11, 11.8%; EM n=70, 76.3%; PM n=5, 5.4%. The initial carvedilol dose increased significantly according to patients clinical needs in each of the four genotype groups. Twenty-two patients experienced adverse events (ADRs). There were not significant differences among the dose and the number ADRs after 3, 12 and 60 months following initiation of carvedilol treatment in each genotype group. There were no statistically significant differences in carvedilol doses among those treated with 4 medications compared with those treated with 5 or more concomitant drugs. Twenty-two patients were also treated with 2D6 inhibitors (amiodarone, n=19; antidepressants, n=4). Regression analyses revealed that genotype group affiliation and number of adverse drug reactions were not predictive of carvedilol dose changes. Patient weight was the only significant predictors for the carvedilol dose. CONCLUSIONS: No relationship was found between carvedilol dose and patient CYP2D6 genotype and number of adverse drug reactions in an Israeli cohort. Therefore, the recommendation of CYP2D6 genotyping prior to carvedilol initiation should be questioned.

Impact of Sleep Disturbances on Quality of Life in Heart Failure Patients

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Patients with heart failure (HF) commonly have disrupted sleep, reduced sleep efficiency, and a feeling of fatigue. We sought to explore the relationship between sleep disturbances and quality of life (QOL) in HF patients.

Methods: After informed consent, patients with HF attending a HF clinic or day treatment program were administered Hebrew validated versions of the Pittsburgh Sleep Quality Index, The MOS 36-item Short Form health survey (SF-36), and the Visual Analog Mood Scale. For quality of life analysis, the Physical Role, Physical Functioning and Bodily Pain portions were excluded so as to avoid the confounding factor of physical illness.

Results: 73 patients participated in the study. Patient mean age was 75+10yrs, with 57% males. Etiology of HF was ischemic in 46%, valvular in 29%. NYHA class average was 3.2, with 17% class 2, 44% class 3, and 39% class 4. 78% of patients met criteria for a significant sleep disturbance, compared with ~30% reported in healthy elderly patients. Degree of sleep disturbance was significantly correlated with all measures of quality of life other than impact of emotional problems on daily life: general health ($r=-.264$, $p=.022$); vitality ($r=-.535$, $p<.001$); social functioning ($r=-.349$, $p=.002$); emotional well-being ($r=-.469$, $p<.001$); and mental health ($r=-.483$, $p<.001$). Sleep duration ($r=-.262$, $p=.02$), sleep disorder ($r=-.477$, $p<.001$), sleep latency ($r=-.387$, $p=.001$), sleep effectiveness ($r=-.305$, $p=.008$), and sleep quality ($r=-.351$, $p=.002$) were all correlated with poor quality of life. Sleep disturbance was more common in woman, but was not affected by NYHA class, BMI, total daily dose of furosemide, PA pressure, or presence of atrial fibrillation,

Conclusions: Sleep disturbances account for a significant proportion of disruption in quality of life in heart failure patients, and warrant further attention by HF programs.

Relation Between Red Cell Distribution Width and Outcomes in Patients with Acute Heart Failure

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Introduction: Red cell distribution width (RDW) is a measure of red blood cells size variability. Recently, it has been reported to predict outcomes in patients with heart failure and coronary artery disease, by unclear mechanism.

Objectives: To examine whether RDW predicts mortality in patients admitted for acute worsening of heart failure, and to check if there is a correlation between RDW and NT-proBNP.

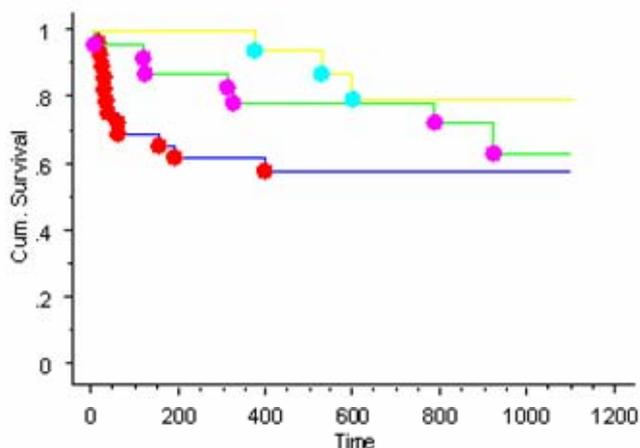
Methods: Retrospective analysis of patients admitted for acute decompensation of heart failure between 10/2006 and 1/2009. For each patient demographic and clinical data (including RDW, NT-proBNP) were obtained. Follow-up for the occurrence of death was performed using the national death registry.

Results: During the study period, 80 patients were recruited, with mean age of 72 ± 11 years. of them, 60% were males, 74% had coronary artery disease, 55% had diabetes and 71% had reduced left ventricular systolic function (moderate or severe). The mean RDW was 15.8 ± 1.8 . Mean NT-proBNP value was 2263 ± 608 PG/ML.

After a mean follow-up period of 748 ± 260 days, 22 patients died. patients were divided into tertiles according to their RDW. Patients in the high RDW tertile had the least survival rates (Figure 1, $P=0.03$). After adjusting for age, gender, diabetes, Hemoglobin, NT-proBNP and left ventricular function, their Hazard Ratio of mortality compared to patients in the low RDW tertile was 3.9, ($P=0.03$).

A modest, but statistically significant correlation was found between RDW and NT-proBNP level (Spearman correlation 0.28; $p = 0.015$).

Summary and conclusion: Increased RDW is independent predictor of survival in patients admitted with acute decompensation of heart failure. The mechanism by which RDW affects survival is unclear, but its correlation with NT-proBNP may give a hint to the possible mechanism.



Long-Term (4-years) Outcome of Hospitalized Patients with Acute Decompensated and Chronic Heart Failure: Data from HFSIS 2003

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The prognosis of pts hospitalized with acute decompensated heart failure (ADHF) is grave. Most studies and registries have included hospitalized pts with ADHF, while pts with chronic HF hospitalized for other reasons were excluded. Data on the long-term outcome of hospitalized ADHF pts as compared to chronic HF pts are scarce.

Methods: We compared the characteristics, management and short- and long-term (4-years) mortality of 3 groups of hospitalized HF pts: acute, acute on chronic and chronic, from the heart failure national Israeli Survey (HFSIS) in 2003, hospitalized in all cardiology and internal medicine wards in Israel. Results: (see Table).

*By Cox model adjusted for: age, DM, Hypertension, eGFR<60 ml/min, Hb<12 gr/dl, Na<136 meq/L, ACS, A. Fib, NYHA III/IV, COPD, stroke/TIA and malignancy.

Conclusions: The characteristics, etiology, management and outcome of hospitalized HF pts differ by their presentation. While the early outcome of acute HF pts is the worse, their late outcome is better as compared to counterpart pts with chronic or acute on chronic HF who had the worst outcome. Trials and registries of HF should interpret their data according to pts presentation and history.

	Acute (n=724), %	Acute on chronic (n=1612), %	Chronic (n=1671), %	P-value
Age, yrs	71±14	75±11	73±11	<0.0001
ACS	57	32	32	<0.0001
Anemia (Hb<12 gr%)	38	48	45	<0.001
COPD	14	22	29	<0.0001
eGFR<60 ml/min	44	54	48	<0.0001
LVEF <40%	45	54	55	<0.001
NYHA III/IV	22	55	36	<0.0001
IV Inotropes	12	7	4	<0.0001
IV Diuretics	71	82	36	<0.0001
Discharge medications:				
ACE-I	65	59	54	<0.0001
ARB	8	11	11	0.02
β-blockers	63	60	56	<0.005
Furosemide	63	86	68	<0.0001
Spirolactone	10	28	18	<0.0001
Digoxin	10	18	14	<0.0001
Mortality:				
In-hospital	6.6	5.1	3.4	0.02
Adj. HR (95% CI)*	1.0	0.53 (0.35-0.79)	0.40 (0.26-.62)	
1-year	22.3	32.5	27.6	<0.0001
Adj. HR (95% CI)*	1.0	1.08 (0.89-1.31)	0.99 (0.81-1.20)	
4-year	46.0	66.5	55.4	<0.0001
Adj. HR (95% CI)*	1.0	1.21 (1.07-1.39)	1.06 (0.93-1.21)	

1545512

Plasma Erythropoietin Levels and long Term Outcome in Patients with Acute Coronary Syndromes

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Background: Elevated Erythropoietin (EPO) has been related to adverse prognosis in patients with heart failure. Recent trials also suggested EPO may add prognostic information in patients with IHD. We tested the association between endogenous EPO level with the extent of coronary disease, myocardial damage as well as long term outcome, in patients with ACS.

Methods: between September 2004 and December 2005 we collected the sera of 256 patients admitted to the hospital due to ACS who underwent cardiac catheterization. We tested the levels for EPO and hsCRP in patients sera . The extent of myocardial damage was assessed from Troponin and CPK levels. We also prospectively evaluated major cardiac events in this population 24 months post admission.

Results: We observed a direct association between EPO levels and hsCRP. A significant correlation was found between EPO levels and tertiles of CPK ($p=0.018$). EPO levels at baseline were related to an increased mortality in the subsequent follow up period ($p=0.005$). There was no significant relation with respect to overall major adverse cardiac events (MACE). Logistic regression analysis demonstrated that higher EPO levels were independently associated with an increased risk of mortality.

Conclusions: Elevated erythropoietin level was associated with increased myocardial damage and mortality in patients admitted with ACS .Moreover the prognostic information of EPO relating to mortality was additive to that of hsCRP

Shortcuts:

EPO- Erythropoetin

hsCRP- High Sensitive CRP

IHD- Ischemic Heart Disease

ACS- Acute Coronary Syndrome

Clinical Characteristics and Outcomes of Patients Discharged from Chest Pain Unit- Are There Gender Differences?

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Background: Prior studies have highlighted the differences in diagnostic and management approaches between men and women presenting with chest pain. There are few data regarding the possible differences in outcomes of male and female patients discharged from a chest pain unit (CPU) after a thorough work-up. Aim: To assess modes of evaluation and outcomes in men and women presenting with acute chest pain.

Methods: The cohort included 1064 consecutive patients (70.4% male) presenting to the emergency room with chest pain that were admitted to CPU for further evaluation. Patients subsequently discharged, were followed for a median period of 110 (60-25) days.

Results: Compared to men, women were significantly older ($p < 0.00$) and had higher rates of hypertension, diabetes and hyperlipidemia, and less prior cardiovascular disease or prior coronary interventions. Non-invasive evaluation was done in 92.4% of women and 89.0% of men with similar rates of stress echocardiography (6% women and 5% men), but more isotope scans in men (40% vs. 45% $p = 0.01$), and more multidetector computed tomography in women (48% vs. 39% $p < 0.001$).

After complete CPU evaluation, men were hospitalized more often than women (8.6% vs. 16.9% $p < 0.001$), and underwent more coronary interventions. During the follow up period, all re-admission rates to CPU were similar (4.5% women, vs. 7.1% men $p = 0.1$), as were rates of acute coronary syndrome (0.96% women vs. 0.53% men $p = \text{NS}$) and coronary intervention. Recurrent chest pains rates were similar among genders (25.5% women, 23.4% men $p = 0.49$). All -cause mortality rates were similar among genders (0.32% women vs. 0.27% men $p = \text{NS}$).

Conclusion: In this large cohort of patients discharged from a CPU after thorough evaluation, we demonstrated similar short -term outcomes. Therefore thorough CPU evaluation in both men and women is effective.

Characteristics, Management and Prognosis of Israeli Arabs and Jews with ACS: Data From Acsis 2008

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Background: In recent years, there has been an impressive improvement in the management and outcome of pts hospitalized with ACS. Previous reports from Israel have shown an excess in risk factors and worse outcome after ACS among Arabs.

Methods: We examined the characteristics, management and outcome of Arabs and Jewish pts hospitalized with ACS in Israel during a 2-month period in ACSIS 2008. ACSIS plays a major role in the assessment of the quality of care of ACS pts in Israel .

Results: Baseline characteristics, management and outcome of the 2 groups were:

	Arabs (n=316)	Jews (n=1421)
Age (mean ±SD)*	59±13	64±13
Men (%)	78	80
Past MI (%)	33	31
Past PCI (%)	36	34
Past CABG (%)	9	10
Diabetes (%)*	50	35
Hypertension (%)	60	60
Dyslipidemia (%)	77	74
Smokers (%)*	52	36
Family History (%)*	35	25
Killip class ≥ 2 (admission) (%)	12	13
Primary reperfusion (in STE) (%)*	66	63
Primary PCI /TLx (%)	84/16	88/12
Any coronary angio (%)*	85	89
Any PCI (%)	71	69
Medications at discharge:		
Aspirin (%)	97	96
Clopidogrel (%)	81	79
ACE-I / ARB (%)*	77	75
Beta-blockers (%)	83	82
Statins (%)	92	93
Age-adj. Mortality: 7-day (%)*	4.2	2.2
30-day (%)	5.5	3.8
Age-adj. 30-day MACE	15.5	11.9

*P<0.05

Conclusion: ACSIS-2008 data show that Arabs were 5 yrs younger than counterpart Jewish pts, and had higher prevalence of known CAD risk factors. Their in-hospital management was comparable, but their early outcome tended to be worse. The higher prevalence of risk factors and ACS appearance at younger age, can partially explain, the mortality excess in Arabs vs. Jews. Primary and secondary prevention modalities should be implied to this high risk population by changing their lifestyle and emphasizing their risk factors.

Surrogate Temperature Measurements during Selective Cerebral Hypothermia

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Background: The neuroprotective effects of mild systemic hypothermia (SH) post cardiac arrest are well established. Improved effects of moderate and profound hypothermia have been demonstrated in arrest and stroke models. Cardiac adverse effects limit SH to 32°C. Recently, attempts have been made to develop techniques of selective cerebral hypothermia (CH) where moderate CH is achieved in the presence of limited SH. Transfer of these techniques to human trials is partially limited by the inability to determine the degree of the CH in the absence of intracranial thermistors. Our aim was to determine the ability of surrogate measures to accurately represent intracerebral temperatures.

Methods: Using a transfemoral arterial approach, a catheter-in-catheter system was positioned with the inner lumen in a single common carotid artery and the outer lumen in the aortic arch in 9 pigs (60-64kg). Blood from the aorta, was cooled and reperfused into the carotid artery using a dialysis machine.

Temperatures were measured with thermistors placed at a depth of 1-1.5cm in each cerebral hemisphere. Cooling was performed for 3hrs, with a target ipsilateral cerebral temperature of 28-30°C. Additional thermistors were positioned in the rectum, esophagus, right and left nostrils and introduced cranially in the right and left jugular veins (JV).

Results: The mean treated cerebral hemisphere reached target temperature in 15 mins. The ipsilateral JV temperature responded most rapidly with a gradient of 2°C over the first hour. At 90 mins there was equilibration with cerebral temperature. Nasal temperature remained consistently 1-2°C higher. On the contralateral side, a consistent 1-2°C gradient was noted over 180 mins with both nasal and JV temperatures.

Conclusion: In this selective cerebral hypothermia model, jugular venous temperature most closely represents true intracerebral temperatures with regard to response time and steady state gradient.

1550914

The Blood Cultures of Patients Developing Fever or Sepsis Like Syndrome Treated in the Coronary Care Unit after Successful Out of Hospital CPR

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¹Assaf Harofeh, Zerifin, Israel; ²Kaplan, Rehovot, Israel

Background: Patients hospitalized in the CCU after successful out of hospital CPR frequently develop fever and/or sepsis-like state in the first days after admission. Accordingly, they are frequently treated with broad spectrum antibiotics. This presentation may be due to infection as well as to anoxic brain damage or other metabolic derangement. The objective of this study was the determination of objective evidence of infection in these patients.

Patients and methods: The data of all patients that were hospitalized in the CCU of our institution after successful out of hospital CPR was extracted from electronic database. The bacterial cultures obtained in the first 48 hours after admission were evaluated.

Results: Since July 2003 110 patients were hospitalized after out of hospital CPR. Appropriate cultures were obtained in 52 patients. Sixty three percent had negative and 37% had positive cultures: blood cultures were positive in 7 patients (13.5%), urinary in 6 (11.5%), sputum cultures in 10 (19.2%). Of 7 positive blood cultures in 3 was growth of coagulase negative staphylococcus (most probably contaminant). Of 6 urine cultures 2 showed a mixture of bacteria.

Conclusion: Bacterial infection is an infrequent cause of early fever or sepsis like syndrome in patients hospitalized after out of hospital CPR. The empiric antibiotic treatment should be considered carefully without proven source of infection.

Use of Intravenous Morphine for Acute Decompensated Heart Failure

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Background: Current guidelines regarding the use of intravenous morphine (IM) in the management of patients with acute decompensated heart failure (ADHF) are discordant; whereas the American guidelines reserve IM for terminal patients, the European guidelines recommend its use in the early stage of treatment. **Aim:** To determine the impact of IM on outcomes of consecutive ADHF patients enrolled in a national survey.

Methods: Propensity score analysis of ADHF patients with and without use of IM in a national heart failure survey.

Results: Of the 4102 enrolled patients, we identified 2336 ADHF patients, of whom 218 (9.3%) received IM. IM patients were more likely to have acute coronary syndromes, acute rather than exacerbation of chronic heart failure, diabetes mellitus, and dyslipidemia. They were more likely to have hyperglycemia, leukocytosis, and higher heart rate, and to receive aspirin and statins, but less likely to receive diuretics. Unadjusted in-hospital mortality was 11.5% vs. 5.0% for patients who did or did not receive IM, and the adjusted odds ratio (OR) for in-hospital death was 2.0 (1.1-3.5, $p=0.02$). Using propensity analysis, we identified 211 matched pairs of patients who did or did not receive IM. In multivariable analysis accounting for the propensity score, use of IM was not associated with more in-hospital death (OR 1.2 0.6-2.4, $p=0.55$).

Conclusions: IM was used sparingly in our ADHF cohort, and was independently associated with increased in-hospital death in multivariate analysis, but not in propensity score analysis. Thus, our propensity score analysis did not find a deleterious effect of IM per se. However, IM should be used sparingly and cautiously in the setting of ADHF, given the high-risk profile of pts receiving IM.

3D Characterization of Coronary Arteries for Assessing Risk of Plaque Rupture by Using Patient-Specific Computational Models Based on IVUS-VH Images.

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Background: The disruption of vulnerable plaques is considered as the major cause of cardiovascular events. The probability of a specific plaque to rupture strongly depends on mechanical and biomechanical factors; however, the explicit processes that lead to an acute ischemic event are, to large extent, still unknown.

Objectives: To develop a 3D model which characterizes the morphology of the plaque based on IVUS-VH images.

Method: Our technique allows to select any desired segment of the artery, by collecting the IVUS-VH cross-section images, and to create a 3D model of the artery wall and its plaque components (Fig 1). A finite element analysis system takes this 3D-model as its input to evaluate the flow and stress distributions in the diseased artery with atherosclerotic plaque and to identify the sites prone to rupture.

Results: The reconstruction of the complex plaque in the segment enables to identify high risk areas and to examine the effect of calcium and necrotic core pools on the cap stability. Based on the 3D geometrical model of the lumen, the flow patterns throughout the atherosclerotic lesion and the shear stresses are calculated and a biomechanical analysis is used to estimate the mechanical forces at the lesion site. Our results indicate that minute calcium deposits, especially when adjacent to the lumen and nearby necrotic cores, are associated with high stress distribution which act on the thin-cap fibro-atheroma (TCFA) and may impair its stability.

Conclusions: This IVUS-based 3D computational model provides better insights into plaque vulnerability and may improve the understanding of the biomechanisms leading to plaque rupture.

Figure 1. A 3D reconstruction of the culprit lesion, including multi-component plaque structure based on IVUS-VH slices.

Oxidized Phospholipids and Lipoprotein(a) Response Following Successful Percutaneous Revascularization of Chronically Occluded Coronary Arteries.

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Background: Percutaneous coronary intervention (PCI) results in acute plasma increases of oxidized low-density lipoprotein (OxLDL) and lipoprotein(a) (Lp(a)). We studied the temporal changes in release of OxLDL and Lp(a) following PCI of chronically occluded coronary arteries (CTOs).

Methods: Thirty three patients who underwent successful PCI of CTO were included. Blood samples were drawn before PCI, immediately post-PCI and at 6 and 24 hours, 3 days and 1 week. Plasma levels of Ox-LDL-E06, a measure of oxidized phospholipids content on apo-B-100 and levels of Lp(a) were measured in all samples and compared with previous data from 141 patients undergoing successful PCI of non-CTO vessels.

Results: Levels of OxLDL-E06 and Lp(a) were significantly higher in patients with CTOs (47344 ± 7628 vs 9064 ± 680 relative light units and 32.8 ± 4.4 vs 21.7 ± 2.6 mg/dl respectively). OxLDL-E06 and Lp(a) levels, both expressed as percent change from baseline levels before PCI, rose gradually following PCI of CTOs (see graph). In contrast, levels of Ox-LDL-E06 and Lp(a) in non-CTO vessels rose immediately post PCI and then dropped rapidly to baseline by 24 hours. **Conclusions:** Higher levels of OxLDL and Lp(a) likely reflect greater disease burden in these patients. The temporal changes in markers of circulating OxLDL differs substantially in patients undergoing PCI of CTO versus non-CTO vessels, probably reflecting differences in CTO lesion composition with more fibro-calcific and less fatty elements compared with non-CTO lesions. This may explain the low frequency of distal embolization observed following PCI of chronically occluded vessels.

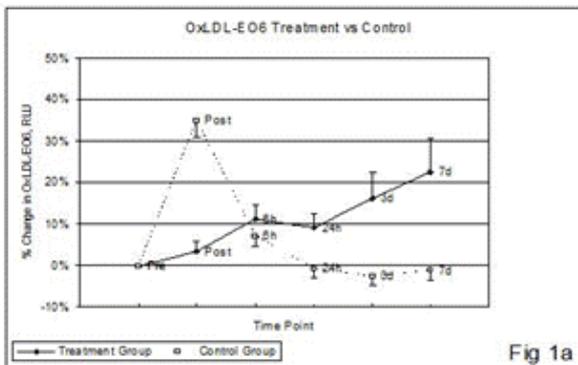


Fig 1a

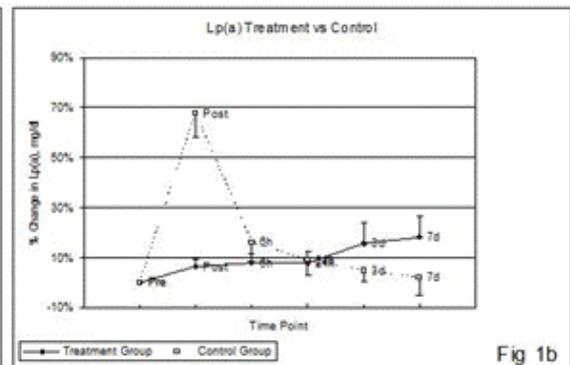
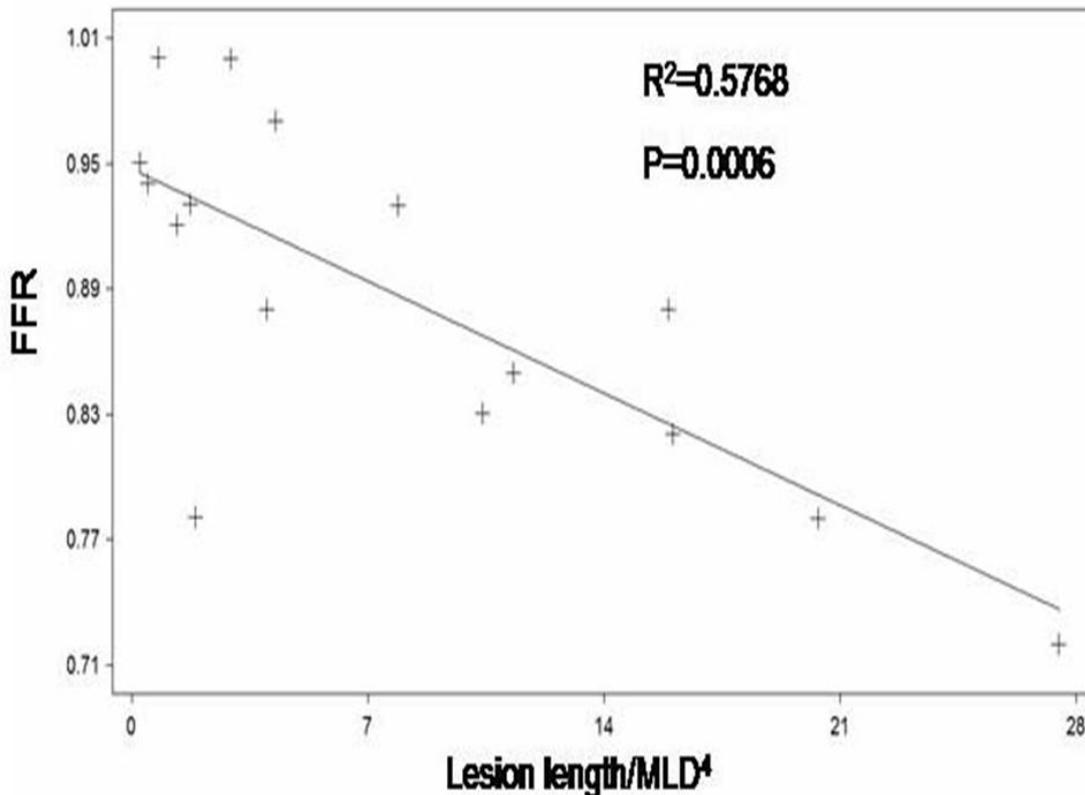


Fig 1b

A New Angiographic Tool for Assessing the Hemodynamic Significance of Intermediate Coronary Lesions: Correlation with Fractional Flow Reserve

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Background: Angiographic percent stenosis does not reflect the hemodynamic significance of intermediate coronary lesions. Fractional flow reserve (FFR) <0.8 reliably identifies functionally significant lesions however this technology is invasive, expensive and not routinely available. On the basis of the Poiseuille equation we hypothesized that the quotient of lesion length and minimal lumen diameter (MLD⁴) measured by quantitative coronary angiography (QCA) would correlate with FFR measurement. Methods: All FFR studies at our center were analyzed. Exclusion criteria included: LV ejection fraction <40%, left main stenosis >50%, tandem coronary lesions, Q-wave myocardial infarction in the coronary territory, recent MI (<5 days), collateral flow distal to the assessed lesion and significant valvular disease, angiography with a <6F catheter and without IC nitroglycerine. FFR measurement (Brightwire, Volcano) was performed following IC adenosine up to 120 mcg or achievement of FFR<0.8. Results: Sixteen lesions were included in the current analysis. Mean lesion length was 14.8±9.0 mm (range 4.3-38.8), MLD 1.4±0.5 mm (range 0.7-2.3), lesion stenosis 52.3±15.1 % (range 28.2-74.5) and FFR 0.89±0.08 (range 0.72-1.00). FFR did not correlate with percent stenosis, had weak correlation with MLD (R²=0.2536, p=0.0467) and correlated with lesion length (R²=0.3504, p<0.02). Best correlation was with quotient of length/MLD⁴ (R²=0.5768, p<0.001) for which a cut-off value of 20 identified 2 of 3 pts with abnormal FFR and confirmed all normal FFR values. Conclusions: The QCA-derived quotient of lesion length and fourth power of MLD correlates well with FFR. This angiographic tool may enable reliable assessment of the hemodynamic significance of intermediate coronary lesions without need for the more invasive and expensive use of pressure wire measurements.



Is there an Intravascular Ultrasound luminal area threshold that Correlate with Fractional Flow Reserve, in Intermediate Coronary Artery Stenosis

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Background: Fractional Flow Reserve (FFR) of >0.8 or 0.75 is currently used to guide revascularization in lesions with intermediate coronary stenosis. Whether there is an intravascular ultrasound (IVUS) measurement which can reliably be used to predict when patients should undergo intervention is unclear.

Aim: To determine the minimal luminal area (MLA) obtained by IVUS that correlates with a $FFR < 0.8$ or < 0.75 in patients with intermediate coronary stenosis. Methods: The analysis included 92 intermediate lesions (84 patients) located in a vessel diameter >2.5 mm. All were evaluated by both FFR and IVUS. A positive FFR was considered present when it was < 0.8 and < 0.75 . IVUS MLA was correlated to the FFR findings in those intermediate lesions with 40-70% stenosis.

Results: The mean FFR value was 0.89 ± 0.08 . In 24 (26.1%) was 0.8 and in 17 (18.5%) < 0.75 . The mean MLA was 3.6 ± 1.1 mm², and the mean diameter stenosis by QCA was 47.5 ± 9.8 %. The analysis detected correlations between FFR and MLA IVUS of ($r = 0.34$, $p < 0.001$), minimal luminal diameter (MLD) by IVUS of ($r = 0.31$, $p = 0.004$), lesion length by IVUS of ($r = -0.5$, $p < 0.001$) and area stenosis by IVUS of ($r = -0.31$, $P = 0.01$). There was no significant correlation between FFR and minimal luminal diameter by QCA ($r = 0.19$, $p = 0.06$), diameter stenosis by QCA ($r = 0.08$, $p = 0.4$) and lesion length by QCA ($r = -0.14$, $p = 0.17$). ROC curve identified MLA < 2.8 mm² (sensitivity 79.7%, specificity 80.3%) to be the best cut-off values for an $FFR < 0.75$ and MLA < 3.2 mm² for $FFR < 0.8$ (sensitivity 69.2%, specificity 68.3%). For lesion with vessel reference diameter 2.5-3mm, 3-3.5mm and >3.5 mm the MLA cut-off for $FFR < 0.75$ were 2.57, 2.8 and 3.7mm² respectively.

Conclusion: Anatomic parameters of intermediate coronary lesions obtained by IVUS showed a significant correlation to the FFR values, they differ for different vessel sizes and may be used as an alternative to FFR in determining significant CAD that will require intervention.

A 'Real-Time' Evaluation of a Novel Coronary Stent Expansion System Using an Advanced Visibility Enhancement Tool: Initial Clinical Experience

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Background: Appropriate stent expansion is an important predictor of the long-term procedural success. The low opacity of current stents is a major obstacle in imaging their silhouette. Post-deployment image enhancement may assist clinicians in identifying suboptimal expansion and confirming proper stent deployment.

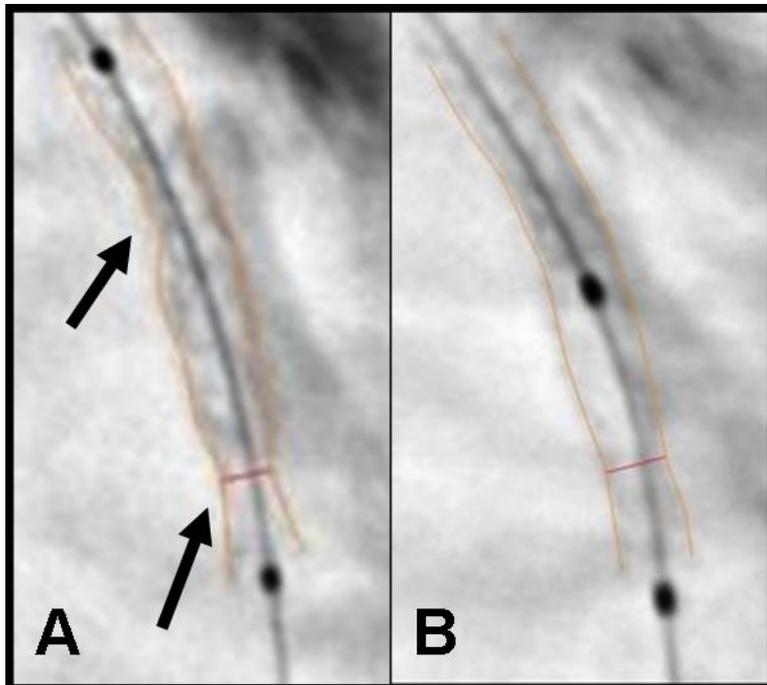
Aim: To evaluate the performance of a stent-enhancement tool in the catheterization lab and its clinical implications.

Methods: The study group consisted of 46 patients (age 66 ± 7 years; 82.6% men) undergoing coronary intervention with a stent in our catheterization lab. The novel StentOptimizer system (Paieon Medical, Israel) was used for stent enhancement. After the stent was implanted, its diameter was measured along its length using dedicated a software. Post-deployment balloon inflation was performed at operator discretion and assisted by the enhanced stent images.

Results: A total of 48 stents were evaluated in real-time. The success rate of enhancement was 83.3%. The most common predictor of stent-enhancement failure was the presence of chest metal struts after sternotomy (75% of failures). Suboptimal stent expansion (below 90% of the designated diameter size in any part of the stent) was detected in 75% of stent enhancements, and further balloon inflation was performed in 93% of these cases (Figure 1). More than 2 balloon inflations were performed in 36.7% of cases. Stent under-expansion was more common on the middle part (46.7%) or proximal part (40%) of the stent than on the distal part (13.3%) ($p < 0.01$).

Conclusion: Stent under-expansion is relatively common after implantation. The StentOptimizer system is a promising angiographic tool, enabling the optimization of stent expansion in 'real time' and may improve clinical results.

Figure 1. Serial stent enhancement images. A. Stent under-expansion within its middle and distal parts. B. After balloon angioplasty there is an improvement in stent minimal diameter.



Abnormal Vasomotor Function of Porcine Coronary Arteries Distal to Sirolimus-Eluting Stents

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Objectives: To determine vasomotor functional responses of conduit coronary artery distal to bare-metal (BMS), polymer-only (POLY), and sirolimus-eluting (SES) stents, in a clinically relevant animal model.

Background: Drug-eluting stents (DES) reduce in-stent restenosis, and also affect neointima formation and vascular remodeling in downstream coronary segments. Whether distal artery vasomotor function is also influenced by DES has not been determined.

Methods: Pigs (n=12) received coronary stent implant and hearts were harvested at one month. Arterial segments ≥ 15 mm distal to stents were excised and studied in an organ-chamber apparatus. Endothelium-dependent and -independent relaxation and contraction to classical agonists were measured. **Results:** SES showed increased lumen area and reduced neointima; abnormal vasomotor function of conduit arteries distal to SES was also observed.

Contraction to endothelin-1 was significantly enhanced for SES compared to both BMS and POLY. Endothelium-dependent relaxation to a maximal dose of substance P was attenuated for SES compared to both BMS and POLY ($46 \pm 6\%$ vs. $71 \pm 3\%$ and $78 \pm 3\%$, respectively, $P < 0.001$). Endothelium-independent relaxation to sodium nitroprusside was potentiated for SES, compared to BMS and POLY ($100 \pm 5\%$ vs. $69 \pm 7\%$ and $77 \pm 5\%$, respectively, $P = 0.02$).

Conclusions: Stent-based local delivery of sirolimus profoundly inhibited neointima formation but caused vasomotor dysfunction in distal conduit vessel segments. These observations suggest that distal coronary vasospasm may be more readily evoked in the presence of DES and contribute to pathophysiological sequelae.

"QT-Stretching:" The Response of the QT Interval to the Brief Tachycardia Provoked by Standing. A Bedside Test for Diagnosing Long QT Syndrome

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Objectives. To determine if the short-lived sinus tachycardia that occurs during standing will unravel changes in the QT interval of diagnostic value.

Background. The QT interval shortens during heart rate acceleration but this response is not instantaneous. We tested the idea that the transient, sudden, sinus tachycardia that occurs during standing would reveal abnormal QT prolongation in patients with LQTS.

Methods. Patients (68 LQTS and 82 controls) underwent a baseline electrocardiogram (ECG) while resting in the supine position and were then asked to get up quickly and stand still during continuous ECG recording. The QT was studied at baseline and during maximal reflex sinus tachycardia, maximal QT prolongation and maximal "QT-stretching."

Results. In response to brisk standing, patients and controls responded with similar heart rate acceleration of 28 ± 10 beats/min ($p=0.261$). However, the response of the QT interval to this tachycardia differed: On average the QT of controls shortened by 21 ± 19 msec while the QT of LQTS-patients increased by 4 ± 34 msec, $p < 0.001$. Since the R-R interval shortened more than the QT, during maximal tachycardia the QTc increased by 50 ± 30 msec in the control group and by 89 ± 47 msec in the LQTS group ($p < 0.001$). Receiver operator curves demonstrated that the test has diagnostic value. The response of the QT interval to brisk standing was particularly impaired in patients with LQT2.

Conclusions. Evaluation of the response of the QT interval to the brisk tachycardia induced by standing provides important information that aids in the diagnosis of LQTS.

Prevalence of Sudden Cardiac Death in Israeli Athletes in View of the 1997 Mandatory Medical-Screening Legislation

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Background:

The prevalence of sudden cardiac death (SCD) in Israeli athletes has never been estimated. In 1997, updated legislation to the sports law of 1988 regulated a mandatory medical-screening program for all athletes. There is no current data to support this screening program. Our aims were to evaluate the hypothesis that the 1997 mandatory screening program did not reduce SCD in Israeli athletes and to establish an estimate of the prevalence of SCD of professional athletes in Israel.

Methods: SCD in athletes is a media-covered event. We conducted a data base search on SCD in Israeli athletes during the years 1985-2009. These included national and local news papers, medical literature, sports organizations, government and sick fund offices. All reports were scrutinized for the affirmation an SCD event. An estimate for the total number of Israeli athletes during these years was calculated using data from official sport organizations.

Results: The systematic data base search yielded 24 documented SCD or sudden cardiac collapse events leading to death in Israeli athletes, during the years 1985-2009. We excluded 12 documented events from this analysis. Of the SCD events, 11 occurred before the 1997 legislation and 13 after it. At a crude assumption of 50,000 athletes in Israel, the present data covers 1,250,000 person years. The total prevalence for SCD was 1.92 per 100,000 person years. The prevalence before the legislation was 1.7 per 100,000 person years and after it 2.2 per 100,000 person years.

Conclusions: The current SCD estimates are similar to previously published ones (Italy, USA). We found no preventative benefit for the mandatory screening legislation.

The Site Of Origin Of Torsade de Pointes

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Introduction: The mode of onset of torsade de pointes (TdP) is well described. However, little is known about the site of onset of this arrhythmia.

Objective: To determine if arrhythmias in the long QT syndrome (LQTS) have a predominant site of origin and if this region is disease-specific (i.e., differs between congenital and acquired LQTS) or patient-specific (that is, if multiple episodes of TdP in the same patient share a site of origin).

Methods: Patients with LQTS and no structural heart disease, for whom electrocardiographic recordings of the onset of TdP were available in simultaneous 6-12 leads recording, were studied. The site of origin of QT-related arrhythmias was defined according to the morphology of the initiating ventricular complex.

Results: Multiple-lead recordings of 409 QT-related extrasystoles (impending TdP) and 110 episodes of TdP were available for 46 patients. The site of origin of TdP was not homogeneously distributed ($p=0.01$). Instead, most TdP (47%) originated in the outflow tract area. There was no correlation between site of origin and the etiology of LQTS. On a given patient, multiple episodes of TdP tended to originate from the same area and the site of origin of QT-related extrasystoles correlated with the site of origin of TdP.

Conclusions: The most frequent site of origin of TdP is the outflow tract. Further studies are needed to understand why this relatively small area of the ventricle is a predominant site of origin of diverse ventricular arrhythmias.

Post Cardioversion Renal Failure: An Under-recognized Complication of Atrial Fibrillation Cardioversion.

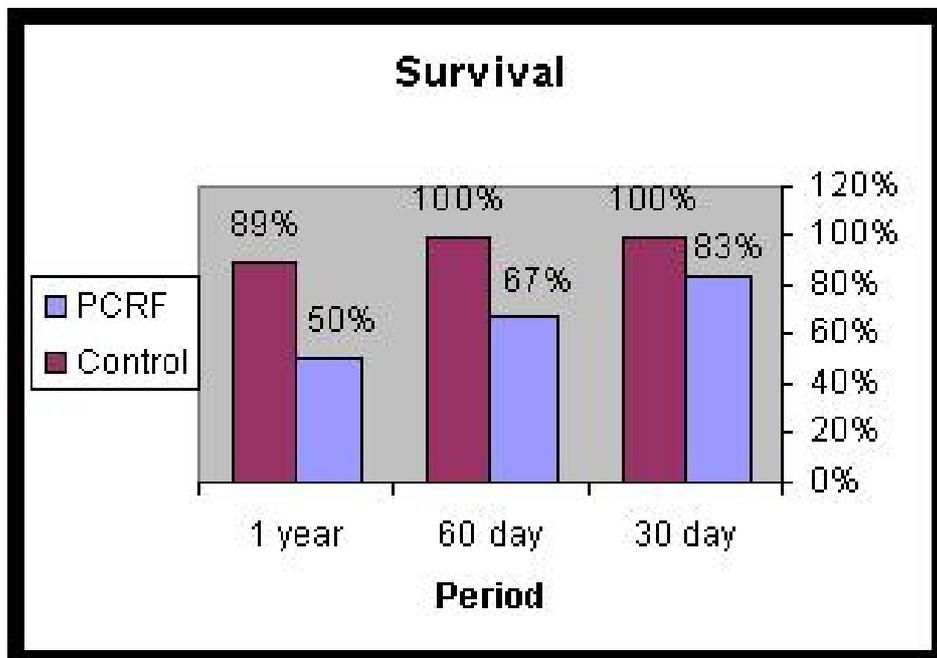
*Hellman, Y; Gozal, D; Haviv, Y; Loncar, S; Haber, G; Afifi, M; Rozenhak, S; Lotan, C; Gilon, D
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Introduction – Electrical cardioversion of atrial fibrillation may be associated with various risks – thromboembolism, complications associated with sedation such as aspiration or respiratory arrest, sinus bradycardia, and rarely pulmonary edema. Renal failure may also follow cardioversion due to a variety of pre-renal and renal etiologies.

Methods - We conducted a retrospective case control study to determine the incidence, timing, risk factors and outcome of post cardioversion renal failure (PCRf). All consecutive patients undergoing cardioversion for atrial fibrillation or flutter in our institution during 2008 were considered. Patients with end stage renal disease requiring hemodialysis were excluded. A measurement of serum creatinine before and after the cardioversion was also required. Renal failure was defined as a rise in serum creatinine greater than 25% or greater than 0.5 mg/dl from baseline.

Results- In 2008, 116 patients underwent cardioversion in our institution. 57 patients were excluded – 10 were patients with chronic dialysis and 47 did not have an available creatinine measurement following the cardioversion. In the remaining 61 patients, one patient underwent cardioversion on two separate occasions – both were included in the statistical analysis. Atrial flutter was present in 13.1% of the patients. PCRf had an incidence rate of 9.7%. Two predictors were noted – chronic renal failure (OR = 6, $p = 0.047$) and a history of congestive heart failure (OR = 2.8, $p=0.07$). In the PCRf subgroup, 2 patients died within 45 days since the cardioversion. Survival in the two groups is demonstrated in figure 1. One patient with PCRf required a prolonged hospitalization, including temporary pacing and dialysis.

Conclusion- Post cardioversion renal failure is a true entity which is under-recognized, and is associated with an adverse outcome. The etiology of this phenomenon is multifactorial- risk factors include chronic renal failure and congestive heart failure.



Atrial Fibrillation in Nursing Home Residents: Prevalence, Comorbidity, Treatment and Outcomes

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The prevalence of atrial fibrillation (AF) is especially high in nursing homes (NH) residents. Most NH residents with AF would be at high risk for embolic stroke. However, they carry a high risk of bleeding and anticoagulation is underused. AF in NH residents in Israel was not investigated.

Objective: To identify the prevalence, comorbidity, treatment and outcomes among NH residents with AF. Methods: Prospective study. All residents (318), between March to July 2007, of 2 public NH, were included. Primary endpoint: death or stroke and secondary endpoint: physical or cognitive decline at 1-year. Results:

	AF patients, n=50 (15.7%)	Non-AF patients, n=268 (84.3%)	p value
Baseline characteristics:			
Age	81.54+/-8.3	79.08+/-12.22	0.173
Female	70%	70.9%	0.891
Hypertension	76%	63.8%	0.428
Ischemic heart disease	64%	22%	<0.0001
Heart failure	50%	12.3%	<0.0001
Prior stroke	50%	31.8%	0.021
Comorbidities	7.24+/-2.24	4.99+/-2.08	<0.0001
Bartel index*	46.34+/-36.06	37.96+/-37.61	0.146
MMSE score**	14.08+/-12.28	10.66+/-11.72	0.061
Treatment:			
Medications	6.64+/-2.44	5.36+/-2.56	0.001
Aspirin	48%	22%	0.032
Warfarin	20%	1.1%	<0.0001
Warfarin and aspirin	6%	0	<0.0001
1-year outcomes:			
Mortality or stroke	36%	24.6%	0.094
Physical or cognitive decline	4%	4.1%	0.973

* Index for functional evaluation, 0-100 (100= independent subjects) ** Mini Mental State Examination, 0-30 (30=normal cognitive function). In multivariable model, AF was not associated with increased risk of the death or stroke (adjusted HR 0.67, 95% CI 0.29-1.66, p=0.418) and physical or cognitive decline (adjusted HR 0.91, 95% CI 0.19-4.23, p=0.906). Predictors of death or stroke were age (p=0.005) and low Bartel functional index (p=0.004). Conclusion: The high prevalence of AF among NH residents is associated with high rates of comorbidity and polypharmacy. Undercoagulation of this population was not associated with increased risk of death or stroke. Thus, guidelines should be adjusted for this unique group of patients with AF.

Mild Renal Impairment Adds Prognostic Value to MTWA and EPS in Predicting Ventricular Tachyarrhythmias

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Patients with severe renal dysfunction have increased total mortality and might not benefit from ICD implantation. The aim of this study was to determine whether mild renal dysfunction adds to microvolt T-wave alternans (MTWA) and to an electrophysiological study (EPS) in predicting ventricular tachyarrhythmic events (VTEs).

Methods: The ABCD trial enrolled patients with ischemic cardiomyopathy, LVEF 0.40, and non-sustained ventricular tachycardia. Patients underwent both a MTWA test and an EPS at baseline. Of those, 529 patients had a baseline creatinine level available. Creatinine level in the third tertile (>1.2 mg%) was considered abnormal. The primary end-point of the study was first VTE (ICD therapy or SCD). Using Cox regression and the log-rank test we analyzed the effect of renal dysfunction on VTEs, alone and in combination with MTWA and EPS.

Results: Median creatinine level was 1.1 mg% for the whole cohort. The hazard ratio for all cause mortality, cardiac mortality, and VTEs in patients with abnormal creatinine vs. the rest was 4.4 (p<0.01), 4.2 (p<0.01), and 1.8 (p=0.02), respectively. One-year VTE rate in patients with both normal creatinine and MTWA tests was 4.2% vs. 13.1% in patients who had both tests abnormal (p=0.01). One-year VTE rate in patients with both normal creatinine and EPS was 4.1% vs. 17.6% in patients who had both tests abnormal (p<0.01). Using creatinine level, MTWA, and EPS, the VTE rate at the end of follow up (median=1.8 years) was 10.9%, 10.0%, 16.6%, and 26.5% with none, one, two, or three abnormal tests, respectively (p=0.01).

Conclusions

Mild renal dysfunction increases cardiac mortality, but it also predicts the likelihood of VTEs. Withholding ICD therapy in patients with mild renal dysfunction may not be appropriate given the high likelihood of appropriate ICD therapy in our population. The combination of an abnormal creatinine, with either a MTWA test or EPS or both improves the risk stratification value of each alone.

Velocity Characteristics of the Normal Left Anterior Descending Coronary Artery Depend on Mode of Determination: Angiographic or Stress-Echographic

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Normal left anterior descending coronary artery (LAD) as determined by coronary angiography is considered equivalent to normal LAD as evaluated by noninvasive studies like dobutamine stress echocardiography (DSE) or to other methods of clinical evaluation. However, subjects who undergo coronary angiography may differ from those who do not need to have invasive evaluation even if their coronary arteries were considered normal by angiography.

Aim: Compare LAD velocities in subjects with normal angiography and those with normal DSE.

Methods: 244 subjects were evaluated, 78 had normal LAD by angiography and 166 had normal LAD by DSE. All had Doppler sampling of LAD velocities by trans-thoracic echocardiography.

Results: Velocity was higher in the angiographic subgroup in diastole 41 ± 23 , vs 33 ± 14 cm/sec, $p=0.0078$, in systole 18 ± 14 vs 13 ± 7 cm/sec, $p=0.012$, diastolic integral 12.6 ± 5 vs 9.8 ± 3.8 cm, $p=3.15 \times 10^{-5}$, systolic velocity integral 4 ± 2.9 vs 2.8 ± 1.9 , $p=0.0014$. While heart rate was similar in both groups, the product of diastolic velocity integral and heart rate of the LAD in the angiographic group was higher 902 ± 450 vs 743 ± 363 , $p=0.00599$. Diastolic velocity deceleration time was similar in both groups. Coronary flow reserve defined as diastolic velocity ratio before and immediately after DSE correlated negatively with baseline velocity, $r= -0.4$.

Conclusions: Mode of defining normality of coronary artery affects velocity behavior of the vessel, reflecting functional differences possibly related to microvasculature and vasodilatation.

Improved Detection of Ischemic Heart Disease by Combining High-Frequency ECG Analysis with Stress Echocardiography

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Background: Analysis of high-frequency QRS components (HFQRS) were recently reported to improve the diagnostic accuracy of ECG treadmill test (ETT). We sought to evaluate the clinical usefulness of HFQRS analysis during exercise echocardiography (echoCG) in detecting ischemic heart disease (IHD).

Methods: We evaluated 156 pts (age 58±10, 103 men) who performed stress echoCG and either invasive angiography (n=57) or CT angiography (CTA, n=99), which were used as the gold standard for comparison. Exclusion criteria included indeterminate CTA, QRS>120ms, significant valve disease, resting wall motion abnormalities, previous cardiac surgery and insufficient maximal HR. ETT was performed using the HyperQ System (BSP Ltd, Tel-Aviv, Israel) that enables automatic ST-segment analysis and measures changes in HFQRS intensity during exercise. Pts with HFQRS intensity reduction of 50% or more in at least 3 leads were considered ischemic.

Results: Significant IHD was found in 48 pts (31%). HFQRS was significantly more sensitive than ST segment analysis, with similar specificity (Table 1). Stress echoCG combined with HFQRS was more sensitive than the conventional combination with ETT. HFQRS provided an incremental diagnostic value (p<0.001) over pre-test, ETT and echoCG parameters (Figure 1). Using optimized cut-off points, the combined model achieved sensitivity and specificity of 86% and 80%, respectively.

Conclusions: HFQRS analysis during stress echoCG is feasible and may provide additional information for the detection of significant IHD.

1549885

Speckle Imaging in Acute Perimyocarditis

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³General Electric Healthcare, Haifa, Israel

Purpose: Echocardiographic changes in acute peri-myocarditis vary from regional/global LV dysfunction to apparently normal heart. We measured strain in 3 myocardial layers, torsion, pre-stretch and postsystolic index in patients with acute peri-myocarditis with modified 2D strain software.

Methods. 35 patients with acute pericarditis (mean EF 50%) and 14 normals (mean EF 60%) underwent echo examination. Short axis and apical views were analyzed with Modified 2D strain speckle tracking capable of measuring 3 myocardial layers.

Results. At each myocardial level longitudinal and circumferential strain in patients with peri-myocarditis were significantly lower than in control subjects. Postsystolic longitudinal and circumferential index in patients with peri-myocarditis was higher than in normals in basal and mid-ventricular segments. Radial postsystolic index was higher in the patients with peri-myocarditis than in normals in basal and apical segments.

Myocardial torsion in patients with peri-myocarditis was lower than in controls: 10.4° vs. 17.4° (p<0.0002).

Conclusions. Deformation parameters: 3-layers strain, torsion, postsystolic index are different in the patients with peri-myocarditis from normal subjects.

Screening for Rheumatic Heart Disease: A New Way for an Old Problem

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Background: Rheumatic heart disease (RHD) is a common disease, which remains a major cause of morbidity and premature death especially in developing countries. Screening programs have shown that physical examination (PE) is not a sensitive tool for its' early detection, so diagnosis relies on echocardiographic studies that are expertise dependent and expensive. We evaluated the accuracy of echocardiographic assessment by briefly trained examiners to identify RHD utilizing a portable, easy to use, hand-carried ultrasound (HCU) device.

Methods: Three 6th year medical students received 8 hours of training in cardiac ultrasound, focused on the assessment of rheumatic valve injury. They operated an HCU device, OptiGo™ weighing 2.9 kg. The medical students, blinded to the medical condition of the patients, performed a PE and then a focused HCU study on volunteers and on patients with known RHD. A standard echocardiography study was used to validate the students' results.

Results: Each student performed a PE and HCU study on 23 patients (mean age 54 ± 6 years, 68% females), 14 of them having rheumatic mitral valve injury. The sensitivity for diagnosing RHD by PE and HCU was 18% and 81%, respectively; and specificity of 97% and 85%, respectively. The table depicts inter-observer variability of both diagnostic techniques.

Conclusions: Medical students' ability to detect rheumatic valve injury with a portable ultrasound device, after brief echocardiographic training is significantly superior to that of physical examination. These results highlight the utility of portable cardiac ultrasound devices operated by basic-trained personnel as a valuable tool for screening for RHD, especially in low-income countries with a high prevalence of the disease.

Parameters	Tool	Student 1	Student 2	Student 3	Average
Rheumatic mitral injury (n= 14)	Physical exam	31%	8%	16%	18%
	Hand-carried ultrasound	86%	93%	65%	81%
Control (n= 9)	Physical exam	100%	100%	88%	97%
	Hand-carried ultrasound	100%	88%	66%	85%

Histogram Analysis Improves Diagnostic Value Of 2D Longitudinal Strain In Patients with CAD

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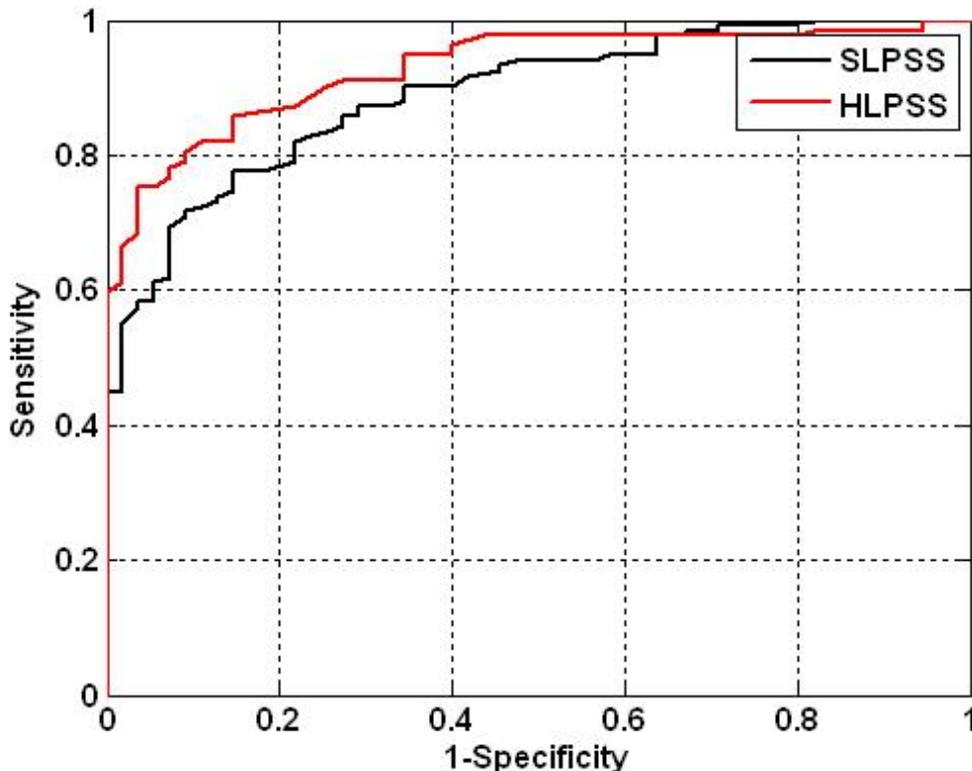
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Longitudinal peak systolic strain (LPSS) was recently introduced as a sensitive parameter of left ventricular (LV) function and ischemic changes. We used a customized code to generate and analyze the histogram of 150 – 200 LPSS values (HLPSS) uniformly distributed along the entire LV wall. We assessed the predictive value of HLPSS vs. standard segmental LPSS analysis (SLPSS), according to which the minimally contracting segment is used, in the detection of coronary artery disease (CAD) in patients (pts) with angina.

Methods: SLPSS and HLPSS were measured in 162 pts hospitalized with angina or acute coronary syndrome that had coronary angiogram and 51 pts with low probability of CAD and normal stress echocardiography. SLPSS was assessed with AFI (automated function imaging). HLPSS was assessed in each pt and determining the utmost value of the 15% worst LPSS samples.

Results: 133 pts had significant CAD on coronary angiogram. The mean SLPSS was $-8.3\% \pm 4$ and $-14\% \pm 2.5$ in pts with and without CAD, respectively ($P < 0.001$). The LPSS of the worst 15% strains by HLPSS was $-10\% \pm 4$ and $-16.5\% \pm 2$ in pts with and without CAD, respectively ($p < 0.001$). The area under the ROC curve was 0.89 for SLPSS and 0.93 for HLPSS (Figure). The optimal cutoff for SLPSS and HLPSS analysis was -12.1% and -14.5% , respectively. The sensitivity was 79% and 85% and the specificity of 79% and 85%, respectively.

Conclusion: In pts hospitalized with angina or acute coronary syndrome LPSS at rest was significantly lower in pts with CAD. The histogram analysis is a better predictor of CAD than standard segmental analysis.



Strain Analysis by Speckle Tracking Echocardiography Allows Discovery of Essential Similarities in Left Ventricular Function between Rats and Humans

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Rats are commonly used as experimental models of human heart diseases to investigate left ventricular (LV) function under controlled conditions, assuming that LV function of rats and humans are alike. LV of Rats and humans has the same anatomical structure of continuum helical fibers. The question is whether this similarity infers similarity in LV function, and whether LV of rats is a good model for studying human LV function. The aim of this study was to investigate the similarities and differences in LV function between rats and humans by comparing various measurements performed on healthy rats and humans. The analysis was applied to 110 sedated Sprague-Dawley rats and 120 humans that underwent standard echocardiography. In order to compare the LV twist, torsion-to-shortening ratio, LV rotation and circumferential strain measurements short axis scans were obtained. Longitudinal strain was compared between rats and humans from long axis scans. The measurements were assessed by utilizing a speckle tracking echocardiography approach. The results show that the longitudinal strain is equal in rats ($-16.3 \pm 3.6\%$) and humans ($-16.2 \pm 4.2\%$), while the circumferential strain is larger in humans ($P < 0.01$). The LV twist was found to be equal in rats (8.7 ± 4.4 deg) and humans (9.7 ± 4.5 deg). However, for rats the rotation was larger at the apex ($P < 0.01$) and lower at the base ($P < 0.001$). The torsion-to-shortening ratio parameter was found to be equal in rats and humans (rats 0.43 ± 0.21 , humans 0.41 ± 0.21). The similarity of the torsion-to-shortening ratio parameter between humans and rats indicates same transmural distribution of contractile myofibers in rats and humans. Moreover, the longitudinal strain and LV twist are equal in rats and humans, and thus no scaling is needed while comparing these parameters among rats and humans. These parameters are recommended to be measured, while evaluating LV function of a rat model of heart disease, in order to infer to human LV function.

Mortality in Heart Failure with Preserved Vs. Reduced Systolic Function; The Same Outcome But Different Causes

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Background: There are conflicting reports regarding the mortality rates in heart failure patients with preserved systolic function (HFPSF) comparing to systolic dysfunction heart failure (SHF). We aimed to evaluate the mortality rates and causes in HFPSF (EF≥40%) compared to SHF (EF<40%) patients.

Methods: Analysis included 164 HFPSF and 317 SHF patients, followed at our medical center. We documented every patient cause of mortality based on clinic data and hospital records. We classified the cause of death as pump failure, sudden cardiac death (SCD) or as non-cardiac cause {renal disease, malignancy, stroke, major bleed and sepsis}. In 2 patients we could not determine the cause of death.

Results: A total of 148 (31%) patients died over a mean follow-up period of 2 years; 53(32%) HFPSF and 95(30%) SHF patients (p=0.96). Comparing to the HFPSF patients, the SHF patients were predominantly younger males with ischemic etiology but with fewer cardiovascular comorbidities such as obesity, hypertension, diabetes mellitus and atrial fibrillation:

Variable	E.F<40% (n=317)	E.F≥40% (n=164)	P-value
Age	65.1±13.9	70.7±13.2	<0.0001
Body mass index	28.2±5.2	31.9±6.9	<0.0001
Female gender	55 (17%)	86 (53%)	<0.0001
Ischemic etiology	209 (66%)	71 (43%)	<0.0001
Hypertension	168 (53%)	124 (76%)	<0.0001
Diabetes Mellitus	127 (40%)	91 (56%)	0.001
Atrial Fibrillation	111 (35%)	86 (52%)	<0.0001

The total mortality rates between the two groups were similar, however the etiology was different. The SHF patients comparing to the HFPSF patients had significantly higher death rates due to pump failure {32/95 (34%) patients vs. 9/53 (17%) patients, respectively, p<0.05} with a similar prevalence of mortality due to SCD {17/95 (18%) vs. 10/53 (19%) patients, respectively, p=0.88}. However, the SHF patients had a tendency towards lower rates of mortality due to non-cardiac causes {45/95 (47%) patients vs. 33/53 (62%) patients, respectively, p=0.08}.

Conclusion: Although the characteristics of HFPSF and SHF patients are distinctively different, the mortality rates of these two patients' populations are similar. Of note, the etiology of death is different among the two groups. Pump failure is significantly higher in SHF and on the other hand a tendency towards non-cardiac mortality is higher in patients with HFPSF.

De Novo Titin Mutation In Familial Restrictive Cardiomyopathy

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Familial restrictive cardiomyopathy (RCM) is the least common amongst inherited cardiomyopathies. We report a novel mutation in titin (TTN) in a family with RCM inherited as an autosomal dominant trait. Family members were screened by ECG, echo-doppler, serum creatine kinase and NTproBNP. DNA was extracted from peripheral venous blood. Linkage to candidate loci was examined with custom generated polymorphic repeat markers. The family comprised 5 affected individuals (2 males, 3 females) aged 12-35 years, and 12 healthy first degree relatives. Echo-doppler of the affected was characterized by restrictive left ventricular filling and miniature 'A' waves but normal wall thickness and preserved left ventricular function. Four had symptoms of heart failure and NTproBNP of 1016 to 4242 pg/μl. All had left axis deviation on ECG, 3 had RBBB but none had atrioventricular block or skeletal myopathy. Endomyocardial biopsy showed extensive fibrosis and disorganized sarcomeres but no storage or infiltration. The proband and her daughter had undergone heart transplantation while a 16 year old nephew expired. Linkage analysis to candidate loci excluded 18 genes of sarcomere proteins, desmin, etc. A common haplotype surrounding the TTN gene was shared by all the affected. Sequence analysis identified a Y7621C mutation, replacing a highly conserved hydrophobic tyrosine with a polar cysteine within the fibronectin3 domain. The mother and 2 siblings of the proband carried the disease haplotype but not the mutation, suggestive of germline mosaicism. TTN mutations were previously reported to cause skeletal myopathy and dilated or hypertrophic cardiomyopathy. In this family, a missense mutation arose de novo resulting in malignant RCM. Titin is a giant protein responsible for sarcomere assembly and regulating resting tension. We propose that the change in protein structure impairs the "molecular spring" function, thereby leading to restriction and development of cardiomyopathy.

1550072

Cylex Guided Conversion to Everolimus Based Immunosuppression in Heart Transplant Recipients: The Rabin Medical Center Experience

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Background: Everolimus provides effective immunosuppression after heart transplantation (HTx) allowing Calcineurin inhibitors (CNI) minimalization. It has the potential of reducing renal toxicity and the severity of cardiac allograft vasculopathy (CAV). Immunosuppressant dosing is commonly based on measuring drug levels despite the known clinical inaccuracy of this surveillance method. The Cylex assay determines the cellular immunity status by quantitative measurement of intracellular ATP level in CD4+ lymphocytes. Levels below 225 and above 525 indicate over and under immune suppression respectively.

Aim: To assess the efficiency and safety of the conversion to Everolimus based immunosuppression (EBI) in HTx patients using the Cylex assay.

Methods: Since December 2006, Everolimus (initial dose: 1.5 gr/day) was introduced in 43 (35%) of the 108 HTx pts followed at our center: 26 (60%) pts in the reduced CNI dose (CNI reduced by 30% MMF withheld) and 17 (40%) in the CNI free (CNI discontinued, MMF increased to 3 gr/day) protocols. Drug levels were maintained as proposed. The Cylex assay was introduced in June 2007. The 24 pts with Cylex assay performed before and after the conversion to EBI were studied.

Results: Everolimus was introduced due to: worsening renal function, CAV, recurrent CMV, CNI induced neuropathy or malignancy. Everolimus levels in the CNI free and reduced protocols were 6.1 ± 2.5 and 4.8 ± 2 respectively. Cyclosporine and FK levels were 66 ± 21.1 and 4.2 ± 2.5 respectively. Pre conversion, one week and one month post conversion mean Cylex levels were 361 ± 130 (range 187-600), 359 ± 121 (range 142-573) and 378 ± 82 (range 226-513) respectively ($p=NS$). During the first month post conversion, doses were changed guided by the Cylex levels. No adverse events (rejections or infections) occurred as a result of the doses alterations.

Conclusions: Cylex guided conversion to EBI therapy is safe and efficient in tailoring the most appropriate therapy for each HTx recipient.

The Clinical Outcome of Patients with Chronic Heart Failure Followed in a Specialized Heart Failure Center

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¹Hadassah University Hospital, Jerusalem, Israel; ²Clalit Health Services, Jerusalem, Israel

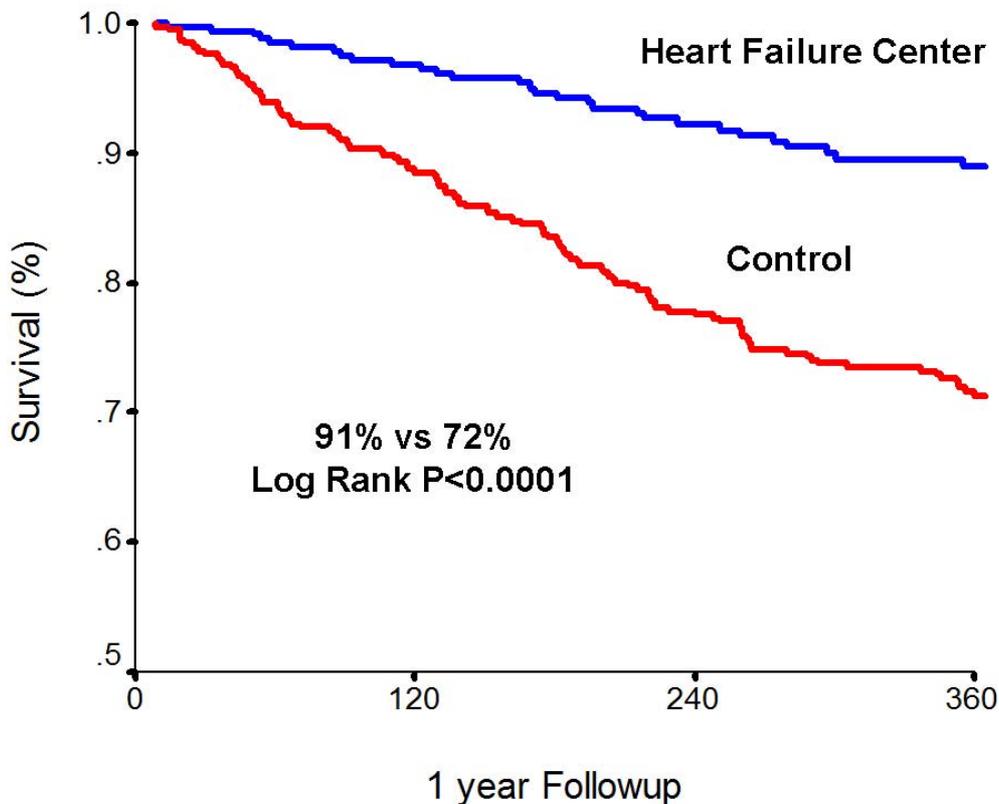
Background: Patients with heart failure (HF) have a poor prognosis. Heart failure centers (HFC) with specialized management programs have been proposed to improve prognosis. We evaluated this at a multidisciplinary HFC operating in Jerusalem during the last two years.

Objectives: To evaluate the clinical outcome of patients with HF treated at the HFC of Clalit Health Services in Jerusalem in collaboration with Hadassah University Hospital.

Methods: We evaluated all patients followed at the HFC with HF for clinical outcome including hospitalizations and death. Three major principles governed the management of the patients: 1. Specialized nurse supervised implementation of care; 2. Joint management of patients with the primary physician; 3. Careful implementation of management guidelines, from lifestyle modification to pharmacologic therapy and all applicable advanced technologies.

Results: A total of 344 patients were included and followed at the HFC for a mean period of 380 ± 227 days; 58% were males with a mean age of 75 ± 11 years. Mean New York Heart Association (NYHA) class was 2.42 ± 0.8 with 45% in NYHA 1-2 class and 55% in NYHA 3-4; 74% suffered from ischemic heart disease, 49% from diabetes and 83% from hyperlipidemia. The overall one-year survival rate was 91%, significantly higher than in a comparable control group of HF patients (N=362), Figure 1. Overall survival during the entire follow-up was 87% with a 93% survival rate in NYHA 1-2 patients and 82% in NYHA 3-4. Hospitalization rate was 37% with 25% in NYHA 1-2 patients and 49% in NYHA 3-4. Event-free survival from death or hospitalization was 56%, with 71% rate in NYHA 1-2 patients and 42% in NYHA 3-4.

Conclusions: Hospitalization and survival rates of patients followed in a HFC, including those with severe chronic heart failure, were significantly better than the dismal expected rates published in the literature. HFC should be considered part of the standard treatment of patients with symptomatic HF.



Echocardiographic Evaluation of Patients with Acute Heart Failure during Pregnancy with or without Identifiable Precipitating Factors.

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Background: Peripartum cardiomyopathy (PPCM) is defined as the onset of cardiac failure without identifiable cause 1 month pre, to 5 months post-partum. Because it is difficult to distinguish between classical PPCM and acute heart failure (AHF) due to a precipitating factor(PF), most such patients are usually discharged with a diagnosis of PPCM, an ominous prognostic factor regarding future pregnancies.

Methods: We studied women diagnosed with PPCM according to Leviev Heart Center registry between 1998-2009 in order to differentiate between patients with and without PF. Mean follow up time was 39i38, months(1-140) .

Results: PPCM was diagnosed in 41 women. Seventeen had identifiable PF for AHF (5 hypertensive crisis or eclampsia, 6 acute blood dyscrasia with massive fluid reposition, 2 sepsis, 4 other causes). Presentation with acute pulmonary edema was more common in women with PF (58% vs 25%, p=0.05).

Baseline Echocardiographic Characteristics of Patients with AHF with and without PF

	AHF WITH PF	AHF WITHOUT PF	p
LVEDD(mm)	51±6	57±7	0.01
LVESD(mm)	39±6	46±7	0.003
LVEDD/BSA(mm/m2)	29±3	32±4	0.01
LVEF(%)	35±9	27±10	0.006
SF(%)	23±8	19±6	0.1

LVEF, LV ejection fraction; LVEDD, LV end-diastolic dimension; LVESD, LV end-systolic dimension; BSA, Body Surface Area.

During the follow up period 83% of women with PF vs. 30% without PF improved their LVEF to $\geq 50\%$ (p<0.01).

Conclusions: Women who develop AHF with identifiable PF have smaller baseline LV dimensions and better LVEF than patients without PF. Unlike patients with heart failure without PF (PPCM), most of the patients with AHF+PF recover LV function allowing positive consideration of future pregnancies.

1550460

Normalization of High Pulmonary Vascular Resistance with HeartMate II LVAD Support

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Objective: Pulmonary hypertension (PHT) and elevated pulmonary vascular resistance (PVR) lead to poor outcome after heart transplantation due to postoperative failure of the donor right ventricle. As such, patients with PHT and elevated PVR are considered high risk for transplantation. The use of left ventricular assist device (LVAD) to reduce PHT has been suggested to convert those patients to be good transplant candidates.

Methods and Results: We describe 4 patients with ischemic cardiomyopathy who deteriorated and required support. Three had previous CABG. All patients had PHT and elevated PVR despite maximum medical therapy. HeartMate II Lvad was implanted in all 4 patients. The patients experienced clinical improvement and was sent home. Systolic pulmonary pressure was measured preoperatively and between 3 – 15 months postoperatively (table). Pulmonary pressures came down in all patients.

Patient	Preop pulmonary pressure (mmHg)	Postop pulmonary pressure (mmHg)	Time between studies (months)
1	70	30	11
2	80	30	15
3	95	48	7
4	90	40	3

Conclusions: Elevated PVR and severe PHT were both previously considered as contraindication for heart transplantation. A period of LVAD pumping leads to a progressive decrease of PVR and normalization of pulmonary pressures, making these patients amenable for heart transplantation.

The Impact of Caffeine on Brachial Endothelial Function in Healthy Subjects and in Patients with Ischemic Heart Disease

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Background: Coffee is one of the most widely used pharmacologically active beverages, however, its impact on the cardiovascular system is controversial.

Methods: To explore the impact of acute caffeine ingestion on vascular endothelial function, 80 consecutive subjects [40 healthy volunteers and 40 patients with documented coronary artery disease (CAD)] were assessed on 2 separate mornings, 1-2 weeks apart. Following overnight fasting and discontinuation of all medications for ≥ 12 hours, and absence of > 48 hour caffeine, participants received 200 mg of caffeine tablets or placebo in a prospective, randomized, double-blind, placebo control and cross-over study. An hour after the study drug ingestion, participants underwent brachial artery endothelium-dependent flow-mediated dilation (FMD) and nitroglycerin-mediated dilation (NTG), using high resolution ultrasound.

Results: CAD patients were older, had more diabetes, hypertension and dyslipidemia compared to healthy subjects (all $p < 0.01$). Additionally, the use of aspirin, plavix, angiotensine-enzyme inhibitors, beta blockers, and statins was significantly more common in CAD patients compared to healthy controls (all $p < 0.01$). At baseline, FMD, but not NTG, was significantly lower in CAD patients compared to controls ($5.6 \pm 5.1\%$ vs $8.4 \pm 2.9\%$, $p < 0.01$ and $13.1 \pm 5.2\%$ vs $12.9 \pm 3.9\%$, $p = 0.27$, respectively). However, caffeine ingestion significantly increased FMD (CAD: $5.6 \pm 5.1\%$ vs. $14.6 \pm 5.1\%$; Healthy: $8.4 \pm 2.9\%$ vs. $18.6 \pm 6.9\%$; all $p < 0.001$), NTG (CAD: $13.1 \pm 5.2\%$ vs. $17.9 \pm 6.1\%$; Healthy: $12.9 \pm 3.9\%$ vs. $22.9 \pm 10.1\%$; all $p < 0.001$) and significantly reduced high-sensitivity C-reactive protein (CAD: 2.6 ± 1.4 mg/L vs. 1.4 ± 1.2 mg/L; Healthy: 3.5 ± 3.0 mg/L vs. 1.3 ± 1.0 mg/L; all $p < 0.001$) in both study groups compared to placebo.

Conclusion: Acute caffeine ingestion significantly improved endothelial function assessed by brachial artery FMD in healthy subjects and CAD patients associated with reduced plasma markers of inflammation.

Long-Term Association of Brachial Artery Flow-Mediated Dilation and Cardiovascular Events in Middle-Aged Subjects with No Apparent Heart Disease

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Background: Endothelial dysfunction is considered an important prognostic factor in atherosclerosis.

Methods and Results: To find out the long-term association of vascular endothelial function and adverse cardiovascular events (CVE), we prospectively assessed brachial artery endothelium-dependent flow-mediated dilation (FMD), using high-resolution linear array ultrasound, in 618 consecutive healthy subjects with no apparent heart disease: 387 (63%) men, mean age 54±11 years and body mass index 28±kg/m². Subjects were divided into 2 groups: ≤ (n=309) and > (n=309) the median %FMD of 11.3%. The 2 groups were comparable in regard to cardiovascular risk factors, lipoproteins, fasting glucose, high-sensitivity C-reactive protein, concomitant medications and Framingham 10-year risk score. In a mean clinical follow-up of 3.6±1.8 years the composite CVE (all-cause mortality, non-fatal myocardial infarction, hospitalization for heart failure or angina pectoris, stroke, coronary artery bypass grafting and percutaneous coronary interventions) were significantly more common in subjects with %FMD ≤ rather than > the median of 11.3% (14.2% vs 1.0%, p=0.0001). Univariate analysis demonstrated that the median %FMD significantly predicted CVE [odds ratio (OR) of 2.78 and 95% CI (1.35 to 5.71) (p=0.003)]. After multivariate analysis that included traditional cardiovascular risk factors, median %FMD was the best independent predictor of long-term CVE [OR of 2.70 and 95% CI (1.16 to 6.32) (p<0.0001)] (Figure).

Conclusions: Brachial artery median %FMD independently predicts long-term adverse CVE in healthy subjects with no apparent heart disease in addition to those derived from traditional risk factor assessment.

Coronary Artery Calcification Predicts All Cause Mortality in Hypertensive Males

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Background: Coronary artery calcifications (CAC) are a measure of atherosclerosis and are well accepted as a marker of the total atherosclerotic burden. We studied the long term prognostic effect of CAC in hypertensive patients.

Methods: We followed 423 participants of the INSIGHT (International Nifedipine Study Intervention as Goal for Hypertension Therapy) calcification sub-study, for the incidence of all cause mortality. All participants had hypertension without coronary artery disease (CAD) or peripheral vascular disease, were older than 55 years and had in addition to hypertension at least one major cardiovascular risk factor. All participants underwent a baseline dual slice CT for coronary calcium measurements, and were followed for a mean period of 14±0.5 years. Death was recorded from the ministry-of-interior-affairs registry.

Results: During the follow-up 94 patients died. Coronary artery calcifications [Total coronary calcium score (TCS) >0] was observed in 272 patients. CAC was more prevalent in those who died [82% in those who died as compared to 59% in those who survived (p<0.001)]. The annual death rate was 2.1% in those with CAC compared to 0.8% in those without CAC (p <0.001). Patients who died were slightly older, had higher systolic blood pressure, higher left ventricular mass, and lower kidney function and were more likely to have proteinuria. After adjustment for these covariates, CAC predicted mortality with an hazard ratio (HR) of 2.14 [95% confidence interval (CI) 1.62-4.63, P = 0.03]. Analysis by gender showed that CAC predicted mortality only in males (adjusted HR =3.31, 95%CI; 1.29-8.47 P=0.013 for males and HR=1.42 95% CI; 0.65-3.14 P=0.380 for females).

Conclusion: The presence of CAC independently predicts long term all cause mortality in high-risk asymptomatic hypertensive male.

Anemia and Low Hemoglobin Levels are Associated with Significant Erectile Dysfunction in Men with Coronary Artery Disease

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Introduction: Erectile dysfunction (ED) is prevalent among coronary artery disease (CAD) patients. However, the association between ED, anemia, and low hemoglobin (Hgb) levels, has never been studied in CAD patients, to the best of our knowledge.

Methods: We studied the association between significant ED, anemia, and low Hgb levels, in CAD patients. CAD was defined as >50% stenosis in one or more coronary arteries documented by angiography. Anemia was defined as Hgb levels <13g/dL. Excluded were men with Hgb levels <10g/dL. All subjects filled the Sexual Health Inventory for Males (SHIM) questionnaire in order to detect ED and assess its severity. Significant ED was defined as SHIM questionnaire scores <17.

Results: The cohort included 218 men with mean ages of 62.7±11.9 years, mean Hgb levels of 13.8±1.4 g/dL, and mean SHIM scores of 15.9±7.9. Overall, 83 (38.1%) men had significant ED, 62 (28.4%) men had anemia, and 39 (17.9%) men had both. Men with anemia had higher prevalence of significant ED relative to men without anemia (62.9% vs. 28.2%; p=0.0002), as well as lower mean SHIM scores (11.8±8.9 vs. 17.5±6.8; p<0.0001). Men with significant ED had higher prevalence of anemia relative to men without significant ED (51.8% vs. 14.1%; p<0.0001), as well as lower mean Hgb levels (13.2±1.5 vs. 14.1±1.2g/dL; p<0.0001). Hgb levels correlated with SHIM questionnaire scores (r=0.24; p<0.0001) following adjustment for age (figure). In a multivariate analysis, age and Hgb levels were the only factors independently associated (p<0.0001) with significant ED in men with CAD, rather than the number of stenotic coronary arteries, medications, and cardiovascular risk factors.

Conclusions: Anemia and low Hgb levels are associated with significant ED in men with CAD. Whether increasing Hgb levels also improves ED in men with CAD is a matter for future prospective studies.

Is There a Relationship Between Heart Failure and Fractures?

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Background: Recent findings suggest a role for heart failure (HF) in the etiology of osteoporotic fractures, but the nature of the relationship is unclear and community-based data are lacking.

Methods and Results: Using the resources of the Rochester Epidemiology Project, we conducted a 2-phase study: A case-control study compared osteoporotic fracture history among Olmsted County, Minnesota, residents newly diagnosed with HF in 1979-2002 (cases) to age- and sex-matched community controls without HF (961 pairs; mean age: 76 years; 54% women). Both cases and controls were then followed forward in time to July 2009 to evaluate their fracture risk using a cohort design. Prior fractures were more frequent in HF cases than controls (23.1% versus 18.8%, $P = 0.02$). The adjusted odds ratio (OR) for HF associated with any osteoporotic fracture was 1.39 (95% CI: 1.07-1.81), mainly driven by hip fractures (OR: 1.82; 95% CI: 1.25-2.66); there was little or no association with other fractures. Over a mean follow-up of 7.5 years, 444 individuals developed osteoporotic fractures. The adjusted fracture risk was elevated in HF patients compared with controls (hazard ratio [HR]: 1.32; 95% CI: 0.98-1.79), again largely attributable to hip fractures (HR: 1.58; 95% CI: 1.03-2.41).

Conclusions: Prior fracture is associated with HF at least as strongly as HF is associated with subsequent fracture. In both instances, the increased risk is driven by hip rather than other fractures. These findings suggest common underlying mechanisms of HF and hip fracture, which in turn may define prevention opportunities.

Usefulness of Duke criteria for chest pain stratification to select patients undergoing computed coronary tomography Angiography

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Background: Duke criteria of chest pain is a useful tool to assess pretest likelihood of obstructive coronary disease during invasive angiography. However its correlation with computed coronary tomography angiography(CCTA) is unknown and may be helpful in patients selection for CCTA.

Objective: To assess correlation between Duke criteria and atherosclerotic burden on CCTA in a consecutive population hospitalized for chest pain.

Methods: One hundred fifty five patients without known coronary disease hospitalized with chest pain underwent CCTA. Duke pretest probability was calculated taking into account risk factors and the 3 chest pain categories as well as age and gender. The 3 categories of pre-test likelihood were defined as : low (<33.3%), intermediate (33.3%-66.6%) and high (>66.6%). CCTA findings were classified as normal (no atherosclerosis detected), non obstructive (plaque with 0-50% luminal stenosis),and obstructive (>50% luminal stenosis).

Results: 88(56.8%) were male, aged 52.7 \pm 10.9 years, with a median coronary calcium score of 1 (0.0 to 5.3) and the mean Duke pretest likelihood was 29.0% (95% CI: 25.2 to 33.3%). According to Duke criteria, 79 patients (51.3%) were at low risk, 49(31.8%) at intermediate risk and 26(16.9%) at high risk. Normal , non obstructive and obstructive coronary disease were present in 50(63.3%), 21(26.6%) 8(10.1%) of the low risk group , in 18(36.7%), 15(30.6%) 16(32.7%) of the intermediate group and in 4(15.4%) , 12(46.2%) , 10(36.5%) of high risk patients (p=0.004 between 3 groups , p=0.13 between intermediate and high risk groups).

Conclusions: Duke criteria is especially useful and correct to recognize low risk patients: about 10% of them will have obstructive disease and will likely undergo invasive coronarography whereas another quarter will benefit from aggressive primary prevention for non obstructive coronary disease. In both the intermediate and the high pretest group, about one third will have obstructive disease.

Peripartum Cardiomyopathy- Evaluation with Trans-Thoracic Echocardiography (TTE) and Cardiac MRI (CMR)

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Purpose:

Peripartum cardiomyopathy (PPCM) is defined as new onset heart failure (HF), between the last month of pregnancy and 5 months post partum, absence of HF cause or recognizable heart disease and demonstration of left ventricular (LV) dysfunction.

The purpose of the study is to report trans-thoracic echocardiography (TTE) and cardiac MRI (CMR) findings in patients with clinically suspected PPCM.

Patients and methods:

The study cohort included 5 patients , mean age 35.8 ± 4 years (range: 30-42). All presented with new onset peripartum HF.

All patients underwent TTE and CMR. Two patients performed a follow-up CMR. TTE: according to the American Society of Echocardiography standard. CMR: 1.5T scanner; steady state free precession and late gadolinium enhancement (LGE) sequences.

Results: TTE was performed within 1-2 day from presentation; CMR was performed in 3 patients within 1-2 day and in 2 patients within 4 months. TTE demonstrated an average left ventricular ejection (LVEF) fraction of $22 \pm 14\%$ (range 15-45%). Accordingly, average LVEF at CMR was 25 ± 21 (range 15-63%). Linear or punctuate midwall septal LGE was demonstrated in 4/5 of the patients. A repeat CMR scan in two patients (at nine and eleven months after the initial scan) demonstrated mild LVEF improvement (15% to 27%) but with no change in LGE pattern.

Conclusions:

PPCM is a diagnosis of exclusion in peripartum patients. We demonstrated septal LGE in 4/5 patients of our cohort. This suggests that CMR may contribute new data, in the non invasive evaluation of PPCM, and in the understanding of the pathologic basis of PPCM.

Assessment of Left Ventricular Dyssynchrony by Phase Analysis of Gated SPECT: Preliminary Results

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Background: Cardiac resynchronization therapy (CRT) has shown benefits certain group of patients. However, about 30% of them failed to respond to CRT. Recently, phase analysis software has been developed to assess mechanical left ventricular (LV) dyssynchrony from gated SPECT (GSPECT) using the Emory Cardiac Toolbox.

Aims: to apply the toolbox software in consecutive patients referred to GSPECT, define our normal values, secondly, correlate phase measures with various range of LVEF and QRS duration.

Methods: We revised all consecutive patients referred to GSPECT to our laboratory during 3 weeks and applied phase analysis. LV dyssynchrony was measured by phase standard deviation (SD) and histogram bandwidth (BW). Because of poor technical results (for phase analysis), patients who underwent thallium tests, low dose TC99 sestamibi tests, obese patients (>110 Kg) and inadequate imaging quality, were excluded.

Results: 72 patients with high dose TC 99 Sestamibi (40 stress and 32 rest) were recruited for study. Normal controls of SD and BW were defined in patients with EF>50%, normal perfusion and QRS<120, and found to be similar to the literature normal controls. Comparison of phase SD and BW measures among 3 groups according to EF [Table1] and 2 groups according to the duration of QRS [Table 2] are as follows:

Table 1	A EF>50%	B EF 35%-50%	C EF <35%	P (A-B)	P (B-C)
Number	52	9	11		
Phase SD (Mean±SD)	17.2±11	29.4±14	73.1±25	0.01	<0.01
Bandwidth (Mean±SD)	44.1±21	78±43	195.3±76	0.02	<0.01

Table 2	QRS<119	QRS>120	P
Number	57	15	
EF (Mean±SD)	57.7±12	41.6±22	<0.01
Phase SD (Mean±SD)	21.6±2	48.75±27	<0.01
Bandwidth (Mean±SD)	52.1±4	145±89	<0.01

Conclusions: Normal data base for phase analysis was validated for high dose sestamibi GSPECT, similar to that in the literature. A good correlation was found between LV dyssynchrony, EF and QRS duration.

Trends in the Baseline Characteristics of Patients Referred to Myocardial Perfusion Imaging Between the Years 2000-2008

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Background: Over the last decade, the variety of imaging modalities has increased. We sought to investigate the impact of this change on the characteristics of patients referred to myocardial perfusion imaging (MPI).

Methods: Using the heart institute computerized database we identified all consecutive MPI studies between January 2000 and October 2008. Demographic, clinical and MPI data were extracted. Proportions were compared using crosstabs and chi-square statistics. To assess the associations between multiple variables ANOVA was used. The level of significance was 0.05.

Results: We identified 36456 studies. Table 1 shows the baseline characteristics over the years. There was a significant but not clinically relevant trend in patients' age, male ratio and history of CAD. However, the rate of patients with 0-1 risk factors had declined dramatically while the rate of patients with 2-3 and 3-4 risk factors inclined. Similar trends were demonstrated for patients with no history of CAD (n=19102).

Conclusions: The profile of patients referred to MPI has changed significantly. This trend might reflect improvement in the selection of patients referred to MPI (intermediate risk) and impact of alternative imaging modalities.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	p
Age (Mean ±SD)	63±11.3	63.5±11.4	64.1±11.4	64.3±11.6	64.4±11.5	64.2±11.7	64.1±11.6	64.7±12.0	64.7±11.5	p<0.05
Male n (%)	2132 (59.5%)	2370 (59.9%)	2221 (58.3%)	2261 (59.9%)	2344 (62.9%)	2686 (57.8%)	2932 (58.5%)	2763 (60.0%)	1986 (59.7%)	p<0.05
RF (#) 0-1	1750 (48.8%)	1502 (37.9%)	1175 (30.8%)	967 (25.6%)	866 (23.2%)	962 (20.7%)	1012 (20.2%)	781 (17.0%)	535 (16.1%)	p<0.05
RF (#) 2-3	1552 (43.3%)	2114 (53.4%)	2173 (57.0%)	2281 (60.4%)	2316 (62.1%)	2868 (61.7%)	2988 (59.7%)	2836 (61.6%)	1964 (59.0%)	p<0.05
RF (#) 4-5	284 (7.9%)	343 (8.7%)	463 (12.1%)	528 (14.0%)	550 (14.7%)	821 (17.7%)	1008 (20.1%)	988 (21.5%)	829 (24.9%)	p<0.05
Hx of CAD n (%)	1887 (52.6%)	1877 (47.4%)	1805 (47.4%)	1771 (46.9%)	1755 (47.0%)	2190 (47.1%)	2329 (46.5%)	2161 (46.9%)	1579 (47.4%)	p<0.05

Experimental Induced Myocarditis In Rat Can Be Detected and Monitored By Clinical 3T Cardiac Magnetic Resonance.

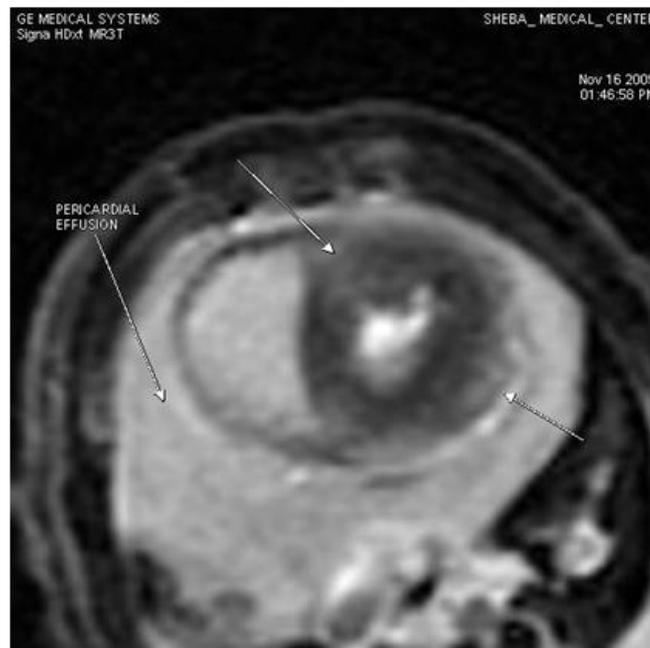
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Background: We aimed to compare cardiac magnetic resonance (CMR) imaging, using a clinical whole body 3T scanner (Signa HDx version 15 GE healthcare), with histopathological measurement as a method for the quantitative evaluation of the extent of myocardial involvement and function in a rat model of autoimmune myocarditis.

Methods and Results: Male Lewis rats (n=11) were subjected to myosin immunization and developed autoimmune myocarditis. Approximately 3 weeks later, rats with myocarditis underwent CMR examination and subsequently, histopathological evaluation. Rats with myocarditis showed pericardial thickening, effusion, and LV wall motion abnormalities with septal hypokinesis (Figure). Short axis views showed patchy delayed enhancement of epicardial segments, with distribution mainly located within the inferolateral LV wall including the septum. This increased signal/hyperenhancement ratio defines focal areas of myocardial fibrosis and/or necrosis, highly suggestive of inflammation. Additionally, the presence of large pericardial effusion provides supportive evidence for the existence of peri-myocarditis. Positive correlation was found between CMR examination results and histological findings.

Conclusions: Experimental myocarditis in rat can be detected and monitored by CMR performed on a clinical 3.0 T scanner. The overall advantages of CMR, mostly its high measurement accuracy and reproducibility, make it an ideal technique for monitoring myocarditis and pre-clinical evaluation of novel therapies.



Short axis view with inversion recovery with TI 300msec on 3Tesla CMR, post Gadolinium injection, showing a large pericardial effusion, and patchy delayed enhancement of epicardial myocardial segments (arrows), compatible with myocarditis.

MRI versus CT for Characterization of Pulmonary Vein Morphology before Radiofrequency Catheter Ablation of Atrial Fibrillation

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Background: Accurate assessment of pulmonary vein (PV) anatomy is important for the planning of radiofrequency catheter ablation (RFCA) of atrial fibrillation (AF). This study sought to perform a head-to-head comparison between magnetic resonance imaging (MRI) and multislice computed tomography (CT) for evaluation of PV before RFCA of AF.

Methods and Results: Contrast-enhanced MRI (1.5 Tesla system) and multislice CT (dual-source system) were performed for evaluation of PV in 44 consecutive patients (31 men, 56 ± 10 years) admitted for RFCA of drug-refractory AF. Data on PV anatomy, ostial branching pattern, and ostial dimensions were compared between MRI and multislice CT. Variant PV anatomy was observed in 21 (48%) of patients with both imaging approaches. The incidence of PV ostial branching, as assessed with MRI and multislice CT, was higher on the right, and more common in the inferior than superior vein. Agreement between both imaging modalities for evaluation of variant PV anatomy and ostial branching pattern was nearly perfect (Kappa = 0.87; 95% CI: 0.77, 0.97, kappa = 0.84; 95% CI: 0.75, 0.93, respectively). Assessment of PV ostial cross-sectional area as well as maximal and minimal ostial diameters resulted in a strong agreement and correlation (r values ranged from 0.75 to 0.99, P < 0.001 for all) between the two imaging approaches.

Conclusion: MRI and multislice CT images of the PV appear to provide similar and detailed anatomic and quantitative information before RFCA of AF.

Diagnostic Accuracy of Multidetector 64-Slice Computed Tomographic Angiography in Assessing Anomalous Coronary Arteries

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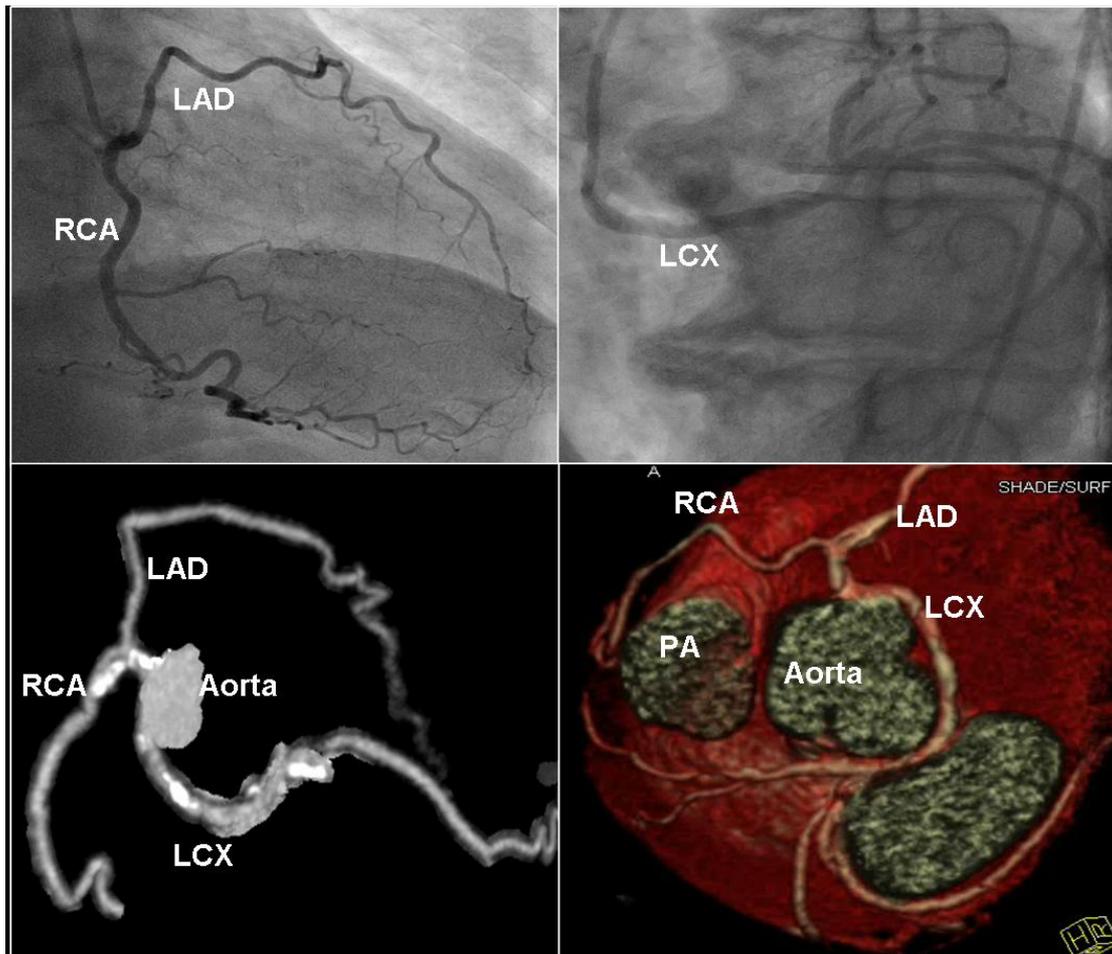
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Objective: To evaluate the diagnostic accuracy of 64 slice computed tomographic angiography (CTA) in assessing anomalous coronary arteries compared to invasive coronary angiography.

Methods: A total of 12 anomalous coronary arteries were evaluated in 10 consecutive patients. The CTA scan protocol used 64x0.5mm slice collimation, 0.33s gantry rotation time during simultaneous ECG gating and was compared to invasive angiography.

Results: Three right and nine left anomalous coronary vessels were detected. Among the left anomalous coronaries; 2 left main, 2 left circumflex arose from the right cusp, and 3 LAD's originated from the proximal portion of RCA. Two right coronary arteries originated from the left cusp and another one had an acute angle take off. Interestingly one patient presented with acute inferior MI and showed anomalous left main by both modalities but the noncompressibility of the vessel and its course beneath the pulmonary artery was shown only by multiplanar reconstruction on CTA. Defining anatomical course in relation to great vessels of these anomalous arteries was possible only by CTA. Six out of ten patients underwent bypass surgery due to the course between the great vessels, slit like ostial opening and dynamic compression in the anomalous vessel.

Conclusions: CTA is the imaging modality of choice in the evaluation of anomalous coronary arteries due to the ability not only to describe the course of the vessel but to noninvasively evaluate the degree of obstructive coronary artery disease.



High Dose Atorvastatin for Reduction of Atrial Fibrillation after Cardiac Surgery

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Methods: This study was an unmatched retrospective cohort study. Over a two-year period (2005-2006) and a one-year period (2008), 426 and 340 patients, respectively, underwent cardiac surgery, without a history of AF or PAF. Uni-variant analysis was performed exploring the relationship regarding high-dose atorvastatin use and AF development. Patients in the first group (2005-2006) had been taking low-dose statins (<40 mg), while the second group (2008) had been taking high-dose atorvastatin (80 mg). The primary end point was incidence of postoperative AF.

Results: Of the 766 patients, 203(27%) had new onset AF after surgery. Many factors were found to increase the incidence of postoperative AF: older age >71 (37.2%) vs. <50 (13.5%, P=0.0001); female gender (33.3%, P=0.014); congestive heart failure (44.2%, P<0.001), HTN (28.2%, P=0.018); urgent status (42.0%, P=0.013); valve surgery (38.3%, P<0.001). High-dose atorvastatin was found to be associated with reduction in the incidence of postoperative AF. High-dose (19.4%) vs. low-dose (32.2%), (P<0.001). To adjust the effects of other factors known to affect AF (age, sex, CHF, HTN, urgent status and valve surgery) which may have changed over the study period, logistic regression models were created to control for possible sources of bias. High-dose atorvastatin was found to be associated with a reduction in post cardiac surgery AF (OR=0.53, P<0.0001).

Conclusion: In our study, patients who had been treated with high-dose atorvastatin had a reduced incidence of post cardiac surgery AF to 35%-72%.

Aortic Valve Replacement in the Elderly: Is the Risk Truly Increased?

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Introduction: With the evolution of new technology for aortic valve implantation patients deemed at high risk for conventional surgery are referred for catheter based procedures. One factor believed to predict increased risk is patient age. We reviewed our data to try and determine the effects of age on surgical outcomes in elective isolated aortic valve replacement (AVR).

Methods: There were 343 patients. Pre-operative data were analyzed by univariate and multivariate analysis in order to identify predictors for operative mortality.

Results: Mean age was 66 ± 13 years. Euroscore was 6 ± 3 (predicted mortality 8%). Overall, 20 patients (6%) died. Predictors for operative mortality, by multivariate analysis were age as a continuous variable ($p=0.005$), female gender ($p=0.009$), reduced LV function ($p=0.01$) and PVD ($p=0.02$). We then compared results in patients over the age of 75 ($n=87$; 25%) to those below 75. In the older and younger group respectively, mean age was 80 ± 3 and 61 ± 12 ($p<0.0001$), and mortality was 11% and 4% ($p=0.009$). By multivariate analysis, female gender was the strongest predictor for mortality ($p=0.008$). Other predictors were age ($p=0.03$), PVD ($p=0.02$) and reduced LV function ($p=0.02$).

Conclusions: Surgical replacement of the aortic valve is safe also in elderly patients, and long term results are well established. Until such results are demonstrated with catheter based valve implantation, surgery should still be the procedure of choice, also for older patients. In elderly female patients, trans-catheter aortic valve implantation may be the preferred procedure.

Effect of Human Mesenchymal Stem Cells Derived From Epicardial Fat on Ischemic Hind Limb in Mouse

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Background:

Despite the recent advance in cardiovascular regenerative medicine, clinical trials did not replicate stem cell use benefits recorded in preclinical studies. Thus, there is a need for new cell sources. The epicardium has been recently suggested as the source of cardiac progenitors in heart development. In this study, we aimed to determine the regenerative potential of mesenchymal stem cells derived from human epicardial fat tissue, in mice with hind limb ischemia.

Methods and Results:

Epicardial fat tissue was extracted from patients undergoing open/ closed heart procedures. Cells were isolated with an enzymatic digestion cocktail. Cell phenotype was defined by flow cytometry and immunocytochemistry. Mice (n=20) were subjected to moderate limb ischemia by permanent ligation of the left femoral artery. Ligation was verified by Laser Doppler and Animals were randomized to 2 treatment regimens: Cell implantation group (n=10) and placebo group (n=10). 10 days from ligation, a functional test was performed, limb perfusion was assessed by Laser Doppler, animals were euthanized and immunohistochemical examination performed. Functional tests depicted a significantly better improvement in the cell implantation group (mean functional test score of 0.6 ± 0.1 VS 3.4 ± 0.1). Mean flow improvement by Laser Doppler was significantly higher in the cell implantation group (304.9 ± 33.3 VS. 57.5 ± 27.9 , $p=0.0001$). Using human mitochondrial stain, human implanted cells were located in mice limb tissue 10 days after implantation.

Conclusions

Human epicardial fat tissue is a viable source of mesenchymal stem cells. These cells can be used to improve perfusion in ischemic limbs.

Computer Finite-Element Simulations of Remodeling and Re-Implantation for Aortic Root Aneurysm*Raanani, E¹; Haj-Ali, R²**¹Sheba Medical Center, Ramat Gan, Israel; ²tel Aviv university, Tel Aviv, Israel*

Root aneurysm leads to abnormal aortic valve (AV) mechanical-structural performance with larger deformation gradients and stresses. Current AV computational models are somewhat qualitative and do not capture the local complex nonlinear tissue and structural behaviors. Nonlinear multiscale (heterogeneous) material and structural (MMS) models have been developed in this study in order to simulate normal and abnormal mechanical behavior of the AV structure. The overall goal is to introduce predictive simulations of native and porcine AV's initially under in vitro pulsatile flow conditions. The proposed predictive modeling framework is verified using sophisticated imagery measurements to examine the kinematics and deformations of normal AV systems. A major aspect of this study is to employ these computational models for AV pathology and repair. Towards that goal, select repair procedures, such as root re-implantation and re-modeling are simulated and examined computationally. Preliminary simulation results demonstrate that the computational model is capable of capturing the geometrical changes (strains) on the leaflet along with the induced stresses during the different stages of the sparing procedure, i.e. extracting the enlarged sinus tissue; installing the graft; suturing the tissue; and imposing different transvalvular pressure-profiles for the cardiac cycle. It is shown that the changes in the leaflet geometry in the earlier stages have an impact on the AV performance and should be considered in a progressive-sequential manner. The proposed AV-MMS approach is important towards imagery-based diagnostics and repair design of the AV.

Endoluminal Stent Graft for Acute Blunt Traumatic Thoracic Aortic Injury

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BACKGROUND: Traumatic injury of the thoracic aorta is a life-threatening complication in patients who sustain deceleration or crush injuries. Open surgical mortality is increased in the presence of coexisting head, lung, and abdominal injuries. Spinal cord ischemia may occur following aortic cross-clamping and operative hypotension. Endoluminal stent-graft placement offers a safe, effective, and timely treatment option. The aim of this study was to assess our single center experience of endovascular repair following acute blunt traumatic aortic injury.

METHODS: Data from 16 consecutive patients (mean age, 38.7 years; range, 18 to 84 years) with acute blunt traumatic aortic injury treated by endovascular stent-graft insertion between January 2002 and October 2009 was prospectively collected. Demographics, injury characteristics, technique, and complications were recorded. Follow-up data consisted of computed tomographic angiography and plain chest radiography at regular intervals. Mean and median follow-up after stent-graft implantation were 37.9 and 36 months, respectively.

RESULTS: All patients underwent endovascular repair within a median of 9 hours from hospital presentation. Stent-graft implantation was technically successful in all patients. No patient required conversion to open surgical repair of the acute blunt traumatic aortic injury. Procedure-related paraplegia was zero. We recorded a common femoral lesion during the procedure as a unique immediate complication. The median hospital stay was 21 days. The only perioperative death was unrelated to the aortic rupture or stent placement.

CONCLUSION: Endovascular repair is evolving as the procedure of choice for acute blunt traumatic aortic injury. Treatment of lesions that extend into the aortic arch is feasible with extra-anatomical bypass. In our study, endovascular repair of blunt traumatic aortic injury is a safe procedure with low morbidity and a mortality rate.

Predictors of Death in Patients with Aortic Stenosis Not Eligible To Participate In a Trial Evaluation of Transcatheter Aortic Valve Implantation

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Background: Transcatheter aortic valve implantation (TAVI) is currently evaluated in patients (Pts) with severe aortic stenosis (AS) who are considered high risk surgical candidates. This study aimed to detect incidence, cause and correlates of mortality in Pts who were not eligible to participate in the TAVI study.

Methods: A cohort of 362 pts with severe AS were screened and did not meet the inclusion/exclusion criteria to participate in the TAVI trial. These pts assigned into two groups: I medical arm 274 (75.7%) treated medically 97 (35.4%) or by balloon aortic valvuloplasty (BAV) 177 (64.6%) and II surgical arm 88 (24.3%). Clinical follow-up was obtained by telephone or office visit

Results: The medical/BAV group had significantly higher risk compared to the surgical group, with significantly higher STS 12.8 ± 7.0 vs. 8.5 ± 5.1 , $p < 0.001$ and logistic Euroscore 42.4 ± 22.8 vs. 24.4 , $p < 0.001$. The medical/BAV group had higher NYHA functional class, incidence of renal failure, and lower ejection fraction. During median follow up of 377 days the mortality in the medical /BAV group was 102 (37.2%) and during median follow up of 386 days the mortality in the surgical group was 19 (21.5%). The cause of death in the medical/BAV group and surgical groups was cardiac in 44 (43.1%) and 9 (47.3%), non-cardiac in 37 (36.2%) and 10 (52.6%), and unknown in 21 (20.6%) and 0 patients respectively. Multivariate adjustment analysis identified renal failure, HR 5.88, NYHA HR 4.16 and aortic systolic pressure HR 0.98 as independent predictors for mortality in the medical group while renal failure HR 7.45, STS score HR 1.09 and Euroscore HR 1.45 were correlates of mortality in the in the surgical group

Conclusion: Pts with severe symptomatic AS who are not included in the TAVI trials are doing poorly with extremely high mortality rate, especially in the non-surgical group and loss of quality of life in the surgical group. Renal failure, NYHA class and low blood pressure correlates of mortality in this population

1550088

Predictors of Vascular Complications Post Percutaneous Coronary Interventions

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Vascular complications are the most common adverse events after percutaneous coronary intervention (PCI). Both cardiologists and nurses play a vital role in identification of risk factors and implementation of methods to reduce complications. Objectives: To assess predictors of vascular complications post PCI. Methods: Single center prospective study conducted by the nursing staff with collaboration of cardiologists. Inclusion criteria: Patients underwent PCI. Primary endpoint: Hematoma >5cm, pseudo-aneurysm or AV fistula during hospitalization and 1-week after. A multivariable Cox proportional hazards model was used to evaluate the association between variables and outcomes. Results: 300 patients, mean age 59.1 +/- 10.9 years, 20% females. Indications for PCI: 209 (69.7%) acute coronary syndrome (ACS) (59 primary PCI) and 91 (30.3%) stable angina. Pretreatment: Aspirin and clopidogrel 262 (87.3%), Enoxaparin or heparin 128 (42.7%), IIb/IIIaGP antagonists 50 (16.7%). Access site: 227 (75.7%) radial/ulnar and 73 (24.3%) femoral. All patients received weight adjusted heparin during catheterization. Primary endpoint was observed in 24 patients (8%): hematomas >5cm, n=21; pseudoaneurysm, n=3; fistulas, n=0. Pseudoaneurysm, n=3 (2 needed intervention) and blood transfusion, n=2, were observed in femoral access only. Multivariate model, using patient characteristics, medications, interventional and hemostasis techniques, revealed that females (OR 1.13, 95% CI 1.00-1.27, P=0.021), ACS (OR 1.04, 95% CI 0.97-1.11, P=0.016), femoral access (OR 1.26, 95% CI 1.06-1.50, P=0.007) and pain during sheath insertion (OR 1.23, 95% CI 1.05-1.44, P=0.009), were significant predictors of vascular complications. Conclusion: The main strategy to reduce vascular complications is the radial approach. Females, ACS patients and access site pain, were found to be at increased risk for vascular complications and need a careful follow-up post catheterization.

Radial Approach is Associated with Lower Bleeding Complications in Patients Undergoing Percutaneous Coronary Intervention with I Ib/IIIa Inhibitors

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The aim of this study was to evaluate the impact of radial versus femoral approach on bleeding complications in patients treated with Glycoprotein-IIb/IIIa-inhibitors(GPI) during PCI, and to assess the rate of early discontinuation of GPI therapy. Methods and Results: Between 9/2007 and 4/2009, GPI was administered to 335 patients. Administration of GPI and access-site [Femoral access n= 256 and radial access n= 79] were determined by the operator. Baseline characteristics were similar between groups, except for higher rate of previous CABG in the femoral-group. Patients who had out-of-hospital CPR, cardiogenic shock, inherent bleeding diathesis or chronic anticoagulation therapy were excluded. All patients were treated with dual antiplatelet therapy and heparin 50U/kg during the procedure. The indication for PCI was ST-Elevation MI (STEMI) [n=126 (49%) femoral, n=33 (42%) radial], Non STEMI [n=86 (34%) femoral , n=33 (42%) radial] or stable angina [n=43 (17%) femoral , n=12 (15%) radial]. Radial access was associated with significantly less 30-day access site associated major (0%) and minor bleeding (0%) Vs femoral major (1.5%) and minor (11%) bleeding .There were no differences in non access site related bleeding (radial 6% vs femoral 1.5%). Importantly, GPI was discontinued after less than 6 h due to access site bleeding in 11 pts (4.3%) in the femoral group compared to 0% in the radial group (p<0.05).

Conclusions:

In stable patients treated with GPI, transradial compared to femoral access is associated with significantly lower access site related bleeding. Radial approach enables the completion of the recommended dose and duration of GPI in significantly higher proportion of patients.

1550332

Mortality Outcomes of Unprotected Left Main Coronary Stenting

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Background: Unprotected left main coronary artery (ULMCA) disease is considered a surgical indication in most centers. However, PCI is an increasingly utilized method of revascularization in patients with ULMCA. Several reports show that emergent PCI is associated with a less favorable outcome.

Goal: Our study aimed at assessing the clinical outcomes among patients surviving the first month after stent-based ULMCA angioplasty at our institution.

Methods: We identified 102 consecutive patients who underwent PCI in ULMCA. Six months mortality rate was compared to the predicted by the EuroSCORE and Parsonnet surgical scoring systems.

Results: Mean age was 74 ± 12 years [range 42-95], 64% were men and 34% diabetics, 72% presented with AMI or ACS, 19% had previous CVA, 32% had LVEF < 40%, 45% had LM bifurcation lesion and DES was used in 65% of cases. At six months follow up: Cardiac death-7%, MI-2%, TVR-7.8%, CABG-4% and total MACE-18.6%. The observed and predicted death rates are shown:

Conclusion: 1) PCI of UPLMCA is feasible and safe if carefully planned among patients who are in a stable clinical condition. 2) The short term clinical results in high risk patients without immediate mortality risk is acceptable as compared to predictable surgical risks.

Visible Angiographic Complications Predict Short and Long-Term Outcomes in Patients with Post-Procedural Creatine-Phosphokinase Elevation.

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Objectives: To assess whether visible angiographic complication is related to outcome in patients with elevated creatine phosphokinase (CK-MB) following percutaneous coronary intervention (PCI).

Background: Elevated biomarkers following PCI are associated with increased incidence of adverse events but the absolute risk of such events is low. A more specific marker of risk is needed.

Methods: Consecutive patients with elevated post-PCI CK-MB were divided into two groups according to presence (n=115, 43%) or absence (n=150, 57%) of angiographic complication. A control group (n=250) was randomly chosen from 2403 patients undergoing PCI during the same period without CK-MB elevation. Major adverse cardiac events (MACE) were assessed at 30 days and one year.

Results: Patients with identifiable angiographic complications and elevated post-procedural CK-MB had significantly worse outcomes at 30 days and one year compared with biomarker positive patients without identifiable complication and control patients (30 day MACE rate: 8% vs 0% vs 0.4% respectively, $p < 0.001$; 1 year MACE rate: 26% vs 11% vs 11% respectively, $p = 0.002$, all p -values for angiographic complication vs no angiographic complication and for angiographic complication vs control). Biomarker positive patients without identifiable angiographic complication had an excellent short and long term outcome which was no different from biomarker negative patients (One year MACE rate: 11% vs 11%, $p = 0.53$).

Conclusion: Post-PCI patients without visible angiographic complications have an excellent short and long term outcome and will probably not benefit from additional in-hospital monitoring. These findings call into question the need for routine CK-MB monitoring after PCI in the absence of clinical symptoms or angiographic complication.

Transradial Approach for Cardiac Catheterization and Percutaneous Coronary Intervention in Elderly Patients

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Background: Bleeding complications are increasingly recognized to portend adverse outcome in patients with ST-elevation myocardial infarction (STEMI). Elderly patients are especially prone to access site complications. Transradial approach (TRA) vascular access site complications in patients undergoing cardiac catheterization (CC) and percutaneous coronary interventions (PCI) when compared with transfemoral approach (TFA). There is a concern that technical difficulties using TRA in elderly patients can compromise the outcome, therefore many interventional cardiologists avoid using TRA in this group of patients.

Methods: We prospectively studied 242 patients age ≥ 75 who underwent CC or PCI using TRA (146 patients) and TFA (96 patients). Statistical analysis was performed on intention to treat basis. Procedural success was defined as successful completion of the intended procedure from the original access site. Vascular complications were hematoma > 10 cm, pseudoaneurism, AV fistula, need for blood transfusion or surgery.

Results: Baseline clinical characteristics were similar in both groups. Procedural success was achieved in 91.0% and 96.8% and angiographic PCI success in 97.8% and 97.9% of patients in TRA and TFA group respectively ($p=NS$). Use of contrast media was 145.1 ± 67.1 mL in TRA group and 157.0 ± 84.9 mL in TFA group ($p=NS$). Fluoro time (min) was 10.8 ± 7.0 vs. 9.7 ± 8.4 in TRA and TFA groups respectively ($p=NS$). Five patients (3.4%) had at least one vascular complication in TRA group vs. 10 in TFA group ($p<0.05$). All 5 complications in TRA group were hematomas, 3 of them in the femoral site after unsuccessful radial attempt. In TFA group there were two blood transfusions, two femoral pseudoaneurisms and two patients required surgery (one for closure of pseudoaneurism and one for acute thrombosis of common femoral artery).

Conclusions: In elderly patients, TRA approach has high success rate and leads to fewer vascular complications as compared with TFA.

Off-hours activation of the cathlab team: who should push the button?

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Objectives: Primary percutaneous coronary intervention (PPCI) is the standard reperfusion strategy for ST-segment elevation myocardial infarction in our center. To reduce door to balloon time we have adopted a strategy in which the cathlab team is activated by mobile intensive care unit (MICU) paramedics with direct transfer of the patients from home to the cathlab. However, this strategy may incur false alerts. We critically assessed this activation strategy for the occurrence of unnecessary calls and compared it with different activation approaches.

Methods and Results: We retrospectively analyzed 110 consecutive admissions of patients referred to our cathlab for PPCI during off-hours. Fifty-four patients (49.1%) were referred by MICU, 27 (24.55%) by emergency room physicians and 26 (23.6%) were referred from other hospitals. Forty-three patients (79.6%) who were referred by MICU personnel underwent P-PCI. The reasons to postpone procedure were signs of spontaneous reperfusion in 8 patients (14.8%), and ECG misinterpretation, high-risk for procedure (CRF, Cirrhosis), and death on the way, each occurring in one patient (1.85%). In comparison, of 27 patients referred by emergency physicians, 6 patients (22.2%) did not undergo primary PCI due to spontaneous reperfusion (4 pts., 14.8%), ECG misinterpretation (1 pt., 3.7%), and high risk (1pt., 3.7%). Of 26 patients referred from another hospital, 9 patients (34%) did not undergo primary PCI mainly due to spontaneous reperfusion (8 pts., 30.7%).

Conclusions: Activation of the cathlab team for PPCI by MICU personnel significantly shortens the time to balloon and is associated with a low rate of unnecessary calls. Simple and efficient cathlab activation protocols that rely on MICU-cathlab interaction are mandatory to reduce door to balloon time and improve STEMI patients' outcome.

Six-Month Clinical Outcomes of Patients Deferred from Angioplasty Based on Fractional Flow Reserve - The Rabin Medical Center Experience

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Background: Fractional flow reserve (FFR) has become the gold standard in physiologic assessment of coronary artery stenosis. A FFR value ≥ 0.75 is considered a reliable physiologic parameter indicating a functionally non-significant lesion.

Objective: To evaluate the clinical outcomes of "real world" patients deferred from angioplasty based on FFR measurements and clinical judgment.

Methods: The FFR measurement was performed in 71 patients (71 vessels) that were referred to the catheterization laboratory for evaluation of coronary artery disease and had an intermediate grade stenosis in their angiograms. Mean age was 63 ± 12 yrs and 79% were males. Patient's risk factors for ischemic heart disease were: diabetes in 41%, hypertension in 69% and dyslipidemia in 82%. The clinical presentation was stable angina in 45% and acute coronary syndrome (excluding those with myocardial infarction < 5 days) in 55%. The angiographic findings revealed multivessel disease in 53%. The culprit lesions were in the LAD in 64%, in the CX in 19% and in the RCA in 17%. Mean % diameter stenosis was 55 ± 12 with a mean FFR value of 0.8 ± 0.1 .

Results: Based on FFR measurements and clinical judgment, patients were treated by angioplasty with stent deployment in 38% of the cases (mean FFR= 0.78 ± 0.1 at baseline, increased to 0.92 ± 0.06 post angioplasty) and by conservative medical treatment (mean FFR= 0.88 ± 0.07) in 62%. Six-month follow-up of all the patients included in this cohort revealed only one non-cardiac death (2.3%) in the patients treated conservatively with no cardiac events in the patients treated by angioplasty.

Conclusion: In "real world" patients with intermediate grade coronary lesions, the defer of angioplasty based on FFR measurement combined with clinical judgment seems to be a viable strategy with good six-month clinical outcomes.

Pulmonary Exposure to Fine Particulate Matter From Oil Combustion Power Plants Decreases Myocardial Ischemic Tolerance in Rats

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Background: Short term exposure to respirable ambient particulate matter (PM) triggers ischemic cardiac events (Pope et al., *Circulation* 2006; 114: 2443). This has been associated with oxidative stress, inflammation, and acceleration of atherosclerosis in compromised mouse models. An alternative / additional mechanism could involve an adverse effect of PM on cardiomyocyte ischemic tolerance.

Aim: To assess ischemic tolerance of rat heart following pulmonary exposure to oil combustion source PM enriched with vanadium.

Methods: Healthy male SD rats (300±20 g) were exposed to a single intratracheal instillation of saline or different doses of soluble vanadium-rich oil combustion fly ash PM, collected from a power plant in Boston, MA (HP-10) containing: carbon based particles, sulfate, iron, nickel, and vanadium. Myocardial slices were exposed in vitro to simulated ischemia/reoxygenation 48h later. Mitochondrial function (mitochondrial dehydrogenases redox activity) in these slices was assessed by the MTT colorimetric assay.

Results: Rats exposed to the PM, at 2.5 mg/kg, did not exhibit toxic effect by histological assessment, and had no effect on dehydrogenase activity in oxygenated conditions. However, simulated ischemia/reoxygenation, significantly decreased dehydrogenases activity by 29%, compared to controls (p<0.05). A lower dose of HP-10 (0.5 mg/kg) cause no effect on the MTT assay in either condition.

Conclusions: Recovery of cardiac ischemic events depends not only on the extent and duration of the ischemic stimulus, but also on the myocardial intrinsic ischemic tolerance. Thus, inhaled PM may cause occult cardiotoxicity, reflected by normal histology and mitochondrial function during normoxia, but an impaired response to ischemia / reoxygenation.

1550209

Expression of miR-17~92 Family of miRNA Clusters in Experimental model of Myocardial Infarction

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Background

MicroRNAs (miRs) are small non-coding RNAs that regulate a wide range of physiological and pathophysiological processes. miRNAs regulate gene expression by interacting with target mRNAs at their 3' untranslated region, leading to translational repression or mRNA degradation.

The polycistronic microRNA cluster miR-17~92 comprises seven mature micro-RNAs and has two closely related paralogs: miR-106a~363 and miR-106b~25. Studies revealed a critical role of these miR clusters in heart and lung development, tumor angiogenesis, hematopoiesis, immune functions and postnatal vascularization.

We sought to investigate the expression profile of individual genes from the miRNA family: miR-17 and miR-25, in experimental model of acute myocardial infarction.

Methods

For detection of miRNAs levels quantitative Real-time PCR was performed. RNA was isolated from Balb/c mouse hearts following myocardial infarction. Hearts were dissected into infarct area+infarct border zone and to infarct non-adjacent areas. Sham operated animals served as control.

Results

Following myocardial infarction in Balb/c mice, both miR-25 and miR-17 were down-regulated (2.5 and 2 folds of down-regulation respectively) in the infarct area and infarct border zone but not in the infarct non-adjacent areas.

Conclusions

miR-17 and miR-25 are down-regulated in response to acute myocardial infarction in the infarct zone and infarct border zone. Further experiments are needed to elucidate the possible role of miR-17~92 cluster and its paralogs in post MI processes.

Umbilical Cord Wharton's Jelly-Derived Mesenchymal Stem Cells: A Potential Cell Source for Infarct Repair?

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Background: Tissue adult stem cells are rare and their number and potency significantly decrease with age and concomitant diseases. These problems stimulate the search for alternative cell sources for infarct repair. The umbilical cord stroma can provide an attractive source since it contains a high number of fresh allogeneic mesenchymal stem cells (MSCs).

Objective: To examine whether MSCs from umbilical cord stroma are able to repair or regenerate the infarcted myocardium in rat.

Methods and Results: We developed a method that can be readily used to isolate and expand MSCs (Wharton's jelly cells) from human umbilical cord tissue. These cells display a fibroblast-like morphology, express mesenchymal markers, and have the potential to differentiate into osteogenic and myogenic cells. The in vitro study focused on their differentiation potential into cardiomyocytes using medium culture with 5-azacytidine. The in vivo study was performed in a rat model of MI: 7 days after MI, Wharton's jelly, bone marrow-derived MSCs (1×10^6 cells in 150 μ l sodium chloride) and saline were injected into the scar tissue, rats were injected with cyclosporine-A (15mg per 1kg) for a period of 30 days after cell transplantation. Serial echocardiography studies before and 60 days after injection showed that injection of Wharton's jelly stromal cells or bone marrow MSCs into a 7-day old infarct did not attenuate left ventricular (LV) systolic and diastolic dilatation and dysfunction. Postmortem morphometric analysis of the hearts showed a significant increase in wall thickness in the bone marrow MSCs treated group compared with control group (2.2 ± 0.6 vs. 1.6 ± 0.3 , $P=0.02$).

Conclusions: The present work suggests that human MSCs (Wharton's jelly or bone marrow) transplantation does not prevent LV remodeling and dysfunction after MI in rat. However, further research is warranted to determine the optimal dose, timing and mode of delivery of Wharton's jelly-derived MSCs for infarct repair.

1550540

The Function of Regulatory T Cells in Cardiac Ischemia

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Background: Naturally occurring Regulatory T cells (nTregs) comprise 5–10% of both human and murine peripheral CD4+ T cells. Landmark studies have pointed to the essential role of Treg in induction of immune tolerance. Tregs act by diverse mechanisms to 'tune down' pathogenic and autoreactive immune responses. Accumulating data in our lab points to an active involvement of innate and adaptive immune systems in atherogenesis. We have previously demonstrated that nTregs are capable of reducing the size of atherosclerotic lesions (Mor et al, ATVB, 27: 893-901, 2007). These findings prompted us to investigate the potential involvement of Treg in myocardial ischemia.

Methods: Murine cardiac derived cells were stained with anti mouse FITC-CD4 and anti-mouse PE-CD25. CD4+CD25high (Tregs) level was calculated out of total cardiac CD4+ and of the total cardiac cells.

Results: Our preliminary data show that the levels of CD4+ CD25high in cardiac cells in mice undergoing LAD ligation are higher than in Sham (7.1% versus 1.2%) and control (0.4%) animals, seven days post infarct induction.

Conclusion: The data point out to the possible involvement of nTreg in the post-MI immune response, probably by taking part in the post-MI healing process. Further experiments are being performed to elucidate the functional activity of systemic and local Tregs following MI.

Healthy And Heart Failure Patient-Generated Induced Pluripotent Stem Cells Derived Cardiomyocytes

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The groundbreaking induced pluripotent stem cells (iPSC) technology allows the reprogramming of adult somatic cells, yielding pluripotent cells with characteristics similar to those of embryonic stem cells. This technology holds great promise for the emerging disciplines of personalized and regenerative medicine, because of the potential to derive patient-specific in vitro models and the ability to elude the immune system. The aim of the current study was to establish and characterize human iPSC derived cardiomyocytes (hiPSC-CMs) from healthy and heart-failure patients. Healthy and heart-failure patients derived iPSC lines were achieved by retroviral reprogramming of dermal fibroblasts, using three reprogramming factors (Oct4, Sox2, and Klf4) and VPA without the oncogene c-Myc. Cardiomyocytes (CMs) differentiation of all iPSC lines was induced using the embryoid body (EB) differentiation system. Gene expression studies demonstrated that the CMs differentiation process was characterized by an initial increase in mesoderm and cardiomesoderm markers, followed by expression of cardiac specific transcription factors and finally by cardiac-specific structural genes and ion channels. hiPSC-CMs were stained positively for cardiac specific genes. Electrophysiological multielectrode array recordings of hiPSC-CMs established the development of a functional syncytium with stable pacemaker activity, action potential propagation, and responsiveness to adrenergic and muscarinic stimuli. Our study shows that hiPSC from healthy and heart failure patients are capable of differentiating into CMs presenting cardiac-specific molecular, structural, and functional properties. Their ability to respond to adrenergic and muscarinic stimuli introduces them as potential in vitro tissue models for personalized patient-specific drug screening. Most importantly, these cells demonstrate a functional syncytium crucial for the development of cell replacement strategies for myocardial repair.

The External-Work Pressure-Time Integral Relationships and the Frank Starling Law of the heart.*Sela, G; [Landesberg, A](#)**Technion - IIT, Haifa, Israel*

The mechanisms underlying the Frank-Starling Law of the heart are elusive. Despite the prevalent notion that it is afterload independent, isolated fiber studies reveal that the afterload affects this mechanism. The study explores the roles of the afterload, in situ. Methods: The LV was exposed by left-thoracotomy in adult sheep (72.6 ± 8.2 Kg, $n=8$). Flowmeter was placed around the aortic root. LV volume was assessed by sonocrystals. Occluders around the aorta and the inferior vena-cava enabled to control the afterload and preload. Different afterloads were imposed by partial aortic occlusions. Transient inferior vena-cava occlusions (IVCOs) were performed at each steady afterload. Results: A highly linear relationship was found between the external work (EW) and pressure-time integral (PTI) ($R^2=0.98 \pm 0.01$) during each transient IVCO ($n=48$). These EW-PTI relationships (WPTiRs) were preload independent since the preload had a proportional effect on the EW and PTI at constant afterload. Interestingly, the slope of the WPTiR was afterload dependant. The slope was 33.3 ± 4.1 mJ/(mmHg·s) at baselines and decreased by 1.0 ± 0.50 mJ/(mmHg·s) per 1 mmHg·min/L increase in the peripheral resistance. A unique WPTiR was obtained during both the occlusion and release phases of each IVCO, while two distinct EW-preload or PTI-preload relationships were observed. The same WPTiRs were also obtained for steady state conditions where the afterload was constant and the preload changes were only due to changes in lung ventilation and not an invasive IVCO. Conclusions: The novel WPTiR ties the Frank (pressure development) and Starling (EW production) phenomena together. The dependence of the WPTiR on the afterload highlights the adaptive control of the Frank-Starling mechanisms to changes in the afterload. Since the WPTiR can be obtained in a minimally invasive manner, it also has the potential to be of clinical use.

Targeting Toll-Like Receptor 4 (TLR4) Protects Against Lipopolysaccharide (LPS) Bacterial Like Sepsis and Myocardial Infarction

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Toll like receptors are expressed in immune cells and cardiac muscle. We examined whether the cardiac TLR4 is involved in the acute myocardial dysfunction caused by septic shock and myocardial ischemia. Wild type mice (WT), TLR4-deficient (TLR4-ko) mice and chimeras that underwent myeloablative bone marrow transplantation to dissociate between TLR4 expression in the heart (TLR4-ko/ WT) and the immuno-hematopoietic system (WT/TLR4-ko) were tested. Mice were injected with LPS (septic shock model) or coronary artery ligation (MI model) and tested for function, histopathology proinflammatory cytokine and TLR4 expression. WT mice challenged with LPS and MI displayed reduced cardiac function, increased myocardial levels of IL1 β and TNF α and upregulation of mRNA encoding TLR4 prior to myocardial leukocyte infiltration. TLR4-ko mice sustained significantly smaller infarctions compared with control mice given similar areas at risk. Cardiac function of TLR4-ko mice was not affected by LPS and demonstrated reduced suppression by MI compared to WT. Chimeras deficient in myocardial TLR4 were resistant to suppression induced by LPS and the heart function was less depressed, compared to the TLR4-ko, following MI in the acute phase (4 hours). In contrast, hearts of chimeras deficient in immune-hematopoietic TLR4 expression were suppressed both by LPS and MI, exhibiting increased myocardial cytokine levels, similar to WT mice. The cardiac function of TLR4-ko and chimeric mice that express TLR4 in the immune-hematopoietic system but not in the heart, revealed resistance to LPS and reduced depression following MI, suggesting that TLR4 expressed by the cardiomyocytes plays a key role in these events.

Dealing with a Device Failure- Any Hope for Success?

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Background: In May 2009 Medtronic (MDT) issued an advisory warning of certain subsets of Pacemakers (PM) due to "separation of wires that connect the electronic circuit to other pacemaker components".

Objective: To describe the management of this advisory in a single institution.

Methods: Retrospective analysis and review of charts.

Results: Eighty six pts were identified with the affected PMs. (45 women). The indications for PM were: heart block (53), sinus node dysfunction (21), slow atrial fibrillation (7) and others in 5 .

Thirty seven pts died prior to the issuing of this recall.

Forty two pts were PM dependent. Of them, 19 had died before the advisory, 6 had their PM replaced before the advisor, 13 had their PM replaced in response to the advisory, 3 refused to come and have their PM checked in response to the recall and 1 was lost to follow-up. Of the 44 non dependent pts – Five were scheduled for PM replacement.

Two patients experienced adverse events. One patient with complete AV block was admitted with syncope(one week prior to a scheduled generator change- in response to the PM recall) and with an escape rhythm of 20/minute. A temporary PM was inserted and he later had his PM changed with no further complications. A second pt had her PM changed in response to the recall and was readmitted a week later with syncope and bradycardia. During a lead revision a break was found on the insulation and a new electrode was implanted in the right ventricle.

Conclusions : Of the 86 pts from the relevant series- 2 pts(2.3%) were adversely affected by the recall. One with a malfunction of electrode and one with a complication of PM change.

Eighteen of the 86 (21%) had (or were planned to have) their PM changed.

Salvage of Infected Pacemakers and Implantable Cardioverter-Defibrillator by Selective, Insitu-Targeted Ultra-High Dose Antimicrobial Treatment

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Background: Infection of pocket and subcutaneous portion of lead from permanent pacemakers (PPM) and implantable cardioverter-defibrillators (ICD) comprise over 52% of infected devices. Exclusive systemic antibiotic treatment of infected PPM and ICD is relatively ineffective, often resulting in complicated, costly, and sometimes hazardous removal and replacement of device. **Objectives:** To demonstrate the efficiency of novel therapy method for infections of PPM and ICD limited to the pocket and proximal wiring by continuous insitu-targeted ultra-high dose antibiotic (CITUHDA).

Methods: 9 consecutive patients with infected PPM or ICD were treated by CITUHDA under Regulated Negative Pressure Assisted Wound Therapy (RNPT) system, and if indicated, minimal manipulation of hardware. CITUHDA treatment was provided 7-14 days followed by a course of 2-4 weeks of oral antibiotics as clinically indicated.

Results: All treated PPM and ICD were salvaged. All patients remained with no clinical manifestations of infection. The mean follow up was 13.4±11.6 months, (range 3-25 months). Pocket concentrations of antibiotics were up to 10³ higher than normal target therapeutic plasma levels. Plasma levels of antibiotics were within normal therapeutic range reflecting an apparent first-order pocket-to-plasma delivery. By controlling the antibiotic concentration in the pocket, the desired therapeutic or low-therapeutic plasma levels were achieved. Exposure of generator or wiring could be managed by either delayed direct closure or by coverage with local flaps.

Conclusions: Infection of implant pocket and/or of subcutaneous wiring can be efficiently managed by CITUHDA under RNPT system, diminishing the need for removal of device. Moreover, CITUHDA also provides concurrent controlled systemic antibiotic therapy, adjustable to the patient's clinical restrictions.

Incidence and Hemodynamic Effects of Anodal Stimulation in Patients with Cardiac Resynchronization Therapy

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Introduction: Anodal stimulation (ANS) is a well known phenomenon among patients (pts) with CRT. Its incidence varies according to the implanted hardware, and there are inconsistent data regarding its hemodynamic effects. In this prospective study, we sought to evaluate the incidence of ANS among pts with CRT devices and to evaluate the acute hemodynamic effects of this phenomenon by echocardiography.

Patients and methods: After excluding pts with leads and devices incompatible with ANS, the initial screening was done by evaluating the 3 lead ECG while pacing LV-only from LV tip to RV ring at a gradually decreasing output. Pts with evidence of ANS underwent repeated testing by 12-lead ECG during biventricular pacing (BiV) at decreasing output using the same configuration. Pts with electrocardiographic evidence of ANS underwent detailed echocardiography with and without ANS looking at dp/dt, volumes, myocardial performance index and ejection fraction.

Results: We screened a total of 129 pts, of whom 91 were excluded, 68 due to inappropriate hardware, 12 due to atrial fibrillation and 11 pts were enrolled in other trials. Of the 38 subjects tested in this study, ANS was found in 28 pts (75.7%) by LV only pacing. Of these only 12 (32.4%) showed ANS with BiV pacing. Nine pts with ECG evidence of ANS during BiV pacing underwent detailed echocardiography with and without ANS. There were no significant differences in the echocardiographic findings with and without ANS.

Conclusion: Anodal stimulation is a common phenomenon among CRT patients. In many cases ANS is seen in LV pacing only, while it is often not seen during biventricular pacing. The mechanism of this phenomenon remains to be established. Echocardiography did not show any consistent hemodynamic effects of ANS during BiV pacing.

CRTD with plug- Is it worth it ?

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Background: While many patients with low EF have indications for ICD implantation , indications for cardiac resynchronization therapy (CRT) include in addition to low LVEF, a broad QRS and NYHA class 3 or 4. Since congestive heart failure is a progressive disease, it is a common practice in Israel to consider implantation of an ICD with an option to be upgraded to CRTD (CRT-D with LV plug) in pts implanted with ICD and low EF who do not fulfill CRTD criteria at the time of implantation. We sought to investigate whether and which patients benefit from implantation of such a device.

Methods: One hundred thirty two consecutive pts implanted with a CRT- D with LV plug device, were included in the present study. NYHA class, QRS duration and LVEF were recorded at the time of device implantation. Patients were divided into 2 groups: those who did not undergo an upgrade during the follow up period (group A) and those who underwent an upgrade by adding an LV lead (group B).

Results: Only 7/132 (5%) were upgraded by addition of an LV lead during an average follow up (FU) of 26± 18 months. All patients included had a LVEF < 35%. The basic NYHA class and LVEF were similar between patient groups A and B (1.9± 0.7 vs. 2.1± 0.4 and 25± 6% vs. 23± 9% respectively; p= NS) . However QRS duration was shorter in patient group A compared to B (123± 25ms vs. 182± 48ms respectively; p< 0.001). None of the patients who underwent an upgrade of their device had a narrow QRS or were in NYHA class 1 at baseline.

Conclusions: Despite the common use of CRTD with plugs, the incidence of upgrading to full CRT-D is relatively low. Pts with a narrow QRS or NYHA class 1 do not undergo an upgrade and therefore it seems reasonable to implant only an ICD in these patients even if they have other partial indications for CRT.

The Impact Of PREPARE-Based Programming Of cardiac defibrillators On the Therapy Delivery Burden

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Background: The PREPARE trial showed that a pre-specified strategic profile of VT/VF detection and therapy settings reduced the number of appropriate and inappropriate therapies in primary prevention patients with ICD's of a single manufacturer. We sought to verify their findings in patients with ICD's of four different manufacturers.

Methods: Over the last two years, we applied PREPARE-based settings ("translated" to parameters of the various manufacturers) in most primary prevention patients. Records of all patients implanted for primary prevention since 1/2005 were reviewed and the incidence of both appropriate and inappropriate therapies were compared.

Results: 206 patients [115 PREPARE programming (p), 91 non PREPARE programming (non-P)] were included. There were no differences between groups in mean age, ejection fraction, type of device (VVI/DDD/CRTD), gender, NYHA class, and history of supraventricular arrhythmias other than atrial fibrillation. Patients with P programming were implanted more frequently due to the MADIT II indication (83.3% Vs. 60.5%, $P < 0.001$) and were more likely to have permanent a-fib (16.5% Vs. 6.1%, $P = 0.016$). Follow up period was longer for patients with non-P programming- 785+436 vs. 210+170 days ($P < 0.0001$). Over the entire follow up period there were no episodes of appropriate or inappropriate therapies in P patients (figure). Overall, 40 combined episodes occurred in the non-P (18 inappropriate, 22 appropriate, of them 10 inappropriate and 12 appropriate shocks). 21 of these events (53%) occurred within the first year. Five patients died, all in the non-P group.

Conclusions: In patients implanted with ICD's of all major manufacturers programmed according to P settings, the combined rate of inappropriate and appropriate therapies was zero over a mean follow up of 210.7 days. Despite different follow up duration, there was a clear advantage to the P programming with dramatic therapy reduction without an increase in mortality.

Survival and Benefit of Cardiac Resynchronization Therapy in Concomitant Right and Left Ventricular Dysfunction

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Background: The effect of Cardiac resynchronization therapy (CRT) on patients with right ventricular (RV) dysfunction and high pulmonary artery pressure (PAP) has not been thoroughly studied.

Methods: Patients (n= 353) with CRT were divided into 4 groups according to their characteristics at implantation: RV dysfunction (RV fractional area change (FAC) < 40%) with normal PAP (< 38mmhg) (group A, n=25), RV dysfunction and high PAP (group B, n=84), normal RV function and high PAP (group C, n=85), normal RV function and normal PAP (group D, n= 170). Clinical response to CRT was defined by a combined score of improvement in NYHA class, QOL and 6mw (<-1/0/>1). Echocardiographic response was defined as a combined score of absolute increase in LVEF \geq 5% and relative increase in LVESV \geq 10% (<-1/0/>1).

Responders had to have a combined score of \geq 1 and alive. All parameters were assessed at baseline and 1 year post implantation. Duration of follow up was up to 8 years. All cause mortality was analyzed by Kaplan- Meier method and was compared between groups.

Results: Patients from all 4 groups had similar response (table). In the long term, the hazard ratio (HR) for mortality for those with RV dysfunction and high PAP was 1.59 (95% C.I.: 1.02-2.49) compared to all the others (P=0.04).

	A	B	C	D	P value
Clinical response (n= 210)	12 (55%)	52 (68%)	55 (66%)	91 (54%)	0.1
Echocardiographic response (n=150)	13 (52%)	34 (40%)	48 (56%)	55 (55%)	0.2

Conclusions: Patients with concomitant RV and LV dysfunction with or without high PAP , and pts with high PAP and LV dysfunction benefit from CRT as much as patients with lone LV dysfunction. Patients with RV and LV dysfunction with high PAP have a higher long term all cause mortality rates in spite of CRT. Patients treated with CRT who have RV dysfunction in addition to LV dysfunction but with normal PAP and patients with PAP without RV dysfunction have similar long term mortality rate as those with lone LV dysfunction.

Improvement in MR and in the Dyssynchrony Involving Mid Segments Predict Super Responders in Patients Undergoing Cardiac Resynchronization Therapy

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Background: About 20-30% of patients in randomized trials do not respond clinically to cardiac resynchronization therapy (CRT).

Objectives: To estimate the effectiveness and safety of CRT in our routine practice and 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. Patients that improved in one class and two classes of New York Heart association (NYHA) were defined as responders and Super 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 NYHA improved by one class ($p < 0.001$), number of hospital admissions due to LHF reduced by 79%, ($p < 0.0001$) and mean ejection fraction (EF) improved by 31% ($p < 0.002$). Significant improvement in severity of MR was an important predictor of high responsiveness ($p = 0.004$). Improvement of MR was associated with complete left bundle branch block (CLBBB) on the electrocardiogram ($P = 0.04$) and lower total mortality ($p = 0.005$). Among the patients with moderate to severe MR, super responders had decreased left ventricular end diastolic volume (LVEDV) prior the implantation ($p = 0.05$). Improvement in synchronization between the mid lateral and mid septal segments, as was calculated with longitudinal strain was predictor of super responders ($p = 0.008$). Absence delay between the mid posterior and mid anterior septal segments was associated with poor response ($p = 0.006$).

Conclusions: CRT an effective therapy in long term follow up of symptomatic patients with LHF in real world practice. One of the main factors that predict clinical improvement and survival is significant reduction in MR. Baseline dyssynchrony involving mid segments predicts reduction in MR and significant clinical improvement post CRT.

Cardiovascular and Medical Emergency Events and Sudden Cardiac Death (SCD) on Days (n=34) of Zero Geomagnetic Activity (GMA), 2002-2007

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Geospace is sensitive to solar activity (SA), to changes in this activity and its manifestations on Earth and its surrounding. It is widely accepted that the Sun-Earth interaction processes and related space weather changes influence ground-based and space-borne technologies and pose a health and safety threat to living beings and all kinds of human activities. The geomagnetic field which protects the Earth mainly from solar wind and cosmic rays is also essential to the evolution of life. Investigations show that when the geomagnetic environment is disturbed, it can have either direct or indirect effect on human physiology and health when the magnitude of the factor is quite small. Recent studies show for many medical-biological parameters, inverse links with GMA. The aim of this study was to study dynamics of medical events not only at extremely low GMA levels, but also at zero geomagnetic conditions, namely to check the number of medical events and specific death number trends at days of - daily zero- GMA. Patients & methods: Daily data were created on the basis of data from Grand Baku Area (Azerbaijan, 3.0 mln. population) in accordance to the WHO standards for the period 01.12.2002-31.12.2007. 1567576 emergency calls and 46350 deaths, 10054 cerebral strokes (CVA), 7817 AMI, 1608 SCD were analyzed. In addition to cardiology data trauma (n=54654) and infections (n=18838) were also included in the study on 1837 consecutive days. According to daily GMA indices K=0 were at 34 days, 1823 days-K>0. Also daily cosmic ray activity (CRA) was studied as a parameter antagonistic to Solar and GMA. CRA was presented by Neutron activity on the Earth surface in imp/min. Space weather data were handled from the USA, Russian and Finland space science centers. Results: The number of all emergencies (n=1567576, p<0.0001), all deaths (n=46350, p=0.0076) were significantly revealed at days of zero level of GMA. Absolutely more (+5.0%) deaths from acute myocardial infarction (AMI), cerebral stroke (CS) (+14.28%), sudden cardiac death (SCD) (+17.08%), trauma (+4.0%) were registered at geomagnetical zero days. Meanwhile only for CS (n=10054) and SCD (n=1615) there was achieved a strong trend level. For MACE (AMI,CVA,SCD) the difference was p=0.058. The neutron activity on Earth's surface was significantly higher (p<0.0001) at days of "0" GMA. Deaths from infections showed an inverse relation (-6.3%). For achieving the statistical significance for CS and SCD such days' number must be approximately three times higher (99-100). Conclusion: on days of zero GMA and high CRA-neutron activity the number of cardiovascular emergencies and deaths show a trend to raise, compared to days with higher GMA. Between compared pathologies, SCD and CVA-related deaths are most prominent ones.

Type-D personality- the Israeli Sample: Initial validation and new questions

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The primary purpose of the current study was to examine the validity and reliability of the DS-14 (Type D scale) among cardiac patients in Israel. We examined the contribution of type-D to patients' psychological distress, physiological improvement in blood lipids and adherence to behavioral changes (smoking cessation and joining a formal rehabilitation program) immediately after their first ACS and after six months. In addition, the role of marital quality in moderating these associations was examined.

The participants were 94 men who had undergone first ACS and were admitted to the Cardiac Intensive Care Unit at Meir Hospital in the center region of Israel. The patients completed baseline questionnaires during their hospitalizations, and a month later the type D scale (DS-14) was administered by telephone. Additionally, a telephone tracking interview was administered six months later, during which the dependent variable data was collected.

The translated type D scale (DS- 14) was found to be highly valid and reliable, rendering it useful in regard to cardiac patients in Israel. In comparison to previous research, our research found a lower prevalence of the type D personality, and only 5.3% of the patients were classified as such.

In comparison to non-type D patients, type- D patients reported higher levels of anxiety and depression and lower levels of HDL. They were also less likely to enroll in rehabilitation programs. A significant interaction between type D and marital quality was detected for measured LDL levels and for depression.

The Impact of Early Compared to Late Morning Hours on Brachial Endothelial Function and Long-Term Cardiovascular Events in Healthy Subjects

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Background: Cardiovascular events (CVE) tend to peak during early morning hours after waking.

Methods: To test whether acute early morning reduction in endothelial function may contribute to this circadian pattern, we prospectively assessed brachial artery endothelium-dependent flow-mediated dilation (FMD), using high resolution ultrasound, in 268 consecutive healthy subjects without any concomitant medications, 169 (63%) men and mean age 53±11 years. All subjects were followed for combined CVE which included mortality, myocardial infarction, hospitalization for heart failure or angina pectoris, stroke, coronary artery bypass grafting and percutaneous coronary interventions.

Results: The study cohort was divided to Group A [n=151 (56%) subjects] with FMD performed immediately after waking between 6:00 and 10:00 AM, and Group B [n=117 (46%) subjects] after 10:00 AM. The 2 groups were comparable regarding age, sex, height, weight, body mass index, resting heart rate, blood pressure, baseline brachial artery diameter and the prevalence of cardiovascular risk factors. FMD was significantly lower in Group A subjects compared to Group B (10.4±9.4% vs. 13.5±9.5%, p=0.007, respectively). Thereafter the study cohort was divided into 2 sub-groups < (n=128) and ≥ (n=140) the median FMD of 11.3%. These 2 groups were comparable regarding traditional cardiovascular risk factors, physical examination and laboratory results. In a mean follow-up of 45±21 months, the composite CVE were significantly more common in subjects with < vs. ≥ median FMD [18/128 (14.1%) vs. 1/140 (0.7%), p=0.007, respectively].

Conclusions: FMD is blunted in the early morning hours after waking in healthy subjects, suggesting a potential mechanism for higher CVE during early morning hours. Furthermore, median FMD independently predicts long-term adverse CVE in addition to the traditional risk factor assessment in healthy subjects with no apparent heart disease.

1548614

Is ECG monitoring mandatory during exercise training in cardiac rehabilitation ?

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Aim - To determine whether routine ECG monitoring is required during cardiac rehabilitation phase II & III exercise training sessions.

Background - According to the guidelines for cardiac rehabilitation, ECG monitoring is recommended for early exercise training, and in high risk patients in particular. The rate of severe complications during supervised exercise training has been reduced during the years, from 1 cardiac arrest/33,000 training hours to 1/268,500 training hours, and fatalities from 1/89,000 to 1/784,000 training hours. Complications rates were found to be associated with the type of ECG monitoring during exercise sessions (continuous, intermittent, graduated), and center experience.

Methods - Data from 4922 patients files monitored with the intermittent program (Polar transmitter) during the period 1.1.1999 - 1.11.2009 and 16,720 exercise tests (EXT) were evaluated. The rate of SCD, fatal/non fatal arrest, fatal/non fatal MI, significant atrial/ventricular arrhythmias, association with patient risk category and time elapsed from program initiation to the time of complication occurrence were assessed.

Results - A total of 221,490 training hours were recorded (mean adherence time = 17 weeks +/- 2.5 s.d., 160 min/week/pt, and 45.2+/-6.6 exercise hours/pt/ program). Deaths - 0/221,490, aborted SCD - 3/221,490 (0.00001%), 1 during training & 2 during EXT's (2/16720 = 0.0001%), PAF -5/221,490 during training, 7/16,720 during EXT's (0.0004%), NSVT & Couplets - 39 during EXT's (0.002%), MI - 0/221,490 during training and 4/17,620 during EXT's. No association found between events and patients risk category, or with time elapsed from program initiation.

Conclusion - Due to the extremely low rate of serious events, the value of ECG monitoring during exercise training for limiting cardiac complications is very low. The intermittent monitored type seems to be sufficient and safe for phase II and III rehabilitation program regardless of patient risk category.

Fasting glucose levels within the normal range and cardiovascular risk

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Background: Elevated fasting glucose levels above the normal range are associated with increased cardiovascular risk. However, it is unknown whether this association exists with variations of fasting glucose within the normal range. Methods: The study was conducted using the computerized database of the Sharon-Shomron district of Clalit Health services. Included were subjects with fasting glucose levels within the normal range (<100mg/dL). We excluded patients with a history of cardiovascular disease or diabetes and those receiving cardiovascular (including anti-platelets, anti-hypertensive, lipid lowering or anti arrhythmic drugs) or anti diabetic medications. We collected demographic and clinical data of the participants, and examined their subsequent need for coronary revascularization with either percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG).

Results: The 28,263 participants, 53.7±12.2 years old, were divided into quartiles according to fasting glucose levels (75.4±4.5, 83.6±1.7, 88.9±1.4, 95.1±2.2 mg/dl). During a mean follow-up of 5.9±0.7 years, 424 subjects required coronary revascularization. There was a progressive increase in the risk for coronary revascularization as fasting glucose levels were higher within the normal range (hazard ratio 1.73, 95% CI= 1.3-2.3, P=0.0001, for comparison between the fourth and first quartiles). However, this association lost its statistical significance after adjustments for age and conventional coronary risk factors (hazard ratio 1.16, 95% CI= 0.84-1.6, P=0.36).

Conclusions: Higher fasting glucose levels within the normal range are associated with an increased cardiovascular risk. This association is caused by the higher prevalence of the other conventional risk factors and not by the glucose level itself. Nevertheless, higher glucose levels within the normal range can be used as a marker for high risk patients that may benefit from a more aggressive risk factor modification.

Can HDL-cholesterol Predict Coronary Artery Disease (CAD) ? A Study of Computed Tomography Coronary Angiography (CTCA)

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Objective: To asses the rule of HDL-cholesterol on the incidence of CAD using CTCA imaging.

Methods: Subjects without evidence of CAD who had undergone CTCA for the early detection of CAD were categorized according to their HDL-ch level; <40 for men, <45 for women (group-I) and >40 for men, > 45 mg/dl for women (group-II), matched in baseline characteristics (table). In each group the incidence of CAD; number of segments with significant (diameter stenosis > 50%) and non-significant (diameter stenosis < 50%) disease and calcium score were calculated. **Results:** CTCA finding of 120 subjects; 50 in group-I and 70 in group-II were analyzed. Both groups were not statistically different regarding the mean calcium score, non-significant and significant CAD (table).

Conclusion: Our CTCA data showed that HDL-ch level was not trusting predictor for the incidence of CAD

Variables	HDL<40(M),<45(F)	HDL>40(M),>45(F)	P-value
Gender (male)	35 (70)	51 (72)	0.89
Age (yrs) SD	54+10	56+8	0.35
HDL (mg/dl) SD	36+5	53+9	
BMI (kg/m ²)	28+4.7	27+3.4	0.065
DM (mg/dl)	12 (24)	16 (22.8)	0.88
Hypertension	23 (46)	31 (44)	0.85
LDL (mg%) SD	128+33	133+29	0.082
Smoking	24 (46)	34 (48)	0.95
CTCA findings			
Ca-score	248+461	189+291	0.43
N-CAD	4 (8)	4 (5.7)	0.63
NS-Seg/p	3.8	4.6	0.18
S-Seg/p	0.96	1.3	0.44

M-male, F-female, BMI-body mass index, DM-diabetes mellitus, N=normal, NS-non-significant,S-significant , Seg/p- segments per patient

1550870

The presence of cardiovascular risk factors among children with parental history of premature ischemic heart disease

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objective:

The aim of this study is to evaluate the presence of cardiovascular risk factors in children of parents with premature ischemic heart disease (IHD).

Methods:

Children between the age 5-18 y/o with parental history of premature IHD are included. BMI, BP, waist and hip circumference, cholesterol, LDL and HDL levels, fasting glucose, liver enzymes, CRP were measured. Carotid intima media thickness (CIMT) were evaluated.

Initial results:

Thirty nine children, aged 4 - 18 y/o, with parental premature IHD were checked. BMI percentiles were 15 to 90, BP percentiles were normal, and fasting glucose was normal. Thirty four children had familial hypercholesterolemia (FH), with LDL values above 160 mg/dl, 27 of them were evaluated for CIMT and 11/27 were found to have increased CIMT. Four of them had already carotid plaques.

Conclusion:

To date, there is not enough information regarding children of parents with premature ischemic heart disease. Intensive follow up and treatment are thus required in order to establish more data and allow primary prevention of future morbidity.

In our study, the main cardiovascular risk factor was hypercholesterolemia, Characterization of the cardiovascular risk factors in this population will provide usefull information required to establish recommendations for screening and early treatment of these children, in order ot prevent future morbidity and mortality.

1546721

Comparison of Ring Types for Tricuspid Valve Annuloplasty

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Introduction: For many years, suture annuloplasty (De-Vega) was the accepted procedure for tricuspid valve annuloplasty, however results have been disappointing. We compared early results between various available rings for tricuspid annuloplasty.

Methods: One hundred and forty nine patients underwent tricuspid valve annuloplasty in adjunct to other procedures. In 73 a flexible (Duran or Cosgrove) ring was implanted, in 46 a rigid planar ring (Carpentier-Classic (CE)), and in 30 a rigid 3-dimensional (MC3) ring. The groups were similar in age, clinical profile, and surgical categories. Mean implanted ring size was 28.5 ± 1.5 , 30 ± 1 and 30 ± 1 for MC3, CE, and flexible rings respectively ($p < 0.0001$).

Results: Post-operative echocardiogram was available in 135 patients (91%), at a mean interval of 21 ± 12 days. For the MC3, CE and flexible groups respectively: LV dysfunction was observed in 2 (10%), 2 (5%), and 15 (24%) ($p=0.05$); RV dysfunction in 1 (3%), 4 (10%) and 8 (12%) ($p=ns$); MR grade 3-4 in 0, 2 (12%), and 4 (17%) ($p=ns$). Residual (moderate or severe) TR was observed in 6 (21%), 3 (8%), and 27 (43%) ($p=0.002$). Comparison between the two rigid groups showed no difference in outcomes. Comparison between the rigid groups and the flexible group showed a distinct advantage for the former: residual TR in 9 (13%) and 27 (43%) respectively ($p=0.0001$).

Conclusions: Rigid tricuspid annuloplasty rings are superior to flexible rings. This is probably due to ring design, which in addition to annular size also dictates annular shape. In our experience we did not find any advantage of one rigid ring to another.

Clinical Experience with Everolimus in Heart Transplant Recipients at the Sheba Medical Center – Efficacy and Tolerability

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Background: Everolimus (EVR) is a potent novel immunosuppressive drug which, when combined with reduced dose of cyclosporine, can minimize adverse side effects of the calcineurin inhibitor (CNI). *Purpose:* To compare the clinical and laboratory results in heart transplant (HT) patients (pts) receiving EVR with those receiving the standard CNI-based protocol. *Methods:* Between July 2005 and November 2009, 31 HT pts treated at the Sheba Medical Center with an EVR-based protocol were compared to 31 pts matched in age, gender, time since transplant and indication, treated with the standard CNI-based protocol. *Results:* In all but one of the 31 EVR treated pts the drug was begun at a minimum of 6 months post-transplant (mean 56.8 months) due to adverse events related to CNI's (56%) or MMF (22%), malignancies (25%) and established coronary disease (22%). The drug was discontinued in 3 pts in less than 1 month due to adverse events (2 cases of drug eruption and 1 case of leukopenia). Three deaths occurred among patients receiving EVR: one due to acute graft rejection, one metastatic lung cancer and one self injury. No cases of cardiac allograft vasculopathy (CAV) were noted in the EVR group compared to 2 cases (7%) in the CNI group. Rates of acute graft rejection, infection or malignancy were similar in both groups. Despite higher mean serum creatinine levels at baseline (2 vs 1.4 mg/dL; $p < 0.02$), by 6 months pts receiving EVR had similar levels compared to those receiving CNI's (1.6 vs 1.5 mg/dL). Conversely, while baseline mean serum cholesterol levels were lower in the EVR group (168 vs 184 mg/dL; $p < 0.04$), they have increased to 176 mg/dL after 6 months of EVR and decreased to 166 mg/dL in the CNI group. ($p < 0.004$). *Conclusion:* EVR provides a safe alternative to CNI based treatment for HT recipients, with comparable rates of acute graft rejections, CAV, infections and malignancies, with improved renal function but with a significant increase in serum cholesterol levels.

1550211

Surgery For Type A Aortic Dissection At A Low Volume Hospital

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Objective: Acute Type A Aortic Dissection is a life threatening disorder amenable to prompt surgical treatment. Advocates of Quality Control claim such therapy should be limited to high volume referral centers to ensure the best outcomes. Reported results from such centers reveal an operative mortality ranging 10-20%. We report our experience at a low volume center.

Methods: Between 1993-2009 23 pts. Were operated on for the diagnosis of Acute Type A Aortic Dissection.

Results: All but one was operated on an emergent basis. The one pt. With previous valve surgery was initially diagnosed as having an intramural hematoma of the ascending aorta. Mean Age was 58+/-17 and 19(83%) were male. Two pts. Had Marfan's Syndrome and one had a Bicuspid Aortic Valve. The Euroscore was 11+/-3(predicted mortality27%). Bentall Procedure was carried out in 13; Replacement of the Ascending Aorta in 10(2 had concomitant CABG). Cardiopulmonary Bypass time was 225+/- 75 min; Cross clamp time - 120+/-53 min.; Circulatory Arrest time- 46.3+/-32. min. Operative mortality was 4(17%); 1 suffered a CVA, which later resolved. No other major morbidity occurred postoperatively. Predictors of mortality by univariate analysis were: Age and Euroscore ($p<0.002$). We did not identify any predictor by multivariate analysis.

Conclusions: Type A Aortic Dissection carries a high operative mortality. Our results fall within the range of published results from high volume referral centers. Prompt surgical intervention by experienced surgeons yields the best outcomes in this very complex surgical emergency.

Outcome after Aortic Valve Replacement in Octogenarians

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Background: The advancing age of the population and improvements in surgical techniques and postoperative care have resulted in an increasing number of very elderly patients undergoing cardiac operations. The aim of this study is to evaluate the surgical outcome of octogenarians after aortic valve replacement.

Methods: We retrospectively identified 191 patients (90 men, 101 women) aged 83.2 ± 2 years (range, 80 to 92 years) who underwent aortic valve replacement alone (73 patients, 38%) or in combination with coronary artery bypass grafting (118 patients, 62%), between October 2003 and September 2009. These patients had significant severe aortic stenosis with a mean valve area of 0.7 ± 0.19 cm² and a peak gradient of 80 ± 25 mm Hg.

Results: The in-hospital mortality rate was 8.2% for the isolated AVR, and 12.7% for the combined AVR and CABG ($p=0.24$). Actuarial survival at 1 and 5 years was 76% and 61%, respectively for isolate AVR, and 73% and 50%, respectively for combined AVR and CABG ($p=0.21$). Predictors for in-hospital mortality were redo surgery, severe LV dysfunction, and critical preop status. Predictors of late mortality were critical preop status, and COPD.

Conclusions: The outcome after aortic valve replacement in octogenarians is excellent; The addition of CABG does not seem to carry statistically worse results and the long term survival of the patients approaches the life expectancy of the general age matched population. Cardiac surgery should not be withheld on the basis of age alone.

Routine use of Epi-Aortic Ultrasound - Tthe Cardiac Surgeon's Answer to the SYNTAX Trial

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Background

Intra-operative Epi-Aortic Ultrasound (EAUS) has proved the most sensitive modality, in finding ascending aorta atherosclerosis. Studies have shown a reduction in post-operative neurological complications and most authors recommend routine EAUS in every cardiac operation. The purpose of this study was to check early clinical results after implementation of a routine Intra-operative EAUS in every cardiac surgery done in our institute.

Methods.

EAUS was performed routinely and documented as part of the operative computer report. The report contains: patient data, operative plan, palpation findings, EAUS finding (atheroma was graded according to the standard classification), change of operative plan according to the EAUS , and procedure time. Review of the first 65 consecutive patients is presented.

Results

There was no postoperative stroke. Findings on palpation were found in 10 patients, seven of whom were planned for CABG only and three were planned for a combined procedure. All findings were found on the EAUS; however, the view from the EAUS (protruding atheromas) in six of these patients led to a change in the operative plan; from CABG to off-pump coronary bypass in two, and there was a change in the cross clamp location and the cannulation and proximal anastomosis sites in the remaining four patients. Another five patients who had no findings on palpation had a positive finding on EAUS ; nevertheless, there was no resulting change in the operative plan. In total, 15 (23%) patients had positive EAUS findings, in six (9%) of whom there was a change in the operative plan. Median and mean procedure times were 2 and 2.7 minutes, respectively.

Conclusions

Routine use of EAUS has proved itself as the definitive approach for detecting and defining the extent of aortic atheromatic disease. Palpation alone is an important maneuver but it is less sensitive. Moreover, palpation may be misleading and, therefore, EAUS is a better tool for intra-operative decision

Aortic Valve Replacement: Who are the high risk patients, that should be considered for transcatheter procedures?

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Background:

Transcatheter aortic valve implantation (TAVI) is an emerging technology for high risk patients with severe aortic stenosis. High risk patients are defined by Logistic euroscore and STS score. The objective of our study is to analyze the outcome of all patients undergoing AVR±CABG , and identifying risk factors for adverse early outcome.

Methods:

From 2004, 1273 patients underwent AVR. Isolated AVR and AVR+CABG were performed in 773 patients. 80% patients had aortic stenosis, 9% regurgitation, and 11% mixed pathology. 199 patients were Octogenarians (26%) - Group A, and 574 were below 80 years - Group B. Mean age, Logistic EuroScore, preop LVEF and NYHA were 83 ± 2.5 and 66 ± 11 ($p<0.01$), $17\pm 14\%$ and $8\pm 9\%$ ($p<0.01$) $52\pm 11\%$ and $55\pm 12\%$ ($p=0.34$), 2.1 ± 1.3 and 2.0 ± 1.3 ($p=0.18$), group A and B, respectively. In group A severe pulmonary hypertension (PHT) was more prevalent (7% vs. 3%, $p=0.02$), and previous cardiac operation was more common in group B (26% vs. 16%, $p<0.01$).

Results:

There were 47 (6%) in hospital death: 20 (10%) in the group A and 27 (5%) in group B ($p=0.02$). Mortality within octogenarians was distributed as follows: 7% for EuroScore<20 (mean $11\pm 6\%$); 13% for EuroScore 20-30 (mean $25\pm 13\%$) and 29% for EuroScore>30 (mean $46\pm 17\%$).

Mean hospital length, ICU time and ventilation time, for Group A and B, respectively were: 10 ± 8.2 and 8.4 ± 7.4 days ($p=0.01$), 99 ± 183 and 63 ± 115 hours ($p=0.01$), 42 ± 92 and 31 ± 105 hours ($p=0.22$).

The most significant predictors for in hospital death were: age ($p<0.01$), EuroScore ($p<0.01$), severe PHT ($p=0.08$), previous cardiac operation ($p=0.08$) and female gender ($p=0.09$).

Conclusions:

Surgical AVR has good early results, in all age groups, with observed mortality, lower than predicted by the current available score models. The most high risk patients are octogenarians with EuroScore>30, females, severe PHT and previous cardiac operation. New scoring model is necessary for identifying the high risk patients for surgical AVR.

Tricuspid Valve Surgery: Early and Mid term results

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Background:

Tricuspid valve (TV) surgery is associated with higher morbidity and mortality, as compared to left side valve surgery. The objective of our study is to analyze our experience in TV surgery, and identifying risk factors for adverse early and late outcome.

Methods:

From 2004, 249 patients underwent TV surgery (122 redo, 49%): 209 repairs (84%) and 40 replacements (16%). Valve pathology was secondary to left side mitral disease in 109 patients (44%), rheumatic 115 patients (46%), endocarditis 11 patients (4%) or other pathology in 16 patients (6%). Mean age was 64 ± 13 , and preoperative NYHA was 2.7 ± 0.7 . Pulmonary hypertension was present in 60 patients (24%), LVEF was 51% and RV dysfunction was present in 13% patients. Logistic EuroScore was $14 \pm 15\%$.

Results:

There were 21 (8%) in hospital death: 8% in the repair group and 10% in replacement ($p=0.7$); 5% in rheumatic group and 11% in non-rheumatic group ($p=0.09$).

The most significant predictors for hospital mortality were: lower preop EF ($p=0.01$), higher preop NYHA class ($p=0.01$), RV dysfunction ($p=0.06$), atrial fibrillation ($p<0.01$), endocarditis ($p<0.01$), concomitant CABG ($p=0.04$) and higher EuroScore ($p<0.01$).

Mean follow up was 21 ± 17 months. Freedom from reoperation was 96%. At follow up there were 11 late deaths (7%). Freedom from thromboembolism events was 95%. Overall survival (early and late death) was similar between repair and replacement groups ($p=0.96$), but was better in rheumatic patients versus non-rheumatic patients ($p=0.01$). NYHA improved from 2.7 ± 0.7 to 1.7 ± 0.8 . Echocardiography follow-up revealed 80% of patients in the repair group were free from moderate or severe tricuspid regurgitation.

Conclusions:

TV surgery remains a high risk procedure with significant early mortality and morbidity. Patients undergoing valve replacement had similar early and late outcome, as valve repair. Rheumatic patients had similar early outcome, but their late survival was better than non-rheumatic etiology.

Internal Carotid Artery Stenosis Peak systolic velocity is Associated to Coronary Artery Disease Severity: A Retrospective analysis of 884 Patients

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Background: Atherosclerosis is a diffuse process in the body vasculature. Our Objective was to investigate the relationship between the severity of the atherosclerotic lesions in the coronary arteries and those of the internal carotid arteries (ICA).

Methods: We performed a retrospective analysis of prospectively collected data obtained from 884 consecutive patients that underwent same-day elective coronary angiography and carotid Doppler study, between January 2007 and December 2007. The data was retrieved from the catheterization and Doppler laboratories databases. The chi-square test was used to evaluate the relation between severity of internal carotid artery stenosis and the extent of coronary disease. Step wise multiple regression models were fitted for the peak systolic velocity as the dependant variable and adjusted to degree of coronary disease, age, gender and cardiovascular risk factors.

Results: The study population included 884 patients (696 males) at a mean (SD) age of 65 (± 10). Significant ICA stenosis was found in 13.1% of the study population, while 58.1% had at least mild stenosis. The relation between severity of ICA stenosis and the extent of coronary arteries disease was statistically significant ($p < 0.001$). The ICA peak systolic velocity was related to three vessel and left main artery disease, age, history of smoking and coronary artery bypass grafting ($r = 0.259$; $r^2 = 0.066$; all $p < 0.05$).

Conclusions: The degree of ICA stenosis is related to the degree of coronary artery disease severity. Carotid Doppler study in patients undergoing coronary angiography, should be used for early detection of significant ICA disease in order to apply appropriate preventative measures.

Values of Color Doppler Three Dimensional Transesophageal Echocardiography in the Percutaneous Closure of Mitral Prosthesis Paravalvular Leak*Biner, S¹; Rafique, A²; Siegel, R²; Shiota, T²**¹Tel Aviv Sourasky medical Center, Tel Aviv, Israel; ²Cedars Sinai Medical Center, Los Angeles, USA*

Methods and results: We investigated the clinical value of three dimensional (3D) transesophageal echocardiography color flow Doppler (TEE-CFD) for percutaneous transcatheter closure of mitral prosthesis paravalvular leaks (PVLs) in comparison with two dimensional (2D) TEE. Number, location and size of mitral prosthesis PVLs were determined in 8 patients by 2D TEE-CFD and 3D TEE-CFD. We also evaluated 2D TEE-CFD and 3D TEE-CFD for identifying the canalization of target PVL during intervention, and assessing the change in PVL effective orifice following the endovascular procedure. Twelve PVLs and 15 PVLs were visualized with 2D TEE-CFD and 3D TEE-CFD. There was no substantial disagreement between 2D TEE-CFD and 3D TEE-CFD for location for each of the PVLs. There was no difference in vena contracta short axis width obtained by 2D TEE-CFD and 3D TEE-CFD (5.7 ± 1.4 mm vs. 5.5 ± 1.3 mm, $p=0.09$). However, only 3D TEE-CFD demonstrated the PVL effective circumferential orifice length (12.2 ± 8.5 mm). A closure device was deployed in 6 cases. In one case, the canalization of a non-target PVL, visualized only on 3D TEE-CFD, led to an appropriate change of treatment strategy. The reduction in mean PVL vena contracta width demonstrated with 2D TEE-CFD and 3D TEE-CFD was similar (2.2 ± 0.7 mm vs. 2.1 ± 1.1 mm, $p=0.69$). However, only 3D TEE-CFD verified the reduction of PVL effective orifice circumferential length by 10.5 ± 5.6 mm. Conclusion: 3D TEE-CFD provides unique and additive information in patients with mitral prosthesis PVLs. This new technology has the potential to improve the procedural success of percutaneous transcatheter closure of PVLs.

1550055

A Crossover Balloon Occlusion Technique for Percutaneous Closure After Trans-Femoral Aortic Valve Implantation

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Background: Vascular closure following large vessel access usually requires surgical cutdown and repair. To facilitate percutaneous closure after removal of 22 and 24F sheaths for transcatheter aortic valve implantation (TAVI), we developed an adjunctive crossover balloon occlusion technique (CBOT) in combination with the 10F Prostar™ percutaneous closure device (PCD).

Methods: The CBOT requires (1) contralateral femoral artery access and placement of a crossover sheath in the ipsilateral external iliac artery; (2) insertion of a properly sized balloon with low pressure inflation to occlude the vessel above the arteriotomy site; (3) two-suture Prostar™ PCD deployment with the balloon inflated to decompress the vessel and control bleeding; (4) balloon deflation and assessment of the arteriotomy site; (5) as needed, balloon re-inflation across either a dissection or the arteriotomy to reduce bleeding or to improve angiographic outcomes. 35 consecutive TAVI pt were treated using this percutaneous CBOT between Nov, 2008 and Sept, 2009 followed by assessment of clinical outcomes.

Results: Successful closure (no significant early or late arteriotomy site bleeding) was obtained in all but 2 patients (94.3%). The 2 failures were associated with obesity, vessel calcification, and high arteriotomy access; both patients had immediate and uneventful surgical repair aided by the proximal occlusion balloon. Overall, in these 35 pts, there were no deaths, mean Hgb drop was 2.3 ± 0.9 g/dl, 8 pts (25%) received transfusions (half due to non-access site reasons), and there was one large (> 5cm) hematoma (3.1%).

Conclusion: This adjunctive CBOT combined with the Prostar™ PCD resulted in controlled, safe, and successful percutaneous closure after TAVI and may be associated with reduced access site complications as well as accelerated pt mobilization.

“Primary” Aortic Balloon Valvuloplasty in the Critically Ill: from the Emergency Room to the Cathlab

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Background: Critical aortic stenosis (AS) may present as decompensated heart failure that is refractory to medical therapy. Balloon aortic valvuloplasty (BAV) is a catheter-based option used for palliation of nonsurgical patients. BAV fell from favor due to perceived procedural complexity, suboptimal initial results, and high restenosis rate. Recent progress in therapy of high-risk AS patients widened the use of BAV in the acute treatment of critically AS patients. We report a single center one year experience with “primary” BAV – emergent valvuloplasty of decompensated AS patients, with direct transfer from the emergency room to the cath lab. Methods and Results: From September 2008 to September 2009 four patients, ages 78-87, with critical decompensated AS were treated with BAV within 3 hours from hospital admission. Two patients suffered from cardiogenic shock and two from intractable pulmonary edema. Two of the four had pneumonia and one patient small bowel obstruction that necessitated urgent surgery. Valve area by echo was 0.4-0.6 cm², and maximal AV gradients measured were 40-60 mmHg (50±9 mm Hg). These relatively diminished AV gradients were attributed to a poor LV function, in contrast with higher gradient measurements on prior echo examinations (75±12 mm Hg). Patients were admitted for emergency BAV 60-180 minutes from hospital arrival. BAV was successfully performed with a marked decrease in LV-aortic gradient from an average of 50±9 to 20±5 mmHg. Hemodynamic and clinical improvement was noted in all patients leading to hospital discharge after 10±4 days and successful small bowel operation in one patient on the day of the procedure. All patients are currently awaiting valve implantation. Conclusions: Emergency BAV is an effective and safe therapeutic modality for decompensated severe aortic Stenosis. The “primary BAV” approach in this critical hemodynamic situation is warranted for stabilization, allowing a bridge for valve implantation.

Carotid Artery Stenting: Evaluation of a Neurology-Cardiology Team Approach

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Background: Periprocedural complication rates of carotid stenting (CAS) vary substantially depending on patient characteristics, case volume load and examiner bias. We present safety and efficacy data of our prospectively conducted CAS registry reflecting the results of a joint vascular neurology and cardiology team approach.

Methods: A multidisciplinary system for the treatment of carotid stenosis was established in June 2004. A neurologist assessed all patients to determine indication and mode of carotid revascularization. High-risk subjects, as defined by current guidelines, were pretreated by dual antiplatelet therapy and referred to CAS which was performed by an interventional cardiologist using a protective device. Patients were thoroughly examined by a neurologist immediately post-procedure and transferred to the stroke unit where they were managed until discharge. Follow-up was performed at the stroke outpatient clinic.

Results: Over a 5-year period 238 procedures of CAS in 216 patients were performed. Age ranged from 40 to 92 (69±9) years; 75% were male. 23 patients (10%) were octogenarians, 36% were symptomatic, 20% had severe contralateral stenosis, 45% had significant cardiac disease. The risk of any stroke or death at 30-days was 3.8% and of major stroke or death 2.9%. There was no stroke or death among patients <60 years. Risk of any stroke or death was 3.4% for 60-79 year old patients, and 12.5% for octogenarians. Among non- octogenarians risk for all stroke or death was 2.9% among symptomatic patients and 2.8% among asymptomatic patients. Octogenarians had a > 5-fold increased risk of any stroke or death (OR= 5.0; 95%CI 1.2-21.3), only mildly attenuated after adjustment for symptom status (OR=4.2; 95%CI 0.9-19.0).

Conclusion: Carotid artery stenting is safe and efficacious when performed in a high-volume center using a multidisciplinary team approach, with excellent results in non-octogenarians, but a substantial complication rate in octogenarians.

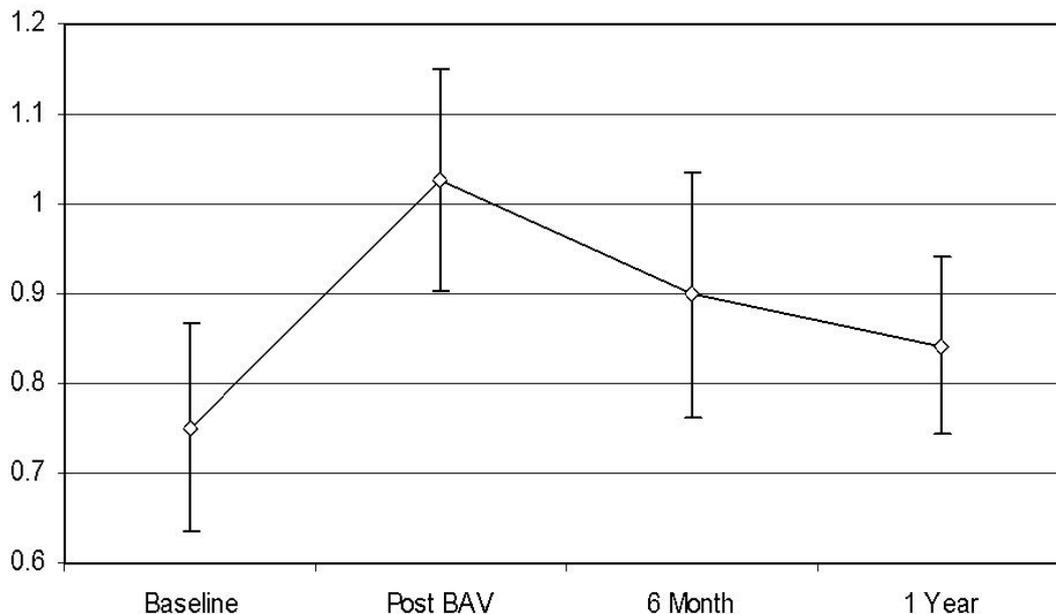
Palliative Balloon Aortic Valvuloplasty for Inoperable Patients With Severe Aortic Stenosis: 18-Month Follow-up

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Background: Surgical valve replacement is the standard treatment for severe aortic stenosis (AS). Transcatheter aortic valve implantation is an alternative therapy for high risk pts but not widely available. Balloon aortic valvuloplasty (BAV) carries lower procedural risk than surgery but has a high restenosis rate. We reinstated a BAV program as palliative treatment for inoperable AS pts. **Methods:** Between May 2008 and November 2009 25 pts underwent BAV. All were inoperable or refused high-risk surgery. Clinical characteristics and pt outcomes were analyzed.

Results: Mean age was 82 ± 9 years (range 53-95), 13/25 were female, 10 had previous CABG and 4 were in cardiogenic shock. Logistic Euroscore was 44 ± 24 % (range 4-91). Five underwent concomitant PCI (3 to unprotected LMCA). Aortic counterpulsation was used in 3 and cardiopulmonary bypass in 1 case. Following BAV aortic valve area increased from 0.75 ± 0.11 to 1.03 ± 0.12 cm². During 227 ± 188 days of follow-up 8 (32%) pts died. Two pts who had been in critical condition prior to BAV died in-hospital. The remaining pts improved symptomatically and were discharged. An additional 6 pts died over 80 ± 91 days (range 8-252) of unrelated causes. Echocardiographic follow-up revealed reduction of aortic valve area to 0.90 ± 0.14 cm² at 6-months and 0.84 ± 0.10 cm² at 1-year. Two pts underwent repeat BAV due to symptomatic restenosis. **Conclusions:** 1) BAV carried low procedural mortality in this population of extremely high-risk elderly pts with severe AS and multiple co-morbidities. 2) A relatively small increase in valve area may translate into significant clinical improvement. 3) Gradual decrease in aortic valve area was observed, but restenosis required repeat intervention only in 2 pts. 4) BAV is a viable palliative therapeutic option in inoperable pts with severe AS.

Aortic Valve Area (Cm²)



Left Atrial Appendage Occlusion with the Amplatzer Cardiac Plug.

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Background: Atrial fibrillation (AF) is associated with a reduction of flow rates particularly in the left atrial appendage (LAA), increasing the risk for in situ thrombus formation and ischemic strokes. A significant proportion of patients are ineligible for anticoagulation. During AF, 90% of thrombi are located in the LAA. Recently LAA occlusion has been demonstrated to be non-inferior to anticoagulation.

Methods: Patients with AF, a CHADS2 score of ≥ 2 and a contraindication to anticoagulation, were offered the option of percutaneous LAA occlusion with the Amplatzer Cardiac Plug (ACP). The ACP is a nitinol mesh device, comprising a retaining lobe that is deployed within the LAA and an attached disc that covers the LAA ostium. A transvenous approach was used, with access to the left atrium achieved via a transeptal puncture, or through a patent foramen ovale. Following contrast injections, measurements of the device landing zone 1cm beyond the LAA ostium were performed by quantitative angiography and echocardiography. Post procedurally, patients were treated with clopidogrel for 1 month and aspirin.

Results: LAA occlusion was attempted in 9 patients. Contraindications to anticoagulation included gastrointestinal bleeding (4), recurrent falls (2), poor compliance (1), retinal (1) and cerebral hemorrhage (1). Mean CHADS2 score was 3(2-6). The procedure was successful in all 9 patients. The mean landing zone was 20mm (15-23) and the mean device size chosen was 22mm (18-26) . In 4 cases the initial selected device was replaced with a different size for successful device deployment. At follow-up (2 weeks-4 months) a single patient suffered a GI bleed. Conclusions: Our initial experience with the ACP for LAA occlusion demonstrates short-term feasibility and safety. Improved sizing technique will reduce the need for changing device size intraprocedurally. Larger numbers and long-term follow-up are required to demonstrate efficacy.

Role of Intracardiac Echocardiographic Guidance in Transcatheter Closure of Interatrial Communications.

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Percutaneous closure of secundum atrial septal defect (ASD) and patent foramen ovale (PFO), when indicated, is performed using a combination of fluoroscopic and echocardiographic guidance. Standardly, imaging of the interatrial septum and the closure device is achieved with transesophageal echocardiography (TEE). Due to the prolonged dwell time of the TEE probe and the necessity for the patients to remain still on their backs, the use of TEE for device closure requires general anesthesia. Intracardiac echocardiographic (ICE) guidance of septal defect closure has emerged as a technique that provides excellent imaging requiring only local anesthetic.

We analyzed 31 patients (11 with ASD and 20 with PFO associated with a stroke), 18 (58%) women, mean age 57.7 ± 16.7 years, that underwent transcatheter closure using ICE guidance (AcuNav, Siemens). Cases where the pre-procedural TEE demonstrated an unstretched ASD diameter of >32 mm were referred for closure with TEE control. The ASD 2-D size as measured by ICE ranged from 11 to 32mm. In all cases there was a <2 mm discrepancy between the ICE and the angiographic size dimensions during balloon stretched sizing. ICE provided adequate views of the defects and surrounding structures and the various stages of device deployment. The unique views provided by ICE provided improved visualization of the left atrial side of the septum including outstanding delineation of all pulmonary veins, compared with our extensive experience with TEE. All patients had successful device placement. There were no complications related to the use of the AcuNav catheter.

We conclude that ICE is a safe and feasible method for guiding atrial septal closure procedures and provides unique images of atrial communications and left atrial structures further facilitating device closure in these cases. We believe ICE should replace TEE as an imaging guiding tool for most ASD and PFO device closure, eliminating the need for general anesthesia.

Complication and Outcome of Balloon Aortic Valvuloplasty in High Risk or Inoperable Patients

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Background: With the introduction of transcatheter aortic valve implantation balloon aortic valvuloplasty (BAV) has experienced a revival for treatment of patients (pts) with severe aortic stenosis (AS). This study aimed to determine the success, complication and survival of pts after BAV

Methods: A cohort of 219 pts with severe AS underwent 241 BAV procedures between 2006-2009. Of these 16 (7.3%) pts had ≥ 2 BAV procedures. Clinical, hemodynamic, and follow up mortality data were collected

Results: The mean age of 81.1 ± 9.6 years, mean STS and logistic Euro score 13.4 ± 23.6 , 43.3 ± 7.6 , respectively. In 78 (35.6%) pts the aortic valve area (AVA) increased to $> 1 \text{ cm}^2$ and in 89 (40.6%) AVA increase in $> 0.4 \text{ cm}^2$. The mean increase in AVA was $0.38 \pm 0.2 \text{ cm}^2$ higher compared to the group who had redo of BAV with a mean increase of $0.26 \pm 0.2 \text{ cm}^2$, $p=0.01$. The mortality rate was 97 (44.2%) during median follow of 183 [60-456] days. Both final AVA and delta increase AVA were associated with lower mortality (OR 0.2, $P=0.02$ and OR 0.1, $P=0.01$, respectively). The mortality of pts with final AVA $> 1 \text{ cm}^2$ vs. $< 1 \text{ cm}^2$ (35.5 vs. 52.7%, $p=0.03$), and in pts with increase AVA $> 0.4 \text{ cm}^2$ vs. $< 0.4 \text{ cm}^2$ (41.1 vs. 51%, $p=0.2$). Renal failure and NYHA class were significantly associated with mortality. 30 (13.6%) pts required blood transfusion

Conclusion: Long term survival after BAV is dismal. Efforts should be targeted to obtain (AVA $> 1 \text{ cm}^2$) post BAV to improve the survival rate. Percutaneous or aortic valve replacement should pursue aggressively if this target is not met

219 patients underwent balloon aortic valvuloplasty			
	Pre balloon valvuloplasty	Post balloon valvuloplasty	P
Mean aortic valve area (cm ²)	0.56±0.17	0.95±0.29	<0.001
Mean Gradients (mmHg)	46.9±20.7	21.3±12.7	<0.001
Cardiac output (l/min)	3.9±1.8	4.1±1.3	0.7
Pulmonary pressure (mmHg)	51.2±17.3	49.1±16.6	0.001
Hematocrit (%)	35.4±4.6	29.3±5.2	<0.001
Creatinine (mg/dl)	1.4±1.0	1.9±1.0	0.02
Troponin (ng/dl)	0.7±6.2	1.3±2.4	0.3
Serious adverse events		39(17.8%)	
Intraprocedural death (%)		4(1.8)	
Stroke (%)		6(2.7)	
Vascular complication (%)		13(5.9)	
Life threatening bleeding		6(2.7)	
Moderate/Severe aortic regurgitation (%)		3(1.3)	
Profound hypotension requiring resuscitation and intubation (%)		3(1.3)	
Tamponade /Left main occlusion(%)		1(0.45)/1(0.45)	
Ventricular tachycardia (%) ²		2(0.9)	

PISA, Vena Contracta, and Regurgitant Jet Area have Limited Reproducibility for Assessment of Mitral Regurgitation Severity

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Objective:

The aim of this study was to evaluate the interobserver agreement of isovelocity surface area (PISA) and vena contracta (VC) for differentiating severe from non severe MR.

Background:

Recommendation for MR evaluation stresses the importance of VC width, and effective regurgitant orifice area (EROA) by PISA measurements. Reliable assessment of MR is important for decision making regarding corrective surgery. We hypothesize that color Doppler based quantitative measurements for classifying MR as severe versus non-severe may be susceptible to inter observer variability.

Methods:

PISA and VC of 16 patients with MR were interpreted by 18 echo cardiologists from 13 academic institutions. In addition we obtained quantitative assessment of MR based on color flow Doppler jet area.

Results:

The overall inter observer agreement for grading MR as severe or non severe was using qualitative and quantitative parameters was suboptimal: 0.32 (95% CI: 0.12-0.52) for jet area based MR grade, 0.28 (95% CI: 0.11-0.45) for VC measurements, and 0.37 (95% CI: 0.16-0.58) for PISA measurements. Significant univariate predictors of substantial inter observer agreement for a) jet area based MR grade was functional etiology (p=0.039), b) VC was central MR (p=0.013) and identifiable effective regurgitant orifice (p=0.049), and c) PISA was presence of a central MR jet (p=0.003), fixed proximal flow convergence (p=0.025), and functional etiology (p=0.049). Significant multivariate predictors of substantial inter observer agreements included for VC identifiable effective regurgitant orifice (P=0.035), and for PISA central regurgitant jet (p=0.02).

Conclusion:

VC and PISA for distinction of severe versus non-severe MR are only modestly reliable and associated with substantial inter observer variability. An identifiable effective regurgitant orifice improves reproducibility of VC and a central regurgitant jet predicts substantial agreement between multiple observers of PISA assessment.

Pulmonary Hypertension in Patients with Significant Aortic Regurgitation:an Echocardiographic Study.

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Background: Pulmonary hypertension(PH) is well recognized risk factor for worse prognosis in patients with mitral valve disease and aortic stenosis. However, little is known about its incidence in patients with significant aortic regurgitation(AR). Therefore, we sought to evaluate this issue by means of echocardiography.

Methods:Patients with more than moderate AR were recruited from the departmental echo database. Excluded were patients with prosthetic valves, acute aortic dissection , concomitant significant aortic stenosis or mitral valve disease.PH was defined by TR gradient ≥ 30 mmHg : mild - 30-39, moderate - 40-49 , severe- ≥ 50 . Patients were divided into two groups according to the presence of normal (group I) or increased (group II) pulmonary pressure.

Results: 121 patients were included(78% male, mean age 61 ± 16 , years) . The main causes of AR were aortic dilatation (n=46) , degenerative disease (n=26),and bicuspid valve (n=14). Data regarding TR gradients and left ventricular dimensions and function between group I and II are depicted in the table. Overall, PH was found in half of the patients , and it was moderate to severe in twenty five (20.6% of the entire population) and mild in thirty six. Compared to group I, patients in group II had significantly larger TR gradients, left ventricular dimensions and reduced shortening fraction. Moreover , by qualitative analysis ("eyeballing") , left ventricular systolic function was considered depressed in 28 group II vs. 8 group I patients, and right ventricular dysfunction in seven vs. two.

	Group I N=60	Group II N=61	P value
Male- n (%)	44 (74.5)	50 (81)	NS
Age	60 \pm 15	63 \pm 17	NS
LVEDd (cm)	5.7 \pm 0.7	6 \pm 0.7	<0.02
LVESd (cm)	3.8 \pm 0.7	4.3 \pm 0.9	<0.01
Shortening fraction (%)	34 \pm 7	29 \pm 9	<0.01
Septum thickness (cm)	1.05 \pm 0.2	1.1 \pm 0.2	NS
TR gradient (mmHg)	23 \pm 3.5	40 \pm 11	<0.01
LV dysfunction- n	8	28	<0.01
RV dysfunction-n	2	7	

Conclusions: Pulmonary hypertension is frequently found in patients with significant, chronic AR and it is associated with larger ventricles and decreased ventricular function. It may reflect left ventricular decompensation after a long-standing disease. The significance of these findings on the outcome of these patients is unknown and deserves further investigation.

Persistence of Left Atrial Appendage Thrombus in Patients with Atrial Fibrillation Treated with Anti-Coagulants

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Background: Few studies using repeat transesophageal echocardiography (TEE) reported that LA/LAA thrombus might persist in spite of anticoagulation. There is no agreement whether clot resolution should be documented with a 2nd TEE before cardioversion in patients with atrial flutter-fibrillation (AF).

Patients and methods: From 12/1993 until 09/2009 1015 pts with AF lasting longer than 2 days underwent TEE before elective cardioversion. LAA thrombus was identified in 182 patients (18%). 66 of these pts (36%), mean age 69.9 ± 13.1 , 36 male(55%), underwent a 2nd TEE 21-90 days after the 1st TEE, and all were treated with warfarin.

Results: LAA thrombus completely resolved in 36 of 66 pts (55%) and persisted in 30. The underlying conditions were: 39 pts had mitral incompetence, 11 had mitral stenosis, 8 had prosthetic mitral valves. Echo parameters (see table).

Echo Parameters on 1st TEE	Thrombus resolved (2nd TEE)	Thrombus not resolved (2nd TEE)
LA Dimension (cm)	5.15	5.29
Spontaneous echo contrast	24 (47%)	27 (53%)
Low velocity in LAA	19 (57%)	14 (43%)
Mitral stenosis	4 (34%)	7 (63%)
Mitral incompetence > mild	23 (59%)	16 (41%)
Mod-sev LV dysfunction	3 (27%)	8 (73%)

None of the echo measurements on 1st TEE were found to predict presence of LA/LAA thrombus on 2nd TEE.

Summary: We found persistence of LA/LAA thrombus in 45% of patients that underwent repeat TEE before cardioversion for AF in spite of treatment with anticoagulants. Most pts with persistence of LAA thrombus were not converted, while all patients with thrombus resolution underwent cardioversion. Thus we recommend routine 2nd TEE in pts with LAA thrombus considered for cardioversion.

Respiratory Variation in Tricuspid Regurgitation Peak Systolic Velocity: A Sign of Severe Tricuspid Regurgitation

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Background: Respiratory variation in tricuspid regurgitation (TR) peak systolic velocity is frequently observed in patients with severe TR, but the diagnostic significance of this finding is unclear.

Methods: Our echocardiographic laboratory database was searched to identify all echocardiographic examinations fulfilling the following criteria: a) presence of severe TR, defined by color flow imaging and Doppler evidence of hepatic venous systolic flow reversal; b) regular heart rhythm (sinus rhythm or regular ventricular pacing); c) continuous-wave Doppler strip with at least 4 consecutive TR Doppler signals. The difference between the maximal (expiratory) and minimal (inspiratory) TR velocities within a given Doppler strip (delta velocities) was measured and delta velocities in patients with severe TR were compared to a random sample of 20 patients with moderate TR who fulfilled criteria b and c (above).

Results: Severe TR was diagnosed in 243 echocardiographic examinations during an 18 month period and the above inclusion criteria were fulfilled in 52 examinations in 50 patients (age 71+/-12 yrs; 44% male). Delta velocities were 0.70+/-0.28 (range: 0.2-1.3) m/s in patients with severe TR vs. 0.32+/-0.17 (range: 0.1-0.7) m/s in patients with moderate TR ($p < 0.001$). Using a cutoff of delta velocities ≥ 0.7 m/s (median value in patients with severe TR), this criterion had a sensitivity of 58% and a specificity of 95% for diagnosing severe TR. Among patients with severe TR, there was a trend for greater right ventricular size and more severe tricuspid leaflet malcoaptation in patients with excessive respiratory delta velocities (≥ 0.7 m/s), compared to patients with severe TR and low delta velocities (< 0.7 m/s), suggesting that these patients have the most severe degree of TR.

Conclusions: Excessive respiratory variation in TR velocities is a common phenomenon in patients and is a specific marker of severe TR, usually associated with very severe TR.

Clinical and Echocardiographic Features of Patients with Mitral Stenosis and Effort Dyspnea

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Background: Left atrium compliance (LAc) can explain, at least partially, the erratic functional capacity of patients with mitral stenosis (MS). Previous studies have shown that LA size has no impact on LAc, however LA size was investigated only at rest and not at effort. We thought to investigate clinical and echocardiographic parameters that could potentially impact on MS patients' symptoms.

Methods: Patients with rheumatic mitral valve injury and predominantly MS who underwent a treadmill stress echocardiography study were included in the study. Clinical and echocardiographic data at rest and at effort were noted. We compared patients in whom the stress study was terminated due to dyspnea (group I) to those in whom the study was stopped for other reasons (tiredness, fatigue, maximal predictive heart rate) (group II).

Results: Thirty-two patients, age 54 ± 7 years, female 81% completed a treadmill stress echocardiography. Patients exercised during 4.4 ± 1.0 minutes. Average age, gender and duration of exercise were similar between groups. Atrial fibrillation was seen in 6/18 (33%) of patients in group I compared to 1/14 (7%) in group II ($p < 0.0001$). The table depicts echocardiographic characteristics of both groups. There was no significant difference between groups for all the parameters evaluated except for the presence of \geq moderate mitral regurgitation at rest and effort, which was significantly more frequent in group I than in group II.

Conclusions: Patients with similar severity of MS and different symptoms at effort had no echocardiographic differences at rest and effort except for the presence of mitral regurgitation, which was more common in patients with effort dyspnea. A significantly higher incidence of atrial fibrillation was seen in patients with MS whose effort was limited because of dyspnea.

ECHOCARDIOGRAPHIC PARAMETERS	GROUP I (n=18)	GROUP II (n=14)
REST		
Mitral valve area (cm ²)	1.5 ± 0.3	1.6 ± 0.3
Mean mitral gradient (mm Hg)	9.0 ± 1.3	8.0 ± 0.9
Pulmonary artery systolic pressure (mm Hg)	45 ± 4.1	42 ± 3.9
More than mild mitral regurgitation (n) (%)	6/18 (33%)	1/14 (7%)
Left atrial size (supero-onferior diameter) (mm)	64 ± 7.1	63 ± 5.3
EXERCISE		
Mean mitral gradient (mm Hg)	18 ± 3.4	17 ± 3.6
Pulmonary artery systolic pressure (mm Hg)	64 ± 7.2	60 ± 6.9
More than mild mitral regurgitation (n) (%)	7/18 (39%)	2/14 (14%)
Left atrial size (supero-inferior diameter) (mm)	61 ± 5.9	62 ± 7.0

Left Ventricular Diastolic Dysfunction as a Predictor of New-Onset Atrial Fibrillation After Acute Myocardial Infarction

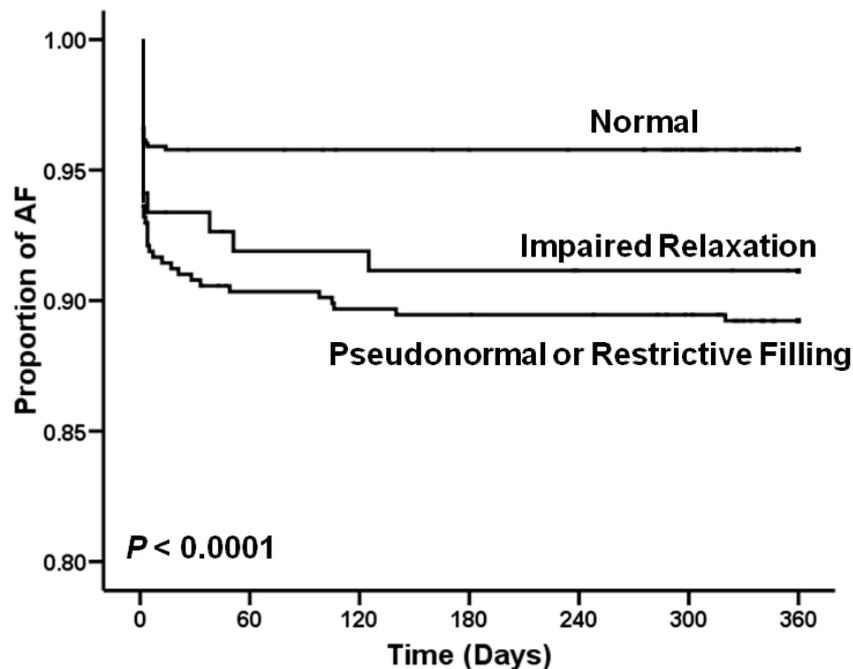
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Background: The role of factors that increase left atrial pressure or is frequently emphasized in the pathogenesis of atrial fibrillation (AF) in patients with acute myocardial infarction (AMI). Diastolic dysfunction occurring after AMI may promote the development of AF. However, there is no information concerning the role of diastolic dysfunction in the development of new-onset AF in patients with AMI.

Methods: 1422 patients with AMI underwent echocardiographic examination while in sinus rhythm during the index hospitalization. Impaired relaxation and advanced diastolic dysfunction (either pseudonormal filling pattern or restrictive filling pattern) were defined according to standard criteria. Patients with previous AF were excluded. The relationship between diastolic dysfunction and new-onset AF occurring during the hospital course and at 1-year was analyzed using multivariable Cox model, adjusting for age, gender, previous infarction, hypertension, diabetes, ST-elevation, coronary revascularization, anterior infarction, left ventricular systolic function and mitral regurgitation.

Results: AF developed in 35 of 860 (4.1%), 12 of 136 (8.8) and 49 of 456 (10.7%) patient with normal diastolic function, impaired relaxation, and advanced diastolic dysfunction, respectively ($P < 0.0001$). Kaplan-Meier curves for the development of AF in the 3 study groups are shown in the Figure. After adjustments in a Cox model, compared with patients with normal diastolic function, the adjusted hazard ratio for AF was 1.6 in patients with impaired relaxation (95% CI 0.8-3.1; $P = 0.17$), and 2.6 (95% CI 1.6-4.1; $p < 0.0001$) in patients with advanced diastolic dysfunction.

Conclusions: In a large cohort of patients with AMI, the presence of advanced diastolic dysfunction was independently predictive of new-onset AF.



Surgery for Ischemic Mitral Regurgitation: Should the Valve be Repaired?

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Introduction: Patients with ischemic cardiomyopathy undergoing CABG often have concomitant mitral regurgitation (MR). Repairing the valve at the time of surgery is not universally accepted. We compared results of CABG with or without mitral valve annuloplasty (MVA) in patients with reduced LV function and ischemic MR.

Methods: There were 195 patients with moderate or severe LV dysfunction and moderate or severe MR: 108 underwent isolated CABG, 87 CABG with MVA. Endpoints included survival, degree of MR, and NYHA class. **Results:** Patients in the repair group had more severe cardiac pathology: severe LV dysfunction in 45% vs 26% ($p=0.006$) and severe MR in 82% vs 14% ($p<0.001$). Operative mortality was 9% and similar in both groups. Mean follow-up was 66 months and available in 97%: overall, no improvement was seen in LV function, symptomatic improvement was more pronounced in the repair group ($p=0.006$), and residual MR was present in 23% of the repair group and 64% in the CABG only group ($p<0.001$). For the repair group and non-repair groups respectively, 5 and 10 year survival was 66% and 47% vs 73% and 40% ($p=ns$). By multivariate analysis, neither degree of MR nor LV function at follow-up had any impact on survival.

Conclusions: For patients with reduced LV function undergoing CABG, the addition of MVA does not increase operative risk. Although patients in the repair group were sicker, there was better symptomatic improvement, and they attained similar survival. We recommend performing MVA at time of CABG in patients having MR associated with reduced LV function.

Mitral Valve Repair-Is Post operative Anticoagulation Really Indicated?

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In order to prevent post operative thromboembolism, the current European and ACC/AHA task forces recommendation is to administer oral warfarin anticoagulation for three months following mitral valve repair operation. The aim of this study is to assess the validity of this practice. Between 1.1998 and 8.2009, 250 consecutive patients underwent mitral valve repair operation in a single institution. Of them, 240 were discharged alive. The decision to administer warfarin was based on surgeon's preference. One hundred and thirty four patients who did not receive warfarin were compared to 106 who did. The primary study endpoint was survival and the incidence of thromboembolism.

The baseline patients' profile of the study groups was similar. The survival was similar between the patients who received warfarin and those who did not (5.6 ± 2.5 years vs. 4.5 ± 1.3 years respectively $p=NS$). During the follow-up period, 10 patients in the warfarin group (9.4%) experienced thromboembolic complications in comparison to 14 patients (10.4%) in the group who did not receive warfarin ($p=0.87$). During the first three months following the operation, none of the patients who were treated with warfarin experienced thromboembolic complications comparing to four patients (2.9%) who were not treated with warfarin ($p=NS$).

In our study, the incidence of post mitral valve repair thromboembolic complications was not significantly different whether patients were treated with oral warfarin or not. A prospective randomized trial is indicated.

1550388

Prolonged ICU Stay After Cardiac Operations

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Introduction: Clinical profile and post-operative events after open-heart surgery often dictate a prolonged (>30 days) stay in the intensive care unit. We examined the clinical, surgical, and post-operative profile of patients with prolonged ICU stay, to try and determine predictors for prolonged ICU stay and operative mortality.

Methods: Between 1993 and 2009, 5961 patients underwent cardiac surgery in our department. Of these, 155 (2.6%) had an ICU stay greater than 30 days (study group). A retrospective analysis was performed to compare these patients to those under 30 days (control) to try and determine predictors for adverse outcomes.

Results: Study group patients were older, had more extensive co-morbidity as well as more advanced cardiac morbidity. Predicted (logistic Euroscore) and observed mortality was 25% and 48% compared to 9% and 5% for the study group and control group respectively. By multivariate analysis, clinical predictors for prolonged ICU stay were female gender, COPD, re-operation, non-pure CABG surgery ($p<0.0001$). Stroke and sepsis were the strongest post-operative events ($p<0.0001$). Predictors for mortality by multivariate analysis were critical pre-operative state, female gender, and renal failure ($p<0.0001$). The main cause of death was non-cardiac in the study group and cardiac in the control group ($p<0.0001$).

Conclusions: Patients requiring prolonged ICU stay have more severe cardiac and non-cardiac morbidity. Mortality in these patients is high, and higher than predicted by the Euroscore. Many of the predictors for mortality in these patients are not expressed in the Euroscore. Modes of death were different in these patients compared to those with a short ICU stay.

1550490

HeartMate II LVAD as a Destination Therapy: The Beilinson Experience

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Objectives: Left ventricular assist devices (LVAD), used in the setting of destination therapy, for patients with deteriorating severe heart failure are continuously developing. The second generation, the axial flow pumps, have been introduced since some years.

Results: Six patients with end staged ischemic cardiomyopathy were implanted with the HeartMate-II. All patients were in severe left and right heart failure and were considered non transplantable at time of LVAD implantation. Two patients died early after surgery, 1 from sepsis secondary to empyema, and 1 due to multiorgan failure secondary to right ventricular dysfunction. The 4 remaining patients are alive 3 – 15 months following surgery. Quality of life improved in all survivors. One patient developed cerebellar stroke with gradual improvement. This patient also had drive line infection and had episodes of bacteremia. One patient who had severe pulmonary hypertension developed chronic fistula from mediastinum to skin and is currently under chronic antibiotic therapy. His pulmonary pressures decreased dramatically and he was listed for transplantation. Another patient with severe preoperative pulmonary pressures, had a decrease in his pulmonary pressures that made him a good transplant candidate, however the patient refuses transplantation and prefer the assisted circulation.

Conclusions: In these severely ill patients, the use of HeartMate II continuous-flow LVAD for long-term support improve quality of life and offers a good chance of surviving, although not complications free.

Surgical Treatment of Massive Pulmonary Emboli

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Background

Massive pulmonary embolism (MPE) is an infrequent but devastating clinical event which carries high morbidity and mortality. Treatment of MPE is controversial in the clinical literature. Surgical pulmonary embolectomy is one of the treatments available for unstable patients. The purpose of this study was to evaluate our early, mid, and long term results after pulmonary embolectomy.

Methods

Between November 1999 and March 2009, 13 patients (mean age 53.8 ± 16.14 years) diagnosed with a MPE were operated in our department emergently. The indications for surgical intervention were: hemodynamic instability, right heart failure (RHF; per echocardiography), respiratory failure, and massive PE diagnosed by CT angiography. All 13 patients had an embolism involving the main pulmonary branches. Nine of the patients arrived after cardiopulmonary resuscitation (CPR) and eight were intubated and ventilated prior to entering the operating room. All procedures were performed using extracorporeal circulation, 4 on a beating heart (without aortic cross-clamping). All surviving patients were followed and reported their medical condition in a telephone survey.

Results

Average bypass and cross-clamp times were 82.76 ± 37.41 (40-158) and 38.66 ± 22.7 (20-91) minutes, respectively. Time interval between diagnosis and start of surgery was 14 ± 16.99 (2-62) hours. Postoperative length of stay was 12.2 ± 6.18 (4-23) days. Short-term mortality occurred in three (23%) patients; causes of death were anoxic brain damage (1), AMI (1), and RHF(1). Long-term mortality occurred in two patients, one from heart failure and one from oncological disease two years later. The remaining 8 patients were in a good general condition at long-term follow-up. Six were being treated with anticoagulation for life, and two were on Aspirin only.

Conclusions

Emergent pulmonary embolectomy proved to carry a relatively good short and long term survival even in very high risk patients.

Tricuspid Valve Repair: Predictors of Late Failure

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Background: Tricuspid valve repair is a common adjunct to other procedures in cardiac surgery due to the appreciation that significant tricuspid regurgitation (TR) is associated with right heart failure and significant morbidity and mortality. The purpose of this study was to assess the durability of tricuspid valve repair during follow up.

Patients and Methods: Between January 2000 and November 2009, 204 patients with a mean age of 63 ± 13 years underwent tricuspid valve repair in addition to several other cardiac procedures (Mitral valve-85%, Aortic valve-21%, CABG-25%). All patients had echo preop, postop and at follow up. Ring annuloplasty was used in all patients (classic Carpentier Edwards-96%, Cosgrove-3%, Duran-1%). Median ring size was 32.

Results: Preop severe TR was present in 63% of patients. Immediately postop moderate to severe TR was present in 2% of patients. Follow up severe TR was present in 7.5% of patients. RV function, pulmonary pressure, degree of TR, ring type, procedures performed and diagnosis were assessed as probable predictors of follow up severe TR. Only immediately postop moderate to severe TR was identified as independent predictor of late severe TR. No predictors of immediately postop moderate to severe TR were identified. In-hospital mortality was 4% and 1 and 5 years actuarial survival were 90% and 73%, respectively.

Conclusions: Tricuspid valve repair with ring annuloplasty is a durable procedure. Late failure of the repair is related to suboptimal immediate postoperative results.