Emergency PCI Therapy in 1336 Consecutive Patients with STEMI: Mortality Insights from the a Large Single-center Registry

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Background and Aims: Because cumulative evidence has demonstrated that rapid primary percutaneous coronary intervention (PCI) is the most effective reperfusion strategy for acute STEMI, the development of integrated system providing full time coverage for primary PCI is suggested. Some of the large and high volume hospitals implemented full time coverage for emergency PCI. In this study we report our experience in implementing "around the clock" coverage for primary PCI in a 1336 consecutive pts with STEMI.

Methods: We used our clinical database consisting of all pts treated using emergent PCI for AMI between 1/2001 and 10/2007. Clinical, procedural and angiographic results and 30 days mortality were analyzed.

Results: 1336 pts with STEMI mean age 61 ± 13 years [range 24-101] were included. PCI was successful in 94% of non-shock pts and in 84% of shock pts. Mortaility results distinguished by the categories are shown in the Table as follow:

Mortality	One month	Six months	One year
Non cardiogenic shock [n=1224]	3.5%	5.9%	7.7%
Cardiogenic shock [n=112]	55%	60%	64%
Non cardiogenic shock			
Age>75years [n;207/1017]	8.2%/2.3%*	16.2%/3.8%*	19.4%/8.8%*
Female/Male [n; 242/982]	6.2%/2.9%*	10%/4.9%*	13.2%/6.2%*
Rescue PCI [n;47/1177]	4.3%/3.5%	4.3%/6%	6.4%/7.7%
Anterior AMI [N=584]	4.6%	7.7%	10%
Right ventricular AMI [N=117]	7.7%	10.6%	11.5%
GFR (<60 mL/min/1.73 m^2) [n; 173/995]	9.8%/2.3%*	16.3%/3.8%*	19.6%/5.1%*
Day/Night [n;713/497]	4.4%/3.0%	7.4%/4.9%	9.3%/6.6%
Weekend [n;321/903]	5.3%/2.9%*	7.8%/5.3%	10.2%/6.7%*
Failed PCI [n;75/1149]	17.3%/2.6%*	21%/5%*	24%/6.6%*

* $p<0.05$

Conclusions:

1. Cardiogenic shock still remains an important cause of mortality in STEMI with most mortality occurs in the first month.

2. Female gender, MI location, renal function, "off-hours" admission, and failure to restore normal coronary flow 3 are important prognostic factors.

Impact Sub-clinical Renal Dysfunction on One Month Mortality of Patients with STEMI with Cardiogenic Shock Undergoing Primary Angioplasty

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Background: Acute myocardial infarction complicated by cardiogenic shock is associated with an exceedingly high mortality, even if patients are treated with early reperfusion therapy. Risk stratification of these patients before undergoing primary angioplasty is important in order to predict outcomes and to delineate targeted therapeutic strategies. Current knowledge of predictors of death is limited.

Aims: The aim of this study was to evaluate the impact of sub-clinical renal failure on one month mortality of a cohort of consecutive patients with cardiogenic shock treated with primary percutaneous coronary intervention (PCI).

Methods: We used our database of consecutive patients treated by primary PCI for AMI performed between 1/2000–10/2007. A total of 1336 procedures were registered, of these 112 (8.4%) were performed in patients with cardiogenic shock. In this analysis we included pts with normal serum creatinine [<1.5mg%]. Pts were stratified according to GFR values at admission: GFR <60 mL/min/1.73 m^2.

Results:

	GFR>60 mL/min/1.73 m^2) N=46	GFR≤60 mL/min/1.73 m^2) N=13	P
Age (yrs)	64±12	77±8	0.001
Male	74%	31%	0.004
Anterior AMI	48%	54%	.7
DM	26%	38%	0.4
2 or 3 vessel disease	67%	77%	0.4
SBP [mmHg]	89±22	83±23	0.4
Anti GP 2B/3A use	33%	54%	0.2
Post PCI TIMI 3	87%	100%	0.4
Mortality			
1 month mortality	28%	77%	0.001
Six months mortality	31%	92%	0.009

In a multivariate analysis adjusted for age and gender, GFR≤60 mL/min/1.73 m^2) [OR=1.8, 95% CI=1.04-3.0, P=0.03] was a significant independent predictors of one month mortality.

Conclusion: Sub-clinical renal failure even with "normal" serum creatinine is an important risk factor for mortality in patients undergoing emergency PCI for acute myocardial infarction in the presence of cardiogenic shock.

Trends in Management and Outcome of Women and Men with STEMI in Israel in the New Millenium

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Background: Major modifications in therapies have been introduced in the management of patients with STEMI in the last decade, leading to a decline in mortality.

Aim: To evaluated trends in management and their impact on outcome of women (W) and men (M) with STEMI, in the new millenium.

Methods: 840 W and 2868 M with STEMI hospitalized in 26 CCU's in Israel during the biannual ACSIS 2000-2006 surveys were assessed.

Results: W comprised 21-25% of cohorts, mean age 69-72 vs. 59-61 yrs in M.

Year	Women (n=840)				p-for trend	Men (n=2868)				p-for trend
	2000	2002	2004	2006		2000	2002	2004	2006	
No. of pts	219	211	229	181		727	744	703	694	
Ac. Reperfusion (%)	51	52	56	54	0.36	62	63	66	57	0.13
TLx /PPCI (%)	78/22	58/42	31/69	22/75	<0.0001	83/18	56/44	34/66	23/73	<0.0001
Angiography (%)	49	60	73	81	<0.0001	56	74	86	91	<0.0001
PCI (%) of angiography	70	84	86	89	<0.0001	75	83	85	88	<0.0001
Medications @48h:										
Aspirin (%)	94	91	98	97	0.007	97	96	98	98	0.014
b-blockers (%)	59	71	80	78	<0.0001	66	76	85	84	<0.0001
ACE-I/ARBs (%)	57	65	71	76	<0.0001	57	66	75	80	<0.0001
Statin (%)	29	47	74	91	<0.0001	31	60	78	95	<0.0001
Clopidogrel (%)	14	44	71	78	<0.0001	19	52	80	87	<0.0001
*SCORE (4,5)	18	46	73	83	<0.0001	22	56	79	89	<0.0001
30-day Mortality (%)	20.5	13.7	12.2	8.3	0.0004	8.7	5.2	5.5	4.9	0.003
OR$_{adj}$ (95% CI)†	1.0	0.55 (0.39-0.24)	0.40 (0.22-0.71)	0.23 (0.11-0.46)		1.0	0.39 (0.24-0.64)	0.56 (0.34-0.89)	0.51 (0.30-0.84)	

*SCORE (4,5) management with ≥4 evidence-based medications(either aspirin, b-blockers, ACE-I/ARB, statins, or clopidogrel.

†Adjusted for: age, Killip (admission)≥II, Anterior MI, heart-rate>100bpm, SBP<100mmHg, history of diabetes, hypertension, angina, renal failure, year performed.

Conclusions: In both sexes the management of pts with STEMI changed substantially during the last years. The high degree of implementation and adherence to recommended guidelines was associated with a significant decline in early mortality.

Patients with Diagnosis of ST-elevation Myocardial Infarction not Treated with Reperfusion: Clinical Characteristics, Causes, and Short-term Outcome

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Background. According to registries and surveys about 30% of patients with diagnosis of ST-elevation myocardial infarction (STEMI) do not receive reperfusion therapy (RRx), neither primary PCI nor thrombolysis. The reasons for this phenomenon ("reperfusion paradox") are ill-defined.

Aim. To study clinical characteristics, reasons for omitting RRx and outcome of STEMI patients who did not receive RRx.

Patients. Source of data: Rambam Intensive Cardiac Care (RICCa) database. Study period: 01.01 – 31.12.2004.

Results. During the study period 327 patients were hospitalized with diagnosis of STEMI. We identified 80 (24%) patients who did not receive RRx; mean age 65$\pm$13. In-hospital mortality in entire cohort was 16%. Patient's characteristics presented in the table 1; reasons for not recieving RRx and outcome – in table 2.

Table 1.

	Number of patients (%)
Female gender	22 (28)
Diabetes mellitus	24 (30)
Previous MI	13 (16)
Previous PCI	8 (10)
Previous CABG	3 (4)
Cardiogenic shock on admission	12 (15)

Table 2.

Reason for not recieving RRx	Number of pts (%)	In-hospital mortality (%)
Late admission (>12 hrs)	41 (51)	9
Early ST-elevation resolution	16 (20)	0
Very elderly (≥90 years old)	3 (4)	0
Death before RRx	4 (5)	100 (by definition)

Conclusions. Late admission is the main reason for not receiving RRx. After exclusion of patients who died shortly after admission, patients with early ST-segment resolution and late comers, the proportion of patients in whom omitting RRx seems inappropriate is small (6%).

Enhanced Basal and Exertional Isometric Diastolic Function in Resistance Training Athletes

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Background: It is widely accepted that individuals involved in sports characterized by intense resistance training present with an increased absolute left ventricular (LV) wall thickness and mass and show a good systolic response to isometric exercise. Despite these well-established characteristics, there is no consensus regarding the diastolic features; rest diastolic function was described to be either normal, improved, or even diminished. Moreover, no information is available regarding diastolic function in athletes during isometric exertion itself. Therefore, our aim is twofold: 1) to assess the basal diastolic left ventricular function in athletes engaged in resistance training, and, 2) to evaluate the exercise-induced modifications in diastolic function while performing isometric exercise in these athletes, as compared with healthy untrained individuals.

Patients and Methods: The population consisted of 96 men (mean age 29 ± 7 years): 48 weightlifters (W) who trained 15-20 hours/week and 48 sedentary (S), not engaged in any kind of routine training. All weightlifters had been active for >6 years, including the 6 months prior to the study. Ultrasound was performed using a commercially available echocardiographic Doppler system. Isometric exercise was performed in the supine position using a standard 2-hand bar dynamometer, i.e. a telescopic bar designed to be stretched simultaneously by both hands, determining the force in kilograms on a linear scale.

Results: End-diastolic volume at rest was 97 ± 6 ml in S and 101 ± 5 in W, augmenting to 100 ± 6 and 118 ± 11 at exercise ($p=0.06$ and $p<0.01$, respectively). End-systolic volumes at rest were similar in both groups, showing a significantly greater reduction during exercise in the weightlifters. Absolute LV mass was 167 ± 30 g in S and 202 ± 32 in W ($p<0.0001$). Stroke volume increased from 65 ± 7 to 86 ± 7 ml in S and from 70 ± 6 to 107 ± 11 in W (intergroup significance $p=0.05$ and $p<0.01$, respectively). A similar pattern of response was documented for ejection fraction, i.e. a significantly greater increase during exercise for the W group. Doppler diastolic indexes were peak early velocity (PEV, cm/s), peak atrial velocity (PAV, cm/s), early-to-atrial velocity ratio (EAR), acceleration time (AT, ms), acceleration rate (AR, cm/s/s), isovolumic relaxation time (IRT, ms), deceleration time (DT, ms) and deceleration rate (DR, cm/s/s). Out of these indexes, in the W group rest PEV was 68 ± 7, EAR 1.8 ± 0.2, AR 1242 ± 176 and DR 414 ± 44. All these values were significantly higher than those in the S group, with further increase during exercise ($p<0.0001$). Rest PAV in W group was 37 ± 6, AT 55 ± 4, IVR 63 ± 3, and DT 164 ± 4; these values were lower than in S group ($p<0.0001$ for all).

Conclusions: These data demonstrate that despite their markedly increased LV mass, diastolic function in resistance athletes remains normal and even better than in healthy sedentary men. Whilst rest systolic function was similar in both groups and presented only weak differences at exercise, athletes' LV diastolic function at rest and while exercising exhibited significant quantitative differences, noticeably distinguishing them from their sedentary counterparts.

Attenuation of the Expression of Matrix Metalloproteinases (MMPs) in Coronary Thin Cap Fibroatheromas (TCFAs) by Valsartan Alone or in Combination with Simvastatin

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Background: We investigated the effect of Valsartan (V) alone or in combination with Simvastatin (S), on the gene expression of MMP-2 and -9, as well as their tissue inhibitors (TIMP-1 and -2) in coronary atherosclerotic plaques.

Methods: 12 streptozotocin-induced diabetic, hyperlipidemic swine were allocated into 3 treatment groups: placebo (P, n=4), V (n=4), and VS (n=4) and followed-up for 30 weeks. Coronary arteries (n=31) were harvested at the end of this period and 156 subsegments of interest were identified, cryosectioned, analyzed for the expression of MMP- 2, -9, and TIMP-1, -2 by real-time PCR, and examined by histology and immunohistochemistry. Intima/media ratio, minimum fibrous cap thickness, lipid deposition and inflammation were quantified, and lesions were histopathologically classified into minimal, intermediate, or TCFAs. The MMP-2/TIMP-2 and MMP-9/TIMP-1 ratio were assessed as measures of matrix degrading activity.

Results: Blood pressure, serum cholesterol and glucose were similar between the treatment groups. Compared to P, VS significantly reduced the levels of MMP-2 (Fig A), and the MMP-2/TIMP-2 ratio (Fig B) in TCFA. MMP-9 levels were reduced in both treatment groups (V, VS) but not significantly. These effects were regardless of the lipid lowering effects of S.

Conclusion: Treatment with VS significantly reduces the expression of MMP-2 (Fig A), in TCFAs, thereby suggesting it may have a role in attenuating the matrix degrading activity.

Correlated Expression of D-Dimer Concentrations with Thrombotic Burden in Acute Pulmonary Embolism

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Objective: Thrombotic burden might have an influence on the concentration of D-Dimer in patients with acute pulmonary embolism (PE). The correlations of the concentrations of D-Dimer with the pulmonary artery occlusion score (PAOS) in a cohort of patients with acute PE was assessed in this study.

Methods: We have studied the correlation between the concentrations of D-Dimer and the PAOS in a group of 75 patients who presented to the Department of Emergency Medicine with a clinical picture suggestive for acute PE and had a positive pulmonary CT angiography.

Results: A significant ($P<0.001$) correlation ($r=0.42$) was noted between the concentration of D-Dimer and the PAOS in this group of 75 patients with acute PE. We have further divided the cohort into those who had a score below the median of 18 (n=37) and those who had a score above the median (n=38), the corresponding mean concentrations of D-Dimer being 364 and 814 ng/ml as opposed to a concentration of 285 ng/ml that was observed in the group of controls (n=73). In addition, in the ROC curves that were performed in order to differentiate between the presence or absence of PE, those who had the low score turned to be non significant (area under the curve 0.595 as opposed to 0.835 [$p<0.001$] for the group with the high score).

Conclusions: Patients with acute small PE might present with relatively low concentrations of D-Dimer. These findings might have implications regarding the diagnostic yield of D-Dimer in patients who are suspected of having acute PE.

Calcification of the Thoracic Aorta as Detected by Spiral Computed Tomography among Stable Angina Pectoris Patients: Association with Cardiovascular Events and Death

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Background: Calcification of the thoracic aorta is associated with atherosclerotic risk factors, yet its pathogenesis and clinical implications are not yet elucidated. The goal of the present study was to assess whether thoracic aorta calcification is associated with an increased risk of cardiovascular events and death, in patients with stable angina pectoris.

Methods: A prospective cohort of 361 stable angina pectoris patients (307 men and 54 female, age ranged 37-83 years) underwent chest spiral computed tomography and were evaluated for aortic calcification. We recorded the prevalence of cardiovascular events and death during a 4.5-6 year follow-up.

Results: Aortic calcification was documented in 253 patients (70% of patients, 213 men, 40 women, mean age 65 ± 7). Patients with aortic calcification were older ($p<0.001$) and fewer were classified as smokers (13% vs. 26%, $p=0.014$) in comparison to patients without aortic calcification. Significant correlation was found between patients with aortic calcification to those without for the presence of aortic valve calcification (28% vs. 11%, $p<0.001$), mitral annulus calcification (29% vs. 4%, $p<0.001$) and coronary calcification, as expressed by coronary calcium score ($p<0.001$). During a 4.5-6 years of follow-up, 19 patients have died, all of which were in the aortic calcification group. Age adjusted O.R. for total events, cardiovascular events and for acute MI, by aortic calcification, were 3.19 (95% C.I. 1.60-6.36), 2.82 (95% C.I. 1.30-6.11) and 5.62 (95% C.I. 1.73-18.27) respectively. Multivariate adjusted odds ratio for all events in patients with aortic calcification as compared to no calcification was 1.73 (95% C.I. 0.64-4.67, $p=0.27$), 3.74 (95% C.I. 1.71-8.18, $p=0.001$) and 3.22 (95% C.I. 1.50-6.90, $p=0.003$) for calcification of ascending aorta, descending aorta and both respectively.

Conclusions: Calcification of the thoracic aorta is age related and associated with coronary calcification as well as valvular calcification. Thoracic aortic calcification is associated with an increased risk of death and cardiovascular disease.

Timing of C-Reactive Protein Increment in Acute Traumatic Stress. Relevance for CRP Determinations in Acute Cardiovascular Events

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Objective: To evaluate whether acute stress of few hours duration is capable to increase the concentration of C-reactive protein (CRP), a valuable biomarker in patients with acute myocardial infarction or stroke.

Methods: We measured the concentration of CRP in patients who presented with an acute fracture and in whom we can assume that the CRP concentrations prior to the event were within the normal limits.

Results: There were 20 patients with bone fractures and 20 gender and body mass index (BMI) matched controls at the respective mean+SD age of 52+27 and 51+21 years. The patients were examined at a mean+SD of 3.2+2.5 hours from their actual trauma and presented a modestly elevated concentrations of CRP (2.7+2.1 mg/l) as compared to the controls (2+2.2 mg/l). No difference was noted in the CRP concentration of 10 patients who presented earlier than the median of 2.5 hours (2.8+2.1 mg/l) and in those who presented later than that (2.8+2.1 mg/l). At the same time, the expected increment in the white blood cell count was noted in the patients (12.4+3 $\times 10^3/\mu L$) as opposed to the controls (7.1+1.9).

Conclusions: We conclude that the expected increment in CRP within few hours from the onset of acute traumatic stress is modest. The findings are relevant for stressful conditions of acute myocardial infarction and stroke who present within few hours and in whom elevated CRP levels might represent the causative inflammation and are not necessarily a results of the acute stress/infarction per se.

Erythrocyte Aggregation is Associated with Erectile Dysfunction in Men with Ischemic Heart Disease

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Introduction: Endothelial dysfunction and atherosclerosis have a significant role in the pathophysiology of erectile dysfunction (ED) and ischemic heart disease (IHD). Erythrocyte aggregation is one of the main factors affecting blood viscosity. However, the role of enhanced erythrocyte aggregation in the pathophysiology of ED and IHD has never been studied.

Methods: A total of 119 men underwent coronary angiography and filled the Sexual Health Inventory for Males questionnaire (SHIM). Excluded were men with acute coronary syndromes and men with recent or chronic inflammation. Erythrocyte aggregation was evaluated by a computer filming slides of blood smear and calculating the erythrocyte percentage (EP), i.e. the field that was covered by erythrocytes. High EP represented low erythrocyte aggregation. SHIM scores 21 or less represented ED.

Results: Included were 62 men, mean ages 61.0 ± 11.9 years. Mean SHIM scores were 15.5 ± 8.1 and the mean EP was $70.9 \pm 14.7\%$. EP was associated with SHIM scores ($r=0.4$; $p=0.001$) for the whole cohort. After dividing the cohort into four groups: men with no ED and no IHD ($n=6$), men with ED but no IHD ($n=9$), men with both IHD and ED ($n=40$), and men with IHD but no ED ($n=7$), EP was significantly higher in the last group compared with the other ($69.7 \pm 8.7\%$, $68.6 \pm 16.6\%$, $69.0 \pm 14.6\%$, and $86.4 \pm 7.1\%$, respectively; $p=0.02$).

Conclusions: Increased erythrocyte aggregation is associated with ED. Men with IHD and normal erections have decreased erythrocytes aggregation. This finding may be the first step in establishing therapeutic intervention in order to prevent ED in men with IHD.