Impact of Elevated Admission White Blood Cell Count on Outcomes of ST-Elevation Acute Coronary Syndrome Patients Treated with Primary Percutaneous Intervention.

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Background: Elevated white blood cell (WBC) count on admission in pts with ST-elevation acute coronary syndrome (STE-ACS) has been associated with adverse prognosis. Little data are available on the relationship of WBC count to outcome in STEMI patients treated by primary percutaneous intervention (PPCI).

Aims: To examined the association of WBC counts on admission with clinical outcomes after PPCI in STEMI.

Methods and Results: We analyzed consecutive STE-ACS pts without cardiogenic shock after PPCI. The 1027 pts were divided into 3 groups according to WBC count determined on admission: 1) < 10,000, n=319 (31%) pts; 2) 10,000-20,000, n=651 (63%) pts; 3)> 20,000, n=57 (6%) pts. Pts with elevated WBC were more often smokers, without previous history of myocardial infarction. They presented more often with anterior STEMI location, and higher killip class. Peak CK and the left ventricular dysfunction as well as the Cadillac score, denoting increased risk, were significantly higher in pts with elevated WBC. There was no difference in prevalence of other risk factor, extent of coronary disease, and procedural success.

Outcomes:

Variable	***<10,000***	***10-20, 000***	***>20,000***	***P value***
MACE*	6.8%	8.6%	13.5%	0.02
30-days mortality	**0.9%**	**3.5%**	**14%**	**0.000**
Stent thrombosis	2.5%	2%	1.8%	0.8

* Composite of mortality, re-infarction and re- PCI

In multivariate analysis adjusted to the Cadillac risk score, pts in groups 2-3 had almost four-fold greater risk of mortality, as compared with groups 1 (OR 3.8; CI 1.9-7.5, p=0.0001).

Conclusion - Baseline leukocytosis [simple and easy obtained measure] is an independent correlate of increased mortality after PPCI in STEMI. Our findings suggest that the WBC count should be considered an important prognostic factor in patients with STEMI treated by PPCI.

Intra-Aortic Balloon Pump Counter-Pulsation Improves Coronary Flow and Recovery of Left Ventricular Systolic Function after Primary Angioplasty in Patients with Suboptimal Microcirculation

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Coronary artery Doppler velocities reflect coronary flow and their patterns correlate with function of the microcirculation and may allow assessment of pumping efficacy after intra-aortic balloon pump counter-pulsation (IABP) after primary angioplasty. Aim: Evaluation of the effects of IABP on left anterior descending coronary artery (LAD) velocities and recovery of left ventricular ejection fraction (LVEF) in patients with acute anterior ST-elevation myocardial infarction (STEMI) after primary angioplasty and suboptimal flow. Methods: twenty eight patients with acute anterior STEMI who had primary angioplasty and suboptimal flow were evaluated. In eleven IABP was applied. Results: Transthoracic Doppler sampling of LAD velocities was feasible and diastolic LAD deceleration time was less than 600 msec in all. Diastolic LAD peak velocities of pumped beats, 73±28 cm/sec were higher than those of non-pumped beats, 34±11 cm/sec, p=0.00075. Diastolic time velocity integrals of pumped beats 14.7±6.5 cm were higher than non-pumped beats, 7.3±3.1cm, p=0.0047. Diastolic LAD flows of pumped beats 60±47 ml/min were higher than without pumping, 28±19 ml/min, p=0.05. Baseline LVEF in subjects with IABP 29.4±5.7% was less than that in those without, 36.4±7%, p=0.05. One week after angioplasty, LVEF in IABP patients, 34±7%, was similar to LVEF in those without, 36.4±6.8%. In 6 (54.6%) patients with IABP LVEF increased more than 5% while only in 4 (23.5%) in those without, $p<0.05$ Conclusions: IABP increases LAD flow, as detected by transthoracic Doppler, and promotes recovery of left ventricular systolic function in patients with suboptimal microcirculation after primary angioplasty for acute anterior myocardial infarction.

Mortality Outcome of ACS Patients Treated with Bare Metal vs. Drug Eluting Stents: Insights from the National ACSIS-2004 Registry

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Background: The use of drug eluted stents (DES) in patients with acute coronary syndrome (ACS) which is primarily due to coronary atherothrombosis remains a topic for ongoing clinical investigation and long-term mortality data are still awaited.

Methods: We identified 163 patients enrolled in the ACSIS-2004 (Acute Coronary Syndrome Israeli Survey) registry who underwent PCI using DES during or soon following the course of ACS (e.g. unstable angina, non-STEMI and STEMI) and compared the clinical characteristics and mortality outcomes to 812 corresponding ACS patients treated using bare metal stents (BMS). Baseline characteristics and mortality outcomes data were obtained for all patients up to one year.

Results: The main demographic and mortality results are shown in the **Table** as follow:

	DES (n=163)	BMS (n=812)
Men	77	78
Age (yrs) *	63.6±12	61.3±12
Diabetes (%)	31	27
MV disease (%)	64	59
STEMI (%) *	39	64
Non-STEMI (%) *	61	36
Killip Class ≥2 (%)	16	16
PCI following lytics (%)	29	19
Mortality data		
30 day (%)	1.2	3.5
180 day (%)	3.1	4.8
360 day (%)	3.7	5.8

** Statistical significant difference ($p<0.05$)*

Using a logistic regression analysis model, the patients age (by 10 years increment: odds ratio=2.17 and confidence limits = 1.69-2.83; $p<0.001$) was the most powerful independent predictor for one year morality following ACS and regardless of stent category being utilized (i.e. DES vs. BMS).

Conclusion: PCI indicated for ACS is associated with comparable mortality outcomes up to one year in ACSIS-2004 cohort despite heterogeneous baseline variables which is primarily due to age at ACS onset and STEMI clinical presentation.

The Ratio of Contrast Load to Glomerular Filtration Rate (GFR) as a Predictor for Renal Dysfunction and Subsequent Mortality Following Emergent PCI for STEMI

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Background: The ratio of contrast load utilized during PCI to baseline glomerular filtration rate (GFR) has been proposed as a surrogate marker for the development of contrast induced nephropathy post elective PCI. We sought to use the ratio in order to predict the renal and cardiac prognosis among patients with STEMI who were treated using emergent primary PCI.

Methods: Data from consecutive patients who underwent PCI for STEMI at our hospital were imputed into a dedicated clinical database. We compared the clinical outcome (death, re-MI, TVR, MACE) at 6 month in patients distinguished by the ratio of contrast load utilized during PCI to baseline GFR prior to PCI.

Results*:* Results of 871 consecutive (non-shock) patients with STEMI are summarized as follow:

Contrast Volume / GFR Ratio	**0.14-1.5 (N=290)**	**1.5-2.35 (N=290)**	**>2.35 (N=290)**
Age (years)	62±10	63±12	63±11
Males (%)$^{+}$	83	86	76
Diabetes Mellitus (%)	24	23	28
Anterior MI (%)$^{+}$	37	46	56
Multivessel Disease (%)$^{+}$	46	56	70
Killip>1 (%)$^{+}$	11	10	22
Successful PCI (%)	98	98	92
Multivessel PCI (%)$^{+}$	2.4	8.6	13.8
EF<40% (%)$^{+}$	31	38	53
GFR<60 ml/min^{+}	0.7	4.8	33
In-hospital renal dysfunction (on top of baseline) $^{+}$			
	0.7	3.8	20.3
6 months outcome			
Death (%)$^{+}$	1.8	3.1	9.6
Re-AMI (%)	4.9	4.5	5.5
Target vessel revascularization (%)	8.5	8.4	8.3
MACE (death, re-AMI, TVR) (%)$^{++}$	12.3	15.3	19.6

$^{+}$p<0.05 (statistically significance) ; $^{++}$p=0.06

Conclusions*:* Our results show: 1) the ratio of contrast load utilized during PCI to baseline GFR would predict the likelihood of in-hospital renal deterioration and/or dysfunction, 2) higher contrast volume to GFR ration is associated with increased subsequent total mortality. Thus, such ratio should be utilized in order to optimize the contrast utilization adjusted for GFR during emergent PCI

On-Admission Serum Phosphate Level and Long Term Outcome in Patients with Acute Myocardial Infarction

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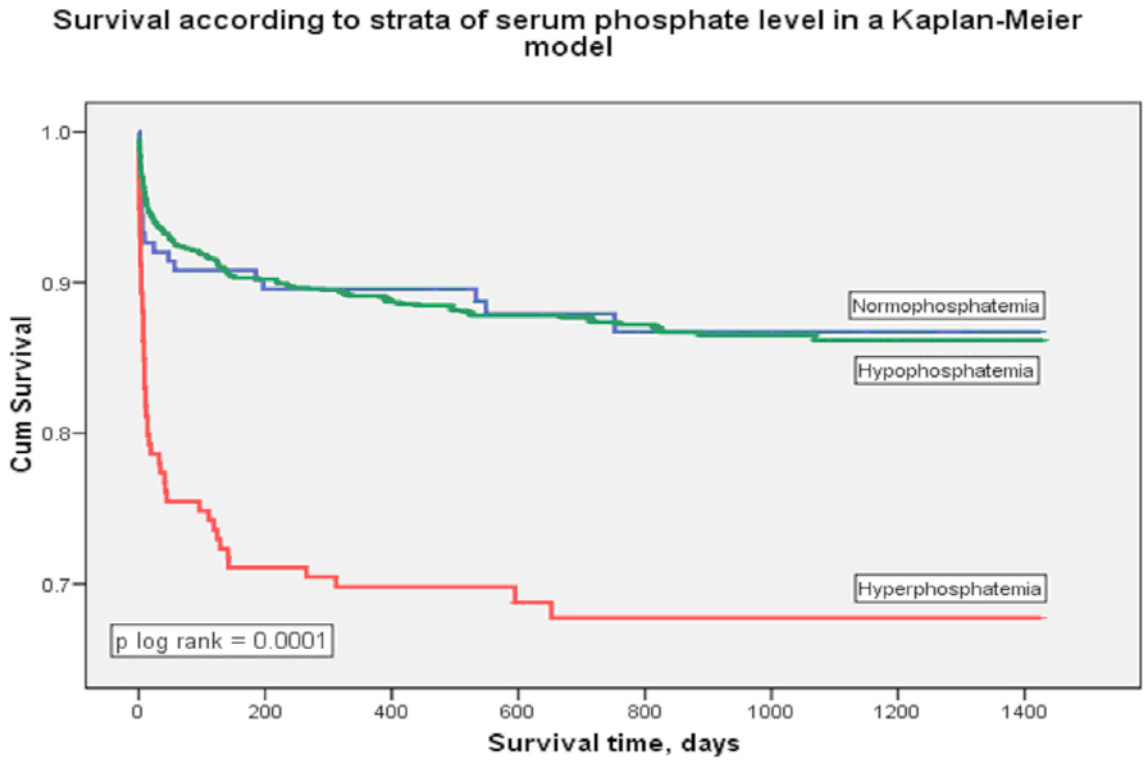
Aim: To study the prevalence and the long term prognostic significance of changes in serum phosphate in patients with acute myocardial infarction (AMI).

Methods: We prospectively studied 1746 consecutive patients admitted with AMI. Serum phosphate levels were tested 12-24 hours from admission. Mean follow-up was 24 months. Logistic regression models were used to assess the relationship between the serum phosphate levels and long term survival.

Results: On-admission 1367 (78.3%) of patients had normal serum phosphate levels, 192 (11.0%) had hypophosphatemia (<2.5 mg/dl), and 187 (10.7%) had hyperphosphatemia (>4.5 mg/dl). The overall mortality was 11.7%, 12.0% and 32.6% in normal, hypo and hyperphosphatemia, respectively (p<0.0001). After adjusting for age, gender, diabetes mellitus, ST-elevation AMI, anterior wall involvement, creatinine clearance and serum calcium levels, the odds ratio for mortality were: 0.80 (95% confidence interval [CI], 0.42-1.52) in patients with hypophosphatemia and 2.16 (95%CI, 1.35-3.48) in patients with hyperphosphatemia, as compared to those with normal levels. Figure 1 depicts the survival in the different groups in a Kaplan-Meier model.

Conclusion: Hyper but not hypophosphatemia in patients with AMI is strongly correlated to increased long term mortality. Further investigations regarding the impact of rapid correction of high serum phosphate levels on mortality are necessary.

Figure 1



The Impact of Changes in Serum Albumin Levels during Hospitalization on Long Term Mortality in Patients with Acute Myocardial Infarction

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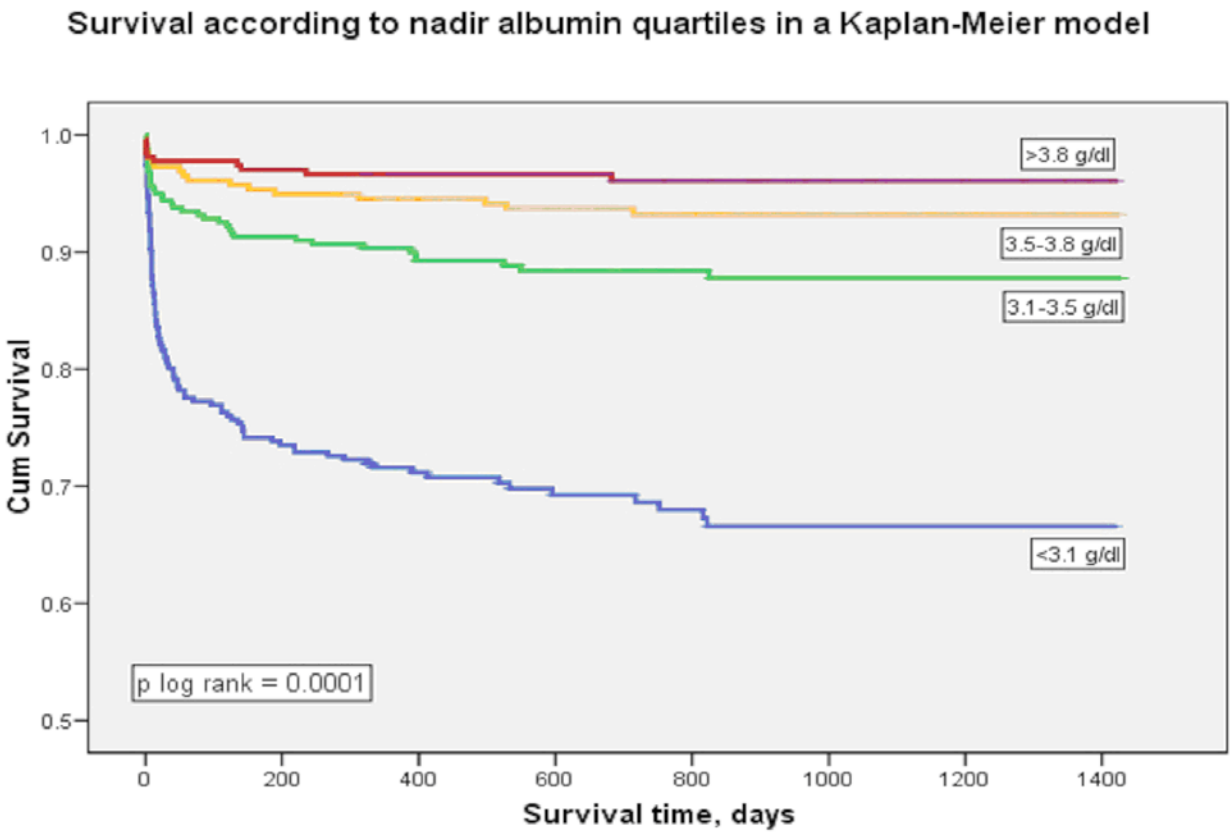
Aim: To assess the prevalence and long term prognostic significance of changes in serum albumin levels during hospitalization in patients with acute myocardial infarction (AMI).
Methods: We prospectively studied 1460 consecutive patients admitted with AMI and normal synthetic liver function. Serum albumin concentration was tested daily during hospitalization. The mean follow-up period was 24 months. Multivariate Cox models were used to assess the relationship between nadir albumin level and long term survival.
Results: During hospitalization 54.5% of study population developed hypoalbuminemia (<3.5 g/dl). The mean nadir albumin was 3.38±0.58 g/dl (median 3.5, IQR 3.1-3.8), 0.31 g/dl lower then admission levels (p<0.0001). Low nadir albumin was strongly associated with high mortality (Fig. 1). After adjusting for age, gender, diabetes mellitus, hypertension, ST-elevation AMI, anterior wall involvement, left ventricular systolic function and creatinine clearance, the nadir albumin in the lower quartile (<3.1 g/dl) remained a strong predictor for mortality (HR 3.54, 95% confidence interval 1.06-11.80).
Conclusion: The development of hypoalbuminemia is frequent during hospitalization of patients with AMI and is strongly related to an increased long term mortality.

Fig.1



Detection of Acute Myocardial Ischemia using High-Frequency QRS Analysis

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Background: Myocardial ischemia causes changes in the depolarization phase of the ECG which can be quantified by analyzing the high-frequency mid-QRS components (HFQRS). Our aim was to test this technique in detecting supply ischemia caused by prolonged intra-coronary balloon occlusions and assess the feasibility of HFQRS detection of acute ischemia using a single, unreferenced measurement.
Methods: High resolution 12-lead ECG was recorded prior to and during prolonged intra-coronary balloon occlusion in 104 patients (60±11 yo, 65 men) undergoing elective PTCA (STAFF3 database). The HyperQ™ System (BSP Ltd, Israel) was used to derive HFQRS data and ST segment levels. Indices of HFQRS based on i) relative intensity reduction and ii) ischemia-specific signal morphology without a reference measurement were examined. The area under the receiver operating characteristics (AUROC) curve was used to assess the diagnostic value of each index and to derive optimal cutoff values. ST changes were examined according to ESC/ACCF/AHA guidelines.
Results: Balloon occlusions lasted 4.4±1.3 min. HFQRS intensity index was available in 87 pts, morphological index in 64 pts and ST analysis in 99 pts. Both HFQRS indices were more sensitive than ST analysis (Table), with similar specificity for the HFQRS intensity index and ST analysis.

Index	Sensitivity	Specificity	Accuracy	AUROC
HFQRS intensity	95%*	96%	96%*	0.99
HFQRS morphology	84%*	80%	82%*	0.88
ST segment analysis	55%	95%	75%	NA

* $p<0.001$ vs. ST analysis

Conclusion: HFQRS analysis provided high diagnostic performance in detecting acute supply ischemia. In particular, HFQRS morphology index achieved high accuracy without using a baseline measurement. Thus, HFQRS analysis may aid in detecting both transient ischemic episodes and conditions of acute myocardial ischemia/infarction.

Time to Fibrinogen in Acute Coronary Syndromes

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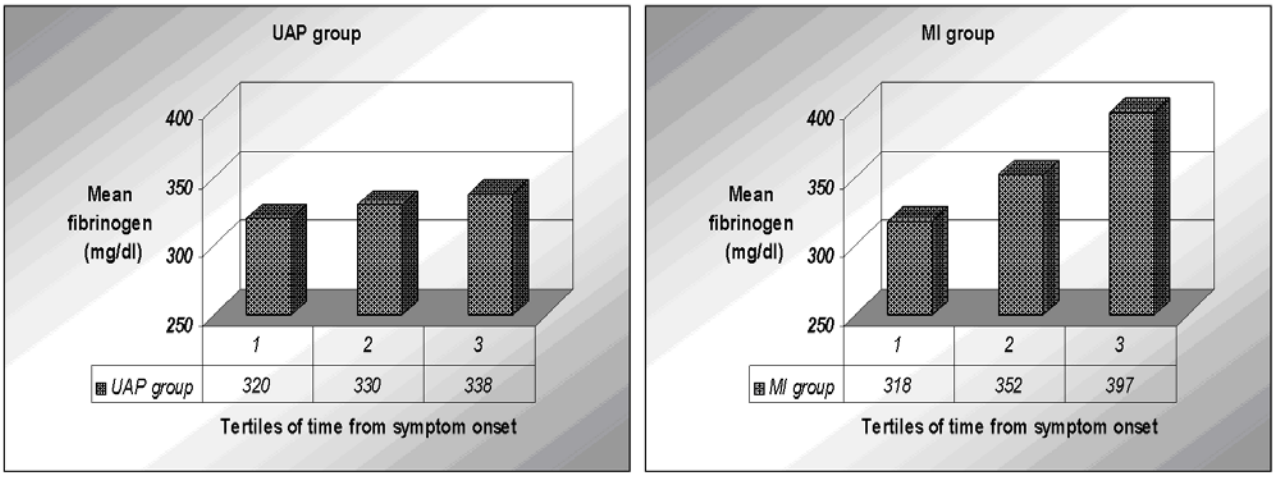
Background: Elevated fibrinogen concentrations correlate with poor prognosis in acute coronary syndromes (ACS). We presently explored the correlation between fibrinogen concentrations and the time from symptom onset to angiography.

Methods: We enrolled ACS patients during coronary angiography. Linear regression models were fitted for fibrinogen as the dependant variable and adjusted to cardiovascular risk factors and relevant medications. Anova and Kruskal Walis tests were used to determine differences between time tertiles from symptom onset.

Results: Included were 540 patients, 316 with unstable angina (UAP group), and 224 with non-ST and ST-elevation myocardial infarction (MI group). In the MI group the mean fibrinogen was 356 mg/dl and the mean time to angiography from symptom onset was 66 hours. There was a significant difference between the tertiles of time from onset of pain ($p<0.001$) and the time from onset of pain entered as a strong predictor for fibrinogen ($r=0.395$; $p<0.001$). In the UAP group the mean fibrinogen was 330 and the mean time from onset of pain to angiography was 126 hours. No significant contribution of time from onset of pain on the baseline fibrinogen concentration was noted for the UAP group.

Conclusion: Time to angiography is an independent predictor of fibrinogen concentration in MI patients. Increased fibrinogen concentrations, probably part of the acute phase response, could be detrimental in terms of increased viscosity and microcirculatory dysfunction.

Mean Fibrinogen in tertiles of time from symptom onset



Single Center Experience with Mild Therapeutic Hypothermia in ICCU

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Aim: To assess the impact of mild therapeutic hypothermia in patients admitted to ICCU after cardiac arrest and successful out-of-hospital CPR.

Methods: We prospectively studied 33 consecutive patients admitted to our institution ICCU after cardiac arrest due to VF, VT, asystole or other tachy-brady arrythmias, and who were treated by mild hypothermia together with standard intensive care treatment according to guidelines. Hypothermia was defined as a body temperature of 32-34 ºC, and achieved with the use of an external cooling device. Patients were followed-up during hospitalization.

Results: The rhythm abnormalities observed at arrival of resuscitation team were: 63.6% VF, 9% VT, 12.1% asystole and 15.3% other associated arrhythmias. Out of 33 patients studied, 14 (42.4%) patients survived the index event. Mean time duration from collapse to start of advanced life support was 9.0±5.3 minutes, with 9.4±6.0 minutes and 8.5±4.4 minutes in the deceased and discharge from hospital groups respectively. The total resuscitation duration was 36.1±10.9 minutes, with 39.9±11.0 minutes and 31.5±9.4 minutes in the deceased and discharge from hospital groups respectively. Cooling time in the group of patients who died during hospitalization was 801.1±535.4 minutes, while in the discharge from hospital group was 1011.0±560.2 minutes. The hospitalization period was 12.9±12.5 days in the succumbed patients and 16.1±5.8 days in survivors.
The most common complication observed after re-warming was pneumonia.

Conclusions: Mild therapeutic hypothermia in patients who survived out-of-hospital CPR, was effective for all causes of cardiac arrest without major complications. Our results are in line with previous reported studies.

Clinical Characteristics and Angiographic Findings of Patients with Acute Myocardial Infarction and Spontaneous Reperfusion and Comparison with STEMI Patients who Underwent Primary PCI

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Background: Spontaneous reperfusion (SR) is a well recognized phenomenon in myocardial infarction but the best approach to treating these patients has not yet been determined.

Objectives: To describe the clinical and angiographic features and prognosis of STEMI patients with SR versus STEMI patients.

Methods: Retrospective analysis of 86 patients admitted between April 1998 and December 2006 with the diagnosis of STEMI and SR and compared their baseline, event and outcome features with patients with STEMI without SR.

Results: Of the total number of STEMI patients (2756) there were 86 who met criteria of SR (group I). All patients were catheterized within 48 hours. Group II consisted of 86 consecutive patients with STEMI admitted between April and October 2006. Baseline characteristics were similar except for lower incidence of diabetes in group I (15% vs. 28% p0.037). Median time from symptom onset to ER admission tended to be shorter in group I (108 ± 87 vs. 180 ± 27 min p0.076).More patients in group I had been treated with chewable aspirin (89% vs. 64% p<0.01).Infarct related artery was patent with pre-PCI TIMI flow 3 in 95% of patients in SR group vs. 14% in group II (p <0.01).SR patients developed less myocardial damage: normal LV Function was detected in 60% of patients in group I vs. 27% in group II (p<0.01) and there was significant survival benefit in SR group at 30 days (mortality 3.5% vs. 11.6% p=0.043).

Conclusions:

1. There was excellent correlation between clinical and ECG markers of spontaneous reperfusion and patent infarct related artery with TIMI flow 3.
2. Acute aspirin treatment was an important predisposing factor for SR.
3. SR is less frequent in diabetic patients.
4. SR in STEMI is associated with smaller infarct size and a better clinical outcome at 30 days.