

Prognosis of Patients with Acute Coronary Syndromes with Elevated Troponin and Patent Coronaries

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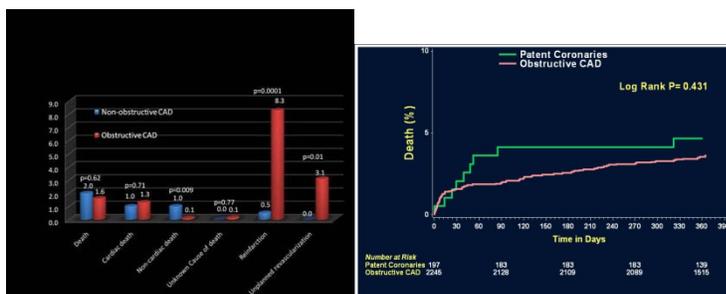
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Background: Troponin elevation is a risk factor for mortality in non ST-segment elevation acute coronary syndromes (NSTEMACS). The prognosis of ACS patients with troponin elevation and non-obstructive CAD is unknown.

Methods: Patients with moderate and high-risk NSTEMACS, presenting within 24 hours with ≥ 10 minutes of symptoms of unstable angina with elevated baseline troponin levels (>ULN) in the angiographic core laboratory substudy of the ACUTY trial, were stratified by the presence or absence of obstructive CAD (DS ≥50%).

Results: Of 2,442 patients with elevated troponins, 197 (8.8%) had non-obstructive CAD. Maximal diameter stenosis was 83.5±17.5 vs. 24.1%±12.2 (p<0.0001) in patients with vs. without obstructive CAD. Patients with non-obstructive CAD were younger (median age [IQR] =54 [45, 63] vs. 60 [52, 70], p<0.0001) and more frequently women (53.3% vs. 32.0%, p<0.0001), had lower rate of ST segment deviation ≥ 1mm (17.3% vs. 31.1%, P<0.0001), and lower TIMI risk score (TIMI 5-7: 10.8% vs. 28.8%, p<0.0001). Those with non-obstructive CAD had greater non-cardiac mortality at 1 month but the overall and cardiac mortality rates at 12 months were not significantly different (Figures 1,2). Conversely, recurrent MI and unplanned revascularization rates were significantly higher in patients with obstructive CAD. By multivariable analysis, a trend was present toward increased 1-year mortality in patients without compared to those with obstructive CAD (HR [95% CI] = 1.91 [0.91, 4.02], p=0.09).

Conclusions: Patients with NSTEMACS and elevated troponin levels but without obstructive CAD, while having low rates of subsequent MI, are still at considerable risk for 1-year mortality from cardiac and non-cardiac causes.



The Effect of Right Atrial Pressure on Survival in Patients with Acute Myocardial Infarction

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Aim: To assess the prevalence and long term prognostic significance of elevated right atrial pressure (RAP) in the early phase of hospitalization for acute myocardial infarction (AMI).
Methods: We prospectively studied 1269 patients admitted with AMI and RAP estimated by echocardiographic examination performed 24 - 48 hours from admission. Mean follow-up was 36.5 months. Cox models were used to evaluate the relationship between RAP and long term survival.

Results: Normal RAP (5 mmHg), mild (10 mmHg), moderate (15 mmHg) and severe (20 mmHg) elevated RAP were diagnosed in 870 (68.5%), 238 (18.6%), 104 (8.4%) and 57 (4.5%) patients respectively. Long term mortality according to RAP strata was 14.5%, 29.8%, 38.5% and 61.4% respectively ($p < 0.0001$). The hazard ratios (HR) for mortality in patients with mild, moderate and severe elevated RAP, as compared with normal RAP were: 2.22 (95%CI 1.66-2.97; $p < 0.0001$), 3.29 (95%CI 2.30-4.70; $p < 0.0001$) and 6.62 (95%CI 4.54-9.63; $p < 0.0001$). After adjusting for age, gender, Killip class, diabetes mellitus, ST elevation AMI, anterior wall infarction, left and right ventricular systolic function and creatinine clearance, moderate and severe elevated RAP remained a strong predictor for mortality: 1.86 (95%CI 1.17-2.98, $p < 0.009$) and 2.78 (95%CI 1.57-4.93; $p < 0.0001$) respectively.

Conclusion: The presence of moderate or severe elevated RAP in the early phase of AMI is strongly related to a worse outcome.

25-Hydroxyvitamin D Serum Levels and Acute Coronary Syndromes - A pilot study

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Background: The association between 25-hydroxyvitamin D [25(OH)D] serum levels and ischemic heart disease is controversial. Objective: To evaluate the association between serum vitamin D levels and acute coronary syndromes (ACS).

Methods: Prospective case control study of consecutive patients with ACS. Consecutive age matched non cardiac patients comprise the control group. A blood sample for 25-hydroxyvitamin D level was drawn for each patient during the first 3 days of the hospitalization.

Results: 40 ACS patients and 40 control patients were included in the study; mean age of both groups was 57 years, male gender - 82%. Patient distribution: ACS pts - unstable angina (UA) - 9, non ST elevation myocardial infarction (NSTEMI) - 14, ST elevation myocardial infarction (STEMI) - 17. Mean 25(OH)D level was 24.8 + 7.8 ng/ml, (range # - # ng/ml), 74% of ACS cases had hypovitaminosis D (<30 ng/ml). Mean 25(OH)D among ACS cases was significantly lower than the control group: 22.4 + 6.6 ng/ml vs. 27.1 +8.3 ng/ml respectively (P = 0.007) .

Subjects with hypovitaminosis D were at increased risk for ACS compared to those with normal 25(OH)D levels (odd ratio [OR], 3.9; 95% CI, 1.26-12.16; P = 0.02) using a conditional logistic regression adjustment for conventional risk factors. Subjects with deficiency levels (<21 ng/ml) were at significantly higher risk for ACS after adjusting for conventional risk factors (OR, 7.2; 95% CI, 1.8-29.06; P = 0.005). For each 1ng/ml increment in 25(OH)D level, there was a significant decrease in risk only in the NSTEMI patients (multivariable-adjusted OR, 0.828; 95% CI, 0.72-0.94; P = 0.004).

Conclusions: Hypovitaminosis D is associated with increased risk for ACS, even after adjustment for traditional risk factors for IHD. There is association between Hypovitaminosis D and NSTEMI rather than with UA or STEMI patients. Further studies are warranted.

Intermediate Intensity Glucose Control after Cardiac Surgery

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Background: Tight glucose control has become a major therapeutic goal in the ICU after cardiac surgery. It has been associated, however, with high risk of hypoglycemia. We developed and introduce in the clinical practice the new intermediate intensity glucose control protocol. Our primary objective was evaluation efficacy and safety of this protocol. Our second objective was identify risk factors for developing moderate (blood glucose < 70 mg/dl) or severe hypoglycemia (blood glucose < 40 mg/dl) after cardiac surgery and influence hypoglycemia on mortality.

Methods: A study population include of 1089 consecutive patients undergoing cardiac surgery between 1.09 2010 to 31.08 2011. Intravenous insulin drip was targeted to achieve intensive care unit (ICU) glucose levels between 80 and 150 mg/dl. Average and median glucose level, standard deviation, and hypoglycemic episodes were recorded and analyzed, together with outcomes.

Results: 793 patients (72.8%) had average postoperative glucose level 80-150 mg/dl, 236 patients (21.7%) had moderate hyperglycemia 151-180 mg/dl and 60 patients (5.5%) had severe hyperglycemia more than 180 mg/dl. At least one episode of moderate hypoglycemia less than 70 mg/dl occurred in 91 patients (8.2%) and no episodes of severe hypoglycemia (< 40 mg/dl). Total hospital mortality was 2.6% (28 patients). Risk factor for hypoglycemia was high logistic and standard EuroSCORE.

Conclusions: In our study hypoglycemia was not associated with increased mortality. It seems that intermediate intensity glucose control protocol is safe and effective.

The Impact of the Metabolic Status on Treatment and Prognosis in Patients with Myocardial Infarction

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Purpose: It has been demonstrated that hypoalbuminemia is in close relation to the inflammation status, plaque instability, hypercoagulability and reduced drug efficacy. The aim of the present study was to assess the therapeutic and prognostic significance of on-admission serum albumin levels in patients with acute myocardial infarction (AMI).

Methods: We studied 2777 patients admitted with AMI for whom albumin serum levels tested on-admission. Hypoalbuminemia was defined as a level below 3.5 mg/dl. The study population was grouped according to serum albumin level and use of invasive or conservative strategy. The mean follow-up was 36.5 months. Kaplan-Maier and Cox models were used to assess the behavior and relationship between the albumin levels, therapeutic strategy and long term mortality.

Results: Hypoalbuminemia was detected in 1064 (38.3%) patients. Of them, 457 (42.9%) had PCI, while the remainder were treated conservatively. In the normal albumin group, PCI had been performed in 968 (56.5%) patients, with the rest being treated conservatively. The crude mortality for the hypoalbuminemia/no-PCI, hypoalbuminemia/PCI, normal albumin/no-PCI and normal albumin/PCI groups were 43.0%, 19.0%, 26.7% and 7.3% ($p < 0.0001$) respectively. The hazard ratios (HR) for long term mortality for hypoalbuminemia/no-PCI, hypoalbuminemia/PCI and normal albumin/no-PCI, as compared to normal albumin/PCI groups were 9.47 (95% CI 6.79-13.20, $p < 0.0001$), 3.52 (95% CI 2.39-5.18, $p < 0.0001$) and 5.01 (95% CI 3.58-7.02, $p < 0.0001$). After adjusting for age, gender, Killip class, diabetes mellitus, ST elevation AMI, anterior wall infarction and creatinine clearance, the HR were 4.00 (95% CI 3.00-5.32, $p < 0.0001$), 2.23 (95% CI 1.62-3.09, $p < 0.0001$) and 2.79 (95% CI 2.10-3.70, $p < 0.0001$) respectively.

Conclusion: On-admission hypoalbuminemia is a marker for high risk population suffering an AMI. Despite the metabolic imbalance, an invasive strategy should be the preferred therapeutic strategy adopted.

Routine Laboratory Indices Predict Neurological Recovery after CPR in Patients Treated with Hypothermia

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Aims: To identify laboratory tests that may assist in predicting favorable neurological outcome in post cardiac arrest patients treated with therapeutic hypothermia.

Materials and methods: The data of 41 patients who had undergone therapeutic hypothermia due to sudden death and return of spontaneous circulation (ROSC) between May 2008 and November 2011 were reviewed. Patients were divided into two outcome groups depending on their Cerebral Performance Category (CPC) scale: CPC scale of 1-2 was defined as favorable outcome, CPC scale of 3-5 was defined as poor outcome. Mild TH (32-34°C) was implemented on all patients and rewarming began after 24 hours of cooling by a rate of 0.30°C per hour. We collected the values of the following variables during admission to the ICCU, during the first 72 hours since admission and one week after admission: WBC, %PMN, PLT, pH, Na, K, glucose, CPK, INR, Cr, urea, ALT, AST, troponin. The results were analyzed and compared between the two outcome groups using the student's t test and ANOVA.

Results: When comparing the two outcome groups upon admission to the ICCU the mean values of the following variables were significantly lower in the favorable outcome group as opposed to the poor outcome group: glucose (232 vs. 303 respectively, $p=0.011$) and ALT (115 vs. 204, $p=0.038$). A non-significant trend was observed in the mean values of %PMN (60% vs. 71%, $p=0.055$). When comparing the variables during the 72 hours after admission to the ICCU, the trend of the mean values of %PMN and glucose differed significantly between the two outcome groups. Furthermore, the mean values of glucose and urea were significantly lower in the favorable outcome group than in the poor outcome group. One week following admission to the ICCU, the mean values of %PMN were significantly lower in the favorable outcome group as opposed to the poor outcome group (70.3% vs. 83.2%, $p<0.001$). Mean value of WBC one week after admission was lower in the favorable outcome group as opposed to the poor outcome group (statistically non-significant trend).

Conclusion: The overall results of this study suggest that the acute stress reaction to the initial insult, as expressed by various laboratory indices, is more extreme in patients with poor neurological outcome. We thus believe that these indices may be utilized when assessing the future prognosis of these patients. Further, larger cohorts and prospective studies are warranted for validation of this hypothesis.

<IMAGE02>

Exponential Increased Utilization of Cardiac MRI in the Coronary Care Unit

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Background: In the last decades cardiac magnetic resonance (CMR) has been established as an important modality for the evaluation of numerous cardiac pathologies.

Purpose: To analyze trends in CMR utilization for coronary care unit (CCU) patients in a seven year period in a tertiary University Hospital.

Subjects and methods: Retrospective analysis of a prospectively maintained database was performed. Database (January 2004 and October 2011) was queried for: demographic data, referring department and scan indication.

Results: A total of 3557 patients (61% males) underwent CMR scans during this period. Of these, 542 patients (15%) were referred from the CCU. The number of CMR scans increased 15 fold (from 8 scans in 2004 to 122 scans in 2011); The number of patients in the CCU remained stable in this time periods; in 2004 - 5767, patients and during 10 months in 2011 4789 patients . The main clinical indications included: arrhythmogenic right ventricular dysplasia (ARVD) (3%; from 1 study to 7 studies per year), constrictive pericarditis (4%; 0 studies to 6 studies), cardiac tumors (4%; 1 study to 14 studies), dobutamine stress CMR (3%; 0 studies to 9 studies), viability (6.5%; 2 studies to 15 studies), cardiomyopathy (14%; 0 studies to 20 studies), ST elevation MI (26%; 0 studies to 32 studies) and myocarditis (38%; 2 studies to 81 studies).

Conclusions: CMR utilization in the CCU has significantly increased over the past 7 years. CMR was performed for the accurate definition of various pathologies. Of note, is the unique ability of CMR to clearly distinct between myocarditis and acute MI, which led to routine utilization of CMR for such indications. In our institution a dedicated multidisciplinary team has been established contributing to better cooperation and coordination between cardiology and cardiovascular imaging. This continuing collaboration and mutual interests contributed to the growing utilization CMR imaging.

Incidence of Clopidogrel Resistance by Vasodilator-Stimulated Phosphoprotein (VASP) in ACS

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Background: Clopidogrel is a potent platelet P2Y₁₂ receptor blocker, inhibiting ADP induced platelet activation. Its effective use after an acute coronary syndrome (ACS) is well established. Nonetheless, up to 30% of the population is reported to have preserved platelet aggregation even after high dose clopidogrel loading during ACS. The purpose of this study was to assess the incidence of clopidogrel resistance in northern Israel, an ethnically diverse area.

Methods: Platelet reactivity was measured using the VASP/P2Y₁₂ flow cytometric assay, the most specific platelet assay to evaluate P2Y₁₂ ADP receptor activity and thus the effect of clopidogrel on platelets. The test was performed on whole blood samples taken at least 48 hours after initiating Clopidogrel. Platelet reactivity index (PRI) $\leq 50\%$ was used as the cutoff value for poor responsiveness. Six month clinical outcomes will be determined.

Results: Preliminary data from 57 patients (50 men, 7 women, 35 Jews, 22 Arabs, mean age 62) presenting with ACS and treated with Clopidogrel showed that 38 (66.6%) patients had PRI $\leq 50\%$. These patients had slightly more risk factors for cardiac events than patients with PRI $< 50\%$ (3.7 vs 3.4 risk factors). There were significantly more Arab patients in the poor responders than in the good responders (44.7% vs. 26.3%, $p=0.03$). There was no significant difference between men and women ($p=0.06$), but significantly higher poor responders in the non-ST elevation ACS compared to ST elevation (63% vs. 52%, $p=0.045$).

Conclusions: We found significantly higher rates of Clopidogrel resistance in the Arab population compared to the Jewish population. Our data also suggest that the heterogeneous population of Northern Israel may express higher rates of Clopidogrel resistance than expected.