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PROGNOSTIC VALUE OF BRAIN NATRIURETIC PEPTIDE IN ACUTE CORONARY SYNDROME

Introduction**:** Nowadays an increased interest is seen towards the study of neurohormonal activation and the role of brain natriuretic peptide (BNP) in patients with acute coronary syndrome (ACS). BNP – is the only neurohormone which is secreted by the ventricles in response to myocardial stretch or wall tension and may be used as a diagnostic marker not only for chronic heart failure, but also as a sensitive marker of myocardial ischemia. Elevated levels of BNP may be associated with the size of infarct zone [1, p. 22]. Blood concentrations of BNP in these patients is increased directly with the degree of left ventricular dysfunction according to Killip classes of heart failure, level of pulmonary capillary wedge pressure and reflects summary individual risk [2, p. 47]. According to some authors, elevated levels of BNP is an independent predictor of repeated cardiovascular events and mortality in patients with ST-elevation ACS during the first 30 days and after 10 months from the beginning of an acute ischemia [2, p. 47-48]. Many reports have shown that using several amounts of markers with different pathophysiological basis, supplement biomarkers of necrosis in the risk stratification of ACS [3, p. 75]. However, there are limited data available that show impact of methods of therapy on BNP levels, and additional investigations are needed to confirm BNP levels as the tool in therapeutic decision making. Thus, determination of activity of BNP in patients with STE-ACS for the risk stratification of cardiovascular events, also for attenuation the rate of these events using current methods of therapy is an actual scientific-practical issue [4, p. 59].

Methods: 23 consecutive patients admitted to The City Cardiologic Center in Almaty with acute chest pain. The inclusion criteria were a diagnosis of STE-ACS and the age in the range of 40-85years. 16 (69,5%) male and 7 (30,5%) female. The mean age was 66,7 ± 10. Patients with both ST segment elevation and T wave inversion with the cut-off points of > 0,1mV in 2 or more consecutive leads were defined as having STE-ACS**.** Blood samples for BNP were drawn from all patients on

admission, 3rd and 7th days of follow-up period using immunoferment analysis. Also, measurement of troponin I and C-reactive protein, 12-lead ECG, echocardiography were performed after admission. All patient classified into groups based on location of ischemic lesion on ECG and methods of reperfusion therapy (systemic thrombolytic therapy (STT), percutaneous transluminal coronary angioplasty(PTCA)). 10 (43,5%) patients with ST segment elevation in anterior leads, 7 (30,4%) with posterior leads and 6 (26,1%) with anterior-lateral leads. Control group included 10 healthy patients of the same age range. Mean left ventricular ejection fraction on echocardiography was 53,36±5,05%. 5 (21,7%) patients underwent systemic thrombolytic therapy (STT) using Actilyse; 13 (56,5%) patients underwent (PTCA). In 5 (21,7%) patients was not performed nor STT (contraindications), nor PTCA(refusal). Basic treatment was performed according to Guidelines for the Management of ST-ACS: anticoagulants, nitrates, β-blockers, ACE inhibitors, statins.

Results: In patients with STE-ACS median BNP level on admission was 427,71±89pg/mL. There was no significant difference between male (421,65±195,1pg/mL) and female (440,71±195,1pg/mL). The median BNP level in admission was significantly higher in the group with posterior wall lesion (576,8±71,92pg/ml) than in the group with anterior wall lesion (383,87±191,12pg/ml). This tendency was observed during follow-up period.

During the first day of admission cardiovascular events developed in 10 (34,7%) patients: pulmonary edema(PE) in 2 (8,6%), cardiogenic shock (CS) in 2 (8,6%), ventricular flutter (VF) in 4 (17,3%) and premature ventricular contraction (PVC) in 2 (8,6%). The median BNP level was significantly higher in the group with cardiovascular events on admission (623,43±31,4pg/ml) than in the group without cardiovascular events. BNP levels on the 3rd day were elevated regardless of the method of reperfusion therapy. Median BNP levels according to used method of reperfusion therapy: systemic thrombolytic therapy (STT) (629,25 ±43,60pg/ml), percutaneous transluminal coronary angioplasty (PTCA) (441,70±72,17pg/ml). On the 7the day BNP levels tended to decrease in all groups. There was significant

decrease in BNP levels in the PTCA group (153,17±48,60pg/ml compared to the level on admission 441,70 ±72,17pg/ml, p < 0,01); in the STT group (498,98±93,69pg/ml; on admission 441,70 ±72,17pg/ml); In the group without STT and PTCA there was not a significant difference: 627,8 ±72,63pg/ml; on admission 520,6±79,79pg/ml. The median levels of TnI and CRP was assessed (4, 29±6,5ng/ml and 19,48±5,32mg/l respectively). A significant positive correlation was observed between BNP and CRP (r=0,4, p <0,05). 15(65%) patients had a final diagnosis of AMI and 8(34%) patients had UA. There was significant elevation in BNP levels between the AMI and UA patients (619±89pg/ml and 416±102pg/ml, respectfully).

Discussion: Several observational studies, which include patients with ACS, showed that BNP levels can serve as a high sensitive predictor of short and long term cardiac death (4.59). Other studies investigated correlation between BNP and other conventional markers of necrosis, such as troponin and hsCRP (4. 58). In our study we revealed a significant correlation between BNP and CRP levels, which can predict unwanted outcomes of ACS. In the present study we revealed high BNP levels in patients with STE-ACS, and more significant elevation was revealed in patients with posterior wall lesions of the left ventricle. The peak concentrations of BNP on the 3rd day is presumably due to reperfusion damage of cardiac cells and pathogenically can be explained by activation of lipid peroxidation and membrane damage of cardiomyocytes by the free radicals of oxygen. In conditions of successful reperfusion in patients with PTCA, BNP concentrations were decreased by the 5th day of treatment. This study proved utility of BNP as a tool of risk stratification of cardiovascular events; also benefits of invasive methods of reperfusion compared to noninvasive methods. **CONCLUSION:** 1. There is a high risk of early cardiovascular events in ACS patients with elevated BNP levels. 2. Positive correlation revealed between elevated levels of BNP and CRP, which is a factor of adverse outcome in ACS. 3. BNP levels tended to decrease on the 7th day of the treatment, reaching its peak level on the 3rd day. 4. A more significant decrease in BNP level was revealed in the group with PTCA

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