

Abstract

Background: In early stages of septic shock, impaired myocardial function plays an important prognostic role. Plasma BNP level may be a valuable prognostic factor for patients with sepsis. Assessment of diastolic function through measurement of the components of ventricular filling has largely neglected the vigor of atrial systole, in part because this has been difficult to quantify. However, atrial ejection force, defined as that force exerted by the left atrium to accelerate blood into the left ventricle during atrial systole, can be assessed noninvasively by combined two-dimensional imaging and Doppler echocardiography.

Objective: We aimed to assess the utility of atrial function (diagnosed by atrial ejection force) in predicting mortality in the ICU population with sepsis. We aimed also to evaluate the value of B-type natriuretic peptide (BNP) in predicting the outcome of sepsis, severe sepsis and septic shock patients.

Methods: 40 patients presented with sepsis, severe sepsis or septic were included in the study. The patients had undergone transthoracic Echocardiographic examinations and BNP measurements on the 1st and 3rd day of admission. Cultures were done to identify the source of infection and acute physiology and chronic health evaluation II (APACHE II) scores and the length of stay (LOS) in ICU were collected. The patients were retrospectively divided into survivors and non survivors for statistical analysis of the sensitivity and specificity of the echocardiographic data and the BNP in correlation to the APACHE II score and the prognosis

Results: 23 patients with sepsis survived and 17 patients did not survive. There was significant statistical difference in APACHE II score between the two groups ($P=0.001$). Also, there was significant statistical difference in grade of infection ($P=0.049$), use of mechanical ventilation ($P=0.0001$), vasopressors use ($P=0.0001$) and BNP level ($P=0.0001$) between the two groups. There was significant statistical difference in relation between the degree of sepsis ($P<0.05$), APACHE II score ($P=0.001$) and BNP in the 1st and 3rd day. BNP showed statistical significant rise in non survival group from day 1 to day 3 ($p=0.002$) and statistically significant decrease from day 1 to day 3 in survived group ($p=0.001$). As regarding the echo findings there was significant statistical difference in EF1st day, EF3rd day and AEF3rd day between survivors and non survivors ($P=0.004$, 0.0001 , 0.0001) respectively. There was significant statistical difference in relation between the degree of sepsis and EF in the 1st and 3rd day ($P=0.00$) and significant statistical difference in relation between the APACHE II score and EF in the 1st and 3rd day, LAD 1st day, LAV 1st day, AEF 3rd day and LVEDD in the 1st and 3rd day ($P=0.00$, 0.00 , 0.004 , 0.013 , 0.001 , 0.007 and 0.011 respectively). There was significant statistical correlation between BNP during the 1st day and LVEDD 1st day and EF 1st day ($p=0.002$ and $.001$ respectively) and (Pearson correlation= 0.475 and -0.505 respectively). The logistic regression analysis showed that BNP3rd day is a significant predictor for mortality in patient with sepsis (p -value was 0.001) and the ROC curve showed that APACHE II and BNP 1st day, 3rd day are good tests for prediction of mortality in patient with sepsis. We found that APACHE II score of 16 can signify a sensitivity of 76% and a specificity of 78% in testing the mortality of patients presenting with sepsis, severe sepsis and septic shock and EF 1st day level of 58.5% can signify a sensitivity of 60% and a specificity of 77% in testing the survival of patients presenting with sepsis, severe sepsis and septic shock. While EF 3rd day level of 57% can signify a sensitivity of 73% and a specificity of 95% in testing the survival of patients presenting with sepsis, severe sepsis and septic shock. Also, a BNP 1st day level of 449 pg/ml can signify a sensitivity of 94% and a specificity of 79% in testing the mortality of patients presenting with sepsis, severe sepsis and septic shock. While BNP 3rd day level of 544 pg/ml can signify a sensitivity of 82% and a specificity of 92% in testing the mortality of patients presenting with sepsis, severe sepsis and septic shock. AEF 3rd day level of 9.8Kdyn can signify a sensitivity of 91% and a specificity of 89% in testing the survival of patients presenting with sepsis, severe sepsis and septic shock.

Conclusion: In conclusion, Atrial ejection force (on admission) unlike left ventricular function, BNP level and APACHE II score cannot be used as independent predictors of mortality in patients with sepsis. Left ventricular function, BNP level correlates with the severity of sepsis. According to our study AEF in 3rd day may be good predictors for survival of patients presenting with sepsis.

Key words: left atrial function; sepsis; shock; BNP; echocardiography; AEF.