P-252

Multi-biomarker approach using ANP, BNP, NT-Pro BNP and hs-TnT improve prediction of adverse cardiac events in pediatric heart failure with congenital heart disease.

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Introduction: Few reports describe the prognostic values of measuring multiple biomarkers in pediatric patients with congenital heart disease (CHD). We aimed to determine whether atrial natriuretic peptide (ANP), B-type natriuretic peptide (BNP), N-terminal pro BNP (NT-proBNP) and high sensitivity troponin T (hs-TnT) predicted the adverse events, and whether a combination with use of these biomarkers impoved prediction of events in pediatric patients with CHD.
Methods:Pre-and post operative 259 patients with CHD who were measured 4 biomarkers at the same time were included in the study. Adverse events were defined as cardiac death, arrest and acutely decompensated heart failure requiring inotropic agents. The receiver operating characteristic (ROC) curve was performed to determine high-risk levels of 4 biomarkers for predicting adverse events. Patients were divided into 5 groups based on number of high-risk levels (group 1: No biomarkers elevated, group 2: one biomarker elevated, group 3: 2 biomarkers elevated, group 4; 3 biomarkers elevated, group 5: all biomarkers elevated). Usefulness of combinations of biomarkers was investigated by comparing 5 groups.
Results: The median age at entry was 6.1 years [IQR 1.8~10.2 years]. There were 10 adverse events during a median follow-up of 3.9 years. The C-statistic of all biomarkers was over 0.8, and patients with levels of ANP >77.6pg, BNP >61pg/ml, NT-pro BNP >1090pg/ml and hs-TnT >0.016ng/ml were high-risk for predicting adverse events by ROC analysis. There were 174 patients in group 1, 45 in group 2, 20 in group 3, 4 in group 4 and 16 in group 5. There were significant differences among 5 groups (Log-rank $p<.0001$). Also significant differences were found between group 1 and 3 or 4 (Log-rank $p<0.005$).
Conclusions: The mesurements of ANP, BNP, N-T pro BNP and hs-TnT provide prognostic imformation in pediatric patients with CHD. When use together, these biomarkers improve prediction of adverse events.