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Clinical, neurohormonal and psychological characteristics predict on a long-term basis, adverse cardiac events in patients with congenital heart defects

*Kourkouveli P. , Apostolopoulou S. , Kiaffas M., Moutsou A., Rammos S.
Onassis Cardiac Surgery Center, Department of Paediatric Cardiology and Congenital Heart Disease
Athens, Greece*

INTRODUCTION: Patients with congenital heart disease (CHD) face problems regarding their medical condition per se, like heart failure, but also their psychological status. Aim of this study is to identify the clinical, psychological and neurohormonal predictors of survival of patients with CHD, and define cut-off values.

METHODS: Sixty consecutive clinical stable patients, mean age 28.9 ± 11.4 years old with various forms of CHD were included. Patients' neurohormonal, psychological status, and exercise capacity were assessed through plasma B-type brain natriuretic peptide (BNP) and interleukin 6 (IL-6), Beck depression inventory and Zung depression scale questionnaires and cardiopulmonary exercise test (CPX). Patients were followed for major cardiovascular events (MACE), including death or hospitalization for 5.1 ± 1.1 years.

RESULTS: Most patients were symptomatic (48.3% with NYHA II and 36.7% with NYHA III) and 17 (28.3%) of them were cyanotic at rest. Mean plasma concentrations of BNP and IL-6 were 106.6 ± 98.6 pg/ml and 2.4 ± 2.6 pg/ml respectively. 17 patients (28.3%) were characterized as depressed. Patients with depression had higher plasma BNP levels ($p=0.030$), limited exercise capacity, as expressed with peak VO_2 ($p=0.019$) and higher probability of experiencing a major adverse cardiac event (MACE) compared to non-depressed patients (95% CI: 1.630 to 3.616, $p<0.05$). 22 patients (36.6%) experienced a MACE, among them 8 patients (13.3%) died. BNP, IL-6, peak VO_2 , VE/VCO_2 were proved to be strong predictors of survival; BNP value > 241 pg/ml predicted MACE with a sensitivity of 65.38% and a specificity of 73.53% (Area Under the ROC Curve, i.e. $AUC = 0.693$, $p< 0.0001$), IL-6 value >1.54 pg/ml predicted MACE with a sensitivity of 61.53% and a specificity of 73.53% ($AUC = 0.627$, $p< 0.0001$), VE/VCO_2 value >38 predicted MACE with a sensitivity of 73.08% and a specificity of 76.47% ($AUC = 0.808$, $p< 0.0001$) and peak VO_2 value ≤ 21.4 ml/Kg/min predicted MACE with a sensitivity of 76.92% and a specificity of 70.59% ($AUC = 0.794$, $p< 0.0001$) respectively.

CONCLUSIONS: Patients with CHD share common characteristics with patients with heart failure. BNP, IL-6 levels, exercise parameters and depression strongly predicted MACE and can be used with their cut off values for routine risk stratification in this population.