The Influence of Aortic Dilatation and Aortic Valve Regurgitation for Plasma Brain Natriuretic Peptide Level in Patients with Fontan Procedure

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Objective: The Fontan procedure has improved the morbidity and mortality of patients with single ventricular morphology. Several reports showed that plasma brain natriuretic peptide (BNP) levels were elevated in late after Fontan procedure with systemic ventricular failure. However, mechanisms of elevation of plasma BNP levels in Fontan patients were still unknown. The objective of this study was to evaluate plasma BNP levels with long-term after Fontan procedure, and reveal relationships with cardiac magnetic resonance (CMR) parameters.

Methods: Ten Fontan patients (median age 18.0 years, range 12.7 - 39.3 years, 7 males, 3 females, median follow-up 13.8 years, range 10.8 - 24.8 years) underwent BNP analysis and CMR.

Results: Median level of plasma BNP was 14.7 pg/mL (range ≤ 0.2 - 418.4 pg/mL). In CMR parameters, mean end-diastolic volume index (EDVI) was 81.7 ± 21.3 mL/m2, end-systolic volume index (ESVI) was 36.2 ± 12.4 mL/m2, ejection fraction (EF) was 56.4 ± 6.9%, ascending aortic diameter (AOD) was 25.5 ± 4.7mm, and aortic valve regurgitation (AR) was 11.7 ± 12.7%. Eight patients had New York Heart Association (NYHA) class I, and 2 patients had NYHA class II. Plasma BNP levels were positively correlated with AOD (r = 0.685; P = 0.014), AR (r = 0.697; P = 0.013) and NYHA functional class (r = 0.609; P = 0.031). Other CMR parameters (EDVI, ESVI, and EF) were not correlated with plasma BNP levels.

Conclusion: The plasma BNP level may be associated with aortic dilatation and the severity of AR long-term after Fontan procedure. To improve the prognosis of Fontan patients, we should pay more attentions to aortic dilatation and aortic valve regurgitation.