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Elevated plasma B-type natriuretic peptide and C-reactive protein levels in children with restrictive right ventricular physiology following tetralogy of Fallot repair

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Objectives: This study aimed to compare the plasma B-type natriuretic peptide (BNP) and C-reactive protein (CRP) levels in relation with oxygen transport between patients with restrictive right ventricle group (rRVG) and those without restrictive right ventricle (non-rRVG) early after tetralogy of Fallot (TOF) repair.

Methods: Eighty patients (30 in rRVG) underwent TOF repair in 2011-2012. BNP and CRP were repeatedly measured within postoperative day (POD) 7, with oxygen transport variables including arterial and superior venous oxygen saturation (SaO₂ and SvO₂), oxygen extraction ration (ERO₂) and lactate. Demographic data included age, durations of cardiopulmonary bypass (CPB), aortic cross clamp (ACC), mechanical ventilation, ICU and hospital stays.

Results: Within POD7, BNP did not change in either of the two groups, but was consistently higher in rRVG ($p < 0.0001$). CRP increased in POD1-2, and decreased thereafter. The decrease was slower in rRVG ($p = 0.04$). The increase of SvO₂ and decrease of ERO₂ were slower in rRVG ($p < 0.05$). Lactate decreased in both groups ($p < 0.05$), but was consistently higher in rRVG ($p = 0.03$). BNP negatively correlated with SvO₂ and preoperative SaO₂, and positively correlated with ERO₂ and lactate ($p < 0.05$). No correlation was found between CRP and oxygen transport variables. rRVG was older with longer CPB, ACC, mechanical ventilation, ICU and stay hospital compared with non-rRVG ($p < 0.05$ for all).

Conclusions: Restrictive right ventricular physiology is associated with significantly higher BNP and CRP levels with poorer balance of systemic oxygen transport. The information about the pathophysiological changes may help to identify the appropriate treatment strategies in this difficult group of patients.