

Right ventricular distress influences the elevation of brain natriuretic peptide in symptomatic infants with ventricular septal defects

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Background: In symptomatic infants with ventricular septal defects (VSD) volume overload for left ventricle occurs. The values of brain natriuretic peptide (BNP) uprise to high levels occasionally. In severe cases cardiac decompensation occurs. We attempted to identify the clinical characteristics in symptomatic infants with VSD who had high levels of BNP. Methods: Between 2005 and 2011, consecutive 96 symptomatic infants with VSD were studied. Cardiac catheterization was performed with surgical intervention in view. Venous blood samples for analysis of BNP were obtained within a week before catheterization. We defined BNP levels 100pg/ml or over as high-levels of BNP. First, we compared the clinical features between patients with high-levels of BNP and those with non-highly elevated BNP. Second, cardiac performances influencing high-levels of BNP were determined. Results: Study age and cardio-thoracic ratio were not different significantly between two groups. But body weight in high-level BNP was significantly lighter than in low-level BNP group. Additionally patients in high-level BNP group had more histories of hospital care significantly. After multiple logistic regression analysis high levels of BNP was independently associated with odds ratio of 6.9 ($p=0.004$) for expanded end-systolic volume of RV ($\geq 240\%$), 6.4 ($p=0.038$) for elevated end-diastolic pressure of RV ($\geq 9\text{mmHg}$) and 3.9 ($p=0.024$) for elevated end-systolic pressure of RV ($\text{RV/LV} \geq 93\%$). These three factors explained 48% of high-elevated BNP ($R\text{-square} = 0.48$). The extension of end-diastolic and end-systolic volume of LV had a weak tie to high levels of BNP by univariate analysis ($p < 0.1$). Conclusions: Our study showed heart failure worsened all the more in patients with high levels of BNP. This study also revealed that a variety of RV overload were related to high levels of BNP in symptomatic infants with VSD. The left-sided functions were not significantly with BNP elevation even by univariate analysis. Heart failure might not be caused by volume overload of left heart, more might be caused by excessive burden of fragile right ventricle. Dysfunction of RV is difficult to be detected by echocardiogram. We could use high-levels of BNP as the method of picking out the exhaustion for right ventricle in symptomatic infants with VSD.