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Shortly after corrective surgery of a ventricular septal defect right ventricular function is impaired and the level of impairment is correlated with cardiopulmonary bypass time

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Introduction: Little is known about the changes in ventricular function shortly after surgery of a ventricular septal defect (VSD). Additionally the influence of load changes, cardiopulmonary bypass and surgery on ventricular adaptation is unclear. Tissue Doppler Imaging (TDI) allows for sensitive quantification of ventricular function. We studied the ventricular function shortly after correction of a VSD.
Methods: Complete echocardiographic studies of the left and right ventricle were performed in 42 children with a VSD (0-17 years) and 20 age-matched controls. Systolic ventricular function was assessed using conventional echocardiography, including ejection fraction (EF) and Tricuspid Annular Plane Systolic Excursion (TAPSE), and systolic TDI (S'). Diastolic function was assessed using TDI (E', A' and E/E'). Studies were performed preoperatively, one day after surgical correction and at discharge.
Results: In the left ventricle (LV), EF and LV free wall S' were comparable to controls preoperatively and one day postoperatively. Both parameters were still comparable to controls at discharge (51±9% versus 53±6% and 5.6±1.7cm/s versus 6.3±1.6cm/s respectively; NS). LV basal free wall E' and A' were normal compared to controls preoperatively. One day postoperatively both parameters were slightly impaired but restored to control values at discharge.
In the right ventricle (RV), TAPSE was slightly lower than controls preoperatively and decreased postoperatively. At discharge TAPSE remained impaired (patients versus controls 8±2mm versus 17±4mm; $p<0.001$). All RV basal free wall TDI velocities were comparable to controls preoperatively and decreased one day postoperatively. At discharge RV function was still impaired compared to controls; S' (5.0±1.6cm/s versus 12.1±2.5cm/s), E' (7.4±2.8cm/s versus 18.3±4.9cm/s), A' (4.6±1.9cm/s versus 10.5±2.6cm/s) and E/E' (13.6±7.8 versus 4.7±1.9;all $P<0.001$). Additionally, longer aortic cross-clamp time correlated with larger reductions of the RV E' and A' one day postoperatively.
Conclusions: In contrast to left ventricular function, which differs little from normal values during short term follow up after VSD correction, right ventricular systolic and diastolic function deteriorated postoperatively and remained impaired at discharge. The correlation between aortic cross-clamp time and TDI velocities could imply cardiopulmonary bypass adds to the deterioration of RV diastolic function. Future research is necessary to further clarify especially right ventricular adaptation after surgery.