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Properties of heart remodeling in children with congenital heart diseases complicated by pulmonary hypertension

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Objective: We aimed to assess echocardiography data of heart remodeling in children with congenital heart diseases (CHDs) and different degrees of pulmonary arterial hypertension (PAH).
Methods: 422 echocardiography protocols were analyzed. The Echo was performed to children from 1 month to 18 years. 284 (67,3%) were defined having PH 1 degree, 52 (12,3%) – PH 2deg., 72 (17,1%) – PH 3deg., 14 (3,3%) - PH 4deg. PH degree was defined by the level of systolic pressure in the right ventricle (SPRV) according to the Echo: 30-50 mmHg - PH 1deg., 51-69 mmHg - PH 2deg., 70 mmHg and higher - PH 3-4 deg. Echo data were showed in percentage of individual norm. End diastolic volume of left ventricle (EDV LV), its form: spherical (SI) and eccentric index (EI), volume of right and left atrium, LV ejection fraction and contractility index of right ventricle, index of systolic (ISR) and index of diastolic remodeling (IDR) were assessed. Data are presented as M±SD, where M is an average value; SD is standard deviation.
Results: PH growth from 1 to 3 degree is accompanied by EDV LV increase to 157,59±98,54% ($p<0,001$), and at 4 degree of PH EDV decrease is observed to 75,11±15,35% ($p<0,001$). Significant change of LV form is marked at 4 degree of PH: SI is 1,84±0,48 r.u. and EI – 0,55±0,49 r.u. ($p>0.001$). Right atrium volume increase to 132,37±24,15% ($p>0,001$) is discovered at 2 degree of PH, left atrium volume increases to 133,62±24,15% ($p<0,001$) at 2 degree of PH, left atrium volume decrease to 65,13±15,08 % ($p<0,001$) is observed at 4 degree of PH. Tendency of LV ejection fraction decrease as PH growths and reduction of right ventricle contractility index at PH of 4 degree to 26,1±7,5 r.u. ($p<0,001$) were determined. LV systolic remodeling was discovered in children with PH 2deg. (ISR-1,19±0,31r.u.), and diastolic remodeling at PH 3-4deg. (IDR-3,35±1,2r.u.) ($p<0,001$).
Conclusion: Changes of structural characteristics of heart chambers and their function disturbance are observed at CHDs with PH. LV remodeling with systolic dysfunction is appeared at CHDs complicated by PH of 2deg., and PH of 3-4 degree with LV diastolic dysfunction.