

Exercise capacity and lung function in patients late after fontan intervention and impact of physical activity

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Introduction: The Fontan operation have improved survival in patients with functionally univentricular heart. However their exercise tolerance is reduced with a wide range of maximum oxygen consumption. The determinants of such variability are not well understood.

The aim of our study is to evaluate the impact of physical activity on exercise capacity evaluated by cardiopulmonary test (CPT) in patients late after Fontan.

Methods: We retrospectively reviewed patients after Fontan palliation who underwent CPT cardiac magnetic resonance (CMR), and spirometry in our institute. 28 patients (age: 17.8±2.9) were included in the study. Self and/or parents-reported physical activity were reported and grouped into no physical activity (Group 0, n:9), scholar physical activity (Group 1 n:10) and regular aerobic activity at least twice a week (Group 2: n:9). Medical and surgical history was recorded.

Result: No difference between groups was found for systemic ventricle type or for type of Fontan, ventricular volumes and function and cardiac index. There were no significant differences also in lung parameters at rest (FEV, FEV1/FVC, TLC, VT, VD/VT, VE, RR). While the following parameters at peak were significantly different between groups: Watt: Group 0 (72±24) vs Group1 (96±36) vs Group 2 (136±20) p<0.01; Vo2 peak (ml/Kg/min): Group 0 (16,8±3,1) vs Group 1 (22,9±3,9) p<0.001 and vs Group 2 (28.3±2,7) p<0.01; Vo2 (% of predicted): Group 0 (36±13) vs Group 1 (51.6±6,3) and vs Group 2 (57.7±7.5) p<0.01, VE/VCO2 slope: group0 (34.7±7), Group1 (35±3,7) Group2 (29,6±5,7) p=0.02 -Vo2/HR: Group 0 (median 6: 5.2-8) vs Group1 (median 8: 5.8-13): p=0.004, basal VE/peak VE at peak was higher in the Group 2 (median 64: 54-72) vs Group 1 (median 42: 34-93), p=0.05 and vs Group 0 (median 37: 34-47,5), p=0.006. Basal VT/peak VT: group 0 (median 1.02:0.6-1.36), group 1 (median 1.18: 0.78-1.8), group 2 (median 1.83: 1.44-2.1) p=0.001.

Conclusion: patients after Fontan palliation perform lower physical activity probably due to functional capacity and imposed limitations, and/or psychosocial factors. From our data exercise performance of patients after Fontan palliation is mainly related to physical activity regardless more traditional cardiovascular and pulmonary parameters at rest.