Inspiratory Muscle Training did not improve Physical Capacity in adult Patients with Fontan Circulation

Fritz C. (1), Müller J. (1,2), Oberhoffer R. (1,2), Ewert P. (1), Hager A. (1)
German Heart Centre Munich, Technical University of Munich, Munich, Germany (1);
Institute of Preventive Pediatrics, Technical University of Munich, Munich, Germany (2)

Introduction
Impairments in respiratory musculature strength are associated with a reduction in physical capacity. Furthermore, intervention studies have shown a beneficial effect of an inspiratory muscle training (InMT) on physical capacity measures. This study investigates the effect of a daily six-month InMT on physical capacity in adult patients with Fontan circulation.

Methods
After receiving a symptom limited cardiopulmonary exercise and lung function test, 42 patients (50% female; 30.8 ± 8.2 years) with Fontan circulation were randomized into either an intervention (IG) or control group (CG). The IG performed a telephone supervised InMT of 3 sets with 10-30 repetitions with the device POWERbreathe Medic (POWERbreathe International Ltd., Southam, UK). Since four patients dropped out, re-testing was performed in 18 patients of the IG and 20 of the CG six months after baseline.

Results
After six month of InMT, peak oxygen uptake (%predicted) did not increase in the IG in comparison to the CG (IG: -0.3 ± 2.3 ml/min/kg vs. CG: -0.2 ± 3.0 ml/min/kg; p=0.952). There was also no difference in ventilatory efficiency (IG: -0.5 ± 3.1 ml/min/kg vs. CG: -0.3 ± 2.5 ml/min/kg; p=0.844) nor in peak workload (IG: -3.6 ± 11.1 Watt/kg vs. CG: -3.4 ± 9.5 Watt/kg; p=0.938) after Intervention. Neither improved forced vital capacity (IG: 1.6 ± 7.1% vs. CG: -0.4 ± 7.8%; p=0.402) nor forced expiratory volume in the first second (IG: 0.2 ± 6.2% vs. CG: -2.0 ± 7.0%; p=0.315).

Conclusion
A daily six-month InMT did not improve physical capacity measures in patients with Fontan circulation. Advanced studies should investigate further training forms suitable for patients with Fontan circulation enhancing physical capacity including a reduced mortality and morbidity.