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

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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: $1.6 \pm 7.1\%$ vs. CG: $-0.4 \pm 7.8\%$; $p=0.402$) nor forced expiratory volume in the first second (IG: $0.2 \pm 6.2\%$ vs. CG: $-2.0 \pm 7.0\%$; $p=0.315$).

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.