Correlation between cardio-pulmonary exercise test variables and health-related quality of life among children with congenital heart diseases

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Introduction

Background: peak oxygen uptake (VO2) correlates with health-related quality of life (QoL) in adults with heart failure. Cardiopulmonary exercise test (CPET) is recommended in the follow-up of adults with congenital heart diseases (CHD). Few data is available as regards correlation between CPET and QoL among children with CHD.

Methods

202 CHD children aged 8 to 18 performed a complete CPET (treadmill n=96, cycle-ergometer n=106) in 2 tertiary care pediatric cardiology university centers (UCL St Luc, Brussels, Belgium and Montpellier University Hospital, France). CHD severity was stratified into 4 groups. All children and parents filled out the Kidscreen QoL questionnaire. This study complies with the declaration of Helsinki. It was approved by Ethics Committees in France (South Mediterranean IV) and Belgium (UCL Medical School) and was registered on ClinicalTrials.gov (number NCT01202916). Informed consent was obtained from all parents.

Severity class 1: Mild CHD requiring no therapy or effectively treated with medication.  Severity class 2: Moderate CHD requiring no therapy or surgically corrected (curative).  Severity class 3: Surgically treated CHD with significant residual or need for additional surgery.  Severity class 4: Complex or severe CHD, inoperable or palliated (includes single ventricle).

Results

Peak VO2, anaerobic threshold (AT), oxygen pulse followed a downward significant trend with increasing CHD severity and conversely for VE/VCO2 slope. Self-reported and parent-reported physical well-being QoL scores correlated with peak VO2 (respectively r=0.27, p<0.0001 and r=0.43, p<0.0001), percentage of predicted peak VO2 (r=0.28, p=0.0001 and r=0.41, p<0.0001), and percentage of predicted VO2 at AT (r=0.22, p<0.01 and r=0.31, p<0.0001). Significant correlations were also observed between several QoL dimensions and VD/VT ratio, oxygen uptake efficiency slope (OUES), oxygen pulse but never with VE/VCO2 slope. The strongest correlations were observed in the treadmill group, especially between peak VO2 and physical well-being for parents (r=0.57, p<0.0001) and self (r=0.40, p<0.0001).

Conclusion

Peak VO2 and anaerobic threshold are the two CPET variables which best correlated with self and parents-reported QoL in this large pediatric cohort. If QoL is involved as a “patient related outcome” in a clinical trial in pediatric cardiology, we suggest to use parents related QoL scores.