MP3-8

The predictive value of cardiopulmonary exercise testing in children with congenital heart disease.

van Genuchten W.J. (1), Snoeren E.C.G. (1), van den Bosch E. (1), Kardys I. (2), Cuypers J.A.A.E. (3), Helbing W.A. (1), Bartelds B. (1)
Paediatric Cardiology, Sophia's Children's Hospital, Erasmus Medical Centre, Rotterdam, Netherlands (1);Department of Cardiology, Erasmus Medical Centre, Rotterdam, Netherlands (2);Department of Congenital Cardiology, Erasmus Medical Centre, Rotterdam, Netherlands (3);

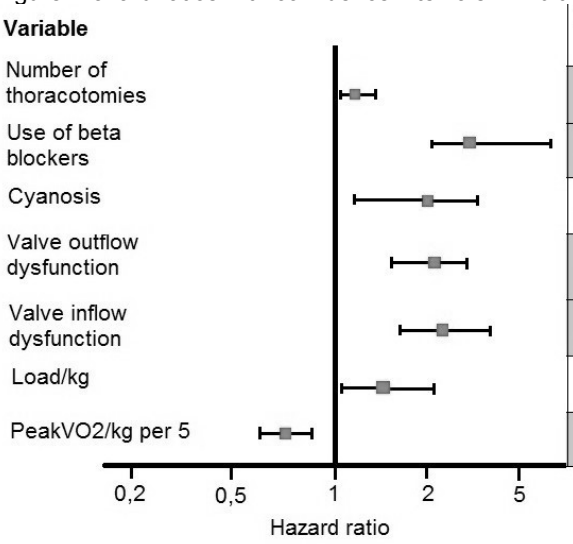
Background: Children with congenital heart disease (CHD) are at increased risk to develop late complications, e.g. arrhythmias, residual valvar dysfunction and heart failure, possibly leading to re-intervention and/or rehospitalization. In clinical practice, predicting which patients will develop complications remains difficult. In adults with CHD, cardio pulmonary exercise test (CPET) has been used to identify those at risk for morbidity and mortality, but its value in children with CHD has not been established. Our aim was to investigate the predictive value of CPET for morbidity and mortality in children with CHD.

Methods: We retrospectively assessed patients with CHD who performed a CPET between 2001 and 2017. We performed clinical follow up, starting at the day of CPET. We excluded patients who underwent an intervention within 3 months after the CPET. Clinical data were extracted from the hospital medical records. Primary endpoints were mortality or heart transplantation and a composite endpoint (CE) of cardiac hospitalization, arrhythmia, cardiac surgery, percutaneous intervention or the use of heart failure related medication. Patients who underwent an intervention within 3 months after the CPET were excluded from the analyses. Unpaired t-tests, univariate and multivariate Cox regression (backward stepwise selection) were used for analyses.

Results: 402 children with CHD were included in this study. Six patients died during an mean 6.7 +- 3,5 years follow-up. The absolute number of deaths did not allow regression modelling. A total of 135 patients reached the composite endpoint. Univariate analyses revealed nine patient characteristics and three CPET parameters as significant predictors of the composite endpoint. After multivariate analysis, peakVO2/kg was the only CPET variable in the final model; the other parameters were number of thoracotomies, use of β-blockers, and valvular inflow/outflow dysfunction (see figure). Cyanosis and load/kg lost statistical significance after correcting for multiple testing. Stratification on univentricular vs. biventricular circulations showed no essential differences.

Conclusion: In a paediatric cohort of patients with congenital heart disease, PeakVO2/kg predicted a composite cardiovascular endpoint independently of patient characteristics. These findings can be used to develop a prediction model for children with CHD.

Figure: Hazard ratios with confidence intervals in multivariate analysis (backward stepwise selection).



Variable	Hazard	95% CI Lower	95%CI Upper	p-value
Number of thoracotomies	1,276	1,100	1,480	,001
Use of beta blockers	4,305	2,085	8,888	,000
Cyanosis	2,138	1,174	3,894	,013
Valve outflow dysfunction	2,289	1,596	3,285	,000
Valve inflow dysfunction	2,885	1,764	4,718	,000
Load/kg	1,632	1,098	2,425	,015
PeakVO2/kg per 5	,765	,670	,874	,000