Exercise tolerance after Senning operation for transposition of great arteries and its limiting factors

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Objectives: Senning operation is associated with increased long-term risk of cardiovascular mortality and morbidity. Decreased exercise capacity carries a substantially higher risk of death. The purpose of the study was to assess the exercise capacity in patients with Senning operation and to determine its limiting factors.

Methods: 87 out of a total of 152 pts (men 64/87) who underwent the Senning operation between 1984-1997 could be recruited for a cross-sectional evaluation at median 22.5 (range 15.2-29.4) years after surgery consisting of a questionnaire, clinical examination, echocardiography, magnetic resonance imaging and cardiopulmonary exercise test. Maximum oxygen uptake (VO2max) was considered to be an objective exercise performance parameter in the study. Pathologic limits were defined as those exceeding 2 Z-values.

Results: 73% of pts were NYHA class I and 27% NYHA II. Involvement in some kind of sport activity was declared by 83.9%. Maximum exercise level could be achieved in 67/87 pts. The median Z-values of both VO2max and of the maximum achieved heart rate (-1.971 and -1.795, resp.) were decreased with significant decrease in maximum exercise capacity in 49% of pts. 22% pts had increased blood pressure at rest and/or during exercise. In a multivariate analysis decreased VO2max was predicted by the VE/VCO2 slope at exercise (OR=1.271, CI 1.069-1.511, P=0.007) and BMI (OR=1.193, CI 1.027-1.386, P=0.030) but not by the right ventricular ejection fraction, degree of tricuspid regurgitation, heart rate at maximum exercise or NYHA class.

Conclusions: The Senning operation is associated with decreased exercise tolerance in 50% of the pts. Decrease in exercise capacity is predicted by increased BMI and by ventilation inefficiency, but not by objective hemodynamic parameters. A significant proportion of pts has an arterial hypertension. Obesity, hypertension control and respiratory rehabilitation should thus be an essential part of the long-term management.

Supported by the Project of Internal Grant Agency of Ministry of Health, Czech Republic: NT 13408-4/2012 and by MH CZ – DRO, University Hospital Motol, Prague, Czech Republic 000642.