Enddiastolic right ventricular volume exceeding 160 ml/m² - a reasonable value for every Fallot patient regarding pulmonary valve replacement?

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Introduction: Body surface area is accepted and used as one possible means for normalization of right ventricular volumes (RVi); clinically it is the gold standard to define RV volume overload. We tested the hypothesis if greater variations of BSA have an influence on decision making of pulmonary valve replacement (PVR) in patients with Tetralogy of Fallot (TOF) after repair.

Methods: Retrospective analysis of CMR volumes from 80 TOF patients (group A: BMI 22.7±4.1, BSA 1.77±0.3 m², RV-EDVi=138±39ml) as well as 20 healthy persons (group B: BMI 23±4.5, BSA 1.83±0.25 m², RV-EDVi=85.2±13ml) older than 16 years. In a mathematical model both groups gained and lost weight (+20 kg, -10 kg). Changes of indexed volumes were compared using a Student’s T-Test. Additionally a prospective CMR-investigation of 10 obese and 12 anorectic adult individuals with normal RV-function was performed and the results were compared with height-matched controls.

Results: With increasing or decreasing weight RV-EDVi-volumes changed significantly in group A (148±42ml/m² vs 123±35ml/m²) and group B (91.4±13ml/m² vs 76.2±12ml/m², p<0.001). The number of patients with RV-EDVi>160 ml/m² in group A decreased from 16 to 6 by gaining weight and rose to 30 by weight loss. Comparison of anorectic (BMI 16.7±3.6, BSA 1.5±0.19m², RV-EDV 124±31ml) and obese (BMI 33±3, BSA 2.0±0.18m², RV-EDV 124±29ml) individuals to matched controls did not result in significant differences of not indexed RV-Volumes. RV volumes of TOF patients correlated more with height (r=0.72, p<0.01) than with weight (r=0.38, p<0.01).

Conclusions: Weight changes influence BSA and consequently indexed RV volumes affecting indication for PVR in TOF patients. Absolute RV volumes of anorectic, healthy and obese people do not differ much. Indexed volumes to an expected “normal” BSA or normalization of volumes to height should be used in those patients for decision making of PVR.