

Right ventricular systolic and diastolic response to exercise in children after Tetralogy of Fallot repair- a bicycle exercise study

Cifra B., Woerner C., Pondorfer P., Dragulescu A., Friedberg MK., Slorach C., Mertens L.
 Division of Cardiology, The Labatt Family heart Centre, Hospital for Sick Children, Toronto, Ontario, Canada

Background: Right ventricular (RV) systolic and/or diastolic dysfunction is an important clinical problem in children with repaired Tetralogy of Fallot (TOF). Tissue Doppler Imaging (TDI) represents a unique tool for measuring RV systolic and diastolic velocities of the tricuspid annulus in patients after TOF repair at rest and during exercise. The aim of the current study was to evaluate systolic and diastolic response to exercise in children with repaired TOF using semi-supine cycle ergometry stress echocardiography (SSCE).

Materials and Methods: A total of 12 children with repaired TOF and 12 age and gender matched controls were included. Median age at surgery was 6 months and median time from surgery was 11.7 years. A stepwise SSCE protocol was used. RV S' and E' were measured in all the subjects at rest and at incremental HR. Systolic and diastolic reserve was assessed by plotting RV S' and E' values against HR.

Results: Resting and peak exercise HR (mean \pm SD) was not significantly different in the TOF group compared to controls (73 \pm 17 vs 63 \pm 13 bpm, $p=0.33$; 141 \pm 16 bpm vs 144 \pm 21 bpm, $p=0.87$). RV E' values were significantly lower at rest and peak in the TOF group compared to controls (rest: 7.8 \pm 2.05 cm/s vs. 10.6 \pm 2.1 cm/s, $p=0.0005$; peak: 16 \pm 4.3 cm/s vs. 20.9 \pm 2.9 cm/s, $p=0.003$). RV S' values were not significantly different at rest between the two groups (7.0 \pm 1.7 cm/s vs. 8.7 \pm 2.1 cm/s, $p=0.1$) but were significantly lower at peak exercise in the TOF (9.6 \pm 3.1 cm/s vs. 15.1 \pm 3.2 cm/s, $p=0.003$). RV systolic and diastolic response was blunted in TOF compared with controls (figures).

Conclusions: Our data suggest that RV systolic and diastolic response to exercise in children with repaired TOF is blunted compared to controls. The clinical implication of our finding needs further investigation but identifying early RV dysfunction could have important prognostic implications for the management of these patients.

