

Isovolumic Acceleration at Rest and During Exercise in Children with repaired Tetralogy of Fallot

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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) is well suited to assess cardiac response to exercise for patients after TOF repair. RV myocardial acceleration during isovolumic contraction (IVA), a TDI derived parameter, has been proven to correlate well with indices of myocardial contractility. The force frequency relationship (FFR) reflects the increase in contractility with increasing heart rate (HR). The aim of the current study was to evaluate myocardial contractile 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 IVA was measured in all the subjects at rest and at incremental HRs. FFR was constructed by plotting RV IVA 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 IVA values were not significantly different at rest in the TOF group compared to controls (0.82 \pm 0.3m/s² vs. 1.21 \pm 0.8 m/s² $p=0.06$) but were significantly lower at peak exercise in the TOF (2.7 \pm 1.5 m/s² vs. 6.1 \pm 2.71 m/s², $p=0.002$). The contractile response as studied by the FFR, was blunted in TOF compared with controls (figure).

Conclusions: Our data suggest RV contractile response to exercise in children with repaired TOF is blunted compared to controls as shown by the FFR curve. The clinical implication of our finding needs further investigation but identifying subclinical RV dysfunction could have important prognostic implications for the management of these patients.

