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Measurement of Coronary Flow Velocity and Coronary Flow Reserve During Stress Echocardiography in Pediatric Heart Transplant Patients

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Introduction: Coronary flow velocity (CFV) and coronary flow reserve (CFR) by transthoracic Doppler echocardiography represents a novel non-invasive tool for the assessment of coronary allograft vasculopathy (CAV) in adult heart transplant patients. However, no data currently exists describing the pattern of CFV or CFR in pediatric heart transplant patients (PHTP) using non-invasive imaging during stress. In this pilot study, we sought to determine the feasibility of using this technique to measure CFV and CFR during stress testing in this group of patients. **Methods**: Measurements of resting and peak CFV and CFR (peak CFV/resting CFV) were obtained from transthoracic Doppler echocardiograms performed during semi-supine cycle exercise (SSCE) (n= 8) or dobutamine stress (DSE) (n=10) testing in a total of 14 PHTP. In 3 of these patients, 2 coronary arteries were examined during a single test. The findings were correlated with each patient's rejection status obtained from their myocardial biopsy histopathology reports and coronary artery status imaged by angiography. A normal CFR value was defined as >2 times the resting value. **Results**: CFV and CFR were measured in the LAD (n=4), left main (n=11), RCA (n=3) and circumflex (n=3) arteries. The resting and peak CFV were 0.27 ± 0.12 m/s and 0.65 ± 0.26 m/s, respectively. The CFR was 2.54 ± 0.75. No patient had evidence of acute rejection on biopsy or CAV by coronary angiography. However, four patients had a CFR<2: two of these patients had a low workload and 1 had poor images during SSCE; 1 patient had a normal DSE. All but one patient had a normal stress test; this patient having abnormal wall motion at rest. **Conclusions:** In this preliminary study, we were able to measure CFV and CFR using DSE and SSCE echocardiography in PHTP. CFR indicated no evidence of CAV in 17/18 tests. The measurement of CFR may have clinical utility as a non-invasive, inexpensive and technically simple tool in assessing CAV following pediatric heart transplantation. However, as there were no cases of rejection nor CAV, further studies are warranted to determine the utility and predictive accuracy of this tool.