Left coronary artery Doppler systolic flow reversal is associated with adverse myocardial events post arterial switch operation for Transposition of the Great Arteries

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Introduction
Transposition of the great arteries (TGA) is generally repaired using the arterial switch operation (ASO). Early complications are mainly following coronary artery related events. Intra-operative coronary flow patterns may predict clinical outcome.

Objective
The objectives of this prospective study were 1) to determine whether coronary Doppler patterns intra-operatively predicted an adverse outcome, 2) to compare transesophageal (TEE) vs. epicardial echocardiographic assessment of coronary arteries post ASO.

Methods
Patients with TGA undergoing the ASO were eligible. All patients (when technically feasible) underwent a TEE plus an epicardial echo intra-operatively. All predischarge transthoracic echocardiograms were reviewed for ventricular function. The primary clinical endpoint was a composite myocardial ischemic event (any of: post-operative ST changes, ventricular tachycardia, need for ECMO support). Correlation and Kappa statistics were used to assess agreement between the imaging modalities.

Results
From May 2009 – Dec 2012, 36 patients (26 male, birth weight 3260±590 grams) were recruited. Of those, 11 had a ventricular septal defect, 27 had usual coronaries (1LCx2R), 6 had 1L2RCx, and 2 were intramural. The median age at the time of the ASO was 10 days, IQR: 6-21 days, N=28 had TEE + epicardial, 4 TEE only, 4 epicardial only. N=7/36 (19%) patients had an adverse myocardial event (5 ST changes, 2 ventricular tachycardia (1 also ECMO), 1 death). Systolic flow reversal in the left coronary artery was associated with the primary endpoint (86% vs. 10%, p<0.001). By TEE, the median VTI for the right coronary artery was 0.112, IQR 0.084-0.159 and the left coronary was 0.117, IQR 0.094-0.150. There was excellent agreement for global assessment of function between TEE and epicardial (K=0.925) and visualization of the left coronary (91% visualized with both), and strong agreement (92% visualized with both) of the right coronary.

Conclusion
Systolic flow reversal in the left coronary artery is associated with myocardial ischemic events post ASO. Intra-operative evaluation of coronary artery flow patterns is a potentially useful tool and should be considered for all ASO procedures.