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Echocardiographic arterial measurements in complex congenital diseases before bidirectional Glenn: Comparison with cardiovascular magnetic resonance imaging

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INTRODUCTION: This study sought to investigate diagnostic accuracy of echocardiographic measures of great vessels in patients before bidirectional cavopulmonary connection (BCPC) compared to cardiovascular magnetic resonance (CMR).

METHODS: Seventy-two patients (61% after Norwood operation) undergoing BCPC between 2007 and 2012 were assessed pre-operatively using echocardiography and CMR. Bland-Altman analysis and correlation coefficients were used for comparison of echocardiography and CMR measurements. Sensitivity, specificity, positive and negative predictive values were calculated to assess the ability of echocardiography to detect vessel stenosis.

RESULTS: Twenty-four percent of all vessel measurements could not be made by echocardiography due to poor image quality. Acquisition of unsatisfactory images was higher in non-sedated patients. Although there was reasonable correlation (0.68-0.90) and low bias (-0.8 to 0.5), there were wide limits of agreement between echocardiography and CMR demonstrating poor agreement. Sensitivity and specificity for pulmonary branches were moderate (sensitivity for right pulmonary artery (RPA) 67%, left pulmonary artery (LPA) 54%, specificity for RPA 65%, LPA 72%) with low levels of accuracy (RPA and LPA 42%). Sensitivity, specificity and accuracy were better for aorta (82%, 86%, 63% respectively).

CONCLUSION: This study demonstrates modest agreement between echocardiographic and CMR measures of vessel diameter and stenosis detection. Approximately a quarter of all vessel segments could not be measured using echocardiography due to poor image quality, which was significantly lower in non-sedated patients. These findings suggest that in complex patients echocardiography cannot be used as the only method of comprehensive assessment of the vasculature before BCPC.