Imaging

NOVEL ECHOCARDIOGRAPHIC ASSESSMENT OF RIGHT VENTRICULAR FUNCTION IN PRETERM INFANTS: FEASIBILITY AND REPRODUCIBILITY OF RIGHT VENTRICULAR STRAIN MEASUREMENTS BY SPECKLE-TRACKING ECHOCARDIOGRAPHY

Poster Contributions
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Background: The right ventricular (RV) function is an important determinant of hemodynamic status and prognosis of cardiopulmonary pathologies in neonates. However, RV geometry does not lend itself to conventional assessment of ventricular function. Strain and strain rate represent sensitive measures of ventricular function and their estimation does not require geometric assumptions. 2-dimensional speckle tracking echocardiography (2DSE) is an angle-independent method for strain measurement, but has not been applied in preterm infants for the assessment of RV function. The aim of this study was to determine the feasibility and reproducibility of 2DSE measurement of RV global longitudinal strain and strain rate in preterm infants, and establish standardized methods for acquiring and analyzing strain measurements.

Methods: 2DSE was performed on 50 preterm infants (<28 weeks @birth), enrolled through the Prematurity and Respiratory Outcomes Program (NIH 1U01 HL1014650), at 32 & 36 weeks. Peak global longitudinal strain (pGLS) & strain rate (pGLSR) were measured (GE EchoPac) in the RV modified apical 4-chamber view with different frame rates and 2D imaging settings. 2 blinded observers measured RV pGLS & pGLSR in 30 randomly selected patients at both time points. Inter- & Intra- observer reproducibility was assessed using Bland Altman analysis (bias, 95% limits of agreement (LOA), and intraclass correlation (ICC).

Results: Strain imaging was feasible in 84% of the acquisitions. For optimized image acquisition, intra-observer RV pGLS & pGLSR reliability demonstrated high reproducibility (bias 5%, 95% LOA -2.3-2.4, ICC 0.96, and bias 8%, 95% LOA -0.48-0.53, ICC=0.86, respectively). Inter-observer RV pGLS and pGLSR reliability also showed high reproducibility (bias 9%, 95% LOA -4.8-4.7, ICC=0.84, and bias 7%, 95% LOA -0.38-0.42, ICC=0.84, respectively).

Conclusion: Our study demonstrates high feasibility and reproducibility of RV strain measurements by 2DSE in preterm infants and offers specific recommendations for image acquisition and data analysis that optimizes reliability. Strain measurements by 2DSE offer a reliable tool for the assessment of global RV function. [R21 HL106417]