Comprehensive Analysis of the Four-Chamber View identifies 100% of Fetuses with Coarctation of the Aorta

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Objectives: To determine if fetal echo measurements of the size and shape of the 4-chamber heart (4CV), or the size, shape and function of the right and left ventricles (RV, LV) can successfully discriminate fetuses with true coartation of the aorta (CoA) from fetuses with suspected CoA.

Methods: Eighty-eight fetuses with the presumptive prenatal suspicion of CoA were identified from a cardiology database. The size and shape of the 4CV were measured (area, circumference, and sphericity index). Using speckle tracking software the RV and LV size and shape (area, length, 24-segment transverse diameter, and 24-segment sphericity index (SI)) were measured as well as the ventricular global, longitudinal, and circumferential function.

Results: Fifty-one fetuses had a confirmed postnatal diagnosis of CoA requiring surgery the first week of life and 37 did not have CoA. Logistic regression analysis identified 23 variables that separated 100% (n=51) the true positive from the false positive (N=37) fetuses with and without CoA, respectively. The variables identified from the 4CV were the end-diastolic length and circumference. The identified variables for the right and left ventricles included the ventricular SI, transverse diameters, global, longitudinal and circumferential function.

Conclusions: A comprehensive analysis of the 4CV and the RV and LV successfully predicted postnatal CoA, and differentiated CoA from fetuses who did not have CoA. This new method of analysis may significantly decrease the high false-positive rate when CoA is suspected prenatally.