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Ventricular Doppler Inflow Duration Corrected by Cycle Length in Fetuses with Normal and Abnormal Diastolic Function

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Introduction: Myocardial performance index (MPI) and cardiovascular profile score (CVPS) quantify fetal cardiac dysfunction and heart failure. CVPS combines 5 echocardiographic variables (effusions; heart size; cardiac function; systemic venous flow; umbilical arterial flow) with deduction of 1-2 points from maximal 10 points per abnormal component. MPI, calculated as isovolumetric contraction plus relaxation times/ejection time, requires antegrade pulmonary/aortic flow. In fetuses with normal and abnormal cardiac function, we sought to determine correlation of another measure of function, ventricular inflow duration corrected by cardiac cycle length (ID) with MPI and CVPS.

Methods: Fetuses diagnosed with cardiomyopathy (CM; n=30) and twin-twin transfusion syndrome (TTTS; n=30) were compared with age-matched healthy fetuses (n=120). All measurements were made offline. Observer agreement was evaluated in 30 cases.

Results: The table summarizes the main findings. For CM/TTTS, significant linear correlations were found among all variables, with best fit between IDs and MPIs (R2 0.5-0.56; p<0.001). Using the 95th confidence limit as normal cutoff, ID <35% and MPI>0.43 were considered abnormal. In 86% of ID and MPI measurements, both results were either normal or abnormal. Intra- and interobserver agreements were comparable for IDs (0.96; 0.89) and MPIs (0.95; 0.88).

Conclusions: ID is a valuable and reproducible index to detect and quantify abnormal fetal ventricular function and should be included in baseline echocardiographic assessment.

	TTTS	CM	Normal	p-values
Cases	30	30	120	
Age	21.8±4.2%	24.9±5.7%	23.8±5.3%	NS
Left VID	31.9±7%	31.8±7.7%	41.1±2.7%	<0.001
Right VID	26.7±8.3%	32±6.4%	40.7±2.3%	<0.001
Left MPI	0.73±0.23	0.83±0.43	0.42±0.05	<0.001
Right MPI	0.98±0.94	0.85±0.49	0.40±0.06	<0.001
CVPS	6.9±2.5	5.4±2.2	10±0.0	<0.001