

Fetal Aortic Coarctation

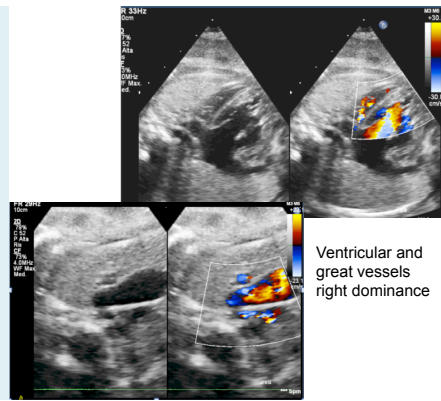
A combination of echocardiographic parameters that improves the prediction of postnatal outcome.

A single center experience.

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Detailed fetal echocardiography can stratify the risk for CoA in fetuses with a suspected diagnosis. Prenatal detection rate of CoA may improve when a multiple-criteria prediction model is adopted.

In our experience cardiac asymmetry with right dominance carries an increased risk for the occurrence of CoA if detected in the second trimester of pregnancies. In the third trimester a small mitral valve, a small left ventricle and a hypoplastic transverse aortic arch are predictors of CoA eventually associated with various degree of multilevel left ventricular obstruction. The presence of redundant FO membrane and of PLSCV may lead to a false positive CoA diagnosis.



Background Prenatal detection of CoA is still challenging and affected by high rate of false-positive diagnoses especially during the third trimester, because it relies on indirect and nonspecific signs, especially cardiac asymmetry with right dominance that may also be seen in normal fetuses in late pregnancy.

Objectives

To determine a combination of fetal echocardiographic parameters for improving the prediction of coarctation of the aorta (CoA) after birth.

Methods

Study period: January 2015 to September 2020.
Inclusion criteria: fetuses diagnosed with CoA suspicion at II and/or III trimester of pregnancy.
Exclusion criteria: fetuses with hypoplastic left heart syndrome class IV, isolated aortic valve stenosis or aortic arch interruption type B or C, fetuses with unknown postnatal echocardiogram and/or outcome.
All retrospective measurements are reported in the table.

Neonates were divided into two groups depending on the presence or absence of CoA at postnatal ultrasound examination:

group 1 – fetuses without CoA

group 2 – fetuses with CoA.

Risk of CoA was stratified as low, moderate or high on the basis of major echocardiographic criteria detected at last fetal examination.

Variable	All patients N=59	No CoA N=39	CoA N=20	P value
GA at last fetal ECHO	30.49 (6.75)	29.69 (6.55)		0.70
Early CoA Diagnosis (≤ 28 weeks)	5 (13%)	17 (85%)		0.0001
Borderline LV	0	8 (40%)		0.0001
Inflow tracts				
z score MV	-2.66 (1.07)	-4.15 (1.33)		0.0001
MV/TV ratio	0.67 (0.09)	0.51 (0.09)		0.0001
LV/RV ratio	0.65(0, 09)	0.53 (0,12)		0.001
Outflow tract				
z score AoV	-0.99(0.81)	-2.01 (1,34)		0.004
AV/PV ratio	0.65 (0,10)	0.58 (0,11)		0.02
MPA/Ao ratio	1.51 (0,33)	1.85 (0,26)		0.0001
Aortic Arch				
z score Aortic Isthmus	-1.75 (0,97)	-3.15 (0,68)		0.0001
Hypoplastic Transverse Arch	0	19 (95%)		0.0001
Aortic Isthmus/Arterial Duct ratio	0.57 (0,11)	0.46 (0,09)		0.001
Functional Features				
Reversed or mixed flow at the Aortic Arch	11 (28.2%)	13 (65%)		0.01
Bidirectional flow at the foramen ovale	4 (10.3%)	15 (75%)		0.0001
Associated Cardiac Anomalies				
VSD	4 (10.3%)	9 (45%)		0.01
Redundant FO Membrane	18 (46.2%)	5 (25%)		0.16
PLSCV	7 (17.9%)	3 (15%)		1
Suspicion of Bicuspid Aortic valve	2 (5%)	4 (20%)		0.8

Quantitative results are expressed as mean (standard deviation)

A p-value less than 0.05 was considered statistically significant

Among the 59 fetuses with CoA suspicion, 20 (34%) were confirmed with CoA. CoA risk was prenatally estimated high in 18/20 and moderate in 2/20. Among the other 39 fetuses that did not developed CoA, 11/39 were considered to have a moderate CoA risk and 28/39 a low risk

Multiple-criteria prediction model that combines size-based cardiac parameters and that has to be gestational age-specific may improve the accuracy of fetal echocardiography to stratify the risk of CoA



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