Abnormal Fetal Z-Scores are a Sensitive Predictor of Fetal Congenital Heart Disease

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Introduction:

Current obstetric fetal cardiac screening recommendations fail to provide the proper tools necessary to accurately identify congenital heart disease (CHD). We sought to utilize 4 established normative fetal measurements to simplify screening for CHD.

Hypothesis:

Abnormal z-scores of 4 fetal cardiac measurements are a sensitive predictor of CHD.

Methods:

We performed a retrospective review of fetal echocardiograms done on neonates with a post natal diagnosis of CHD from 2010 to 2013. Four anatomic measurements (aortic annulus, pulmonary valve annulus, right and left ventricular diameters) were performed according to ASE guidelines and compared to normative z-score reference ranges from published data. CHD lesions were categorized as right-sided lesions (tetralogy of Fallot, tricuspid and pulmonary valve abnormalities), left-sided lesions (hypoplastic left heart syndrome, aortic valve abnormalities, aortic coarctation and interrupted aortic arch), transposition of the great arteries (TGA), ventricular septal defects (VSD), and atrioventricular septal defects (AVSD).

Results:

120 patients with average gestational age of 28.2 weeks met criteria. At least 1 abnormal z-score was present in 93 of 120 patients. Overall sensitivity was 78% but varied by lesion subgroups. (Table). Sensitivity was lowest for VSD (53%), AVSD (62%) and simple TGA (33%) and highest for right sided lesions, left sided lesions and complex TGA. When VSD, AVSD and simple TGA were removed from the cohort, sensitivity improved to 90%.

Abnormal Z-scores/Patient Groups						
Percentage of Abnormal Z-Score/Total Pts	Total abnl z-score excluding VSD and AVSD	Total abnl z-score excluding TGA, AVSD, VSD	Simple TGA abnl z-score	Complex TGA abnl z-score	Right sided lesions abnl z-score	Left sided lesions abnl z-score
93/120	71/82	62/69	1/3	8/10	20/24	24/25
77.5% Sensitivity	85.4% Sensitivity	89.9% Sensitivity	33.% Sensitivity	80% Sensitivity	83.3% Sensitivity	96% Sensitivity

Conclusion:

Abnormal fetal z-scores are a sensitive predictor of CHD. Inclusion of z-scores of 4 fetal cardiac measurements in level 1 obstetric sonograms can identify patients needing referral for fetal echocardiography and improve detection rate of CHD. Additional focus on TGA and septal defects would further improve detections rates.