Echogenic Focus in Fetal Heart: Is it still a dilemma?

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INTRODUCTION:
Congenital heart diseases (CHD) are the most common type of birth defect. Each year, more than 35,000 babies in the United States are born with congenital heart defects. The incidence of congenital heart disease in different studies varies from about 4,100 to 50,100 live births. A well-established fetal echocardiography performed especially in high risk pregnancies leads to early detection of fetuses at high risk for CHD.

By the time, improving in fetal imaging techniques, we had the chance to get detailed information about the fetal development of various structures. Fetal echocardiography has been done especially in numerous risk factors influences cardiovascular system development. Echocardiographic (EF) within the fetal cardiac ventricles have been reported from examinations more than a decade. However, in spite of many publications on intracardiac echocardiographic, its clinical significance regarding the proposed association with chromosomal or CHD remains controversial.

Detailed fetal echocardiography (DFE), including ultrasound examination for fetal morphology, detailed assessment of cardiac anatomy and functions, should be offered. Fetal cardiovascular morphology scanning and functional evaluation with echocardiography may help to better define cardiac structures and functions associated with EF. In this respect, the aim of our cross-sectional study was to review the publications on literature about the intracardiac EF and providing the clinicopathologic significance of EF.

METHODS:
We’ve performed 760 DFE (including 2D, M–Mode, Doppler and Tissue Doppler imaging - heart size, ventricular diameters and ratios, ventricular wall thicknesses, pulmonary and aortic diameters; peak velocities, mitral and tricuspid E/A ratio; left ventricular fractional shortening and myocardial performance indexes) during 18 and 34 weeks gestational age pregnancies between January 2013 and November 2014 admitted to our tertiary health center. Fetal heart structures and ventricular functions (using both conventional and doppler techniques) were evaluated. A questionnaire were taken from the patients including general health and obstetric history. All subjects were informed about the study and written consent had taken for participation in the study.

The location and the number of EF on fetal echocardiography were recorded. All sonographic examinations were performed with a 2-5 MHz convex transducer, with VVID 7 PRF echocardiography machine (GE, Vingmed, Norway). Fetal measurements included biparietal diameter, and cardiac/thoracic area. Two-dimensional fetal echocardiography was used to define the structural cardiac anomaly. M-mode echocardiography included measurements of left and right ventricular free wall and interventricular septal thickness and ventricular systolic and diastolic dimensions. Fetal echocardiography measurements included pulmonary and aortic maximum velocities, and the ratio between A- and W-peak velocities (the E/A ratio). For calculation of the myocardial performance index, pulsed-tissue Doppler recordings of longitudinal myocardial wall motion obtained were at the level of mitral and tricuspid valve annuli in an apical four-chamber view.

The standard approach to fetal echocardiography should take into consideration the ALARA (as low as reasonably achievable) principle, limiting examinations to those that are medically necessary and the length of the assessments to what is necessary, particularly the application of higher-output modalities.

All statistical analyses were carried out using SPSS version 20 (SPSS, Chicago, IL USA). Statistical significance was determined by a two-tailed Student’s t-test to compare group mean values; when the criteria for conducting the t-test were not met, the nonparametric Wilcoxon Rank–Sum Test was applied to the data. The sensitivity, specificity, positive and negative predictive values, and relative risk with 95% confidence intervals were calculated.

RESULTS:
The number of fetuses with single IEF in left ventricle were 206; right ventricle 72 and in both ventricles 48. The overall incidence was 42% in our study. When compared fetuses without IEF, only the multikaps showed significant difference (n=161, 49,3%, p<0.05). No significant differences were found in fetal cardiac dimensions, Doppler indices and left ventricular fractional shortening and myocardial performance indexes of both ventricles of fetuses who have IEF in left, right or both ventricle when compared with fetuses without IEF. Congenital cardiac malformations and chromosomal anomalies like trisomy 21 were same (p>0.05 for all).

CONCLUSIONS:
The significance of fetal intracardiac echocardiographic foci remains uncertain. Prevalence rates from 0.5% to 30% have been reported. In previous publications, it was recommended prenatal detection of EF within the fetal heart should prompt a thorough fetal anatomic survey to search for associated anomalies and markers of chromosomal abnormality.

According to the currently available literature, detection of EF in an otherwise normal fetus probably represents a normal variant of papillary muscle development. The role of fetal echocardiography in otherwise normal fetuses, once a normal four-chamber view has been documented, seems to be of limited value. Conversely, if other ultrasound markers or fetal structural anomalies are found, the parents should be counselled regarding the increased risk for chromosomal anomalies.

False tendons might be taken into account as differential diagnosis of left ventricular echogenic focus in the fetus. Misinterpretation of false tendons and EF may cause unnecessary fet al invasive approach and maternal anxiety as well.

Isolated EF in fetal heart; even multiple and in both ventricles has no association between fetal cardiac structural and functional abnormality and has no adverse outcome and thus no need for further evaluation of this benign situation.