OP08.15
Fetal myocardium: Compressible or noncompressible?

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Background: Controversy exists regarding whether myocardium compresses during contraction. Some studies have shown that during systole the muscle compresses when fluid and blood exit from the muscle during contraction. This theory has not been tested in the fetal heart.
Objectives: To examine whether fetal myocardium during systole is of lesser or equal volume to that of diastole, and to compare these measures in newborn myocardium, employing 4D-STIC and inversion mode.
Methods: STIC volumes were acquired and analyzed with VOCAL and inversion mode. Right and left heart end-diastolic and end-systolic myocardial (MV) and ventricular volumes were determined. Proportional change between end-diastolic and end-systolic MV was calculated, as were stroke volume (SV) and ejection fraction (EF) for the right and left ventricles. For comparison, echocardiography was performed on 10 normal term newborns and children using 4D-STIC, but limiting acquisition and analysis to the left ventricle.
Results: 30 fetuses at GA 20–37 wks were examined. The Total Volume Change (ventricle+myocardium) between end-diastole and end-systole ranged from 0.5–5.38 cm^3 in the left ventricle and 0.25–4.89 cm^3 in the right, while the SV ranged from 0.13–2.64 cm^3 in left ventricle and 0.15–2.16 cm^3 in the right at these GAs. SV values therefore are smaller than the total volume change in systole, i.e. SV does not account for all volume change following cardiac contraction. This difference is the compression of the myocardium. MV compressed between end-diastole and end-systole by 8–19% in the right ventricle and 5–25% in the left. In newborns and children left heart MV compression between end-diastole and end-systole was 0–8%. EF was relatively constant at ~60%.
Conclusions: Fetal myocardial volume in the second half of gestation compresses by approximately 20% during systole. To the best of our knowledge this is the first study to demonstrate the compressibility of fetal myocardium.

OP09: FIRST TRIMESTER ULTRASOUND

OP09.01
The impact of crown rump length measurement error on combined down syndrome screening

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Objectives: To evaluate the impact of a 5 mm-error in the measurement of crown-rump length (CRL) in a woman undergoing ultrasound and biochemistry combined screening for Down syndrome.
Methods: Based on existing risk calculation algorithms, we simulated the case of a 35 year old woman undergoing combined screening based on NT measurement and early second trimester maternal serum markers (MSM: βHCG and AFP expressed as Multiple of the Median -MoM). Two measurements errors were considered (+ or −5 mm), for 4 different CRLs (50, 60, 70 and 80 mm), with 5 different NT measurements (1, 1.5, 2, 2.5 and 3 mm) in a patient undergoing biochemistry test at 14, 15, 16, 17 or 18 weeks'. Four different values for each MSM were tested (1, 1.5, 2, and 2.5 MoM and 0.5, 0.8, 1 and 1.5 MoM for βHCG and AFP respectively) leading to a total of 3200 simulations of the impact of measurement error. In all cases the ratio between the risk as assessed with or without the measurement error was calculated (MERR = Measurement Error Related Risk Ratio).
Results: Over 3200 simulated cases, MERR ranged from 0.53 to 2.14. In 488 simulations (18.3%), it was < 0.66 or > 1.33. Based on a risk cut-off of 1/300, women would be misclassified in 112 simulations (3.5%). This would go up to 33 (27.5%) out of the 120 simulations in women with "border line" risk with 1.5 MoM and 0.5 MoM for βHCG and AFP respectively and NT measurement of 1 or 2 mm.
Conclusions: Down syndrome screening may be highly sensitive to measurement errors in CRL. Quality control of CRL measurement should be performed together with NT measurement quality control in order to provide the highest standard of care.

OP09.02
A cross-sectional analysis of embryonic growth in normal and genetically abnormal pregnancies

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Introduction: Some genetic abnormalities have been reported to be associated with growth restriction, in the first trimester of pregnancy. The aim of this study was to analyze early growth in normal pregnancies compared to pregnancies with a genetic abnormality, based on one or more crown rump length (CRL) measurements.
Methods: A retrospective database study of the CRL of embryos at different gestations was conducted in a referral center for fetal medicine with a predominantly Caucasian population. A growth curve was obtained using multilinear regression analysis, having first carried out an internal validation of the regression curve on datapoints from normal pregnancies. Subsequently the deviation from the regression curve of CRL's in pregnancies with a genetic abnormality was calculated and expressed as a z-score.
Results: Growth analysis based on cross-sectional data was performed on 6666 normal pregnancies compared to 50 genetically abnormal pregnancies with at least one known CRL. 4034 normal pregnancies were included in a multilinear regression analysis. The mean of the distribution of z-scores for the remaining 2632 pregnancies was not significantly different from zero ($P = 0.1314$). The mean of the z-scores of measured CRL for genetically abnormal singleton pregnancies equals −42.6 (SD 82.1). This shows a statistically significant lower than expected CRL value at a specific gestational age in genetically abnormal pregnancies compared to normal pregnancies ($P = 1.3115\text{e-}4$).
Discussion: Statistical analysis based on cross-sectional data has shown a significant difference in early pregnancy growth for pregnancies with genetic abnormalities in comparison to normal singleton pregnancies.

OP09.03
Crown-rump length measurements during the first trimester screening: Critical evaluation of dating the pregnancy

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Objectives: The aim of this study is to evaluate the accuracy of pregnancy dating based on CRL measurements.
Methods: Retrospective analysis of results of patients reffered to our department for the first trimester screening between April 2004 and October 2007. All pregnancies continued until second trimestr. The total of 6221 CRL measurements performed between 75 and 98 days