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Growth delay in the first trimester: Sensitivity and specificity of using serial measurements of embryonic growth for the prediction of early pregnancy loss

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Objectives: Early pregnancy loss (EPL) can be preceded by observation of crown rump length (CRL) smaller than expected for gestational age (GA). However a one off small CRL may also be explained by inaccurate menstrual dates. Longitudinal growth studies may better demonstrate true abnormal growth. Our objective was to determine sensitivity and specificity of FLDA (functional linear discriminant analysis) to assess longitudinal growth of CRL, mean gestational sac diameter (MSD) and mean yolk sac diameter (MYD) in prediction of EPL.
Methods: Prospective cohort study of women with at least 2 ultrasound scans prior to 14w confirming singleton viability. To obtain FLDA performance in distinguishing pregnancies viable at 12w from EPL, a leave-one-out (LOO) cross-validation strategy was applied, resulting in sensitivity and specificity reflecting performance of FLDA on an independent validation set.
Results: Of 1078 pregnancies, 773 (71.7%) remained viable at 12 w (class 1) and 305 (28.3%) miscarried (class 2). Increase in CRL with GA was significantly lower for class 2 than class 1 (one-sample t-test, $P = 2.98e{-}22$). Using rate of change of CRL, FLDA could predict EPL with sensitivity of 60.7% and specificity of 93.1% (PPV 33.3%, NPV 97.7%). Using rate of change of MSD gave sensitivity of 67.6% and specificity of 84.5% (PPV 50%, NPV 91.9%). MSD/CRL ratio gave sensitivity of 44.4% and specificity of 96.6% (PPV 70.6%, NPV of 90.3%). MSD-CRL difference and rate of change of MYD predicted EPL very poorly.
Conclusions: There is a difference in rate of change of CRL, MSD and the ratio of the two values for viable pregnancies and those destined to miscarry. This approach can predict EPL with high specificity (up to 96.6%) before 12w gestation. The sensitivity is lower (44.4–67.6%) reflecting the proportion of class 2 patients (miscarriages) without antecedent growth retardation, suggesting two possible mechanisms for miscarriage – one associated with growth delay and another that is not.

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Continuous ultrasound monitoring during surgical evacuation of pregnancy in the first trimester

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Objectives: To evaluate the value of use of continuous ultrasound monitoring during surgical evacuation of pregnancy in the first trimester in reducing the operative time and rate of intra-operative (IO) and post-operative (PO) complications.
Methods: A prospective randomized study included 300 consecutive patients undergoing surgical evacuation of pregnancy in the first trimester from January 2002 till January 2006. They included 131 cases (44%) of missed abortion/blighted ovum, 46 cases (15%) of legally induced abortions of intact pregnancy and 123 cases (41%) of incomplete abortion/retained products of conception. They were randomized into two groups: Group I ($n = 150$) where dilatation of the cervix and suction evacuation of the uterus was done under continuous IO monitoring with trans abdominal (TA) ultrasound and a trans vaginal (TV) scan was done at the end of the procedure to confirm emptiness of the uterus. Group II ($n = 150$) were control patients that had the procedure done without ultrasound monitoring. Follow up transvaginal ultrasound was done at 1 week PO in all cases.
Results: The mean operative time was 12.6 minutes (SD = 4.9, range = 7–29) in group I and 17.4 minutes (SD = 8.2, range = 11–45) in Group II ($P < 0.0001$). No cases had uterine perforation during surgery in Group I while, in Group II, four cases had suspected uterine perforation that was confirmed at laparoscopy in two and the other two had conservative follow up ($P < 0.05$). In group I, one case (0.7%) had retained products of conception at follow up ultrasound compared to 12 cases (8%) in group II ($P < 0.001$).
Conclusions: Continuous TA ultrasound monitoring of surgical evacuation of the pregnant uterus shortens the operative time significantly and decreases the incidence of IO complications. A TV scan at the end of the procedure will ensure the emptiness of the uterus and will prevent PO complications and the need for repeat surgical procedures.

OC109
Validation of the Robinson growth curve with data of transvaginal ultrasound assessments in early pregnancy from a large Caucasian population

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Introduction: The accuracy of the commonly used Robinson curve for the estimation of gestational age (GA) based on the crown-rump length (CRL) of the embryos has recently been questioned. The aim of the study is to examine the validity of the Robinson growth model based on an analysis of early pregnancy growth in a large Caucasian population.
Methods: A retrospective database study of the CRL of embryo's at different gestations in the first trimester of pregnancy was conducted in a referral center for fetal medicine with a predominantly Caucasian population. The deviation between the CRL in the normal pregnancies was compared to the expected CRL at a given gestational age according to the Robinson growth model and was expressed as a z-score.
Results: 6666 normal pregnancies were included in the study. Z-scores are calculated for all 10 691 data points with respect to Robinson's curve. A one-sample t test verifies if the mean of the distribution of z-scores is equal to zero (meaning that the data points of our data set are equally spread above and below the Robinson curve). The mean z-score 0.1873 (SD 1.0465) is included with 95% confidence in the interval [0.1674 0.2071] (p-value = 2.828e–75).
Compared to our data, Robinson gives a 3 days underestimation of gestational age with a difference in CRL of 2.46 mm at 6 weeks and a 1 day overestimation with a difference in CRL of 1.64 mm for pregnancies from 9 to 12 weeks. At 7 weeks gestation, both our curve and Robinson's are similar.
Conclusion: The classic Robinson curve which estimates GA based on transabdominal CRL measurements could not entirely be validated by cross-sectional analysis of transvaginal ultrasound assessments of CRL in patients from a large Caucasian population. The underestimation by Robinson in very early pregnancies could be clinically relevant in terms of redating the pregnancy.