Predicting adverse obstetric outcome after early pregnancy events and complications

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Introduction: To evaluate the impact of early pregnancy events and complications as predictors of adverse obstetric outcome in the subsequent or ongoing pregnancy.

Methods: We conducted a literature review on the impact of first trimester complications in previous and index pregnancies using Medline and Cochrane databases covering the period 1980-2008.

Results: We found that a history of one or more miscarriages is associated with a higher risk of premature preterm rupture of membranes (PPROM) and premature- and very premature delivery (PTD <37 weeks and VPTD < 34 weeks) in the subsequent pregnancy. After recurrent miscarriage (RM) there is a variable increased risk of the above mentioned parameters as well as preeclampsia (PE), placental abruption, placenta previa, small for gestational age (SGA, p<10) and congenital malformations. A history of termination of pregnancy (TOP) is associated with an increased risk for PPROM, PTD and VPTD in the subsequent pregnancy. These risks depend on the number of TOP. First trimester vaginal bleeding in the index pregnancy is associated with placental abruption, placenta previa, PPROM, PTD and VPTD. Heavy bleeding and the presence of an intrauterine haematoma further increase these risks and haematomas are associated with PE, placental abruption, SGA and intra uterine fetal death. A smaller than expected CRL measurement is associated with fetal aneuploidy, VPTD and intrauterine growth retardation (IUGR, p<5) in both singleton and twin pregnancies. The survivor in vanishing twin pregnancy is at an increased risk of PTD, VPTD and SGA. Hyperemesis gravidarum (HG) is associated with an increased risk of PTD and SGA.

Conclusion: Data from our literature review indicate, by finding significant associations, that specific early pregnancy events and complications are predictors for subsequent adverse obstetric outcome. Identification of these risks will improve obstetric care.

First trimester growth charts derived from virtual reality measurements.

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Introduction:

The first 10 weeks of pregnancy are of great importance, since abnormal growth or development are likely to have an impact on foetal growth in the 2nd and 3rd trimester of pregnancy and subsequent health of the newborn. Three-dimensional (3D) ultrasound has had major impact on visualization in early pregnancy. However, 3D imaging is still used by means of a two-dimensional (2D) medium, which is unable to provide all the information offered by the 3D volume. The Erasmus MC University Medical Centre in Rotterdam operates a Virtual Reality (VR) system, called the Barco I-Space. Innovative imaging techniques, using up-to-date ultrasonic equipment, necessitates improved biometry charts. The aim of this study was therefore, using these virtual reality techniques, to comprise longitudinal charts of several embryonic biometry parameters, which had not been available up to now.

Methods:

We performed longitudinal 3D measurements from 6 weeks to 14 weeks gestational age in 32 pregnancies. 16 were conceived spontaneously and 16 after assisted fertility treatment. We analyzed a total of 125 3D volumes in the I-Space Virtual Reality system. This system allows binocular depth perception, providing a realistic 3D illusion. The 3D dataset is visualized as a “hologram” and can be manipulated and measured with a virtual pointer, controlled by a wireless joystick. We measured the following standard biometry parameters: crown-rump length (CRL), biparietal diameter (BPD), occipito-frontal diameter (OFD) and the abdominal diameter in two directions, resulting in abdominal circumference (AC) calculation. For non-standard biometry measurements we measured the following variables: arm length, shoulder width, elbow width, hip width, and knee width. We also measured the length of the umbilical cord and length of the vitalline duct.

Results:

There were no significant differences in general characteristics between women with assisted fertility treatment (N = 16) and women who conceived spontaneously (N = 16). CRL, BPD, OFD and HC could be measured in more than 96% of patients. AC measurements were not possible in 22%, mostly in the earlier gestational ages. Shoulder width, elbow width, hip width and knee width could be measured in more than 95% of cases, arm length in 82 % of cases. Umbilical cord length could be measured in 55% and vitalline duct length in 42 % of cases. Growth charts were constructed for all variables. Only the vitalline duct length did not demonstrate a strong correlation with advancing gestational age. The CRL growth chart perfectly matched the curve from Robinson and Fleming from 1975.

Discussion:

This study is unique as far as we know since it provides a detailed, longitudinal description of normal human embryonic growth, facilitated by a virtual reality system.

We have been able to construct new charts for embryonic biometry of the CRL, BPD, HC and AC early in pregnancy and provided charts for new biometric measurements; arm length, shoulder width, elbow width, knee width, hip width and even of umbilical cord length and vitelline duct length. Applying Virtual Embryoscopy will enable us to diagnose growth and / or developmental delay earlier and more accurate. This is especially important for pregnancies at risk for severe complications like recurrent late miscarriage and early growth restriction.

Selective karyotyping in recurrent miscarriage: is recent evidence implemented in daily clinical practice?

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Introduction

Couples who have had two or more miscarriages are at increased risk of either of the partners carrying a structural chromosome abnormality. Recently (2005) four independent factors influencing the probability of carrier status have been identified [1]; maternal age at second miscarriage, a history of three or more miscarriages, a history of two or more miscarriages in a brother or sister of either partner, and a history of two or more miscarriages in the parents of either partner. Maternal age proved to be the most influential risk factor.

With these four risk factors a model has been developed to perform karyotyping only in high risk patients. In case of a low risk of carrier status, below 2,2%, it is advised to refrain from karyotyping. This model for selective karyotyping has been adopted in 2006 in the ESHRE-guideline on recurrent miscarriage (RM) [2]. It takes time to integrate evidence into consulting rooms. Current use of the model in daily gynaecological practice is unknown.

Objective

The first aim of this study was to investigate the application of selective parental karyotyping in couples with RM, after publication of the model. The second aim was to determine barriers for physician adherence to the model.

Methods

A retrospective cohort study was performed in nine Departments of Obstetrics and Gynaecology in the Netherlands. Patients referred for or diagnosed with RM in 2006 were included. Data about the adherence to the model were obtained through medical records and additional questionnaires sent to the patients. Focusgroup interviews with 6 clinical geneticists, 17 gynaecologists, 19 residents and fertility doctors were performed to identify barriers for adherence.

Results

In total 534 patients were included in the study; 340 patients experienced two miscarriages, 194 three or more. Almost no conscious application of selective karyotyping was observed. According to the advised model, 269 (50,4%) patients received indeed appropriate genetic diagnostic care; of the 255 patients with a high risk (>2,2%) of carrier status, only 188 (73,7%) were offered karyotyping. Although not advised, in 198 out of 279 (71,0%) low risk patients karyotyping was still performed.

Only in 81 (29,0%) low risk patients the gynaecologist refrained from karyotyping. Adherence to the model was worse for patients at the age of 34-39, where obstetric history and family history need to be taken into account to adopt the model.
Several barriers on organisational, professional and patient level were recorded during the interviews. Main problems mentioned were lack of knowledge of the professionals, the complexity of the model and the lack of a reliable family history on miscarriages. Furthermore demanding patients, asking for karyotyping despite their low risk, were seen as a potential barrier to withhold karyotyping.

Conclusion

The application of selective karyotyping for RM was not adequately after publication of the model. Implementation of selective karyotyping should focus on further dissemination of the model and on the development of a strategy to implement the model, based on the existing barriers. The findings during the implementation process will be of use for future improvement of RM care.

References

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Optimising the timing of an ultrasound scan to assess the location and viability of an early pregnancy

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Introduction

The optimal timing of early first trimester transvaginal ultrasound (TVS) to confirm pregnancy location, viability or gestation is unclear. Ultrasound too early may be associated with an increase in the rate of inconclusive ultrasound findings (pregnancy of unknown location (PUL) or intrauterine pregnancy of uncertain viability (IPUVI)) with the need for serial serum hCG measurement and further TVS assessment. The first objective of this study was to test the hypothesis that there is a positive association between gestational age and the ability to make a definitive diagnosis of viability or non-viability at first TVS assessment in an early pregnancy unit (EPU) population. The second objective was to determine whether there is an optimal time for an ultrasound scan to be performed, in both asymptomatic and symptomatic women, in order to limit the number of PUL and IPUVI findings and yet identify the majority of women with pathology present within the cohort studied.

Methods

This was a prospective observational cohort study of 1442 women undergoing initial TVS in an early pregnancy unit from January to October 2006. All women had a positive pregnancy test and a gestational age of less than 84 days from the last menstrual period. Logistic regression analysis was performed to determine the relationship between gestational age and the ability to confirm viability or non-viability. The effect of symptoms of pain and bleeding on the ability to confirm pregnancy location and viability was analysed.

Results

Viability or non-viability was confirmed at first scan in 509/893 (57.0%) of women with certain dates and 307/549 (55.9%) of women with uncertain dates (p=0.7019). The frequency of the TVS findings according to gestational age is to be presented graphically. The commonest TVS finding prior to 35 days was a PUL, from 35-41 days an IPUVI and from 42 days a viable intrauterine pregnancy. Miscarriage could not be diagnosed at initial scan until at least 35 days, with most miscarriages diagnosed between 63 and 85 days. There was no significant difference between the ability to make a diagnosis (p=0.719) or pregnancy outcome (p=0.4375) for women with certain or uncertain dates. The chance of confirming viability increased rapidly per day of gestation until 49 days and thereafter plateaued. The number of blood tests (Spearman correlation coefficient = -0.20, $p<0.0001$) and the number of repeat ultrasound assessments (Spearman correlation

coefficient = -0.14, $p<0.0021$) were found to correlate with gestational age. 21/29 (72%) ectopic pregnancies were diagnosed prior to 49 days, 90% (19) of whom had either pain or bleeding. The remaining two (10%) had a previous history of ectopic pregnancy.

Conclusions

This study confirms the hypothesis that there is a positive association between reported gestational age and the ability to make a definitive diagnosis of viability or non-viability at first early pregnancy assessment. This finding is independent of whether menstrual dates are certain or uncertain. In women with no previous history of ectopic pregnancy and no pain or bleeding TVS assessment should be delayed until 49 days from the reported LMP. Our data suggest that this policy will safely reduce the number of PUL and IPUVI, without an associated increase in serious morbidity from delayed diagnosis of ectopic pregnancy. In women with symptoms of pain or bleeding or with a previous history of an ectopic pregnancy, ultrasound should not be deferred due to the potential risk of serious morbidity associated with missing the diagnosis of ectopic pregnancy.