A longitudinal assessment of gestation sac growth in subsequently viable and non-viable pregnancies

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Objectives

Functional linear discriminant analysis (FLDA) has been validated as an approach to discriminate between subsequently viable and non-viable pregnancies based on the growth of the crown-rump length (CRL). The aim of this study was to use FLDA to define mean sac diameter (MSD) longitudinal growth in normal first trimeter pregnancies and so to establish the relationship between MSD growth and the likelihood of miscarriage

Methods

In this prospective cohort study MSD was measured on at least two separate occasions in women who underwent ultrasound assessments in the first trimester. FLDA was used to compare MSD growth between subsequently viable and non-viable pregnancies. The performance was compared with peviously established predictors of poor outcome.

Results

A total of 281 pregnancies were included. Viable first trimester outcome was observed in 199 patients, while 82 pregnancies miscarried. The sensitivity of FLDA in predicting miscarriage from serial MSD measurements was 79% and specificity was 84% (positive predictive value (PPV) 67%, negative predictive value (NPV) 91%), whereas the sensitivity of a single observation of MSD of more than 2SD below that expected (Hellman et al, 1969 confirmed by Rossavik et al, 1988) was 38% and specificity 87% (PPV 55%, NPV 77%). Single maximum gestation sac diameter (MGSD) and calculated gestational sac volume (GSV) performed less well with a specificity of 79.5% and 71.3% and a sensitivity of 79.3% and 85% respectively.

Conclusion

Using FLDA to discriminate between normal and abnormal gestation sac growth to predict miscarriage is significantly better than either a single MSD, MGSD or GSV measurement. Assessments of longitudinal growth give more information about pregnancy wellbeing than single measurements of gestational sac size. As gestation sac size can be measured earlier than the embryo itself, these results may be useful in earlier miscarriage prediction.