Longitudinal growth of MSD and CRL in intrauterine pregnancies of uncertain viability (IPUV) and its relationship to gestation sac shape

Y Abdallah [1], O Naji [1], A Daemen [3], A Pexsters [2], C Stalder [1], C Bottomley [4], E Kirk [1], N Raine-Fenning[5], C Lees [6], D Timmerman [3] and T Bourne [1,3]

1. Institute of Development and Reproductive Biology (IRDB), Imperial College London, Hammersmith Campus, Du Cane Road, London, UK.
2. Department of Obstetrics and Gynecology, University Hospitals, KU Leuven, Belgium
3. Department of Electrical Engineering (ESAT), Katholieke Universiteit Leuven, Belgium
4. Chelsea and Westminster Hospital, Fulham Road, London, UK
5. Nottingham University Research and Treatment Unit in Reproduction (NURTURE), UK
6. Division of Fetal Medicine, Addenbrookes Hospital, Cambridge UK

Correspondence to:

Dr Yazan Abdallah

Institute of Development and Reproductive Biology IRDB

Imperial College London, Hammersmith Campus.

Du Cane Road, London, UK. W12 0HS.

Tel: +44 (0) 208 383 5131

Fax: +44 (0) 208 383 5151

Email: y.abdallah@imperial.ac.uk

Keywords: Intra-uterine pregnancy of uncertain viability IPUV, MSD and CRL growth, and gestation sac shape.

Objectives

To study the MSD and CRL growth rates in intrauterine pregnancies of uncertain viability (IPUV) using cross-sectional and longitudinal analysis, in relation to the gestation sac (GS) shape. Our hypothesis was that MSD and CRL growth would relate to GS shape and future pregnancy viability. In addition, we hoped to establish cut-off values for MSD and CRL growth rate that may be predictive of miscarriage.

Methods

Seventy-eight consecutive cases of IPUV were prospectively followed up, mostly within 7-10 days. Gestation sac regularity was described and crosschecked by two examiners. The two-sample t-test was used to compare MSD and CRL growth according to these variables, independent of the gestation age by LMP. Growth was also analysed by functional linear discriminant analysis (FLDA).

Results

Of 78 pregnancies, 47 remained viable, 17 non-viable and 14 miscarried completely before reaching the second scan. MSD growth rate was significantly higher in the viable than the non-viable group (mean 1.1 vs. 0.34 mm/day; $p<0.001$; 95% CI [0.46; 1.08]). Similarly, a difference in CRL growth was found between the two groups respectively (mean 0.71 vs. 0.12 mm/day; $p= 0.0039$; 95% CI [0.22; 0.96]. Pregnancies with regular as opposed to irregular GS shape showed significantly higher MSD growth (mean 0.99 vs. 0.47 mm/day; $P= 0.0144$; 95% CI [0.11; 0.93]. These differences in growth rate were confirmed by FLDA.

Conclusion

Our data demonstrate a significant difference in both MSD and CRL growth rates between viable and non-viable subgroups of IPUV. Regular sac shape showed higher growth rate than irregular shaped sacs. This can be reliably used as a predictor of growth, which in turn reflects the likelihood of miscarriage. Cut-off values for MSD and CRL growth rate can be established, below which pregnancies with suboptimal growth rates that are destined to miscarry could potentially be identified at an earlier stage than current protocols indicate.

Deleted: