Performance of a Third Trimester Combined Screening Model for the Prediction of Adverse Perinatal Outcome

BCNatal - Barcelona Center for Maternal-Fetal and Neonatal Medicine (Hospital Clinic and Hospital Sant Joan de Deu) and Universitat de Barcelona, Barcelona, Spain

Objective
To explore the potential value of a third trimester combined screening composed by maternal baseline characteristics, mean arterial pressure (MAP), fetoplacental ultrasound and biochemical markers for the prediction of adverse perinatal outcome (APO) in the general population and among small-for-gestational age (SGA) fetuses.

Methods
Nested case-control study within a prospective cohort of 1590 singleton gestations referred for third-trimester evaluation (32-36 weeks of gestation). Maternal baseline characteristics, MAP, fetoplacental ultrasound and circulating biochemical markers [placental growth factor (PIGF), lipocalin-2, unconjugated estriol and inhibin-A] were assessed in all women who subsequently presented an APO (n=148) and in a control group without perinatal complications (n=902). APO were defined by the occurrence of stillbirth, umbilical artery cord blood pH<7.15, low Apgar score (5 minutes score <7) or emergency C-section for fetal distress. Logistic regression predictive models were developed for the prediction of APO in the general population and among SGA cases (defined as birth weight below the 10th centile).

Results
The prevalence of APO was 9.3% (148/1590) in the general population and 27.4% (48/175) among SGA cases. In the general population, a combined screening model including a priori risk (maternal characteristics), estimated fetal weight centile (EFWc), umbilical artery pulsatility index (UA-PI), estriol and PIGF, achieves a detection rate (DR) of 26% (AUC 0.59, 95% CI 0.53-0.64) for APO, at a 10% false positive rate (FPR). Among SGA cases, the model included a priori risk, EFWc, UA-PI, cerebroplacental ratio, estriol and PIGF predicting 62% of APO (AUC 0.86 (95% CI 0.80-0.92) at a 10% FPR.

Conclusion
The use of fetal ultrasound and maternal biochemical markers at 32-36 weeks of gestation provides a poor prediction for APO in the general population. Although continue to be limited, the performance of the screening model is improved when is applied to fetuses with suboptimal fetal growth.