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Ultrasound and serum protein predictors of pregnancy outcome at diagnosis of early-onset fetal growth restriction

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What's new?

This poster presents validated outcome markers. Findings from the discovery cohort were presented at BMFMS 2017.

Conclusion

Ultrasound measurements and maternal serum PlGF concentration at diagnosis of severe early-onset FGR predict pregnancy outcomes of importance to patients and clinicians.

Background

Severe early-onset fetal growth restriction (FGR) causes significant fetal and neonatal mortality and morbidity. Predicting the outcome of affected pregnancies at the time of diagnosis is difficult, preventing accurate patient counselling. This study identified and validated models containing ultrasound and/or maternal serum protein measurements at diagnosis to predict fetal or neonatal death and three secondary outcomes.

Methods

- Study population : estimated fetal weight (EFW) <3rd centile and <600g between 20+0 and 26+6 weeks' gestation without a structural, chromosomal, or infective cause, recruited from UK, Spain, Germany and Sweden.
- Maternal serum from the discovery set (n=63) was analysed for seven proteins linked to angiogenesis, 90 additional proteins linked to cardiovascular disease and five proteins identified through pooled liquid chromatography tandem mass spectrometry.
- Patient and clinician stakeholder priorities were used to select models tested in the validation set (n=60), with final models calculated from combined data.

Results

The most discriminative model for fetal of neonatal death included EFW z-score (Hadlock 3 formula/Marsal chart; EFW-HM), gestational age (GA) and umbilical artery Doppler category (UmA) (AUC 0.91, 95%CI 0.86-0.97) but was less well calibrated than the model containing only EFW z-score (Hadlock3/Marsal). The most discriminative model for fetal death or delivery ≤28+0 weeks of gestation included maternal serum placental growth factor (PlGF) concentration and umbilical artery Doppler category (AUC 0.89, 95%CI 0.83-0.94).
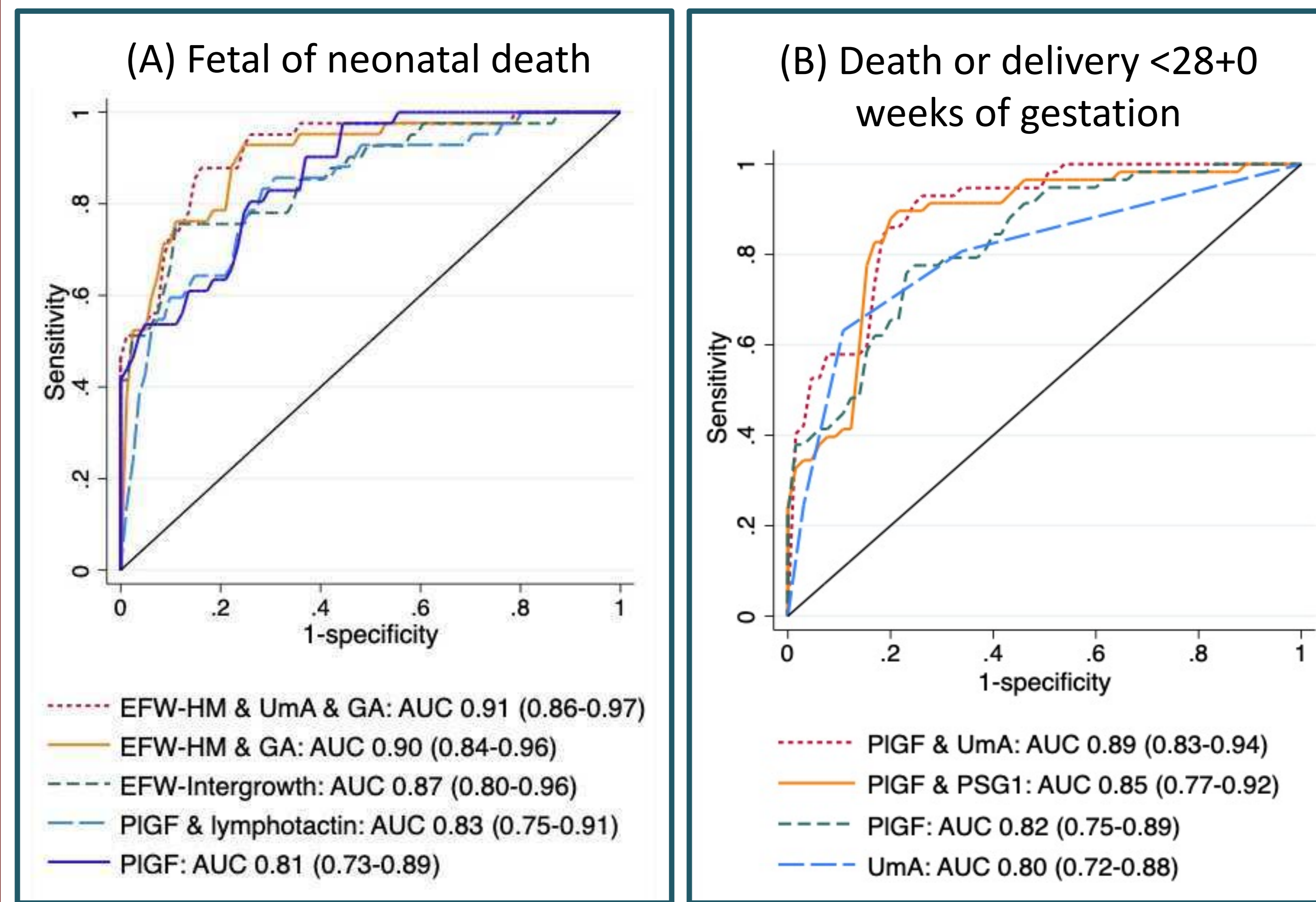
(A) Fetal of neonatal death

EFW-HM & UmA & GA: AUC 0.91 (0.86-0.97)
EFW-HM & GA: AUC 0.90 (0.84-0.96)
EFW-Intergrowth: AUC 0.87 (0.80-0.96)
PlGF & lymphotactin: AUC 0.83 (0.75-0.91)
PlGF: AUC 0.81 (0.73-0.89)

(B) Death or delivery <28+0 weeks of gestation

PlGF & UmA: AUC 0.89 (0.83-0.94)
PlGF & PSG1: AUC 0.85 (0.77-0.92)
PlGF: AUC 0.82 (0.75-0.89)
UmA: AUC 0.80 (0.72-0.88)

Figure: Comparison of the receiver operating characteristic (ROC) curves from the combined data sets for the validated models predicting (A) fetal or neonatal death (B) fetal death or delivery <28+0 weeks of gestation. EFW-HM=estimated fetal weight calculated using Hadlock 3 formula (1) with z-score calculated using Marsal reference chart (2), EFW-Intergrowth=estimated fetal weight and z-score calculated using Intergrowth formula and reference chart (3), GA=gestational age at enrolment, PlGF=placental growth factor concentration, PSG1=pregnancy-specific growth factor 1 normalised protein expression, UmA=umbilical artery category (0=pulsatility index <95th centile, 1=pulsatility index >95th centile, 2=absent or reversed end-diastolic flow, 3=reversed end-diastolic flow

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