

Combination of Doppler and biophysical parameters for the prediction of acidemia in preterm intrauterine growth restriction

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Objective

To evaluate the efficacy of multi-vessel Doppler, biophysical parameters and combination of both modalities in predicting birth pH in growth-restricted fetuses (FGR) delivered before 34 weeks gestation.

Methods

Retrospective cohort study of singleton FGR pregnancies that were monitored with umbilical (UA), middle cerebral artery (MCA), ductus venosus (DV), umbilical vein (UV) Doppler and assessment of fetal tone, movement, breathing, heart rate reactivity and amniotic fluid index (AFI). Based on univariate associations between surveillance tests with a cord artery pH <7. 20 at birth, candidate variables were further evaluated by logistic regression analysis to determine the primary determinants.

Results

In 408 patients, 120 (29. 3%) neonates had a cord artery pH <7. 20 and 23 (5. 6%) had an pH < 7. 0 or base excess <-12 (severe acidemia). DV a-wave reversal, UV pulsations, UA PI > 4. 84 SD, absent fetal tone and movement and AFI were the primary determinants of an abnormal pH. On receiver operator curve statistics, combining all variables provided significantly better predictive accuracy for severe acidemia than Doppler or biophysical variables in isolation (area under the curve 0. 87 vs. 0. 73, 0. 80, p<0. 02 and 0. 04 respectively). Combining Doppler and biophysical parameters provided lowest false positive rates for pH<7. 20 and lowest false negative rates for severe acidemia.

Conclusion

Prior to 34 weeks, umbilical artery, ductus venosus, and umbilical vein Doppler, fetal tone, movement and amniotic fluid are the strongest and most accurate predictors of acid-base status at birth if considered in combination.