

Association of cerebroplacental ratio with adverse neonatal outcomes in late small-for-gestational-age fetuses

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OBJECTIVE

To evaluate the association between abnormal cerebroplacental ratio (CPR) and adverse neonatal outcomes in late SGA fetuses

Methods

Design and setting

Retrospective cohort, 2019 - 2025, at a regional perinatal center serving an inner-city, high-risk population

Population - late SGA

Abdominal circumference or estimated fetal weight in the 3rd–10th percentile with a normal umbilical artery PI, after 32 weeks gestation

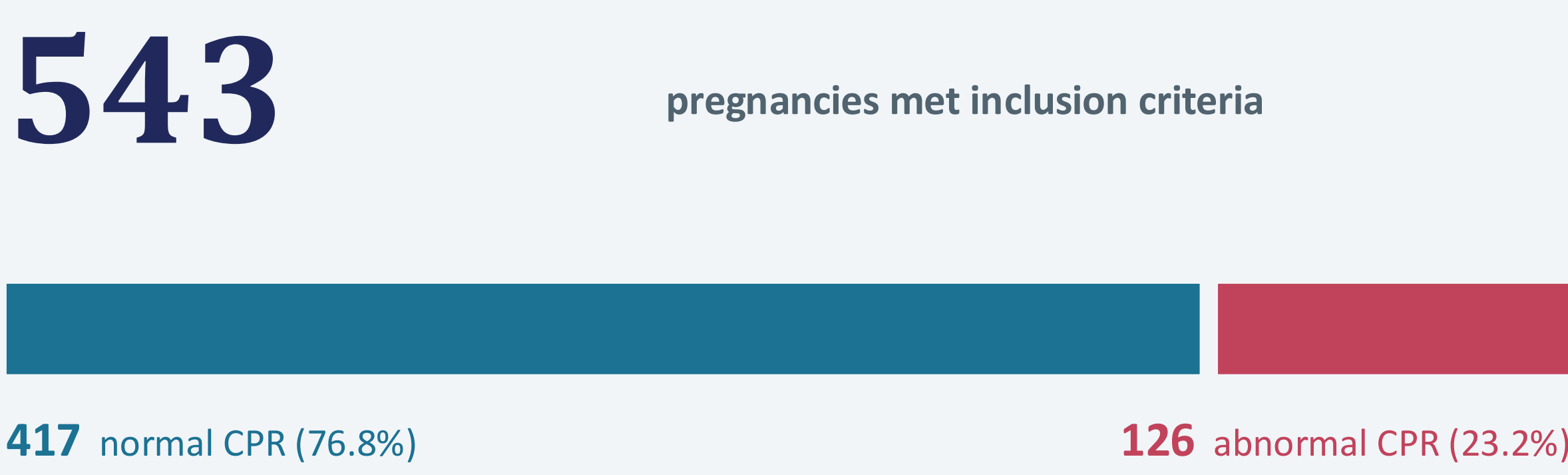
Exposure - abnormal CPR

Middle cerebral artery to umbilical artery PI ratio below the 5th percentile; normal and abnormal groups compared.

Analysis

Between-group comparison of maternal, delivery and neonatal outcomes, then multivariable logistic regression adjusted for confounders.

Study population



Outcome measures

PRIMARY OUTCOME

Composite of adverse neonatal outcomes

- Arterial cord pH $\leq$ 7.05
- 1-minute Apgar $<$ 7
- NICU admission $>$ 24 hours
- Respiratory distress syndrome
- Intraventricular hemorrhage
- Necrotizing enterocolitis
- Neonatal death

SECONDARY OUTCOMES

- Preeclampsia
- SGA at birth ($<$ 10th percentile)

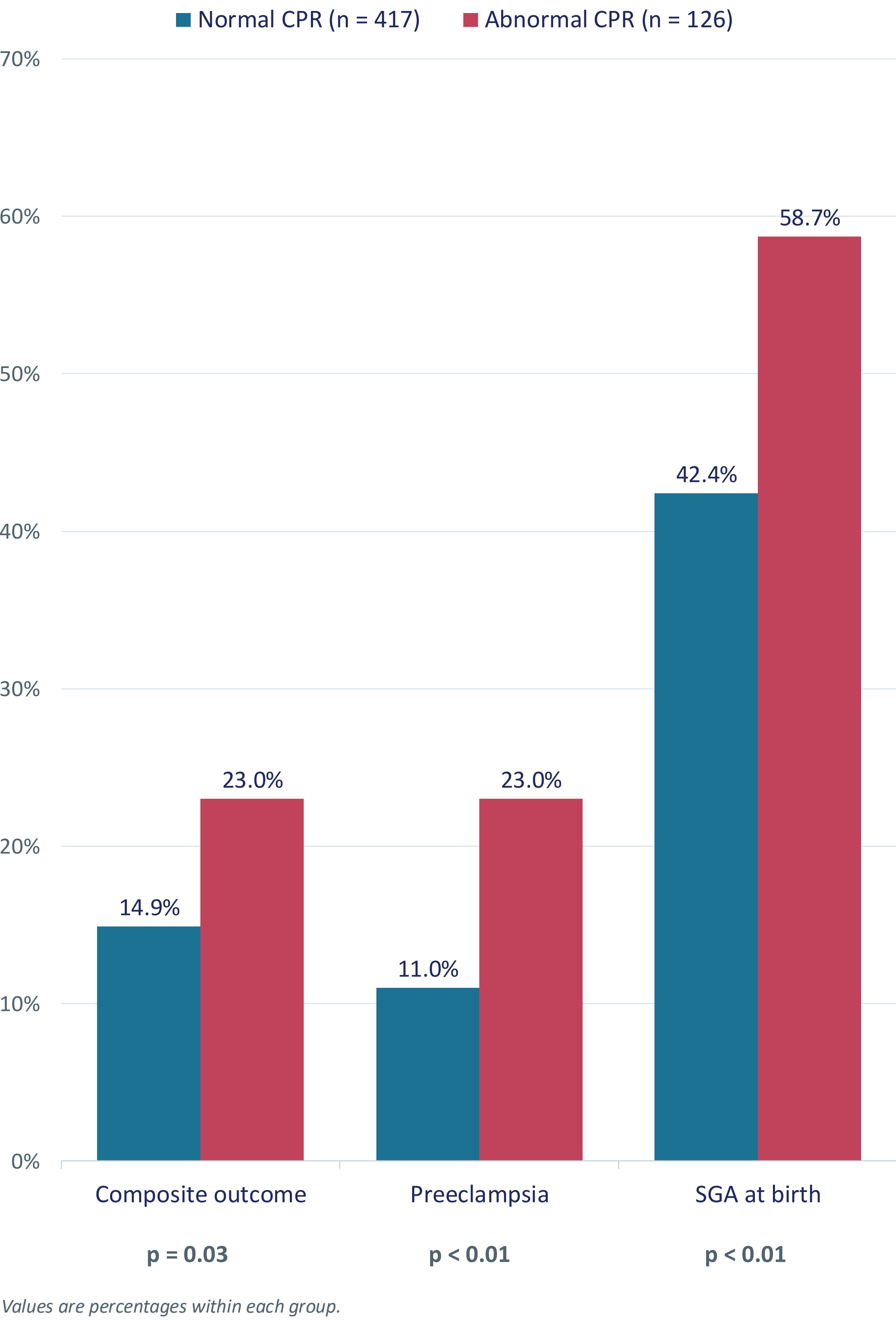
ADJUSTMENT

Adjusted odds ratios (aOR) with 95% confidence intervals from multivariable logistic regression.

Groups were comparable at baseline

- Maternal age, BMI, parity and hypertensive history did not differ
- Gestational age at delivery was lower with abnormal CPR: 38.1 ± 0.2 vs 38.6 ± 0.1 weeks ($p < 0.01$).

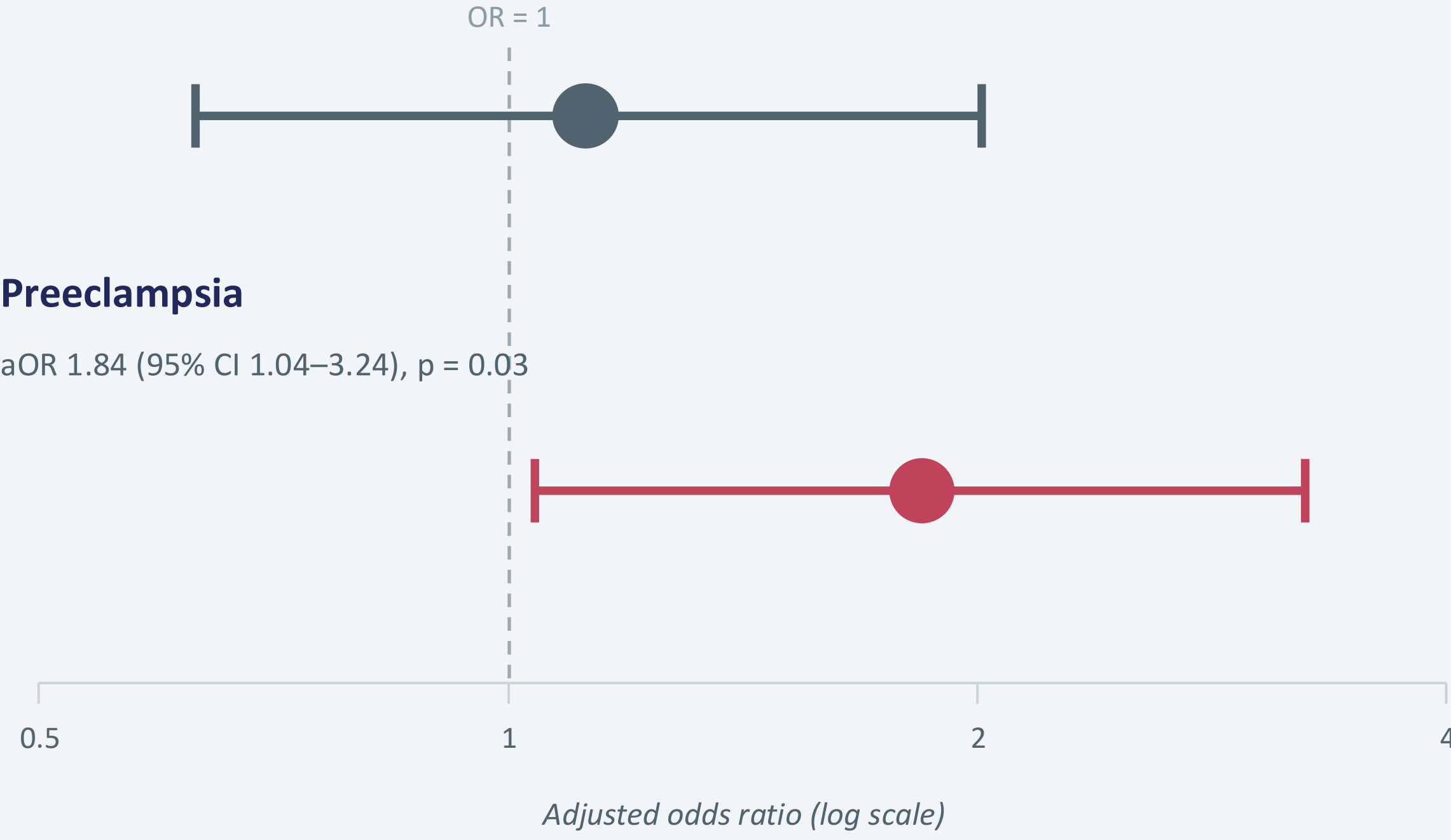
Unadjusted outcomes



Multivariable analysis

Composite adverse neonatal outcome

aOR 1.12 (95% CI 0.63–2.01), $p = 0.6$



Abnormal CPR was not independently associated with the neonatal composite but **remained associated with preeclampsia**.

CONCLUSIONS

Significant - until adjustment

Abnormal CPR was associated with adverse neonatal outcomes on unadjusted analysis, but not after adjustment for confounders.

The independent link is to preeclampsia

This suggests CPR reflects fetal adaptation to placental insufficiency rather than immediate neonatal compromise.

The relevant outcome may be later

Abnormal CPR may be more closely linked to later neurodevelopmental vulnerability than to newborn morbidity.

Interpretation and Conclusions

The unadjusted differences were largely explained by measured covariates - most plausibly placental disease that produces both the abnormal Doppler and the adverse outcome.