# Fetal Abdominal Circumference as an Early Marker in Prediction of Small for Gestational Age Newborns

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## Objectives

- To evaluate the relationship of the fetal abdominal circumference (AC) and the subsequent development of fetal growth restriction (FGR) in small for gestational age (SGA) newborns

## Introduction

- FGR is defined as an estimated fetal weight (EFW) < 10$^{th}$ percentile on ultrasound
- Recent literature suggests including an isolated abdominal circumference < 10$^{th}$ percentile in the definition of FGR
- There is a paucity of literature describing the temporal relationship of the development of AC < 10$^{th}$ percentile and subsequent development of SGA

## Study Design

- A retrospective cohort study of singleton fetuses diagnosed with antenatal FGR (EFW < 10$^{th}$ percentile) during ultrasound between 2012 and 2020
- Time from diagnosis of AC < 10$^{th}$ percentile to time of diagnosis of FGR and time to delivery were calculated
- Primary outcome: SGA newborns (birthweight < 5$^{th}$ percentile)
- Secondary outcomes: fetal umbilical artery Doppler, maternal comorbid disorders such as hypertension and autoimmune disease, and newborn outcomes
- Abnormal umbilical artery Doppler was defined as an S/D ratio > 95$^{th}$ percentile for GA, absent end diastolic flow or reverse end diastolic flow
- Statistical analyses, including Chi square and logistic regression modeling, were performed with significance levels of < 0.05

## Results

- 231 women given an antenatal diagnosis of FGR
- 182 (79%) SGA newborns and 49 (21%) non-SGA newborns
- Both groups were similar in age, parity, ethnicity, substance use disorder, gestational age at delivery, oligohydramnios, preeclampsia, and maternal comorbidities
- Fetal AC <10$^{th}$ percentile preceded ultrasound diagnosis of FGR in SGA newborns more frequently than non-SGA newborns (46% v 29%; p=0.03)
- Time from identification of an AC <10$^{th}$ percentile to diagnosis of FGR averaged 6.7±4.9 weeks
- Antenatal abnormal umbilical artery Doppler occurred more frequently in SGA newborns compared with non-SGA newborns (92% v 8%; p=0.002)
- In logistic regression, the antenatal variables most likely to predict an SGA newborn included fetal AC <10$^{th}$ percentile preceding FGR (OR 2.27; 95%CI: 1.09 - 4.71) and abnormal umbilical artery Doppler (OR 4.41; 95%CI: 1.7 – 11.4)

**Table 1. Antenatal variables in prediction of an SGA newborn <5$^{th}$ percentile**

| Variable | Odds Ratio | 95% CI | *p* value |
|---|---|---|---|
| AC <10$^{th}$ percentile prior to FGR | 2.27 | 1.09-4.71 | **0.0278** |
| Abnormal Umbilical Doppler | 4.41 | 1.70-11.4 | **0.0022** |
| Maternal Comorbidities | 0.54 | 0.26-1.11 | 0.0939 |
| BMI > 35 kg/m$^2$ | 0.70 | 0.28-1.73 | 0.4406 |
| IVF conception | 0.60 | 0.10-3.61 | 0.5782 |
| Multiparity | 1.05 | 0.54-2.09 | 0.8978 |
| Smoker | 2.36 | 0.62-8.92 | 0.2071 |

## Conclusion

- Measurement of fetal AC <10$^{th}$ percentile on antenatal ultrasound independently predicts development of subsequent FGR and SGA newborns
- AC <10$^{th}$ percentile preceded diagnosis of FGR by an average of six weeks
- Further antenatal monitoring with ultrasound surveillance is recommended

## References

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