How to Manage the Patient with Fetal Intrauterine Growth Restriction

Intrauterine Growth Restriction
Definition and Standards
• Failure to achieve inherent growth potential
• Defined by <10th or 5th percentile weight for gestational age (in the U.S. and Great Britain)
  “Customized” v. population-based growth curves (www.gestation.net)
Figure 2: Percent mortality of SGA infants by gestational age at birth. Mortality was significantly higher for SGA infants in the 25th week of life (P < 0.05) and from 28 to 39 weeks' gestation (P < 0.001). (From: Rogers BP, Daffin LA, Litmanovici I, Anser S, Backes T, Lord. Neonatal Network. Excess mortality and morbidity among small-for-gestational age premature infants: a population-based study. J Pediatr 2003;143:186–90, with permission.)
Etiologies of IUGR

- Fetal Aneuploidy/malformations
- Multiple gestation
- Placental factors
- Maternal smoking/drug use
- Maternal hypertensive disorders
- Lupus anticoagulant and ACA
- Congenital Thrombophylic Disorders??

Chromosome Abnormalities

- 458 fetuses referred for IUGR underwent blood karyotyping: 17-39 weeks
- 19% had chromosome defects, most commonly Trisomy 18

Snijders A/JOG 1993; 168:547

Major Structural Malformations

- 13000 infants born with major structural malformations
- 22% were IUGR
- Most commonly associated with anencephaly and Trisomy 18

Khoury Pediatrics 1988;82:83
Congenital Thrombophilic Disorders and IUGR

- Meta analysis of 10 case-control studies
- Association between factor V Leiden (RR 2.7), prothrombin gene variant (RR 2.3) and IUGR (Howley et al, 2005 AJOG)
- Four recent studies show no relationship:
  - NEJM 2002; 347: 19
  - AJOG 2004; 191: 2002
  - Haematologica 2004; 89: 444
  - Epidemiology 2005; 16: 281

Preeclampsia

Mean Urinary Concentrations of PI GF at 21 to 32 Weeks of Gestation According to Preeclampsia Status and Severity, Before and After Normalization for Creatinine

DIAGNOSIS OF FETAL GROWTH ABNORMALITIES
Diagnostic Evaluation

• Ultrasound confirmation and detailed anatomy
• Fetal Karyotyping
• Maternal serum studies for evidence of seroconversion if suspicious of viral infection. Amniotic fluid viral DNA testing
• Observation for development of preeclampsia
• Evaluation for Thrombophylic disorder?

Management

• Evaluation of fetal growth velocity
• Assessment of fetal health
  – Biophysical profile
  – Doppler flow of umbilical and middle cerebral artery
Autoregulation of fetal cerebral blood flow

Classification of Fetal Growth Abnormalities

- Constitutionally small fetus
- Structural and/or chromosomal abnormalities
- Substrate deprivation/placental insufficiency
Constitutionally Small Fetus

- Normal growth velocity, symmetrical pattern
- Normal anatomy and fluid volume
- Normal fetal function tests: BPP/Doppler
- Delivery at term

Structural/Chromosomally Abnormal Fetus

- Symmetrical and below normal
- Abnormal anatomy, aberration in fluid volume
- Additional evaluation: karyotype, amniotic fluid DNA
- BPP and Doppler variable
- Delivery timing dependent on etiology

Substrate Deprivation/Placental Insufficiency

- Usually asymmetric
- Normal anatomy, oligohydramnios
- Detection of maternal vascular or Thrombophylic disorder.
- Meticulous fetal health evaluation
- Delivery timing based on growth velocity, fetal status and lung maturity
Delivery Timing

**Term or near term** (≥36 weeks)
- Preeclampsia
- Failure of apparent growth over 2—4 weeks
- BPP 6 or less
- AEDF or REDF

**Remote from term** (≤ 36 weeks)
- AEDF and ↑ MCA flow; BPP <6
- REDF
- ? Role of venous circulation

Areas Under Investigation

Assessment of Fetal Venous Circulation

- Ductus Venosus
- Umbilical vein
Ductus venosus flow

Umbilical Venous Flow

Deleterious Effect of Corticosteroids

- 19 preterm IUGR fetuses with AEDF
- Following steroids 10 had transient improvement in UA flow, 9 did not
- Two deaths and 2 with severe acidosis in the group without improvement in UA flow

Simchen et al. AJOG 2004; 190:296
Fetal Programming – Effect of IUGR on Adult Disorders

- Death rates from coronary artery disease 2x higher among those born of LBW
- Prevalence of insulin resistance and the “Metabolic Syndrome” much higher among LBW
- Hypertension