

DIABETES

**GEORGIA PERINATAL ASSOCIATION
CONFERENCE**

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ST. SIMMONS, GEORGIA

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DIABETES

OBJECTIVES~to obtain a better understanding of:

- Prevalence of diabetes
- Classifications of diabetes
 - Gestational diabetes
- Treatment and management of diabetes in pregnancy
 - HAPO study
- Practical information

DIABETES

PREVALENCE OF DIABETES

- Epidemic of diabetes and obesity worldwide due to dietary practice and lack of physical activity
- In the year 2000 there were 171 million diabetics worldwide
- Predicted by 2030 there will be 366 million worldwide

DIABETES

- This increase greatly affects women of childbearing age
- There has been an increase in preexisting diabetes
- With preexisting diabetes there is:
 - Double the risk of birth injury
 - Triple the risk of cesarean
 - Quadruple the risk of NICU admissions
 - A 3 to 4 times more likely risk of congenital anomalies
 - 10 times more likely risk of macrosomia

DIABETES

- THESE COMPLICATIONS CAN BE PREVENTED OR AT LEAST REDUCED BY INTENSIVE MANAGEMENT AND INTRAPARTUM CARE

DIABETES

CLASSIFICATIONS OF DIABETES

- Type I
- Type II
- Other~drug or chemical induced
- Gestational

DIABETES

- Type I
- ~5 to 10%
- Cellular mediated autoimmune destruction of the beta cells of the pancreas
- Can occur at any age
- These patients are at the highest risk of adverse outcomes with pregnancy – maternal and fetal

DIABETES

- Type II
- Loss of the balance between insulin sensitivity and insulin response
- Both insulin resistance and beta cell dysfunction exist
- Decrease in insulin sensitivity and adequate insulin response = an increase in blood glucose
- Preexisting factors include: obesity, sedentary lifestyle, family history, and genetics

DIABETES

- Other
- Anything medically, physically, or pharmaceutical that affects the pancreas
- Cystic fibrosis
- Trauma
- Medications ~ HIV medications and organ transplant medications

GESTATIONAL DIABETES

- GDM
- Carbohydrate intolerance of various degrees of severity with onset first recognized during pregnancy
- Pathophysiology is similar to type II—loss of the balance between insulin sensitivity and insulin response with both insulin resistance and beta cell dysfunction. There is a decrease in insulin sensitivity and an increase in blood glucose
- 3 to 9% of all pregnancies are complicated by GDM
- ~ 135,000 cases in the U.S.

GESTATIONAL DIABETES

- Recognition is important to decrease pregnancy complications
- Risk factors for GDM:
 - > 35 years of age
 - BMI > 30
 - History of GDM
 - Previous LGA
 - PCOS
 - Family history

GESTATIONAL DIABETES

- Also consider those on certain medications
for example--
- Organ transplant medications
- HIV medications
- Steroids

GESTATIONAL DIABETES

- Any risk factors would indicate need for early screening
- Early screening at intake of care or once able to tolerate glucola
- If normal repeat at 24 to 28 weeks gestation
- Sometimes repeated again if LGA/Polyhydramnios occurs on ultrasound later in pregnancy
- Screen if glucouria occurs on routine testing or elevated glucose with routine labs

GESTATIONAL DIABETES

- Testing
- One step option ~ 75 gram glucola and 2 hour OGTT~ mostly performed outside the U.S. (also recommended by the American Diabetic Association)
- Current ACOG recommendations:
 - One hour followed by three hour if one hour is > 135
 - The one hour is performed by giving a 50 gram glucola and assessing a glucose level one hour later

GESTATIONAL DIABETES

- Three hour testing
- 100 gram glucola is given
- Values are as follows:

Fasting >95

One hour >180

Two hour >155

Three hour >140

GESTATIONAL DIABETES

- The three hour is performed by giving a 100 gram glucola
- Two or more values must be abnormal for the diagnosis of GDM
- If one value is abnormal would place on diet and check two to three fasting and 1 hour pp values per week
- Treat as GDM if abnormal values occur

HAPO STUDY

- HYPERGLYCEMIA AND ADVERSE PREGNANCY OUTCOMES
- American Diabetic Society supports and advocates the recommendations of this study

HAPO STUDY

- Study rationale was that diabetes increases adverse pregnancy outcomes
- Want to know at what level of glucose intolerance will these adverse outcomes occur?
- Was a multicenter observational study that looked at associations between maternal glucose levels and perinatal outcomes.
- Was not a clinical trial

HAPO STUDY

- HAPO Protocol
- 75 gram glucola at 24 to 32 weeks gestation
- Check fasting, one hour, and two hour glucose levels
- After delivery cord glucose and C-peptide were assessed
- Neonatal glucose at 1 to 2 hours of age
- By 72 hours of age the fetal length, head circumference, weight, and skin folds X 3 were assessed

HAPO STUDY

- 25,505 participates
- 1,443 were incomplete
- 746 unblinded for treatment
- Total of 23,316 for the final results
- Participate centers included: Bellflower, Chicago, Providence, Cleveland, Toronto, Belfast, Manchester, Barbados, Petah-Tiqva, Beersheba, Bangkok, Brisbane, Newcastle, Singapore, and Hong Kong

HAPO STUDY

- PRIMARY RESULTS
- Weight greater than 90%
- Primary cesarean section
- Neonatal hypoglycemia
- Neonatal hyperinsulinemia (cord serum C-peptide > 90%)

HAPO STUDY

- SECONDARY RESULTS
- Newborn body fat >90%
- Preterm delivery
- PIH
- Shoulder dystocia or birth injury
- NICU admission
- Hyperbilirubineamia

HAPO STUDY

- Broken down into 7 glucose categories
- 1. FPG <75 1hr <104 2hr<90
- 2. 75-79 106-131 92-108
- 3. 81-85 133-155 110-124
- 4. 86-88 157-171 126-139
- 5. 90-94 173-193 140-157
- 6. 95-99 194-211 158-176
- 7. >101 >212 >178

HAPO STUDY

- Adjustments were made for the following:
- Field center
- Age, BMI, Height
- Parity
- Alcohol and tobacco use
- Hospitalizations during pregnancy
- First degree relative with diabetes
- Gestational age

HAPO STUDY

- From the data obtained a committee of experts were appointed to resolve issues
- International Association of Diabetes in Pregnancy Study Group
- Had conference workshop to present and discuss data for three days
- Then had second meeting March 25, 2009 in Italy to finalize diagnostic criteria

HAPO STUDY

- Discussion of meetings focused on:
- How much risk is too much?
- Importance of specific glucose measures
- Results—advantages versus disadvantages of treating mild gestational diabetes

HAPO STUDY

- Diagnosis of GDM in pregnancy values:
- Fasting 92 or less
- 1 hour post 75 gram glucola 180 or less
- 2 hour post 75 gram glucola 153 or less
- One or more abnormal value results in the diagnosis of gestational diabetes

HAPO STUDY

- Data proved that the outcomes were significantly improved over the treated group versus the non-treated group
- Decrease in LGA, Macrosomia, PIH, NICU admissions
- It should be noted that the recommendations were for testing to be performed using venous plasma and not capillary sampling for the diagnosis of GDM

HAPO STUDY

- Diagnosis of overt diabetes in pregnancy
- Fasting $>126\text{mg/dl}$
- Hgb A1C greater than 6.5%
- Random glucose greater than 200mg/dl and confirmed with Hgb A1C greater than 6.5% or Fasting value greater than 126mg/dl
- **THESE PATIENTS SHOULD BE TREATED AS PREEEXISTING DIABETICS**

HAPO STUDY

- Still questions regarding if all patients should be tested or just those who fall in high risk category
- Definitely test all those falling in high risk category at intake of care or as soon as possible and if abnormal treat as if preexisting diabetic
- If high risk patient is normal then retest at 24 to 28 weeks gestation with 75 gram glucola criteria
- If not high risk then wait until 24 to 28 weeks gestation and screen with 75 gram glucola

?????

Why are we not performing the HAPO protocol?

- ACOG~not current recommendations
- NIH~not current recommendations
- Cost

RISKS OF GDM

- Macrosomia
- Polyhydramnios
- Preterm labor
- Fetal complications with glycemic control
- 50% risk of overt DM in the next 10 years to the mom

- Dietary counseling
- Pattern blood sugars—fasting and one/or two hour pp
- Fetal movement counts at 26 weeks
- Weekly blood sugar assessments
- Serial ultrasounds in the third trimester for fetal well-being, growth, and amniotic fluid index
- Fetal NST's if under poor control or progresses after 40 weeks gestation
- Testing at 6 weeks post partum

TREATMENT / MANAGEMENT

- Prefer fasting glucose levels to be less than 95, one hour pp blood glucose to be less than 140, and two hour pp less than 120
- If borderline or slightly elevated can treat with PO glycemics
- If moderate to severely elevated would treat with insulin
- If PO glycemics or insulin is started will need twice weekly NST's at 32 weeks and delivery at 39 weeks

TREATMENT/MANAGEMENT

- 50% risk of developing overt diabetes in the next 10 years
- Encouraged healthy diet, moderate exercise, and weight control
- Need to be tested every one to two years for overt diabetes with primary care provider
- Early screening is recommended with future pregnancies

RISKS OF OVERT DM & PREGNANCY

Maternal Morbidity

- Retinopathy
- Nephropathy
- Cardiovascular complications~Chronic hypertension, PIH, Atherosclerotic heart disease
- Diabetic Ketoacidosis
- Preterm delivery
- Cesarean
- Maternal death

RISKS OF OVERT DM CONT...

- Fetal morbidity and mortality
- Increase risk of miscarriage
- Increase risk of congenital anomalies
- IUGR
- Macrosomia
- Polyhydramnios
- Fetal obesity
- Preterm delivery
- Birth injury

RISKS OF OVERT DM CONT....

- Polycythemia
- Hypoglycemia
- Hypocalcemia
- Hyperbilirubinemia
- Hypertrophic and congestive cardiomyopathy
- RDS
- Childhood neurologic abnormalities

MANAGEMENT

- PEEEXISTING DIABETICS
- Hgb A1C of 6% or less prior to conception
- Consultation with Maternal Fetal Specialist to discuss risks of diabetes and pregnancy
- MMS at 15 to 18 weeks
- Targeted ultrasound at 18 weeks
- Fetal echocardiogram at 20 to 24 weeks
- Serial ultrasounds in the third trimester for fetal growth and well-being

MANAGEMENT

- Fetal movement counts at 26 weeks
- Bi-weekly nonstress tests at 30 to 32 weeks
- Delivery at 39 weeks if uncomplicated
- Weekly blood sugar assessments and insulin adjustments during pregnancy
- Pattern blood sugars and dietary counseling
- Baseline 24 hour urine for total protein and creatine clearance in first trimester
- Ophthalmology exam
- Cesarean with macrosomic infant

MANAGEMENT

- Usually decrease insulin by $\frac{1}{2}$ after delivery
- Follow up with primary MD for insulin/diabetic management or referral to endocrinologist
- Breast feeding is encouraged and shows benefits for the neonate and mom

ISSUES WITH DIABETES

- Compliance: diet, medications, blood sugar assessment, appointments
- Different management styles and goals with each provider
- Living in the South
- Economics of eating appropriately
- Patients that do everything right and still have poor outcomes
- Patients who do everything wrong and still have good outcomes