GESTATIONAL DIABETES: GLUCOLA™ TO BIRTH

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OBJECTIVES

1. Recognize the difference between the diagnosis of gestational diabetes (GDM) and pregestational diabetes.
2. Identify risk factors of gestational diabetes and understand the screening, diagnosis, and treatment process.
3. Identify the treatment needs of patients/clients.
4. List possible complications of GDM for mom and baby.
5. Identify aftercare/postpartum recommendations for patients/clients with GDM.
6. Identify important concepts of preconception counseling to help prevent GDM.
DEFINITIONS AND PREVALENCE IN USA

• Gestational Diabetes (GDM)
  • Any glucose intolerance with onset or first recognition during pregnancy. (ADA)
  • One of the most common medical conditions in pregnancy

• About 7% of pregnancies were complicated with any type of diabetes, but 86% were GDM

• Pregestational diabetes or diabetes in pregnancy
  • Previously diagnosed type 1 or type 2 diabetes in pregnancy or diagnosed glucose intolerance prior to 24 weeks gestation.
  • The prevalence of diabetes mellitus in reproductive age women is about 3.1% to 6.8%
  • Pregestational diabetes is observed in 1-2% of all pregnancies.
  • Type 1 and Type 2 diabetes causes greater risk in pregnancy compared to GDM
GDM CASE EXAMPLE #1

- Patient at NOB (11 weeks gestation)
- Pre-pregnancy BMI 36, large frame size.
- PMH: Hypertension, Hyperlipidemia, Obesity

- **Early Screening:**
  - 1hr abnormal: 164mg/dl (H)
  - 3hr WNL:
    - Fasting: 79 mg/dl
    - 1hr: 167 mg/dl
    - 2hr: 151 mg/dl
    - 3hr: 130mg/dl

- **Follow-up Screening at 27 weeks**
  - 2hr abnormal:
    - Fasting: 77 (WNL)
    - 1hr: 185mg/dl (H)
    - 2hr: 160mg/dl (H)

- Diagnosed with GDM at 27 weeks
PREGESTATIONAL DIABETES CASE EXAMPLE #2

• Patient at NOB (12 weeks gestation)
  • 20 BMI, small frame size.
  • Previous Hx of GDM about 3 years prior

• Early Abnormal 1hr: 172mg/dl (H)

• Early Abnormal 3hr:
  • Fasting: 91mg/dl (WNL)
  • 1hr: 184 (H)
  • 2hr: 172mg/dl (H)
  • 3hr: 163 mg/dl (H)

• Diagnosed with pregestational diabetes in pregnancy
MODIFIABLE RISK FACTORS

- Physical Inactivity
- Hypertension (>140/90mmHg or on therapies for hypertension)
- Hyperlipidemia (or medical Hx of CVD)
  - HDL cholesterol >35mg/dl (0.9mmol/L) and/or triglyceride level >250 mg/dl (2.82mmol/L)
- Overweight or obese
  - BMI >25
  - BMI >23 in Asian Americans
- Elevated HgbA1C
  - Pre-diabetes (A1C >5.7%)
NON-MODIFIABLE RISK FACTORS

- Race and ethnicity
  - GDM is most common in Hispanic, African American, Native American, Asian American, Pacific Islander
- Family History of DM
- Polycystic Ovarian Syndrome (PCOS)
- Personal Hx of GDM
- Advanced Maternal Age (>35 years old)
PREGNANCY WEIGHT GAIN RECOMMENDATIONS

- Risk of GDM increases with adiposity and BMI
- Pregnancy weight gain recommendations based on pre-pregnancy weight (ACOG)
  - Healthy Weight (18.5-24.9): 25-35lbs
  - Underweight (<18.5): 28-40lbs
  - Overweight (25-29.9): 15-20lbs
  - Obese (>30): 11-20lbs
GENERAL SCREENING

All OB patients should be screened with 1hr Oral Glucose Tolerance test (OGTT) at 24-28 weeks gestation.

**If 1hr OGTT elevated, recommend 3hr OGTT

Elevated 1hr OGTT if ≥135mg/dl
ORAL GLUCOSE TOLERANCE TESTS (OGTT)

- **Two Step:**
  - One Hour OGTT (step 1)
    - NOT fasting
    - 50g glucose drink (value drawn at 60min)
  - 3 Hour OGTT (step2)
    - Fasting test
    - Positive result if 2 values elevated
    - 100g glucose drink (values drawn at baseline, 60 min, 120 min, and 180min)

- **One step:**
  - 2 Hour OGTT
    - Fasting test
    - Positive result if 1 value elevated
    - 75g Glucose (values drawn at baseline, 60 min, and 120min)

- **Two Step NIH Consensus**: 1hr OGTT, then if abnormal, continue to 3hr OGTT screening.
Early Screening

Women who present to 1st OB visit before 24 weeks with 1 or more risk factors for GDM are recommended to have early screening for gestational diabetes.

**Recommendation:**
- 1hr OGTT
- Result:
  - If elevated, 3hr OGTT recommended
  - If WNL, retest with 3hr in 4 weeks or if <24 weeks, use 2hr OGTT

If any OGTT returns with elevated fasting value, could treat as GDM for rest of pregnancy
- Signifies insulin resistance
ADDITIONAL SCREEN LATER IN PREGNANCY

Early 1hr OGTT elevated

3Hr OGTT

2 or more values elevated (GDM)

One or less values elevated

Repeat 3hr OGTT in 4 weeks or if >24 weeks, can do 2hr OGTT
INTOLERANCE TO OGTT

• If a patient/client is unable to tolerate or refuses OGTT test:
  • Start BG checks four times daily (Fasting, 2hrs PP Breakfast, lunch and dinner)
  • Follow up in a week to assess blood glucose readings, if multiple elevated then continue to monitor and medical provider able to make diagnosis.
  • Random blood sugar checks recommended at all OB checks with medical provider.

• Normal blood glucose readings (for patients/clients without GDM)
  • Fasting: 61-75mg/dl
  • Postprandial: rarely greater than 126mg/dl
DIAGNOSIS

- Generally, 2 step OGTT used more often due to ease and convenience
  - 1hr elevated if >135mg/dl

- After an elevated 1hr OGTT, a 3hr OGTT with two values greater than the following, denotes positive 3hr OGTT and diagnosis made for GDM.

Plasma or Serum Glucose Level Carpenter and Coustan Conversion

<table>
<thead>
<tr>
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<th>Fasting</th>
<th>1Hr</th>
<th>2Hr</th>
<th>3hr</th>
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<tr>
<td></td>
<td>&gt;95mg/dl</td>
<td>&gt;180mg/dl</td>
<td>&gt;155mg/dl</td>
<td>&gt;140mg/dl</td>
</tr>
<tr>
<td></td>
<td>5.3mmol/L</td>
<td>10.0mmol/L</td>
<td>8.6mmol/L</td>
<td>7.8mmol/L</td>
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TREATMENT OF GESTATIONAL DIABETES AND PREGESTATIONAL DIABETES
INITIAL NUTRITIONAL INTERVENTION

- **Initial Consult:**
  - Complications and description/overview of insulin resistance and GDM
  - Practice identifying carbohydrates, proteins, and fat foods
  - Meal plan and carbohydrate counting
  - Blood sugar monitoring and demonstration of glucometer (4 times/day)
    - Fasting and
    - 2 hours Postprandial (breakfast, lunch, and dinner)
  - Importance of exercise and blood sugar management
FOLLOW-UP NUTRITION EDUCATION

• **Follow-up schedule:**
  - Initially 1 week or less until blood sugars are stabilized WNL
  - Provider need for future follow up schedule
    - Usually every 2-3 weeks if A1 GDM with stable blood sugars
    - More frequent if blood sugars elevated or if A2 GDM, weekly appointments
  - Blood sugar log and trend assessment
  - About 70-85% of women with GDM can manage with lifestyle and eating alone. (under Carpenter and Coustan or National Diabetes Data Group)
EDUCATIONAL TOOLS

- Measuring cups
- Food models or example nutrition facts labels
- Food and blood sugar logs
  - Individual assessment of logs at each visit
- Other educational handouts
  - Sample menu’s
  - Meal and Snack ideas
  - Complications of Gestational Diabetes
RECOMMENDED MEAL PLAN

• Recommended Meal Plan:
  • Breakfast: 2 Carbohydrate servings
  • AM snack: 1 Carbohydrate serving
  • Lunch: 3-4 carbohydrate servings
  • PM snack: 1 carbohydrate serving
  • Dinner: 3-4 carbohydrate serving

• A minimum of 71 g protein and 28 g fiber/day

• DRI is 175g Carbohydrates/day

• Plant based eating and minimal saturated fat intake
  • Triglycerides pass through placenta to the baby and can cause excessive adiposity

• Increased whole grains and fiber intake

• Emphasis on adequate carbohydrate intake
  • Inadequate carbohydrate intake= excessive fat intake= excessive Kcal intake= excessive weight gain and increased fetal adiposity
MEDICATIONS FOR BLOOD GLUCOSE MANAGEMENT

• **NO ORAL MEDICATIONS!**
  • Crosses placenta, baby doesn’t have glucose intolerance
  • May cause pre-term birth
  • Fetal concentrations have been found to be similar to maternal levels

• **Insulin Initiation:**
  • Initiate if >50% of blood sugars elevated above goal
  • Only recommended hyperglycemic management medication
  • Doesn’t cross placenta
  • Insulin needs may increase as pregnancy advances due to increase insulin resistance later in pregnancy

• **Weight and trimester based dosage (ADA):**
  • 1\textsuperscript{st} trimester: TDD=0.6 x Kg body weight
  • 2\textsuperscript{nd} Trimester: TDD=0.7 x Kg Body weight
  • 3\textsuperscript{rd} Trimester: TDD=0.8 x Kg Body weight

* * Due to differences in patient populations, organizations may choose to use different estimated insulin needs calculations.
**BLOOD SUGAR AND A1C TARGETS (ADA, ACOG)**

- **Blood Sugar Targets:**
  - Fasting <95 mg/dl
  - One-Hour Postprandial <140 mg/dl
  - Two-Hour Postprandial <120 mg/dl

**Some organizations may hold stricter blood sugar management targets.**

- **A1C goal during pregnancy is <6.0%** (if this can be achieved without risk of hypoglycemia, if not, relax goal)

- **Hyperglycemia and Adverse Pregnancy Outcomes Study (HAPO)**
  - Found that the least amount of adverse fetal outcomes happened in pregnant women with AIC <6-6.5% early in gestation.
  - Due to increase red blood cell turnover or hemoglobinopathies, the measure of AIC is most useful in the first trimester and can be inaccurate later in pregnancy.
MATERNAL FETAL MEDICINE TEAM

Team:

- Perinatologist and other specially trained medical providers (MD, NP, PA, Etc.)
- CDE providers
- Registered Dietitians

More frequent follow up may be required.

- Registered Dietitian and/or CDE to see at all OB appointments or regularly scheduled.
- Additional labs (HgbA1C, random glucose, UA, etc.)
- Urine Ketones to monitor for DKA, mostly in type 1 DM
- Additional fetal monitoring
  - Non-stress tests (NST's)
  - Ultrasounds (level 2)
BEHAVIORAL HEALTH PROVIDERS

• Support and encouragement
• Behavior modification (habits, routines, etc.)
• Psychosocial factors (DV, Mental Health disorders, financial barriers, etc.)
• Recommended consults within each trimester, if available.
IDENTIFYING BLOOD GLUCOSE LOGS AND TRENDS

• Identify lows and highs (always fix lows first, if GDM A2 decrease insulin and/or make sure 15/15 rule is being followed)

• Assess food intake and compare to blood glucose trends

• Encourage balance meals/snacks (plate method as guide)

• Remain unbiased and try to avoid judgement

• Insulin Need:
  • More likely to need insulin if elevated baseline (fasting) in 2 or 3hr OGTT
  • If fasting blood sugars continue to stay elevated
  • If most PP blood sugars elevated

• Other Recommendations to try first before insulin initiation:
  • 1 carbohydrate serving snack before bedtime, delays liver glucose release
  • Walking after meals
  • Dietary interventions (i.e. more fiber, more stringent CHO counting, low fat, etc.)
COMPLICATIONS OF GESTATIONAL DIABETES AND PREGESTATIONAL DIABETES
FETAL COMPLICATIONS

- Macrosomia (large baby)
- Hyperbilirubinemia
- Shoulder Dystocia
- Birth Trauma
- Still Birth
- Spontaneous Abortion
- Neonatal Hypoglycemia at Birth
- Increase risk of developing type 2 diabetes or obesity later in life
MATERNAL COMPLICATIONS

- Preeclampsia
- Need for cesarean delivery
- Risk of type 2 DM of about 50% within the following 5 years after delivery
- Risk of Prediabetes
- Risk of future GDM
COMPLICATIONS CASE EXAMPLE #3

• Patient with pregestational diabetes seen for NOB at 14 weeks.
• Past medical Hx: Obesity Class 3 (48 BMI), Type 2 DM, Hypertension, Hx of GDM, Hx preterm delivery
• Insulin Started during first trimester:
  • TDD=82 units
• Not consistently checking blood sugars 4 times/day and not bringing logs to appointments.
• FBG range 172-215 mg/dl
• PPBG range 78-200mg/dl
CASE CONTINUED…

- At OB check (35 weeks gestation) heart tones were heard and patient was stable.

- A week later… at 36 weeks, No heart tones and baby diagnosed still birth by MD in office.

- BG ranges at last OB check:
  - FBG 86-104mg/dl
  - PPBG 178-208 mg/dl

- Final Insulin Regimen:
  - TDD= >300 units
  - Very insulin resistant!

- Discussion Points:
  - Is the patient taking insulin accurately? What are the barriers?
AFTERCARE & POSTPARTUM RECOMMENDATIONS

• Encourage Breastfeeding
  • Increases postpartum weight loss
  • Decreases risk of developing type 2 diabetes

• 2hr OGTT at 4-12 weeks postpartum
  • If elevated, transition/referral to family practice provider
  • If normal, recommend A1C testing every 3 years

• RD Consult at 2 and 6 week postpartum
  • Assess for:
    • Nutrient Balanced meals
    • Breastfeeding difficulties
    • Meal consistency

• Insulin management follow-up:
  • D/C insulin at delivery (unless patient on insulin or oral medication therapy prior to pregnancy, and in that case, most likely decrease by 30-50% after delivery)
  • Recommend checking and recording fasting blood glucose 2-3 times/week
  • Insulin sensitivity likely returns in 1-2 weeks following delivery.
GDM PREVENTION AND PRECONCEPTION RECOMMENDATIONS

- Nutrition counseling to optimize pre-pregnancy blood sugars
- Achieve A1C less than 6.5% pre-pregnancy
- If pregnancy not desired, referral to medical provider for appropriate birth control method
- If pregnancy desired:
  - Avoid contraindicated medications prescribed (ie. Statins, ACE inhibitors, ARBS, etc.)
  - Vitamin supplementation (prenatal, folic acid)
OTHER CONSIDERATIONS

• **Blood pressure management**
  - Home blood pressure monitoring and logging
  - Medical provider to prescribe Aspirin (81mg) starting at the end of the 1st trimester.
    (US preventative task force)
  - High risk of pre-eclampsia
  - Blood Pressure Targets in Pregnancy 120-160/80-105 mmHg
  - Lower blood pressure levels may be associated with impaired fetal growth

• **Disordered Eating**

• **Metabolic Surgery**

• **Specialized Recommendations**
  - Insulin to carb ratios
  - Type 1 diabetes and Insulin Pumps
  - Low literacy level/ illiteracy
  - Cultural and/or language barriers
    • Cultural Foods
    • Fasting
FUTURE TRENDS

• More plant based focus

• Increase recommended carbohydrate intake in pregnancy
  • Need to take placenta into account

• Lower fat intake (limiting saturated fats)
THANK YOU AND QUESTIONS
REFERENCES


