**Common Complications of Pregnancy: Gestational Diabetes Mellitus**

Michelle Isley MD, MPH  
Assistant Professor  
Department of Obstetrics and Gynecology  
Ohio State University

- Carbohydrate intolerance that begins/is first recognized during pregnancy  
- U.S. prevalence → 1% to 14% (2-5% most common figure)

**Maternal Complications of GDM**

- More likely to develop hypertensive disorders  
- Increased risk for pre-eclampsia and cesarean delivery  
- Increased risk of developing diabetes later in life


**Gestational Diabetes Mellitus (GDM)**

- Carbohydrate intolerance that begins/is first recognized during pregnancy  
- U.S. prevalence → 1% to 14% (2-5% most common figure)

**Fetal Complications of GDM**

- Increased risk for macrosomia and hyperbilirubinemia  
- Increased risk for operative delivery, shoulder dystocia, and birth trauma  
- Some studies to suggest maternal hyperglycemia linked to long-term obesity and diabetes in offspring

Coustan DR. NIDDK, PIIH Publications 1995  
Screening for GDM

- All pregnant patients should be screened
- Optimal method of screening is controversial
  - History and clinical risk factors
  - Laboratory screening

Laboratory Screening

- 50-g (50 g glucose in 150 mL of fluid), 1-hour oral glucose challenge test administered 24-28 weeks gestation
- Ideally screening test should be performed on venous plasma or serum samples
- American Diabetes Association
  - 140 mg/dL: sensitivity 80%
  - 130 mg/dL: sensitivity 90%

History and Clinical Factors: Low risk women have all of the following characteristics

- Age younger than 25 years
- Not a member of racial or ethnic group with high DM prevalence (i.e. Hispanic, African, Native American, South or East Asian, or Pacific Islands ancestry)
- Body mass index of 25 or less
- No history of abnormal glucose tolerance
- No previous history of adverse pregnancy outcomes usually associated with GDM
- No know diabetes in first degree relative

Diagnosis of GDM

- 100-g, 3-hour oral GTT, administered in the morning after overnight fast
- No smoking, remain seated during test
- Positive diagnosis: 2 abnormal values

<table>
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<th>Status</th>
<th>Plasma/Serum level (mg/dL)</th>
<th>Plasma/Serum level (mg/dL)</th>
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<td>105</td>
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<td>One hour</td>
<td>180</td>
<td>190</td>
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<td>155</td>
<td>165</td>
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<tr>
<td>Three hours</td>
<td>140</td>
<td>145</td>
</tr>
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American Diabetes Association, Diabetic Care 2001
Monitoring GDM

- Optimal frequency of blood glucose monitoring not determined
  - Daily self monitoring shown to decrease potential adverse outcome, such as macrosomia
- Fasting and postprandial values


Fetal Monitoring

- GDM not well controlled, insulin requiring, other risk factors, such as hypertension or adverse obstetric history should be managed same as those with pre-existing diabetes
  - Initiate at 32-34 weeks gestation
- Antepartum test:
  - Nonstress test
  - Contraction stress test
  - Biophysical profile


Treatment of GDM

- Diet therapy
  - Nutritional counseling (by registered dietician if possible), with individualization of nutrition plan based on height and weight
- Insulin treatment
  - If fasting >95 mg/dL, 1-hour >130-140 mg/dL, 2-hour >120 mg/dL, should consider insulin tx
- Exercise
- Oral hypoglycemic agents


Timing of Delivery

- If good control and no other complications
  - No good evidence to support routine delivery before 40 wks gestation
- If poor control or undocumented metabolic control, or with risk factors (htn) or previous stillbirth, manage as pre-existing DM
  - Less than 39 weeks gestation → recommend assessment of pulmonary maturity prior to delivery

### Timing of Delivery

- GDM + estimated fetal weight of 4,500 g or more
  - Consider cesarean delivery to reduce likelihood of permanent brachial plexus injury to infant

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### Common Problems in Pregnancy: Bleeding

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### Post Partum Screening

- Women with GDM at increased risk of developing type-2 diabetes later in life
- Convenient to do at post partum visit, ~6 wks
- 75-g, 2-hour oral glucose tolerance test
  - Fasting: impaired, 110-125 mg/dL, DM, ≥126 mg/dL
  - 2-hour plasma glucose: impaired, 140-199 mg/dL, DM, ≥200 mg/dL

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### Vaginal bleeding

- Gestational age
- Character of bleeding
  - Light or heavy
  - Associated with pain or painless
  - Intermittent or constant
- Laboratory and Imaging tests
### Case 1

- 22 y/o presents to ED with vaginal bleeding, abdominal pain. Urine pregnancy test is positive. Unsure LMP.

### Evaluation

- How much bleeding? Pain?
- Lightheaded/Dizzy?
- Risk factors for ectopic pregnancy: past hx of ectopic, PID hx, IUD in place, previous adnexal surgery?

### First Trimester Vaginal Bleeding

- Four main sources:
  - Threatened or impending miscarriage
  - Implantation
  - Ectopic pregnancy
  - Cervical, vaginal, or uterine pathology
- Evaluation
  - Transvaginal u/s
  - Exclude ectopic

### Physical Exam

- BP, heart rate
- Abdominal exam
- Pelvic exam
  - External genitalia
  - Speculum, direct visualization of vaginal walls, cervix
  - Bimanual: uterine size? Cervix dilated? Pelvic mass? Tender?
  - Send any tissue to pathology
- Ultrasound
  - Intrauterine pregnancy? Adnexal mass?
Laboratory Tests

- Urine pregnancy test to confirm pregnancy
- Quantitative Bhcg
  - Failure to see an intrauterine gestational sac by TVUS when BHCG is greater than 1000 to 2000 mIU/mL indicates increased risk for ectopic pregnancy
- Blood type
- Complete blood count


Management

- Incomplete abortion: open cvx, tissue at cvx, painful cramps, bleeding can be heavy → hypovolemic shock
  - Surgical management
- Missed abortion: in-utero death of embryo/fetus prior to 20 wks, with retention of pregnancy, closed cvx
  - Expectant vs. surgical vs. medical management

Management

- Ectopic pregnancy
  - Medical or surgical management
- Threatened abortion: bleeding + closed cvx
  - Expectant management
- Inevitable abortion: bleeding + open cvx
  - Expectant vs. surgical vs. medical management
- Complete abortion: small, empty uterus, scant bleeding

Management

- Vaginitis, trauma, cancer, warts, polyps, fibroids
- Ectropion: eversion of the endocervix, prone to bleeding with touch
  - No therapy needed
- Physiologic/Implantation bleeding: diagnosis of exclusion; bleeding 10 to 14 days after fertilization
  - No therapy needed

### Prognosis: First trimester bleeding

- Some studies have found an association between first trimester bleeding and adverse outcomes
  - Better prognosis if bleeding <6 weeks gestation
- No change in pregnancy management indicated

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### Case 2

- 26 y/o G3P2002 at 23 wks presents to OB triage with bright red vaginal bleeding. Mild cramping.

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### Second and Third Trimester Bleeding

- Bleeding prior to 20 weeks (similar to 1st trimester)
  - Miscarriage
  - Cervical, vaginal, or uterine pathology
  - Cervical insufficiency
  - Abruption, ectopic
- How much bleeding? Pain? Fetal heart tones present?
- Abdominal exam, speculum exam, u/s

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### Bleeding after 20 weeks gestation

- Placenta previa (20%)
  - U/S
  - Avoid digital exam until placenta previa has been excluded
- Abruption placenta (30%)
  - Bleeding, uterine tenderness, contractions, +/- non-reassuring fetal testing
  - +/- U/S
  - Trauma
- Bloody show from cervical insufficiency or labor
- Uterine rupture (rare)- intrapartum
- Vasa previa (rare)- intrapartum
Prognosis: Second and third trimester bleeding

- Second and third trimester bleeding are associated with adverse pregnancy outcomes
  - Risk depends on the degree of bleeding and the cause
  - Worse outcome with heavier bleeding and bleeding from nonprevia source

Conclusions and Summary: Bleeding in pregnancy

- Can make provisional clinical diagnosis based on gestational age and character of bleeding
- In the first trimester, it is important to rule the possibility of ectopic pregnancy
- After 20 weeks, digital cervical exam should be avoided until placenta previa has been excluded
- Anti-D immune globulin should be administered to women who are Rh(D) negative

Rh(D) Negative Women

- Women with uterine bleeding who are Rh(D)-negative should receive anti-D immune globulin to protect against Rh(D) alloimmunization
  - RhoGam® 300mcg: antenatal, postpartum; 2nd and 3rd trimester
  - MicRhoGam ® 50mcg: 1st trimester

Common Pregnancy Complications

Katherine Strafford, MD
The Ohio State University
Obstetrics/Gynecology
J W

- 30-yo G1P0 at 34 weeks
- Uncomplicated pregnancy
- Blood pressure 148/98, urine 2+ protein
- Reassuring fetus, no labor
- Uric acid 5.9, Cr. 0.8, LFT’s & CBC normal
- 24 hour urine 600mg

Pregnancy Complications

- Seizure (Eclampsia)
- Hemorrhage/Abruption
- PTL/PTD/C-section
- Pulmonary, hepatic, renal, cardiac
- Maternal mortality
- Fetal death, Growth/fluid restriction

Pre-Eclampsia (Pre-E)

- Elevated BP and proteinuria
- Presents after 20 weeks
- Resolve within 12 weeks post partum
- Mild >140/90, 300mg protein/24hs
- Severe >160/110, 5gm protein
- Treatment is delivery

Pre-E Risk Factors

- Nulliparity
- Personal/Family Hx Pre-E
- Obesity, HTN, DM
- Multiple gestation
- Thrombophilias
- Etiology is unknown
## Diagnosis

- Headache, edema, scotomata, epigastric or RUQ pain, N/V, oliguria
- Fetal growth restriction, oligohydramnios
- Labs: LFT's, CBC, uric acid, Cr, 24hr urine
- Seated BP with appropriate cuff
  - Use BP criteria not a change in BP

## Severe Pre-E

- Deliver
- Remote from term (<34wks)
  - Steroids for FLM
  - Consider C-section with unfavorable cervix
- Antihypertensives (BP 140-155/90-105)
- HELLP – hemolysis, elevated liver enzymes, low platelets

## Mild Pre-E

- Monitor BP, labs, 24hr urine
- Outpatient management possible >32wks
  - Weekly Labs, NSTs, office visits
  - Serial ultrasounds
- Deliver at term
- Magnesium sulfate
- C-section for obstetrical indications

## Magnesium Sulfate

- Load 6gms over 20min, run at 2gm/hr
- Use in labor - 24hrs pp
- Scheduled C-section: 2hrs pre-op through > 12hours pp
- Calcium gluconate
### Eclampsia

- Convulsions or coma unrelated to other cerebral conditions with s/s Pre-E
- 1/2000-3448 pregnancies
- Supportive care
- Magnesium – 2gm bolus/5min
  - Sodium amobarbital 250mg IV/5min
- Deliver when stable

### Prevention

- No effective prevention available
- Unknown etiology makes prediction and prevention difficult
- Protein, salt restriction, Zn, Mg, Ca, fish oil, vit C & E, ASA, diuretics and anti-HTN have been tried
- 20% recurrence

### Anti-Hypertensives

- Hydralazine 5mg IV bolus q15-20min, max 20mg
- Labetalol 20-40mg IV q10-15min, max 220mg
  - Labetalol 100mg BID (max 2400mg/D)
- Nifedipine 10-20mg po q30min, max 50mg
  - Nifedipine 10mg BID (max 120mg/D)

### A.S.

- 28-yo G1P0 Uncomplicated pregnancy
- 30 weeks c/o spotting and cramping
- Reactive fetal heart rate
- Contracting every 8 minutes
- Cervix 2 cm dilated and 70% effaced
Preterm Labor (PTL)

- Regular contractions with cervical change <37 weeks gestation = PTL
- PTB leading cause infant mortality
- PTB 12.5% US births in 2004
- Screen by risk factors (negative >50%)
- Difficult diagnosis with little therapy

Diagnosis

- Persistent second trimester abdominal complaints
  - Contractions, cramping, pressure, bleeding, back pain
- Symptoms and evaluation are imprecise
  - 50% Dx with “PTL” are not in labor
  - 20% symptomatic patients “ruled-out” PTD

Risk Factors

- Prior preterm birth
- Multiple gestation/uterine distention
- Second trimester bleeding
- Infection/Inflammation
- Nonwhite race
- Low prepregnancy weight

Cervical Length

- Transvaginal ultrasound (TVUS)
- Difficult to measure prior to 20 weeks
- Useful in cervix <2cm dilated
- >30mm in symptomatic patient reassuring
- <20mm in symptomatic patient = PTL
- Screening: <25mm 22-24 weeks, 6.5x increased risk
### fFN (fetal fibronectin)
- Extracellular cement between membranes and decidua
- + fFn, 22-37 weeks indicates disrupted decidual-chorionic interface
- Use between 24-34 weeks
- Swab posterior fornix of cervix <3cm
- Negative fFN <5% deliver within 14 days

### Evaluation
- SSE: fFN, cultures, fluid leak?
- Ultrasound: AFI, EFW, Placenta
- Cervix
  - 3cm or greater/80% = PTL
  - <3cm/<80%, TVUS, fFN, repeat exam
  - Cvx change, TVUS<20mm, +fFN (?) = PTL

### Tocolytics
- Allow for maternal transfer (Level III)
- Allow for steroid delivery (48hrs)
- Allow for GBS prophylaxis
- Do not reduce PTD
- Contraindicated in bleeding, HTN, CVD, IUFD, chorioamnionitis, fetal compromise
- Do not use in combination

### Tocolysis
- Ca Channel blockers – nifedipine
  - 10-20mg po q3-6hrs then XL 30-60mg q8-12
  - Low side effects, easy to use, effective
- Magnesium Sulfate
  - 4-6gm IV load/30min then 1-4gm/hr
  - Caution with creatinine >0.9mg/dl
  - Calcium gluconate 10%, 10-20ml reverses respiratory depression
### Tocolysis
- **Cyclooxygenase inhibitors – indomethacin**
  - Fetal risks, limit to <32wks and 48hrs
  - 50mg po, then 25mg q6hrs
- **β-Mimetics – terbutaline**
  - 0.25gm SQ single dose
  - Oral and SQ pumps not useful

### Antibiotics
- **Intrapartum penicillin or ampicillin for GBS prophylaxis**
  - Stop with negative culture
- **Treat specific pathogens with + culture**
- **Preterm PROM 3-7 days prophylaxis**
  - Ampicillin + Erythromycin IV x 48hr
  - Amoxicillin + Erythromycin po x 5D

### Steroids
- **Promote surfactant and lung maturation**
- **Reduce RDS, intraventricular hemorrhage, NEC, PDA**
- 12mg betamethasone IM q24hr x 2
- 6mg dexamethasone IM q12hr x 4
- Use between 24-34 weeks

### Prevention
- **Not effective**
  - Screening/treating BV
  - Bedrest
  - Uterine activity monitoring
  - Salivary estriol
  - Prophylaxis with tocolytics
- **Cerclage – may benefit when cervix is short and prior preterm birth**
### Progesterone

- Weekly 17α-hydroxyprogesterone caproate 250mg IM
- Vaginal natural progesterone 200mg daily
- 40-55% reduction in recurrent PTD
- Prior PTD between 18-36wks
- Short cervix (<15mm)
- Initiate at 16-20wks in high risk singletons

### Sources

- Diagnosis and management of preeclampsia and eclampsia. ACOG practice bulletin no. 33, 2002.

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### Sources