

Common Complications of Pregnancy: Gestational Diabetes Mellitus

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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

Cousins L. Diabetes Mellitus in pregnancy, 1995; Naylor CD et al. JAMA 1996; Sermer M et al. Am J Obstet Gynecol 1995

Gestational Diabetes Mellitus (GDM)

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

Coustan DR. NIDDK, PIH Publications 1995

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

Cundy T et al. Aust NZJ Obstet Gynaecol 1993; Dang K et al. J Matern Fetal Med 2000; Pettit DJ et al. Diabetes 1991; Vohr BR et al. Diabetes Care 1999; Silverman BL et al. Diabetes Care 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%

Either threshold is acceptable.

O'Sullivan JB et al. Am J Obstet Gynecol 1973; Nutritional management during pregnancy. ADA 2000; Carpenter MW et al. Am J Obstet Gynecol 1982;

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

American Diabetes Association. Diabetic Care 2001

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

Status	Plasma/Serum level Carpenter/Coustan (mg/dL)	Plasma/Serum level National Diabetes Group (mg/dL)
Fasting	95	105
One hour	180	190
Two hours	155	165
Three hours	140	145

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

De Veciana M et al. N Engl J Med 1995; Goldberg JD et al. Am J Obstet Gynecol 1986; Jovanovic-Peterson L et al. Am J Obstet Gynecol 1991

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

Kjos SL et al. Am J Obstet Gynecol 1995; Landon MB et al. Diabetes 1985

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

American Diabetes Association 2000; O'Sullivan JB et al. Obstet Gynecol 1966; Coustan DR et al. Obstet Gynecol 1978; Thompson DJ et al. Obstet Gynecol 1990; Jovanovic-Peterson L et al. Am J Obstet Gynecol 1989; Langer O et al. N Engl J Med 2000

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

Acker DB et al. Obstet Gynecol 1985; Benedetti TJ et al. Obstet Gynecol 1978

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

Acker DB et al. Obstet Gynecol 1985; Benedetti TJ et al. Obstet Gynecol 1978

Common Problems in Pregnancy: Bleeding

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**

O'Sullivan JB. Diabetes 1991; O'Sullivan JB. Carbohydrate metabolism in pregnancy and the newborn. 1984; Kjos SL et al. Diabetes 1995

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
- Blood type
- Complete blood count

Morin L, VandenHof MC. Ultrasound evaluation of first trimester pregnancy complications. J Obstet Gynecol Can 2005; 27:581-585

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

Tongsong T, Srisomboon J, et al. J Obstet Gynecol 1995; 21:331; Tannirandorn Y, Sangsawang S, et al. Int J Gynecol Obstet 2003; 81:263

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

Speert H, Guttmacher AF. JAMA 1954; 155:712; Williams MA, Mittendorf R, et al. Obstet Gynecol 1991; 78:14; Weiss JL, Malone FD, et al. Am J Obstet Gynecol 2004; 190:745

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

Williams MA, Mittendorf R, et al. Obstet Gynecol 1991; 78:14; Weiss JL, Malone FD, et al. Am J Obstet Gynecol 2004; 190:745

Case 2

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

Second and Third Trimester Bleeding

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

Bleeding after 20 weeks gestation

- Placenta previa (20%)
 - ✓ U/S
 - ✓ Avoid digital exam until placenta previa has been excluded
- Abruptio 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

Signore CC, Sood AK, et al. Am J Obstet Gynecol 1998; 178:336; Parant O, Clouet-Delannoy M, et al. J Gynecol Obstet Biol Reprod 2000; 29:66; McCormack RA, Doherty DA, et al. BJOG 2008; 115:1451

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

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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 <37weeks 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 22-24weeks, 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

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

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

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 17 α -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

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