Objectives

- Review the basics
  - Prenatal care, genetic screening
  - Intrapartum management
  - Postpartum complications
- More recent developments in obstetrics
  - Screening for Down syndrome and Trisomy 18
  - Management of meconium in amniotic fluid
- Cover issues relevant to non-delivering family physicians
  - Management of obstetrical emergencies
  - Medical illness, trauma and medications in pregnancy

Establish Accurate Gestational Age

- Menstrual history
  - EDC = LMP – 3mo ±7d ± cycle variation
- Early uterine size by exam
- US dating most accurate – earlier is better
  - CRL at 7-14 wk ± 3-5 days
  - BPD 14-20 wk ± 7 days
Screening Tests First Trimester
- CBC
- Blood type, Rh
- Antibody screen
- RPR or VDRL
- Rubella immunity
- Varicella immunity
- HBsAg
- HIV – “opt out” testing recommended by ACOG
- Urine culture

Pap smear if needed
Universal vs. risk-based testing:
- Chlamydia testing
  - CDC - all
  - ACOG and USPSTF – risk based
- PPD
- TSH
  - Most guidelines advise risk based screening

First trimester screening tests Risk-based
- Gonorrhea
- GDM screen (1 hr)
- Hg electrophoresis
- Tay-Sach and Canavan
- Cystic fibrosis
- HCV
- TSH
- Toxoplasmosis Ab
- Phenylalanine levels

Controversial:
- BV testing in asymptomatic patients with h/o preterm delivery
- I recommendation from USPSTF (insufficient evidence for or against)
- TSH screening in absence of thyroid disease

Second and third trimester testing
- Universal
  - 24-28 wk GDM screening with 50gm 1 hour glucose challenge
  - Hemoglobin or Hct
  - 35-37 wk GBS screen
    - Vaginal and anal swab
    - For all women unless intrapartum antibiotics indicated by GBS bacteriuria in current pregnancy or invasive GBS in previous child

Risk based
- HIV
- Chlamydia screen
- RPR
- HBsAg
- Ab screen done before 28 wk anti-D if Rh negative

Counseling about Down Syndrome Testing Options
- ACOG recommends offering testing to all women regardless of age

Screening test vs. diagnostic test
- Individual baseline risk: Age, Family history
- Personal implications if fetus is affected with Down syndrome
- Risk of pregnancy loss with diagnostic testing
- Tolerance of uncertainty involved in screening tests
Trisomy 21 screening options

- First trimester combined screening offered by CA DPH as part of fully integrated screening test
  - Serum hCG, PAPP-A at 10wk-13wk6d
  - Nuchal translucency at 11wk2d-14wk2d by CRL
- Quad screening test
  - AFP, uE3, HCG, inhibin A at 15-20 wks
  - 80% DTR for 4.5% SPR
- Integrated serum screening test
  - Quad plus first trimester serum testing (no NT)
  - 85% DTR for 4.5% SPR
- Fully Integrated screening test
  - Integrated screen with NT – 90% DTR for 4.5% SPR
  - Preliminary first trimester screen: 75% DTR for 2.5% SPR

AFP screening for open neural tube defects

- Maternal serum AFP at 15-20 wks, followed by ultrasound + amniocentesis
- 75-90% DTR for open NTD
- 95% DTR for anencephaly
- Elevated AFP also associated with
  - Fetal abdominal wall defects
  - Other congenital defects
  - Pregnancy complications: fetal death (RR = 8.1), neonatal death, low birth weight, oligohydramnios, abruption (RR = 3 to 4)

Patient Education - Nutrition

- Vitamins
  - Folic acid 400-800mcg/d recommended
    - 4mg/d if increased risk of NTD
  - Vitamin A is a teratogen >10,000 IU/day
- Weight gain – IOM recommendations
  - Underweight (BMI<18.5): 28-40 lbs = 1-1.3lb/wk
  - Normal weight (BMI 18.5-24.9): 25-35 lbs=0.8-1/wk
  - Overweight (BMI 25-29.9): 15-25 lbs = 0.5-0.7lb/wk
  - Obese (BMI >30): 11-20 lbs = 0.4-0.6 lb/wk
- Maternal PKU – low phenylalanine diet recommended in preconception period through pregnancy

Patient Ed - Precautions

- Listeria – avoid unpasteurized dairy products
- Mercury
  - NO shark, swordfish, king mackerel or tilefish
  - Limit other fish to < 12 oz/wk, or albacore (white) tuna or tuna steaks < 6 oz/wk
- Toxoplasmosis
  - Avoid raw eggs, undercooked meat or poultry, cat feces
- Substances
  - Tobacco – Most important modifiable risk factor associated with adverse pregnancy outcome
  - Alcohol – No safe dose –abstinence recommended
  - Others: cocaine, methamphetamine, opiates, MJ
- Seatbelts
- Travel
Imaging: Ultrasound

- Multiple studies confirm safety
- Used in 67% of live births in 2002
- Now nearly universal as routine screening
  - First trimester NT measurement as Downs screen
  - Reduces intervention for postdates pregnancy and preterm delivery (OR for postdates inductions = 0.61, CR 0.52-0.72)
  - Improves detection of multiple gestation
  - May increase detection of fetal anomalies
  - Optimal timing is 16-20 weeks
  - US Screening in third trimester does not improve outcomes

Ultrasound: Obstetrical indications

- First trimester
  - Pregnancy location
  - Fetal viability
  - Gestational age
  - Multiple gestation
  - Maternal pelvic organs

- 2nd or 3rd trimester
  - Multiple gestation
  - Placenta location
  - Fetal growth and anatomy
  - Amniotic fluid
  - Biophysical profile
  - Umbilical artery flow
  - Presentation
  - Cervical length
  - Maternal organs

X-Ray Imaging in Pregnancy

- Use alternative imaging (MR or US) if appropriate
  - Avoid gadolinium
- Do not withhold medically necessary imaging
- Reduce exposure (consult radiologist)
  - Lead apron for non-abdominal images
  - Narrow beam, minimize imaging area, number of films, number and thickness of CT slices
- Discuss risk with patient before procedure
  - Include background risk for miscarriage (20%), congenital anomalies (4%), or growth restriction (10%)
- Radiation exposure < 5 rad not associated with miscarriage, fetal anomalies, or growth restriction
- Possible increased risk of childhood leukemia after 1 rad exposure from 1:3000 to 1:2000

Vaccines in pregnancy

- Routine vaccines – Td, HBV, HAV, HIB pneumococcal or meningococcal vaccine
  - Ideally updated preconception
  - Delay vaccines to after first trimester if no urgency
- Tdap not yet approved for routine use in pregnancy
  - May be used in special circumstances
  - Specifically indicated postpartum
- AVOID live virus vaccines during pregnancy – MMR, VZV, Intranusal influenza, yellow fever, oral typhoid, smallpox
  - None associated with documented risk if unplanned or undiagnosed pregnancy

Fundamentals of Obstetrics
Vaccines in pregnancy

- Specifically indicated for all pregnant women:
  - Influenza – inactivated virus vaccine
- Postpartum:
  - Tdap, MMR, VZV indicated for susceptible women
- OK during pregnancy if disease exposure risk unavoidable
  - Typhoid (parenteral inactivated only)
  - Inactivated Polio Vaccine
  - Rabies
  - Cholera, Japanese encephalitis

Medications in Pregnancy

- Category A: Controlled trials in humans show no risk
- Category B: No evidence of risk in animals, or demonstrated safety in humans
- Category C: No evidence of safety, animal studies may show risk
- Category D: Evidence of risk in humans, but may be used if benefits outweigh risks
- Category X: Contraindicated in pregnancy

Medications in Pregnancy

Think beyond categories
- Pick medications with known safety record
- Refer to recently published databases
- Avoid use of newly released medications
- Use lowest effective dose and fewest number of medications when possible
- Consider risks of withholding therapy vs. risk of therapy

Proven Teratogens – High Risk
- Thalidomide
- Cytotoxic Drugs – Methotrexate
  - Cyclophosphamide
  - Cisplatin
  - Doxorubicin
- Etretinate, Isotretinoin

Proven Teratogens – Low to Moderate Risk
- DES
- Androgens/Danazol
- Anticonvulsants: Phenobarb, Carbamazepine, Phenytoin, Valproic acid
- Warfarin
- Mycophenolate
- Lithium
- Alcohol – dose related risk
- Vitamin A doses over 25,000 IU/d
- Elavirenz
- Paroxetine
- Fluconazole ≥ 400mg/d
Medications in Pregnancy Teratogens

- **Possible Teratogens**
  - Misoprostol – abortifacient, teratogenicity uncertain
  - Azathioprine, Cyclosporine
  - Pyrimethamine – Folate antagonist, no proven human teratogenicity
  - Finasteride – Abnormal development of male fetal genitalia in animal studies
  - Vitamin A doses 10,000 to 25,000 IU/d
  - HMG CoA reductase inhibitors (statins)
  - Ribavirin
  - Methimazole (aplasia cutis)
  - SSRI's

- **Anticholinergic drugs**
  - Neonatal meconium ileus

- **Chloramphenicol**
  - Possible gray baby syndrome when used at term

Drugs that adversely affect the fetus in the second and third trimesters

- **ACE inhibitors**
  - Fetal renal failure, oligohydramnios, fetal death

- **Anticholinergic drugs**
  - Neonatal meconium ileus

- **Chloramphenicol**
  - Possible gray baby syndrome when used at term

- **PTU, Methimazole**
  - Neonatal goiter and hypothyroidism

- **NSAIDs**
  - Premature closure of the ductus

- **Psychoactive drugs**
  - Neuro-developmental effects, withdrawal syndrome

- **Tetracyclines**
  - Dental staining

Antibiotics in Pregnancy

- **Considered Safe**
  - Penicillins
  - Cephalosporins
  - Erythromycin (except estolate)
  - Azithromycin
  - Clindamycin

- **Probably Safe**
  - Aminoglycosides (except streptomycin)
  - Vancomycin
  - Sulfonamides (risk of neonatal jaundice if used in third trimester)
  - Nitrofurantoin (risk of hemolysis in newborn if used near term)
  - Metronidazole (not recommended in first trimester for vaginitis)
  - Isoniazid (requires pyridoxine to prevent fetal neurotoxicity)
  - Ethambutol
  - Rifampin

- **Chloramphenicol**
- **Tetracyclines**
- **Streptomycin**
  - no malformations, but sensorineural deafness

- **Fluoroquinolones**
- **Erythromycin estolate**
  - associated with cholestatic jaundice

- **Trimethoprim**
  - first trimester exposure associated with 3-fold increase in neural tube defects, cardiovascular defects and oral clefts

Antibiotics Contraindicated in Pregnancy
Trauma in Pregnancy

- Largest nonobstetrical cause of maternal mortality
- MVA, followed by DV, other assaults, and falls
- Assess maternal ABC’s
  - if CV instability or CPR, displace uterus to the left
  - need for diagnostic imaging nearly always outweighs radiation risk
- After maternal stabilization (or simultaneously, but not before) - assess fetus
  - Gestational age and EFW
  - Viability and well-being

Obstetric complications of trauma

- Abruption, preterm labor or fetomaternal hemorrhage
- Can occur with relatively mild maternal trauma or symptoms
- All women past 24 wks with abdominal trauma
  - Monitor FHT and uterine activity for 4 hour minimum, or longer, consult obstetrical care provider
- Consider CBC, plat, fibrinogen, Kleinhauer-Betke
- Consider anti-D immune globulin (Rhogam) if Rh negative and unsensitized – increase dose if large fetomaternal hemorrhage by KB

Obstetric complications of trauma

- Discharge home when all of the following:
  - No maternal indication for continued observation
  - No abdominal pain
  - No vaginal bleeding
  - Normal FHR tracing
  - Contractions less than every 10 minutes

Thromboembolic Disease Diagnosis

- Major cause of maternal mortality in U.S.
- Diagnose DVT with serial venous Doppler ultrasound
  - Venogram or MRI if necessary
- Diagnose PE with spiral CT
  - Perfusion and ventilation scan if contrast contraindicated
  - Angiogram if noninvasive testing is equivocal
Assess risks of medication versus risks of relapse or uncontrolled depression.

**Thromboembolic Disease**
- **Treatment**
  - Low molecular weight heparin preferred therapy during pregnancy
  - No epidural canula 24 hrs after last dose
  - Warfarin contraindicated in pregnancy
    - Nasal hypoplasia, skeletal abnormalities, optic atrophy, microcephaly, growth retardation, developmental delay, and Dandy-Walker malformation
  - Duration of therapy when DVT or PE in pregnancy
    - Continue anticoagulation at least 6 weeks postpartum
    - Warfarin or LMWH compatible with breastfeeding

**Diabetes Mellitus Reproductive Risks**
- Inadequate blood sugar control at time of conception
- Inadequate blood sugar control during pregnancy
- Periconception euglycemia
- 4-10 fold increased risk of major congenital abnormalities
- Polyhydramnios, fetal macrosomia and neonatal hypoglycemia
- Reduces risk of anomalies to that of baseline population

**Diabetes Mellitus in Pregnancy - Treatment**
- Intensive control and monitoring to achieve control pre-conception (ACOG guidelines)
  - FBG <95 mg/dl
  - Pre-prandial blood sugar < 100 mg/dl
  - 1 hour post-prandial blood sugar < 140 mg/dl
- Intensive diabetes management programs for pregnancy are cost-effective
- Antenatal testing (NST and BPP) by risk
  - 26-28wk for poor control or complications
  - Term for diet controlled GDM
- Intrapartum management:
  - Insulin infusion and close monitoring

**Depression and Pregnancy**
- Consider psychotherapy initially for new onset, mild-moderate depression
- For patient on pharmacotherapy preconception
  - If candidate for trial off medication, consider tapering antidepressant prior to conception or in early pregnancy, or at term to minimize discontinuation syndrome
- 50% risk of relapse during pregnancy in women with recurrent depression
- Assess risks of medication versus risks of relapse or uncontrolled depression
- Discontinue MAO Inhibitors - associated with IUGR, risk of congenital anomalies, fetal death
Antidepressant Medication in Pregnancy
- MAO Inhibitors contraindicated
- SSRIs
  - Neonatal discontinuation syndrome
  - Increase in congenital heart disease
  - Fluoxetine has best safety record
- Paroxetine use may be associated with increased risk of congenital heart defects, ASD and VSD
- Tricyclic antidepressants
  - Anticholinergic effects and neonatal withdrawal
  - Nortriptyline and desipramine preferred
- Bupropion and venlafaxine inadequately studied

Pre-gestational Hypertension Risks in Pregnancy
- Pre-eclampsia
- Placental abruption
- Fetal growth retardation
  - Monitor for IUGR with serial US
  - Antenatal testing if signs of growth restriction
- Pregnancy outcome not improved by treatment of diastolic blood pressure < 110

Chronic Hypertension in Pregnancy - Treatment
- Treatment for maternal indications:
  - SBP > 160 or DBP > 105-110
- Preconception medication adjustment to regimen safe during pregnancy
- ACE inhibitors contraindicated
  - Limb contractures
  - Fetal renal failure
  - Oligohydramnios
  - Fetal death

Hypertension Therapy
- Labetolol
  - Atenolol NOT recommended - fetal growth retardation
- Methyldopa
  - No adverse fetal effects
- Second line therapy
  - Hydralazine
  - Prazosin
  - Calcium channel blockers, nifedipine, verapamil, diltiazem
- Use of diuretics for hypertension controversial
**Preeclampsia – Risk Factors**
- Nulliparity
- Age < 18 or > 35
- Ethnicity
- Multiple gestation
- Previously effected pregnancy
- Unexplained abnormal 2nd trimester triple marker or quad test
- Pregestational hypertension
- Chronic kidney disease
- Obesity
- Diabetes
- Connective tissue disease

**Preeclampsia – Diagnosis**
- SBP ≥ 140 or DBP ≥ 90
  - Documented at least twice, 6 hours apart
- And proteinuria > 300mg in 24hrs
  - Dipstick Proteinuria ≥ 30 mg/d (1+) is suggestive
- Mild preeclampsia – any preeclampsia not satisfying criteria for severe

**Severe Preeclampsia Criteria**
- Severe HA, altered mental status or visual symptoms
- RUQ pain, nausea or vomiting
- Severe hypertension SBP ≥ 160 or DBP ≥ 110 – twice at least 6 hours apart
- Labs
  - Elevated ALT/AST or
  - Platelet count <100,000 or
  - Proteinuria > 5 gms in 24 hr, or 3+ on 2 samples 4 hours apart
- Oliguria (<500cc per 24 hr)
- Pulmonary edema or CVA
- IUGR

**Preeclampsia Treatment**
- Delivery is the cure
- Until delivery:
  - Monitor fetal growth and well-being
  - Treat severe hypertension
  - Consider corticosteroids for fetal lung maturation
- Intra-partum seizure prophylaxis
  - magnesium sulfate
  - continue 24-48 hours postpartum

Fundamentals of Obstetrics
**Intrahepatic Cholestasis of Pregnancy**
- Pruritis and elevated bile acids in late pregnancy, most often without jaundice
- Associated with adverse pregnancy outcome – fetal demise, meconium stained amniotic fluid, complications of prematurity
- Treatment
  - Delivery
  - Ursodeoxycholic acid (Ursodiol)

**Infections: Parvovirus B19**
- “Slapped Cheek” Virus – serologic Dx
- Obstetrical complications
- Fetal loss – 6%
- Transient fetal pleural or pericardial effusion
- Fetal hydrops 4% – result of severe anemia
  - Can be treated with intrauterine transfusion
  - Deliver at tertiary center

**Infections: Herpes Simplex**
- Maternal-fetal transmission
  - 5% overall
  - Lower with C-section than vaginal delivery (OR 0.14)
  - Higher in primary infection (first episode HSV infection)
- Treatment – safety of acyclovir well-documented
- Suppression starting at 36 weeks
- PPROM: expectant management with acyclovir prophylaxis

**Infections: Group B Strep**
- Maternal colonization associated with:
  - Chorioamnionitis and endometritis
  - Neonatal sepsis, pneumonia and meningitis
  - Intrapartum antibiotics reduce risks
- CDC recommendations:
  - Screen all pregnant women at 35-37 wks with culture from vaginal introitus and anal canal
  - Intrapartum antibiotics if any of the following:
    - Positive culture at 35-37 wks
    - Preterm labor or PPROM
    - ROM > 18hrs and no culture results
    - GBS bacteriuria during index pregnancy
    - Invasive GBS disease in previous child
  - Use penicillin or ampicillin, or if pen allergic: cefazolin, clindamycin, erythromycin or vancomycin
Preterm Birth
- Second leading cause of infant mortality in US (after congenital anomalies)
- 50% from preterm labor
- 30% PPROM
- 20% intentional delivery for maternal or fetal indications
- Effective prevention – address modifiable RF:
  - Smoking cessation
  - Measures to reduce multiple pregnancies with infertility treatment
  - Treatment of cervicitis (GC or CT) or asymptomatic bacteriuria
- Ineffective: Home uterine monitoring, maintenance tocolysis, risk scoring systems

Preterm Labor
- Diagnosis
  - Regular (4 in 20 min or 8 in 1 hr), painful contractions before 34 weeks, accompanied by cervical change
  - Risk of preterm delivery increased if cervical length < 2.5 cm
  - Positive fetal fibronectin
- Management
  - Corticosteroids – betamethasone 12mg IM, 2 doses 24 hours apart - reduces RDS, IVH, and NEC
  - Tocolytic drugs – prolong pregnancy for corticosteroids and/or transfer
  - Treat infection
  - GBS prophylaxis

Tocolytics
- Calcium channel blocker – nifedipine
  - Effective at delaying delivery
  - SE less severe than terbutaline or MgSO4
- COX inhibitors – nonspecific (indomethacin)
  - More effective than placebo for prolonging pregnancy
  - Serious potential side effects:
    - Premature closure of the ductus if used >72 hrs
    - Oligohydramnios
- Beta agonist – terbutaline – IV or SQ
  - Tremor, hyperglycemia, hypokalemia, rare pulm edema
- Magnesium sulfate
  - No trials proving effectiveness
  - Side effects: flushing, muscle weakness, respiratory depression

Vaginal Bleeding in Pregnancy
- Early pregnancy
  - Vaginal or cervical lesions
  - Ectopic pregnancy
  - Miscarriage - threatened, inevitable, missed, incomplete or complete
- Mid pregnancy
  - Vaginal or cervical lesions
  - Miscarriage
  - Cervical insufficiency
- Late pregnancy
  - Vaginal or cervical lesions
  - Bloody show
  - Placenta previa
  - Abruption
  - Uterine rupture
  - Vasa previa
Placenta Previa
- Placenta implantation over cervical os
- Painless bleeding
- Incidence
  - 5% in 2nd trimester
  - 0.5% at term
- Ultrasound diagnosis
  - With bladder full and empty: full bladder may create false positive
  - Transvaginal ultrasound safe, sensitive, and specific
- Delivery by C-section when fetus mature, sooner if fetal or maternal compromise

Abruptio Placentae
- Separation of the placenta before delivery
- Uterine pain and bleeding
- Incidence 1%
- Clinical diagnosis – U/S nonspecific
- Risk factors – hypertension, smoking, uterine abnormalities, multiple gestation, multiparity, abdominal trauma
- Maternal support and delivery as expedient

Vasa Previa
- Bleeding with rupture of membranes
- Fetal hemorrhage from umbilical vessels in membranes
- Associated with fetal heart rate abnormalities, especially sinusoidal pattern
- Usually clinical diagnosis, confirmation by Wright stain or Apt test if time allows
- Immediate abdominal delivery, neonatal resuscitation

Uterine Rupture
- Most occur with labor after uterine scar, during trial of labor after cesarean section (TOLAC)
- Incidence: 0.3% with TOL after LTCS, higher with other scars
- Diagnosis:
  - Fetal and maternal instability
  - Abdominal pain
  - Extrusion of fetal parts,
  - Usually with vaginal bleeding
- Treatment: Immediate abdominal delivery
TOLAC Candidates
- One prior LTCS
- No contraindications to vaginal delivery
- MD immediately available for C-section
- Best success if: prior successful VBAC, any prior vaginal delivery, C/S for breech, lower maternal age, spontaneous labor, gestational age < 41 wks
- Contraindications
  - Classical or T-shaped scar
  - Previous rupture
  - Medical or obstetrical contraindication to vaginal birth
  - Lack of immediate availability of C-section
  - Two prior uterine scars without prior vaginal delivery

TOLAC vs. ERCS
- Pros of trial of labor after LTCS
  - Success rate 60-80%
  - Reduced risk of thromboembolism
  - Shorter hospitalization
  - Less postpartum pain
  - Overall maternal morbidity (8%) equivalent, but reduced risk of minor complications
  - Reduced risks in future pregnancy
- Cons
  - Uterine rupture 2.7 per 1000 TOLs
  - Perinatal death 13-90 per 10,000 TOLs vs. 1-50 per 10,000 ERCS

Malpresentation- Terminology
- Fetal Lie
  - Direction of long axis of fetal trunk/spine
  - i.e., Longitudinal, transverse, oblique
- Presentation
  - Which part of the fetal body is leading
  - i.e., Cephalic – vertex, face, or brow; Breech – frank, complete, or footling; Compound presentations
- Position
  - Orientation of the presenting part to the maternal pelvis
  - i.e., occiput posterior, sacrum anterior, mentum anterior

Malpresentations
- OP - 5% in second stage
  - prolonged first and second stage
- Breech - 3-4% at term
  - May be associated with uterine or fetal anomalies
  - Lower perinatal mortality after CS vs. vaginal delivery
  - External cephalic version vs. elective c-section
  - ECV reduces C-section rate by 50%
- Face <1%
  - Mentum Anterior – can deliver vaginally
  - Mentum Posterior – cannot deliver vaginally
- Brow <1% - unstable presentation
**Postterm Pregnancy**
- Pregnancy extending beyond 42 weeks
- Management usually begins at 41 weeks - Accurate dating is crucial
- Increased perinatal mortality vs. term
  - At 42 week 2x term
  - At 43 weeks 4x term
  - At 44 weeks 5-7x term
- Increased risk of uteroplacental insufficiency, oligohydramnios, meconium aspiration, neonatal hypoglycemia, seizures

**Fetal surveillance**
- Non-stress test (NST) and amniotic fluid index (AFI)
  - Reactive NST: 2 fetal heart rate accelerations ≥ 15 beats/minute, lasting ≥ 15 sec, over 20 minutes
  - AFI: Sum of maximal vertical pocket in each quadrant
  - AFI: < 5=oligo; 5.1-8=low-normal; 8.1-24=normal, >24=poly
- Biophysical profile (BPP) or modified BPP
  - BPP: score 0 (absent) or 2 (present) on 5 measures:
    - fetal breathing movt, fetal movt, fetal tone, reactive NST, AFI>5
  - Modified BPP = same as NST + AFI
- Oxytocin challenge test (OCT)
  - Negative OCT: 3 contractions in 10 minutes without late decelerations

**Postterm Pregnancy Management**
- **Timing of delivery**
  - When risks of continued pregnancy outweigh risks of induction, commonly 41-42 wks
  - Delivery eliminates risk of intrauterine death
  - Risk of stillbirth higher than risk of neonatal death at 41 week pregnancy, increasing with GA
  - Higher risk of C-section if unfavorable cervix
  - No evidence for increase in cesarean delivery with induction vs. expectant management

**Meconium stained amniotic fluid**
- **Goal:** to prevent meconium aspiration syndrome
- **Amnioinfusion:** No benefit
- **Endotracheal intubation and suctioning of vigorous infant:** No benefit
- **Suctioning recommended only for infants with absent or depressed respiratory effort, decreased muscle tone, or heart rate <100 beats/min**
Labor Induction

- Indications:
  - Need for non-urgent delivery in absence of labor and absence of contraindications
- Risks: hyperstimulation, uterine rupture, fetal distress
- Contraindications: Uterine scar, Placenta previa, Non-cephalic presentation
- Bishop score predicts success of induction
  - ≤3 have higher risk of failure, c-section
  - ≥9 have good prognosis for success
  - Cervical ripening often recommended when Bishop score ≤6

Bishop Score

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Labor Induction

- Uterine and fetal monitoring indicated with induction
- Cervical ripening
  - Prostaglandin E2 – Prepidil gel or Cervidil insert
  - Misoprostil – Not FDA approved
    - CONTRAINDICATED IF PRIOR C-SECTION
    - Studies show efficacy of intravaginal or oral dosing
  - Foley bulb insertion with 30mL balloon against internal os
- Oxytocin induction
  - More effective if used with amniotomy

Normal and Abnormal Labor

- First stage of labor – onset of labor to complete dilation of the cervix
  - Latent Phase – slow cervical change
  - Active Phase – more rapid dilation, usually at 3-4 cm
    - Protracted active phase
      - <1.2 cm/hr for nullipara or <1.5cm./hr for multipara
    - Active phase arrest
      - No cervical dilation for > 2 hours
  - Second stage – complete dilation to delivery
    - Median duration Nullip: 50 min Multip: 20 min
    - Arrest (no epidural) Nullip: >2hrs Multip: >1hr
    - Arrest (with epidural) Nullip: >3hrs Multip: >2hrs
  - Third stage – delivery of fetus to delivery of placenta
**Protraction or Arrest of Labor**
- Consider the 3 P’s
  - Power: Uterine contractions/expulsive force
  - Passenger: fetal anomalies, macrosomia, malposition
  - Pelvis: Pelvimetry NOT useful to predict delivery
- Insure adequate forces:
  - ≥ 200 Montevideo units for 2-4 hours as long as fetal heart tracing reassuring
  - MVU = add (max - baseline IUP) for each UC for 10 minutes

**Management of labor dystocia**
- For inadequate forces: Labor augmentation
  - Oxytocin
  - AROM
- For persistent OP in second stage: Manual rotation
- Assisted vaginal delivery (forceps or vacuum) in appropriate cases
- C-section for fetal distress or failure of other measures

**Shoulder Dystocia**
- Definition – failure of spontaneous delivery of the shoulders after delivery of the head
  - Often defined subjectively, 60 second standard
- Risk factors - fetal macrosomia, maternal DM, previous shoulder dystocia, assisted vaginal delivery, postterm pregnancy
  - Most common risk factor: NONE OF THE ABOVE
- Sequelae – brachial plexus injury, fetal asphyxia, hypoxic encephalopathy, clavicle or humerus fracture
- Warning – “Turtle sign” head retracts into perineum

**Shoulder Dystocia Management**
- AVOID:
  - excessive neck traction, neck rotation, fundal pressure
- DO:
  - Call for help
  - McRoberts maneuver – maternal hip flexion up to abdomen
  - Suprapubic pressure – from side of fetal spine toward face
  - Delivery of posterior shoulder – pull fetal arm across abdomen
  - Rotation maneuvers
    - Rubin – abduct shoulder and rotate toward abdomen
    - Woods screw – pressure on clavicle and rotate toward back
Pain Management in Labor

- Non-pharmacologic
  - Water baths, relaxations, hypnosis, acupuncture
  - Best evidence for continuous labor support (doula)
- Systemic opioid analgesics
  - Morphine, meperidine, fentanyl
- Inhalation agents
  - Self administered nitrous oxide
- Local/nerve blocks
  - Paracervical, pudendal blocks
- Neuraxial anesthesia – spinal or epidural

Epidural Anesthesia

- Indication:
  - Maternal request for pain relief in labor
- Contraindications:
  - Refractory hypotension
  - Coagulopathy (including anticoagulation)
  - Bacteremia or skin infection at site
  - Increased intracranial pressure
- Adverse effects
  - Hypotension, pruritis, spinal headache, urinary retention, hematoma, fetal bradycardia
  - Increased rate of oxytocin augmentation
- NO increased risk of C-section
- May increase rate of instrumental delivery
  - Consider reduce dose, delay pushing

Third Stage Complications

- Retained Placenta
  - > 30 minute third stage
  - Incidence 0.5-1.0%
  - Manual removal, consider antibiotic prophylaxis
- Uterine Inversion
  - Large bore IV access
  - Manual reduction with uterine relaxation (terbutaline, nitroglycerine or halothane anesthetic)
  - After reduction maintain position with fist in uterine cavity and uterotonic agents (oxytocin, prostaglandin F2 alpha, methylergonovine)
- Placenta accreta/percreta – increasing incidence with increasing incidence of uterine scars
  - Cesarean hysterectomy at 36 wk or fetal lung maturity

Postpartum Hemorrhage

- Call for help
- Establish IV access and replace fluid and blood
- Begin fundal massage
- Determine cause
  - Uterine atony is cause in 50%
  - Laceration – vaginal, cervical or uterine
  - Uterine rupture
  - Retained placenta or placental fragments
  - Coagulopathy
- Repair lacerations
Postpartum Hemorrhage

- Treat atony
  - Oxytocin 10-40 U in 1 L saline or 5-10 U IVP
  - Methergine 0.2 mg IM – NOT if hypertension
  - Prostaglandin F2 alpha (Hemabate) 250 mcg IM repeat q 15-90 min to max 2 mg

- Further measures
  - Arterial embolization
  - Uterine vessel ligation
  - Internal iliac artery ligation
  - Laparotomy/hysterectomy

Postpartum Endometritis

- More common after C-section
  - Prophylactic antibiotics for CS after labor or ROM

- Diagnosis: within 5 days of delivery
  - Fever, uterine tenderness, leukocytosis, foul lochia within 5 days of delivery or
  - Fever without other evident cause (if not wind, wound or water, think of womb)

- Polymicrobial

- Treatment
  - Cefotetan, cefoxitin, or cefotaxime
  - Gentamycin plus clindamycin
  - Ampicillin and gentamycin ± metronidazole

Lactation

- Best chance for success:
  - Do: Start early, educate parents, provide coaching
  - Do not: provide formula at discharge or weigh infant before and after feeding

- Contraindications to breastfeeding: maternal HIV, active TB, use of street drugs, amiodarone, lithium, ergotamine, chloramphenicol, retinoids, tetracycline, doxorubicin, acebutolol, 5-aminosalicylic acid, bromocriptine, aspirin, clemastine, primidone, sulfasalazine, and radioisotopes

- Medications while lactating
  - Most psychotropics considered "of concern"
  - Consult AAP guidelines or recently published database

Q&A

“Examinations are formidable even to the best prepared, for the greatest fool may ask more than the wisest man can answer.”
– Charles Caleb Colton, 1780-1832