Medical Complications of Pregnancy
Objectives

- Describe selected medical emergencies exclusive to pregnancy
- Describe selected medical conditions that can cause serious complications in pregnancy
- Formulate a plan for diagnosis and treatment of these conditions
**Conditions Exclusive to Pregnancy**

- Severe pre-eclampsia
- Eclampsia
- HELLP syndrome
- Acute fatty liver of pregnancy (AFLP)

**Conditions That Complicate Pregnancy**

- Deep venous thrombosis (DVT)
- Pulmonary embolism (PE)
- Disseminated intravascular coagulation (DIC)
- Human immunodeficiency virus (HIV) infection
Hypertensive Disorders of Pregnancy

Pregnancy Induced Hypertension

- PIH (no proteinuria)
- Preeclampsia (proteinuria +/- edema)

6-8% of all gestations

Chronic Hypertension (Elevated BP prior to 20 weeks)

- Severe Preeclampsia
- Eclampsia
- HELLP Syndrome
Pre-Eclampsia

- Classic Triad:
  - Hypertension (>140/90)
  - Proteinuria (>1+ or >300 mg/24h)
  - Generalized edema (least reliable)

- Hypertension and proteinuria must be present on two occasions >6 hr apart

- Rapid weight gain is supportive evidence
Diagnostic Criteria for Severe Preeclampsia

- Headaches
- Visual Disturbances
- Pulmonary Edema
- Hepatic Dysfunction
- RUQ or Epigastric Pain
- Oliguria
- Elevated Creatinine
- Proteinuria of 5 g or more in 24 hrs

Systolic BP > 160 to 180 mm Hg
Diastolic BP > 110 mm Hg
Thrombocytopenia or hemolysis
Risk Factors for Preeclampsia

- Nulliparity
- Maternal age >40
- Twin gestation
- Family history of pre-eclampsia or eclampsia
- Chronic hypertension
- Chronic renal disease
- Antiphospholipid syndrome
- Diabetes mellitus
- Angiotensin gene T235
Prevention: No Proven Benefit

- Correct nutritional deficiencies
  - Magnesium
  - Zinc
  - Omega 3 fatty acids
- Change prostacyclin / thromboxane balance:
  - Aspirin
Clinical Course of Preeclampsia

Eyes
- Arteriolar Spasm
- Retinal Hemorrhage
- Papilledema
- Transient Scotomata

Respiratory System
- Pulmonary Edema
- ARDS

Liver
- Subcapsular Hemorrhage
- Hepatic Rupture

Hematopoietic System
- HELLP Syndrome
- DIC

CNS
- Seizures
- Intracranial Hemorrhage
- CVA
- Encephalopathy

Pancreas
- Ischemic Pancreatitis

Kidneys
- Acute Renal Failure

Uteroplacental Circulation
- IUGR
- Abruption
- Fetal Compromise
- Fetal Demise
Management of Severe Preeclampsia

- Admit to hospital, monitor closely at bedrest
- Treatment goals:
  - Prevent seizures
  - Lower BP to prevent cerebral hemorrhage
  - Expedite delivery, balancing maternal condition and fetal maturity
Maternal Evaluation

- Vitals, neuro checks, and DTRs q15-60 min. until stable
- Foley catheter - output and dipstick protein hourly
- External monitoring - NST
- Labs: Blood count, BUN, creatinine, AST, ALT, LDH, electrolytes and uric acid
- Meds: MgSO$_4$ IV; BP meds for diastolic $> 110$
Magnesium Sulfate

- Preferred anticonvulsant
- Slows neuromuscular conduction and decreases CNS irritability
- No significant effects on blood pressure
- 4-6 gram IV load, followed by infusion of 1-3 grams / hour
# Magnesium Levels

<table>
<thead>
<tr>
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<th>mg/dl</th>
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<tbody>
<tr>
<td>Normal</td>
<td>1.3 to 2.6</td>
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<tr>
<td>Therapeutic</td>
<td>4 to 8</td>
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<tr>
<td>Loss of patellar reflex</td>
<td>8 to 10</td>
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<tr>
<td>Somnolence</td>
<td>10 to 12</td>
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<tr>
<td>Respiratory depression</td>
<td>12 to 17</td>
</tr>
<tr>
<td>Paralysis</td>
<td>15 to 17</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>30 to 35</td>
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Antidote is calcium gluconate one gram IV over 3 minutes
Antihypertensive Medication

- Goal: Maternal diastolic 90-110 mm Hg
- Choices of parenteral agent
  - Beta blockers (labetalol)
  - Vasodilators (hydralazine)
- Oral alternatives (slower onset)
  - Calcium channel blockers (nifedipine)
  - Methyldopa (Aldomet)
Delivery Decisions - Severe Preeclampsia

- Maternal deterioration? Severe IUGR? Fetal compromise? In labor? >34 weeks gestation?
  - Yes: Delivery within 24 hours
  - No:
    - 28-32 weeks:
      - Corticosteroids
      - Antihypertensive drugs
      - Daily evaluation of maternal and fetal conditions until 33-34 weeks
    - 33-34 weeks:
      - Amniocentesis
        - Immature fluid:
          - Corticosteroids
          - Deliver 48 hours later
        - Mature fluid:
          - Delivery

Adapted from University of Tennessee, Memphis, management plan for patients with severe preeclampsia, Sibai, BM, in Obstetrics: Normal and Problem Pregnancies, 3rd Edition, Gabbe, SG, Niebyl, JR, Simpson, JL.
Delivery Decisions for Severe Preeclampsia II

- Vaginal delivery preferred
- Cesarean delivery for
  - Continuous seizures or other emergency
  - Fetal distress
  - Unfavorable cervix
  - Severe prematurity
- Anesthesia
  - Epidural vs. general
Postpartum Management

- Improvement usually rapid after delivery
- Risk of seizure greatest in first 24 hours
- Magnesium continued for 24 hrs
- Continue monitoring serum MgSO$_4$ levels, BP, urine output
- Watch for signs of fluid overload
Eclampsia

- Appearance of seizures in a patient with preeclampsia
- Etiology uncertain
  - cerebral edema, ischemia possible causes
- BP often significantly elevated, but in 20% can be normal (diastolic < 90)
- Can occur before, during or after delivery
Seizure Management

- Avoid anticonvulsant polypharmacy
- Protect airway to minimize aspiration
- Prevent maternal injury
- Give MgSO$_4$ to control the convulsions
- When stable, plan for delivery
HELP Syndrome

- Atypical presentation of severe preeclampsia
- Acronym HELLP:
  - Hemolysis
  - Elevated Liver enzymes
  - Low Platelets
Clinical Presentation of HELLP

- Extremely variable

- Common findings:
  - RUQ pain, epigastric pain, nausea, and vomiting
  - 85% hypertensive

- Time of diagnosis
  - 2/3 antepartum, 1/3 postpartum
  - Mid-second trimester to several days postpartum
Differential Diagnosis of HELLP

- Biliary colic, cholecystitis
- Hepatitis
- Gastroesophageal reflux
- Gastroenteritis
- Pancreatitis
- Ureteral calculi or pyelonephritis
- ITP or TTP
Laboratory Findings in HELLP

- **Hemolysis**
  - Abnormal peripheral smear
  - Total bilirubin > 1.2 mg/dl
  - LDH > 600 IU/L

- **Liver enzymes**
  - AST (SGOT) > 70 IU/L

- **Platelet count**
  - <100,000 per mm³
  - Used to classify severity
Management of HELLP

- Similar to severe preeclampsia:
  - Stabilize mother
  - Evaluate fetus for compromise
  - Determine optimal timing/route of delivery
  - Use CEFM and manage BP and fluid status

- All women should receive MgSO₄ while symptomatic or in labor
HELLP: New Treatments

- Dexamethasone 10 mg IV q12h when platelets <100,000
- Platelets for active bleeding, or if <20,000
- Plasmapheresis: limited success, but not routinely recommended
Acute Fatty Liver of Pregnancy

- Occurs in one of 7,000-16,000 pregnancies
- Presents in third trimester:
  - Vomiting (76%), abdominal pain (43%)
  - Anorexia (21%), jaundice (16%)
- May progress to liver failure, including ascities and renal failure
- Differential includes HELLP, acute hepatitis, or toxin-induced liver damage
Diagnosis of AFLP

- SGOT (AST) elevated, but < 500 IU/L
- Bilirubin elevated, but < 5 mg/dl
- PT and PTT prolonged, fibrinogen decreased
- Liver biopsy diagnostic
  - correct coagulation defects first
- Delivery is most important part of treatment
Venous Thromboembolism

- Includes DVT and PE
- Occurs in 1/1000-2000 pregnancies
- Leading cause of maternal mortality in developed countries
- 5-15% recurrence risk in future pregnancies
- Chronic venous insufficiency is common sequelae
Risk Factors for VTE

- Virchow’s Triad
  - Hypercoagulability
  - Venous stasis
  - Vascular damage
- Age > 35
- Weight > 80 kg
- Multiparity
- Family history of VTE
- Deficiencies:
  - Antithrombin
  - Protein C
  - Protein S
- Gene variants:
  - Factor V Leiden
  - Prothrombin
- Lupus anticoagulant
Clinical Presentation of DVT

- 75% antepartum - 51% by 15 weeks
- Swelling and discomfort of the leg
- Calf circumference difference >2 cm
- Signs of superficial phlebitis
- Positive Homan’s sign may be present
Consider anti-coagulation therapy

Impedance plethysmography

Meets diagnostic criteria for DVT

Equivocal

Ultrasound

Repeat ultrasound vs. IPG vs. abdominal shielded venography

Begin anti-coagulation therapy

Meets diagnostic criteria for DVT

Equivocal

Consider anti-coagulation therapy
Pulmonary Embolism (PE)

- Majority occur postpartum
- Mild dyspnea and tachycardia progressing to cardiopulmonary collapse
- Treat ($O_2$, hemodynamic support) and evaluate simultaneously
- ABG will show decreased $PO_2$ (<85 mm Hg) and increased A-a gradient
PE Evaluation

- CXR
  - 30% normal
  - May show atelectasis or elevated diaphragm

- EKG
  - Sinus tachycardia
  - Classic “S1 Q3 T3” pattern

- V/Q scan
  - Treat if high probability
  - PE unlikely if low probability

- Evaluate for DVT if V/Q equivocal
Diagnostic Tests for Pulmonary Embolism

Symptoms/risk factors suggesting PE

Initial evaluation supports diagnosis of PE (ABC, CXR, ECG)

V/Q scan

High probability
- Anti-coagulation therapy
  - Emboli present
  - Pulmonary angiogram

Intermediate
- Begin heparin

Low probability
- Emboli absent
- No therapy

Normal
- No therapy
VTE Treatment

- Anticoagulation
  - Data lacking - adapted from non-pregnant patients

- Heparin
  - Safest agent - does not cross placenta
  - Role of LMW heparins under study

- Warfarin
  - Does cross the placenta
  - Can cause fetal damage in 1st trimester
VTE Prophylaxis

- Low risk patients: begin in early pregnancy
  - Aspirin 75 mg qd -OR-
  - Unfractionated heparin 5000 units SQ q12h

- High risk: begin in early pregnancy or 4-6 weeks before previous VTE
  - Unfractionated heparin 7500-10,000 units SQ q12h
  - LMWH 40 mg daily (adjust dose for weight)
Treatment of Acute VTE

- Rapidly institute anticoagulation with UFH
  - 5000 unit IV bolus
  - 1300 units per hour continuous infusion
  - Maintain aPTT at 1.5-2.5 times normal
  - Continue for 5-10 days

- Follow with UFH 10,000 units SQ q12h

- If postpartum
  - Begin warfarin the first day
  - Stop UFH when INR is between 2.0-3.0
Delivery with Anticoagulation

- Risk of significant hemorrhage is low
- Consider reduced UFH dose vs. stopping at onset of labor
- Spinal or epidural analgesia safe with prophylactic doses of UFH
- Avoid regional anesthesia if IV heparin or high-dose SQ regimens
DIC

- Simultaneous activation of clotting system and clot lysis
- Depletes clotting factors, causing bleeding
- Clots can lead to ischemia
- Hemolysis can lead to significant anemia
- Underlying cause can be difficult to detect
Diagnosis of DIC

- Oozing from venipuncture and IV sites, easy bruising, petechiae
- Lab evaluation:
  - ↑ aPTT and PT-INR
  - ↑ fibrin split products and D-dimer
  - ↓ fibrinogen
  - ↓ platelet count and H/H
Treatment of DIC

- Correction of underlying cause is key!
- Often related to pregnancy complication
- Delivery necessary
- If cause uncertain, replace coagulation factors:
  - Maintain platelets > 100,000
  - Maintain fibrinogen (from FFP or cryoprecipitate) > 150 mg/dl
  - Avoid heparin if patient actively bleeding
HIV in Pregnancy

- Goal: decrease vertical transmission
  - Can be decreased from 25% to 2% with antepartum treatment

- Risk factors for transmission
  - High viral load (>1000 copies per ml)
  - Lower CD4 count
  - Prolonged rupture of membranes
  - Premature birth or low birth weight

- Can be transmitted by breast feeding
HIV Antivirals in Pregnancy

Current recommendations: (August 2000)

- ZDV 100mg 5x/d beginning 14-34 weeks
- In labor: ZDV 2mg/kg IV over one hour, followed by 1 mg/kg/hr infusion
- Postpartum: ZDV 2 mg/kg po 4x/d for infant
  - adjust dose if less than 34 weeks at birth
HIV Delivery Management

- If viral load > 1000 per ml, elective cesarean decreases transmission
  - Schedule for end of 38th week
- If labor or ROM, cesarean does not reduce risk
- Consider prophylactic antibiotics in all cesarean deliveries
- Decision must be individualized
Antenatal Screening for HIV

- Multiple groups support universal screening
- In women at high risk, repeat testing in 3rd trimester indicated
Summary

- Multiple medical challenges can evolve during pregnancy
- Key to diagnosis is clinical vigilance + appropriate lab or imaging studies
- Clinical challenge is balancing maternal and fetal well-being
- Consultation of value in difficult cases
- Universal HIV testing strongly recommended