Hypertension During Pregnancy

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Overview

• Learning objectives
• Introduction
• Terminology / Classification
• Specific hypertensive disorders of pregnancy
• Treatment
• Complications
• Summary
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Learning Objectives

• Differentiate the four categories of hypertensive disorders of pregnancy.
• List the risk factors for hypertension during pregnancy (in particular, preeclampsia).
• List the complications of preeclampsia.
• Discuss the treatment of hypertensive disorders of pregnancy.

Introduction

• Leading cause of maternal morbidity and mortality worldwide
• Complicates 5-10% of pregnancies.
• Responsible for 16% of maternal deaths in developed countries
• Hypertension during pregnancy is a marker for cardiovascular morbidity and mortality later in life.
Hypertension During Pregnancy

Terminology/Classification

Classification of Hypertension in Pregnancy:

- Preeclampsia & eclampsia syndrome
- Chronic hypertension
- Preeclampsia superimposed on chronic hypertension
- Gestational hypertension
- Postpartum hypertension
Specific Disorders (cont.)

Preeclampsia

1. Hypertension + proteinuria (classic definition)  
   or...

2. Hypertension + multisystemic signs*, without proteinuria (New addition)
   
   *Thrombocytopenia (platelet count < 100,000), or  
   *Hepatic dysfunction (transaminases > 2x upper limits of normal), or  
   *New renal insufficiency (serum creatinine > 1.1 mg/dL, or doubling of serum creatinine in the absence of other renal disease), or  
   *Pulmonary edema, or  
   *New-onset cerebral or visual disturbances

Preeclampsia (cont.)

• Other signs and symptoms
  • Edema
  • Headache
  • Epigastric or right upper quadrant (RUQ) abdominal pain

• Lab studies may reveal HELLP syndrome:
  • Hemolysis
  • Elevated LFT’s
  • Low platelets
Specific Disorders (cont.)

Preeclampsia (cont.)

• HELLP syndrome – Variable presentation:
  • Some do not have proteinuria
  • Some are normotensive

Hypertension

• Mild
  • Systolic BP > 140 mmHg or diastolic BP > 90 mmHg on 2 occasions at least 4 hours apart while seated at rest, after 20 weeks gestation

• Severe
  • Systolic BP > 160 mmHg or diastolic BP > 110 mmHg while seated at rest, after 20 weeks gestation, confirmed within minutes to facilitate timely treatment

• 30/15 Rule
  • Systolic BP increase > 30 mmHg or diastolic BP increase > 15 mmHg
  • No longer used – not prognostic
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Specific Disorders (cont.)

Preeclampsia (cont.)

• Proteinuria
  • \( > 300 \text{ mg} \) protein in a 24 hr. urine collection
    (may be extrapolated from a shorter duration collection)
  • Protein / creatinine ratio \( > 0.3 \)
  • \( > 1+ \) protein in urine dipstick
    (use only if other quantitative methods are not available)

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Specific Disorders (cont.)

Preeclampsia (cont.)

• Descriptive terminology for preeclampsia:
  • For preeclamptic patients with any (one or more) of the features listed on the next slide, the phrase “preeclampsia with severe features” is preferred (over “severe preeclampsia”)
  • The phrase “preeclampsia without severe features” is preferred (over “mild preeclampsia”) for preeclamptic patients without any of the features listed on the next slide
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Specific Disorders (cont.)

Preeclampsia (cont.)

• Severe features of preeclampsia:
  • Systolic BP > 160 mmHg or diastolic BP > 110 mmHg while seated at rest, after 20 weeks gestation
  • Thrombocytopenia (platelet count < 100,000)
  • Impaired liver function (transaminases > 2x upper limits of normal and/or severe persistent RUQ or epigastric pain unresponsive to medication and not accounted for by alternative diagnoses)
  • Progressive renal insufficiency (serum creatinine > 1.1 mg/dL, or doubling of serum creatinine in the absence of other renal disease)
  • Pulmonary edema
  • New-onset cerebral or visual disturbances

• Risk factors:
  • Primiparous
  • Age > 40 years
  • Obesity
  • Diabetes mellitus
  • Chronic hypertension
  • Preexisting renal disease
  • Preeclampsia in previous pregnancy
  • Family history of preeclampsia
  • Multifetal gestation
  • In vitro fertilization
  • Thrombophilia
  • Systemic lupus erythematosus
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Specific Disorders (cont.)

Preeclampsia (cont.)

• Effects on the fetus
  • Adverse effects due to impaired uteroplacental blood flow or placental infarction:
    • Intrauterine growth restriction (IUGR)
    • Oligohydramnios
    • Placental abruption
    • Non-reassuring fetal status on the monitor or other antepartum surveillance
    • Death

• Maternal complications:
  • CNS
    • Seizures (eclampsia)
    • Cerebral hemorrhage
    • Cerebral infarction
    • Hypertensive encephalopathy
    • Posterior reversible encephalopathy syndrome (PRES)
      • Seizures / status epilepticus
      • Altered mental status
      • Cortical blindness

(cont.)
Specific Disorders (cont.)

Preeclampsia (cont.)

• Maternal complications (cont.):
  • Hepatic
    • Jaundice
    • Subscapular/ intrahepatic hematoma
    • Hepatic rupture
    • HELLP syndrome
      • Microangiopathic hemolytic anemia
      • Hepatic dysfunction
      • Thrombocytopenia

(cont.)

Specific Disorders (cont.)

Preeclampsia (cont.)

• Maternal complications (cont.):
  • Coagulation system
    • Disseminated intravascular coagulopathy
    • Microangiopathic hemolysis
    • Hematoma
    • Hematuria
    • Pulmonary embolism

(cont.)
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Specific Disorders (cont.)

Preeclampsia (cont.)

- Maternal complications (cont.):
  - Other
    - Acute renal failure
    - Pulmonary edema
    - Infection/ sepsis
    - Placental infarction
    - Placental abruption

(continues)

Prevention

- Low-dose aspirin
  - For women with a medical history of early-onset preeclampsia and preterm delivery < 34 wks. gestation, aspirin 60-80 mg (81 mg) PO daily is recommended beginning in the late first trimester.
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Specific Disorders (cont.)

Preeclampsia (cont.)

- Management
  - Delivery (for any of the following):
    - > 37 wks. gestation
    - Suspected abruptio placentae
    - > 34 wks. Gestation, with any of the following:
      - Progressive labor or rupture of membranes
      - Fetal weight < 5th percentile (estimated by ultrasound)
      - Oligohydramnios
      - Persistent biophysical profile (BPP) < 6/10

- Medical treatment (cont.)
  - Seizure prophylaxis:
    - Magnesium sulfate (MgSO₄)
      - Data support the use of MgSO₄ for seizure prophylaxis only for preeclampsia with severe features or eclampsia (not gestational hypertension or preeclampsia without severe features).
      - Loading dose: 4 - 6 g MgSO₄ diluted in 100 mL fluid given IV over 20 min.
      - Maintenance infusion: 1 - 2 g/hr. IV
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Specific Disorders (cont.)

Preeclampsia (cont.)

• Medical treatment (cont.)
  • Pharmacologic blood pressure control:
    • Only recommended if systolic BP ≥ 160 mmHg or diastolic BP ≥ 110 mmHg!
    • Conservative BP targets with treatment:
      • Systolic BP: 140 - 150 mmHg
      • Diastolic BP: 90 - 100 mmHg

Preeclampsia (cont.)

• Medical treatment (cont.)
  • Blood pressure control (cont.)
    • First-line treatment – three options:
      • IV labetalol
      • IV hydralazine
      • Oral nifedipine (new)
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Specific Disorders (cont.)

Preeclampsia (cont.)
• Medical treatment (cont.)
  • Blood pressure control (cont.)
    • Labetalol
      • 20 mg IV (over two min.) initial dose, followed by an additional
      • 40 mg IV (over two min.) in 10 min. if initial dose is ineffective, followed by an additional
      • 80 mg IV (over two min.) in 10 min. if 40 mg dose is ineffective
    • If BP targets have not been achieved within 10 min. of the above protocol, administer hydralazine 10 mg IV (over two min.).

• Hydralazine
  • 5 or 10 mg IV (over two min.) initial dose, followed by an additional
  • 10 mg IV (over two min.) in 20 min. if initial dose is ineffective, followed by an additional
  • 20 mg IV (over two min.) in 20 min. if the above dose is ineffective, followed by an additional
  • 40 mg IV (over two min.) and obtain emergency consultation if the 20 mg dose is ineffective after 10 min.
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Specific Disorders (cont.)

Preeclampsia (cont.)

- Medical treatment (cont.)
  - Blood pressure control (cont.)
    - Nifedipine
      - 10 mg PO initial dose, followed by an additional
      - 20 mg PO in 20 min. if initial dose is ineffective, followed by an additional
      - 20 mg PO in 20 min. if the above dose is ineffective, followed by an additional
      - 40 mg PO and obtain emergency consultation if the second 20 mg dose is ineffective after 20 min.

Eclampsia

- New-onset grand mal seizures in a woman with preeclampsia
- Premonitory symptoms:
  - Persistent occipital or frontal headache
  - Blurred vision
  - Photophobia
  - Epigastric and/or RUQ abdominal pain
  - Altered mental status
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Specific Disorders (cont.)

Eclampsia (cont.)

- **Management:**
  - Intravenous magnesium sulfate to control convulsions
    - IV loading dose: 4 – 6 g
    - Maintenance infusion: 1 – 2 g/hr. for at least 24 hrs. after the last seizure
  - Antihypertensive medication to control blood pressure if it is dangerously high
  - Delivery of the fetus following maternal stabilization

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Specific Disorders (cont.)

Chronic hypertension in pregnancy

- Hypertension present before pregnancy or before 20 weeks gestation
- Hypertension that persists beyond 12 weeks postpartum
- Diagnosis is easy if patient is taking antihypertensive medication before conception.
- Diagnosis is difficult if patient presents late in gestation
  - Is this chronic hypertension or gestational hypertension?
Specific Disorders (cont.)

Chronic hypertension in pregnancy (cont.)
• During pregnancy, chronic hypertension is categorized as:
  • Mild-to-moderate
    • Systolic BP 140 - 159 mmHg and/or diastolic BP 90 - 109 mmHg
  • Severe
    • Systolic BP > 160 mmHg and/or diastolic BP > 110 mmHg

Nonpharmacological treatment:
• Recommended:
  • Moderate exercise (for women accustomed to regular exercise)
• Not recommended:
  • Weight loss
  • Extremely low-sodium diet (< 100 mEq/day)
Specific Disorders (cont.)

Chronic hypertension in pregnancy (cont.)

• Medical treatment (cont.)
  • BP targets during medical therapy:
    • Systolic BP: 120 - 159 mmHg
    • Diastolic BP: 80 - 104 mmHg
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Specific Disorders (cont.)

Chronic hypertension in pregnancy (cont.)

• Medical treatment (cont.)
  • First-line agents:
    • Methyldopa
      • 250 mg PO BID to 1,000 mg PO TID
    • Labetalol
      • 100 mg PO BID to 800 mg PO TID
    • Nifedipine, extended release
      • 30 mg PO daily to 120 mg PO daily

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Specific Disorders (cont.)

Chronic hypertension in pregnancy (cont.)

• Medical treatment (cont.)
  • Second-line agent:
    • Thiazide diuretics
Specific Disorders (cont.)

Chronic hypertension in pregnancy (cont.)

• Contraindicated medications
  • Angiotensin-converting enzyme (ACE) inhibitors
    • Not to be used during pregnancy or the preconception period
    • Adverse effects:
      • Underdeveloped cranial bones (hypocalvaria)
      • Oligohydramnios
      • Renal failure/dysgenesis
      • Intrauterine growth restriction (IUGR)
      • Fetal/neonatal death
  • Angiotensin-receptor blockers (ARB’s) and other inhibitors of the renin angiotensin aldosterone system are felt to have similar effects

Specific Disorders (cont.)

Preeclampsia superimposed on chronic hypertension:

• Women with chronic hypertension: fourfold risk of preeclampsia.
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Specific Disorders (cont.)

Preeclampsia superimposed on chronic hypertension:

- Presence of hypertension before 20 weeks gestation
  and
  - New onset proteinuria $\geq 300$ mg /24 hrs.
  or
  - Sudden increase in proteinuria if already present in early gestation
  or
  - Sudden increase in blood pressure over baseline
  or
  - Increase in liver enzymes to abnormal levels

- Thrombocytopenia (platelet count $< 100,000$)
  or
- Sudden symptoms: severe headache, or blurred vision, or RUQ or epigastric pain
  or
- Pulmonary edema
  or
- New-onset renal insufficiency
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Specific Disorders (cont.)

Gestational Hypertension

- “Gestational hypertension” has replaced the term “pregnancy-induced hypertension”
- New hypertension during pregnancy developing after 20 weeks gestation, without proteinuria or any of the features of preeclampsia without proteinuria
- BP normalizes by 12 weeks postpartum
- Up to 50% will develop preeclampsia

Gestational Hypertension (cont.)

- Reclassified as “chronic hypertension” if hypertension persists beyond 12 weeks postpartum
- Used to be reclassified as “transient hypertension” if preeclampsia does not develop and blood pressure normalizes by 12 weeks postpartum*

*New guidelines no longer recommend this
Specific Disorders (cont.)

Postpartum hypertension

- Exact incidence of postpartum hypertension and preeclampsia is unknown.
- Preeclampsia and eclampsia can develop up to four weeks postpartum.
- In women with preeclampsia while pregnant, BP usually decreases within 48 hours of delivery, but the BP increases again 3 – 6 days postpartum.

Summary

- Hypertensive disorders of pregnancy are common.
- They are associated with significant morbidity and mortality (maternal and fetal).
- All women with hypertension during pregnancy should be followed closely.
- Hypertension during pregnancy is a marker for cardiovascular morbidity and mortality later in life.
## Hypertension During Pregnancy

### References


