Hypertension During Pregnancy

Carmine D’Amico, D.O.

Overview

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

Classification of Hypertension in Pregnancy:

- Preeclampsia & eclampsia syndrome
- Chronic hypertension
- Preeclampsia superimposed on chronic hypertension
- Gestational hypertension

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**Terminology/Classification**

Classification of Hypertension in Pregnancy:

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- Postpartum hypertension
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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

Specific Disorders (cont.)

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
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 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
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Specific Disorders (cont.)

Preeclampsia (cont.)

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

(cont.)

Preeclampsia (cont.)

• 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

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Specific Disorders (cont.)

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.).

    • If BP targets have not been achieved within 20 min. of hydralazine administration, obtain emergency consultation.
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Specific Disorders (cont.)

Preeclampsia (cont.)

• Medical treatment (cont.)
  • Blood pressure control (cont.)
    • 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.
      • If BP targets have not been achieved within 20 min. of the above, administer labetalol 20 mg IV (over two min.).
      • If BP targets have not been achieved within 10 min. of the above, administer labetalol 40 mg IV (over two min.) and obtain emergency consultation.
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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.

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Specific Disorders (cont.)

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

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?
### 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 $\geq 160$ mmHg and/or diastolic BP $\geq 110$ mmHg

### Specific Disorders (cont.)

- **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
  • Threshold for pharmacologic treatment (patient currently not on antihypertensive medication):
    • Systolic BP ≥ 160 mmHg or diastolic BP ≥ 105 mmHg

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

- **Second-line agent:**
  - **Thiazide diuretics**
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

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
  - New onset proteinuria ≥ 300 mg /24 hrs.
  - Sudden increase in proteinuria if already present in early gestation
  - Sudden increase in blood pressure over baseline
  - Increase in liver enzymes to abnormal levels

(cont.)

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Specific Disorders (cont.)

Preeclampsia superimposed on chronic hypertension:

- Presence of hypertension before 20 weeks gestation (cont.)
  - Thrombocytopenia (platelet count < 100,000)
  - Sudden symptoms: severe headache, or blurred vision, or RUQ or epigastric pain
  - Pulmonary edema
  - New-onset renal insufficiency
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.

