HYPERTENSION AND PREECLAMPSIA IN PREGNANCY UPDATES

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OBJECTIVES

• To understand diagnosis and management of hypertensive disorders in pregnancy
• To understand in-patient care for the patient with hypertensive disease

Background

➢ Each year, more than a half-million women die from pregnancy-related causes worldwide
➢ Leading causes include
  • Hemorrhage
  • Sepsis
  • Unsafe Abortion
  • Hypertensive Disorders
  • Obstructed Labor
➢ A majority occur in low-income or 3rd world countries
Background


The World

The World – Maternal Deaths
Background

- Hypertensive disorders affect approximately 10% pregnancies worldwide
- Preeclampsia may account for 10 – 15% maternal deaths in low and middle income countries
- Associated with up to 12% IUGR infants and 1/5 preterm births
Background

• Associated with up to $\frac{1}{4}$ stillbirths and neonatal deaths

• Women with preeclampsia at higher risk for:
  – Hypertension
  – Heart Disease
  – Stroke

• Adolescents exposed to preeclampsia in utero have higher BPs than those of normotensive mothers

HISTORY

➢ Disease recognized for over 2,400 years

➢ Only in the latter half of the 20th century were significant advances into the understanding

➢ Still no complete explanation of the disease

HISTORY – Treatment

➢ Early 20th century (conservative treatment)
  ▪ Goal to eliminate stimulation and prevent seizures, and await labor
  ▪ Sedation with morphine, reduce stimulation by keeping patient in dark and quiet room
  ▪ All exams performed under light anesthesia

➢ Since 1960s, medical management has changed little
  ▪ Magnesium Sulfate demonstrated as efficacious and safe by Lazard and Dorsett in the 1920s
  ▪ Routine prenatal care with BP measurements, UA
  ▪ Hospitalization at diagnosis
    ▪ Routine BP, daily weights, bed rest, fetal surveillance
    ▪ Antihypertensives, Magnesium Sulfate, decision for delivery
HISTORY – 1980s – 2000s

Diagnosis

- New-onset hypertension after 20 weeks gestation
- SBP > 140 mmHg, DBP > 90 mmHg
- Proteinuria > 300 mg/24 hours

Criteria for Severe Preeclampsia could include:
- SBP > 160 mmHg, DBP > 110 mmHg
- Proteinuria > 5000 mg/24 hours
- IUGR
- HELLP Syndrome

2013 ACOG Task Force on Hypertension in Pregnancy Report
2013 ACOG Task Force

- ACOG convened a task force to review available data and publish evidence-based recommendations for clinical practice

- 17 clinician-scientists met multiple times
  - Obstetrics, Maternal-Fetal Medicine, Internal Medicine (hypertension), Nephrology, Anesthesiology, Physiology, and Patient Advocacy

2013 ACOG Task Force

- Task force considered hypertension in pregnancy in four categories
  - Preeclampsia – Eclampsia
  - Chronic Hypertension
  - Chronic Hypertension with superimposed Preeclampsia
  - Gestational Hypertension

Key Differences

- Dependence of diagnosis upon proteinuria eliminated
  - Due to syndromic nature of preeclampsia

- In the absence of proteinuria, Preeclampsia may be diagnosed as hypertension plus:
  - Thrombocytopenia (platelets < 100k)
  - Impaired liver function (LFTs elevated twice normal)
  - New development of renal insufficiency (creatinine > 1.1 mg/dL or doubling of creatinine)
  - Pulmonary Edema
  - New onset cerebral or visual disturbances
Key Differences

- Terms **Mild** Preeclampsia and **Severe** Preeclampsia discouraged

- New terminology:
  - Preeclampsia without severe features
  - Preeclampsia **WITH** severe features

- Proteinuria >5 grams/24 hours eliminated from severe form of disease (preeclampsia with severe features)

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2013 ACOG Task Force

**Table 6-1. Diagnostic Criteria for Preeclampsia**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure</td>
<td>Systolic blood pressure &gt;140 mm Hg, diastolic blood pressure &gt;90 mm Hg, or an increase in blood pressure of 30 mm Hg or more within 1 hour.</td>
</tr>
<tr>
<td>Proteinuria</td>
<td>&gt;5 grams/24 hours</td>
</tr>
<tr>
<td>Urine collection</td>
<td>24-hour urine collection of proteinuria &gt;300 mg</td>
</tr>
<tr>
<td>Fluid retention</td>
<td>Serum creatinine concentration &gt;1.1 mg/dl, or doubling of the serum creatinine concentration in the absence of other renal disease</td>
</tr>
<tr>
<td>Pulmonary edema</td>
<td>Elevated blood concentrations of lung transaminase to twice normal concentration</td>
</tr>
</tbody>
</table>

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**Box 6-1. Severe Features of Preeclampsia (Any of these findings)**

- Systolic blood pressure of 140 mm Hg or higher, or diastolic blood pressure of 90 mm Hg or higher on two occasions at least 6 hours apart while the patient is in bed and without antihypertensive therapy is initiated before this time.
- Thrombocytopenia (platelet count less than 100,000/mcL)
- Impaired liver function as indicated by abnormally elevated blood concentrations of liver enzymes (twice normal concentration), severe abdominal pain, or underlying chronic liver disease.
- Progressive renal insufficiency (serum creatinine concentration greater than 1.1 mg/dl, or a doubling of the serum creatinine concentration in the absence of other renal disease).
- Pulmonary edema
- Non-convulsant or visual disturbances
2013 ACOG Task Force

- Chronic Hypertension
  - Elevated BP either prior to pregnancy or detected before 20 weeks of gestation

- Gestational Hypertension
  - New onset BP elevations after 20 weeks (often near term)
  - Absence of proteinuria or other diagnostic criteria
  - Failure to normalize post-partum changes diagnosis to chronic hypertension

- Chronic Hypertension with Superimposed Preeclampsia
  - Development of proteinuria after 20 weeks
  - Sudden exacerbation of hypertension or escalation in antihypertensive drug dose
  - Sudden manifestation of other symptoms (elevated LFTs)
  - Decrease in platelets < 100k
  - Sudden appearance of other symptoms (headache, renal insufficiency-Cr>1.1, pulmonary congestion, RUQ pain)

Management of Gestational Hypertension

- Close monitoring for women with Gestational Hypertension
  - BP assessment with proteinuria monitoring weekly, with an additional BP measurement at home or in the office
  - Weekly NST and Amniotic Fluid Index
  - Weekly platelet count and LFTs
  - Assessment for fetal growth every 3 weeks
  - Expectant management for women less than 37 0/7 weeks

- For women with gestational hypertension at or beyond 37 0/7 weeks, delivery rather than continued observation is suggested
Management of Preeclampsia

- Preeclampsia without severe features
  - Maternal BP evaluation twice weekly
  - Assessment for fetal growth every 3 weeks
  - Fetal Assessment with NSTs twice weekly
  - Assessment of LFTs & platelets weekly
  - Assessment of Amniotic Fluid Index weekly

- For women with Preeclampsia without severe features at or beyond 37 0/7 weeks, delivery rather than continued observation is recommended

Management of Preeclampsia

- For women with Preeclampsia with a systolic BP less than 160 mmHg and a diastolic BP less than 110 mmHg AND no maternal symptoms, it is suggested that magnesium sulfate not be administered universally for the prevention of eclampsia

  This does not mean that "mild preeclamptics" do not need magnesium sulfate

Management of Preeclampsia

- For women with Preeclampsia with severe features, administration of intrapartum and postpartum magnesium sulfate is recommended
Management of Preeclampsia

For women with Preeclampsia with severe features at or beyond 34 0/7 weeks, and in those with unstable maternal or fetal conditions irrespective of gestational age, delivery soon after maternal stabilization is recommended.

Management of Preeclampsia

For women with Preeclampsia with severe features less than 34 0/7 weeks gestation with stable maternal and fetal conditions, it is recommended that continued pregnancy be undertaken only at centers with adequate maternal and neonatal intensive care resources.

Management of Preeclampsia

[Diagram showing management of preeclampsia]
Management of Preeclampsia

- For women with Preeclampsia with severe hypertension during pregnancy (sustained systolic BP at least 160 or diastolic BP at least 110 mmHg), the use of antihypertensive therapy is recommended
  - **EARLY** treatment of severe hypertension is **MANDATORY**

Management of Preeclampsia

- Mode of delivery should be determined by fetal gestational age, fetal presentation, cervical status, and maternal and fetal conditions
- Delivery decision should not be based upon amount of or change in the amount of proteinuria
- For women with Preeclampsia undergoing Cesarean Section, continued intra-operative administration of magnesium sulfate is recommended

Management of Preeclampsia

- For women with HELLP syndrome after 34 0/7 weeks, delivery is recommended after maternal stabilization
- For women with HELLP syndrome from age of fetal viability to 33 6/7 weeks, it is suggested that delivery be delayed for 24 – 48 hours if maternal and fetal condition remains stable to complete a course of steroids for fetal benefit
- For women with Preeclampsia with severe features before fetal viability (including HELLP syndrome), delivery after maternal stabilization is recommended. Expectant management is not recommended
Management of Preeclampsia

- For women with Gestational Hypertension, Preeclampsia, or Superimposed Preeclampsia, it is suggested that BP be monitored for at least 72 hours post partum and again 7 – 10 days after delivery or earlier in women with symptoms.

- For women in the postpartum period who present with new-onset hypertension, headache, or blurred vision, the administration of magnesium sulfate is recommended.

Management of Chronic Hypertension

- For pregnant women Chronic Hypertension treated with antihypertensives, it is suggested that BP be maintained between 120/80 – 160/105.

- For women with Chronic Hypertension and no additional maternal or fetal complications, delivery before 38 0/7 weeks of gestation is not recommended.
  - Delivery between 38 – 39 weeks.

Management of Chronic Hypertension

- [Graph showing neonatal risks following induction of labour and fatal risks in ongoing pregnancies.]

- Hutcheon et al; 2010.
Management of Chronic Hypertension

- For pregnant women Chronic Hypertension and superimposed Preeclampsia without severe features and stable maternal and fetal conditions, expectant management until 37 0/7 weeks of gestation is suggested.

- For pregnant women Chronic Hypertension and superimposed Preeclampsia with severe features less than 34 0/7 weeks gestation, pregnancy should only be continued at facilities with adequate maternal and neonatal intensive care resources.

Morbidity & Mortality

- Data reviewed from health departments of 50 states and District of Columbia over 14 year period.

- Identified 4024 pregnancy related deaths:
  - Defined as maternal death during pregnancy or within 1 year of end of pregnancy that resulted from complications of the pregnancy itself.

- 796 attributed to preeclampsia-eclampsia.

Morbidity & Mortality

<table>
<thead>
<tr>
<th>Table 1. Pregnancy-Related Deaths and Mortality Ratios*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause of death</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Embolism</td>
</tr>
<tr>
<td>Hemorrhage</td>
</tr>
<tr>
<td>Preeclampsia and eclampsia</td>
</tr>
<tr>
<td>Infection</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
</tr>
<tr>
<td>Anesthesia</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Unknown</td>
</tr>
<tr>
<td>All causes</td>
</tr>
</tbody>
</table>

* Pregnancy-related deaths at 20 or more weeks' gestation per 100,000 live births.
Morbidity & Mortality

Table 2. Specific Causes of Death Among Women Who Died of Preeclampsia or Eclampsia

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Preeclampsia</th>
<th>Eclampsia</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebrovascular events</td>
<td>17.3</td>
<td>21.4</td>
<td>38.7</td>
</tr>
<tr>
<td>Cerebrovascular hemorrhage</td>
<td>15.8</td>
<td>18.8</td>
<td>34.7</td>
</tr>
<tr>
<td>Cerebral edema</td>
<td>1.1</td>
<td>1.8</td>
<td>2.9</td>
</tr>
<tr>
<td>Cerebral embolus</td>
<td>0.4</td>
<td>0.8</td>
<td>1.1</td>
</tr>
<tr>
<td>Renal or hepatic failure</td>
<td>7.2</td>
<td>5.4</td>
<td>12.5</td>
</tr>
<tr>
<td>HELLP syndrome</td>
<td>4.8</td>
<td>2.3</td>
<td>7.1</td>
</tr>
<tr>
<td>Other complications of hypertension</td>
<td>13.9</td>
<td>11.8</td>
<td>25.7</td>
</tr>
<tr>
<td>Not specified hypertension</td>
<td>7.6</td>
<td>8.3</td>
<td>15.9</td>
</tr>
<tr>
<td>Preeclampsia and eclampsia</td>
<td>58.8</td>
<td>82.2</td>
<td>100</td>
</tr>
</tbody>
</table>

HELLP = hemolysis, elevated liver enzymes, and low platelet count syndrome.

In Martin et al (2005) stroke occurred in:
- 23/24 women had systolic BP > 160
- 1/24 had systolic BP 155 – 159
- 5/24 women had diastolic BP > 105
  - 3 > 110

Systolic hypertension may be more important than diastolic

Treat the Hypertension

- **EARLY** treatment of severe hypertension is **MANDATORY**
- Controlling BP is the optimal intervention to prevent deaths due to cerebrovascular events in preeclamptic women
Management of Preeclampsia

TABLE 7.1. Antihypertensive Agents Used for Urgent Blood Pressure Control in Pregnancy

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labetalol</td>
<td>10-20 mg IV, then 20-40 mg every 20-30 min to a maximum dose of 300 mg or Constant infusion 1-2 mg/min IV</td>
<td>Considered a first-line agent. Tachycardia is less common and fewer adverse effects. Contraindicated in patients with asthma, heart disease, or pregnancy-related hypertension.</td>
</tr>
<tr>
<td>Hydralazine</td>
<td>5 mg IV or IM, then 5-10 mg IV every 20-40 min or Constant infusion 0.5-10 mg/h</td>
<td>Higher or frequent dosage associated with minimal hypotension, headaches, and total distress—may be more common than other agents.</td>
</tr>
<tr>
<td>Nifedipine</td>
<td>10-20 mg orally, repeated in 30 minutes if needed, then 10-20 mg every 2-6 hours</td>
<td>May observe reflex tachycardia and headaches</td>
</tr>
</tbody>
</table>

**Late PostPartum Preeclampsia**

- >48 hours following delivery up to 6 weeks after delivery
- 63% had no antepartum diagnosis of hypertensive disease in pregnancy
- Headache was most common presenting complaint (69%)
  - SOB, edema, blurry vision, nausea of vomiting, epigastric pain.
Summary

TREAT HYPERTENSION!!!!!!

Timing of Delivery:
- **Gestational Hypertension:** 37 0/7 weeks
- **Preeclampsia (w/out severe features):** 37 0/7 weeks
- **Chronic Hypertension:** 38 – 39 weeks
- **C.H. with superimposed Preeclampsia:** 37 0/7 weeks
- **Preeclampsia with severe features:** 34 0/7 weeks
  - Deliver at these gestational ages, or upon diagnosis (if later than recommended age)

Preeclampsia prior to 34 0/7 weeks is most likely severe and should be managed at a facility with resources for maternal and neonatal complications

Summary

Magnesium is indicated for ALL patients with preeclampsia with severe features, but not **Universally** recommended for preeclampsia without severe features

Post-partum period is potentially dangerous. Patient’s should be educated to recognize early signs and symptoms

PEC with Severe Features – Expectant Management

- Task Force Recommendations:
  - Women with severe PEC at less than 34 0/7 week GA with stable maternal and fetal conditions, it is recommended that continued pregnancy be undertaken only at facilities with adequate maternal and neonatal intensive care resources.
  - Women with severe PEC less receiving expectant management at 34 0/7 or less, corticosteroids for fetal lung maturity is recommended
  - Delivery decision should not be based on the amount or change in proteinuria.
References


