

HYPERTENSION in PREGNANCY

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Hypertension in Pregnancy

- Second leading cause maternal mortality in US
 - VTE most common cause
- Accounts for 15% of maternal deaths
- Complicates 6% - 8% of all pregnancies
- Significant risk for intrauterine fetal death and neonatal morbidity/mortality
- Maternal risk of abruption, DIC, intracranial hemorrhage, hepatic failure, and renal failure

Hypertension in Pregnancy

- "Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy"
- Management guidelines for 2 distinct groups
 - Chronic hypertension predating pregnancy
 - Hypertension first appearing during pregnancy



AJOG 2000; 185(S1):S22

HYPERTENSION

Hypertension in Pregnancy ACOG Task Force 2013

- 17 expert clinician-scientists met 2012
 - Reviewed data last 10 years
 - Published evidence based recommendations
- Highlights regarding preeclampsia
 - Association with later life CV disease
 - Failure to note multisystemic nature of disease
 - Emphasized dynamic nature of disease
 - 'Mild' Dx applies only at time of diagnosis
 - Disease is progressive, although at variable rates
 - Frequent postpartum appearance of preeclampsia



Executive Summary: Obstet Gynecol November 2013

Classification of Hypertension in Pregnancy

- Chronic hypertension
- Preeclampsia-eclampsia
 - Significant modifications made
- Superimposed preeclampsia
- Gestational hypertension
 - Transient hypertension of pregnancy
 - Persistent chronic hypertension
 - Preeclampsia



Executive Summary: Obstet Gynecol November 2013

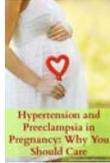
Chronic Hypertension

- Present and observable prior to pregnancy or diagnosed prior to 20 weeks' gestation; use of anti-hypertensive medication prior to pregnancy
- BP > 140 mm Hg systolic or >90 mm Hg diastolic
 - Mild: systolic 140-159 or diastolic 90-109
 - Severe: systolic >160 or diastolic >110
- Hypertension diagnosed initially during pregnancy that does not normalize by 12 weeks post partum

ACOG Practice Bulletin #125; February 2012

Chronic Hypertension

- Increased risk adverse outcomes
 - Maternal mortality 4.8 x; CVA 5.3 x
 - Pulmonary edema 5.2 x; renal failure 6.0 x
 - Placental abruption 2-3 x
 - Cesarean section 2.7 x
 - SGA infants 2-5 x
 - IUFD 2 x; NND 2.5 x;
 - Superimposed preeclampsia 20%-75%



ACOG Practice Bulletin #125, February 2012

Preeclampsia-Eclampsia

- Pregnancy-specific syndrome of reduced organ perfusion tied to vasospasm and activation of coagulation cascade
- Presents after 20 weeks' gestation
 - Earlier with trophoblastic disease
- BP >140 mm Hg systolic **or** >90 mm Hg diastolic in patients previously normotensive
- Accompanied by proteinuria



ACOG Practice Bulletin #125, February 2012

Preeclampsia-Eclampsia

- **Proteinuria removed as requirement**
- If absent, severe preeclampsia diagnosed with
 - Thrombocytopenia (< 100,000)
 - Impaired LFTs (> twice normal)
 - New-onset renal dysfunction (creatinine > 1.1)
 - Pulmonary edema
 - New-onset cerebral or visual disturbances
- Bottom line: may diagnose severe preeclampsia without proteinuria

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Preeclampsia-Eclampsia

- Proteinuria defined as > 300 mg/24 Hrs
 - Protein/creatinine ratio > 0.3
 - Dipstick 1+ or greater (discouraged)
- Massive proteinuria (> 5 g)
 - Eliminated as diagnostic of severe disease
- IUGR
 - Eliminated as diagnostic of severe disease
- Eclampsia is above syndrome with seizures



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Preeclampsia 'Severe Features'

- Systolic BP > 160 or diastolic BP >110
 - Two occasions; 4 hours apart
- Thrombocytopenia (< 100,000)
- Impaired liver function
 - LFT's > twice normal levels
 - Severe, persistent RUQ/epigastric pain
- Progressive renal dysfunction
 - Creatinine > 1.1 or doubling from baseline
- Pulmonary edema
- New-onset, severe cerebral or visual disturbances

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Preeclampsia-Eclampsia

- Spectrum of syndrome: mild to severe
- Progression typically slow, if at all
- **Beware:** fulminant disease may evolve within days, or even hours
- Syndrome is unpredictable
 - "wears many faces"
- Maintain high index of suspicion
- Remember: even if disease appears mild, it has been present for weeks, if not months



Preeclampsia superimposed on chronic hypertension

- Maternal/fetal prognoses worse versus either condition alone
- Diagnosis of superimposed disease likely:
 - New-onset proteinuria after 20 weeks'
 - Sudden increase in proteinuria
 - Sudden increase in blood pressure
 - If previously well controlled
 - Thrombocytopenia/increased LFT's

ACOG Practice Bulletin #125, February 2012

Gestational hypertension

- HTN w/o proteinuria > 20 weeks'
 - Absent 'features of severe preeclampsia'
- Designation during pregnancy only until more specific diagnosis can be assigned
 - Preeclampsia develops
 - Transient HTN: preeclampsia does not develop and patient normotensive 12 weeks' pp
 - Chronic HTN: persistent HTN 12 weeks' pp

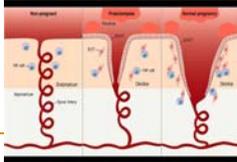
ACOG Practice Bulletin #125, February 2012

Pathophysiology

- Critical to emphasize: preeclampsia is not simply HTN
 - Systemic syndrome
 - Potentially lethal complications in setting of only modest blood pressure elevations
- 'Cause' of preeclampsia remains unknown

Pathophysiology

- Syndrome characterized by
 - Vasospasm
 - Coagulation cascade activation
 - Ischemic insult to placenta, liver, kidney, CNS
- Abnormal trophoblastic invasion (or "remodeling process") of spiral arteries may represent morphologic basis for syndrome



Pathophysiology

- Blood pressure
 - Altered vascular reactivity
 - Increased peripheral resistance
 - Decreased prostacyclin/increased thromboxane
 - Decreased nitric oxide synthase activity
- The heart

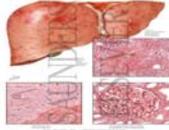


Pathophysiology

- The kidney
 - Glomerular endotheliosis
 - Pathognomonic lesion
 - GFR/RBF decreased
 - ATN/cortical necrosis rare
 - Fractional urate clearance decreased
 - Hemoconcentration/CVP-PCWP low normal

Pathophysiology

- Coagulation system
 - Thrombocytopenia most common abnormality
 - Platelet deposition at endothelial damage
- The liver
 - Peri-portal hemorrhage/ischemic lesions
 - Wide spectrum of damage: mild necrosis to HELLP syndrome to subcapsular hemorrhage to hepatic rupture
- The CNS
 - Eclampsia: precipitating cause unknown
 - Headaches/visual symptoms



Diagnostic Evaluation

- Attempt to differentiate
 - Preeclampsia vs chronic vs transient HTN
 - Also, assess severity of process
- Screening/predictive tests not effective
- Baseline testing (high-risk pts w/normal BP)
 - CBC w/platelets
 - Serum creatinine/uric acid
 - 24 hr urine protein/creatinine clearance
 - Early dating US/follow-up US for growth

Diagnostic Evaluation

- Patients w/HTN before 20 weeks'
 - Consider screening for secondary HTN
 - Renal, renovascular, aldosteronism, Cushing syndrome, pheochromocytoma
 - Judgment required
 - Other baseline tests as above
- Patients w/HTN presenting after 20 weeks'
 - Add LFT's/coagulation profile to baseline tests

Chronic Hypertension

- Preconceptional counseling
 - Evaluate for potentially reversible causes
 - **Discontinue** ACE inhibitors and angiotensin II receptor antagonists
 - Cranial abnormalities, renal dysgenesis, pulmonary hypoplasia, IUGR, IUFD, oligohydramnios, NND
 - Thiazide diuretic therapy does not require discontinuation
 - Screen for end-organ damage
 - LVH, retinopathy, renal disease
 - Address activities, exercise, weight management

Chronic Hypertension

- Treatment indications
 - Value of treating mild CHTN unclear
 - Reduces risk severe HTN crisis
 - Does not improve perinatal outcome
 - Many authorities treat BP > 150-160/100-110
 - 'reasonable' to treat if BP is 150/100
 - Particularly in patients with end-organ damage
- Drug selection
 - Labetalol 'good option' first-line treatment
 - 200-2400 mg/day in 2-3 divided doses
 - Nifedipine also widely studied; safe and effective
 - 30-120 mg/day slow-release
 - Potential negative effect with magnesium not observed in large trial
 - Methyldopa used for decades; appears safe
 - 0.5-3.0 gm/day in 2-3 divided doses



ACOG Practice Bulletin #125, February 2012

Emergency Therapy Acute-Onset, Severe HTN: > 160 or > 110

- **Labetalol** 20 mg IV over 2 minutes
 - Repeat BP in 10 minutes
 - If still elevated, labetalol 40 mg IV over 2'
 - Repeat BP in 10 minutes
 - If still elevated, labetalol 80 mg IV over 2'
 - Repeat BP in 10 minutes
 - If still elevated, hydralazine 10 mg IV over 2'
 - If still elevated, consult MFM, IM, Anesth, etc.



ACOG Committee Opinion #514; December 2011

Emergency Therapy
Acute-Onset, Severe HTN: > 160 or > 110

- **Hydralazine 5-10 mg IV over 2 minutes**
 - Repeat BP in 20 minutes
 - If still elevated, hydralazine 10 mg IV over 2'
 - Repeat BP in 20 minutes
 - If still elevated, hydralazine 20 mg IV over 2'
 - Repeat BP in 10 minutes
 - If still elevated, labetalol 40 mg IV over 2'
 - Consult MFM, IM, Anesthesia, Critical Care, etc.

ACOG Committee Opinion #514, December 2011

Emergency Therapy
Acute-Onset, Severe HTN: > 160 or > 110

- **Nifedipine 10 mg orally**
 - Repeat BP in 20 minutes
 - If still elevated, Nifedipine 20 mg orally
 - Repeat BP in 20 minutes
 - If still elevated, Nifedipine 20 mg orally
 - Repeat BP in 20 minutes
 - If still elevated, labetalol 40 mg IV over 2'
 - Consult MFM, IM, Anesthesia, Critical Care, etc



ACOG Committee Opinion #623, February 2015

Chronic Hypertension

- **With mild renal disease**
 - Creatinine < 1.4 mg/dL
 - Good fetal survival/limited disease progression
- **With moderate/severe renal disease**
 - Fetal survival jeopardized/disease may accelerate
 - Dialysis/renal transplant: guarded prognoses
 - Modify magnesium sulfate maintenance dosage

Chronic Hypertension

- Fetal assessment
 - Monitor for superimposed preeclampsia/IUGR
 - Abrupton remains constant risk
 - Serial ultrasound for fetal growth
 - Assess acute utero-placental function
 - NST, BPP, CST



Chronic Hypertension

- Timing of delivery
 - No medication: 38-39 weeks
 - Controlled on medication: 37-39 weeks
 - Difficult to control on medication: 36-37 weeks
 - Superimposed preeclampsia
 - Consider delivery at 34 weeks
 - Judgment required
 - 2013 Task Force recommendations:
 - If MF status stable/no severe features; deliver at 37 wks

Spong, et al. Obstet Gynecol 2011; 118:323-33

Preeclampsia Prevention

- Baby ASA data
 - Evolving recommendations: 2013
 - Meta-analyses 30,000 patients
 - History of early-onset preeclampsia and PTB at < 34 weeks in > 1 prior pregnancy
 - Initiation of baby asa late first trimester suggested
- USPSTF December 2014
 - Much more aggressive prophylaxis
 - History of preeclampsia, particularly with adverse outcome
 - Chronic hypertension
 - Renal disease, SLE, APS, pregestational DM
- Not recommended as effective prevention strategies
 - Vitamin C or Vitamin E
 - Restriction of dietary salt
 - Calcium supplementation
 - May be useful in low calcium intake populations; not U.S.
 - Bed rest or physical activity restriction

Baby Aspirin
Y/N?

Executive Summary: Obstet Gynecol November 2013

Preeclampsia Management Rationale

- Delivery is always appropriate for mother-may not be so for fetus
 - Any management, other than delivery, must reduce perinatal morbidity and mortality
 - Management based upon determination of whether fetal prognosis is better in-utero or in nursery



Preeclampsia Management Rationale

- Basic pathophysiology of severe preeclampsia is ischemia
 - Treating only Sx/Sx may worsen status
- Pathologic features of syndrome present long before clinical Sx/Sx appear
 - "Evidence" of syndrome typically appears late in natural history of disease



Preeclampsia Management

- Preeclampsia/GHTN w/o severe features
 - Serial assessment maternal symptoms
 - Fetal kick counts
 - BP checks twice weekly
 - Check LFT's and platelets weekly
 - If BP < 160/110, no antihypertensive Rx
 - Strict bedrest not recommended
 - EFW's and NST's recommended
 - If IUGR diagnosed, assess umbilical artery dopplers
 - Deliver at 37 weeks
 - Universal magnesium sulfate prophylaxis not suggested

Executive Summary: Obstet Gynecol November 2013

Preeclampsia Management

- Ultimately, only delivery is curative
- Delivery timing
 - Limited role for FLM amniocentesis
 - Gestational hypertension: 37–38 wk
 - Preeclampsia—mild: 37 wk
 - Preeclampsia—severe: at diagnosis if > 32-34 wks
- Severe disease remote from term
 - Deliver if after 32-34 wks'
 - Selective expectant management at 23-32 wks'
 - Tertiary centers only
 - Steroids to enhance FLM



Spring Obstet Gynecol 2011;118:323-33

Preeclampsia Management

- Vaginal delivery preferable
 - "Aggressive" labor induction
- Epidural analgesia preferred intrapartum
- Parenteral magnesium sulfate prophylaxis
- Invasive hemodynamic monitoring
 - Rarely indicated
 - Pulmonary edema, oliguria, intractable HTN

Postpartum Counseling

- HTN and organ dysfunction resolve rapidly
- Postpartum follow up important:
 - Within 3-7 days if medication was used L/D or postpartum
 - within 7-14 days if no medication was used
- Recurrence risks vary
 - Early/severe disease: 25-40%
 - Late/mild disease: < 10%
 - HELLP SYNDROME: 5-10%
- Screen for Antiphospholipid Syndrome (APS) with early and/or severe disease
 - Lupus Anticoagulant
 - Anticardiolipin antibodies
 - Anti-B₂ Glycoprotein I antibodies

ACOG Practice Bulletin #118 January 2011

Questions