Chronic Hypertension Complicating Pregnancy

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Disclosure

Neither I, nor my spouse, have financial conflicts of interest to report.
Objectives

- To discuss the epidemiology, definition, and diagnosis of chronic hypertension in pregnancy.
- To discuss the maternal effects of chronic hypertension in pregnancy.
- To discuss the fetal effects of chronic hypertension in pregnancy.
- To outline antepartum management of the chronic hypertensive patient in pregnancy.
- To discuss the evaluation and diagnosis of superimposed preeclampsia.
Hypertensive disorders in pregnancy

- Chronic hypertension
- Gestational hypertension
- Preeclampsia
- Preeclampsia superimposed on cHTN
- Eclampsia
- Hemolysis, elevated liver enzymes, and low platelets (HELLP)

http://www.springerimages.com/img/Images/ImagesMD/GIC/01/01/MEDIUM_GIC0104-01-021.jpg
Chronic Hypertension

♦ 140/90 on two occasions at least 4 hours apart
♦ Diagnosed prior to pregnancy
♦ Before 20 weeks gestation
  ♦ +/- proteinuria
♦ Diagnosed during pregnancy but persisting past 84 days post-partum

Newly diagnosed severe hypertension

- Warrants evaluation for secondary causes
  - Pheochromocytoma
    - Plasma and urine metanephrines, MRI adrenal glands
  - Renal artery stenosis
    - Renal ultrasound
  - Primary aldosteronism
    - Serum $K^+$, plasma renin activity, 24 hour urine aldosterone
  - Cushing Syndrome
  - Sleep apnea
  - Drug abuse
Epidemiology

- National Health and Nutrition Examination Survey (NHANES) 2005-2008
  - 29-31% of adults in the United States
  - Prevalence increasing along with obesity epidemic
- Centers for Disease Control
  - Women 20-34 years old: 6.8%
  - Women 35-44 years old: 19%
  - 45% of Black women
  - 29% of Hispanic women
  - 31% of White women
- Risk factor for heart disease, stroke, congestive heart failure, and kidney disease

Increased risks for pregnancy

- Preterm birth (5-fold)
- Fetal growth restriction (2-5 fold)
- Stillbirth (2-fold)
- Placental abruption (2-fold)
- Cesarean delivery (3-fold)
- Preeclampsia (>3-fold)
- Maternal mortality (OR 4.8, CI 3.1-7.6)
- Cerebrovascular accident (OR 5.3, CI 3.7-7.5)
- Pulmonary edema (OR 5.2, CI 3.9-6.7)
- Renal failure (OR 6, CI 4.4-8.1)
Impact of pregnancy on women with chronic hypertension

- Women with benign essential hypertension without cardiac or renal damage can do very well.
- Anticipate physiologic decrease in blood pressure in second trimester.
- Women with pregestational cardiac effects are at increased risk of cardiac decompensation from the increased cardiac output and physiologic changes of pregnancy.
- Women with nephropathy are at risk for worsening proteinuria, and transient decline in renal function (most of which returns following pregnancy).
Chronic Hypertension

- Baseline evaluation helpful
  - 25% of women with cHTN will develop preeclampsia versus 4% of normotensive women

- Preeclampsia superimposed on cHTN is worse than de novo
  - increased risk of mortality, eclampsia, and stillbirth
  - abruption (1.5%), PTD (33.3%), and SGA (11.1%)

- Hypertension is an important diagnosis outside of pregnancy as well
Early Pregnancy Evaluation

♦ ECG and ECHO if abnormal
♦ Ophthalmologic exam
♦ Baseline 24 hour urine collection for CrCl and total protein
♦ CBC, AST, AST, BUN, Cr
17 year old primagravida

- No past medical history
- BP at first visit 116/65
- Office visit at 38 weeks, BP 154/97, 2+, mild H/A
27 year old G2P1001

- Chronic hypertension and obesity
- BP at first visit 135/82 on metoprolol
- 24 hour urine collection for total protein = 122 mg
- BP at 32 weeks 158/92, asymptomatic
- 24 hour urine collection for total protein = 465 mg
- AGA fetus
- Reassuring antepartum testing

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33 year old G2P0010

- Chronic hypertension and obesity
- BP at first office visit 148/98 on Lisinopril
- 24 hour urine collection for total protein = 184 mg
- BP at second office visit 126/84 now on Labetalol
- BP at 18 weeks 116/78
- BP at 35 weeks 142/96, asymptomatic
- 24 hour urine collection for total protein = 222 mg
37 year old primigravida

- Membranous nephropathy and hypertension
- BP at first office visit 134/84
- 24 hour urine collection for total protein = 640 mg
- At 25 weeks 700 mg
- At 34 weeks 2000 mg, BP 138/94
- At 37 weeks BP 172/107, headache
Antihypertensive Medications

♦ No clear benefit for mild

♦ For severe HTN the goal is to reduce risk of CVA, CHF, and RF. Improved control limits end-organ damage

♦ ACE-inhibitors and ARBs are contraindicated
  ♦ Teratogenic, renal dysgenesis, pulmonary hypoplasia, IUGR, stillbirth, and neonatal demise

♦ Not contraindicated:
  ♦ Methyldopa, Labetalol, Hydralazine, Nifedipine, HCTZ
Antepartum care and Delivery timing

- BP and urine dip for proteinuria at every visit
- Monitor fetal growth monthly
- Antepartum testing remains controversial
- Anticipate vaginal delivery at term

Delivery
- Mild hypertension without medication
  - 38-39 weeks
- Those requiring anti-hypertensive medication
  - 37-39 weeks
- Those with poorly controlled hypertension
  - 36-37 weeks
Intrapartum Care

- Magnesium drip if diagnosed with preeclampsia
- Monitor BP
- Treat if severe (>160/110)

Acute management
- Labetalol 20mg IV
  - Then 40mg, then 40-80mg q 15 minutes up to 300mg
- Hydralazine 5-10mg IV q 20 minutes
- Nifedipine 10-30mg PO q 45 minutes

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Anesthesia Concerns

- May have epidural
  - Some concern for epidural hematoma with preeclampsia and HELLP due to altered platelet function
  - Attempt to avoid acute drop in BP
- Best to avoid general anesthesia
  - Worsening hypertension with intubation
- Involve anesthesiologist early in care of severely hypertensive patient
  - Judicious management of fluids may be required
  - Ready for emergencies
Preeclampsia

♦ Perinatal mortality
  ♦ RR 1.4, placental insufficiency, IUGR, abruption, prematurity, preeclampsia superimposed on other vascular conditions carries increased risk

♦ Maternal mortality
  ♦ Abruption, hepatic rupture, eclampsia

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Preeclampsia – clinical presentation

- Often asymptomatic

- May complain of
  - Headache, confusion, dizziness
  - Abdominal/epigastric pain, N/V, hematemesis
  - Scotomata, diplopia, blurred vision
  - Oliguria or hematuria

- “Doctor, I don’t feel very well.”
Preeclampsia – clinical signs

- Rise in blood pressure, 140/90
- Proteinuria, 300 mg/day
- Retinal changes, localized retinal vascular narrowing
  - Not chronic arteriolar changes such as copper wiring or arteriovenous nicking
- Not part of diagnostic criteria
  - Edema, JVD, rales, DIC, hyper-reflexia
Hypertensive emergencies

- Hypertensive encephalopathy
- Acute left ventricular failure
- Acute aortic dissection
- Risk factors
  - Underlying heart disease, renal disease, multiple anti-hypertensive medications
- Posterior Reversible Encephalopathy Syndrome (PRES)
  - 250/150
  - Acute onset headache, altered mental status, cortical blindness, seizures, reversible edema on MRI
- Goal
  - 15-25 mmHg decrease in MAP over 60 minutes
  - Work toward diastolic BP of 100-110 mmHg
  - Too rapid drop can result in coma and/or fetal death
Eclampsia

- Preeclampsia plus seizures that cannot be attributed to other causes
- Antepartum, intrapartum, post-partum (usually within 48 hours)
- Autopsy findings include edema, infarction, and hemorrhage in CNS
- Neurologic findings in survivors are usually transient and may result from hypoxia, edema, or ischemia
- Risk of death 0-1.8% in developed countries, 14% in developing world
- Abruptio placentae, DIC, pulmonary edema, ARF, ARDS, HELLP, liver hematoma, and intracranial hemorrhage
- Perinatal death 5-12% related to prematurity, abruption, and severe IUGR
Management of Eclampsia

- Best to focus on prevention
- Prevent maternal injury
- Support respiratory and cardiovascular function
- Magnesium sulfate to prevent next seizure
- Gradual reduction in blood pressure
- Delivery based on gestational age, fetal condition, signs of labor
- Avoiding general anesthesia if possible
- Close post-partum monitoring
HELLP

- Hemolysis, elevated liver enzymes, and low platelets
- 15-20% do not have antecedent hypertension or proteinuria
- 1-2/1000 pregnancies, 10-20% of severe preeclampsia
- CBC, peripheral smear, AST, bilirubin, LDH

- Evidence of hemolysis:
  - Plts < 100000
  - LDH > 600
  - Total Bili >1.2
  - AST > 70
Mimics: Systemic Lupus Erythematosus Exacerbation

- Mild or severe, multiple organ systems
- Lupus nephritis may result in HTN, proteinuria, hematuria, thrombocytopenia, joint pain
- Labs: pancytopenia, increased anti-DNA antibodies, low to normal complement levels
- May also demonstrate anti-phospholipid antibodies (30-40% flares) with increased risk of thrombosis and tissue ischemia, with renal involvement will be identical to preeclampsia
- Key being rapid change in blood pressure and increase in level of proteinuria
Mimics: Systemic Lupus Erythematosus Exacerbation

- Outcome favorable if in remission before pregnancy and without flare during.
- Maternal morbidity and perinatal morbidity and mortality is high if lupus nephritis, CNS disease, or anti-phospholipid antibodies.
- Fetal death 4-19%, PTD 38-54%.
- Management: corticosteroids (40-80 mg/day), low dose aspirin, hydroxychloroquine, and heparin.
  - IVIG if thrombocytopenia persists.
Mimics:

acute fatty liver of pregnancy

- 1/10000 – 1/15000 deliveries
- More common in nulliparous women and with multiple gestation in third trimester
- Symptoms - Malaise, anorexia, N/V, abdominal pain, headache, or jaundice
- Signs - Ill-appearing, mild fever, jaundice, HTN, proteinuria, coagulopathy, neurologic findings
- Labs - hemoconcentration, prolonged PTT, metabolic acidosis, elevated creatinine, elevated transaminases and bilirubin, elevated amylase and lipase if concomitant pancreatitis
Mimics: acute fatty liver of pregnancy ultrasound

- Increased echogenicity
Mimics: acute fatty liver of pregnancy

CT

- Decrease of diffuse attenuation within liver
Mimics: thrombotic microangiopathies

- Thrombotic thrombocytopenic purpura and hemolytic uremic syndrome
- 1/100000
- Pentad (thrombocytopenia, hemolytic anemia, neurologic abnormalities, fever, renal dysfunction)
- Familial TTP usually chronic relapsing onset
- Acquired may have single episode
- Systemic or intrarenal aggregation of platelets
- High levels of thrombomodulin and large multimers of vWF causing platelet aggregation with resulting thrombocytopenia and mechanical injury of RBC
- ADAMTS13 reduced
  - Metalloprotease that degrades vWF multimers
Mimics: thrombotic microangiopathies

- TTP: Present with abdominal pain, N/V, GI bleed, epistaxis, petechiae, purpura, H/A, visual changes, confusion, aphasia, weakness, or seizures
- HUS: edema, HTN, bleeding, or severe ARF
- Fever (38.4), hematuria, proteinuria, renal insufficiency, and HTN
- Labs: thrombocytopenia (<20000), severe anemia, marked elevation of LDH
- Maternal mortality 0-10% with high morbidity
- 20% fetal loss
- Management: obtain consultation, replacement transfusions, plasma exchange, immune suppression, splenectomy, do not have to deliver
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