HYPERTENSION IN PREGNANCY – REVIEW OF THE GUIDELINES

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The 5th International Congress on Cardiac Problems in Pregnancy
22-25 February, 2018. Bologna, Italy

HYPERTENSION IN PREGNANCY- REVIEW OF GUIDELINES

- Prevalence
- Diagnosis and baseline evaluation
- Complications of chronic hypertension
- Why not treat everyone?
- Hypertensive Emergency

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PREVALENCE OF HYPERTENSIVE DISORDERS

20-30% of adults in the USA

12-22% pregnancies

Chronic hypertension 5% pregnancies

One of the leading causes of maternal mortality

ACOG committee opinion # 692, April 2017

MATERNAL MORTALITY

CHILD HEALTH USA 2013

Leading Causes of Pregnancy-Related Deaths,* 2006–2009

Source (I.15): Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Pregnancy Mortality Surveillance System

Cause	Percent of Pregnancy-Related Deaths
Cardiovascular Disease	14.6
Infection/Sepsis	14.0
Non-Cardiovascular Diseases	11.9
Cardiomyopathy (Heart Muscle Diseases)	11.8
Hemorrhage (Uncontrolled Bleeding)	11.0
Hypertensive Disorders of Pregnancy	9.9
Thrombotic Pulmonary Embolism (Blood Clot in Lung)	9.4
Cerebrovascular Accidents (Stroke)	6.1
Amniotic Fluid Embolism	5.4
Anesthesia Complications	0.6

4 8 12 16

Percent of Pregnancy-Related Deaths

**The cause of death was unknown for 5.3% of all pregnancy-related deaths.*

HYPERTENSION & MATERNAL MORTALITY IN U.K.

- Confidential inquiries report U.K. 2003-2005
- 2/3rd of the hypertension related maternal deaths due to
  - Cerebral hemorrhage
  - Cerebral infarction

ACOG Committee Opinion #514. 2011

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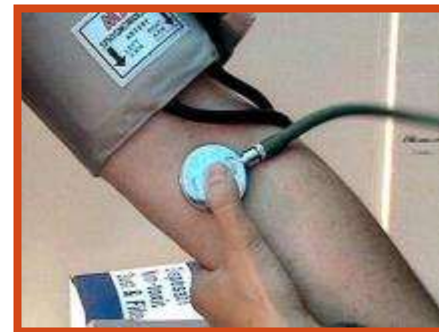
BLOOD PRESSURE CHANGES IN PREGNANCY

- BP decreases in pregnancy
  - Nadirs @ 16-18 weeks
    - SBP decreases 5-10 mm Hg
    - DBP decreases 10-15 mm Hg
- Returns to normal in the 3rd trimester

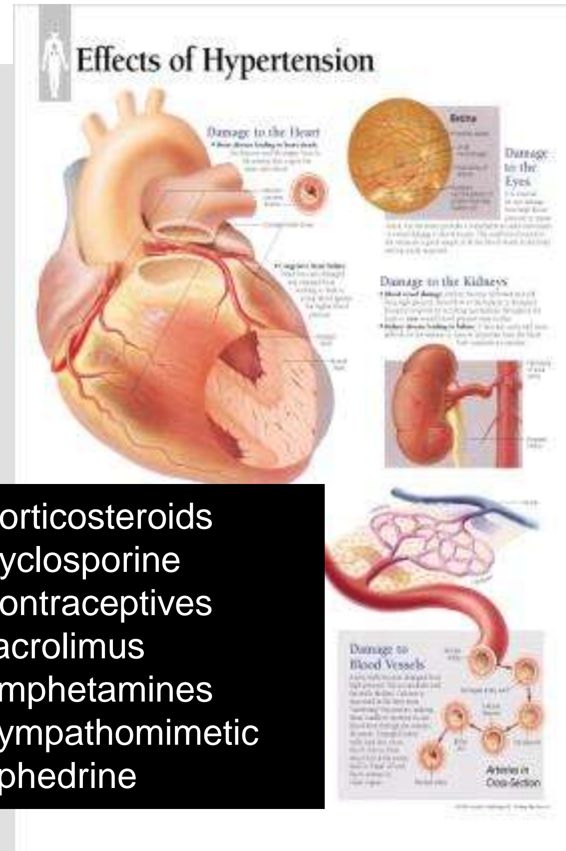
HOW TO MEASURE BLOOD PRESSURE ?

- Timing
  - 10 minute period of rest
  - 30 minute after tobacco / caffeine
- BP cuff
  - 1.5 x arm circumference
- Position
  - Upright / LL decubitus
  - Arm at the level of the heart



CLINICAL EVALUATION - I

- History
  - Duration/severity of HTN
  - Presence of end-organ damage
    - **Brain**
    - **Eye**
    - **Heart**
    - **Kidney**
- Symptoms
- Drugs/medications



Corticosteroids
Cyclosporine
Contraceptives
Tacrolimus
Amphetamines
Sympathomimetic
Ephedrine

CLINICAL EVALUATION - II

- Physical examination
  - BP in both arms
  - Peripheral pulses

1. Neurologic
2. Eye: Fundoscopy
3. Cardiac: JVD, murmurs, crackles

CLINICAL EVALUATION - III

- Laboratory
  - 4. Kidney:
    - Urine analysis
    - Electrolytes,
    - BUN / creatinine, 24hr urine
  - CBC
  - EKG, CXR
  - Baseline -Preeclampsia? LFTs, uric acid

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COMPLICATIONS OF CHRONIC HYPERTENSION

Maternal

- CHF
- CVA
- Renal failure

Obstetric

- Abruption 2 x
- 30% IUGR
- 3 x IUFD
- 10-50% Preeclampsia/ eclampsia
- 60-70% preterm delivery
- Increased CS rate
- Perinatal mortality 4.5%

Chronic Hypertension in Pregnancy. ACOG Practice Bulletin #125. 2012

PROGNOSTIC INDICATORS FOR CHRONIC HTN

- PROTEINURIA
  - Proteinuria >300 mg / 24 hrs associated with IUGR and PTD independent of preeclampsia
- CREATININE
  - Creatinine >1.4 mg/dl may deteriorate
- LEFT VENTRICULAR HYPERTROPHY
  - Cardiac decompensation

Morgan JL. Obstet Gynecol 128(2)270-276. 2016; Cunningham et. al. Am J Obstet Gynecol 1990

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WHY NOT TREAT EVERYONE?

- Risk of IUGR
- A 10 mm Hg decrease in the MAP is associated with 176 gm decrease in birth weight

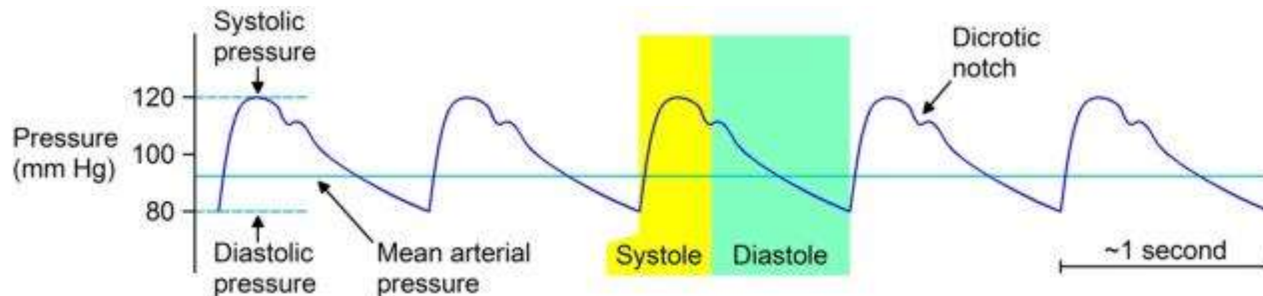
Von Dadelszen P, Magee LA. J Obstet Gynecol Can 2002:24(12);941

CASE

- 25 year old G1@ 25 weeks referred for ultrasound due to IUGR
- Ultrasound:
  - EFW <5th percentile, symmetric IUGR, oligohydramnios with elevated SD ratio on UA Dopplers
- Admitted to labor and delivery
- BP 90/60 mm Hg
- Hypertensive on labetolol 600 mg tid

MEAN ARTERIAL PRESSURE (MAP)

- Systolic BP + 2(Diastolic BP)/3
- MAP = CO x SVR
- What is mean arterial pressure?
  - Average BP in the arteries during one cardiac cycle
  - Better indicator of perfusion to vital organs



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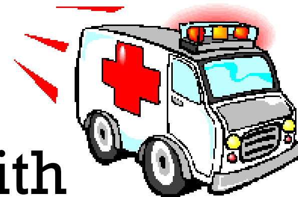
HYPERTENSIVE EMERGENCY

- Blood pressure elevation
- Threat of end-organ injury
- Catastrophic outcomes

HYPERTENSIVE EMERGENCY

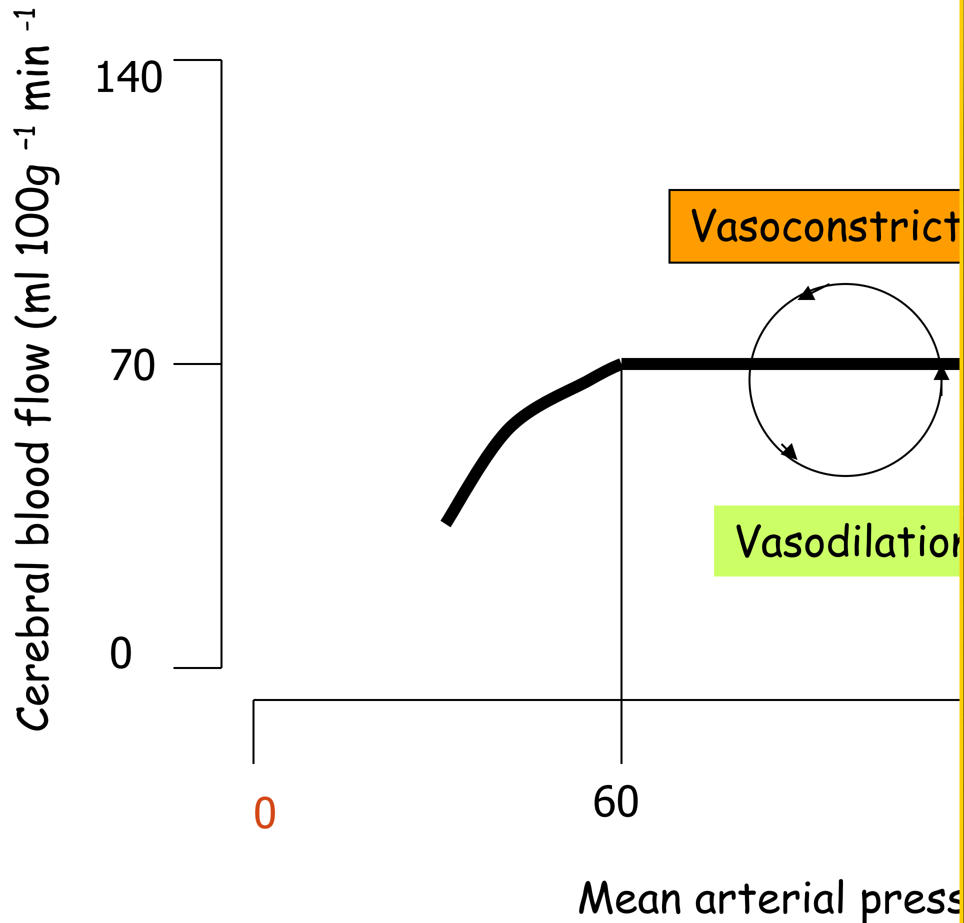
- Acute onset and persistent (≥15 minutes) increase in BP
  - **Systolic BP > 160 mm Hg** ***or***
  - **Diastolic BP > 110 mm Hg** ***or***
  - **Both**



- Pregnant/postpartum women with preeclampsia/eclampsia

ACOC Committee Opinion #514. Dec 2011

AUTOREGULATION OF CEREBRAL BLOOD FLOW



THE EYEGROUNDS IN HYPERTENSION

GRADE I (KEITH, WAGENER, AND BARKER) MILD NARROWING OF THE RETINAL ARTERIES RELATIVE TO THE VEINS

GRADE II MODERATE SCLEROSIS WITH INCREASED LIGHT REFLEX AND COMPRESSION OF VEINS AT CROSSINGS

GRADE III EDEMA, EXUDATES, AND HEMORRHAGES; SCLEROTIC AND MARKEDLY SPASTIC ("SILVER-WIRE") ARTERIES

GRADE IV PAPILLEDEMA OR CHOKED DISC, EXTENSIVE HEMORRHAGES, AND EXUDATES

HYPERTENSIVE EMERENCY

- Do's
  - Gradual reduction of BP
  - 10-20% first hour
  - 5-15% next 23 hours

- Don'ts
  - Too much
  - Too quickly
- Ischemic damage risk
- Autoregulation related damage

HYPERTENSIVE EMERGENCY - WHAT ARE THE RISKS?

- CNS
  - Cerebral hemorrhage
  - Cerebral infarction

ACOG Committee Opinion #514. 2011

HYPERTENSIVE EMERGENCY - EVALUATION

- Acute generalized or focal neurologic symptoms, nausea, vomiting ~ **increased intracranial pressure**
- Chest pain ~ myocardial ischemia, aortic dissection
- Severe back pain ~ aortic dissection
- Dyspnea ~ pulmonary edema

- Drug intoxication
  - Cocaine
  - Amphetamine
  - Phencyclidine
  - Monoamine oxidase inhibitors
- Drug withdrawal
  - Sympatholytic drugs
    - Clonidine

HYPERTENSIVE EMERGENCY IN PREGNANCY
WHAT IS THE GOAL ?

- BP ≥160/110 mm Hg
  - Not to normalize BP
  - Treat within 30-60 minutes
- Goal BP
  - **Systolic 140-160 mm Hg**
  - **Diastolic 90-100 mm Hg**

ACOG Committee Opinion #692, April 2017

HYPERTENSIVE EMERGENCY IN PREGNANCY
FIRST LINE THERAPY

HYDRALAZINE

- **Maternal hypotension**
- *No change in the umbilical artery Dopplers*

- NIFEDIPINE
- 10 mg PO repeat in 20 minutes

LABETOLOL

- Maternal – avoid if
  - Asthma
  - Heart failure
- Fetal bradycardia
- *No changes in the umbilical artery Dopplers*

ACOG Committee Opinion #692, April 2017

HYPERTENSIVE EMERGENCY IN PREGNANCY FIRST LINE THERAPY

- **LABETOLOL & HYDRALAZINE *intravenously***
- **Nifedipine if IV not available**
- Notify physician
- Fetal surveillance
- Magnesium sulphate seizure prophylaxis
- Anesthesia consultation
- MFM consultation

ACOG Committee Opinion #692, April 2017

HYPERTENSIVE EMERGENCY IN PREGNANCY

Labetolol

- 20 mg IVP over 2 min
  - Repeat BP in 10 min>
- 40 mg IVP over 2 min
  - Repeat BP in 10 min >
- 80 mg IVP over 2 min
  - Repeat BP in 10 min >
- Hydralazine 10 mg over 2 min
  - Repeat BP in 20 min >
  - Consult MFM/ Anes/CC

Hydralazine

- 5-10 mg IVP over 2 min
  - Repeat BP in 20 min>
- 10 mg IVP over 2 min
  - Repeat BP in 20 min >
- Labetolol 20 mg IVP over 2 min
  - Repeat BP in 10 min >
- Labetolol 40 mg over 2 min
  - Repeat BP in 10 min >
  - Consult MFM/ Anes/CC

ACOG Committee Opinion #514. 2011

HYPERTENSIVE EMERGENCY IN PREGNANCY
SECOND LINE THERAPY

NICARDIPINE

- *Minimal transplacental passage and no change in the umbilical artery Dopplers*

NITROPRUSSIDE

- Use for extreme emergencies and for the shortest amount of time
- Cyanide and thiocyanate toxicity in the mother/fetus/newborn
- Increases intracranial pressure in the mother and potential worsening of cerebral edema

ACOG Committee Opinion #514. 2011

HYDRALAZINE

- MECHANISM OF ACTION
  - Direct arteriolar vasodilator
- SIDE EFFECTS
  - Tachycardia, flushing, headache
  - Fluid retention
  - Lupus-like reaction

ALPHA-BETA RECEPTOR BLOCKERS

- Labetolol
- Carvedilol

- Associated with hepatotoxicity
- <u>Second choice in pregnancy after aldomet</u>

CALCIUM CHANNEL BLOCKERS
(NIFEDIPINE, DILTIAZEM, VERAPAMIL)

- MECHANISM OF ACTION
  - Blocks inward movement of calcium ion and intracellular depletion of calcium
- SIDE EFFECTS
  - Headache, dizziness, edema, constipation
  - Diltiazem and Verapamil reduce sinus rate and may cause heart block

Pedrinelli R. et. al. J Hum Hypertens. 2001:15(7):455

DIURETICS

THIAZIDE

- Hypokalemia
- Hyponatremia
- Hyperuricemia
- Hypercalcemia
- Hyperglycemia
- LDL
- Hypertriglyceridemia
- Photosensitivity

LOOP DIURETICS

- Hypokalemia
- Hyperuricemia
- Hyperglycemia
- REVERSIBLE DEAFNESS

SUMMARY

- Hypertension remains one of the leading causes of maternal morbidity and mortality
- A close Maternal and Fetal surveillance is indicated
- Early diagnosis and treatment may prevent complications

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