

### CLASSIF. OF HPN DISORDER COMPLICATING PREGNANCY

- Gestational Hypertension
- Preeclampsia
- Chronic Hypertension
- Superimposed Preeclampsia on Chronic Hypertension

### CRITERIA FOR DIAGNOSIS OF HYPERTENSION

**TABLE 53-1.** Criteria for Diagnosis of Hypertension

Blood Pressure (mm Hg)		Nonpregnant ACC/AHA	Pregnant ACOG
<b>SBP</b>	<b>DBP</b>		
<120	and <80	Normal	Normal
120–129	and <80	Elevated	Normal
130–139	or 80–89	Stage 1 HTN	Normal
140–159	or ≥90	Stage 2 HTN	Mild to moderate HTN
≥160	or ≥110	Stage 2 HTN	Severe HTN

### GESTATIONAL HYPERTENSION

- BP ≥140/90mmHg for the 1st time during pregnancy **after 20 weeks**
- NO PROTEINURIA

### PREECLAMPSIA

- BP ≥140/90mmHg
- PROTEINURIA
- 300 mg/24-hour urine sample (+) 1 dipstick
- Urine protein/creatinine ration of 0.3 mg/dL
- Classification:
- Without severe features
- With severe features

### PREECLAMPSIA - MNEMONIC

PREECLAMPSIA	
TRELICEP	
Thrombocytopenia	Platelet count <100,000/ml
Renal Insufficiency	Creatinine >1.1mg/dl or doubling of the creatinine
Liver Impairment	Liver enzymes 2x normal value
Cerebral or Visual Symptoms	
Pulmonary Edema	

### SEVERITY OF GESTATIONAL HYPERTENSIVE DISORDERS

**TABLE 40-2.** Indicators of Severity of Gestational Hypertensive Disorders\*

Abnormality	None/severe <sup>a</sup>	Severe
Diastolic BP	<110 mm Hg	≥110 mm Hg
Systolic BP	<160 mm Hg	≥160 mm Hg
Proteinuria <sup>a</sup>	None to positive	None to positive
Headache	Absent	Present
Visual disturbances	Absent	Present
Upper abdominal pain	Absent	Present
Oliguria	Absent	Present
Convulsion (eclampsia)	Absent	Present
Serum creatinine	Normal	Elevated
Thrombocytopenia (<100,000/μL)	Absent	Present
Serum transaminase elevation	Minimal	Marked
Fetal-growth restriction	Absent	Present
Pulmonary edema	Absent	Present
Gestational age	Late	Early

### DIAGNOSIS OF SEVERE PREECLAMPSIA

**CRITERIA FOR DIAGNOSIS OF SEVERE PREECLAMPSIA**

BP of 160/110 mmHg
Thrombocytopenia (platelets <100,000/ml)
Renal Insufficiency (creatinine >1.1 mg/dL)
Liver function impairment / RUQ
Cerebral or visual disturbances
Pulmonary edema

### Gestational Hypertension vs Preeclampsia

- BP returns to normal within 12 weeks after delivery in GH

### CHRONIC HYPERTENSION

- BP ≥140/90mmHg before pregnancy or diagnosed **before 20 weeks**
- Hypertension first diagnosed after 20 weeks gestation and persistent after 12 weeks postpartum

### SUPERIMPOSED PREECLAMPSIA (ON CHRONIC HTN)

- Women with hypertension only in early gestation who develop proteinuria after 20 weeks of gestation
- Seizures that cannot be attributed to other causes in a woman with preeclampsia

### CRITERIA

Women with hypertension and proteinuria before 20 weeks of gestation who →	Sudden exacerbation of hypertension
	Thrombocytopenia (platelets <100,000/ml)
	Renal insufficiency (creatinine >1.1 mg/dL)
	Elevation of liver enzymes
	Pulmonary edema
	RUQ pain/severe headache
	Substantial increase in proteinuria

### SEVERE PEE, PEE (-)SEVERE FEATURES, GHPN

	GH and preeclampsia w/out severe features	Severe preeclampsia	Chronic hypertension
MgSO4	X	V	X
AOG at delivery	37 wks	34 wks	38 wks
Anti-HPN	V	V	V
	160/110mmHg	160/110mmHg	160/110mmHg

### WHEN TO START ASPIRIN?

- Low dose aspirin (81mg/day) prophylaxis is recommended in women at high risk of preeclampsia and should be initiated between 12 weeks and 28 weeks of gestation (optimally before 16 weeks) and continued daily until delivery

### Clinical Risk Assessment for Preeclampsia

Risk Level	Risk Factors	Recommendation
High	<ul style="list-style-type: none"> <li>History of preeclampsia, especially when accompanied by an adverse outcome</li> <li>Medfetal gestation</li> <li>Chronic hypertension</li> <li>Type 1 and 2 diabetes</li> <li>Renal disease</li> <li>Autoimmune disease (SLE, APS)</li> </ul>	Recommended low dose aspirin if the patient has one or more of these high-risk factors
Moderate	<ul style="list-style-type: none"> <li>Nulliparity</li> <li>Obesity (BMI &gt;30)</li> <li>Family history of preeclampsia</li> <li>Sociodemographic characteristics (African American, low socioeconomic status)</li> <li>Age 35 years or older</li> <li>Personal history factors (abuse, previous adverse pregnancy outcome, more than 10-year pregnancy interval)</li> </ul>	Consider low dose aspirin if the patient has more than one of these moderate factors
Low	<ul style="list-style-type: none"> <li>Previous uncomplicated full-term delivery</li> </ul>	Do not recommend aspirin

### PATHOGENESIS OF HYPERTENSION

- Endovascular trophoblasts replace the vascular endothelial and muscular lining to enlarge the vessel diameter. The veins are invaded only superficially.
- Vasospasm
- Endothelial damage

### PREDICTORS OF PREGNANCY INDUCED HYPERTENSION

- Roll over test
- Uric acid
- Fibronectin
- Coagulation activation
- Oxidative stress
- Cytokines
- Placental peptides
- Fetal DNA
- Uterine artery doppler velocimetry

### PREDICTION OF PREECLAMPSIA

RECOMMENDATION: screening to predict preeclampsia beyond obtaining an appropriate medical history to evaluate for risk factors is not recommended

### TREATMENT - CALCIUM

Dosage	1.5-2.0 g elemental calcium/day
Frequency	Daily, with the total daily dosage divided into 3 doses (preferably taken at mealtimes)
Duration	Commence calcium supplementation at the first antenatal care contact in order to optimize compliance with the regimen
Target group	All pregnant women, particularly those at higher risk of gestational hypertension
Settings	Areas with low calcium intake

### Baseline Evaluation for Chronic HPN in Pregnancy

- Tests for Baseline Evaluation for Chronic Hypertension in Pregnancy**
- Serum aspartate aminotransferase and alanine aminotransferase
  - Serum creatinine
  - Serum electrolytes (specifically potassium)
  - Blood urea nitrogen
  - Complete blood count
  - Spot urine protein:creatinine ratio or 24-hour urine for total protein and creatinine (to calculate creatinine clearance) as appropriate
  - Electrocardiogram or echocardiogram as appropriate

### MAGNESIUM SULFATE

**TABLE 41-6. Magnesium Sulfate Dosage Schedule for Severe Preeclampsia and Eclampsia**

**Continuous Intravenous (IV) Infusion**

Give 4- to 6-g loading dose of magnesium sulfate diluted in 100 mL of IV fluid administered over 15-20 min. Begin 2 g/hr in 100 mL of IV maintenance infusion. Some recommend 1 g/hr. Monitor for magnesium toxicity:

Assess deep tendon reflexes periodically. Some measure serum magnesium level at 4-6 hr and adjust infusion to maintain levels between 4 and 7 mEq/L (4.6-8.4 mg/dL). Measure serum magnesium levels if serum creatinine  $\geq 1.0$  mg/dL. Magnesium sulfate is discontinued 24 hr after delivery.

**Intermittent Intramuscular Injections**

Give 4 g of magnesium sulfate ( $MgSO_4 \cdot 7H_2O$  USP) as a 20% solution intravenously at a rate not to exceed 1 g/min. Follow promptly with 10 g of 50% magnesium sulfate solution, one half (5 g) injected deeply in the upper outer quadrant of each buttock through a 3-inch-long 20-gauge needle. (Addition of 10 mL of 2% lidocaine minimizes discomfort.) If convulsions persist after 15 min, give up to 2 g more intravenously as a 20% solution at a rate not to exceed 1 g/min. If the woman is large, up to 4 g may be given slowly. Every 4 hr thereafter, give 5 g of 50% solution of magnesium sulfate injected deeply in the upper outer quadrant of alternate buttocks, but only after ensuring that:

The patellar reflex is present.  
Respirations are not depressed, and  
Urine output the previous 4 hr exceeded 100 mL.  
Magnesium sulfate is discontinued 24 hr after delivery.

### MAGNESIUM SULFATE - PHARMACOLOGY

#### Loading dose: 4-6 grams IV

Only achieves the desired therapeutic level  
Can be safely administered regardless of renal function

#### Toxicology of Magnesium Sulfate

- Magnesium sulfate intoxication is avoided by ensuring

- Urine output is adequate

- The patellar or biceps reflex is present

- No respiratory depression

• Therapeutic level: 4-7 mEq/L

- Toxic levels:

- 10 mEq/L patellar reflexes disappear

- >10 mEq/L respiratory depression develops

### MAGNESIUM SULFATE - PHARMACOLOGY (cont)

- >12 mEq/L respiratory paralysis and arrest follow

• Antidote: calcium gluconate, 1 g IV over 10 min period

• Maintenance dose: 1-2 grams/hour x 24 hours

• Given during labor and continued up to 24 hours postpartum

• Dose reduced to half if creatinine  $\geq 1.1$  mg/dL

### MECHANISM OF ACTION OF MAGNESIUM SULFATE

- CALCIUM ANTAGONIST
- Decreases vasoconstriction
- Decreases cerebral edema
- Decreases neuronal impulse transmission

### MANAGEMENT OF SEVERE PREECLAMPSIA <34 wks

Observe in labor and delivery suite for 24 - 48 hours

- Magnesium sulfate for 24 hours
- Antihypertensives if indicated

• Ultrasonography, monitoring of FHT, symptoms and laboratory tests

Anti-hypertensive meds during pregnancy

Blood Pressure	160/110 mmHg
Purpose:	To prevent intracerebral hemorrhage

Magnesium sulfate during expectant management

Loading Dose:	4 - 6 grams IV
Maintenance Dose:	1-2 grams / hour
• given for 24 hours	

### ANTIHYPERTENSIVES

DRUG	DOSE/ROUTE	COMMENTS
IV NICARDIPINE	DW 90 ml + Nicardipine 10 mg in solvent Concentration = 0.1 mg/ml Start drip at 10 µgts/min (equivalent to 1 mg/hr) Titrate every hour (increments of 1 mg/hr) Maximum dose 10 mg/hr Note: The IV infusion site must be dilated prior to use	Can be safely used with MgSO4
Anti-hypertensive meds during pregnancy		
DRUG	DOSE/ROUTE	COMMENTS
LABETALOL	10-20 mg IV, then 20-80 mg every 20 min, max of 300 mg	Not readily available locally
HYDRAZINE	5 mg IV or IM then 5 mg (increments of 1 mg/hr) Maximum dose 10 mg/hr	Long experience of safety and efficacy
NIFEDIPINE	10-20 mg PO (30 min) immediate release tabs	Can be safely used with MgSO4
DRUG	DOSE/ROUTE	COMMENTS
METHYDOBA (B)	Max of 3 grams per day	Drug of choice
NIFEDIPINE	30-120 mg/day PO	Slow or long acting preparations may be used; SL preparations should be avoided
Labetalol	200-2,400 mg/day in two- three divided doses	Not readily available locally

### ANTIHYPERTENSIVES (cont.)

THE AIM OF ANTI-HYPERTENSIVE THERAPY IS TO KEEP THE SYSTOLIC BP BETWEEN 140-155 AND DIASTOLIC BP BETWEEN 90-100 mmHg

### MANAGEMENT

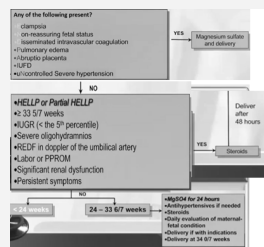
Observe in the labor and delivery suite for 24-48 hours

- Magnesium sulfate for 24 hours
- Antihypertensives if systolic blood pressure >160 mmHg, diastolic blood pressure ≥ 110 mmHg
- Ultrasonography, monitoring of FHT and symptoms, labs

#### Any of the following present?

- Eclampsia
- Pulmonary edema
- **Uncontrolled severe hypertension**
- **Disseminated intravascular coagulation**
- Abruptio placentae
- Non-reassuring fetal status
- IUFD

### MANAGEMENT (cont.)



### HELP SYNDROME

H	hemolysis	LDH > 600 U/L total Bili > 1.2 mg/dL abnormal PBS
EL	elevated liver enzymes	SGPT > 70 U/L
LP	low platelets	<100,000

### ANTENATAL CORTICOSTEROIDS

Betamethasone	• 12 mg IM q 24 hours x 2 doses
Decamethasone	• 6 mg IM q 12 hours x 4 doses
<b>REDUCES</b>	
<ul style="list-style-type: none"> <li>• RDS</li> <li>• IVH</li> <li>• NEC</li> <li>• Perinatal death</li> <li>• Long term neurological problem</li> </ul>	

### INDICATIONS FOR DELIVERY

- UNCONTROLLED HYPERTENSION
- ABSENT OR REVERSE END DIASTOLIC FLOW IN DOPPLER

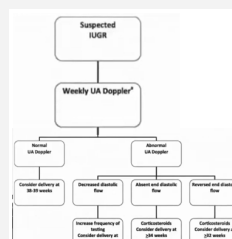
### UNCONTROLLED HYPERTENSION

Uncontrolled Hypertension	
Hydralazine	20 mg IV
Calcium channel blocker	Nifedipine: 50 mg PO Nicardipine: 10mg / hr.

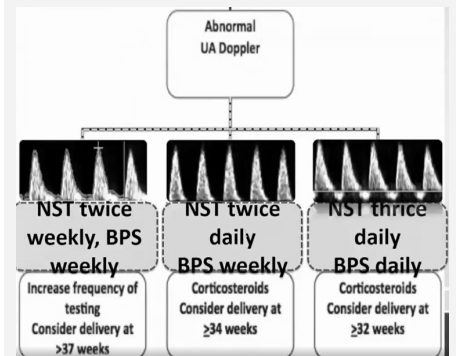
### TIMING OF DELIVERY

- Prenatal management is aimed primarily at determining the IDEAL timing and mode of delivery

### DOPPLER ULTRASOUND IN MANAGEMENT OF SUSPECTED IUGR



### DOPPLER ULTRASOUND (cont.)



### WHAT IS THE MODE OF DELIVERY?

The mode of delivery should be determined after considering the presentation of the fetus and the fetal condition, together with the likelihood of success of induction of labor after assessment of the cervix.

It is suggested that prolonged induction and inductions with low likelihood of success be avoided. In this regard, the pregnancies less than 32 weeks complicated by severe preeclampsia, with unfavorable cervical examination, CS may be recommended.

### WHAT IS THE ANESTHESIA OF CHOICE?

In women with severe preeclampsia or even with eclampsia as long as the woman is awake, and seizure free, regional anesthesia, preferably epidural appears safer than general anesthesia