

# Hypertensive disorders with pregnancy

## Definition

Hypertension: systolic blood pressure  $\geq 140$  mmHg OR diastolic blood pressure  $\geq 90$  mmHg measured in two occasions 6 hours apart

## Classification

Table 5-1: classification

Term	Definition
1. Gestational hypertension	Hypertension discovered for the first time after 20 weeks gestation without proteinuria
2. Preeclampsia	Hypertension discovered for the first time after 20 with a) Proteinuria OR b) Any feature of severe preeclampsia
3. Eclampsia	Convulsions in woman with preeclampsia
4. Chronic hypertension	Hypertension without proteinuria before pregnancy or before 20 weeks gestation
5. Superimposed preeclampsia	Preeclampsia on top of chronic hypertension

## Incidence:

- Hypertension: 15% of pregnancy
- Preeclampsia: 5% of pregnancy
- Severe preeclampsia: 1% of pregnancy
- Eclampsia: 0.03% of pregnancy

## Preeclampsia

### Risk factors

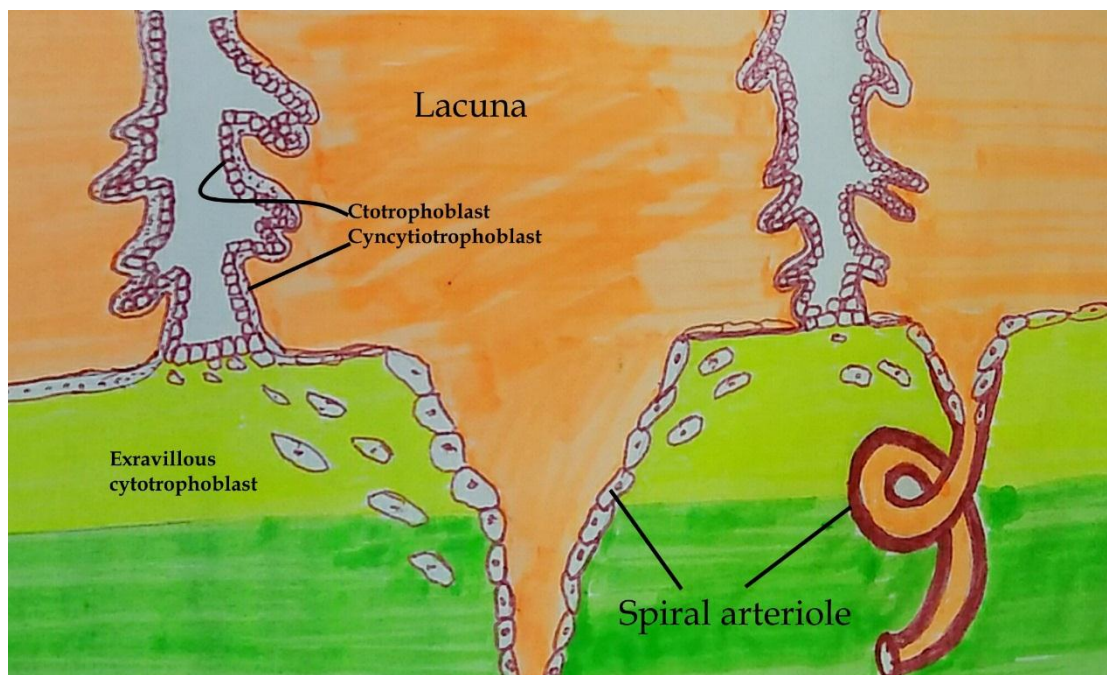
- 1 Nullipara
- 2 Chronic hypertension
- 3 Chronic renal disease
- 4 Gestational hypertension
- 5 Autoimmune disease: as SLE, antiphospholipd syndrome
- 6 Preeclampsia in previous pregnancies
- 7 Family history
- 8 Obesity
- 9 Multiple pregnancy
- 10 Vesicular mole
- 11 Hydrops fetalis (mirror syndrome: Hydrops+ Preeclampsia)
- 12 Diabetes mellitus
- 13 Age > 40 years

## Pathogenesis

Preeclampsia is a two-stage disease. Placental stage occurs first during formation of the placenta. The second stage is a clinical stage.

In preeclampsia, there is failure of trophoblast to invade of the maternal spiral arterioles. In normal pregnancy, this invasion results in loss of the media of the spiral arterioles. The vessels transform into low-pressure high flow vessels (this is called remodelling). Failure of this remodelling results in insufficient blood flow to the placenta. In addition, the preservation of the blood vessel media maintain their ability to undergo vasoconstriction to neurogenic and chemical stimuli.

The clinical stage occurs as consequence of placental insufficiency. The fetus suffers from oligohydramnios, IUGR, or even IUFD. The mother suffers from vascular endothelial injury due to release of factors from the placenta. Injured endothelium results in leakage of proteins in the extracellular space (increased permeability of capillaries) and release of endothelin & thromboxane A2 (TXA2). These are potent vasoconstrictor. Increased permeability is responsible for oedema and haemo-concentration.



*Normal pregnancy*

*Preeclampsia*

*Figure 1: pathogenesis of preeclampsia*

## Clinical picture

- Preeclampsia is a disease of **SIGNS** (hypertension, proteinuria, etc)
- Symptoms: (1) Severe headache, (2) Blurring of vision, (3) Severe epigastric pain, (4) Vomiting. If symptoms present, it indicates an extreme form of severe preeclampsia called "imminent" eclampsia
- No ideal screening test for prediction

## Investigations

1. **Urine:** Proteinuria: presence of proteins in urine more than normal
  - ❖  $\geq 300$  mg/24 hours of urine collection
  - ❖ Protein: creatinine ratio  $\geq 0.3$  mg/dl
  - ❖ Urine dipstick:  $\geq +1$  (degree according to change in the strip colour)
  - ❖ Boiling test:  $\geq +1$  ( degree according to opacification of the urine after boiling: +1 for fine turbidity, +2 for coarse tubidity, +3 for complete opacification, +4 for complete coagulation)
2. **Complete Blood count:** haemoglobin level, HCT , and Platelet count.
3. **Kidney functions:** serum creatinine, urea, creatinine clearance, uric acid.
4. **Liver functions:** bilirubin, Enzymes (AST and ALT)
5. **Coagulation Profile:** Bleeding and clotting time, prothrombine concentration (PC), and partial thromboplastin time (PTTT)
6. **Fundus examination**
7. **Fetal assessment:** Ultrasound (IUGR, Oligohydramnios, IUFD), fetal well-being tests (NST, BPP, and Doppler of umbilical artery) to predict IUFD

## Indicators of severity of preeclampsia (*one criteria is sufficient*)

1. Systolic BP  $\geq 160$  mmHg or diastolic BP  $\geq 110$  mmHg
2. Proteinuria  $\geq 5$  g/24 hours (heavy proteinuria)
3. Thrombocytopenia: platelet  $< 150$  thousand/ml
4. Elevated liver enzymes: ALT or AST  $> 70$  IU/L
5. Increased creatinine:  $> 0.9$  mg/dl
6. Symptoms: severe headache, blurring of vision, epigastric pain or vomiting
7. Sudden swelling of the face, hands, or feet
8. Oliguria:  $< 30$  ml/h
9. Convulsion
10. Pulmonary oedema
11. Evidence of placental insufficiency: oligohydramnios, IUGR, IUFD

## Complications

### A. Maternal complications:

1. Eclampsia
2. Cerebral haemorrhage
3. Placental abruption
4. Acute renal failure
5. Sub capsular hematomas in liver, Hepatic rupture
6. Acute pulmonary oedema
7. Long-term complications:  
Residual hypertension & recurrence in next pregnancy
8. HELLP syndrome
  - **H:** Hemolysis (Schistocytes (fragmented RBCs) in blood smear, ↑bilirubin, ↑Lactate dehydrogenase)
  - **EL:** Elevated liver enzymes (> 70 IU/L)
  - **LP:** Low Platelet (platelet < 150 thousand/ml)
9. Retinal haemorrhage, retinal detachment

### B. Fetal complications

- 1) IUGR
- 2) Preterm birth
- 3) Fetal distress (abnormal fetal well-being tests)
- 4) Intrauterine fetal death (IUFD)
- 5) Perinatal death

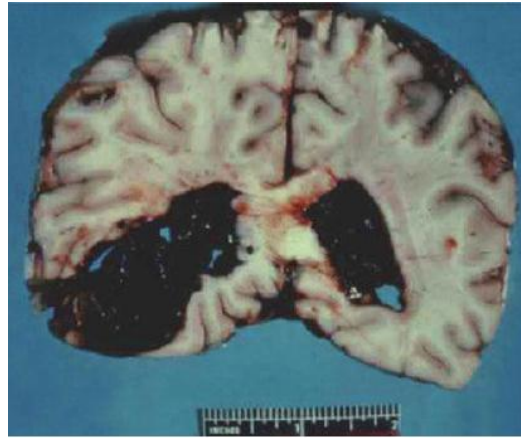


Figure 2: Cerebral haemorrhage

#### Box 5-1

#### Termination of pregnancy for severe preeclampsia before 34 weeks

1. Refractory hypertension: BP > 160/110 mmHg after 48 hours using 3 antihypertensive drugs in appropriate dose
2. Before arbitrary age of viability
3. Eminent eclampsia: symptoms
4. Maternal complications: (1-9)
5. Fetal distress
6. IUFD

## Management

### The only cure for preeclampsia is termination of pregnancy

1. Expectant treatment until 34 weeks for severe preeclampsia and 37 weeks for mild preeclampsia.
2. Termination by induction of labour unless there is another indication of CS.
3. **Immediate termination** is indicated in certain conditions: see box above
4. Expectant management includes:
  - a. Rest: Complete Physical and mental rest.
  - b. Diet: Increase protein and carbohydrate with low Na diet
  - c. Antihypertensive drugs for all severe preeclampsia and if BP >150/100 in mild preeclampsia

- d. Prevention of convulsion: magnesium sulphate in severe preeclampsia
- e. Hospitalization & monitoring: see table 5-1

***N.B. Termination of pregnancy for gestational & chronic hypertension:***

- *If BP is controlled (BP < 160/110): after 37 week*
- *If blood pressure is refractory (BP > 160/110): immediate termination*

*Table 5-2: monitoring of women with preeclampsia*

Monitoring	Mild preeclampsia	Severe preeclampsia
• Maternal		
1. Blood pressure	every 48 hours	every 1 hour until BP is controlled then every 4 hours
2. Proteinuria	twice weekly	daily
3. Investigations	twice weekly	daily
4. Symptoms	yes	yes
• Fetal well-being tests	weekly	daily

**5. Intrapartum care:**

- Regional anaesthesia (Epidural or spinal) is the best for both CS and vaginal delivery. General anaesthesia is indicated if platelet < 80 thousands/ml
- Fetal & maternal monitoring (CTG, fluid balance, hourly BP)
- Avoid straining in the second stage
- Shorten the 2nd stage by forceps or ventouse
- No ergometrine

**6. Postpartum care:**

- Usually in the ICU until starts to improve
- Improvement is monitored by:
  - Increased urine output
  - Decreased oedema
  - Disappearance of Proteinuria within 1 week
  - Decreased hemotocrite value to normal level.
  - BP normalize within 2 weeks
- MgSO<sub>4</sub> stopped 24 hours postpartum

## Antihypertensive drugs

### I. Oral drugs

#### Labetalol (Labipress):

- It is the drug of choice: well tolerated (few side effect)
- It is  $\alpha$  and  $\beta$ -adrenergic blocker resulting in VD
- Contraindication: Bronchial asthma
- Dose: start with 100 mg tablet every 12 hour (maximum 2 g)
- Intravenous labetalol can be given in acute severe hypertension

#### $\alpha$ -methyl DOPA (aldomet):

- It is the most commonly used
- It is  $\alpha_2$ -adrenergic agonist. It results in suppression of sympathetic discharge
- Side effects: depression, sedation, postural hypotension, hemolytic anemia, elevate liver enzymes
- Dose: start with 250 mg tablet every 12 hour (maximum 2 g)

#### Nifedipine

- Calcium Channel Blocker resulting in VD
- It is usually given in addition to labetalol or methyldopa after failure of any of them
- Side effects: headache and tachycardia
- Dose: start with 10 mg slow release tablet every 12 hour (maximum 80mg)
- Sublingual nifedipine may cause dangerous fall in blood pressure and placental insufficiency. It is contraindicated.

#### Other antihypertensive drugs

- $\beta$ -blockers: may cause IUGR.
- Angiotensin converting enzyme (ACE) inhibitors, Angiotensin receptor blockers (ARBs) are **contraindicated**: congenital anomalies and oligohydramnios. They may be used after delivery.
- Thiazide diuretics are **contraindicated**: congenital anomalies, increase the preeclampsia-induced volume depletion. Diuretics are allowed during pregnancy only in acute pulmonary oedema and congestive heart failure

### II. Parenteral drugs:

Used in acute severe hypertension in ICU. Hydralazine (a peripheral VD) or Labetalol (it has fewer side effects than hydralazine) are preferred.

## Magnesium Sulfate ( $\text{MgSO}_4$ ):

- **Indications:**
  1. Eclampsia: control fits and prevent further fits
  2. Severe preeclampsia: if severe enough to indicate termination (Box 5-1)
- **Mechanism of action:** CNS depression.
- **Side effects:** hypotension, depression of respiratory center, myocardium, uterine atony

- **Dose:** Loading: 6 g /100 ml glucose within 20 minutes by IV infusion. Maintenance: 1 g/hour for 24 hours after delivery or from the last fit
- **Monitoring of MgSO<sub>4</sub> for toxicity:**
  - a) Patellar reflex: toxicity result in depressed reflex
  - b) Respiratory rate (RR): : toxicity result in bradypnea
  - c) Urine output: toxicity occur if there is oliguria
  - d) Serum level of MgSO<sub>4</sub>: not routinely used. Therapeutic level is 4-7 mEq/L. At a level of 8-10 mEq/L patellar reflex is lost. >10 mEq/L results in respiratory and cardiac depression
- Antidote : 10 ml of 10 % calcium gluconate slowly IV

## **Eclampsia**

### **Diagnosis: Eclamptic fit stages (4 stages):**

1. Premonitory stage (1/2 minute): Eye rolled up. Twitches of the face and hands
2. Tonic stage (1/2 minute): Generalized tonic spasm with episthotonus. There may be cyanosis.
3. Clonic stage (1-2 minutes): Convulsions. Tongue may be bitten. Face is congested and cyanosed. Blood stained froth from the mouth, involuntary passage of urine or stool. Gradually convulsions stop.
4. Coma: Variable duration due to respiratory and metabolic acidosis. Deep coma may occur due to cerebral haemorrhage

### **Classifications of Eclampsia**

1. Ante partum (65%) with the best prognosis
2. Intrapartum (20%)
3. Postpartum (15%) occurs within 24-48 hours after labour with the worst prognosis

### **Complications of Eclampsia**

1. Cerebral haemorrhage
2. Aspiration pneumonia
3. Blindness
4. Acute renal failure
5. Heart failure
6. Accidental haemorrhage
7. HELLP syndrome
8. Residual hypertension

9. Prematurity, hypoxia, IUGR, IUFD
10. Maternal mortality 10 %

### **Treatment of Eclampsia**

- 1 Initial first aid measures (follow A &B &C)
  - Place: Isolation in a single, quite, semi dark room
  - Call for Help: senior obstetrician & anaesthetist and efficient nurses
  - Equipments & drugs: Oxygen, Airway, endotracheal tube, Suction apparatus, Mouth gag, MgSO<sub>4</sub>, antihypertensive drugs,...
  - A: Ensure patent airway with tracheal and bronchial suction. Insert airway. Nothing by mouth. Nasogastric tube may be inserted
  - B: check for breathing
  - C: assess pulse and blood pressure
  - D: drugs
    - Stop and prevent further convulsions: This is usually by starting MgSO<sub>4</sub> infusion. Diazepam may be used as alternative (20-40mg IV slowly over 5 minutes)
    - Antihypertensive drugs
- 2 Monitoring:
  - Pulse, temperature, BP and RR
  - Level of consciousness, Duration of coma
  - Fetal heart sounds
  - Insert a catheter, monitor urine output and fluid chart
  - Number of convulsions
  - Full laboratory investigation
- 3 Immediate delivery when the maternal condition is stabilized (blood pressure control, preparation of blood if there is risk of bleeding due to thrombocytopenia, HELLP syndrome, or DIC, ICU bed, ... )
- 4 Termination by induction of labour unless there is another indication of CS
- 5 Intrapartum & postpartum care: as preeclampsia