# Hypertension in Pregnancy

Hypertension in pregnancy is a leading cause of maternal and perinatal morbidity and mortality. It is estimated to occur in approximately 6% of pregnancies, though the pathophysiology is not known. The prognosis for women with mild gestational hypertension is generally favorable. It becomes important to discern these mild elevations in blood pressure from severe hypertension or preeclampsia, which have significantly different investigations, treatments, outcomes, and prognoses.

## Diagnostic Considerations

- Hypertension in pregnancy is defined as a diastolic measurement >90 mmHg, while severe HTN in pregnancy is defined as systole >160 mmHg or diastole >110 mmHg.
- Pregnant women with systolic measurements >140 mmHg should be monitored closely for the development of diastolic BP elevations.

Hypertensive Disorders are classified as:
1. Pre-existing (<20 wks) → 90% cases are essential, 10% are secondary
2. Gestational (> 20 wks) → Preeclampsia can occur with either pre-existing or gestational hypertension

### Pre-Existing Hypertension

**Definition:**
- HTN prior to 20 weeks GA (unless a gestational trophoblastic neoplasia (GTN))
- Essential hypertension is associated with an increased risk of: gestational HTN, abruptio placenta, IUGR and IUD

→ 2-7 fold increased likelihood of developing preeclampsia/eclampsia if pre-existing maternal hypertension

### Pre-Existing Hypertension with Preeclampsia

**Definition:**
- Pre-existing hypertension with new onset proteinuria (0.3 g/day, heavy proteinuria 3-5 g/d), or adverse conditions* or resistant hypertension
- Occurs early, tends to be severe (often with IUGR) and to recur with subsequent pregnancies

### Pre-Existing Hypertension with Co-Morbid Conditions

**Definition:**
- HTN <20 weeks GA with any of: Type 1 or II DM, renal disease, an indication for antihypertensive Tx outside of pregnancy

### Gestational Hypertension

**Definition:**
- Onset of HTN at ≥ 20 weeks gestation

### Risk factors:

<table>
<thead>
<tr>
<th>Maternal Factors</th>
<th>Fetal Factors</th>
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<tbody>
<tr>
<td>Primigravida (80-90% of gestational HTN)</td>
<td>IUGR or oligohydramnios</td>
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<td>First conception with a new partner</td>
<td>GTN</td>
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<tr>
<td>PMHx or FHx of gestational HTN</td>
<td>Multiple gestation</td>
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<td>DM, chronic HTN, or renal insufficiency</td>
<td>Fetal hydrops</td>
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<td>Antiphospholipid antibody syndrome (APLA)</td>
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<td>Extremes of maternal age (&lt;18 or &gt;35)</td>
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### Gestational Hypertension with Pre-Eclampsia

**Definition:** Gestational hypertension WITH new onset proteinuria or one/more adverse condition(s)*

### Gestational Hypertension with Co-Morbid Conditions

**Definition:** Hypertension >20 weeks gestation with any of: Type 1 or II DM, renal disease, an indication for antihypertensive therapy outside of pregnancy

### Severe Pre-Eclampsia:

**Definition:** Pre-eclampsia occurs before 34 weeks with heavy proteinuria (3-5 gm/day) or one or more adverse conditions

### Eclampsia:

**Definition:** one or more generalized convulsion or coma in the setting of preeclampsia

*Adverse Maternal Conditions:
- $sBP > 160, dBp > 110$ mmHg
- HELLP ± ↑ LDH
- Cerebral hemorrhage
- Renal dysfunction – oliguria (non-specific, non-diagnostic <15 ml/hr), proteinuria(UACR ≥ 30mg/mmol; 24 hr protein>0.3g/d)
- Liver dysfunction- albumin <20g/L
- Left ventricular failure, pulmonary edema
- Abruption, DIC

*Adverse Fetal Conditions:
- Intrauterine growth restriction
- Oligohydramnios
- Absent/reversed UA end diastolic flow
- Prematurity
- Fetal compromise
- Can result in: fetal disability and/or intrauterine death
HYPERTENSION IN PREGNANCY

Symptoms:
• Hypertension/Preeclampsia: RUQ pain, N & V, headache, visual problems (blurring, scotomata), SOB, chest pain
• Eclampsia: convulsions

Investigations:
• All pregnant women should be screened for proteinuria
  o Low risk = urine dip stick
  o 24-hour urine collection when dipstick shows >2+ protein or with a high suspicion of preeclampsia (signs/symptoms, rising BP)
• Pre-existing HTN: Cr, K+, u/a
• Preeclampsia:
  o Maternal:
    • ↑: Hgb, WBC and differential, INR and PTT with DIC, Serum Creatinine, Serum uric acid, Proteinuria, AST, ALT, LDH, Bilirubin
    • ↓: Platelets, Fibrinogen, Albumin
  o Fetal: FM/kick counts, FHR (NST), U/S for: growth, BPP, Doppler flow studies (S/D ratio)

Management

Prevention of preeclampsia:
• Women at low risk: Ca supplement (>1g/day) or increase in dietary Ca intake (3-4 servings/d)
• Women at increased risk: Low dose aspirin (75-100mg qhs)

Lifestyle management for Hypertensive Disorders of Pregnancy:
• Some bed rest is useful for women with gestational hypertension (w/o preeclampsia), strict bed rest not useful in hospitalized women with severe preeclampsia, insufficient evidence for recommending bed rest for other hypertensive disorders of pregnancy
• Normal salt and protein intake
• Avoid diuretics
• Monitor for progression
• If ≥37 weeks GA, consider induction of labour

Obstetrical management:
• Vaginal delivery preferred unless another indications for C/S
  • Timing:
    o <34 weeks: expectant management can be considered
    o 34 – 36 weeks: insufficient evidence regarding expectant management vs immediate delivery
    o 37 weeks +: immediate delivery should be considered
  → Deliver when the hypertensive disorder is associated with progressively worsening adverse maternal and fetal conditions, regardless of gestational age when the patient is at or near term
• Consider corticosteroids for fetal lung maturation before 34 weeks gestational age
• Continue anti-hypertensives throughout labour to keep systolic BP <160, diastolic BP <110
• Oxytocin for third stage of labour
• MgSO\(_4\) recommended as treatment for eclampsia, prophylaxis for severe (or moderate) preeclampsia
• Consider blood products, including platelet transfusion pending platelet count

Post-partum management:
• Risk of seizure highest in first 24 hours post-partum, thus continue Mg sulfate for 12-24 hours and take vitals q1h
  o Increased BP in days 3-6 post-partum, as extracellular fluid mobilized
• Ongoing monitoring of BP – must normalize within weeks
  o Continue therapies to keep BP <110/60
  o Discuss recurrence of gestational HTN with future pregnancies <2 years or >10 years
  o Consider screening for pre-existing HTN in severe cases
  o Avoidance of NSAIDs
### Pharmacotherapy

#### Anti-Hypertensives

<table>
<thead>
<tr>
<th>Type</th>
<th>Medication</th>
<th>Dose</th>
<th>Side Effects</th>
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<tbody>
<tr>
<td><strong>Pre-existing hypertension</strong></td>
<td>Methyldopa</td>
<td>250-500 mg PO tid/qid</td>
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<tr>
<td></td>
<td>Labetalol</td>
<td>100-300 mg PO bid/tid</td>
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<td></td>
<td>No ACE inhibitors, diuretics or propranolol (teratogens) – if patients are on these medications, change to alternate agent</td>
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<tr>
<td><strong>Maintenance therapy: mild to moderate hypertension</strong></td>
<td>Methyldopa- drug of choice in essential hypertension, not for use in acute settings</td>
<td>500-1000mg BID-QID, max daily dose 3000mg</td>
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<td></td>
<td>Labetalol</td>
<td>160-600mg BID-QID, max daily dose 1200mg</td>
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<td>Nifedipine</td>
<td>Intermediate acting: 20-40 mg BID, max dose 80 mg/d</td>
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<td>Extended release: 20-60 mg/day, max dose 120mg/d</td>
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<td><strong>Acute therapy: severe hypertension</strong></td>
<td>Labetalol</td>
<td>Bolus 10-20mg IV over 2 min, q10min, max 300mg</td>
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<td></td>
<td>Nifedipine</td>
<td>Infusion 1-2mg/min and increase by 1mg q15 min, max 4mg/min</td>
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<td>Hydralazine</td>
<td>Immediate release: 5-10mg PO swallowed, repeat in 30min if no response, onset of action within 5-10min</td>
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<td>Immediate acting: 10mg PO with repeat dose in 30-45min if no response, onset of action within 45 min</td>
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<td>5mg IV test done, followed by 5-10mg IV q 20 min or an infusion of 0.5-10 mg/h</td>
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<td><strong>Anticonvulsant therapy for eclampsia, severe pre-eclampsia, consider in non-severe pre-eclampsia</strong></td>
<td>MgSO₄</td>
<td>4g IV bolus over 20-30min followed by 1-2 g/hr IV. Recurrent seizures may require second 2-4g IV bolus.</td>
<td>SE: weakness, paralysis, cardiac toxicity</td>
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<td>Caution: asthma</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>SE: bradycardia, masking of hypoglycemia</td>
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<td></td>
<td></td>
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<td>SE: flushing, h/a, palpitations, tocolysis</td>
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<td>*can be used at the same time as magnesium sulfate</td>
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<td></td>
<td>Caution: maternal hypotension with resulting fetal compromise</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>SE: flushing, headache, tachycardia</td>
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</tbody>
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References can be found online at [http://www.dfcm.utoronto.ca/programs/postgraduateprograme/One_Pager_Project_References.htm](http://www.dfcm.utoronto.ca/programs/postgraduateprograme/One_Pager_Project_References.htm)