Preeclampsia

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- Preeclampsia is a multisystem progressive disorder characterized by the new onset of hypertension and proteinuria, or of hypertension and significant end-organ dysfunction with or without proteinuria, in the last half of pregnancy or postpartum

Criteria for the diagnosis of preeclampsia

Systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg on at least two occasions at least four hours apart after 20 weeks of gestation in a previously normotensive patient AND the new onset of one or more of the following*:

- Proteinuria ≥0.3 g in a 24-hour urine specimen or protein/creatinine ratio ≥0.3 (mg/mg) (30 mg/mmol) in a random urine specimen or dipstick ≥2+ if a quantitative measurement is unavailable
- Platelet count <100,000/microL
- Serum creatinine >1.1 mg/dL (97.2 micromol/L) or doubling of the creatinine concentration in the absence of other renal disease
- Liver transaminases at least twice the upper limit of the normal concentrations for the local laboratory
- Pulmonary edema
- Cerebral or visual symptoms (eg, new-onset and persistent headaches not accounted for by alternative diagnoses and not responding to usual doses of analgesics¶; blurred vision, flashing lights or sparks, scotomata)

- For women with chronic hypertension who, superimposed preeclampsia is defined by worsening or resistant hypertension (especially acutely) in the last half of pregnancy or development of signs/symptoms of the severe end of the disease spectrum.

- **In a patient with preeclampsia, the presence of one or more of the following indicates a diagnosis of "preeclampsia with severe features**

Severe blood pressure elevation:

- Systolic blood pressure ≥160 mmHg

or

- diastolic blood pressure ≥110 mmHg

Symptoms of central nervous system

- New-onset cerebral or visual disturbance, such as:Photopsia, scotomata, cortical blindness, retinal vasospasm

- Severe headache (ie, incapacitating, "the worst headache I've ever had") or headache that persists and progresses despite analgesic therapy.
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- Response to analgesia does not exclude the possibility of preeclampsia.

Hepatic abnormality

- Severe persistent right upper quadrant or epigastric pain unresponsive to medication

Or

- serum transaminase concentration ≥2 times the upper limit of the normal range

Thrombocytopenia

<100,000 platelets/microL

Renal abnormality

- Renal insufficiency (serum creatinine >1.1 mg/dL

Or

- a doubling of the serum creatinine concentration in the absence of other renal disease)

- Pulmonary edema

- criteria do not include proteinuria >5 g/24 hours and fetal growth restriction as features of severe disease.

- because massive proteinuria has a poor correlation with outcome, and fetal growth restriction is managed similarly whether or not preeclampsia is diagnosed

- Oliguria was also removed as a characteristic of severe disease.

Eclampsia

- refers to the development of grand mal seizures in a woman with preeclampsia in the absence of other neurologic conditions that could account for the seizure.

HELLP syndrome

- (**h**emolysis, **e**levated **l**iver enzymes, **l**ow **p**latelets) probably represents a subtype of preeclampsia with severe features in which hemolysis, elevated liver enzymes, and thrombocytopenia are the predominant features, rather than hypertension or central nervous system or renal dysfunction, although the latter do occur.

- **Chronic/preexisting hypertension** –
  Chronic/preexisting hypertension is defined as hypertension that antecedes pregnancy or is present on at least two occasions before the 20th week of gestation or persists longer than 12 weeks postpartum. It can be primary (primary hypertension, formerly called "essential hypertension") or secondary to a variety of medical disorders

Preeclampsia superimposed upon chronic

- Superimposed preeclampsia is defined by the new onset of proteinuria, significant end-organ dysfunction, or both after 20 weeks of gestation in a woman with chronic.

- Forwomenwith chronicwho have proteinuria prior to or in early pregnancy, superimposed preeclampsia is defined by worsening or resistant hypertension (especially acutely) in the last half of pregnancy or development of signs/symptoms of the severe end of the disease spectrum

Gestational hypertension

- Gestational hypertension refers to hypertension (systolic ≥140 and <160 mmHg, and/or diastolic ≥90 and <110 mmHg) without proteinuria or other signs/symptoms of preeclampsia-related end-organ dysfunction that develops after 20 weeks of gestation.

Development of proteinuria upgrades the diagnosis to preeclampsia. Even without proteinuria, women who develop a systolic blood pressure ≥160 mmHg and/or diastolic blood pressure ≥110 mmHg or other features of severe disease (table 3) are managed with the same approach as women with preeclampsia with severe features .

- Some women (10 to 25 percent) with gestational hypertension may ultimately develop signs and symptoms of preeclampsia. It should resolve by 12 weeks postpartum.

- **Clinical factors that have been associated with an increased risk of developing preeclampsia**

- Nulliparity
- Preeclampsia in a previous pregnancy
- Age >40 years or <18 years
- Family history of preeclampsia
- Chronic hypertension
- Chronic renal disease
- Autoimmune disease (eg, antiphospholipid syndrome, systemic lupus erythematosus)
- Vascular disease

- Diabetes mellitus (pregestational and gestational)
- Multifetal gestation
- Obesity
- Black race
- Hydrops fetalis
- Woman herself was small for gestational age
- Fetal growth restriction, abruptio placentae, or fetal demise in a previous pregnancy

- Prolonged interpregnancy interval if the previous pregnancy was normotensive; if the previous pregnancy was preeclamptic, a short interpregnancy interval increases the risk of recurrence
- Partner-related factors (new partner, limited sperm exposure .
- In vitro fertilization
- Obstructive sleep apnea
- Elevated blood lead level
- Posttraumatic stress disorder

- By comparison, smoking decreases the risk of preeclampsia, and Asian and Hispanic women have a lower risk of preeclampsia than white women and a much lower risk than black women.

SCREENING

- Screening for traditional risk factors for preeclampsia is of value at the first prenatal visit to identify women at high risk of developing the disease, as these women are offered low-dose aspirin therapy to reduce their risk of developing the disease

The value of any laboratory or imaging test for screening and subsequent intervention has not been established. This includes using results from maternal Down syndrome screening (biochemical markers [eg, Quad screen] or cell-free DNA) for prediction of preeclampsia risk.

CLINICAL PRESENTATION

- Most affected patients are nulliparous or at high risk for the disease. Most present with new-onset hypertension and proteinuria at ≥34 weeks of gestation, sometimes during labor .Approximately 10 percent of affected women develop these signs and symptoms at <34 weeks of gestation (ie, early-onset preeclampsia) [44] and rarely as early as 20 to 22 weeks. In approximately 5 percent of preeclampsia cases, the signs and symptoms are first recognized postpartum (ie, postpartum preeclampsia), usually within 48 hours of delivery

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PATIENT EVALUATION

- All pregnant women with new onset hypertension or worsening hypertension after 20 weeks gestation should be evaluated for preeclampsia. Women with severe hypertension or symptoms suggestive of severe disease, such as cerebral or visual symptoms, epigastric pain, or dyspnea, require hospitalization for initial maternal and fetal evaluation and management.

- Asymptomatic women with nonsevere hypertension may be followed closely as outpatients provided they are seen frequently and the maternal and fetal status is stable. The decision to monitor women in the hospital versus in an outpatient setting should be made on a case-by-case basis, taking into consideration both medical and social issues .

Accurate assessment of blood pressure

- Blood pressure is obtained after at least five minutes of rest, with the patient sitting with feet on the ground and legs uncrossed or in a semi-reclining position with her back supported.

- Whether sitting or in semi-Fowler, the arm should be supported and at heart level. Measurement of blood pressure in left lateral recumbency, on the left arm, does not differ substantially from blood pressure that is recorded in the sitting position, and may be used if a seated blood pressure is not feasible .

- Choose an appropriately sized cuff: length 1.5 times upper arm circumference or a cuff with a bladder that encircles at least 80 percent of the upper arm.

Routine laboratory evaluation

- complete blood count, serum creatinine level, liver chemistries (LDH, AST, ALT), and urinary protein determination (protein:creatinine ratio or 24-hour urine protein)

- Coagulation studies (prothrombin time, partial thromboplastin time, fibrinogen) are not routinely obtained but are indicated in patients with additional complications, such as abruptio placentae, severe bleeding, or severe liver dysfunction .

Assessment of fetal status

- At a minimum, a nonstress test or biophysical profile is performed. Ultrasound is indicated to evaluate amniotic fluid volume and estimate fetal weight given the increased risk for oligohydramnios and fetal growth restriction.

Indications for neurology consultation

- The neurology service should be consulted to evaluate women with neurological deficits/abnormalneurological examination, ocular signs and symptoms, or a severe persistent headache that does not respond to a dose of acetaminophen and initial routine management of preeclampsia.

- **SPECTRUM OF DISEASE**

Potential clinical findings

- **Hypertension** —Blood pressures are often around 135/85 mmHg in the one to two weeks before reaching the hypertensive range. However, in some women, hypertension develops rapidly or before 34 weeks of gestation or postpartum.

- **Epigastric pain** —often begins at night, usually maximal in the low retrosternum or epigastrium, but may radiate to the right hypochondrium or back .Nausea and vomiting sometimes also occur. On examination, the liver may be tender to palpation due to stretching of Glisson capsule from hepatic swelling or bleeding.

- Liver rupture or hemorrhage is rare but should be suspected when there is sudden onset of right upper quadrant pain associated with a decrease in blood pressure.
- Acute pancreatitis is a rare complication of preeclampsia and can mimic the epigastric pain of preeclampsia

Neurologic

- **Headache :** it persists despite administration of over-the-counter analgesics, and it may become severe (ie, incapacitating, "the worst headache of my life"). However, resolution of the headache with analgesics does not exclude the possibility of preeclampsia.

- they could represent a form of posterior reversible leukoencephalopathy syndrome (PRES) .PRES is typically associated with severe hypertension but can also occur with rapid increases in blood pressure in patients with endothelial damage

- Acetaminophen is commonly used to treat headache. Doses ≤2 g/day can be administered to women with mild hepatic or renal insufficiency, but it is contraindicated in patients with severe hepatic insufficiency.
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Visual symptoms

- They are caused, at least in part, by retinal arteriolar spasm .Symptoms include blurred vision, photopsia (flashing lights or sparks), and scotomata (dark areas or gaps in the visual field) .Diplopia or amaurosis fugax (blindness in one or both eyes) may also occur. Visual disturbances in preeclampsia may also be manifestations of PRES

- Cortical blindness is rare and typically transient .Blindness related to retinal pathology, such as retinal artery or vein occlusion, retinal detachment, optic nerve damage, retinal artery spasm, and retinal ischemia may be permanent .

Stroke

- Stroke leading to death or disability is the most serious complication of preeclampsia/eclampsia

Pulmonary edema

was observed in approximately 10 percent .The symptom complex of dyspnea, chest pain, and/or decreased (≤93 percent) oxygen saturation by pulse oximetry is predictive of adverse maternal outcome .

Delivery

- Preeclampsia with features of severe disease (formerly called severe preeclampsia) is generally regarded as an indication for delivery at ≥34+0 weeks of gestation after maternal stabilization .

Term pregnancies Delivery

- Experts consistently recommend delivery of women with preeclampsia at ≥37 weeks of gestation, even in the absence of features of severe disease .

Expectant management of selected cases

- Pregnancies in which the fetus has not attained a viable gestational age, pregnancies ≥34 weeks of gestation, and pregnancies in which the maternal and/or fetal condition is unstable are not candidates for expectant management.

favor limiting expectant management to pregnancies ≥24 weeks and <34 weeks of gestation .

Components of expectant management

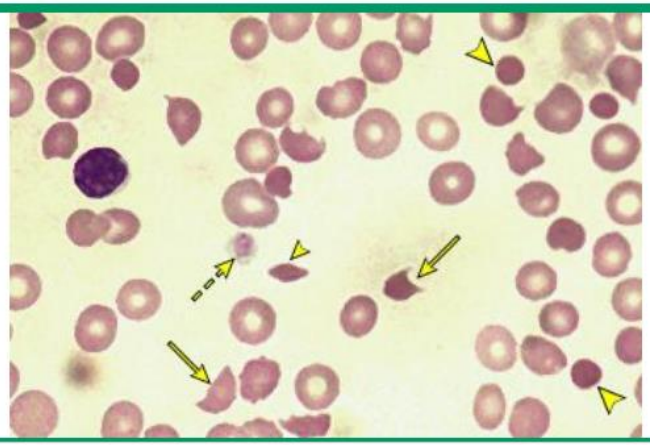
- **Inpatient versus outpatient care:**
- Hospitalization is useful for making these assessments and facilitates immediate intervention in the event of rapid progression .

- After the initial in hospital diagnostic evaluation, outpatient care is a cost-effective option for women found to be stable over a period of several days and no severe features of preeclampsia .

- Patients offered outpatient :able to comply with modified activity at home, live close to a hospital, have someone at home at all times to call in the event of an unexpected adverse event, able to check blood pressure twice daily, and willing to come in for antenatal visits twice a week for fetal monitoring and blood tests.

- **Laboratory follow-up** — The minimum laboratory evaluation should include platelet count, serum creatinine, and liver chemistries. These tests should be repeated at least twice weekly in women with preeclampsia without severe features .

Peripheral smear in microangiopathic hemolytic anemia showing presence of schistocytes



Peripheral blood smear from a patient with a microangiopathic hemolytic anemia with marked red cell fragmentation. The smear shows multiple helmet cells (arrows) and other fragmented red cells (small arrowhead); microspherocytes are also seen (large arrowheads). The platelet number is reduced; the large platelet in the center (dashed arrow) suggests that the thrombocytopenia is due to enhanced destruction.

Monitoring blood pressure and treatment of hypertension

- Blood pressure should be measured daily at home in patients being managed expectantly with preeclampsia without severe features and at least twice weekly in the office .

TREATMENT OF HYPERTENSION IN PREECLAMPSIA

- Lowering blood pressure does not affect the course of preeclampsia because the primary pathogenetic process is an abnormality of the placental vasculature that results in placental underperfusion, which, in turn, leads to release of factors that cause widespread maternal endothelial dysfunction with multiorgan dysfunction

- Severe hypertension should be treated to prevent maternal vascular complications (eg, stroke, heart failure).
- initiate antihypertensive therapy in adult women at systolic pressures ≥150 mmHg or diastolic blood pressures ≥100 mmHg that persist for ≥15 minutes .

- There are two settings in which antihypertensive therapy is used in preeclampsia:
- ●Acute management of severe hypertension, which may require parenteral therapy, and
- ●Longer-term blood pressure control during expectant management of severe preeclampsia.

- **Acute therapy** :
- intravenous labetalol or hydralazine as first-line agents for acute therapy of severe hypertension .

- **Labetalol** :recommend intravenous labetalol for first-line therapy because it is effective, has a rapid onset of action, and a good safety profile.

- Begin with 20 mg intravenously over 2 minutes followed at 10-minute intervals by doses of 20 to 80 mg up to a maximum total cumulative dose of 300 mg, if blood pressure remains above target level .

- The fall in blood pressure begins within 5 to 10 minutes and lasts from 3 to 6 hours .

- If labetalol alone is ineffective, the American College of Obstetricians and Gynecologists (ACOG) suggests switching to hydralazine .

- **Hydralazine** : Begin with 5 mg intravenously over 1 to 2 minutes; if the blood pressure goal is not achieved within 20 minutes, give a 5 to 10 mg bolus depending upon the initial response. If a total cumulative dose of 20 to 30 mg in 24 hours does not achieve optimal blood pressure control, another agent should be used. The fall in blood pressure begins within 10 to 30 minutes and lasts from 2 to 4 hours.

Calcium channel blockers

- Extended-release nifedipine – Extended-release nifedipine 30 mg oral tablet is an effective antihypertensive agent that is less likely to result in a rapid and severe fall in blood pressure than the oral capsule and provides antihypertensive effects over several hours

- **Immediaterelease nifedipine** :caution against the use of immediate-release oral nifedipine, although ACOG endorsed its use as a first-line option for emergent treatment of acute, severe hypertension in pregnancy or postpartum

- Rarely, blood pressure is not controlled with the drug regimens .Options for second-line therapy include nicardipine or esmolol by infusion pump .

- **Nitroglycerin** (glyceryl trinitrate) is an option for treatment of hypertension associated with pulmonary edema in the rare occasion when intravenous diuretics are not effective .It is given as an intravenous infusion of 5 mcg/min and gradually increased every 3 to 5 minutes to a maximum dose of 100 mcg/min

- **Long-term oral therapy** : Occasionally, preeclamptic women with severe hypertension remote from term are stabilized and not delivered immediately. Oral antihypertensive therapy is often indicated for these patients

- **Choice of drug** :preference is to start treatment with either labetalol, a long-acting calcium channel blocker (eg, extended-release nifedipine), or methyldopa .

- **Antenatal corticosteroids** :Antenatal corticosteroids (betamethasone) to promote fetal lung maturity should be administered to women <34 weeks of gestation .

- A course of steroids is administered when the clinician believes delivery within the next seven days .

Seizure prophylaxis

- it is recommended that magnesium sulfate should be used for the prevention and treatment of seizures in women with preeclampsia with severe features

- The mechanism for the anticonvulsant effects of magnesium sulfate has not been clearly defined .The primary effect is thought to be central. Hypotheses include raising the seizure threshold by its action at the n-methyl d-aspartate (NMDA) receptor, membrane stabilization in the central nervous system.

Contraindications

- Magnesium sulfate is contraindicated in women with myasthenia gravis since it can precipitate a severe myasthenic crisis. Alternative anticonvulsant drugs should be used .

Dosing

- loading dose of 6 g of a 10 percent solution intravenously over 15 to 20 minutes followed by 2 g/hour as a continuous infusion

Side effects

- Rapid infusion of magnesium sulfate causes diaphoresis, flushing, and warmth, probably related to peripheral vasodilation and a drop in blood pressure. Nausea, vomiting, headache, muscle weakness, visual disturbances, and palpitations can also occur. Dyspnea or chest pain may be symptoms of pulmonary edema, which is a rare side effect.

When to check magnesium levels :

- ●A seizure while receiving magnesium sulfate
- ●Clinical signs/symptoms suggestive of magnesium toxicity (eg, absent patellar reflex, respiratory rate ≤12 breaths/minute)
- ●Renal insufficiency (creatinine >1.1 mg/dL [110 micromol/L)

- **Antidote**:Calcium gluconate 15 to 30 mL of a 10 percent solution (1500 to 3000 mg) intravenously over 2 to 5 minutes is administered .

- **Assessment of fetal growth**: Early fetal growth restriction may be the first manifestation of preeclampsia and is a sign of severe uteroplacental insufficiency. If the initial examination is normal, we repeat the ultrasound examination for fetal growth every three weeks

Assessment of fetal well-being

- at minimum daily fetal movement counts and twice weekly nonstress testing plus assessment of amniotic fluid volume, or twice weekly biophysical profiles .


THANK
YOU