HTN in Pregnancy

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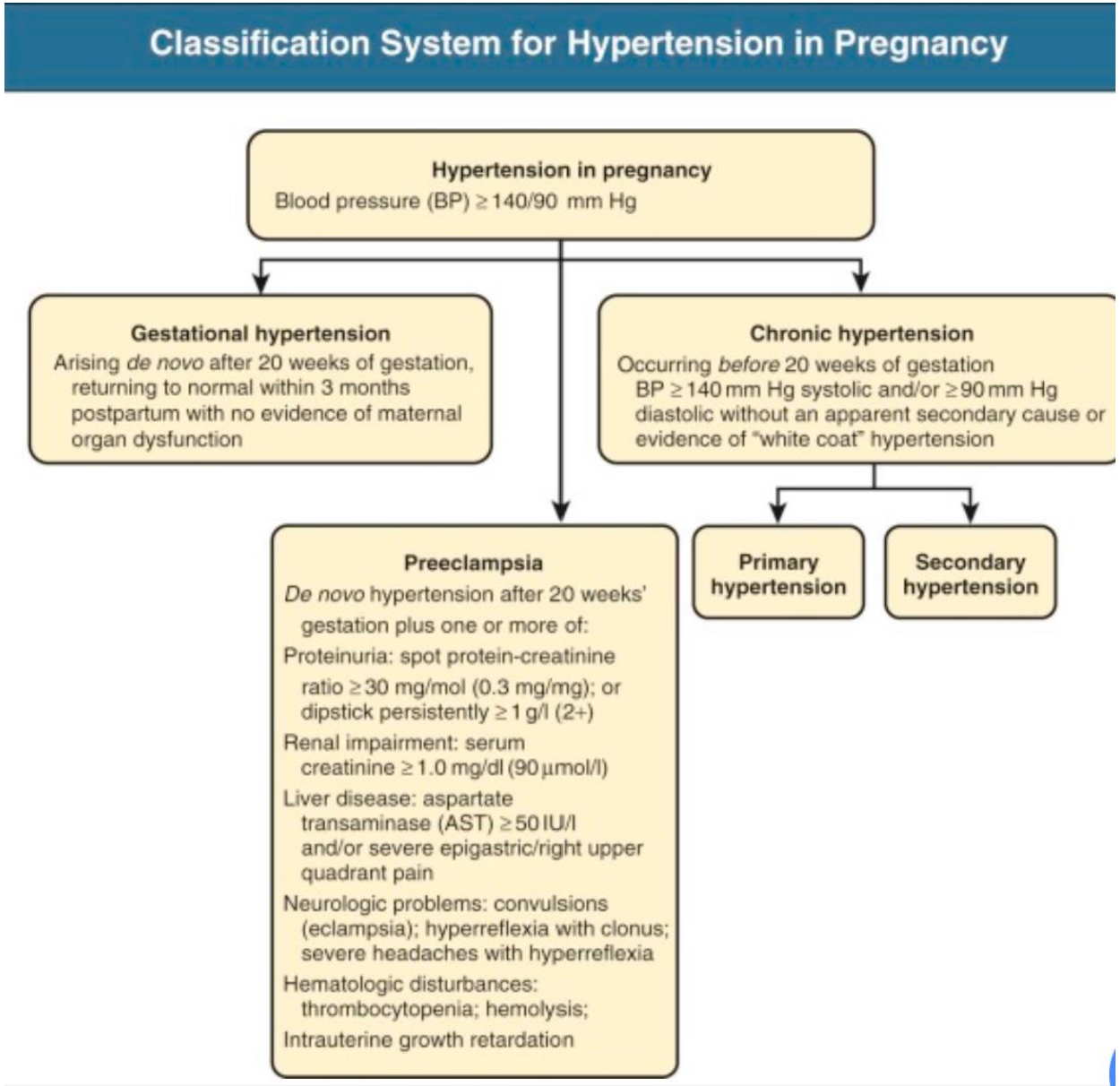
HTN is the most prevalent medical problem during pregnancy,…maternal fetal death .

- Incidence of gestational HTN was 8.9 % among women w/o infertility treatment v/s 15.8 % among with infertility treatment

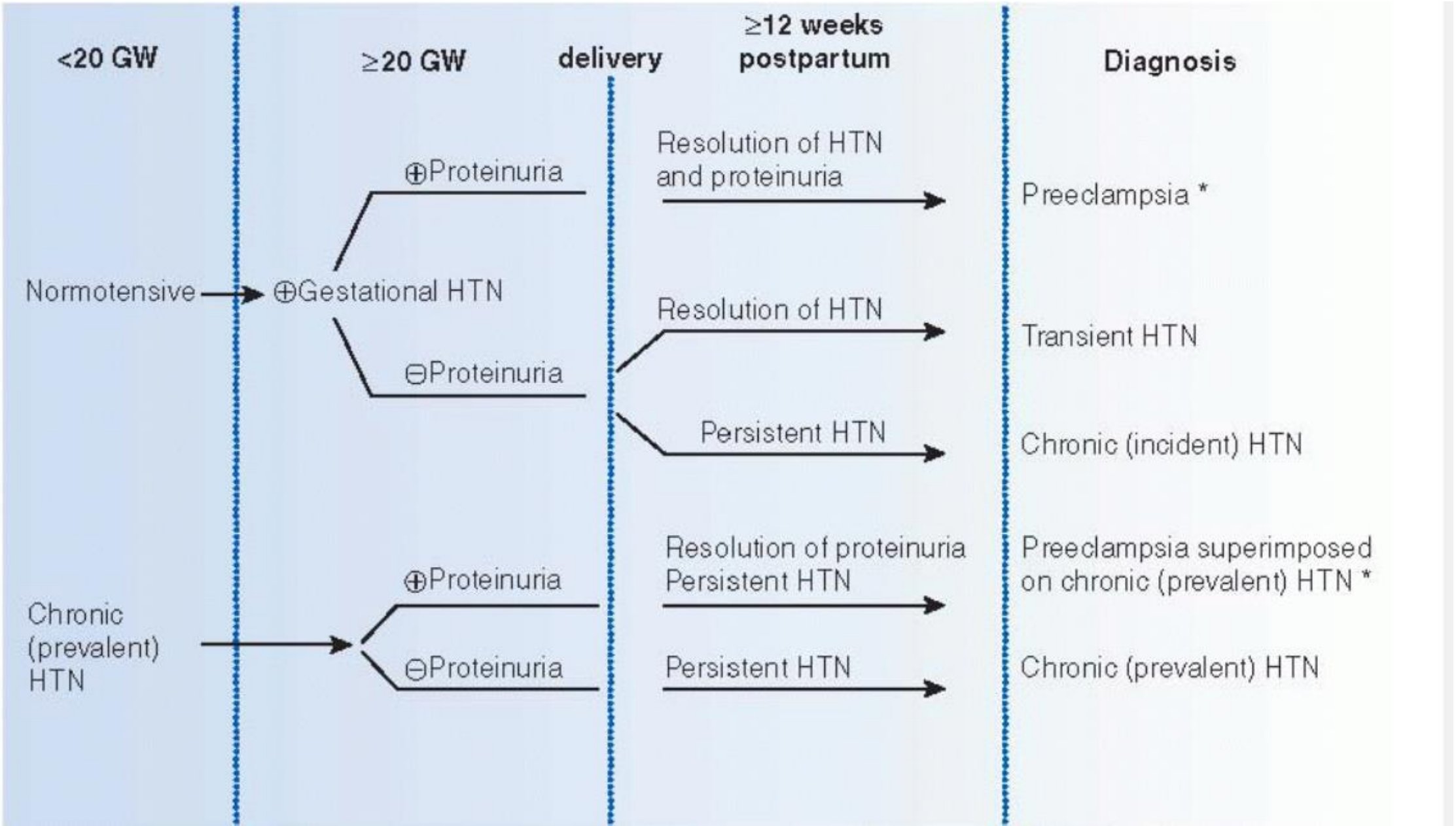
- **Hypertension in Pregnancy**
- There are some major hypertensive disorders related to pregnancy, as follows:
- 1. Gestational hypertension
- 2. Preeclampsia-eclampsia
- 3. Chronic/preexisting hypertension
  - • Primary
  - • Secondary
  - • White coat hypertension
- 4. Preeclampsia superimposed on chronic/preexisting hypertension

50% gest HTN in 24 to 35 week ….develop preeclampsia .

Management of gest HTN: if no problem….UP to 37 WEEK.



Hypertensive pregnancy disorders: classification and diagnostic criteria. (From Garovic VD. The role of angiogenic factors in the prediction and diagnosis of preeclampsia superimposed on chronic hypertension. Hypertension 2012;59:555-557.)



Definitions for the hypertensive disorders of pregnancy

Definitions for the hypertensive disorders of pregnancy

Gestational hypertension	▪ New onset of systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg on at least 2 occasions 4 hours apart after 20 weeks of gestation in a previously normotensive woman **And:** ▪ No proteinuria ▪ No severe features of preeclampsia (thrombocytopenia, renal insufficiency, elevated liver transaminases, pulmonary edema, cerebral or visual symptoms)
Preeclampsia	▪ New onset of systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg on at least 2 occasions at least 4 hours apart after 20 weeks of gestation in a previously normotensive woman **or** systolic blood pressure ≥160 mmHg or diastolic blood pressure ≥110 mmHg confirmed within a short interval (minutes) to facilitate timely antihypertensive therapy **And:** ▪ Proteinuria (≥300 mg per 24-hour urine collection [or this amount extrapolated from a timed collection], or protein:creatinine ratio ≥0.3, or urine dipstick reading ≥1+ [if other quantitative methods are not available]) **Or, in the absence of proteinuria, new-onset hypertension with the new onset of any of the following:** ▪ Thrombocytopenia (platelet count <100,000/microL) ▪ Renal insufficiency (serum creatinine of >1.1 mg/dL [97 micromol/L] or a doubling of the serum creatinine concentration in the absence of other renal disease) ▪ Impaired liver function as indicated by liver transaminase levels at least twice the normal concentration ▪ Pulmonary edema ▪ Persistent cerebral or visual symptoms
Preeclampsia with severe features	**Any of these findings in a patient with preeclampsia:** ▪ Systolic blood pressure ≥160 mmHg or diastolic blood pressure ≥110 mmHg on 2 occasions at least 4 hours apart while a patient is on bed rest (unless antihypertensive therapy is initiated before this time) ▪ Thrombocytopenia (platelet count <100,000/microL) ▪ Impaired liver function as indicated by liver transaminase levels at least twice the normal concentration or severe persistent right upper quadrant or epigastric pain unresponsive to medication and not accounted for by alternative diagnoses, or both ▪ Progressive renal insufficiency (serum creatinine concentration >1.1 mg/dL [97 micromol/L] or a doubling of the serum creatinine concentration in the absence of other renal disease) ▪ Pulmonary edema ▪ Persistent cerebral or visual disturbances
Eclampsia	▪ In a patient with preeclampsia, generalized seizures that cannot be attributed to other causes
HELLP syndrome	▪ Presence of HELLP syndrome in a pregnant woman; hypertension may be present (HELLP in such cases is often considered a variant of preeclampsia)
Chronic (preexisting) hypertension	▪ Hypertension diagnosed or present before pregnancy or before 20 weeks of gestation. Hypertension that is first diagnosed during pregnancy and persists at least 12 weeks post-delivery is also considered chronic hypertension. • The blood pressure criteria are systolic blood pressure ≥140 mmHg, diastolic blood pressure ≥90 mmHg, or both. Ideally, this diagnosis is based on at least 2 elevated blood pressure measurements taken at least 4 hours apart. In the setting of severe hypertension, the diagnosis can be confirmed in a shorter interval to facilitate timely treatment.
Chronic hypertension with superimposed preeclampsia*	**Any of these findings in a patient with chronic hypertension:** ▪ A sudden increase in blood pressure that was previously well-controlled or an escalation of antihypertensive therapy to control blood pressure ▪ New onset of proteinuria or sudden increase in proteinuria in a patient with known proteinuria before or early in pregnancy
Chronic hypertension with superimposed preeclampsia with severe features	**Any of these findings in a patient with chronic hypertension and superimposed preeclampsia:** ▪ Systolic blood pressure ≥160 mmHg or diastolic blood pressure ≥110 mmHg despite escalation of antihypertensive therapy ▪ Thrombocytopenia (platelet count <100,000/microL) ▪ Impaired liver function as indicated by liver transaminase levels at least twice the normal concentration or severe persistent right upper quadrant or epigastric pain unresponsive to medication and not accounted for by alternative diagnoses, or both ▪ New-onset or worsening renal insufficiency ▪ Pulmonary edema ▪ Persistent cerebral or visual disturbances

HELLP: hemolysis, elevated liver enzymes, low platelets.

* Precise diagnosis is often challenging. High clinical suspicion is warranted given the increase in maternal and fetal-neonatal risks associated with superimposed preeclampsia.

Criteria for the diagnosis of preeclampsia

Systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg on at least 2 occasions at least 4 hours apart after 20 weeks of gestation in a previously normotensive patient AND the new onset of 1 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
▪ New-onset and persistent headache not accounted for by alternative diagnoses and not responding to usual doses of analgesics ¶
▪ Visual symptoms (eg, blurred vision, flashing lights or sparks, scotomata)

Preeclampsia is considered superimposed when it occurs in a woman with chronic hypertension. It is characterized by worsening or resistant hypertension (especially acutely), the new onset of proteinuria or a sudden increase in proteinuria, and/or significant new end-organ dysfunction after 20 weeks of gestation in a woman with chronic hypertension.

* If systolic blood pressure is ≥160 mmHg or diastolic blood pressure is ≥110 mmHg, confirmation within minutes is sufficient.
¶ Response to analgesia does not exclude the possibility of preeclampsia.

Adapted from: American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin No. 222: Gestational Hypertension and Preeclampsia. Obstet Gynecol 2020; 135:e237.

Features of severe disease in a woman with a pregnancy-related hypertensive disorder

Systolic blood pressure ≥160 mmHg or diastolic blood pressure ≥110 mmHg, or both (on two separate occasions)
Symptoms of central nervous system dysfunction:
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
Hepatic abnormality:
Severe persistent right upper quadrant or epigastric pain unresponsive to medication and not accounted for by an alternative diagnosis or serum transaminase concentration ≥2 times the upper limit of the normal range, or both
Thrombocytopenia:
<100,000 platelets/microL
Renal abnormality:
Progressive renal insufficiency (serum creatinine >1.1 mg/dL [97.2 micromol/L] or doubling of serum creatinine concentration in the absence of other renal disease)

Adapted from ACOG Practice Bulletin No. 222: Gestational Hypertension and Preeclampsia. Obstet Gynecol 2020; 135:e237.

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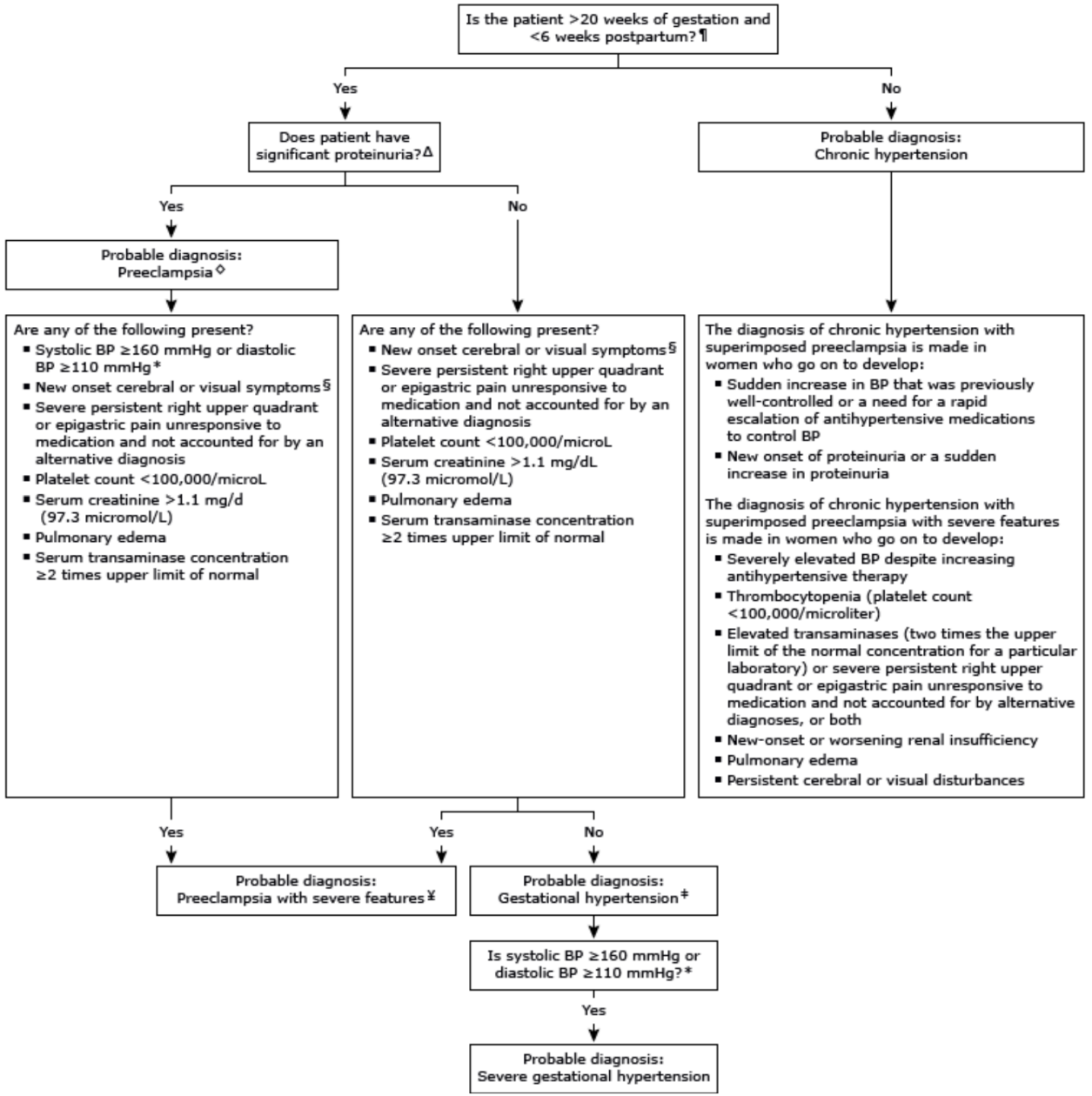
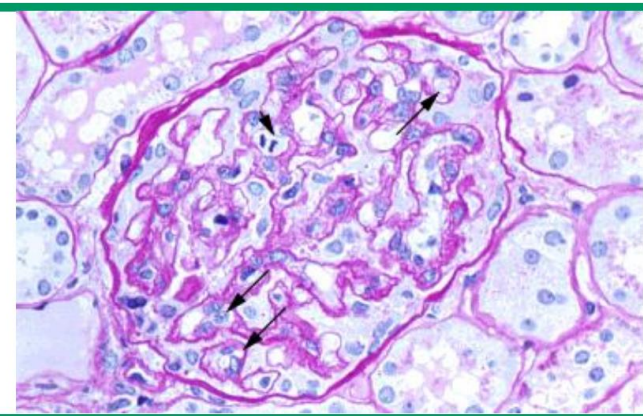
Diagnostic evaluation of a pregnant or postpartum woman with persistent systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg*

Diagnostic evaluation of a pregnant or postpartum woman with persistent systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg*



Preeclampsia

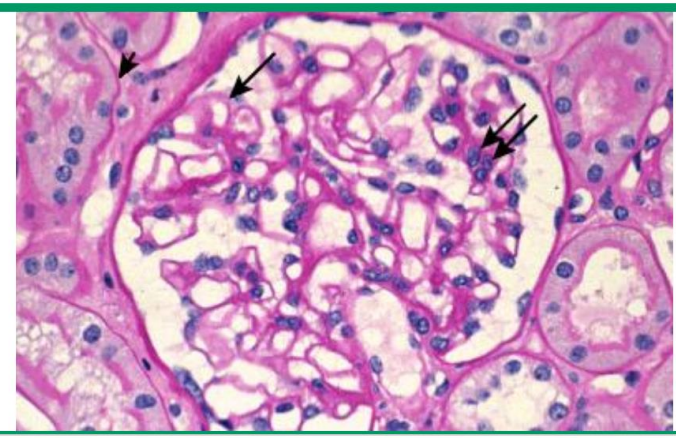


Light micrograph in preeclampsia showing glomerular endotheliosis. The primary changes are swelling of damaged endothelial cells, leading to partial closure of many of the capillary lumens (arrows). Mitosis within an endothelial cell (short arrow) is a sign of cellular repair.

Courtesy of Helmut Rennke, MD.

Graphic 78879 Version 3.0

Normal glomerulus



Light micrograph of a normal glomerulus. There are only 1 or 2 cells per capillary tuft, the capillary lumens are open, the thickness of the glomerular capillary wall (long arrow) is similar to that of the tubular basement membranes (short arrow), and the mesangial cells and mesangial matrix are located in the central or stalk regions of the tuft (arrows).

Courtesy of Helmut G Rennke, MD.

Graphic 75094 Version 4.0

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

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 [eg, previous use of barrier contraception])
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.

Risks of chronic hypertension in pregnancy^[1-3]

Risks of chronic hypertension in pregnancy[1-3]

Maternal	Fetal/neonatal
▪ Severe hypertension ▪ Superimposed preeclampsia ▪ Abruption ▪ Cesarean delivery ▪ Postpartum hemorrhage ▪ Renal insufficiency/failure ▪ Stroke ▪ Myocardial infarction ▪ Pulmonary edema ▪ Death	▪ Fetal growth restriction/small for gestational age infant ▪ Preterm delivery ▪ Congenital anomalies ▪ Stillbirth ▪ Neonatal death

References:

1. *ACOG Practice Bulletin No. 203 Summary: Chronic Hypertension in Pregnancy. Obstet Gynecol 2019; 133:215.*
2. *Bramham K, Parnell B, Nelson-Piercy C, et al. Chronic hypertension and pregnancy outcomes: Systematic review and meta-analysis. BMJ 2014; 348:g2301.*
3. *Bateman BT, Bansil P, Hernandez-Diaz S, et al. Prevalence, trends, and outcomes of chronic hypertension: a nationwide sample of delivery admissions. Am J Obs Gynecol 2012; 206:134.e1.*

Graphic 127248 Version 1.0

Summary of pregnancy care for women with chronic hypertension [1-3]

Preconception or first prenatal visit

- Obtain baseline laboratory tests: Creatinine, urine protein to creatinine ratio (or 24-hour urine for total protein), and complete blood count should be obtained in all patients. Electrolytes are obtained in patients with renal dysfunction.
- Liver transaminases (AST/ALT) and platelet count are optional and useful if the patient exhibits symptoms of preeclampsia later in pregnancy. Obtain additional baseline testing, as appropriate, based on past medical history and comorbid conditions: Transthoracic echocardiogram or 12-lead ECG, testing for secondary causes of hypertension if high suspicion.
- Review and optimize antihypertensive and other medications.
- Evaluate for other comorbidities (eg, diabetes testing, obesity, cigarette smoking) and manage as appropriate.
- Recommend home blood pressure monitoring.

Prenatal care

- Determine estimated date of delivery; ultrasound estimation is generally superior to dating based on the menstrual history if uncertain.
- At 12 to 16 weeks of gestation, begin daily low-dose aspirin (if no contraindications) to reduce risk for developing preeclampsia.
- At each prenatal visit and at least monthly, measure blood pressure (perform more often if suboptimally controlled).
- After 20 weeks of gestation, discuss the signs and symptoms of preeclampsia and when to contact a health care provider.
- At 28 to 32 weeks of gestation, order ultrasound examination every 3 to 4 weeks to evaluate fetal growth.
- At 32 weeks of gestation, begin fetal testing with NSTs or BPPs.
- At 38+0 to 39+6 weeks of gestation, plan induction of labor in patients with well-controlled blood pressure without medications.
- At 37+0 to 39+0 weeks of gestation, plan induction of labor in patients with well-controlled blood pressure on medications; induction is performed sooner for patients with standard indications for induction (eg, superimposed preeclampsia).

Postpartum care

- Evaluate blood pressure 3 to 10 days postpartum and more frequently if home blood pressures can be performed.
- Discuss blood pressure goals after delivery, signs and symptoms of postpartum preeclampsia and severe hypertension, and when to contact a health care provider.
- Encourage breastfeeding. If breastfeeding, prescribe medications with the best safety profile for the infant.
- Discuss contraception options.
- Discuss future pregnancy risks, importance of planned pregnancy, and long-term cardiovascular risks.
- Ask patient to follow up with her primary care provider for ongoing management of chronic hypertension.

AST: aspartate transaminase; ALT: alanine aminotransferase; ECG: electrocardiogram; NST: nonstress test; BPP: biophysical profile.

References:

1. *ACOG Practice Bulletin No. 203 Summary: Chronic Hypertension in Pregnancy. Obstet Gynecol 2019; 133:215.*
2. *American College of Gynecologists, Task Force on Hypertension in Pregnancy. Hypertension in pregnancy. Report of the American College of Obstetricians and Gynecologists' Task Force on Hypertension in Pregnancy. Obstet Gynecol 2013; 122:1122.*
3. *Battarbee AN, Sinkey RG, Harper LM, et al. Chronic Hypertension in Pregnancy. Am J Obstet Gynecol 2019.*

Graphic 127249 Version 1.0

Secondary causes of hypertension [1,2]

Condition	Clinical symptoms/signs beyond hypertension	Investigations
Renal artery stenosis	▪ Resistant hypertension ▪ Renal bruit	▪ US of kidneys with Doppler evaluation or renal arteries ▪ US of the kidneys (one kidney smaller by >1.5 cm compared with contralateral) ▪ Duplex Doppler US of renal arteries ▪ Renal angiogram
Renal parenchymal disease	▪ Mostly asymptomatic ▪ Strong family history (eg, adult polycystic kidney disease) ▪ Other conditions, such as systemic lupus, glomerulonephritis	▪ Elevated serum creatinine ▪ Urinalysis for red blood cell casts or proteinuria ▪ May consider US of kidneys ▪ Evaluate for underlying conditions
Primary aldosteronism	▪ Mostly asymptomatic	▪ Hypokalemia ▪ Aldosterone and renin levels (may not be reliable in pregnancy) ▪ Adrenal imaging (CT or MRI)
Pheochromocytoma	▪ Episodic headaches, sweating, palpitations, and flushing ▪ Labile blood pressure with severe hypertensive episodes	▪ 24-hour urinary fractionated metanephrines and/or catecholamines ▪ Plasma fractionated metanephrines ▪ MRI of abdomen
Cushing syndrome	▪ Moon facies, central obesity, thin skin, easy bruising	▪ 24-hour urinary free cortisol ▪ Late night salivary cortisol ▪ Adrenal imaging
Hypothyroidism or hyperthyroidism	▪ Symptoms of hypothyroidism or hyperthyroidism (eg, gain/loss of weight, cold/heat intolerance)	▪ Thyroid function tests
Coarctation of the aorta	▪ Hypertension in arms with low blood pressure in legs or delayed femoral pulses	▪ Transthoracic echocardiogram
Obstructive sleep apnea	▪ Obesity ▪ Daytime somnolence, fatigue	▪ Polysomnography
Drug-induced	▪ Oral contraceptives, nonsteroidal anti-inflammatory drugs, corticosteroids, cocaine, stimulants	▪ N/A

US: ultrasound; CT: computed tomography; MRI: magnetic resonance imaging; N/A: not applicable.

Recommendations for total and rate of weight gain for singleton pregnancies by prepregnancy BMI

	Total weight gain		Rates of weight gain* second and third trimester	
Prepregnancy BMI	**Range in kg**	**Range in lb**	**Mean (range) in kg/week**	**Mean (range) in lb/week**
Underweight (<18.5 kg/m^2)	12.5 to 18	28 to 40	0.51 (0.44 to 0.58)	1 (1 to 1.3)
Normal weight (18.5 to 24.9 kg/m^2)	11.5 to 16	25 to 35	0.42 (0.35 to 0.50)	1 (0.8 to 1)
Overweight (25.0 to 29.9 kg/m^2)	7 to 11.5	15 to 25	0.28 (0.23 to 0.33)	0.6 (0.5 to 0.7)
Obese (≥30.0 kg/m^2)	5 to 9	11 to 20	0.22 (0.17 to 0.27)	0.5 (0.4 to 0.6)

Recommended weight gain is higher for women with multiple gestations.

BMI: body mass index.

* Calculations assume a 0.5 to 2 kg (1.1 to 4.4 lb) weight gain in the first trimester.

Graphic 75820 Version 18.0

- Treating mild to moderately elevated BP does not benefit the fetus or prevent preeclampsia.
- Overtreatment may cause adverse perinatal outcomes resulting from placental hypoperfusion.
- So medication is reserved for women with BP persistently greater than 150/100 mmhg.
- Women with chronic HTN should be monitored for IUGR with serial ultrasonography.

- Methyldopa(only B), labetalol , and nifedipine are the most commonly used oral agent to treat severe chronic HTN in pregnancy.

- ACE inh and ARB ..contraindicated….IUGR , OHA,..

- Beta blocker
- Atenolol….IUGR

- Thiazide…

- Drug Pharmacokinetics …

Prophylaxis

Clinical risk factors and ASA use

- HIGH RISK: (one or more risk factor)
- History of preeclampsia
- Multifetal gestation
- Chronic HTN
- Type 1,2 DM
- Renal disease
- SLE ,APS
- Moderate Risk : (2 or more)
- Nulliparity
- BMI >30
- FH + for preeclapsia (mother or sister)

- Sociodemographic characteristics
- African Americal
- 35 years or more
- Personal history factors (eg Low birth weight or small for GA,more than 10 year pregnancy interval.)

- Should receive low dose (81 mg/day) ASA for preeclampsia prophylaxis,initiated between 12 weeks and 28 weeks of gestation(optimally before 16 weeks of gestation) and continuing until delivery.

Antihypertensive agents used for urgent blood pressure control in pregnancy

Drug	Initial dose	Follow-up
Labetalol	20 mg IV gradually over 2 minutes.	Repeat BP measurement at 10-minute intervals: ▪ If BP remains above target level at 10 minutes, give 40 mg IV over 2 minutes. ▪ If BP remains above target level at 20 minutes, give 80 mg IV over 2 minutes. ▪ If BP remains above target level at 30 minutes, give 80 mg IV over 2 minutes. ▪ If BP remains above target level at 40 minutes, give 80 mg IV over 2 minutes. Cumulative maximum dose is 300 mg. If target BP is not achieved, switch to another class of agent.
	A continuous IV infusion of 1 to 2 mg/minute can be used instead of intermittent therapy or started after 20 mg IV dose. Requires use of programmable infusion pump and continuous noninvasive monitoring of blood pressure and heart rate.	Adjust dose within this range to achieve target blood pressure. Cumulative maximum dose is 300 mg. If target BP is not achieved, switch to another class of agent.
Hydralazine	5 mg IV gradually over 1 to 2 minutes.* Adequate reduction of blood pressure is less predictable than with IV labetalol.	Repeat BP measurement at 20-minute intervals: ▪ If BP remains above target level at 20 minutes, give 5 or 10 mg IV over 2 minutes, depending on the initial response. ▪ If BP remains above target level at 40 minutes, give 10 mg IV over 2 minutes, depending on the previous response. Cumulative maximum dose is 30 mg. If target BP is not achieved, switch to another class of agent.
Nifedipine extended release	30 mg orally.	If target BP is not achieved in 1 to 2 hours, another dose can be administered. If target BP is not achieved, switch to another class of agent.
Nicardipine (parenteral)	The initial dose is 5 mg/hour IV by infusion pump and can be increased to a maximum of 15 mg/hour. Onset of action is delayed by 5 to 15 minutes; in general, rapid titration is avoided to minimize risk of overshooting dose. Requires use of a programmable infusion pump and continuous noninvasive monitoring of blood pressure and heart rate.	Adjust dose within this range to achieve target BP.
Nifedipine immediate release*	10 mg orally. May be associated with precipitous drops in BP in some women, with associated FHR decelerations for which emergency cesarean delivery may be indicated. As such, this regimen is not typically used as a first-line option and is usually reserved only for women without IV access. If used, FHR should be monitored while administering short-acting nifedipine.	Repeat BP measurement at 20-minute intervals: ▪ If BP remains above target at 20 minutes, give 10 or 20 mg orally, depending on the initial response. ▪ If BP remains above target at 40 minutes, give 10 or 20 mg orally, depending on the previous response. If target BP is not achieved, switch to another class of agent.

Labetalol and hydralazine are the preferred drugs.

IV: intravenous; BP: blood pressure; FHR: fetal heart rate.

* We caution against use of immediate-release oral nifedipine, although some obstetric guidelines have endorsed its use as a first-line option for emergency treatment of acute, severe hypertension in pregnancy or postpartum (other options were labetalol and hydralazine), particularly when IV access is not in place. In most cases, use of immediate-release oral nifedipine will be safe and well tolerated; however, there is a risk of an acute, precipitous fall in blood pressure, which may result in a reduction in uteroplacental perfusion. The immediate-release preparations are also associated with a higher incidence of headache and tachycardia. In nonpregnant adults, the package insert states that "nifedipine capsules should not be used for the acute reduction of blood pressure."

Adapted from:

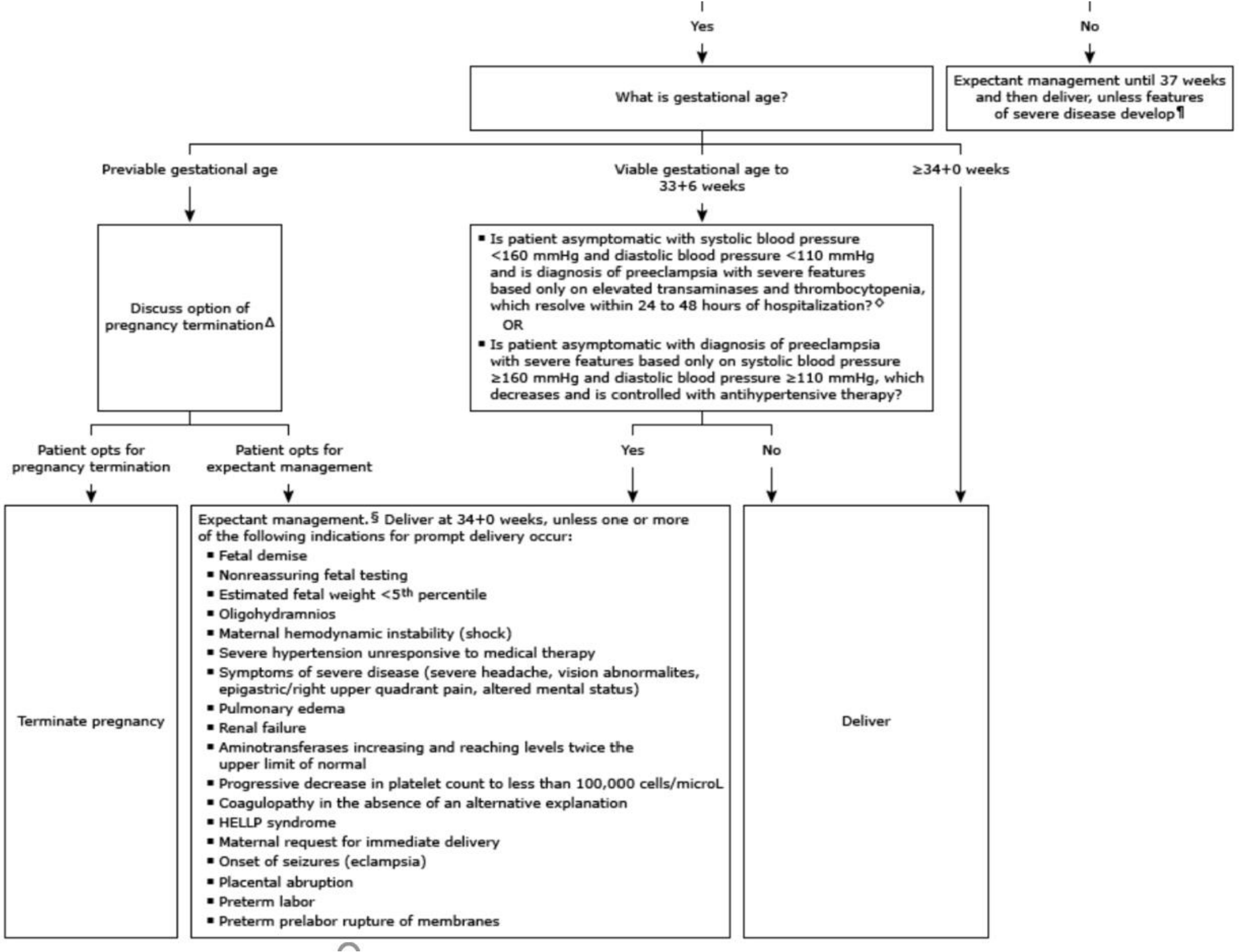
1. *American College of Obstetricians and Gynecologists Committee on Obstetric Practice. Committee Opinion No. 767: Emergent therapy for acute-onset, severe hypertension during pregnancy and the postpartum period. Obstet Gynecol 2019.*
2. *Bernstein PS, Martin JN Jr, Barton JR, et al. National Partnership for Maternal Safety: Consensus Bundle on Severe Hypertension During Pregnancy and the Postpartum Period. Obstet Gynecol 2017; 130:347.*

Graphic 110261 Version 8.0

- Timing of delivery:
- 37 W….
- If severity feature is present:

Or

- Maternal
- And fetal



Eclampsia :

Tonic –clonic , focal or multi focal

many …do not demonstrate classic signs of preeclampsia before seizure episode.

A significant body of evidence :

efficacy Magnesium sulfate

Phases of tonic-clonic seizures

Phases of tonic-clonic seizures

Aura (None)
Tonic phase (10 to 20 seconds)
Sudden loss of consciousness
Loss of posture with high risk of self injury depending on activity
Brief flexion of arms, eyes deviated upward
Extension of back, neck, arms, and legs
Involuntary crying out from contraction of respiratory muscles
Shallow respiration, cyanosis may occur
Ends with tremors that gradually slow and merge with clonic phase
Clonic phase (30 to 90 seconds)
Brief, violent, generalized flexor contractions alternating with progressively longer muscle relaxation
Cyanosis
Possible cheek or tongue biting
Foamy salivation
Possible loss of bowel or bladder control
Ends with deep inspiration, sustained muscle relaxation
Postictal phase (Minutes to several hours)
Headache, mild confusion
Muscles sore
Fatigue, patient may sleep and awake refreshed
Other features
Fast heart rate
Elevated blood pressure
Respiratory and metabolic acidosis
Dilated pupils
Risk of vertebral fracture, pneumonia

Graphic 54942 Version 2.0

Summary of maternal and neonatal outcomes in pregnancies complicated by eclampsia

Outcome	Frequency (percent)
Abruption	7 to 10
Disseminated intravascular coagulation	7 to 11
Pulmonary edema	3 to 5
Acute renal failure	5 to 9
Aspiration pneumonia	2 to 3
Cardiopulmonary arrest	2 to 5
Liver hematoma	1
HELLP syndrome	10 to 15
Perinatal death	5.6 to 11.8
Preterm birth	50

Adapted from: Sibai BM. Obstet Gynecol 2005; 105:402.

Graphic 70241 Version 3.0

Comparison of frequency of signs, symptoms, and laboratory findings in TTP, HUS, HELLP, and AFLP

Comparison of frequency of signs, symptoms, and laboratory findings in TTP, HUS, HELLP, and AFLP

	TTP	HUS	HELLP	AFLP
Abdominal pain	++	++	++	++
Low *ADAMST13* activity	+/++	–	–/+	?
Anemia	++	++	+	+
Elevated lactic dehydrogenase	++ very high values	++ very high values	++	+/++
Elevated transaminases	–/+	–/+	++	++
Fever	+	–	–	+
Headache or visual disturbance	++	–	++	–/+
Hypertension	+/++	++	++	–
Jaundice	–	–	+	+
Nausea and vomiting	++	++	++	++
Proteinuria	+ and hematuria	++	++	–
Thrombocytopenia	++	++	++	+
von Willebrand factor	++	++	–	?
Hypoglycemia	–	–	–/+	++

TTP: thrombotic thrombocytopenic purpura; HUS: hemolytic uremic syndrome; HELLP: hemolysis, elevated liver function tests, low platelets; AFLP: acute fatty liver of pregnancy; +: prevalence of finding in affected patients.

Adapted from:

1. *Stella CL, Dacus J, Guzman E, et al. The diagnostic dilemma of thrombotic thrombocytopenic purpura/hemolytic uremic syndrome in the obstetric triage and emergency department: lessons from 4 tertiary hospitals. Am J Obstet Gynecol 2009; 200:381. Original Table 4.*
2. *Pourrat O, Coudroy R, Pierre F. Differentiation between severe HELLP syndrome and thrombotic microangiopathy, thrombotic thrombocytopenic purpura and other imitators. Eur J Obstet Gynecol Reprod Biol 2015;189:68. Table 1.*

Graphic 53332 Version 9.0

Thank you